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ARTICLE

REGULATING AGAINST BUBBLES: HOW MORTGAGE REGULATION CAN KEEP MAIN STREET AND WALL STREET SAFE—FROM THEMSELVES

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As the Great Recession has painfully demonstrated, housing bubbles pose an enormous threat to economic stability. However, the principal mortgage market reforms in response to the latest boom and bust—the Dodd–Frank Act's provisions

on mortgage lending and securitization—are not designed to protect the economy from a housing bubble. Instead, these reforms tinker with the incentives of securitizers and lenders to prevent their exploitation of naive investors and borrowers. In particular, these changes require securitizers to retain credit risk and lenders to assess borrowers' ability to repay.

This approach misses the mark. The sine qua non of a bubble is marketwide overoptimism about future house prices. Irrational exuberance in a bubble leads parties across the entire system of housing finance to make risky bets based on rosy beliefs. It is not just investors who underprice credit risk and borrowers who overextend. Securitizers and lenders are also eager to take on dangerous levels of risk and leverage. The Dodd–Frank Act's incentive-based reforms, by relying on rational behavior by supposedly sophisticated parties, will do little to protect the economy from a bubble. They might even increase systemic risk by concentrating mortgage risk in large financial institutions.

Because indirect incentive-based regulation is ineffective in a bubble, more direct mandates should be employed. We suggest a number of direct regulations to limit mortgage leverage, debt-to-income levels, and other contractual features that enable or induce borrowers to take out larger loans. We show how such limits can curb bubbles, lower defaults, and reduce household exposure to housing risk. While such limits would undoubtedly entail costs, such as restricting access to mortgage credit and homeownership, we suggest straightforward ways to mitigate many of these concerns. Our critique of incentive-based regulation also provides an important new perspective on current legislative efforts to reform the broader architecture of housing finance.

The Dodd–Frank Act's mistargeted approach reflects in part the growing literature in behavioral law and economics that shows how sophisticated firms take advantage of biased consumers. Indeed, much of the debate over the appropriate response to the Great Recession has been about how to keep Main Street safe from Wall Street. We advance this literature by showing that the mistakes of firms have important implications for the design of regulation. Our analysis calls for a fundamental paradigm shift. The central policy challenge is to keep Main Street and Wall Street safe from themselves.

INTRODUCTION

The financial crisis of 2007 to 2008 and its aftermath are a sobering reminder that the main source of systemic risk in the economy is a real

estate bubble. Between 1996 and 2006, house prices in the United States soared by over 120%.[1] As the bubble inflated, mortgage lenders made loans with steadily lower down payments and little regard for the creditworthiness of borrowers. Most of these loans were sold to other financial institutions that packaged them into mortgage-backed securities (MBS) and then resold them to investors. The bursting of the bubble in 2006 left in its wake economic ruin. The collapse of house prices froze consumer spending and left households mired in debt. The resulting wave of mortgage defaults that struck financial institutions triggered a broader breakdown in credit markets. The Great Recession that followed has taken a heavy human toll in lost homes and jobs, and these hardships have fallen disproportionately on low income, working class families.

Many of the reforms to the financial system following the crisis should, in principle, make it more robust to a future housing bubble. The landmark Dodd–Frank Act[2] imposes higher capital requirements on banks,[3] creates a new resolution regime to safely wind down insolvent financial institutions,[4] and tasks a new Financial Stability Oversight Council with identifying and addressing emerging systemic risks.[5]

The Dodd–Frank Act, however, takes a different tack in its reforms to the mortgage market. Rather than addressing the risks to the economy posed by a future housing bubble, the Act focuses on protecting naive investors and borrowers from opportunistic securitizers and predatory lenders. First, the Act directs banking regulators to require securitizers to retain at least 5% of the credit risk of any assets that they securitize.[6] Second, it requires mortgage originators to "make[] a reasonable and good faith determination" that each borrower has "a reasonable ability to repay" the loan.[7]

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[1] *S&P/Case–Shiller National Home Price Index*, S&P Dow Jones Indicies, http://us.spindices.com/indices/real-estate/sp-case-shiller-us-national-home-price-index (last visited May 11, 2015), *archived at* http://perma.cc/HM2C-6UD2 (mouse over graph, and compare the index numbers from January 1996 (81.46) and January 2006 (180.84)).

[2] Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank Act), Pub. L. No. 111-203, 124 Stat. 1376 (2010) (codified as amended in scattered sections of 2, 5, 7, 11, 12, 15, 16, 18, 19, 20, 22, 25, 26, 28, 29, 30, 31, 41, 42, 44, 49 & 112 U.S.C.).

[3] *Id.* §§ 165–166, 12 U.S.C. §§ 5365–5366 (2012).

[4] *Id.* §§ 201–217, 12 U.S.C. §§ 5381–5394.

[5] *Id.* § 111–112, 12 U.S.C. §§ 5321–5322.

[6] *Id.* § 941(b), 15 U.S.C. § 78o-11 (2012).

[7] *Id.* § 1411(a)(2), 15 U.S.C. § 1639c. In addition to these major reforms, the Dodd–Frank Act included a host of more minor fixes to the mortgage market, many of which have been implemented by the Consumer Financial Protection Bureau. For example, section 1461 of the Dodd–Frank Act and its associated rulemaking, the 2013 Escrows Rule, "lengthen[ed] the time for which a mandatory escrow account established for a higher-priced mortgage loan (HPML) must be maintained." Amendments to the 2013 Escrows Final Rule Under the Truth in Lending Act

The Act thus relies on changing the incentives of sophisticated market participants to end their exploitation of the less sophisticated.

(Regulation Z), 78 Fed. Reg. 30,739, 30,739 (May 23, 2013) (codified at 12 C.F.R. pt. 1026); *see also* Dodd–Frank Act § 1461, 15 U.S.C. § 1639d (requiring that an escrow account be maintained for a minimum of five years, with certain exceptions). The rule "established an exemption from the escrow requirement for certain creditors that operate predominantly in 'rural' or 'underserved' areas." Amendments to the 2013 Escrows Final Rule Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. at 30,739; *see also* Dodd–Frank Act § 1461, 15 U.S.C. § 1639d (enabling the Federal Reserve Board to exempt creditors operating in rural or underserved areas from requirements by regulation). Another rule, the Homeownership Counseling Amendments to the Truth in Lending Act and Homeownership Counseling Amendments to the Real Estate Settlement Procedures Act requires, inter alia, "that consumers receive counseling before obtaining high-cost mortgages and that servicers provide periodic account statements and rate adjustment notices to mortgage borrowers." Amendments to the 2013 Mortgage Rules Under the Real Estate Settlement Procedures Act (Regulation X) and the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 62,993, 62,933 (Oct. 23, 2013) (codified at 12 C.F.R. pts. 1024 & 1026). The rule "amends Regulation Z (Truth in Lending) by expanding the types of mortgage loans that are subject to the protections of the Home Ownership and Equity Protections Act of 1994." High-Cost Mortgage and Homeownership Counseling Amendments to the Truth in Lending Act (Regulation Z) and Homeownership Counseling Amendments to the Real Estate Settlement Procedures Act (Regulation X), 78 Fed. Reg. 6856, 6856 (Jan. 31, 2013) (codified at 12 C.F.R. pts. 1024 & 1026); *see also* Dodd–Frank Act §§ 1431–1433, 15 U.S.C. §§ 1602(aa), 1639 (implementing a broader definition of which mortgages are subject to rules for "high-cost mortgages"). The 2013 Equal Credit Opportunity Act Appraisals Final Rule "require[s] creditors to provide to applicants free copies of all appraisals and other written valuations developed in connection with an application for a loan to be secured by a first lien on a dwelling." Disclosure and Delivery Requirements for Copies of Appraisals and Other Written Valuations Under the Equal Credit Opportunity Act (Regulation B), 78 Fed. Reg. 7216, 7216 (Jan. 31, 2013) (codified at 12 C.F.R. pt. 1002); *see also* Dodd–Frank Act § 1474, 15 U.S.C. § 1691 ("Each creditor shall furnish to an applicant a copy of any and all written appraisals and valuations developed in connection with the applicant's application for a loan that is secured or would have been secured by a first lien on a dwelling promptly upon completion . . . ." (internal quotation marks omitted)). The 2013 Interagency Appraisals Final Rule requires appraisals for "higher-risk mortgages." Appraisals for Higher-Priced Mortgage Loans, 78 Fed. Reg. 78,520, 78,520 (Dec. 26, 2013) (codified at 12 C.F.R. pts. 34, 226, & 1026); *see also* Dodd–Frank Act § 1471, 15 U.S.C. § 1639h ("A creditor may not extend credit in the form of a higher-risk mortgage to any consumer without first obtaining a written appraisal of the property to be mortgaged prepared in accordance with the requirements of this section." (internal quotation marks omitted)). The Loan Originator Compensation Requirements Under the Truth in Lending Act impose requirements and restrictions concerning loan originator compensation, including bans on what is sometimes referred to as yield-spread premiums. Loan Originator Compensation Requirements Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 11,280, 11,280, 11,321 (Feb. 15, 2013) (codified at 12 C.F.R. pt. 1026); *see also* Dodd–Frank Act §§ 1401–1403, 1414, 15 U.S.C. §§ 1602, 1639 (defining "mortgage originator" and restricting certain forms of mortgage originator compensation). Two other recent rules provide new restrictions and requirements for mortgage servicers under the Real Estate Settlement Procedures Act and the Truth in Lending Act. Mortgage Servicing Rules Under the Real Estate Settlement Procedures Act (Regulation X), 78 Fed. Reg. 10,696 (Feb. 14, 2013) (codified at 12 C.F.R. pt. 1024); Mortgage Servicing Rules Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 10,902 (Feb. 14, 2013) (codified at 12 C.F.R. pt. 1026).

In this Article, we identify the costs of the Dodd–Frank Act's borrower and investor protection paradigm in terms of economic and financial stability and chart a better way forward. The mortgage market should be reformed to make the economy more robust to a housing bubble. The sine qua non of a bubble is marketwide overoptimism about future asset prices. Such overoptimism makes the Act's indirect, incentive-based approach ineffective or even counterproductive. The Act's approach will produce little benefit in terms of improved incentives and will likely increase, rather than reduce, systemic risk by concentrating mortgage risk in systemically important financial institutions. A better approach to addressing the risks of housing bubbles would be to regulate directly mortgage leverage and other contractual features that induce borrowers to take out larger and riskier loans.

The Dodd–Frank Act's approach to mortgage regulation reflects in part the influence of an important new academic literature applying insights from behavioral economics to legal policy.[8] A recurring theme in the initial wave of scholarly work in behavioral law and economics is how sophisticated firms can take advantage of biased consumers through contract design.[9] This *asymmetric* view of behavioral biases leads naturally to the borrower

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[8] For examples of this literature, see generally THE BEHAVIORAL FOUNDATIONS OF PUBLIC POLICY (Eldar Shafir ed., 2013); Oren Bar-Gill & Ryan Bubb, *Credit Card Pricing: The CARD Act and Beyond*, 97 CORNELL L. REV. 967 (2012); Oren Bar-Gill, *Seduction by Plastic*, 98 NW. U. L. REV. 1373 (2004); Ryan Bubb & Alex Kaufman, *Consumer Biases and Mutual Ownership*, 105 J. PUB. ECON. 39 (2013); Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1998); Christine Jolls & Cass R. Sunstein, *Debiasing Through Law*, 35 J. LEGAL STUD. 199 (2006); Russell B. Korobkin & Thomas S. Ullen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CALIF. L. REV. 1051 (2000); Russell Korobkin, *The Endowment Effect and Legal Analysis*, 97 NW. U. L. REV. 1227 (2003); Donald C. Langevoort, *Taming the Animal Spirits of the Stock Markets: A Behavioral Approach to Securities Regulation*, 97 NW. U. L. REV. 135 (2002); Jeffrey J. Rachlinski, *The Psychological Foundations of Behavioral Law and Economics*, 2011 U. ILL. L. REV. 1675.

[9] *See generally, e.g.*, OREN BAR-GILL, SEDUCTION BY CONTRACT: LAW, ECONOMICS, AND PSYCHOLOGY IN CONSUMER MARKETS (2012) (analyzing the rationale behind common design choices in consumer contracts and the impact of those features on consumers); Michael S. Barr et al., *Behaviorally Informed Home Mortgage Credit Regulation* (arguing that consumers frequently do not behave as rational agents due to psychological limitations, which firms actively exploit), *in* BORROWING TO LIVE: CONSUMER AND MORTGAGE CREDIT REVISITED 170 (Nicholas P. Retsinas & Eric S. Belsky eds., 2008). An illuminating recent review of this literature supports our characterization of the existing work in the field as based on an asymmetric view of behavioral biases. *See* Botond Kőszegi, *Behavioral Contract Theory*, 52 J. ECON. LITERATURE 1075, 1076 (2014) ("In almost all applications, researchers assume that the agent . . . behaves according to one psychologically based model, while the principal . . . is fully rational and has a classical goal (usually profit maximization).").

and investor-protection approach taken in the Dodd–Frank Act.[10] Similarly, the leading treatment of the recent housing bubble in existing legal scholarship considers "irrational exuberance" exclusively on the part of borrowers, which the authors conclude cannot explain the increase in the supply of mortgage credit during the boom.[11] We advance this literature by also considering mistakes by firms. We show that the *marketwide* overoptimism about house prices in a housing bubble—among sophisticated lenders and securitizers in addition to investors and borrowers—has important implications for the design of regulation. Mortgage regulation should not just seek to prevent lenders and securitizers from exploiting the mistakes of naive borrowers and investors; rather, it should also protect the economy from the mistakes of lenders and securitizers. Our analysis implies that the mistakes of firms (and consumers) undermine indirect incentive-based regulatory approaches and points toward more direct regulatory mandates.[12]

To motivate our analysis, we begin in Part I with an overview of the essential role of the housing bubble in the Great Recession. The bursting of a housing bubble produces a severe economic downturn through two main channels: (1) losses to financial institutions that result in a financial crisis (the "banking channel") and (2) a fall in household wealth that reduces consumption (the "household channel"). The main source of systemic risk is the threat of a future housing bubble, and the mortgage market plays a key role both in fueling housing bubbles and in linking them to the broader economy. Mortgage regulation should therefore be designed to perform well in the face of a bubble and to mitigate its macroeconomic effects through these channels.

We then analyze the Dodd–Frank Act's reforms to the mortgage market and show that they fail this test. We start in Part II with what many consider a centerpiece of the legislation: the risk retention requirement. Barney Frank himself recently declared that "to me . . . the single most

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[10] The Obama administration's point person on the Dodd–Frank Act, Professor Michael Barr, had previously written about the implications of behavioral economics for mortgage regulation, focusing on borrower protection. *See generally* Barr et al., *supra* note 9.

[11] *See* Adam J. Levitin & Susan M. Wachter, *Explaining the Housing Bubble*, 100 GEO. L.J. 1177, 1212 (2012) (arguing that demand-side explanations based on borrower exuberance are incomplete because "any increase in housing-finance demand was outstripped by an increase in housing-finance supply").

[12] For a general argument that behavioral failings often point toward more direct regulatory mandates and a critique of the preference in behavioral law and economics for light-touch regulatory tools, see Ryan Bubb & Richard H. Pildes, *How Behavioral Economics Trims Its Sails and Why*, 127 HARV. L. REV. 1593 (2014).

important part of the bill was risk retention."[13] But to what market failure is a mandatory risk retention requirement a useful regulatory response?

The standard answer is moral hazard. It is now conventional wisdom that lenders made loans to riskier borrowers in the run-up to the crisis because they lacked "skin in the game." Lenders sold the loans to securitizers that in turn passed them off to MBS investors. The Dodd–Frank Act requires securitizers to retain credit risk so that they have incentives to monitor better the quality of the mortgages that they buy and thereby protect investors.

But the risk retention requirement fits uneasily with the canonical models of information economics. The standard result in such models is that when one party has less information about the quality of a loan than another party, the less-informed party will rationally be wary of purchasing the loan. If some form of risk retention by the seller is optimal to align incentives, then market participants will contract for it. Under the conventional economic view, a *regulatory* risk retention requirement is not useful.

To justify the risk retention requirement, we need to identify not just a first-order market failure, like moral hazard, but also a *second-order* market failure: failure of private responses to the first-order market failure. To this end, we consider the *naive-investors theory*, which posits that investors are unable to appreciate the severity of the moral hazard problem. If investors are naive, then forcing securitizers to retain some skin in the game could create needed incentives for securitizers to superintend originators' underwriting.

The risk retention requirement, however, will not effectively mitigate the risks posed by a housing bubble and might in fact exacerbate them. Risk retention relies on incentives by imposing additional costs on securitizers when mortgages default. This might be a sensible approach if securitizers make optimal decisions based on rational beliefs about the prospect of default. But overoptimism about future house prices in a bubble leads market participants to underweigh the probability of default and blunts the incentive benefits of risk retention. Moreover, a binding risk retention requirement would further concentrate mortgage risk on securitizers. As recent experience painfully demonstrates, the "tail risks" of mortgage loans, if held by financial institutions, can result in a run on those institutions by their short-term creditors and a breakdown in credit markets.

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[13] Floyd Norris, *Mortgages Without Risk, at Least for the Banks*, N.Y. TIMES, Nov. 29, 2013, at B1.

Evidence from the recent housing boom and bust confirms that the risk retention requirement will be ineffective in a housing bubble. The market-determined level of risk retention by securitizers during the recent boom was in fact too high, not too low. The same Wall Street banks that led the league tables for the creation of MBS also bore much of the brunt of the losses when the underlying loans failed. There is also little evidence that selling MBS to naive investors caused the decline in underwriting standards preceding the crisis, and there are good reasons to think it did not. The most influential evidence purportedly showing that securitization led to lax screening has now been discredited.[14] And contrary to the naive-investors theory, sophisticated contractual arrangements, put in place over decades of experience with securitizing mortgages, were employed to mitigate the incentive problems posed by securitization.

We turn in Part III to the second pillar of the Dodd–Frank Act's reforms to mortgage underwriting—the ability-to-repay rule. We show that it has an analytic structure that parallels that of the risk retention requirement. The ability-to-repay rule also cannot be justified under the standard rational choice theory of contracting. Rational borrowers can assess their own ability to repay, so there is no reason to depart from the traditional contractual norm of caveat emptor. To justify the ability-to-repay rule, we need to posit a reason for a contractual failure.

The leading explanation—which we call the *naive-borrowers theory*—is that lenders exploit borrowers' misunderstanding of the risks embedded in mortgage contracts by offering loans that have an inefficiently high risk of default. A popular account of the recent financial crisis is that lenders marketed loans with low initial "teaser" interest rates and payments, which fooled borrowers into thinking that they could afford the loan. When the monthly payments reset to a higher amount, the borrower would default unless the borrower could refinance.

But why would lenders find it profitable to make loans that are designed to default? Enter securitization, *deus ex machina*. The standard argument is that originators have incentives to engage in such predatory lending because they can pass on the credit risk to securitizers. The naive-investors theory and the naive-borrowers theory thus work together to provide a coherent justification for the ability-to-repay rule.

The ability-to-repay rule was intended to protect borrowers by discouraging this form of predatory lending. It functions primarily as a type

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[14] *See generally* Ryan Bubb & Alex Kaufman, *Securitization and Moral Hazard: Evidence from Credit Score Cutoff Rules*, 63 J. MONETARY ECON. 1 (2014) (arguing that credit score cutoff rules do not support the conclusion that securitization led to lax screening).

of liability rule for negligent mortgage underwriting and in practice imposes liability on the originator only in the event of a default. Like the risk retention requirement, the ability-to-repay rule relies on changing the incentives of more sophisticated market participants to control mortgage underwriting and to protect the less sophisticated.

A housing bubble undermines the ability-to-repay rule in much the same way that it does the risk retention requirement. In a bubble, originators underweigh the prospect of default, blunting the incentives created by the rule. Moreover, the ability-to-repay rule focuses on a narrow aspect of underwriting—the affordability of the loan—and does nothing to prevent deterioration of other aspects of underwriting in a bubble, including credit histories and down payments. Evidence from the recent crisis confirms that the ability-to-repay rule will be ineffective in a bubble.

In Part IV, we develop the contours of a better approach. Mortgage regulation can and should be designed to protect the economy from housing bubbles. To be effective, such regulation must be robust to the irrational exuberance that pervades all sides of the market during a bubble. Overoptimism about house prices in a bubble will defeat indirect, incentive-based regulation. Accordingly, direct regulatory mandates will be more effective in protecting both banks and borrowers. Similarly, because regulators are also susceptible to bubbles, regulation should be based on simple, fixed rules and should not rely on discretionary judgments by regulators to counteract bubbles in real-time.

One simple but powerful tool for combating bubbles is an ex ante limit on mortgage leverage. Requiring substantial down payments would limit the incidence and magnitude of debt-fueled housing bubbles. It would also provide a buffer that protects mortgages from a fall in house prices and reduce the exposure of households to undiversified, highly leveraged investments in housing. While a leverage limit would restrict access to mortgage credit and therefore potentially to homeownership, there are straightforward ways to mitigate these costs through public grants and guarantees. Our analysis suggests a set of other direct regulatory tools to further mitigate bubbles, including caps on the debt-to-income ratios of mortgages and restrictions on contractual features, like teaser rates, that encourage borrowers to take out unsustainable loans in a bubble. Finally, our critique of incentive-based regulation provides an important new perspective on current legislative efforts to reform the government-sponsored enterprises (GSEs) and the broader architecture of housing finance.

Much of the debate over the policy responses to the recent financial crisis has been about how to keep Main Street safe from Wall Street. Our analysis calls for a fundamental paradigm shift. The central policy challenge is to keep Main Street and Wall Street safe from themselves.

I. THE HOUSING BUBBLE AND THE GREAT RECESSION

The story of the Great Recession is largely the story of a housing bubble. This is not unusual. The recent boom and bust in the United States is simply a particularly severe episode of a historical pattern of countries experiencing real estate bubbles that precipitate financial crises followed by protracted economic downturns. The importance of housing bubbles motivates the basic goal of this Article: to evaluate recent and potential reforms to mortgage regulation in terms of how effectively they mitigate risks posed by housing bubbles. In this Part, we set the stage by briefly describing the recent housing bubble and its essential role in the Great Recession.

A. *The Housing Bubble of 1997–2006*

The decade leading up to the financial crisis of 2007–2008 witnessed unprecedented growth in U.S. house prices. Figure 1 shows the long-run trend in real (that is, inflation-adjusted) house prices.[15] For most of the twentieth century, house prices on average experienced essentially zero growth. From 1890 to 1997, house prices increased nationally by a *total* of 7%, an annual growth rate of 0.06%.[16] But beginning in the late 1990s, house prices increased sharply. From 1997 to 2006, real house prices increased by 85%, an *annual* growth rate of about 7%.[17]

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[15] These data are from ROBERT J. SHILLER, IRRATIONAL EXUBERANCE 13 (2d ed. 2005), and regularly updated versions are available for download online at Robert Shiller, *Online Data*, YALE U. DEPARTMENT ECON., http://www.econ.yale.edu/~shiller/data.htm (last visited May 11, 2015) (follow "US Home Prices 1890–Present" hyperlink), *archived at* http://perma.cc/D493-VTKK.

[16] *Id.*

[17] *Id.*

Figure 1: Long-Run House Prices
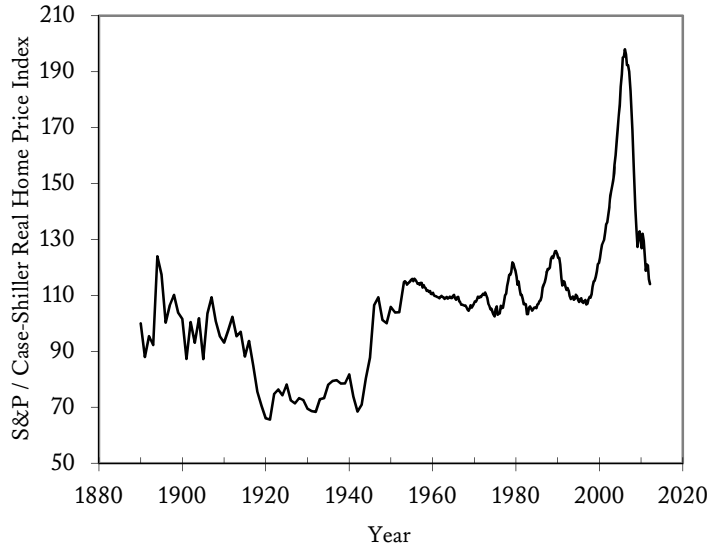
Nominal house prices increased even more sharply, as shown in Figure 2 below, growing by a total of 135% over this period, an annual growth rate of 9%.[18] In many major cities, the boom was even bigger. The S&P/Case–Shiller 10-city composite home price index, also shown in Figure 2, *tripled* from 1997–2006.[19]

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[18] *S&P/Case–Shiller National Home Price Index*, *supra* note 1. Nominal house prices may be even more important than real house prices for setting the expectations of future price growth that are so crucial in a bubble because they are more salient than real house prices, a phenomenon known as the "money illusion." *See* Markus K. Brunnermeier & Christian Julliard, *Money Illusion and Housing Frenzies*, 21 REV. FIN. STUD. 135, 135 (2008) (defining "money illusion" as "the inability to properly distinguish changes in nominal values due to changes in real fundamentals from changes merely due to inflation"); Franco Modigliani & Richard A. Cohn, *Inflation, Rational Valuation and the Market*, FIN. ANALYSTS J., Mar.–Apr. 1979, at 24, 31 (describing "a world of no money illusion, in which creditors are aware of the nature of the effect of inflation on adjusted profits").

[19] The ten cities included in the index are Boston, Chicago, Denver, Las Vegas, Los Angeles, Miami, New York City, San Diego, San Francisco, and Washington, D.C. S&P DOW JONES INDICES, MCGRAW HILL FIN., S&P/CASE–SHILLER HOME PRICE INDICES: *METHODOLOGY* 8 (2015), *available at* http://us.spindices.com/documents/methodologies/methodology -sp-cs-home-price-indices.pdf.

Figure 2: The Housing Bubble
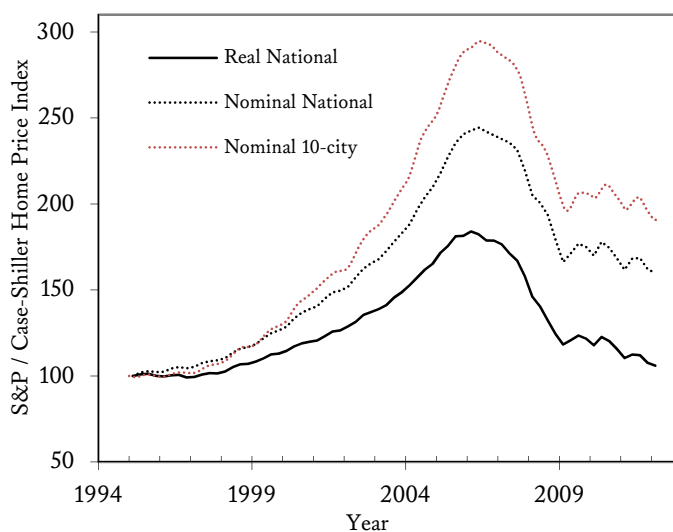
This unparalleled increase in house prices was like a "rocket taking off."[20] But that rocket fell swiftly back to earth. Beginning in 2006, house prices crashed, and, by 2012, they had fallen nationally almost 40% from their peak.[21] Like the takeoff, the crash was even more pronounced in many major cities, as shown in Figure 2. And it is noteworthy that a similar boom-and-bust cycle in house prices occurred over this period in many other countries, including Ireland, Italy, Spain, and the United Kingdom.[22]

This pattern in prices—a rapid run-up followed by a crash—is the characteristic pattern of an asset bubble. But what does it mean to say that there was a "bubble" in housing? The theory of asset bubbles is at an early stage of development and remains controversial. The leading account, which we follow here, was developed by Professor Robert Shiller in work for which he recently won the Nobel Prize. Shiller defines a bubble as a

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[20] SHILLER, *supra* note 15, at 12 (internal quotation marks omitted).

[21] *S&P/Case–Shiller National Home Price Index*, *supra* note 1.

[22] *See* R. Glenn Hubbard & Christopher J. Mayer, *The Mortgage Market Meltdown and House Prices*, 9 B.E. J. ECON. ANALYSIS & POL'Y 1, 6-15 (2009) (comparing house prices and related data in a selection of countries worldwide).

situation in which "excessive public expectations of future price increases cause prices to be temporarily elevated."[23] In Shiller's theory, bubbles are fundamentally a psychological and sociological—not just an economic— phenomenon.[24]

The process begins with an initial increase in house prices caused by some precipitating factor.[25] That increase sparks enthusiasm among potential homebuyers, who then expect a similar increase in prices in the next period and buy homes on the basis of that expectation. This generates a feedback loop as the increased demand for housing pushes prices up further and reinforces expectations of still more price increases.[26] The media dutifully plays its role through news accounts of people making a killing in housing, which generate further enthusiasm.[27] Leverage amplifies this process.[28] Homebuyers who put 5% down on a house that experiences a

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[23] Karl E. Case & Robert J. Shiller, *Is There a Bubble in the Housing Market?*, BROOKINGS PAPERS ON ECON. ACTIVITY, 2003, at 299, 299. For a similar definition, see Joseph E. Stiglitz, *Symposium on Bubbles*, J. ECON PERSP., Spring 1990, at 13, 13, where the author explains that "if the reason that the price is high today is *only* because investors believe that the selling price will be high tomorrow—when 'fundamental' factors do not seem to justify such a price—then a bubble exists." In his book *Irrational Exuberance*, Shiller offers a more expansive definition of "speculative bubbles" as

> a situation in which news of price increases spurs investor enthusiasm, which spreads by psychological contagion from person to person, in the process amplifying stories that might justify the price increases and bringing in a larger and larger class of investors, who, despite doubts about the real value of an investment, are drawn to it partly through envy of others' successes and partly through a gambler's excitement.

SHILLER, *supra* note 15, at 2.

[24] The summary here draws on SHILLER, *supra* note 15, at 147-48, 157-58.

[25] *See, e.g.*, JOHN B. TAYLOR, GETTING OFF TRACK: HOW GOVERNMENT ACTIONS AND INTERVENTIONS CAUSED, PROLONGED, AND WORSENED THE FINANCIAL CRISIS 1-6 (2009) (suggesting that the Federal Reserve's holding of interest rates at an historically low level was a precipitating factor for the recent housing bubble); Maurice Obstfeld & Kenneth Rogoff, *Global Imbalances and the Financial Crisis: Products of Common Causes* (suggesting that a confluence of international forces, including current account deficits, interest rate policies, and private and public debt policies were precipitating factors), *in* ASIA AND THE GLOBAL FINANCIAL CRISIS 131, 131-32 (Reuven Glick & Mark M. Spiegel eds., 2009).

[26] *See* SHILLER, *supra* note 15, at 147-73 (explaining psychological factors, such as herd behavior, that may contribute to major shifts in markets).

[27] *See generally* Cindy K. Soo, *Quantifying Animal Spirits: News Media and Sentiment in the Housing Market* (Univ. of Mich. Ross Sch. of Bus., Working Paper No. 1200, 2013), *available at* http://deepblue.lib.umich.edu/bitstream/handle/2027.42/99759/1200_Soo.pdf?sequence=1 (arguing that sentiment may help explain the boom and bust of the housing market and analyzing the language of relevant newspaper articles to determine their effect on such sentiment).

[28] *See* John Geanakoplos, *The Leverage Cycle* ("[V]ariation in leverage has a huge impact on the price of assets, contributing to economic bubbles and busts."), *in* 24 NBER MACROECONOMICS ANNUAL 2009, at 1, 2 (Daron Acemoglu et al. eds., 2010).

10% increase in value, for example, will have *tripled* their initial investment.[29]

Surveys of recent homebuyers document outsized expectations of future price increases during housing booms. For example, in successive surveys in each of the years 2003 through 2007, the mean annual house price increase expected by homebuyers in Orange County, California, over the next ten years ranged from a low of 9.5% in 2006 to an astounding high of 17.4% in 2004.[30] These survey responses are consistent with the view that overoptimism about future price increases drove the housing bubble. Moreover, they are difficult to reconcile with other models of asset pricing.[31]

In part because of their psychological aspect, bubbles are difficult to recognize as they are forming. Shiller argues that, in a bubble, "new era" narratives naturally emerge to justify the price increases based on fundamentals.[32] In the case of the recent housing boom, a few commentators—most prominently Shiller himself—declared that a bubble had formed in the housing market.[33] But other economists challenged this view, arguing that house prices were consistent with fundamentals, once

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[29] It is easier to see the effect of leverage with a simple numerical example. Suppose the house is initially worth $100,000, and the buyer puts $5000 down, borrowing the other $95,000 to buy the house. With a 10% increase in value, the home is now worth $110,000. The debt owed remains at $95,000 (assuming for simplicity that the owner has not yet paid down the debt or incurred any interest expenses), so the buyer now has tripled his or her equity investment in the house from $5000 to $15,000 ($110,000 - $95,000 = $15,000).

[30] Karl E. Case et al., *What Have They Been Thinking? Homebuyer Behavior in Hot and Cold Markets*, BROOKINGS PAPERS ON ECON. ACTIVITY, Fall 2012, at 265, 276.

[31] *See* Nicholas Barberis et al., *X-CAPM: An Extrapolative Capital Asset Pricing Model* 3 (Nat'l Bureau of Econ. Research, Working Paper No. 19189, 2013) (canvassing alternative asset price models and arguing that they fail to account for the evidence on expectations of future returns); *see also* Robin Greenwood & Andrei Shleifer, *Expectations of Returns and Expected Returns*, 27 REV. FIN. STUD. 714, 742 (2014) ("One difficulty with models in which investors extrapolate cash flows, however, is that investors' expectations are essentially uncorrelated with changes in fundamentals.").

[32] SHILLER, *supra* note 15, at 2. Professors Carmen Reinhart and Kenneth Rogoff describe this phenomenon as the perception that "this time is different." *See generally* CARMEN M. REINHART & KENNETH S. ROGOFF, THIS TIME IS DIFFERENT (2009).

[33] *See* Case & Shiller, *supra* note 23, at 340-41 (noting that indicators of a bubble were present in many cities and that the consequences of a possible decline in prices would be severe); David Leonhardt, *Be Warned: Mr. Bubble's Worried Again,* N.Y. TIMES, Aug. 21, 2005, § 3 (Sunday Business), at 1 (noting that Shiller was "arguing that the housing craze is another bubble destined to end badly"). *The Economist* magazine repeatedly warned of a global housing bubble from 2003 through the eventual collapse. *See* Pam Woodall, *House of Cards*, ECONOMIST, May 31, 2003, at 3 (warning that a housing bubble was in progress and would inevitably burst); *see also, e.g.*, *After the Fall*, ECONOMIST, June 18, 2005, at 11 (same); *In Come the Waves*, ECONOMIST, June 18, 2005, at 73 (same).

properly understood.[34] No less an authority than then-Chairman of the Council of Economic Advisers Ben Bernanke declared in 2005 that increases in house prices largely reflected strong fundamentals.[35] Wall Street economists similarly predicted in this period that house prices would continue to appreciate, albeit at a slower rate.[36] Since the crash, of course, virtually everyone now agrees that in the boom house prices had diverged substantially from their fundamental value.[37]

Crucially, overoptimism about house prices in the recent housing bubble was not confined to homebuyers. The same "bubble fever" infected lenders, securitizers, and MBS investors.[38] Among the key pieces of evidence is that so many holders of MBS, including sophisticated financial institutions, failed to hedge their exposures and suffered large losses when house prices fell.[39]

The behavior of market participants we have described is based on "irrational exuberance," to use the phrase famously coined by Alan Greenspan.[40] Can a bubble based on such irrational behavior be sustained if "smart money" investors recognize that housing is overvalued? The short answer is yes. One reason is that institutional constraints inhibit the ability

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[34] *See, e.g.*, Charles Himmelberg et al., *Assessing High House Prices: Bubbles, Fundamentals and Misperceptions*, J. ECON. PERSP., Fall 2005, at 67, 90 ("Our evidence does not suggest that house prices cannot fall in the future if fundamental factors change. . . . However, this [possibility] does not mean that today houses are systematically mispriced."); Christopher Mayer & John M. Quigley, Comments and Discussion, *Is There a Bubble in the Housing Market?*, BROOKINGS PAPERS ON ECON. ACTIVITY, Fall 2003, at 343, 355 (commenting that Case and Shiller "greatly overinterpret the consistency of their findings with the presence of an asset bubble").

[35] *The Economic Outlook: Hearing Before the Joint Econ. Comm.,* 109th Cong. 7 (2005) (statement of Hon. Ben Bernanke, Chairman, Council of Economic Advisers) ("Although speculative activity has increased in some areas, at a national level these [house] price increases largely reflect strong economic fundamentals, including robust growth in jobs and income, low mortgage rates, steady rates of household formation, and factors that limit the expansion of housing supply in some areas.").

[36] Leonhardt, *supra* note 33.

[37] *See, e.g.*, Edward L. Glaeser et al., *Can Cheap Credit Explain the Housing Boom?* (noting that neither interest rates, approval rates, or down payment requirements were capable of explaining the 1996–2006 housing boom), *in* HOUSING AND THE FINANCIAL CRISIS 301, 350 (Edward L. Glaeser & Todd Sinai eds., 2013); Hubbard & Mayer, *supra* note 22, at 3 ("[T]he acceleration of real estate prices above fundamentals . . . . appears to be a common denominator in the later stage of the property boom.").

[38] Christopher L. Foote et al., *Why Did So Many People Make So Many Ex Post Bad Decisions? The Causes of the Foreclosure Crisis*, *in* RETHINKING THE FINANCIAL CRISIS 136, 137-38 (Alan S. Blinder et al. eds., 2012).

[39] *See infra* notes 149-73 and accompanying text.

[40] Alan Greenspan, Chairman, Fed. Reserve Bd., The Challenge of Central Banking in a Democratic Society, Remarks at the Annual Dinner and Francis Boyer Lecture of the American Enterprise Institute for Public Policy Research (Dec. 5, 1996), *available at* http://www.federalreserve.gov/boarddocs/speeches/1996/19961205.htm.

of rational investors to exploit market mispricing. For example, unlike stocks, there is no easy way for arbitrageurs to sell a home "short."[41] More fundamentally, even those who are fully rational and recognize the existence of a bubble might be drawn into the market in a way that reinforces these bubble dynamics. Rational speculators might attempt to "ride the bubble" by buying into the market in expectation that the bubble will continue to inflate while planning to get out right before it bursts.[42] Such speculation can further inflate the bubble.[43]

B. *The Bubble's Role in the Great Recession*

The housing bubble played an essential role in the financial crisis and the Great Recession that followed. As the bubble inflated, it encouraged— and was fueled by—an expansion in credit. Originators, securitizers, investors, and borrowers alike believed that house prices would continue to appreciate and put little or no weight on the possibility that prices would decline. These price expectations led market participants to believe that there was little risk of mortgage default, causing an increase in riskier lending. The 1997–2006 boom in house prices led to the 2006–2010 crash in house prices. The bursting of the bubble triggered a massive wave of mortgage defaults that ultimately caused a broader financial crisis and a sharp reduction in credit in the economy. It also led to a reduction in consumption by households, who suddenly found themselves much poorer and less able to borrow, which further slowed down the economy.

1. The Rise in Risky Lending as the Bubble Inflated

To explain further the role of the boom and bust in house prices, we begin with a key economic principle: as long as the house is worth more than the outstanding loan amount, mortgages generally do not default. To see why, consider the borrower's perspective. If the house is worth more

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[41] Karl E. Case & Robert J. Shiller, *The Efficiency of the Market for Single-Family Homes*, 79 AM. ECON. REV. 125, 132 (1989).

[42] *See* Franklin Allen et al., *Finite Bubbles with Short Sale Constraints and Asymmetric Information*, 61 J. ECON. THEORY 206, 207 (1993) (providing a rational model in which "[e]verybody realizes the stock is overpriced but each person thinks he may be able to sell it at a higher price to somebody else before the true value becomes publicly known"); *see also* Dilip Abreu & Markus K. Brunnermeier, *Bubbles and Crashes*, 71 ECONOMETRICA 173, 173-74 (2003) (developing a model in which rational speculators ride bubbles produced by behavioral agents).

[43] *See* J. Bradford de Long et al., *Positive Feedback Investment Strategies and Destabilizing Rational Speculation*, 45 J. FIN. 379, 380 (1990) (showing how rational speculators, when combined with investors who predict future price increases based on naive extrapolation, can increase price volatility).

than the balance owed on the mortgage, the borrower would not default even if he or she could no longer make the loan payments. Instead, the borrower would simply sell the house, pay off the balance due on the mortgage, and keep his or her equity. This is why the standard model of mortgage default is called the "double-trigger" model.[44] A job loss or other change in the household's financial circumstances that makes the mortgage unaffordable is not by itself sufficient to trigger a mortgage default. Only if the house is worth less than the borrower owes on the loan—referred to as having "negative equity" or as being "underwater"—would a borrower default on the mortgage rather than sell the house.[45]

The bubble thus provides an explanation for the decline in underwriting standards and the expansion of subprime lending during the boom.[46] If market participants think that house prices will inexorably rise, then they will put little weight on the possibility of default. A bubble therefore leads to "asset-based lending," in which lenders look to the value of the house rather than the creditworthiness of the borrower to ensure repayment. In a bubble, lenders are willing to lend to borrowers with a history of credit problems who would be considered too risky in normal times. Similarly, in a bubble, down payments are considered less important since lenders rely instead on future house price appreciation to provide an equity buffer. The bubble also explains the shift toward no-documentation underwriting practices during the boom.[47] The view that the house would continue to appreciate in value reduces the benefit to the lender of costly verification of the borrower's income and assets. As the lender's concern about the negative equity trigger diminishes, the lender will expend fewer resources to investigate the credit risk factors that predict affordability.[48]

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[44] Christopher L. Foote et al., *Negative Equity and Foreclosure: Theory and Evidence*, 64 J. URB. ECON. 234, 241 (2008).

[45] For recent empirical evidence on the important role of negative equity and changes to households' financial situations in triggering mortgage default, see generally Ronel Elul et al., *What "Triggers" Mortgage Default?*, 100 AM. ECON. REV. PAPERS & PROC. 490 (2010).

[46] Foote et al., *supra* note 38, at 137-38.

[47] *See* Christopher Mayer et al., *The Rise in Mortgage Defaults*, J. ECON. PERSP., Winter 2009, at 27, 43-44 (noting that the number of no- and low-documentation loans increased between 2005 and 2008 and that these loans have a much higher default rate than fully documented loans); *see also* Yuliya Demyanyk & Otto Van Hemert, *Understanding the Subprime Mortgage Crisis*, 24 REV. FIN. STUD. 1848, 1850 (2011) (showing that as loan quality decreased, the fraction of low-documentation loans increased).

[48] This is particularly true for low loan-to-value ratio loans (i.e., loans for which the amount owed is a relatively small percentage of the value of the home that secures the loan). As one prominent mortgage banker explained, "If I'm making a 65%, 75%, 70% loan-to-value [loan], I'm not going to get all the documentation." FIN. CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT 110 (2011) [hereinafter FCIC REPORT] (quoting Herb Sandler, CEO,

A bubble in the housing market also helps explain the emergence of the specific contracts used for riskier borrowers in the subprime mortgage market. About three-quarters of subprime mortgages issued from 2003 to 2007 were hybrid adjustable-rate mortgages (ARMs) that began with a fixed interest rate for an introductory period but reset to a potentially much higher adjustable interest rate after the introductory period expired.[49] Such contracts can be optimal if the borrower and the lender expect the house to appreciate in value.[50] The relatively low initial payments help the borrower to afford the loan at first and provide a way for borrowers to stretch their resources to take out a bigger loan. The borrower and lender alike believe that the house collateralizing the loan will continue to appreciate in value so that, at the end of the initial period of low monthly payments, the borrower will be able to refinance the loan and receive more favorable terms given the appreciation in the value of the collateral.[51] This refinancing would also typically generate fees for the initial lender, either through prepayment penalties on the initial loan or because the initial lender also refinanced the loan.[52] In effect, these contracts served as a way for both lenders and borrowers to speculate on future house prices during the bubble.[53]

Golden West) (internal quotation marks omitted), *available* at http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf. When the lender is caught up in a bubble, this approach would also apply to high loan-to-value ratio loans: because the lender believes the house will continue to appreciate, there is little risk of default and hence little value in documenting the borrower's income and assets.

[49] Truth in Lending, 73 Fed. Reg. 44,522, 44,540 (July 30, 2008) (codified at 12 C.F.R. pt. 226).

[50] *See* Gary Gorton, *The Panic of 2007*, at 12-19 (Nat'l Bureau of Econ. Research, Working Paper No. 14358, 2008), *available at* http://www.nber.org/papers/w14358.pdf (explaining that a subprime mortgage is designed to allow the borrower and lender to benefit from house price appreciation over a short period of time).

[51] *See id.* at 3 ("The key security design feature of subprime mortgages was the ability of borrowers to finance and refinance their homes based on the capital gains due to house price appreciation over short horizons and then turning this into collateral for a new mortgage (or extracting the equity for consumption).").

[52] *Id.* at 17.

[53] *See* Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys., Financial Markets, the Economic Outlook, and Monetary Policy, Speech at the Women in Housing and Finance and Exchequer Club Joint Luncheon (Jan. 10, 2008), *available at* http://www.federalreserve.gov/newsevents/speech/bernanke20080110a.htm ("Although poor underwriting and, in some cases, fraud and abusive practices contributed to the high rates of delinquency that we are now seeing in the subprime ARM market, the more fundamental reason for the sharp deterioration in credit quality was the flawed premise on which much subprime ARM lending was based: that house prices would continue to rise rapidly.").

In our view, the housing bubble itself was a primary cause of the expansion in risky lending during the boom.[54] In a recent article attempting to reconcile the bubble with an alternative, moral hazard–based view of the crisis, Professors Adam Levitin and Susan Wachter argue the opposite: an expansion in risky lending caused the housing bubble and not the other way around.[55] In particular, they argue that the shift toward private securitization of mortgages in the 2000s ushered in unchecked moral hazard.[56] Because mortgage originators were able to pass risky mortgages on to investors, they lowered their lending standards.[57] The resulting boom in subprime lending in turn caused the housing bubble.[58] In Levitin and Wachter's account, the bubble was epiphenomenal; moral hazard from securitization was the root cause of the crisis. Their view of the bubble as a mere side effect of securitization motivates their policy recommendations, which are targeted at reducing moral hazard.[59]

Levitin and Wachter's view, however, is based on an oddly cramped account of bubbles. They view irrational exuberance as a *demand*-side phenomenon that affects only consumers, not lenders or investors. Based on this assumption, they argue that irrational exuberance cannot explain the expansion in credit supply during the boom.[60] As evidence, they assert that the fall in MBS yield spreads—in effect, the price charged by the market for mortgage credit risk—is inconsistent with the irrational exuberance view of the bubble:

> There was undoubtedly a great deal of irrational or misguided consumer behavior in real-estate investment. But this behavior required readily available financing. Shiller's demand-side theory cannot explain the movement in [MBS]-yield spreads during the bubble and is, therefore, an incomplete explanation. Credit relationships are two-sided, and the

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[54] *See* Robert J. Shiller, *Understanding Recent Trends in House Prices and Home Ownership* 17 (Nat'l Bureau of Econ. Research, Working Paper No. 13553, 2007) (arguing that "boom psychology" encouraged lenders because "the boom reduces the default rate on lower-quality mortgages"); *see also* Foote et al., *supra* note 38, at 137-38 ("A 'bubble fever' . . . infected both borrowers and lenders. If both groups believed that house prices would continue to rise rapidly for the foreseeable future, then it is not surprising to find borrowers stretching to buy the biggest houses they could and investors lining up to give them the money.").

[55] *See* Levitin & Wachter, *supra* note 11, at 1181 ("[T]he bubble was, in fact, primarily a *supply-side* phenomenon . . . .").

[56] *Id.*

[57] *Id.*

[58] *Id.*

[59] *Id.* at 1252-55.

[60] *Id.* at 1212.

evidence from [MBS] spreads indicates that any increase in housing-finance demand was outstripped by an increase in housing-finance supply.[61]

But as we—and Shiller before us—have emphasized, the housing bubble was a marketwide phenomenon that affected the financial institutions on the supply side of the credit market just as it did the mortgage borrowers on the demand side.[62] A fall in MBS spreads is thus wholly consistent with—indeed, predicted by—the irrational exuberance view of the bubble. As lenders and MBS investors formed overoptimistic beliefs about future house price appreciation, their assessments of mortgage default risk fell, resulting in lower prices for mortgage credit. As we discuss in detail below, many of the financial institutions most involved in the creation of mortgages and MBS retained risks that resulted in catastrophic losses when the bubble burst.[63] This is inconsistent with a simple moral hazard story. Levitin and Wachter's view that securitization was the root cause of the bubble and the mortgage crisis also cannot explain the boom-and-bust cycles in house prices over the same period in many other countries that did not experience a shift toward securitization.[64] We return to this moral hazard theory in our discussion of the risk retention requirement below.[65]

Levitin and Wachter's one-sided view of irrational exuberance in the bubble reflects the more general *asymmetric* view of behavioral biases that dominates the behavioral law and economics literature.[66] This asymmetric view pits perfectly optimizing firms against mistake-prone consumers. The result is a regulatory approach designed to protect biased consumers from being exploited by sophisticated firms. A central contribution of this Article is to explain the policy implications of a proper understanding of bubbles as

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[61] *Id.* at 1212 (emphasis added).

[62] *See* Shiller, *supra* note 54, at 18 ("The boom psychology encouraged potential homeowners and encouraged lenders as well. Home buyers were encouraged by the potential investment returns. Mortgage lenders were encouraged since the boom reduces the default rate on lower-quality mortgages. The subprime mortgage market was virtually nonexistent before the mid 1990s, and rose to account for a fifth of all new mortgages by 2005. Denial rates for mortgage applications plunged after around 2000.").

[63] *See infra* notes 149-72 and accompanying text; *see also* Viral V. Acharya & Matthew Richardson, *Causes of the Financial Crisis*, 21 CRITICAL REV. 195, 197 (2009) ("[E]specially from 2003 to 2007, the main purpose of securitization was not to share risks with investors . . . . The net result was to keep the risk concentrated in the financial institutions—and, indeed, to keep the risk at a greatly magnified level, because of the overleveraging that it allowed.").

[64] *See* Hubbard & Mayer, *supra* note 22, at 6-15 (reviewing worldwide evidence of causes of the housing boom).

[65] *See infra* Section II.B.

[66] *See, e.g.,* BAR-GILL, *supra* note 9.

marketwide phenomena, entailing irrational exuberance not only among consumers but also among financial intermediaries.

2. The Bursting of the Bubble and the Great Recession

By the peak of the boom in 2006, housing wealth had ballooned to $30.8 trillion, up from only $15.6 trillion at the start of the run-up in 1997.[67] In the process, households had accumulated $10.5 trillion in mortgage debt.[68] When the bubble burst, the dramatic fall in house prices wreaked havoc on the economy. The diagram in Figure 3 summarizes the two main channels of this dynamic: the banking channel and the household channel.

Figure 3: The Housing Bubble and the Great Recession
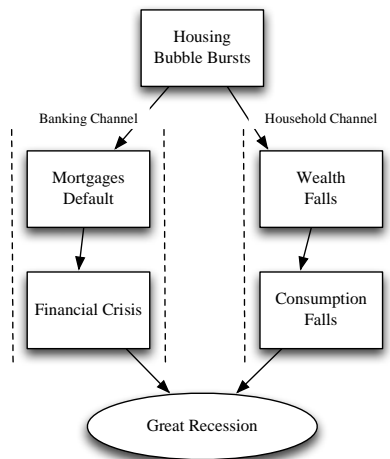
We begin with the banking channel. The bursting of the bubble led to a precipitous jump in mortgage defaults. When the bubble burst, many of the

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[67] All housing wealth figures are in 2006 dollars. Following Matteo Iacoviello, we calculate housing wealth as the market value of all residential assets in the United States. Matteo Iacoviello, *Housing Wealth and Consumption* 1-3 (Bd. of Governors of Fed. Reserve Sys., Int'l Fin. Discussion Papers, Paper No. 1027, 2011). The value for owner-occupied homes is taken from Entry B.101, Row 3 of the Flow of Funds Historical Annual Tables 2005–2014 and the Historical Annual Tables 1995–2004. The value of rented homes is taken from Table B.103, Row 4 of the Flow of Funds. BD. OF GOVERNORS OF THE FED. RESERVE SYS., Z.1 FINANCIAL ACCOUNTS OF THE UNITED STATES: FLOW OF FUNDS, BALANCE SHEETS, AND INTEGRATED MACROECONOMIC ACCOUNTS, *available at* http://www.federalreserve.gov/releases/z1/current/data.htm.

[68] *Mortgage Debt Outstanding*, FED. RES., http://www.federalreserve.gov/econresdata/releases/ mortoutstand/current.htm (last visited May 11, 2015), *archived at* http://perma.cc/27SK-CFP7 (follow the "Historical Data (CSV)" hyperlink; scroll to data entry for 2006Q4).

risky mortgages made during the boom ended up underwater.[69] Mortgages made in the late stages of the boom ended up the furthest underwater because those mortgages were taken out near the peak of the home's value.[70] Similarly, loans with lower initial down payments ended up further underwater because they had less of an equity buffer to absorb a decline in the value of the house. These negative equity mortgages were at high risk of default.[71] As the recession took hold and unemployment rose, many households that were underwater could no longer afford their mortgages or strategically defaulted.[72] The resulting losses to financial institutions sparked a full-blown financial panic, and the resulting reduction in credit led to a sharp fall in business activity and employment.[73]

The bursting of the housing bubble also led to a reduction in household consumption.[74] Housing is a major asset of households and moreover is a highly leveraged asset.[75] Because of leverage, the fall in house prices led to an even larger percentage reduction in household net worth. The fall in house prices also eliminated an important source of collateral that households borrowed against to finance consumption. In the latter half of the housing boom between 2001 and 2005, households extracted about $700 billion of equity from their homes each year through cash-out refinancings and other forms of mortgage debt.[76] With households poorer after the crash and with less equity in their homes to borrow against, household spending sagged, contributing to the Great Recession.[77]

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[69] Mayer et al., *supra* note 47, at 46.

[70] *See* Christopher Palmer, Why Did So Many Subprime Borrowers Default During the Crisis: Loose Credit or Plummeting Prices? 47 (Nov. 15, 2013) (unpublished manuscript), *available at* http://web.mit.edu/cjpalmer/www/CPalmer_JMP.pdf.

[71] Mayer et al., *supra* note 47, at 46.

[72] The evidence shows that about 80% of defaults were due to *both* negative equity and income shocks, as opposed to being strategic defaults driven solely by negative equity. *See generally* Neil Bhutta et al., *The Depth of Negative Equity and Mortgage Default Decisions* (Fin. & Econ. Discussion Series, Working Paper No. 2010-35, 2010).

[73] *See generally* Gabriel Chodorow-Reich, *The Employment Effects of Credit Market Disruptions: Firm-Level Evidence from the 2008–9 Financial Crisis*, 129 Q.J. ECON. 1 (2014).

[74] ATIF MIAN & AMIR SUFI, HOUSE OF DEBT: HOW THEY (AND YOU) CAUSED THE GREAT RECESSION, AND HOW WE CAN PREVENT IT FROM HAPPENING AGAIN 33-35 (2014).

[75] *See supra* note 67 and accompanying text.

[76] Karl E. Case et al., *Wealth Effects Revisited: 1975–2012*, at 5 (Nat'l Bureau of Econ. Research, Working Paper No. 18667, 2013).

[77] Atif Mian & Amir Sufi, *Household Leverage and the Recession of 2007–09*, 58 IMF ECON. REV. 74, 77-81 (2010).

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It is no exaggeration to say that had there not been a bubble in the housing market, there would not have been a financial crisis or indeed any recession approaching the severity of the Great Recession. It is no coincidence that a credit boom and an asset price bubble typically precede financial crises.[78] Indeed, a bubble in real estate has been the primary culprit.[79] The five largest preceding banking crises in the post-war period (Spain 1977, Norway 1987, Finland 1991, Sweden 1991, and Japan 1992) were each associated with a boom and bust in house prices.[80] In their celebrated book on financial crises, Professors Reinhart and Rogoff find that house prices are among the best predictors of a banking crisis.[81] The housing market has also been at the center of more modest macroeconomic fluctuations. As Professor Edward Leamer explains in a paper provocatively titled *Housing* Is *the Business Cycle*, eight of the ten prior recessions in the United States since World War II have been preceded by downturns in housing.[82] Housing continues to be the single largest asset class in the U.S. economy.[83] The main source of systemic risk is the possibility of a future housing bubble.

If housing bubbles are the problem, then what is the solution? Prudential regulation—the rules that govern financial institutions to ensure their stability—provides an important set of traditional tools to mitigate the risks posed by housing bubbles. These include limitations on both the assets and liabilities of financial institutions. However, the history of financial crises shows that prudential regulation is unlikely to be sufficiently effective on its own. First, bubbles themselves undermine the operation of prudential regulation. In a bubble, regulators are reluctant to take away the punch bowl, while financial institutions stand to gain even more from circumventing prudential regulation.[84]

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[78] REINHART & ROGOFF, *supra* note 32, at 216-17.

[79] *Id.*; Franklin Allen & Douglas Gale, *Bubbles and Crises*, 100 ECON. J. 236, 236-37 (2000) (providing examples in many countries of real estate bubbles bursting, leading to years of limited economic growth).

[80] Carmen M. Reinhart & Kenneth S. Rogoff, *Is the 2007 Sub-Prime Financial Crisis So Different? An International Historical Comparison*, 98 AM. ECON. REV. PAPERS & PROC. 339, 340-41 (2008).

[81] REINHART & ROGOFF, *supra* note 32, at 279.

[82] Edward E. Leamer, *Housing Is the Business Cycle* 13 (Nat'l Bureau of Econ. Research, Working Paper No. 13428, 2007), *available at* http://www.nber.org/papers/w13428.pdf.

[83] Susan J. Smith, *Crisis and Innovation in the Housing Economy: A Tale of Three Markets*, *in* FINANCIAL INNOVATION: TOO MUCH OR TOO LITTLE? 71, 73 (Michael Haliassos ed., 2013).

[84] In an important new book, Professor Erik Gerding illustrates how, time and again, bubbles result in the deterioration of financial regulation, a process he colorfully terms the "Regulatory

A second limitation of prudential regulation is the danger of incomplete coverage or leakage. As the history of shadow banking demonstrates, mortgage risk can easily move from regulated to unregulated institutions. For example, regulations covering bank holding companies—a major focus of the Dodd–Frank Act—would have no effect on nonbank mortgage lenders.[85]

A third shortcoming is the considerable uncertainty over how best to implement prudential regulation.[86] The Dodd–Frank Act contains a number of reforms to prudential regulation. These provisions establish the Financial Stability Oversight Council (FSOC), which has the power to designate nonbank financial companies as systemically important financial institutions (SIFIs).[87] They also direct the Federal Reserve to develop enhanced prudential standards—including requirements for risk-based capital, risk management, resolution plans, and stress tests—for bank holding companies and nonbank SIFIs.[88] A number of recent reform proposals envision an expanded mandate for prudential regulators and monetary authorities to identify and counteract housing bubbles (and other sources of systemic risk) in real time.[89] These proposals include targeted monetary policy to deflate asset bubbles and countercyclical prudential limits.[90] This type of

Instability Hypothesis." *See* ERIK F. GERDING, LAW, BUBBLES, AND FINANCIAL REGULATION 2 (2014) (positing "that strong forces act to decay financial regulations at the precise moment when they are most needed").

[85] *See* Gary Gorton & Andrew Metrick, *Regulating the Shadow Banking System*, BROOKINGS PAPERS ON ECON. ACTIVITY, Fall 2010, at 261, 279-80 (describing the role of shadow banking in the financial crisis); *see also* GERDING, *supra* note 84, at 427-44 (arguing that the growth of the shadow banking system accelerated as the housing bubble expanded); Samuel G. Hanson et al., *A Macroprudential Approach to Financial Regulation*, J. ECON. PERSP., Winter 2011, at 3, 25 (arguing that systemic effects from mortgage fire sales come from not only insured depositories, but also nonbank financial intermediaries).

[86] *See* Prasad Krishnamurthy, *Rules, Standards, and Complexity in Capital Regulation*, 43 J. LEGAL STUD. 273, 282-85 (2014) (discussing whether institutionalized cost–benefit analysis could lead to better regulation).

[87] Dodd–Frank Act § 113, 12 U.S.C. § 5323 (2012).

[88] *Id.* § 165, 12 U.S.C. § 5365.

[89] *See* MARKUS BRUNNERMEIER ET AL., THE FUNDAMENTAL PRINCIPLES OF FINANCIAL REGULATION 25-26 (2009) (outlining the types of financial institutions that should be regulated and which agencies should regulate them); Gabriele Galati & Richhild Moessner, *Macroprudential Policy—A Literature Review* 7-12 (Bank for Int'l Settlements, Working Paper No. 337, 2011) (discussing macroprudential tools and other macroeconomic policy tools used to combat systemic risk in financial systems); *see also* GERDING, *supra* note 84, at 491-95 (describing ways to make financial regulation more resilient); Hanson et al., *supra* note 85, at 7-16 (2011) (discussing six proposed tools for regulators to implement a "macroprudential approach to financial regulation").

[90] *See* Hanson et al., *supra* note 85, at 24 (recommending that banks be required to raise new dollars of equity as increased capital requirements are phased in, and recommending use of a small countercyclical buffer on a country-by-country basis).

"macroprudential" regulation requires considerable regulatory foresight and sophistication.

It is beyond the scope of this Article to offer a detailed assessment of these reforms, but there are good reasons to be skeptical that they will prove successful. The Federal Reserve faces a number of challenges in implementing enhanced prudential standards.[91] Stress tests are prone to arbitrary discretion,[92] risk-management requirements may do little beyond creating paperwork,[93] and risk-based capital regulation can be easily manipulated by regulated banks.[94] In fact, despite the prodigious volume of regulatory output in the aftermath of the Dodd–Frank Act, many commentators continue to call for a different approach to prudential supervision that relies to a greater extent on simple, all-purpose regulatory tools.[95]

Moreover, it would be unwise to design regulation that relies on the ability of regulators to identify a housing bubble as it is forming. As we have explained, one of the defining features of a housing bubble is

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[91] *See* John H. Cochrane, Toward a Run-Free Financial System 4-5 (Apr. 16, 2014) (unpublished manuscript), *available at* http://faculty.chicagobooth.edu/john.cochrane/research/papers/run_free.pdf (noting that, because previous regulations produce unintended consequences, financial regulation continuously expands in an effort to correct problems created by old rules). *See generally* JAMES R. BARTH ET AL., RETHINKING BANK REGULATION: TILL ANGELS GOVERN (2006) (conducting the first comprehensive cross-country assessment of bank regulation and questioning current international best practices recommendations); Prasad Krishnamurthy, *Regulating Capital*, 4 HARV. BUS. L. REV. 1 (2014) (noting the challenges of prudential regulation and suggesting a new approach).

[92] *See* Cochrane, *supra* note 91, at 34 ("One might think that the Fed would write down rules for the stress test. But no, the Fed changes the rules and scenarios each time . . . .").

[93] *See* Charles Goodhart, *How Should We Regulate Bank Capital and Financial Products? What Role for 'Living Wills'?* (suggesting that regulation to improve risk management in individual banks is misguided), *in* ADAIR TURNER ET AL., THE FUTURE OF FINANCE: THE LSE REPORT 165, 166-67 (2010).

[94] *See* Krishnamurthy, *supra* note 91, at 35-42 (reviewing criticisms regarding the effectiveness of current capital regulation); Jón Daníelsson et al., *An Academic Response to Basel II*, at 4 (LSE Fin. Mkts. Grp., Special Paper No. 130, 2001) (discussing remaining defects in the Basel Committee's new proposals and arguing that these defects could have destabilizing effects on the global financial system).

[95] *See* Anat R. Admati et al., *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is* Not *Expensive* 2-5 (Rock Ctr. for Corp. Governance at Stanford Univ., Working Paper No. 86, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1669704 (arguing that imposing higher equity capital requirements would lead banks to make better lending decisions and that many of the criticisms of higher equity capital requirements inappropriately focus on private costs to banks rather than larger social costs); *see also* Krishnamurthy, *supra* note 91, at 5 ("[A] group of prominent scholars advocate simple capital ratios as the most effective regulatory tool with which to mitigate risk in the financial system."). While both Basel III and the Federal Reserve's new capital standards increase required capital for most banks, these increases are unlikely to significantly enhance financial stability. *See* Krishnamurthy, *supra* note 91, at 7 (advocating more substantial increases in capital requirements).

disagreement over whether increases in house prices are justified.[96] When there is widespread public concern and an active policy debate over the possibility of a bubble, there will usually be some plausible model under which house prices can be justified by fundamentals.[97] Such alternative models will exist even when other models based on fundamentals cannot explain house prices. For better or worse, such indeterminacy is endemic to asset pricing models and evidence.[98] If the burden of proof rests on regulators to demonstrate that a bubble exists, then this burden will rarely be met. Housing bubbles have a long history,[99] but this history provides little evidence to suggest that regulators can identify bubbles as they occur and take effective measures to counteract them.

Given the current state of knowledge with respect to prudential regulation, regulators should not forego other opportunities to make the financial system and broader economy more resilient to housing bubbles. A central claim of this Article is that mortgage regulation can and should be used to address the risks posed by housing bubbles. The mortgage market provides the credit that fuels housing bubbles. It also plays a key intermediating role linking housing bubbles to the broader economy. Compared to the complexity of financial institutions, mortgages are fairly simple contracts to regulate.

Regulation of the mortgage market therefore presents an opportunity to address the risks of housing bubbles where they are easiest to target. Despite this opportunity, existing scholarship on addressing the threat posed by housing bubbles has largely ignored mortgage regulation, focusing instead on reforming traditional prudential regulation like bank capital requirements,[100] while legal scholarship on mortgage regulation has focused

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[96] *See supra* notes 32-37 and accompanying text.

[97] *See* Himmelberg et al., *supra* note 34, at 68-73 (discussing fallacies about the costliness of the housing market and how to accurately assess the state of home prices to determine whether a bubble exists).

[98] *See generally* Lawrence H. Summers, *Does the Stock Market Rationally Reflect Fundamental Values?*, 41 J. FIN. 591 (1986) (noting that market valuations can differ substantially from rational expectations of future cash flows without such differences being statistically discernible from realized returns).

[99] *See generally* CHARLES P. KINDLEBERGER & ROBERT ALIBER, MANIAS, PANICS, AND CRASHES: A HISTORY OF FINANCIAL CRISES (2005) (recounting the history of asset bubbles followed by financial crises); REINHART & ROGOFF, *supra* note 32 (analyzing the relationship between past financial crises and housing bubbles).

[100] *See generally* ANAT ADMATI & MARTIN HELLWIG, THE BANKERS' NEW CLOTHES: WHAT'S WRONG WITH BANKING AND WHAT TO DO ABOUT IT (2013) (arguing for reforms to prudential regulation to prevent a recurrence of the recent financial crisis).

instead on traditional consumer protection issues.[101] In Parts II and III, we show that the Dodd–Frank Act's reforms to mortgage regulation are also based on a consumer-protection paradigm. Protecting vulnerable borrowers from being exploited by predatory lenders is indeed a worthy regulatory goal and one very much compatible with the bubble-focused paradigm we advocate in this Article. But the Dodd–Frank Act's exclusive focus on consumer protection produces costs in the form of economic instability. In Part IV, we outline a better approach: regulating mortgages against bubbles.

II. Risk Retention

The two principal mortgage-market reforms in the Dodd–Frank Act are the risk retention requirement and the ability-to-repay rule. In this Part and in the next, we analyze the underlying logic of these reforms and show that they have a common structure. Both are premised on the idea that the problems in mortgage underwriting revealed by the crisis resulted from sophisticated market participants—securitizers and mortgage originators—taking advantage of less sophisticated investors and borrowers. Both rely on reshaping the incentives of these sophisticated market participants to improve underwriting. And both will be ineffective, or worse, in the face of a housing bubble.

While our primary goal in this Part is to evaluate the risk retention requirement, our analysis also engages the broader issue of the underlying causes of the financial crisis. We expose fundamental limitations of the dominant narrative, which emphasizes moral hazard in the origination and securitization of mortgages. We emphasize a basic fact that any approach to reforming the mortgage market must face: when the housing bubble burst, the originators and securitizers on the inside of the mortgage market suffered catastrophic losses. The analysis that follows thus holds more general implications for the design of policy to protect the economy from housing bubbles.

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[101] *See generally, e.g.*, Barr et al., *supra* note 9 (studying the interaction between consumer psychology and market competition and concluding that regulation is needed); Oren Bar-Gill, *The Law, Economics and Psychology of Subprime Mortgage Contracts*, 94 Cornell L. Rev. 1073 (2009) (studying a demand-side market failure in the mortgage market where imperfectly rational consumers make suboptimal choices); Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 Tex. L. Rev. 1255 (2002) (studying market failures that give rise to predatory lending); Lauren E. Willis, *Decisionmaking and the Limits of Disclosure: The Problem of Predatory Lending: Price*, 65 Md. L. Rev. 707 (2006) (applying psychology and behavioral economics to the predatory lending problem).

A. *Background*

Moral hazard posed by securitization was the central concern motivating the Dodd–Frank Act's risk retention requirement. The Treasury Department originally proposed the requirement in a June 2009 white paper announcing the Obama administration's financial reform agenda.[102] "Lenders and securitizers had weak incentives to conduct due diligence regarding the quality of the underlying assets being securitized," the report explained.[103] Accordingly, "federal banking agencies should promulgate regulations that require loan originators or sponsors to retain five percent of the credit risk of securitized exposures."[104]

Colloquially referred to as the "skin-in-the-game" requirement, the risk retention requirement survived in the final bill signed into law in 2010. Section 941(b) of the Dodd–Frank Act directs the federal banking agencies and the SEC to promulgate a rule requiring securitizers to retain at least a 5% interest in the credit risk of any asset that they convey to a third party through an asset-backed security (ABS).[105] The statute includes specific standards for the agencies' risk retention regulation. For example, it requires that securitizers be prohibited from hedging their required interest in their ABS.[106] It also directs the relevant agencies to define the term

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[102] DEP'T OF THE TREASURY, FINANCIAL REGULATORY REFORM: A NEW FOUNDATION 3 (2009), *available at* http://www.treasury.gov/initiatives/wsr/Documents/FinalReport_web.pdf.

[103] *Id.* at 44.

[104] *Id.* The Senate Committee Report on the legislation further described the rationale for this approach:

> [L]oans were made expressly to be sold into securitization pools, which meant that the lenders did not expect to bear the credit risk of borrower default. This led to significant deterioration in credit and loan underwriting standards . . . .
>   . . . .
>   . . . [I]t proved impossible for investors in asset-backed securities to assess the risks of the underlying assets . . . .
>   . . . .
>   Section 941 [of the Dodd–Frank Act] directs the Federal banking agencies and the SEC to jointly prescribe regulations to require any securitizer to retain a material portion of the credit risk of any asset that [it securitizes]. When securitizers retain a material amount of risk, they have "skin in the game," aligning their economic interests with those of investors . . . . Securitizers who retain risk have a strong incentive to monitor the quality of the assets they purchase from originators, package into securities, and sell. . . .
>   . . . Originators . . . will come under increasing market discipline because securitizers who retain risk will be unwilling to purchase poor-quality assets.

S. REP. NO. 111-176, at 128-29 (2010).

[105] Dodd–Frank Act § 941(b), 15 U.S.C. § 78o-11(c)(1)(B)(i) (2012).

[106] *Id.*, 15 U.S.C. § 78o-11(c)(1)(A).

"qualified residential mortgage" (QRM), and exempts mortgages that meet this definition from the risk retention requirement.[107]

B. *The Market Failure Theory*

Why might a requirement that securitizers retain a minimum portion of the credit risk of the assets they securitize be useful? Or to rephrase in the conventional terms of regulatory analysis, to what market failure is such a regulatory requirement a useful response? To evaluate the risk retention requirement, it is crucial to understand the market failure theory on which it is premised.

1. The Asymmetric Information Theory of Risk Retention

The most prominent academic defenders of the risk retention approach point to moral hazard posed by securitization as a justification for mandatory risk retention.[108] The basic idea is that when lenders sell the

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[107] More precisely, if an ABS contains only QRMs, it is exempt from the risk retention requirement. *Id.*, 15 U.S.C. § 78o-11(c)(1)(C)(iii). To define QRMs, the law directs regulators to consider features of mortgages that "historical loan performance data indicate result in a lower risk of default." *Id.*, 15 U.S.C. § 78o-11(e)(4)(B). The agencies issued a proposed rule to implement the risk retention requirement in 2011. Credit Risk Retention, 76 Fed. Reg. 24,090 (proposed Apr. 29, 2011) (codified at 12 C.F.R. pts. 43, 244, 373 & 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267). However, it met with fierce criticism by an unusual coalition of consumer advocates and the banking industry. The focus of their attack was the high down payment needed for a mortgage to qualify as a QRM. Imposing risk retention on low down payment loans would "restrict access to credit for a wide swath of prospective homeowners to a more expensive and possibly less accessible market." Comment Letter from Consumer Fed'n of Am. to OCC, Fed. Reserve Bd., FDIC, SEC, FHFA, and HUD 4 (Aug. 1, 2011), *available at* http://www.consumerfed.org/pdfs/CFARiskRetentionRulescommentletter2011.pdf. Accordingly, in September 2013, the agencies proposed a new rule with a substantially broader definition of QRM that eliminated both the down payment and credit history requirements. Credit Risk Retention, 78 Fed. Reg. 57,928 (proposed Sept. 20, 2013) (codified at 12 C.F.R. pts. 43, 244, 373 & 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267). Defenders of risk retention argued that this broad definition of QRM would substantially weaken the Dodd–Frank Act's risk retention requirement and thereby increase systemic risk. Comment Letter from Sheila C. Bair, Senior Advisor, Pew Charitable Trusts, to Robert deV. Frierson, Sec'y, Bd. of Governors of the Fed. Reserve Sys. (Oct. 30, 2013), *available at* http://www.federalreserve.gov/SECRS/2014/January/20140106/R-1411/R-1411_111813_111631_580446904665_1.pdf. The agencies published a final rule in December 2014 that included this expanded definition of QRM. Credit Risk Retention, 79 Fed. Reg. 77,602 (Dec. 24, 2014) (codified at 12 C.F.R. pts. 43, 244, 373 & 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267).

[108] *See* Benjamin J. Keys et al., *Mortgage Financing in the Housing Boom and Bust* (reviewing evidence that securitization led to lax screening by originators and concluding that "it may be beneficial to enforce some mandatory retention of a fraction of lower tranche by originators/underwriters to better align their interests with those of investors"), *in* HOUSING AND THE FINANCIAL CRISIS, *supra* note 37, at 143, 194; *see also* Levitin & Wachter, *supra* note 11, at 1257 ("The major alternative approach to addressing the investor–securitizer, principal–agent

mortgages that they originate to securitizers and, ultimately, investors, they lack incentives to use the information they generate about the borrowers to screen out risky loans.[109] The result is too many bad loans.

Asymmetric information about borrowers can indeed produce incentive problems—including moral hazard and adverse selection—that lead to a market failure. However, because market actors can voluntarily contract for risk retention, a risk retention requirement is not useful under the standard models in information economics—an important point missed by these proponents of mandatory risk retention.

To see this, consider a lender that can originate mortgage loans and a securitizer that has a lower cost of funds than the originator.[110] The lender can assess the creditworthiness of loan applicants by, for example, running credit checks and documenting the applicants' incomes and assets. It is efficient for the lender to do some investigation of each applicant and to lend only to applicants whose creditworthiness is above a particular threshold. The securitizer's lower cost of funds also means that it is efficient for the lender to sell all of the loans it originates to the securitizer.

Suppose, however, that not all of the information the originator generates about each loan applicant can be credibly conveyed to the securitizer. This information asymmetry poses a problem for loan sales. Because the securitizer cannot fully observe the credit quality of the borrower, the lender will have incentives to cut corners on investigating applicants, to lend to borrowers with worse credit quality than the optimal threshold, and to sell those lower quality loans to the securitizer.

Securitization also entails a subsequent credit risk transfer from the securitizer to investors. If the securitizer has better information about the quality of the loans than investors, then this second transfer raises a similar incentive problem. If the securitizer sells all of the credit risk to investors, then the securitizer will not have an incentive to screen the mortgages that it buys and packages into MBS or to adopt the optimal contractual practices to maintain originators' incentives to screen borrowers.

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problem is the approach taken by the Dodd–Frank [Act], which requires that securitizers retain a portion of the risk on their securitizations."). Levitin and Wachter propose to combat moral hazard by prohibiting securitization of nonstandardized mortgages, which is a form of 100% originator risk retention. Levitin & Wachter, *supra* note 11, at 1252-57.

[109] Keys et al., *supra* note 108, at 169-75.

[110] The informal account that follows is based on a formal model provided in Bubb & Kaufman, *supra* note 14, at 5-6.

In the standard economic analysis of asymmetric information, pioneered in George Akerlof's *The Market for "Lemons,"*[111] the securitizers and investors understand the nature of this incentive problem. They thus adjust downward their willingness to pay for loans to reflect their lower expected quality. If this incentive problem is severe, the lender may prefer to keep its loans rather than to sell them at a steep discount.[112] Indeed, this information asymmetry is the accepted explanation for the fact that historically banks originated loans and did not sell them.[113] Information asymmetry reduces the trade in loans in the secondary market.

Surprisingly, some accounts of the incentive problem posed by securitization argue the opposite: that information asymmetry allows securitizers to *increase* the volume of trade in mortgage claims before the market later collapses. For example, Levitin and Wachter argue that "[s]ecuritization's fee-based business model and its inherent information asymmetries create a potential 'lemons' problem because securitizers are tempted to push ever more questionable product on investors."[114] In their account, information asymmetry leads to exploitation of relatively uninformed mortgage borrowers and MBS investors by informed financial intermediaries like lenders and securitizers.[115] Investors paid inflated prices for MBS filled with lemons and allowed securitizers to increase the volume of trade in the secondary mortgage market.[116] Levitin and Wachter characterize their analysis as the standard economic analysis of asymmetric information, concluding that "[t]he bubble and its aftermath play out George Akerlof's lemons problem exactly as predicted."[117] And this conclusion motivates their proposal to ban securitization of nontraditional

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[111] *See* George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488, 490-91 (1970) (analyzing the adverse consequences of asymmetric information).

[112] *See id.* (explaining that asymmetries of information may create a situation where there is essentially no market at all for a good and no trades take place).

[113] Gary B. Gorton & George G. Pennacchi, *Banks and Loan Sales: Marketing Nonmarketable Assets*, 35 J. MONETARY ECON. 389, 390 (1995) ("Historically, financial intermediaries have created loans that were not later sold.").

[114] Levitin & Wachter, *supra* note 11, at 1230.

[115] *See id.* at 1231-32 ("Potential principal–agent problems exist both between mortgage borrowers and financial intermediaries and between mortgage investors and the financial intermediaries. . . . The combination of information asymmetries on both sides of the housing–finance market meant that borrowers were entering into overly leveraged purchases at rates that underpriced risk, while investors were making the leverage available too cheaply.").

[116] *Id.* at 1230-31.

[117] *Id.* at 1230 n.181.

mortgage products, which is equivalent to a 100% risk retention requirement for such mortgages.[118]

However, this dynamic boom-and-bust account is not part of the standard equilibrium analysis of lemons markets. As we have explained, in the standard analysis, rational buyers do not get duped initially by being sold lemons. Rather, they understand the incentive problem from the start, which either reduces trade or prevents the market from forming in the first place.[119] Asymmetric information alone is insufficient to explain a boom in low quality mortgages.[120] As we explain in more detail below, for asymmetric information to lead to such an outcome, there must also be some form of investor naiveté about the incentive problem.[121] This analytic point is crucial for understanding the underlying causes of the mortgage crisis and for evaluating potential reforms.

In the standard analysis, market participants have incentives to devise contractual solutions to the incentive problems posed by asymmetric information in order to efficiently expand trade in mortgages. One private-ordering solution is risk retention by the originator.[122] By retaining a

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[118] *Id.* at 1252-57.

[119] *See* Akerlof, *supra* note 111, at 488 ("As a result [of the lemons market,] there tends to be a reduction in the average quality of goods and also in the size of the market.").

[120] The standard economic analysis requires a *reduction* in asymmetric information to produce more trade in the secondary market. Indeed, one explanation for the expansion of securitization is that the innovations in tranching and other credit enhancements create securities that are less sensitive to information asymmetries. *See* Gary Gorton & Andrew Metrick, *Securitization* ("Securitization has important features that make it very attractive as collateral. A desirable feature of collateral is that it is information-insensitive, so it preserves value." (citation omitted)), *in* 2A HANDBOOK OF THE ECONOMICS OF FINANCE 1, 33 (George Constantinides et al. eds., 2013).

[121] *See infra* notes 122-40 and accompanying text. Levitin and Wachter go on to argue that incentive problems created by information asymmetries elsewhere in the market inhibited normal market constraints on the overpricing of MBS. They point, in particular, to incentive problems in the credit ratings markets, in resecuritizations of junior tranches of MBS, and in the credit-default swap market. Levitin & Wachter, *supra* note 11, at 1233-52. For Levitin and Wachter, it is information asymmetries and incentive problems all the way down.

[122] Gorton & Pennacchi, *supra* note 113, at 394 ("By retaining a portion of the loan, the bank could reduce agency problems since it continues to face a partial incentive to maintain the loan's value. The greater the portion of the loan held by the bank, the greater will be its incentive to evaluate and monitor the borrower."); *see also* Ingo Fender & Janet Mitchell, *The Future of Securitisation: How to Align Incentives?*, BIS Q. REV., Sept. 2009, at 27, 36 (noting that retention of the equity tranche by the originator had traditionally been used in securitization agreements in order to align the originator's incentives); Barney Hartman-Glaser et al., *Optimal Securitization with Moral Hazard*, 10 J. FIN. ECON. 186, 193-95 (2012) (analyzing a model of securitization with moral hazard and showing that the optimal incentive contract can be closely approximated by a requirement that the originator retain a first-loss equity tranche); Darell Duffie, *Innovations in Credit Risk Transfer: Implications for Financial Stability* 8-12 (Bank for Int'l Settlements, Working

fractional interest in the loans it originates and sells, the originator maintains its incentive to screen borrowers. In the now-familiar parlance, the originator has "skin in the game" because it bears at least some of the costs if borrowers default. Moreover, both the securitizer and investors understand the better incentives created by risk retention and are therefore willing to pay a higher price for loans in which the originator retains an interest.

The incentive benefits of risk retention come at a cost. Because the originator has a higher cost of funds than the securitizer, the efficient outcome would be for the lender to sell all of its loans to the securitizer. The cost of risk retention is the lost gains from trade in loans. The optimal amount of risk retention thus balances the benefits in terms of improved incentives against these lost gains from trade. By contracting on risk retention, the parties can achieve a second-best outcome that, while not first-best efficient, is superior to the even more limited trade that would take place in the absence of such contractual incentive devices.[123] Risk retention by securitizers can also be a useful incentive device to support trade between securitizers and investors.[124]

While the theory of asymmetric information provides the standard rationale for risk retention by originators and securitizers, it does not provide a rationale for regulatory imposition of risk retention. Quite the contrary. If risk retention is a useful incentive device, then market participants will voluntarily adopt it in their contracts. In fact, in the standard model, a risk retention requirement can only make the parties worse off. Note that the requirement changes behavior only if it mandates a greater level of risk retention than what market participants would adopt on their own. In the absence of regulation, market participants would bargain for a level of risk retention that balances the benefits of improved incentives

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Paper No. 255, 2008) (showing that the retention of certain mortgage assets by the originator may lead to an efficient outcome in asset-backed security markets).

[123] This is shown using a formal model in Bubb & Kaufman, *supra* note 14, at 5-6.

[124] Importantly, the Dodd–Frank Act's risk retention requirement is an obligation of *securitizers*, not originators, to retain at least 5% of the credit risk of any assets they securitize. Dodd–Frank Act § 941(b), 15 U.S.C. § 78o-11(d)(1) (2012) ("In determining how to allocate risk retention obligations between a securitizer and an originator under subsection (c)(1)(E)(iv), the Federal banking agencies and the Commission shall . . . reduce the percentage of risk retention obligations required of the securitizer by the percentage of risk retention obligations required of the originator . . . ."). Under the proposed rule, a securitizer's risk retention obligation is reduced by whatever amount of risk the originator of the assets retains. Credit Risk Retention, 78 Fed. Reg. 57,928, 57,966-68 (proposed Sept. 20, 2013) (codified at 12 C.F.R. pts. 43, 244, 373, 1234; 17 C.F.R. pt. 246; and 24 C.F.R. pt. 267) (describing the proposed rule's provisions that would allow a securitizer to allocate a portion of the credit risk it is required to retain to the originator).

against the costs of foregone trade. A binding risk retention requirement would be inefficient because, by definition, the lost gains from trade from a higher level of risk retention would outweigh the resulting incentive benefits. Asymmetric information can indeed be an important source of market failure in the securitization market, but it alone does not justify a regulatory risk retention requirement.

To justify such a requirement, we would need, in addition to the first-order market failure of moral hazard, a *second-order* market failure: a failure of market participants to adopt the efficient level of risk retention. Only if market participants for some reason fail to adopt the second-best set of private arrangements to deal with the incentive problem can a mandatory risk retention requirement potentially be justified.

Our analysis of the risk retention requirement bears an interesting parallel to the debate between Ronald Coase and Arthur Pigou about the nature of the market failure posed by externalities. Pigou's great insight was that some activities have effects on third parties.[125] Consider pollution from a factory. Such negative externalities create an opportunity for government policy to improve the allocation of resources. Pigou's prescription was to tax the externality-producing activity so that the marginal private cost to the person or firm engaged in the activity is equal to the marginal social cost.[126] This would result in the socially optimal level of the activity. Coase's response in *The Problem of Social Cost* was to observe that Pigou's concept of externality is incomplete.[127] If all of the parties involved are able to contract at low cost, then there is no market failure and therefore no way for government to improve on the market outcome. If there are "zero transaction costs," a bargain will be struck and there is no need for taxation or regulation. The upshot is that there has to be some transaction cost that impedes such a private bargain in order for a Pigouvian tax to be useful.

Our claim with respect to the risk retention requirement and its proponents is analogous to that of Coase with respect to externality taxes and Pigou. Proponents of risk retention echo Pigou when they argue that if securitizers do not have some skin in the game, then they will sell bad mortgages to investors and therefore that government should regulate incentives.[128] It is true that asymmetric information can lead to a market failure even when there are no other transaction costs.[129] But we respond,

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[125] A. C. PIGOU, THE ECONOMICS OF WELFARE 134 (4th ed. 1932).

[126] *Id.* at 192-94.

[127] R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 28-32 (1960).

[128] *See* Keys et al., *supra* note 108, at 143.

[129] For this reason, our argument is not a direct application of the Coase Theorem, strictly speaking.

echoing Coase, that mandating an incentive device that the parties could adopt on their own is useful only if there is something impeding their ability to do so. In the absence of such an impediment, market participants will achieve the second-best (or constrained efficient) outcome—that is, the best outcome achievable given the information asymmetry. Having the government wade in by requiring a specific incentive arrangement does not make sense absent a second-order market failure in the private responses to the first-order market failure.[130]

2. The Naive-Investors Theory

We next consider an explanation for such a second-order market failure that we call the *naive-investors theory*. The theory takes as its starting point asymmetric information between buyers and sellers of mortgage loans. But it also posits an additional asymmetry in understanding of the incentive problems posed by securitization. Under this view, sellers in this market—securitizers and originators—understand that they are incentivized to exert little effort to screen loans that they will not ultimately hold. In contrast, the buyers—MBS investors—are naive and do not understand the incentives of sellers.[131] We use the term "naive" capaciously to include any reason that MBS investors behave as if they systematically underestimate the extent of the incentive problem, including reasons that are not based in any behavioral bias.

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[130] We put aside here the possibility that mortgage originations might produce negative externalities—for example, through the spillover effects of mortgage default—that might separately warrant some form of regulatory intervention. We simply note that risk retention would be an odd approach to limiting the externalities of mortgage default since risk retention increases systemic risk externalities by concentrating mortgage risk on the balance sheets of systemically important financial institutions. *See infra* notes 143-47 and accompanying text.

[131] Some accounts of the moral hazard problem posed by securitization explicitly posit some form of investor naiveté. *See, e.g.*, Gorton, *supra* note 50, at 68 ("It is argued that originators and underwriters of loans no long[er] have an incentive to pay attention to the risks of loans they originate, since they are not residual claimants on these loans. In this view, investors apparently do not understand this and have been fooled (fingers point to the rating agencies)."); *see also* Atif Mian & Amir Sufi, *The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis*, 124 Q.J. ECON. 1449, 1482 (2009) (describing data that show an increase in default rates when mortgages were sold for securitization as compared to when they were sold to non-government-sponsored enterprises from 2005 to 2007); Frederic S. Mishkin, Governor, Bd. of Governors of the Fed. Reserve Sys., On "Leveraged Losses: Lessons from the Mortgage Meltdown," Speech at the U.S. Monetary Policy Forum (Feb. 29, 2008), *available at* http://www.federalreserve.gov/newsevents/speech/mishkin20080229a.htm ("Investors apparently failed to realize the importance of these agency problems and, it seems, did not insist on practices to align the incentives of originators, securitizers, and resecuritizers with the underlying risks.").

The naive-investors theory provides a theoretically coherent case for the risk retention requirement. As a result of their naiveté, MBS investors will fail to insist on the optimal degree of risk retention—or, more precisely, will fail to accurately price MBS based on the incentives of the originators and securitizer. Because the optimal incentive contract will not emerge on its own through private ordering, a regulator could potentially improve on the market outcome by imposing a risk retention requirement.[132]

There are a number of institutional and psychological factors that might lead investors to behave as if they misunderstand the risks created by the incentive structure of securitization. First, investors might simply lack experience with securitization. Perhaps it took a full-scale mortgage meltdown for investors to appreciate the severe incentive problems at work, and perhaps in time that lesson will be forgotten.

Second, and relatedly, some have argued that securitization leads to excessive complexity that prevents investors from understanding the risks associated with MBS.[133] This complexity transforms the plain-vanilla, asymmetric information problem by turning Rumsfeldian "known unknowns" into "unknown unknowns." As we have emphasized, asymmetric information on its own does not produce a second-order market failure. Faced with a complex securitization that they have little ability to assess, rational investors should refrain from purchasing MBS.[134] Consequently, proponents of this view argue that complexity also led to investor misunderstanding.[135] If complexity causes investors to misunderstand the

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[132] *See, e.g.*, Paul S. Willen, *Evaluating Policies to Prevent Another Crisis: An Economist's View*, 3 CATO PAPERS ON PUB. POL'Y 185, 211 (2014) (providing a monetary example to show how government policy could have helped align investor and lender interests).

[133] *See* Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 220 (2009) ("The complexities of modern investment securities can lead to a failure of investing standards and financial-market practices [because] . . . they obscure the ability of market participants to see and judge consequences . . . ."); *see also* Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657, 686-87 (2012) (explaining that "financial innovations" like MBS become highly complex over time and may escape "close scrutiny by market participants or regulators" as a result of this slow progression).

[134] Put differently, they should purchase fewer MBS than they would if they could assess the associated risks.

[135] Schwarcz, *supra* note 133, at 219 (questioning why MBS investors "did not impose on the originator the same strict lending standards that they would otherwise observe but for the separation of origination and ownership" and hypothesizing that "by separating the ultimate owners of the mortgage loans from the actual lenders, an originate-to-distribute model makes it difficult for those owners to always see the big picture"). Professor Katherine Judge makes a similar argument. *See* Judge, *supra* note 133, at 692 (arguing that "most investors were acquiring [MBS] without a complete understanding of all of the information pertinent to their value"). She continues:

degree of incentive (mis)alignment in MBS, then this is a version of the naive-investors theory as we have defined it.

Third, investor naiveté could result from a failure to understand the extent of other agency conflicts in the securitization market. The most commonly cited concern in this regard is the incentive problems in the market for credit ratings.[136] The conventional wisdom is that, because issuers pay the rating agencies to evaluate their bonds, the rating agencies have an incentive to inflate the ratings of MBS. Any credit rating agency that holds the line and gives accurate ratings would lose business as issuers would take their bonds elsewhere to be rated. So another version of the naive-investors theory is that investors are naive about a different agency problem—the agency conflict between credit rating agencies and themselves—and put too much faith in the rating agencies to evaluate the quality of MBS.[137]

> Without . . . the expectation among mortgage originators that they could quickly and easily resell loans into the secondary market, lending standards most likely would not have declined as far as they did, and real estate prices would not have escalated as high as they did. That capital, however, came in significant part from investors who did not have a clear view through to the quality of the loans underlying their investments.

Id. at 693. She suggests that the resulting information loss "may well have contributed to the degradation in underwriting standards and practices and the growth of the subprime market." *Id.* at 694. She distinguishes two distinct issues:

> One is the mispricing of the risk associated with home loans, particularly subprime home loans, which was a primary factor in both the real estate and mortgage security bubbles. The other, related issue is the extension of loans that were particularly unlikely to be repaid even on the excessively generous terms on which they were being offered. The claim here is that both may be traced, at least in part, to the information loss that resulted from the proliferation of MBSs and CDOs. The FCIC's finding that loans packaged into [private-label MBS] performed substantially worse than seemingly similar GSE loans suggests that the presence of a fragmentation node increased the probability of low-quality loans being made. . . . The empirical evidence is thus consistent with the conjecture that as the number of fragmentation nodes [like MBS] increased, so too did the rate at which home loans were extended that should not have been.

Id. at 695.

   [136] *See, e.g.*, Frank Partnoy, *How and Why Credit Rating Agencies Are Not Like Other Gatekeepers* (highlighting the differences between credit rating agencies and other gatekeepers), *in* FINANCIAL GATEKEEPERS: CAN THEY PROTECT INVESTORS? 59, 60 (Yasuyuki Fuchita & Robert E. Litan eds., 2006); Lawrence J. White, *Markets: The Credit Rating Agencies*, J. ECON. PERSP., Spring 2010, at 211, 216-21 (describing the barriers to entry that keep this market small and the controversy that resulted from Enron's positive credit ratings preceding its bankruptcy).

   [137] Patrick Bolton et al., *The Credit Ratings Game*, 67 J. FIN. 85, 87 (2012) (arguing that while some investors in MBS understand rating agencies' conflicts of interest, "a significant fraction . . . of investors are trusting, in that they take the . . . ratings at face value"); Aaron

This version of the naive-investors theory, however, just peels back one layer of the onion. Why would investors be naive about credit rating agencies' incentives? One possible answer is that investor uncertainty about the extent of the rating agencies' incentive conflict is a natural feature of the reputational mechanism that has traditionally been thought to incentivize rating agencies' truthfulness. The incentives of rating agencies are not so bleak as the issuer-pays story above suggests. Rating agencies have an incentive to resist the temptation to inflate ratings in order to preserve their long-run reputations. A rating agency that gives bad ratings will find its future ratings lose their value to investors. This reputational mechanism is the standard explanation for why market participants value credit ratings in the first place.[138]

The key issue for such reputation mechanisms is whether the short-run gain from inflating the ratings outweighs the long-run reputational cost. In boom times, the short-run gain can increase, leading to a breakdown in the reputational mechanism. Moreover, investors may be uncertain whether, at any given moment, the rating agency has begun to inflate ratings. If rating agencies switch from truthfulness to ratings inflation—for example, during a period of high demand—there will naturally be a transition period before investors realize the deviation.[139]

Whatever the ultimate source of this investor naiveté about credit ratings, it would result in the systematic mispricing of the incentive properties of MBS. If securitizers understand that the rating agencies will

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Lucchetti & Serena Ng, *Credit and Blame: How Rating Firms' Calls Fueled Subprime Mess*, WALL ST. J., Aug. 15, 2007, at A1 ("A lot of institutional investors bought [MBS] substantially based on their ratings, in part because this market has become so complex." (internal quotation marks omitted)).

[138] *See, e.g.*, Stephen Choi, *Market Lessons for Gatekeepers*, 92 NW. U. L. REV. 916, 961 (1998) ("The value of both debt rating agencies lies in their ability to convince financial purchasers of the validity and accuracy of their ratings.").

[139] This theory is in the spirit of the model by Jérôme Mathis et al., *Rating the Raters: Are Reputation Concerns Powerful Enough to Discipline Rating Agencies?*, 56 J. MONETARY ECON. 657 (2009), in which the authors argue that when the majority of a credit rating agency's business is rating complex products, the agency likely inflates its assessments. One reason that investors may be slow to realize a breakdown in the integrity of credit ratings is incentive problems within firms that invest in MBS. Bond portfolio managers are commonly incentivized to maximize yield, conditioned on complying with a set of constraints on risk-taking. *See* Bo Becker & Victoria Ivashina, *Reaching for Yield in the Bond Market*, J. FIN. (forthcoming) (manuscript at 5-6, 10), *available at* http://nrs.harvard.edu/urn-3:HUL.InstRepos:11337406 (describing the behavior of investors who often buy assets with higher risk to achieve higher yields). A common constraint is that the bonds have an investment-grade rating, such as AAA. *Id.* (manuscript at 2). Such incentive arrangements can lead managers to "reach for yield" by purchasing the highest yield bonds in the allowed ratings category. *Id.* (manuscript at 2-3). Inflated ratings, in the short term, would result in bond managers purchasing these higher yield bonds on behalf of investors.

give inflated ratings to MBS with low quality loans, they will have less incentive to superintend the underwriting practices of originators.[140]

To summarize, the naive-investors theory posits that investors may misunderstand some features of the securitization market that affect the incentives of originators and securitizers to screen mortgages. This misunderstanding can result in a second-order market failure—a failure to adopt the optimal contractual mechanisms and practices to mitigate this incentive problem. Therefore, unlike the standard theory of asymmetric information, the naive-investors theory provides a coherent explanation as to why requiring securitizers to retain credit risk might efficiently improve incentives to screen mortgages.

C. *Risk Retention in a Bubble*

While the naive-investors theory provides a coherent account of its potential benefits, risk retention also entails costs. In this Section, we analyze these benefits and costs specifically in the context of a housing bubble in order to evaluate the risk retention requirement's likely macroeconomic effects. The Dodd–Frank Act required the FSOC to study the macroeconomic effects of the risk retention requirement in advance of the rulemaking implementing the requirement and to report on the study to Congress.[141] That report fails to engage with the key issues raised by risk retention, citing as the only cost the possibility that an excessively stringent risk retention requirement will reduce credit availability.[142] We show that, in a housing bubble, the benefits of risk retention are small, and the systemic-risk costs are large. Experience from the recent financial crisis shows that mandating risk retention is, at best, ineffective in a bubble and, at worst, counterproductive.

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[140] Yet another version of the naive-investors theory similarly based on the breakdown in a reputational mechanism is that MBS investors may have misjudged the reputational incentives of originators and securitizers to screen mortgages. These mortgage sellers also care about their reputations because if the loans they sell perform poorly, they will have difficulty selling loans in the future. The strength of these reputational concerns, in turn, is determined by the tradeoff between the present gains from selling more low quality loans and any potential future loss of revenue. The mortgage boom may have increased the temptation to shirk on screening, leading to a breakdown in underwriting, and investors may have been slow to appreciate this change in incentives.

[141] Dodd–Frank Act, Pub. L. No. 111-203, § 946, 124 Stat. 1376, 1898 (2010).

[142] TIMOTHY F. GEITHNER, FIN. STABILITY OVERSIGHT COUNCIL, MACROECONOMIC EFFECTS OF RISK RETENTION REQUIREMENTS 27 (2011), *available at* http://www.treasury.gov/initiatives/wsr/Documents/Section%20946%20Risk%20Retention%20Study%20%20%28FINAL%29.pdf ("An excessive requirement could unduly limit credit availability . . . .").

1. The Costs of Risk Retention for Financial Stability

A commonly cited benefit of securitization—and of financial innovation more generally—is that it allows a more efficient allocation of risk across different actors in the economy.[143] Securitization can increase the stability of the financial system by moving housing risk outside of the banking system. Consistent with this purpose, MBS investors include a wide swath of nonbank institutions, including pension funds and insurance companies.[144]

In contrast, a requirement that securitizers retain a minimum amount of the credit risk of the assets they securitize *concentrates* risk. Twelve underwriters accounted for about 80% of the total volume of private-label MBS issuance during the recent boom.[145] The leading sponsors of MBS in the run-up to the crisis included many of the largest banks and broker–dealers—Lehman Brothers, Bear Stearns, Merrill Lynch, Bank of America, and Citigroup.[146] By concentrating housing market risk on the balance sheets of such large, systemically important financial institutions, risk retention increases systemic risk.[147]

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[143] *See* Franklin Allen & Elena Carletti, *Credit Risk Transfer and Contagion*, 53 J. MONETARY ECON. 89, 95-103 (2006) (demonstrating the beneficial effects of risk sharing across different sectors); Vishal Gaur et al., *Securitization and Real Investment in Incomplete Markets*, 57 MGMT. SCI. 2180, 2194-95 (2011) (describing the pooling and tranching of securities); Thorsten V. Köppl, *Risk Sharing Through Financial Markets with Endogenous Enforcement of Trades*, 30 J. ECON. DYNAMICS & CONTROL 1987, 1994-95 (2006) (analyzing the efficacy of enforcement intermediaries for asset markets); Alan Greenspan, Chairman, Bd. of Governors of the Fed. Reserve Sys., Economic Flexibility, Remarks at the HM Treasury Enterprise Conference (Jan. 26, 2004), *available at* http://www.federalreserve.gov/boarddocs/speeches/2004/20040126/default.htm ("The new instruments of risk dispersion have enabled the largest and most sophisticated banks in their credit-granting role to divest themselves of much credit risk by passing it to institutions with far less leverage."). *See generally* FRANKLIN ALLEN & DOUGLAS GALE, FINANCIAL INNOVATION AND RISK SHARING (1995) (analyzing various financial innovations and their impact on economic welfare).

[144] *See* Dwight Jaffee et al., *Mortgage Origination and Securitization in the Financial Crisis* (listing the holders of mortgage debt by type of institution), *in* RESTORING FINANCIAL STABILITY: HOW TO REPAIR A FAILED SYSTEM 61, 71-72 (Viral V. Acharya & Matthew Richardson eds., 2009).

[145] SEC, SUMMARY REPORT OF ISSUES IDENTIFIED IN THE COMMISSION STAFF'S EXAMINATIONS OF SELECT CREDIT RATING AGENCIES 32 (2008).

[146] *See infra* Table 1.

[147] While the proposed risk retention rule allows securitizers to allocate part or all of the 5% required risk retention to the originator, securitizers, as large, diversified financial institutions, generally have a lower cost of funds than most originators. Hence, we expect that the vast majority of the required retained interests will be held by securitizers rather than originators. Risk retention by large originators raises qualitatively similar costs in terms of systemic risk. The concentration of risk in securitizers and originators encourages additional risk taking by these institutions to the extent it increases the chances of a government bailout. This, in turn, prompts other financial institutions to hold similar risks and free ride on the implicit insurance provided to systemically important institutions.

2. The Performance of the Risk Retention Requirement in a Bubble

Whether the incentive benefits of risk retention outweigh the systemic-risk costs depends on the relative size of these effects. Evidently, the drafters of the Dodd–Frank Act concluded that, on balance, the benefits outweigh the costs. But given the crucial role of housing bubbles as the primary source of systemic risk, it is important to evaluate the performance of the risk retention requirement in a bubble.

The importance of protecting the economy from housing bubbles radically undermines the case for mandatory risk retention. First, a bubble blunts the effectiveness of risk retention as a way to control underwriting. Risk retention operates through incentives. Giving the securitizer skin in the game makes default more costly to the securitizer. The theory assumes that the securitizer will respond by more carefully screening the mortgages it securitizes and insisting that originators adopt appropriate underwriting practices. However, in a bubble, overoptimism about future house prices leads securitizers to discount substantially the possibility of mortgage default. As we have explained, as long as the house is worth more than the amount owed on the mortgage, the loan is safe.[148] The bubble therefore lowers the incentive benefits of risk retention. In the most extreme case, if parties put zero weight on the prospect of mortgage default, then risk retention provides *no* incentive benefits.[149]

Second, a bubble increases the costs of risk retention as a regulatory technique. An important downside of the Dodd–Frank Act's risk retention requirement is that it will force securitizers to retain more housing risk. In normal times, the large, diversified financial institutions that sponsor most securitizations can manage this risk. But as recent events illustrate, mortgages present a "tail risk" that, if sufficiently concentrated on the balance sheets of systemically important financial institutions, can precipitate a broader financial crisis. What is the nature of this tail risk in mortgages? As our discussion of the double-trigger model of mortgage default makes clear, it is the possibility of a national decline in house prices. Put differently, this tail risk comes principally from housing bubbles.

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[148] *See supra* notes 44-45 and accompanying text.

[149] For rational speculators who understand that there is a bubble in a particular asset market and attempt to ride the bubble and dump the assets before the bubble bursts, risk retention might produce more useful incentives. Risk retention would make riding the bubble a less attractive strategy for such rational speculators since it would prohibit them from selling all of the assets before the bubble bursts. A central premise of our analysis, however, is that there is widespread overoptimism about house prices during a housing bubble. *See supra* notes 8-13 and accompanying text. For evidence that securitizers specifically were overoptimistic about house prices during the recent housing boom, see *infra* notes 164-70 and accompanying text.

Because housing bubbles are the main source of system risk, risk retention is an ineffective—indeed, a counterproductive—approach to reducing systemic risk.[150]

3. The Evidence

Our analysis of risk retention in a housing bubble casts great doubt on whether mandatory risk retention would be effective in a bubble. We next turn to evidence from the recent boom and bust in the housing market to further evaluate risk retention. The evidence corroborates the problems associated with risk retention identified above. We start by showing that *even if* the moral hazard problem posed by selling MBS to naive investors played a significant role in the decline in underwriting standards during the boom, the evidence indicates that, in a bubble, mandating risk retention would be ineffective at best. We then show that not only is there little evidence for such a moral hazard problem, there are also good reasons to think that it did not play a substantial role.

 a. *Evidence on the Costs and Benefits of Risk Retention in a Bubble*

We begin with a key fact: in the run-up to the crisis, securitizers retained hundreds of billions of dollars in MBS and suffered massive losses as a result.[151] Table 1 below provides the MBS holdings as of 2007 of the top twenty securitizers of MBS, both in absolute terms and as a percentage of the MBS issued by the securitizer and still outstanding. The vast majority had large exposures to MBS. It is noteworthy that, in percentage terms, all but a handful retained MBS much greater than the 5% required by the Dodd–Frank Act, with most retaining greater than 20%. These MBS holdings were also large as a fraction of the firms' assets. For example, one recent study estimated Citigroup's highly rated MBS holdings as of the end of 2006, on the eve of the crisis, at 4.8% of assets.[152] Including Citigroup's holdings of collateralized debt obligations (CDOs) and holdings through off–balance sheet conduits raises the estimate to 10.7% of assets.[153]

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[150] A binding risk retention requirement might reduce the size of a housing bubble simply by adding costs to mortgage lending. However, there are much more efficient ways to add costs to mortgage lending if that is desirable—for example, by reducing government support of the mortgage market. Bubble prevention is not a sensible rationale for requiring risk retention.

[151] *See infra* Table 1.

[152] Isil Erel et al., *Why Did Holdings of Highly Rated Securitization Tranches Differ So Much Across Banks?*, 27 REV. FIN. STUD. 404, 419 (2014).

[153] *Id.*

Table 1: Top 20 Sponsors of Non-Agency MBS, 2000–2007[154]

Issuer	Issued MBS Outstanding 2007	Non-Agency MBS Holdings 2007	Non-Agency MBS Holdings / Issued MBS Outstanding	Losses on Mortgage-Related Assets as of May 2008
Countrywide	$280,577	$6640*	2.4%	$6953**
Lehman	$143,776	$41,488	29%	$3300
Washington Mutual	$119,531	$25,912	22%	$9100
GMAC	$115,075	$27,400	24%	$10,000***
Bear Stearns	$114,613	$30,313	26%	$3200
Wells Fargo	$104,966	$19,882	19%	$3300
Ameriquest	$73,021	Missing	Missing	Missing
JPMorgan Chase	$70,161	$12,356	18%	$9700
Goldman Sachs	$66,577	$46,436	70%	$3000
Credit Suisse	$66,118	Missing	Missing	$9500
IndyMac	$63,198	$7108	11%	$1264****
Bank of America	$56,428	$24,013	43%	$14,900
Morgan Stanley	$56,242	$13,150	23%	$12,600
Option One	$49,241	$197	0.4%	Missing
New Century	$48,530	$234*	0.5%	Missing
RBS	$48,143	$102,453	213%	$15,200
Merrill Lynch	$47,884	$43,556	91%	$37,000
Deutsche Bank	$44,335	Missing	Missing	$7700
UBS	$38,836	Missing	Missing	$38,200
Citigroup	$38,403	$40,878	106%	$42,900

[154] All dollar figures are in millions. Sources: Issued MBS outstanding and non-agency MBS holdings from authors' calculations from figures in SEC filings and in the Mortgage Market Statistical Annual, published by Inside Mortgage Finance. Except where otherwise noted, losses are from Yalman Onaran, *Subprime Losses Top $379 Billion on Balance-Sheet Marks: Table*, BLOOMBERG (May 19, 2008, 12:20 PM), http://www.bloomberg.com/apps/news?pid= newsarchive&sid=aK4Z6C2kXs3A, *archived at* http://perma.cc/MD6D-ZE76. Issued MBS Outstanding 2007 were calculated by averaging the firm's market share in non-agency MBS in years 2004–2007 and multiplying by the total non-agency MBS outstanding in 2007. MBS Holdings are gross and do not include any hedges. Losses are net of financial hedges.
*2006 data.
**Countrywide losses are calculated by totaling pretax losses from 2007–2008Q2 in mortgage banking and banking business segments from SEC filings.
***GMAC losses as of December 2008 are from SIG-TARP, TAXPAYERS CONTINUE TO OWN 74% OF GMAC (REBRANDED ALLY FINANCIAL) FROM THE TARP BAILOUTS (2013).
****IndyMac losses were calculated by totaling pre-tax losses from 2007–2008Q1 from SEC filings.

The figures in Table 1 overstate actual risk exposures because they do not take into account whether securitizers hedged these positions.[155] However, the final column provides actual losses on mortgage-related assets as of May 2008, which takes into account financial hedges. The losses were large, both in absolute terms and as a fraction of their actual MBS holdings.

Securitizers' losses were a result of risks that were baked into their business model. Securitizers maintained substantial holdings of highly rated MBS on their balance sheets as part of their funding model. These securities served as collateral in the repo market through which securitizers financed themselves.[156] They also retained lower-rated tranches and equity tranches of MBS they sponsored, which were typically more difficult to sell than the senior tranches.[157]

Due to lack of data, the estimates of MBS holdings reported above and in other studies[158] do not distinguish between holdings of MBS sponsored by the securitizer and of MBS sponsored by other firms and purchased on the market. However, Professor Erel and her coauthors show that, controlling for other characteristics, banks' holdings of MBS are significantly correlated with the securitization activity of the firm.[159] This strongly suggests that a substantial portion of MBS holdings were retentions of MBS sponsored by the firm. In contrast, the authors find no increase in banks' MBS holdings as a percentage of assets from the end of 2006 to the end of 2007.[160] This is evidence that MBS holdings are not driven by MBS that were in the pipeline for sale but could not be sold when the market shut down in 2007. Moreover, we know anecdotally that many large firms did indeed retain tranches of the MBS (and CDOs) they sponsored.[161]

Why did securitizers not foresee that they were exposed to huge losses and take steps to prevent them? As proof that such hedging was possible,

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[155] This concern should not be overstated. Relatively few (fifteen) bank holding companies were net buyers of credit protection on MBS. Erel et al., *supra* note 152, at 417. Bank of America, for example, was a net *seller* of credit default swaps on MBS. *Id.*

[156] Gorton, *supra* note 50, at 1-4.

[157] FCIC REPORT, *supra* note 48, at 43, 70-72; *see also* Jaffee et al., *supra* note 144, at 81 ("The financial crisis occurred because financial institutions did not follow the business model of securitization. Rather than acting as intermediaries by transferring the risk from mortgage lenders to capital market investors, they became the investors.").

[158] *See, e.g.*, Erel et al., *supra* note 152, at 413-17 (describing study methods).

[159] *Id.* at 432-35.

[160] *Id.* at 435.

[161] *See* FCIC REPORT, *supra* note 48, at 261 (describing Citigroup's practice of retaining senior tranches in its securitizations). In the CMLTI 2006-NC2 securitization by Citigroup discussed *infra* note 187, Citigroup retained half of the equity tranche. FCIC REPORT, *supra* note 48, at 72.

note that Goldman Sachs is an outlier in Table 1 in its small losses relative to its gross exposures. Goldman moved aggressively to reduce its exposure to mortgage-related securities,[162] but it had difficulty reducing the counterparty risk of its hedges and ultimately relied on the government bailout of its principal counterparty, AIG.[163]

The best explanation for securitizers failing to protect themselves is that they were caught up in the housing bubble and discounted the possibility that house prices would fall. A group of economists at the Federal Reserve, in what we consider to be some of the most convincing work on this issue, document that analysts at the major banks generally understood that MBS would suffer huge losses in value if house prices fell but assigned low probability to that outcome.[164] For example, they uncovered a report issued by Lehman Brothers in 2005, reproduced in Table 2 below, that provided forecasts of losses on subprime MBS for a set of house price appreciation (HPA) scenarios and assigned probabilities to each of those scenarios.[165] The analysts put just 5% probability on the only scenario involving a fall in house prices.[166] Actual HPA was substantially worse than that most pessimistic scenario considered. In contrast, as Kristopher Gerardi and his coauthors at the Fed emphasize, the report shows that the Lehman analysts understood that a fall in house prices would lead to disastrous performance for subprime MBS.[167] They find further evidence that Lehman's optimistic views on the housing market were widely shared on Wall Street.[168]

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[162] As the FCIC reports, Goldman Sachs began this process in early 2007. FCIC REPORT, *supra* note 48, at 235-36. Goldman was still exposed to the counterparties through which it hedged this risk, especially AIG, but other major securitizers did not go so far in this respect. Lehman, for example, doubled down on the subprime market at this time. Report of Anton R. Valukas, Examiner, at 4, *In re* Lehman Bros. Holdings Inc., 456 B.R. 213 (Bankr. S.D.N.Y. 2011).

[163] Karen Mracek & Thomas Beaumont, *Goldman Reveals Where Bailout Cash Went*, USA TODAY (July 26, 2010, 12:06 PM), http://usatoday30.usatoday.com/money/industries/banking/2010-07-24-goldman-bailout-cash_N.htm, *archived at* http://perma.cc/AB8B-C7ZH (reporting that Goldman Sachs received a $12.9 billion payout overall from the government's bailout of AIG).

[164] *See* Kristopher Gerardi et al., *Making Sense of the Subprime Crisis*, BROOKINGS PAPERS ON ECON. ACTIVITY, Fall 2008, at 69, 127-41 (presenting written records of market participants between 2004 and 2006 that reveal why the investment community did not anticipate the subprime mortgage crisis).

[165] *Id.* at 139; *see also* Foote et al., *supra* note 38, at 156.

[166] Gerardi et al., *supra* note 164, at 139.

[167] *See id.* (demonstrating how one of the banks studied actually considered a "meltdown scenario" where the HPA would reach -5 for three years after 2005).

[168] *Id.* at 139-40 ("Reinforcing the idea that [the banks] viewed the meltdown scenario as implausible, the analysts devoted no time to discussing its consequences . . . .").

Table 2: Lehman Brothers Subprime MBS Loss Scenarios[169]

Scenario	Probability	Cumulative Loss
11% HPA over the life of the pool (aggressive)	15%	1.4%
8% HPA for life (modestly aggressive)	15%	3.2%
HPA slows to 5% by end of 2005 (base)	50%	5.6%
0% HPA for the next three years, 5% thereafter (pessimistic)	15%	11.1%
-5% for the next three years, 5% thereafter (meltdown)	5%	17.1%

The Chief Risk Officer at Citigroup during the relevant period corroborates this view. In testimony to the Financial Crisis Inquiry Commission explaining why Citigroup had accumulated a $43 billion position in AAA tranches of its own securitizations, he explained:

> Clearly, Citi and virtually all other market participants failed to anticipate the dramatic and unprecedented decline in the housing market that occurred in 2007 and 2008. Risk models, which primarily use history as their guide, assumed that any annual decline in real estate values would not exceed the worst case historical precedent. And since the beginning of World War II, nominal home prices in the United States had never decreased by more than five percent in any given year. The actual decline had never decreased by more than five percent in any given year. The actual decline proved to be many orders of magnitude greater than any other yearly decline in the post-war period.[170]

In sum, there is persuasive evidence that overoptimism about house prices was a significant factor in these firms' losses on MBS.

There are of course other potential explanations for the failure of securitizers to anticipate these risks. One is based on agency problems

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[169] Foote et al., *supra* note 38, at 156.

[170] David C. Bushnell, Former Chief Risk Officer, Citigroup Inc., Testimony Before the Financial Crisis Inquiry Commission 2 (Apr. 7, 2010), *available at* http://fcic-static.law.stanford.edu/cdn_media/fcic-testimony/2010-0407-Bushnell.pdf.

within the firm.[171] Perhaps the individuals making the decisions to expose the firm to these large risks were doing so because of their own misaligned incentives. For example, perhaps individual executives were paid based on deal flow, had little of their own skin in the game, and therefore walked away from the collapse of the firm unscathed.[172] Or relatedly, perhaps distortions caused by being too-big-to-fail led these firms to place these big bets. Heads, they win; tails, taxpayers lose. These agency problems may well explain some of the failures of these firms to protect themselves.[173] However, all of these alternative explanations have a common implication: mandating risk retention by securitizers will have little incentive effect on mortgage underwriting in a bubble.

The recent financial crisis thus provides compelling evidence that the market-determined level of risk retention by securitizers during a bubble is not too low—*it is too high*. The risk retained by most securitizers in the recent boom was far in excess of the Dodd–Frank Act's 5% requirement. But hundreds of billions of dollars of skin in the game did not deter the aggressive underwriting it took to originate and distribute ever-larger volumes of MBS over this period. What it did do was spark a financial crisis by concentrating mortgage risk on these large, systemically important financial institutions. So even if moral hazard caused by selling MBS to naive investors is a significant problem, mandating risk retention will not be an effective solution in a bubble.

It is certainly theoretically possible that risk retention at even higher levels than observed in 2007 would have meaningfully improved underwriting. But betting that, say, a 60% securitizer risk retention requirement would work to prevent another boom and bust in the mortgage market is a bit like playing a game of chicken with the financial system. The experience of the recent crisis strongly suggests that in the tradeoff posed

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[171] *See* Kevin J. Murphy, *Pay, Politics, and the Financial Crisis* (analyzing the economic incentives for bankers to take excessive risks), *in* RETHINKING THE FINANCIAL CRISIS, *supra* note 38, at 318-22; Lucian Bebchuk & Holger Spamann, *Regulating Bankers Pay*, 98 GEO. L.J. 247, 255 (2010) (arguing that compensation arrangements that shielded executives from a large portion of the possible losses incurred were one of the factors that led to the 2008–2009 financial crisis).

[172] As Alan Blinder memorably put it, "[g]ive smart people go-for-broke incentives and they will go for broke. Duh." Alan S. Blinder, *Crazy Compensation and the Crisis*, WALL ST. J., May 28, 2009, at A15.

[173] A recent study examined the personal home transactions of mid-level managers of securitizers—decisions for which agency problems play no role—and found that they *increased*, rather than decreased, their housing exposure during the boom. Ing-Haw Cheng et al., Wall Street and the Housing Bubble (Jan. 27, 2014) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2232233. This is powerful evidence for the role of overoptimism about house prices in explaining securitizers' losses.

by risk retention between incentives to screen mortgages on the one hand and systemic risk on the other, systemic risk dominates.

b. *Evidence on the Naive-Investors Theory*

The evidence on securitizer losses also calls into question a more fundamental issue: whether moral hazard caused by selling MBS to naive investors is much of a problem in the first place. This version of moral hazard predicts that most of the risk from securitization would be passed on to investors. But, as we have shown, the aggregate evidence overwhelmingly shows that securitization concentrated risk in the same financial intermediaries that organized the securitization chain.[174]

In the standard rational choice model of moral hazard, the high level of trade in mortgages during the boom could only have been achieved if market participants had devised effective solutions to mitigate this incentive problem.[175] Nonetheless, a series of articles based on a particular "natural experiment" research design has convinced many economists and policymakers that moral hazard caused by securitization did indeed play an important role.[176] This body of research interprets jumps in the default rate

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[174] Our view that securitization led to the concentration of risk in financial intermediaries is shared by a number of prominent financial economists and macroeconomists. *See* Acharya & Richardson, *supra* note 63, at 197 (arguing that the net result of securitization was to "keep the risk concentrated in the financial institutions"); *see also* DAVID GREENLAW ET AL., LEVERAGED LOSSES: LESSONS FROM THE MORTGAGE MARKET MELTDOWN 33-35 (2008) (estimating that about 50% of subprime exposures were held by commercial banks, savings institutions, credit unions, investment banks, and government-sponsored enterprises and that leveraged institutions hold 55% of outstanding mortgage debt); Hyun Song Shin, *Securitisation and Financial Stability*, 119 ECON. J. 309, 313 (2009) ("Thus, far from passing the hot potato down the chain to the greater fool next in the chain, the large financial intermediaries end up keeping the hot potato."); Tobias Adrian & Hyun Song Shin, *The Shadow Banking System: Implications for Financial Regulation* 11 (Fed. Reserve Bank of N.Y., Staff Report No. 382, 2009) ("[S]ecuritization had the perverse effect of concentrating all the risks in the banking system itself.").

[175] *See supra* subsection II.B.1.

[176] *See, e.g.*, Wei Jiang et al., *Securitization and Loan Performance: Ex Ante and Ex Post Relations in the Mortgage Market*, 27 REV. FIN. STUD. 454, 480 (2014) ("[W]e document the bank's lack of incentive and ability to collect meaningful 'soft' information about borrower quality in a time of rapid growth supported by the expansion of broker-originated, low-documentation loans."); Benjamin J. Keys et al., *Did Securitization Lead to Lax Screening? Evidence from Subprime Loans*, 125 Q.J. ECON. 307, 354 (2010) [hereinafter Keys et al., *Lax Screening*] ("The results of this paper . . . confirm that lender behavior in the subprime market did change based on the ease of securtization."); Benjamin J. Keys et al., *Financial Regulation and Securitization: Evidence from Subprime Loans*, 56 J. MONETARY ECON. 700, 702 (2009) (arguing that stringent broker laws can help align perverse incentives created from moral hazard by requiring brokers to have "skin in the game"); Benjamin J. Keys et al., *Lender Screening and the Role of Securitization: Evidence from Prime and Subprime Mortgage Markets*, 25 REV. FIN. STUD. 2071, 2075 (2012) ("We conclude our analysis by providing further evidence that lenders relax screening of low-documentation loans in the

of mortgages at particular credit score thresholds commonly used to screen mortgage applicants as evidence that securitization led to lax screening.[177] This research is frequently cited as justifying the risk retention requirement.[178]

However, an article one of us recently published in the *Journal of Monetary Economics* shows that this research design has a fundamental flaw, and, in fact, provides no evidence that securitization resulted in lax screening.[179] Although the details are somewhat technical,[180] the intuition

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subprime market on dimensions that are easily manipulated because they are unreported to investors."); John Krainer & Elizabeth Laderman, *Mortgage Loan Securitization and Relative Loan Performance* 32 (Fed. Reserve Bank of S.F., Working Paper No. 2009-22, 2011), *available at* http://www.frbsf.org/economic-research/files/wp09-22bk.pdf (concluding that during the U.S. housing boom in the 2000s, "lenders appear to have securitized loans through private-label transactions that were riskier than the loans they retained in their portfolios"); Benjamin J. Keys et al., 620 FICO, Take II: Securitization and Screening in the Subprime Mortgage Market 6 (Apr. 2010) [hereinafter Keys et al., 620 FICO] (unpublished manuscript) (on file with authors) ("Our results in this paper . . . identify the presence of moral hazard in the low documentation subprime market.").

[177] *See, e.g.*, Keys et al., *Lax Screening*, *supra* note 176, at 353-54 (finding "a causal link between ease of securitization and screening").

[178] For example, the Treasury Department cited this line of research in a report supporting the risk retention requirement. GEITHNER, *supra* note 142, at 11. The report notes that "subprime borrowers with credit scores just above a threshold commonly used by securitizers to determine which loans to purchase defaulted at significantly higher rates than those with credit scores below the threshold." *Id.* It concludes that "markets are unable, in certain circumstances, to align the incentives of parties in the securitization chain adequately" and that "[s]uch weaknesses demonstrate the need for regulatory reforms." *Id.* at 14; *see also* Keys et al., *supra* note 108, at 169-75.

[179] Bubb & Kaufman, *supra* note 14, at 17.

[180] The economists who originated this research design began with the observation that mortgage lenders treated mortgage applicants with credit scores just above 620 differently than they treated applicants with credit scores just below 620. Keys et al., 620 FICO, *supra* note 176, at 2. In particular, the mortgages they approved to borrowers with credit scores just above 620 performed substantially worse than mortgages to borrowers with credit scores just below 620. *Id.* The researchers hypothesized that this was due to a rule of thumb in the securitization market: that many MBS investors and securitizers were willing to buy only mortgages with credit scores of 620 or above. *Id.* at 15-16. Such a rule of thumb would produce a "natural experiment." Loans to borrowers with credit scores of 620 would have a higher probability of being securitized than loans to borrowers with credit scores of 619, even though these two groups of mortgage applicants are essentially identical. This research design thus interprets the greater level of defaults of loans to 620-score borrowers as the moral hazard effect of securitization on lender screening. *Id.* at 6. The fundamental problem with this research design is that lenders have long followed a credit score cutoff rule in screening mortgage applicants—giving more careful scrutiny to those with scores below 620 than to those above—for reasons that have nothing to do with the probability of securitization. Bubb & Kaufman, *supra* note 14, at 17. Their approach was simply a natural way to incorporate credit scores into underwriting, in much the same way that doctors follow cutoff rules in, for example, the level of the enzyme measured by a Prostate-Specific Antigen (PSA) test to determine whether to order a biopsy to evaluate a patient for prostate cancer. *Id.* at 2-3. Accordingly, there are jumps in the mortgage default rate in the absence of any jump in the securitization rate at credit score cutoffs all over the mortgage market, including in samples of loans originated after the collapse of the private-label MBS market in 2008. *Id.* at 3. The evidence

for this flaw is simple. Credit score thresholds are ubiquitous in lending for reasons that have nothing to do with securitization. As a result, there are jumps in the default rate of mortgages at these thresholds even when securitization rates *do not change*. Consequently, this research in fact provides no evidence that moral hazard caused by securitization was a significant contributor to the financial crisis.[181]

And there are good reasons to think it was not. The risk retention requirement is premised not only on the moral hazard problem posed by securitization but also on a failure of private responses to that incentive problem. While it is difficult to rule out conclusively all versions of the naive-investor theory, there is substantial evidence that the organizational and contractual structure of the securitization market was designed to mitigate moral hazard. The originate-to-distribute model of mortgage lending dates back at least to the 1950s, when independent mortgage companies that sold their loans to outside investors grew to become an important part of the housing finance system.[182] MBS sponsored by Fannie Mae and Freddie Mac became the dominant source of funding for mortgages beginning in the 1980s.[183] Private-label securitization was born in 1977, roughly thirty years prior to the onset of the recent financial crisis.[184] Over these decades of experience with securitization, many institutional mechanisms were developed to mitigate the incentive problems it poses.

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from credit score cutoff rules thus provides no evidence that securitization led to lax screening. *Id.* at 2-3.

[181] A paper that is also sometimes cited as supporting the moral hazard hypothesis is Mian & Sufi, *supra* note 131. The authors find that income growth and credit growth during the recent housing boom from 2002 to 2005 are *negatively* correlated across zip codes, suggesting that the growth in mortgage credit was not driven by demand-side factors. *Id.* at 1453. They also find that the increase in the rate of securitization is much stronger in zip codes with the most subprime borrowers, relative to prime zip codes. *Id.* at 1453-54. Moreover, they find that default rates increased more from 2005 to 2007 in areas in which the fraction of mortgages sold to private-label securitizers increased. *Id.* at 1454. This finding, however, does not provide evidence that securitization led to moral hazard in mortgage underwriting. Prior to the recent boom period, prime loans were already securitized at high rates given the subsidy provided by the implicit government guarantee for MBS sponsored by Fannie Mae and Freddie Mac, which dominate the prime market. And it is well understood that subprime originators were largely funded through securitization, and that subprime loans were riskier than prime loans. But these facts do not imply that securitization *caused* a decline in underwriting standards through a moral hazard effect.

[182] Foote et al., *supra* note 38, at 150.

[183] *See* FCIC REPORT, *supra* note 48, at 40 (explaining how tax relief and relaxed capital requirements enabled Fannie and Freddie to "hold or securitize mortgages worth . . . trillions[] of dollars" and become "too big to fail").

[184] *See* Bank of Am. Nat'l Trust & Savings Ass'n, SEC No-Action Letter, 1977 SEC No-Act. LEXIS 1343 (May 19, 1977) (denying the Bank's request to exempt the new "Mortgage-Backed Pass-Through Certificates" from registration under the Securities Act of 1933).

First, originators and securitizers reduced information asymmetries by making verifiable disclosures about the loans to investors.[185] This information formed the basis of lending decisions both for originators who retained almost all their loans as well as pure originate-to-distribute lenders. Beginning in the mid-1990s, a quantitative revolution automated much of the underwriting process, as lending decisions were increasingly based on hard information, such as credit scores and debt-to-income ratios, that were fed into computer-based underwriting systems rather than on subjective judgments of creditworthiness by loan officers in long-term relationships with borrowers.[186] The result was that underwriting was based on information that could be—and, in fact, was—disclosed to loan buyers. Because of these disclosures, investors were well aware of the general changes in the quality of mortgages during the boom period.[187]

These representations about the characteristics of the mortgages were backed up by warranties that obligated the securitizer or originator to

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[185] Foote et al., *supra* note 38, at 153-54. In fact, the data used by Professors Levitin and Wachter to demonstrate that moral hazard led to a decline in underwriting standards were easily available to investors. *See generally* Levitin & Wachter, *supra* note 11. *By definition*, this is not evidence of *asymmetric* information.

[186] *See* Martha Poon, *From New Deal Institutions to Capital Markets: Commercial Consumer Risk Scores and the Making of Subprime Mortgage Finance*, 34 ACCT., ORGS. & SOC'Y 654, 664 (2009) (detailing the transformation from manual to automated underwriting systems).

[187] For instance, CMLTI 2006-NC2, a Citigroup-sponsored deal containing $947 million of MBS sliced into different tranches that typified mortgage securitizations at the time, illustrates well the information available to investors. FCIC REPORT, *supra* note 48, at 71-72 (explaining how investors were informed of the risk level associated with each tranche, and noting that the top four tranches each received the highest rating (AAA/Aaa) from S&P and Moody's). Like most securitizations of this vintage, CMLTI 2006-NC2 suffered serious losses from 2007 to 2008. *Id.* at 221-23. However, the prospectus disclosed to investors that the mortgages backing the MBS were high risk. The prospectus stated that the average combined loan-to-value ratio for the loans in the pool was 88%; for purchase loans, it was 96%. CITIGROUP MORTGAGE LOAN TRUST 2006-NC2, PROSPECTUS SUPPLEMENT FOR ASSET-BACKED PASS-THROUGH CERTIFICATES, SERIES 2006-NC2 S-7, S-17 (2006) [hereinafter PROSPECTUS SUPPLEMENT], *available at* http://fcic-static.law.stanford.edu/cdn_media/fcic-docs/2006-09-12_CMLTI_2006-NC2_13R%20_%20Prospectus.pdf. About 40% of the loans by principal balance were the notorious "stated documentation" loans, in which borrowers simply stated their income and assets with no verification by the lender. *Id.* at S-18. The borrower's income was verified through two years of W-2 statements or tax returns in only 23% of the loans. *Id.* Around 80% of loans were hybrid loans for which the interest rate would adjust in two or three years, and 18% of loans were interest only for the first five years. *Id.* at S-22. While the loans included came from most of the fifty states, about 43% of the loans by outstanding principal were from California and Florida. *Id.* at S-19. Many of the loans were made to borrowers with low FICO credit scores, including 32% with scores below 600, 50% below 625, and 67% below 650. *Id.* at S-22. These general characteristics—high LTV, two to three year hybrid ARM, interest only, poor documentation, low FICO scores, and geographic concentration—indicated that the loans would be at high risk of default if house prices fell and were fully disclosed to investors in the prospectus.

repurchase the mortgages at par in the event that the representations were false.[188] Investors thus protected themselves contractually—further evidence against the naive-investors theory. Following the crisis, some large securitizers made sizeable payments to settle claims based on false representations.[189]

Second, a range of mechanisms resulted in substantial risk retention by both originators and securitizers. We have already discussed securitizer risk retention.[190] Originators also faced substantial losses if the mortgages they originated performed poorly or were of a different quality than the quality disclosed. Originators faced the risk of buying back loans that defaulted within a given, warranted period after sale or for which their representations were inaccurate;[191] the risk that securitizers would "kick out" specific loans following due diligence review, requiring the originator to sell the loans at a substantial discount;[192] the risk that the originator would be unable to sell loans still in the pipeline for securitization should the market

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[188] PROSPECTUS SUPPLEMENT, *supra* note 187, at S-12.

[189] This includes contractual claims related to Citigroup's CMLTI 2006-NC2 securitization discussed *supra* note 187. *See Citigroup to Pay $1.13 Billion to Settle Securities Claims*, N.Y. TIMES, Apr. 8, 2014, at B2 (discussing the offer made by Citigroup to settle claims by investors demanding that Citigroup buy back billions in residential MBS). *See generally* RMBS TRUST SETTLEMENT AGREEMENT (2014), *available* at http://www.citigrouprmbssettlement.com/pdflib/Proposed%20Settlement%20Agreement.pdf (outlining the terms of the proposed settlement agreement). The agreement would also settle civil suits brought by state and federal regulators for these misrepresentations. Press Release, U.S. DoJ, Federal and State Partners Secure Record $7 Billion Global Settlement with Citigroup for Misleading Investors About Securities Containing Toxic Mortgages (July 14, 2014), *available at* http://www.justice.gov/opa/pr/justice-department-federal-and-state-partners-secure-record-7-billion-global-settlement; *see* CITIGROUP COMPREHENSIVE SETTLEMENT AGREEMENT: STATEMENT OF FACTS (2014) [hereinafter CITIGROUP FACTS], *available at* http://www.justice.gov/iso/opa/resources/558201471413645397758.pdf (providing detailed background information for the settlement); *see also* CITIGROUP COMPREHENSIVE SETTLEMENT AGREEMENT: APPENDIX I (2014), *available at* http://www.justice.gov/iso/opa/resources/93201471413713173954.pdf (listing securitizations which the Justice Department found to have a significant percentage of defective loans). Citigroup acknowledged that it had received information through the due diligence process "indicating that, for certain loan pools, significant percentages of the loans reviewed did not conform to the representations provided to investors." CITIGROUP FACTS, *supra*, at 1. For example, in three of the CMLTI RMBS issued by Citigroup in 2006, some of these loans were missing documentation or had not been originated in compliance with underwriting guidelines or applicable federal law. *Id.* at 6.

[190] *See* discussion *supra* Section II.A–C.

[191] Adam B. Ashcraft & Til Schuermann, *Understanding the Securitization of Subprime Mortgage Credit* 6 (Fed. Reserve Bank of N.Y., Staff Report No. 318, 2008).

[192] *See, e.g.*, Final Report of Michael J. Missal, Bankruptcy Court Examiner, at 66, *In re* New Century TRS Holdings, Inc., No. 07-10416, 2008 WL 850030 (Bankr. D. Del. Feb. 29, 2008), *available at* http://graphics8.nytimes.com/packages/pdf/business/Final_Report_New_Century.pdf (providing an example where investors reviewed loan pools and "kicked out" loans that did not meet expectations).

cease to accept its loans more generally;[193] and the risk of losing valuable servicing rights retained by the originator.[194] As we discuss in more detail in the next Part, these arrangements caused originators to suffer catastrophic losses when the housing bubble burst.[195] These mechanisms suggest that market participants were quite sophisticated about the incentive problems posed by securitization.

Finally, the moral hazard story does a poor job explaining the timing of the decline in mortgage underwriting standards or why similar problems did not emerge in other securitized asset classes. A vibrant secondary market for private-label MBS was in place long before the subprime boom without apparent incident.[196] If there was an inherent flaw in the incentive structure of mortgage securitization, why did it not manifest earlier? Similarly, many other types of assets are securitized and make use of sophisticated devices designed to mitigate incentive problems.[197] While markets for other types of asset-backed securities (ABS) suffered a loss of liquidity from the general financial crisis, there has been no indication of a breakdown in incentives. Why would the same investors understand the incentive problem and contract for protection for some asset classes but not others? In this sense, the underwriting dynamics and performance of MBS in the early-to-mid

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[193] Ashcraft & Schuermann, *supra* note 191, at 24-25.

[194] *Id.* at ii.

[195] *See infra* Table 3.

[196] The secondary market in securitized jumbo loans, which are not insured by Fannie Mae and Freddie Mac, grew substantially over the course of the 1990s. Everson W. Hull, *Securitized Jumbo Mortgages: 1986–2005*, at 2 (Office of Fed. Hous. Enter. Oversight, Working Paper No. 07-1, 2007). In fact, jumbo originations exceeded subprime originations in all years except 2004–2006. *Id.* at 19. But the market for securitized jumbo loans over the course of the 1990s was not accompanied by any substantial change in the credit quality or loan performance. *Id.* at 19-22. The credit quality and performance of Alt-A loans was also relatively stable in this period. *See* Rajdeep Sengupta, *Alt-A: The Forgotten Segment of the Mortgage Market*, 92 FED. RES. BANK OF ST. LOUIS REV. 55, 56, 61-62 (2010) (noting that Alt-A mortgages are typically underwritten to borrowers with high FICO scores and that the share of originations across the various FICO score categories was relatively stable during this period).

[197] These assets included credit card and other business receivables, student loans, automobile loans, and small business loans. For many asset classes, explicit risk retention agreements by securitizers were a standard contractual feature. BD. OF GOVERNORS OF THE FED. RESERVE SYS., REPORT TO THE CONGRESS ON RISK RETENTION 41 (2010), *available at* http://federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf (explaining how mechanisms developed to mitigate incentive and information problems by putting the risk back on securitizers or originators). For example, securitizers of student loans often held a subordinate tranche of the securitized pool. *Id.* at 46. Similarly, it was common for securitizers of credit card loans to hold a "vertical slice" of 4-12% of the asset pool, known as the seller's interest. *See* Adam J. Levitin, *Skin-in-the-Game: Risk Retention Lessons from Credit Card Securitization*, 81 GEO. WASH. L. REV. 813, 831 (2013) (explaining how this "'vertical' slice" or "seller's interest" aligns the interests of card issuers with investors).

2000s was unique, both relative to the MBS market in the past and to the contemporaneous ABS market. The naive-investors theory cannot explain this difference. In contrast, irrational exuberance in a housing bubble provides a parsimonious explanation for why mortgage underwriting standards specifically eroded during the run-up to the crisis, and why participants on all sides of the market suffered large losses as a result.

To be clear, we are not arguing that securitization played no role in the crisis. To the contrary, securitization was a key factor in the collapse of the financial system as the wave of mortgage defaults burst upon its shores. Securitization ended up concentrating mortgage risk on the balance sheets of large, systemically important financial institutions and creating opacity as to the ultimate bearer of this risk.[198] But the case for securitization causing moral hazard in mortgage underwriting is both theoretically and empirically weak.

In sum, the high levels of risk retention by securitizers during the bubble strongly imply that reforms should focus on reducing securitizers' exposure to the MBS they sponsor, not increasing it. And there is little compelling evidence for the moral hazard problem that the Dodd–Frank Act's risk retention requirement was intended to solve. Accordingly, as a regulatory tool, risk retention should be abandoned.

III. ABILITY TO REPAY

We turn now to the second pillar of the Dodd–Frank Act's reforms to the mortgage market: the ability-to-repay rule. While at first glance the requirement that lenders make a reasonable determination of the borrower's ability to repay may seem to have little relation to the risk retention requirement, we show that there are important parallels. Both the risk retention requirement and the ability-to-repay rule aim to improve mortgage underwriting through incentives for supposedly sophisticated market participants. As such, in the face of a bubble, the ability-to-repay rule suffers from the same basic problem as the risk retention requirement.

A. *Background*

Section 1411 of the Dodd–Frank Act creates a duty for creditors making a residential mortgage loan to make "a reasonable and good faith

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[198] For an authoritative account of this process, see generally Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo*, 104 J. FIN. ECON. 425 (2012), in which the authors explain how securitization caused volatility in the repo market by obscuring the magnitude and party-specific exposure of subprime risks.

determination based on verified and documented information that, at the time the loan is consummated, the consumer has a reasonable ability to repay the loan, according to its terms."[199] The statute and its implementing rule provide some guidance on the contours of this duty. Lenders must consider the borrower's credit history, employment status, income, debt-to-income ratio, and assets.[200] More concretely, lenders must verify the borrower's income and assets using third party documentation, such as tax returns, payroll receipts, and bank statements.[201] In calculating the monthly debt payment on the mortgage to determine its affordability, lenders must use a payment schedule of substantially equal payments that fully pays off the loan over its term[202] based on the greater of the "go-to" fully indexed interest rate and any initial introductory "teaser" interest rate.[203] However, the statute and implementing regulations do not mandate any specific standards for how lenders use this information to determine a borrower's ability to repay. They simply impose a duty to make a "reasonable" determination in "good faith."[204] Importantly, the rule applies only to the originator's underwriting of the loan's affordability, not to the size of the borrower's down payment. This is consistent with the rule's goal of *borrower* protection.

The ability-to-repay rule relies on a mix of public and private enforcement. Both the CFPB and state attorneys general have broad authority to enforce the rule.[205] Mortgage lenders are liable to the borrower for special statutory damages for violating their duty to determine the

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[199] Dodd–Frank Act, sec. 1411(a)(2), § 129C(a)(1), 124 Stat. 1376, 2142 (2010) (codified at 15 U.S.C. § 1639c (2012)) (amending the Truth in Lending Act).

[200] *Id.*, § 129C(a)(3), 124 Stat. at 2143 (codified at 15 U.S.C. § 1639c).

[201] *Id.*, § 129C(a)(4), 124 Stat. at 2143 (codified at 15 U.S.C. § 1639c).

[202] *Id.*, § 129C(a)(6)(D)(iii), 124 Stat. at 2145 (codified at 15 U.S.C. § 1639c; 12 C.F.R. § 1026.43(c)(5)(i)(B) (2014).

[203] Dodd–Frank Act, sec. 1411(a)(2), § 129C(a)(6)(D)(iii), 124 Stat. at 2145 (codified at 15 U.S.C. § 1639c); 12 C.F.R. § 1026.43(c)(5)(i)(A) (2014).

[204] *See* Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6408, 6461 (Jan. 30, 2013) (codified at 12 C.F.R. pt. 1026) ("[Section] 1026.43(c) and the accompanying commentary describe certain requirements for making ability-to-repay determinations, but do not provide comprehensive underwriting standards to which creditors must adhere. . . . [C]reditors are permitted to develop and apply their own proprietary underwriting standards and to make changes to those standards over time in response to empirical information and changing economic and other conditions.").

[205] *See* 12 U.S.C. §§ 5561–5567, 5581 (2012) (transferring authority to the CFPB to enforce the Truth in Lending Act (TILA) and granting expansive investigatory and enforcement powers of consumer financial protection laws); 15 U.S.C. § 1640 (giving state attorneys general authority to enforce the ability-to-repay rule).

borrower's ability to repay.[206] Borrowers can also raise a violation of the ability-to-repay rule as a defense in a foreclosure action and by recoupment or setoff against the creditor or an assignee of the mortgage to reduce the amount the borrower owes.[207] This assignee liability raises the prospect that ability-to-repay violations on securitized mortgages could impose costs on investors in MBS. However, securitizers have already put in place changes to representations and warranties that require originators to buy back loans for which they violated the ability-to-repay rule.[208] These contractual provisions put both the cost of liability for violating the ability-to-repay rule and the cost of the resulting default back on the originator.

The statute provides lenders some protection from ability-to-repay liability for loans that meet the definition of a "qualified mortgage" (QM).[209] The definition focuses largely on product features rather than underwriting procedures. In particular, to meet the QM definition,

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[206] A creditor that violates the ability-to-pay rule is liable to the borrower for an amount equal to the sum of (i) any actual damages sustained by the borrower, (ii) general TILA statutory damages up to prescribed thresholds for individual and class actions, (iii) attorney fees and court costs, and (iv) all finance charges and fees paid by the consumer unless the lender demonstrates that the failure to comply is not material. 15 U.S.C. § 1640(a). The statute of limitations for a violation of the ability-to-repay rule is three years from the violation. *Id.* § 1640(e).

[207] Dodd–Frank Act, sec. 1413, § 130(k), 124 Stat. at 2148-49 (codified at 15 U.S.C. § 1640(k)). Due to the effect of the statute of limitations, the recoupment or setoff is limited to the first three years of finance charges and fees. *Id.*, § 130(k)(2)(B), 124 Stat. at 2149 (codified at 15 U.S.C. § 1640(k)(2)(B)).

[208] 12 C.F.R. § 226.34(a)(4) (2014).

[209] Dodd–Frank Act, sec. 1412, § 129C(b)(1)-(2), 124 Stat. at 2146-47 (codified at 15 U.S.C. § 1639c(b)(1)-(b)(2)) (allowing lenders to presume a borrower's ability-to-repay if the mortgage is a QM). The extent of the protection from liability afforded QMs depends on whether the mortgage loan is "higher-priced." 12 C.F.R. § 226.35(b) (placing additional restrictions on higher-priced mortgage loans). "Higher priced" is defined as

> [a] consumer credit transaction secured by the consumer's principal dwelling with an annual percentage rate that exceeds the average prime offer rate for a comparable transaction as of the date the interest rate is set by 1.5 or more percentage points for loans secured by a first lien on a dwelling, or by 3.5 or more percentage points for loans secured by a subordinate lien on a dwelling.

Truth in Lending, 73 Fed. Reg. 44,522, 44,603 (July 30, 2008) (codified at 12 C.F.R. pt. 226). For higher-priced loans, which roughly correspond to the "subprime" market, meeting the definition of QM provides only a rebuttable presumption that the lender has complied with the ability-to-repay rule. 12 C.F.R. § 1026.43(e)(1)(ii). A borrower can rebut that presumption by showing that, at the time the loan was originated, the borrower lacked sufficient income both to make required debt payments and to meet living expenses. *Id.* § 1026.43(e)(1)(ii)(B). In contrast, for non-higher-priced loans, which roughly correspond to the "prime" market, meeting the definition of QM provides the lender with a conclusive presumption that it has complied with the ability-to-repay rule (i.e., a safe harbor that forecloses liability). *Id.* § 1026.43(e)(1)(i).

mortgages may not have negative amortization or interest-only features,[210] or fees and points above 3% of the loan amount,[211] and must provide for regular periodic payments that are substantially equal.[212] The underwriting aspects of the QM definition are minimal: the borrower's income and assets must be documented using third party records,[213] the loan must be underwritten using the maximum interest rate permitted under the loan during the first five years,[214] and the total debt-to-income (DTI) ratio must be no more than 43%.[215]

While the ability-to-repay rule is often described as a "requirement," it functions primarily as a liability rule for a type of negligent mortgage underwriting and in practice will impose liability only if the borrower defaults.[216] As long as a borrower continues to repay, there would be little basis for either a private suit or a public enforcement action under the rule. The fact that a borrower has been able to make the payments on the loan would serve as strong evidence that the lender was not negligent in determining the borrower's ability to repay. When a borrower does default on a mortgage, the creditor already suffers the resulting reduction in value of the loan. The ability-to-repay rule can add additional costs to creditors that fail to take reasonable care at the time of origination to avoid making a loan that the borrower could not repay. The only specific requirement is that lenders document borrowers' income and assets using third party records. This bright-line rule will likely result in the end of the explicit "no documentation" mortgage programs that grew in popularity in the run-up to the crisis. However, with the exception of this documentation requirement, what constitutes reasonable care is largely left undefined.

As a liability rule, the ability-to-repay rule attempts to control creditor behavior through *incentives* by imposing additional costs on creditors ex post in the event of a default if the lender failed to make a reasonable

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[210] Dodd–Frank Act sec. 1414, § 129C(f), 124 Stat. at 2151-52 (codified at 15 U.S.C. § 1639c(f)).

[211] 12 C.F.R. § 1026.43(e)(3)(A).

[212] *Id.* § 1026.43(e)(2)(i).

[213] *Id.* § 1026.43(e)(2)(v).

[214] Dodd–Frank Act sec. 1412, § 129C(b)(2)(A)(v), 124 Stat. 2146 (codified at 15 U.S.C. 1639c(b)(2)(A)(v)).

[215] 12 C.F.R. § 1026.43(e)(2)(vi). The 43% DTI ratio is relatively liberal. In contrast, the GSEs' underwriting guidelines use 36% as the standard benchmark. Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6408, 6505 (Jan. 30, 2013) (codified at 12 C.F.R. pt. 1026).

[216] In its notice of final rule, the CFPB notes the "litigation [under the ability-to-repay rule] likely would arise only when a consumer in fact was unable to repay the loan (*i.e.*[,] was seriously delinquent or had defaulted)." Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. at 6512.

determination of the borrower's ability to repay. This creates incentives for lenders to take greater care in evaluating mortgage applicants' ability to repay. In addition, it operates as a standard, rather than a rule, since what counts as "reasonable" is only given content ex post upon default. The protection from liability afforded to QMs introduces a rule-like feature that creates incentives for lenders to make loans that comply with the bright-line rules of the QM definition. For securitized mortgages, the ability-to-repay rule also functions as a form of *originator* risk retention since originators are contractually obligated to buy back mortgages that violate the ability-to-repay rule.

B. *The Market Failure Theory*

The Dodd–Frank Act's ability-to-repay rule targets a particular form of predatory lending that entails extending credit on the basis of the value of the collateral without regard to the borrower's ability to repay the loan.[217] Such lending practices result in loans with relatively high default risk, which subjects borrowers to potential costs such as high finance charges paid prior to default, loss of equity in their home, and ultimately loss of their home to foreclosure.[218] However, for such loans to count as "predatory," they have to make the borrower worse off ex ante.[219] In the standard rational-choice model, a borrower would never take such a loan. Accounts of predatory lending depart from this standard model by assuming that borrowers are imperfectly rational and that lenders exploit their mistakes by offering loans that have an inefficiently high risk of

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[217] OCC ET AL., EXPANDED GUIDANCE FOR SUBPRIME LENDING PROGRAMS 10-11 (2001) [hereinafter GUIDANCE], *available at* http://www.federalreserve.gov/boarddocs/srletters/2001/sr0104a1.pdf (explaining a number of predatory lending practices); Engel & McCoy, *supra* note 101, at 1262 n.11 (explaining the risks of subprime lending for consumers).

[218] Engel & McCoy, *supra* note 101, at 1262 (describing predatory practices as a "violation[] of the norm that no mortgage shall be made to anyone who, on the face of the loan application, cannot afford the monthly payments"); *see also* Truth in Lending, 73 Fed. Reg. 44,522 44,541-42 (July 30, 2008) (codified at 12 C.F.R. pt. 226) (describing the different consequences of predatory lending on unsuspecting consumers).

[219] Predatory lending is generally defined as a form of credit that makes borrowers worse off than their alternatives. *See* ROBERT E. LITAN, A PRUDENT APPROACH TO PREVENTING "PREDATORY" LENDING 1 (2001), *available at* http://www.brookings.edu/research/papers/2001/02/lending-litan ("[Predatory lending] has come generally to refer to mortgages extended under terms that are more onerous to borrowers than if they were more fully informed about the loans themselves and the alternative sources of finance that may be open to them."); Willis, *supra* note 101, at 736 ("Overly risky loans are loans that present a high risk of foreclosure and loss of home to the borrower when other, less harmful and on the whole preferable, alternatives to such a loan exist.").

default.[220] Accordingly, we refer to this predatory lending–based theory as the naive-borrowers theory.[221]

According to the naive-borrowers theory, lenders design mortgage contracts to exploit borrowers' mistakes in assessing the affordability of the mortgage. Part of the standard narrative of the crisis posits that subprime mortgage lenders induced naive borrowers to accept so-called "exploding ARMs,"[222] adjustable rate mortgages, which were "designed to default."[223] A common structure was the "2/28 ARM," which has a fixed interest rate for two years before adjusting to a floating interest rate for the remaining twenty-eight years of the loan term.[224] Some of these loans—"option ARMs"—also allow the borrower to pay less than the interest due on the loan, resulting in negative amortization (i.e., an increase in the amount owed on the loan) and a corresponding erosion of the borrower's equity in the home.[225] The naive-borrowers theory posits that these loan structures fool borrowers into underestimating the cost of the loan based on the relatively low initial monthly payments.[226] Under the "exploding ARMs" theory of the crisis, when the interest rate resets to a higher floating rate (i.e., "explodes"), the resulting "payment shock" makes the loan unaffordable. Unless the borrower can refinance the loan at a lower rate, the borrower will default. Borrowers fall into this trap, the story goes, because of myopia. In choosing which loan to take out and how much to borrow,

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[220] *See* Bar-Gill, *supra* note 101, at 1080-83 (identifying that the subprime market mortgage market lends itself to behavioral economics modeling); Willis, *supra* note 101, at 713-14, 754-806 (explaining that the subprime mortgage market uses psychology to manipulate consumers into buying overpriced home loans).

[221] We drew the terminology "naive borrowers" from an important article on subprime mortgage lending that developed this theory. *See* Engel & McCoy, *supra* note 101, at 1257 ("Predatory lending—exploitative high-cost loans to naive borrowers—has dominated the headlines in recent years and has sent foreclosure rates soaring.").

[222] FCIC REPORT, *supra* note 48, at 6; *see also* Gretchen Morgenson, *Beware of Exploding Mortgages*, N.Y. TIMES, June 10, 2007, at B1 ("Especially ingenious—for lenders, at least—were so-called exploding A.R.M.'s that lured borrowers with unusually low teaser rates that then reset skyward two or three years later . . . .").

[223] ALAN S. BLINDER, AFTER THE MUSIC STOPPED: THE FINANCIAL CRISIS, THE RESPONSE, AND THE WORK AHEAD 70 (2013) (internal quotation marks omitted).

[224] Holden Lewis, *Subprime Lenders Yank Most Popular Loan Type*, BANKRATE (July 26, 2007), http://www.bankrate.com/brm/news/mortgages/subprime_20070726_a1.asp, *archived at* http://perma.cc/UMJ6-4EGC (describing the 2/28 ARM structure).

[225] FCIC REPORT, *supra* note 48, at 106-09 (describing the details and the history of option-ARMs).

[226] We are broadly sympathetic to the view that teaser rates are used to fool borrowers into taking out inefficiently large loans. *See, e.g.*, Bar-Gill & Bubb, *supra* note 8, at 1006 (attributing the attractiveness of credit card teaser rates to the fact that the rates "lower the perceived price of a given contract").

they put excessive weight on the initial costs of the loan and insufficient weight on what will happen down the road when the rate and monthly payment reset.[227]

The story cannot end here, however. Why would a lender find it profitable to make predatory loans that are "designed to default"? Enter securitization.[228] Exponents of this view typically argue that subprime originators were able to pass off the credit risk of these exploding ARMs to securitizers, who sold it on to naive MBS investors.[229] As the Senate Committee Report on the Dodd–Frank Act explained,

> the ability to sell the mortgages without retaining any risk[] also frees up the originator to make risky loans, even those without regard to the borrower's ability to repay. In the years leading up to the crisis, the originator was not penalized for failing to ensure that the borrower was actually qualified for the loan, and the buyer of the securitized debt had little detailed information about the underlying quality of the loans.[230]

The naive-borrowers theory and the naive-investors theory thus work together to provide an account of the decline in underwriting in the run-up

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[227] *See* Truth in Lending, 73 Fed. Reg. 44,522, 44,525 (July 30, 2008) (codified at 12 C.F.R. pt. 226) ("A consumer may focus on loan attributes that have the most obvious and immediate consequence such as loan amount, down payment, initial monthly payment, initial interest rate, and up-front fees . . . ."); Statement on Subprime Mortgage Lending, 72 Fed. Reg. 37,569, 37,569 (July 10, 2007) ("The Agencies are also concerned that subprime borrowers may not fully understand the risks and consequences of obtaining [a hybrid] ARM loan."); Bar-Gill, *supra* note 101, at 1079 (arguing that borrowers cannot aggregate all the different temporal and cost variables effectively); Engel & McCoy, *supra* note 101, at 1284 ("Introductory teaser rates . . . lull[] loan applicants into a false sense of security about their ability to repay.").

[228] To be clear, securitization is not the only explanation for why lenders would engage in predatory lending with inefficiently high default risk. In particular, lenders may be able to extract sufficient payments from the borrower, stripping the equity in their home over successive refinancings, such that those payments, when combined with the recovery value of the home in foreclosure, make the lending profitable. *See* Engel & McCoy, *supra* note 101, at 1263 (describing the economic strategy of "loan flipping" and "equity stripping"). We focus on the securitization explanation because it features prominently in the literature on predatory lending in the run-up to the crisis and in the legislative history of the Dodd–Frank Act's ability-to-repay rule.

[229] *See, e.g.*, Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6408, 6559 (Jan. 30, 2013) (codified at 12 C.F.R. pt. 1026) (noting that without an ability-to-repay requirement, situations existed where the consumer lacked full information or understanding of the risks and costs before entering into a transaction); Truth in Lending, 73 Fed. Reg. at 44,526 ("[O]riginators were not adequately assessing repayment ability, particularly where mortgages were sold to the secondary market and the originator retained little of the risk."); Bar-Gill, *supra* note 101, at 1080-81 (citing securitization as the "main culprit" in explaining lenders' willingness to make these high default risk loans to naive borrowers); Engel & McCoy, *supra* note 101, at 1286-88 (discussing the incentive problems that encourage brokers to deceive lenders and lenders to deceive market participants).

[230] S. REP. NO. 111-176, at 41 n.121 (2010).

to the crisis. Originators duped borrowers into taking out loans they could not ultimately afford and then sold them to securitizers, who in turn duped investors into buying MBS backed by these bad mortgages. It was this account that motivated the Dodd–Frank Act's ability-to-repay and risk retention approach to reforming the mortgage market.[231]

The ability-to-repay rule was intended to prevent predatory mortgage lending from recurring.[232] As detailed above, it subjects originators to potential liability if they fail to make a reasonable determination that the borrower can afford the loan, including any potential "payment shock" embedded in the loan terms.[233] For securitized mortgages, a finding that the lender failed to make a reasonable ability-to-repay determination for a defaulted mortgage would trigger an obligation of the originator to buy back the mortgage. These liability and risk retention components of the ability-to-repay rule provide lenders with incentives to take reasonable care in underwriting the affordability of mortgage loans.

We agree that predatory mortgage lending is an issue of concern. However, even on its own terms—that is, evaluating the rule as a form of borrower protection—the ability-to-repay rule is unlikely to be sufficiently effective. Lenders remain free to offer teaser loan structures that fool borrowers into thinking that the loan is less costly than it is and induce them to take out larger loans than is efficient. The ability-to-repay rule discourages only extreme versions of these teaser rate structures that truly "explode" into unaffordable loans when the payments reset and therefore risk liability. If teaser loans fool borrowers into underestimating the costs of loans, then lenders will continue to have strong incentives to offer forms of these loans even under the ability-to-repay rule.

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[231] The Senate Committee Report explains further:

> Too often . . . loans have been made without the careful consideration as to the long-term sustainability of the mortgage. Loans are being made without the lender documenting that the borrower will be able to afford the loan after the expected payment shock hits without depending on rising incomes or increased appreciation. . . . Unfortunately, many of these mortgages were packaged by big Wall Street banks into mortgage-backed securities (MBS) and sold in pieces all over the world.

Id. at 13-14.

[232] *See* Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. at 6408 ("The final rule describes certain minimum requirements for creditors making ability-to-repay determinations [for mortgages] . . . .").

[233] Recall that to avoid liability, lenders must use a payment schedule of substantially equal payments that fully pays off the loan over the term of the loan based on the greater of the "go-to" fully indexed interest rate and any initial introductory "teaser" interest rate. *See supra* notes 202-04 and accompanying text.

C. *Ability to Repay in a Bubble*

The ability-to-repay rule was designed to protect naive borrowers from asset-based lending. To evaluate the rule, it is critical to consider how it will perform in a housing bubble. The Consumer Financial Protection Bureau (CFPB) acknowledged as much in its rulemaking to implement the rule, stating that

> [t]he period that covers the "bubble" years and the crash that followed is also useful to gauge the impacts of the final rule. It is exactly the lending conditions during those years, and the damage they caused, that the statute and the final rule are primarily designed to prevent.[234]

However, in its cost–benefit analysis of the final rule, the CFPB failed to consider the implications of overoptimism about future house prices—the defining feature of a bubble—for the efficacy of the rule.[235] Here, we show that the rule will in fact do little to prevent a recurrence of asset-based lending in a bubble.

1. The Performance of the Ability-to-Repay Rule in a Bubble

A housing bubble undermines the effectiveness of the ability-to-repay rule much as it does the risk retention requirement. First, in practice the ability-to-repay rule imposes liability on the originator only in the event of a default. As we have explained, default generally occurs only when the house price has fallen below the value of the loan. In a bubble, originators will underestimate the possibility that house prices will fall and therefore will underweigh the prospect of liability under the ability-to-repay rule. A bubble thus blunts the incentives for underwriting created by the ability-to-repay rule. Lenders caught up in a bubble are likely to engage in asset-based lending, the ability-to-repay rule notwithstanding.

Second, even though the bright-line requirement that lenders document borrowers' income and assets will end explicit no-documentation loan programs, this is unlikely to improve underwriting materially in the face of a bubble. It is true that no-documentation loans performed worse during the crisis than full-documentation loans.[236] But this difference does not

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[234] Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. at 6558.

[235] *Id.* at 6555-75 (discussing the mortgage qualification requirements intended to prevent loans from being issued to consumers who have no realistic chance of repaying them).

[236] *See* Demyanyk & Hemert, *supra* note 47, at 1858 (comparing delinquency rates for no-documentation and low-documentation loans with delinquency rates for full-documentation loans).

represent the causal effect of requiring documentation. In a bubble, lenders faced with the ability-to-repay rule can simply document the borrower's income and assets as required and still make the loan. Because the lender and borrower expect the house value to appreciate and therefore do not expect the loan to default, the documentation requirement only adds some cost to underwriting the loan and does little to change the lenders' incentives to make the loan.

Third, the ability-to-repay rule focuses on only one dimension of underwriting: the borrower's ability to make the payments on the loan given their expected resources. It creates little incentive to maintain other key features of mortgage underwriting standards that decline in the face of a bubble, including credit scores and down payments. In a bubble, a lender would be willing to make low down payment loans to borrowers with poor credit histories, betting that house prices will rise and prevent default. The ability-to-repay rule poses little risk of liability for such loans even when they default. And when the bubble bursts, those loans are at high risk of default.

2. The Evidence

To better evaluate the likely performance of the ability-to-repay rule in a bubble, we turn to evidence from the recent housing bubble. We begin with the losses that originators suffered when the bubble burst. Consider the fate of the top fifteen originators of subprime mortgages by total volume from 2004–2007, detailed in Table 3 below. Six went through bankruptcy or insolvency as a result of losses incurred in the mortgage market. The others were either shut down by their parent or sold after absorbing crippling losses. Clearly, the major subprime originators had skin in the game.

Table 3: Top 15 Subprime Mortgage Originators 2004–2007[237]

Originator	Outcome
Ameriquest	Subprime mortgage unit shut down and assets sold to Citigroup on August 31, 2007.
HSBC	Suffered $48 billion in impairments on subprime mortgages before shutting down subprime mortgage unit in 2009.

[237] The top fifteen subprime mortgage originators for 2004–2007 were identified using figures in Mortgage Market Statistical Annual, published by Inside Mortgage Finance. *See* Countrywide Fin. Corp., Current Report (Form 8-K) (July 8, 2008); OFFICE OF THRIFT SUPERVISION, OTS FACT SHEET ON WASHINGTON MUTUAL BANK 3 (2008); *$3B in Write-Downs Send Countrywide to $893M Loss*, USA TODAY (Apr. 29, 2008, 9:18 AM), http://usatoday30.usatoday.com/money/companies/earnings/2008-04-29-countrywide-loss_N.htm, *archived at* http://perma.cc/8P3U-T26Q; Jenny Anderson & Vikas Bajaj, *Lehman Closes Subprime Unit and Lays Off 1,200*, N.Y. TIMES (Aug. 23, 2007), http://www.nytimes.com/2007/08/23/business/23lend.html, *archived at* http://perma.cc/2ZVQ-24EQ; *Cerberus, H&R Block Quit Deal for Option One Mortgage*, USA TODAY (Dec. 4, 2007, 2:40 PM), http://usatoday30.usatoday.com/money/economy/housing/2007-12-04-cerberus-block_N.htm, *archived at* http://perma.cc/A5DC-RX42; Geoffrey Colvin, *GE Under Siege*, FORTUNE (Oct. 15, 2008, 10:27 AM), http://archive.fortune.com/2008/10/09/news/companies/colvin_ge.fortune/index.htm, *archived at* http://perma.cc/EKW7-8WN3; Gregory Corcoran, *Citi's Math Problem*, WALL ST. J. (Nov. 5, 2007, 10:15 AM), http://blogs.wsj.com/deals/2007/11/05/citis-math-problem, *archived at* http://perma.cc/TX8Q-EDY5; Eric Dash, *Citigroup Buys Part of a Troubled Mortgage Lender*, N.Y. TIMES (Sept. 1, 2007), http://www.nytimes.com/2007/09/01/business/01citi.html?pagewanted=print&_r=0, *archived at* http://perma.cc/WNA3-GLW2; Geraldine Fabrikant, *Bracing for Home Loan Losses, Wells Fargo to Take Big Charge*, N.Y. TIMES (Nov. 28, 2007), http://www.nytimes.com/2007/11/28/business/28bank.html, *archived at* http://perma.cc/8WBD-LDWY; *Fremont, Former Subprime Lender, Emerges from Bankruptcy*, N.Y. TIMES DEALBOOK (June 15, 2010, 5:34 AM), http://dealbook.nytimes.com/2010/06/15/fremont-emerges-from-chp-11-backed-by-signature, *archived at* http://perma.cc/XB5A-56J5; Bradley Keoun & Steven Church, *New Century, Biggest Suprime Casualty, Goes Bankrupt*, BLOOMBERG (Apr. 2, 2007, 4:38 PM), http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aXHDSbOcAChc, *archived at* http://perma.cc/34XR-VR8C; Ari Levy & Linda Shen, *Washington Mutual Falls on $22 Billion Loss Estimate*, BLOOMBERG (June 9, 2008, 3:26 PM), http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a.mZDxKk0bFA&refer=home, *archived at* http://perma.cc/GZY7-PFR7; Stephen J. Lubben, *The Challenges in ResCap's Bankruptcy*, N.Y. TIMES DEALBOOK (May 15, 2012, 2:41 PM), http://dealbook.nytimes.com/2012/05/15/the-challenges-in-rescaps-bankruptcy, *archived at* http://perma.cc/4GNN-M5G6; *Merrill Lynch to Close Subprime Lending Unit, Report Says*, N.Y. TIMES DEALBOOK (Feb. 29, 2008, 7:32 AM), http://dealbook.nytimes.com/2008/02/29/merrill-lynch-to-close-subprime-lending-unit-report-says, *archived at* http://perma.cc/36TB-EECB; Sara Schaefer Muñoz, *HSBC Makes Another Go at the U.S.*, WALL ST. J., http://www.wsj.com/articles/SB10001424052748704534904575131913306941780 (last updated Mar. 22, 2010, 12:01 AM), *archived at* http://perma.cc/H7ZD-5TSH; Jonathan Stempel, *Aegis Mortgage Files for Chapter 11 Bankruptcy*, REUTERS (Aug. 13, 2007, 5:56 PM), http://www.reuters.com/article/2007/08/13/aegismortgage-bankruptcy-idUSN1337247520070813, *archived at* http://perma.cc/7F2L-YDWP.

New Century	Filed for bankruptcy on April 2, 2007.
Countrywide Financial	Sold to Bank of America on July 1, 2008 after posting losses of more than $3 billion.
Option One	Shut down by parent H&R Block on December 4, 2007 after suffering losses of more than $1.5 billion over the previous five quarters.
CitiMortgage	Citigroup announced $10-13 billion of mortgage-related write-offs in 2007.
First Franklin	On February 28, 2008, Merrill Lynch announced that it would wind down First Franklin after Merrill Lynch reported write-downs and losses of $24.4 billion in 2007.
Washington Mutual	WaMu was seized by OTS and placed into receivership with the FDIC on September 25, 2008 after announcing expected losses of $22 billion.
Wells Fargo	Recognized losses of $1.4 billion in the fourth quarter of 2007 on home equity loans.
WMC Mortgage	Shut down by parent General Electric in December 2007 after losing almost $1 billion.
Fremont Investment & Loan	Parent Fremont General filed for bankruptcy in June 2008.
GMAC Residential Funding	Filed for bankruptcy May 15, 2012.
Aegis Mortgage Corp.	Filed for bankruptcy August 13, 2007.
Accredited Home Lenders	Filed for bankruptcy May 1, 2009.
BNC Mortgage	Shut down by parent Lehman Brothers on August 22, 2007 prior to Lehman's bankruptcy filing.

These originators' losses are informative about the ability-to-repay rule for two reasons. First, recall that the "designed to default" claim on which the ability-to-repay rule is premised has to explain why originators would have an incentive to make such loans in the first place. The standard

explanation is that the originators were passing off the default risk to securitizers who sold it on to naive investors. The evidence shows that in fact originators were to a significant degree "eating their own cooking."

Second, and relatedly, the large losses suffered by originators make it implausible that adding still more losses through ability-to-repay liability would have materially affected their incentives to underwrite loans. Most obviously, the fact that many of these lenders became bankrupt raises the standard "judgment proof" problem with using liability to control risky behavior.[238] Because of limited liability, the ability-to-repay rule would not have imposed additional costs for making risky loans on the relevant decisionmaker for many of these originators. Moreover, the fact that originators' large amounts of skin in the game were insufficient to deter the risky underwriting practices during the boom suggests that incentive-based tools such as liability under the ability-to-repay rule are ineffective. As with securitizers, there are multiple potential explanations for why these loan originators failed to protect themselves from the wave of defaults. Overoptimism about house prices is our leading candidate, but other stories based on agency problems within firms lead to the same conclusion: additional incentives from the threat of liability under the ability-to-repay rule would have done little to improve their underwriting.

Additionally, the "exploding ARMs" story in fact accounts for little of the recent wave of mortgage defaults. The evidence shows no marked increase in the rate of defaults for subprime hybrid ARMs when loan payments increased.[239] On the contrary, such loans defaulted in large numbers even before the reset date. For the worst performing vintage of 2/28 hybrid ARM loans in 2007, loan payment amounts actually fell at the reset date.[240]

In fact, loans without any payment reset feature accounted for the overwhelming majority of defaults. In only about 12% of mortgage foreclosures from 2007 to 2010 did the borrower experience a payment increase prior to defaulting.[241] Most defaulting mortgages had a fixed rate

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[238] S. Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45, 45 (1986) (explaining that "liability does not furnish adequate incentives to alleviate risk" due to the judgment proof problem).

[239] *See* Foote et al., *supra* note 38, at 140-43. *See generally* Kristopher Gerardi et al., *Subprime Outcomes: Risky Mortgages, Homeownership Experiences, and Foreclosures* (Fed. Reserve Bank of Bos., Working Paper No. 07-15, 2007) (analyzing and comparing home foreclosures for different types of mortgages in Massachusetts over the period of 1989–2007); Shane M. Sherlund, *The Past, Present, and Future of Subprime Mortgages* (Fed. Reserve Bd. Fin. & Econ. Discussion Series, Working Paper No. 2008-63, 2008) (studying the default rates of subprime mortgages from 2000 to 2007).

[240] Foote et al., *supra* note 38, at 141.

[241] *Id.* at 142.

because fixed rate mortgages comprised the majority of mortgages. Fixed rate mortgages defaulted less often than variable rate mortgages, but the difference was not large. For subprime mortgages originated between 2005 and 2007, about 53% of 2/28 ARM mortgages experienced a ninety-day delinquency before 2010, compared with 48% of fixed rate mortgages.[242]

The primary mistake that borrowers made was not in misunderstanding that the monthly payments would increase. It was in expecting house prices to continue to rise—a mistake that was shared by the lender as well as the ultimate owner of the loan. It is this mistake that poses the primary threat to financial and economic stability. The ability-to-repay rule does little to prevent it.

Given our analysis, a better regulatory response to the market failure represented by the naive-borrowers theory would be to impose clear, bright-line rules on mortgage practices that are publicly enforceable ex ante—that is, without having to wait for a default. We suggest two such rules in Part IV below: a cap on borrower debt-to-income ratios and a ban on teaser payment structures. Moreover, the main policy tool we suggest in Part IV below—a mortgage leverage limit—would, among other benefits, help maintain the affordability of loans over the housing cycle.

*   *   *

In sum, the Dodd–Frank Act's reforms of the mortgage market were designed based on a particular view of the crisis that emphasizes opportunistic behavior of sophisticated market participants vis-à-vis the less sophisticated. They were not designed to address the primary threat to economic stability: the possibility of a future housing bubble. An interesting question is why the Act's mortgage reforms were mistargeted in this way. Such an inquiry is beyond the scope of this Article. We simply point out that this episode is consistent with the view developed by Professor Roberta Romano that the political economy of financial regulation leads Congress to quickly enact major financial reforms in the wake of a financial crisis before a clear understanding of the causes of the crisis comes into view—so-called "regulating in the dark."[243] Some of the early empirical work on the mortgage crisis seemed to demonstrate that moral hazard caused by securitization played a central role.[244] Moreover, a literature in behavioral

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[242] *Id.* at 143.

[243] *See generally* Roberta Romano, *Regulating in the Dark*, in REGULATORY BREAKDOWN: THE CRISIS OF CONFIDENCE IN U.S. REGULATION 86 (Cary Coglianese ed., 2012).

[244] *See supra* notes 176-78 and accompanying text (discussing a series of articles by economists and policymakers positing that moral hazard played a role in the crisis).

law and economics that emphasizes the exploitation of naive market participants by sophisticated firms was cresting in the same period.[245] As Romano explains, the need to act quickly in the wake of a crisis leads Congress to reach for "off-the-shelf" reform proposals.[246] These scholarly literatures might have helped lead Congress astray.

IV. MORTGAGE REGULATION AGAINST BUBBLES

In this Part, we outline an approach to mortgage regulation that would more effectively protect the economy from future housing bubbles. We argue that direct regulatory mandates, rather than indirect incentive-based tools, should be used to protect banks and borrowers from themselves. In particular, we show how limits on leverage and debt-to-income ratios for mortgages can both reduce the incidence of housing bubbles and mitigate their effects. We also suggest other limitations on mortgage lending practices, such as teaser payment structures, and provide a new perspective on the current legislative efforts to reform the broader architecture of the housing finance system.

Our goal in this Part is modest. We aim to identify types of regulation that are well suited to mitigating housing bubbles and to qualitatively analyze their principal benefits and costs. The benefits arise largely from alleviating the severe macroeconomic downturns that housing bubbles can produce when they burst, like the Great Recession from which the United States is now emerging. Other benefits include a reduction in overinvestment in housing as a bubble inflates. To be clear, each of the policies that we propose would also produce costs. The costs vary by regulatory tool but largely flow from preventing borrowers from getting loans that they demand and that lenders would otherwise provide. Choosing the optimal combination and level of these policies would require a more detailed quantitative analysis. We leave that quantitative exercise for future work. Nevertheless, we think it likely that, once properly calibrated, these policies would produce positive net benefits.

A. *Direct Regulation to Protect Banks and Borrowers from Themselves*

As we explained in Parts II and III, the Dodd–Frank Act's mortgage reforms are based on what we have called asymmetric theories of behavioral biases. These theories identify one party in a market that does not rationally

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[245] *See supra* notes 8-9 and accompanying text (discussing this literature).
[246] Romano, *supra* note 243, at 89.

pursue its self-interest. They then attempt to modify the incentives of other rational participants in the market to achieve a better outcome. Both the risk retention requirement and the ability-to-repay rule attempt to regulate incentives by imposing additional costs on financial institutions when mortgages default.

However, indirect incentive-based regulation is ineffective when *both* sides of a market transaction are subject to behavioral biases. The marketwide irrational exuberance that is the defining characteristic of an asset bubble produces exactly such a situation. In a housing bubble, overoptimism about future house prices causes financial institutions to underestimate the probability of default, thereby diluting the incentives created by such indirect regulation.[247]

Bubbles also undermine other classic types of incentive-based regulation. Consider, for example, a Pigouvian tax on mortgage lending. One way to conceive of the regulatory problem is to think of each mortgage loan as imposing a small, systemic risk externality. A Pigouvian tax on mortgage loans could address this externality by making private actors face the true social cost of their actions. A tax set equal to the size of the externality would make the decision problem faced by private actors mirror the social decision problem of choosing optimal lending and borrowing behavior. The tax allows actors to bring their private information about the private costs and benefits of lending to bear in reaching an efficient outcome. This ability of a tax to harness private information underlies the

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[247] Professor Gerding makes a related point about the breakdown of incentives during a bubble by showing how stock market bubbles undermine compliance with antifraud rules. Erik F. Gerding, *The Next Epidemic: Bubbles and the Growth and Decay of Securities Regulation*, 38 CONN. L. REV. 393, 441 (2006). A boom in asset prices increases the benefits of committing securities fraud, while at the same time postponing the time when any reputational costs and legal liability from the fraud will be incurred. *Id.* at 432. Further reinforcing this dynamic is the reduction in probability of detection during a boom in fraud, which overloads the resources of enforcement agencies. *Id.* This "compliance rot" has a similar effect on compliance with prudential regulation during bubbles. GERDING, *supra* note 84, at 218-22. In contrast to our approach, Gerding suggests that the way to make securities law more robust to a bubble is to increase the threat of liability during a bubble to maintain compliance incentives, for example, through countercyclical enforcement budgets. *Id.* at 441-48. Gerding also suggests using incentive-based pay to motivate regulators during bubbles. *Id.* at 497-98. We are skeptical that incentive-based schemes can be fine-tuned based on the state of the housing market for the same reasons we are skeptical of other forms of countercyclical macroprudential regulation. *See supra* notes 86-99 and accompanying text. A more robust approach is to devise regulatory tools that do not rely on incentive schemes that break down in a bubble. Compliance with simple, broad-based rules prohibiting specific mortgage practices can be made stronger to avoid a bubble. Gerding's analysis underscores the need to design such rules to be easily enforced on an ex ante basis.

conventional view that taxes are superior to quantity regulation for addressing externalities.[248]

However, in a bubble, borrowers and lenders overestimate the private benefits of loans. The excessive optimism of market participants undermines the ability of a tax to harness private information. In this setting, a Pigouvian tax equal to the size of the externality would not produce the efficient outcome. One response would be to set the tax above the external social cost to counteract the effect of this optimism. However, this overestimation of benefits varies across individuals and across the boom-and-bust cycle of the housing market. The optimal tax would have to vary, in a complicated way, along both these dimensions. In our view, it would be particularly difficult for regulators to design such a contingent tax because it requires them to know when a bubble is taking place. Errors in setting the tax would result in a system that did too little to discourage lending in a bubble but inefficiently depressed the mortgage market in normal times. Moreover, such a complex Pigouvian tax would distort the decisions of rational individuals who are not swept up in the bubble. We return to the challenges a bubble poses for corrective taxation in subsection IV.B.4 below.

Mortgage regulation against bubbles should rely instead on direct mandates.[249] When borrowers, lenders, and investors alike are susceptible to a bubble mentality, it is best to directly regulate their ability to act on it. Direct regulation could protect banks by preventing the erosion of mortgage underwriting standards as a bubble expands. It could also protect households by reducing the leveraged exposure of homeowners to housing by limiting the accumulation of mortgage debt. Finally, it could reduce the incidence and magnitude of housing bubbles. Regulators are also susceptible to bubbles, and this risk should be taken into account in regulatory design. Simple fixed rules will likely perform better than discretionary regimes that

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[248] *See generally* Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. L. & ECON. REV. 1 (2002) (explaining that taxes are more effective than regulation when taxes can be adjusted to account for the magnitude of the harm).

[249] The question of whether to address externalities by regulating prices or quantities is an old one in the theory of regulation. *See, e.g.*, Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477, 477 (1974) (discussing whether it is better to regulate by directly limiting an activity or fixing prices such that the market regulates itself through market actors' self-interest). The standard neoclassical analysis is that, as long as a sufficiently flexible tax schedule is feasible, corrective taxes are superior to quantity regulation. Kaplow & Shavell, *supra* note 248, at 3-4. Behavioral biases, however, undermine the argument that Pigouvian taxes are the most effective way to address externalities. *See* Bubb & Pildes, *supra* note 12, at 1673-77. We leave a more complete and formal analysis of the effects of behavioral biases on the optimal externality policy to future work.

rely on regulators to identify bubbles and counteract them in real-time. We turn now to a set of specific mortgage regulations that could further these aims.

B. *Limiting Mortgage Leverage*

In our view, the most promising tool of mortgage regulation for combating bubbles is a simple leverage limit on any mortgage loan taken on a home. As an illustration, consider a maximum combined loan to value (CLTV) ratio[250] of 90%.[251] This would require all homebuyers to make an initial down payment that is at least 10% of the purchase price of the home. Any subsequent mortgage transactions, such as a home-equity loan or a cash-out refinance, would be prohibited from bringing the CLTV ratio above 90%.[252] Similarly, negative amortization would be regulated to prevent a rise in the loan balance from increasing the CLTV ratio above the limit.

Leverage limits for home mortgages have a long history under federal law.[253] While historically they were implemented through prudential regulation, rather than the mortgage-level rule we propose, they nonetheless applied to the bulk of the housing finance system. Beginning in the 1970s, however, these leverage limits were rolled back,[254] and today's mortgage

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[250] The loan-to-value (LTV) ratio of a mortgage loan is the ratio of the loan amount to the value of the home. The combined loan-to-value (CLTV) ratio on a home is the ratio of the total value of all mortgages on the home (including second-lien mortgages) to the value of the home.

[251] A quantitative assessment of the precise optimal level of such a limit is beyond the scope of this Article.

[252] It would be sensible to allow an exception to the leverage limit for refinance loans that simply take advantage of lower interest rates and do not extract any equity from the home. This would allow a borrower to refinance at lower interest rates even if home prices have fallen since the home was purchased.

[253] The New Deal reforms to the housing finance system in the early 1930s imposed an 80% LTV cap on mortgages insured by the Federal Housing Administration (FHA) and on those originated by federal savings and loan associations. National Housing Act, Pub. L. No. 73-479, 48 Stat. 1246, 1248 (1934); 24 C.F.R. § 203.10(b) (1938). National banks remained subject to the 50% LTV cap imposed by the Federal Reserve Act. Federal Reserve Act, Pub. L. No. 63-43, 38 Stat. 251, 273 (1913) (codified as amended in scattered sections of 12 U.S.C.).

[254] Mortgage leverage limits were substantially loosened in the 1970s, when the LTV cap on S&Ls increased to 95% and Fannie Mae and Freddie Mac were authorized to securitize loans with no LTV cap, subject only to the requirement that loans with LTV above 80% carry mortgage insurance. Housing and Community Development Act of 1974, Pub. L. No. 93-383, 88 Stat. 633; Amendments Relating to Flexible Payment Loans, 39 Fed. Reg. 9427 (Mar. 11, 1974). In 1982, the statutory limits on LTV for national banks were eliminated and the LTV limit for FHA loans increased to 95%. Garn–St Germain Depository Institutions Act of 1982, Pub. L. No. 97-320, 96 Stat. 1469 (codified as amended in scattered sections of 12 U.S.C.). Today, the FHA will generally insure loans with down payments as low as 3.5%. U.S. DEP'T OF HOUS. & URBAN DEV., HUD

CLTV ratios are largely unregulated.[255] Reinstituting a mortgage leverage limit today would simply be a return to a policy that worked well for decades. These decades include the dramatic expansion in homeownership that followed World War II, when the homeownership rate rose from 44% in 1940 to 62% by 1960,[256] not far from where it stands today.[257]

One could easily imagine more complicated versions of this simple policy designed to optimize its benefits and costs. For example, the limit could be relaxed in periods in which house prices are not rising to avoid unnecessary costs. But we think there is a real danger in such discretion: it may be politically difficult for regulators to tighten the limit when conditions become frothy. Moreover, even a fixed-percentage CLTV limit would function countercyclically because it would be more likely to bind when house prices rise.

In this Section, we first explain how a mortgage leverage limit would lower the incidence and magnitude of housing bubbles by preventing the buildup of mortgage debt. We then turn to specific ways that a leverage limit would mitigate the effects of housing bubbles on the economy through the banking and household channels. We conclude by considering the costs of a leverage limit.

1. Limiting the Incidence and Magnitude of Housing Bubbles

A mortgage leverage limit would reduce the incidence and magnitude of housing bubbles. During a bubble, the growth in house prices usually outstrips the ability of borrowers—particularly first-time homebuyers—to make a down payment on a new loan.[258] A sustained boom in the housing

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4115.1, MORTGAGE CREDIT ANALYSIS FOR MORTGAGE INSURANCE 2-A-4 (2011), *available at* http://portal.hud.gov/hudportal/documents/huddoc?id=4155-1_2_secA.pdf.

[255] Depository institutions are subject only to a requirement that they adopt a prudent policy on high LTV lending. OCC ET AL., INTERAGENCY GUIDANCE ON HIGH LTV RESIDENTIAL REAL ESTATE LENDING 1-4 (1999), *available at* http://www.federalreserve.gov/boarddocs/srletters/1999/sr9926a2.pdf (noting that high LTV loans are becoming more common and desirable for consumers and that institutions may be involved in such lending as long as appropriate risk management programs are in place).

[256] Daniel K. Fetter, *How Do Mortgage Subsidies Affect Home Ownership? Evidence from the Mid-Century GI Bills*, AM. ECON. J.: ECON. POLICY, May 2013, at 111, 112.

[257] The rate of homeownership as of the fourth quarter of 2014 stood at 64%. ROBERT R. CALLIS & MELISSA KRESIN, U.S. DEP'T OF COMMERCE, RESIDENTIAL VACANCIES AND HOME OWNERSHIP IN THE FOURTH QUARTER 2014 (2015), *available at* http://www.census.gov/housing/hvs/files/currenthvspress.pdf.

[258] *See generally* Mian & Sufi, *supra* note 131, at 1451-53 (demonstrating that mortgage credit growth and income growth in zip codes with a large fraction of subprime loans were negatively correlated from 2002 to 2005, but not during other periods).

market therefore requires easy credit.[259] As is well known, easy credit played an integral role in the recent housing boom.[260] For example, loans with CLTVs of 90% or more accounted for only 10% of subprime mortgage originations in 2000, but by 2006 they made up over 50% of such originations.[261]

A leverage limit would throw some sand into the debt machine that allows a bubble to expand. To see why, consider the following simple example. Suppose all houses are currently priced at $100,000, and all households that do not currently own a house have $10,000 in cash. Suppose also that there is no leverage limit in place and house prices appreciate by 20% so that homes are now priced at $120,000. First-time homebuyers could then purchase a home by using their $10,000 to make a down payment and borrowing an additional $110,000. The CLTV on such a loan would be about 92%.[262] If instead a CLTV limit of 90% were in place, first-time buyers would only be able to purchase a home after increasing their savings by 20%, or $2,000.[263] In other words, a leverage limit would allow savings growth to constrain house price growth, thus making it more difficult for a bubble to form in the first place.[264]

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[259] There is substantial evidence across countries and historical periods that housing booms are accompanied by relaxed credit conditions. *See* REINHARDT & ROGOFF, *supra* note 32, at 216-17 (noting that asset price increases and financial liberalization have both historically preceded global and national financial crises); Luca Agnello & Ludger Schuknecht, *Booms and Busts in Housing Markets: Determinants and Implications*, 20 J. HOUSING ECON. 171, 171 (2011) (noting that "a major housing boom coupled with strong money and credit growth emerged in the US and many other industrialised countries").

[260] Studies have concluded that easy credit conditions play an important role in fueling the growth in subprime lending. *See, e.g.*, John V. Duca et al., *Housing Prices and Credit Constraints: Making Sense of the US Experience*, 121 ECON. J. 533, 550 (2011) (stating that "our results are consistent with the view that many asset bubbles are linked to an unsustainable easing of credit standards or adoption of risky financial practices that eventually unwind during a subsequent bust").

[261] Gerardi et al., *supra* note 164, at 82.

[262] $110,000 / $120,000 = 0.917.

[263] This simple hypothetical also highlights the main objection to leverage limits: they limit access to homeownership. We discuss that issue below. *See infra* notes 282-90 and accompanying text.

[264] There is strong evidence that leverage and house prices are related through exactly the channel we describe in this simple example. House prices are more sensitive to changes in income in countries that have a lower regulatory limit on LTVs. Heitor Almeida et al., *The Financial Accelerator: Evidence from International Housing Markets*, 10 REV. FIN. 321, 323 (2006). This finding suggests that, as in our example, savings growth constrains house price growth when LTVs are capped. The sensitivity of house price growth to income growth is strongest for first-time homebuyers. *See id.* at 345 (concluding that "new mortgage borrowings . . . are more sensitive to aggregate income shocks in countries with higher maximum LTV ratios"). In our example, these are precisely the households on whom a leverage limit would have such an effect. There is also evidence that much of the house price boom and bust during the recent bubble can be explained

   A number of countries have successfully used mortgage leverage limits to control real estate booms.[265] Both cross-country studies and individual country case studies support the view that mortgage leverage limits rein in housing bubbles.[266] In response to the recent housing bubble, for example, Hungary, Norway, Sweden, and the United Kingdom have adopted or are considering mortgage leverage limits.[267]

   By reducing the incidence and magnitude of housing bubbles, a mortgage leverage limit would reduce the most important threat to financial and economic stability.[268] Prevention is, as they say, the best medicine. Leverage limits would, in addition, counteract the negative effects of housing bubbles that do form. In particular, leverage limits would

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by easing and tightening of the effective LTV ratio imposed by lenders on borrowers. *See* Duca et al., *supra* note 260, at 549-50 (pointing out that "[m]ost empirical models of US home prices lack a measure of mortgage credit standards . . . rendering them less capable of tracking the earlier surge of home prices during the mortgage boom and the unwinding of much of that appreciation during the early phases of the subprime bust" and that models with a cyclically adjusted LTV ratio for first-time homebuyers "imply that much of the boom-bust cycle in US home prices stemmed from an easing and subsequent tightening in US mortgage standards affecting potential marginal home-buyers").

[265] *See* IMF, GLOBAL FINANCIAL STABILITY REPORT 129 (2011), *available at* http://www.imf.org/external/pubs/ft/gfsr/2011/01/pdf/text.pdf (explaining how countries use LTV limits to "serve a number of objectives, including reining in booms in mortgage credit and real estate prices; reducing the probability of default when the housing market turns sour; and reducing losses, given default, by increasing recover values").

[266] *See* Christopher Crowe et al., *How to Deal with Real Estate Booms: Lessons from Country Experiences*, 9 J. FIN. STABILITY 300, 316 (2013) (documenting that higher LTV limits are associated with greater house price appreciation across a sample of twenty-one countries from 2000 to 2007); Ashvin Ahuja & Malhar Nabar, *Safeguarding Banks and Containing Property Booms: Cross-Country Evidence on Macroprudential Policies and Lessons from Hong Kong SAR* 5, 8-9 (IMF, Working Paper No. 11/284, 2011) (documenting that LTV limits are associated with lower property price growth for a sample of thirty countries from 2000 to 2010); C. Lim et al., *Macroprudential Policy: What Instruments and How to Use Them? Lessons from Country Experiences* 19, 53 (IMF, Working Paper No. 11/238, 2011) (documenting that the introduction of LTV regulation is followed by lower growth in real estate prices across a sample of forty-nine countries from 2000 to 2010); *see also* Crowe et al., *supra*, at 316 (showing a positive correlation between higher LTV limits and higher house prices in a sample of 21 countries); Deniz Igan & Heedon Kang, *Do Loan-to-Value and Debt-to-Income Limits Work? Evidence from Korea* 4 (IMF, Working Paper No. 11/297, 2011) (finding that introducing LTV/DTI mortgage leverage limits reduced house price appreciation in South Korea).

[267] H.K. Monetary Auth., *Loan-to-value Ratio as a Macro-prudential Tool - Hong Kong's SAR's Experience and Cross-Country Evidence*, *in* BANK FOR INT'L SETTLEMENTS, THE INFLUENCE OF EXTERNAL MONETARY FACTORS ON MONETARY POLICY FRAMEWORKS AND OPERATIONS 163, 163 (2011).

[268] To be effective, a mortgage leverage limit would have to impose a real constraint on banks and borrowers. If lenders simply substituted unsecured credit for mortgage credit in a housing bubble, then the limit would be ineffective. As long as unsecured credit is an imperfect substitute for secured credit, a mortgage leverage limit will have the effect that we describe.

counteract the effects of bubbles through both the banking and household channels.

2. Mitigating the Effect of a Bubble Through the Banking Channel

A mortgage leverage limit would enhance the robustness of the financial system to combat a housing bubble. First, a leverage limit would make the performance of mortgage loans less sensitive to changes in house prices. For example, if borrowers start with at least 10% of the value of their home as equity, mortgages would be unlikely to default unless house prices fell by over 10% from their level for the original loan. Borrowers' equity would serve as a buffer for absorbing declines in house prices. Fewer mortgages would end up underwater, and for underwater mortgages, the difference between the amount owed on the loan and the value of the home would not be as large. Consequently, the probability of mortgage defaults and the losses to lenders conditional on default would both decrease. This phenomenon is sometimes called the "contemporaneous equity" effect on mortgage defaults.[269]

Second, a leverage limit would screen out borrowers who are more likely to default on their mortgage. Low CLTV loans default at lower rates not only because they have higher contemporaneous equity but also because borrowers who are able to save up for larger down payments tend to be less risky.[270] A household's ability to save up for a larger down payment is associated with other risk-lowering characteristics, like steady employment, careful financial practices, and patience. A leverage limit would thereby further lower the risk of mortgage default.

Third, a leverage limit would lower defaults by reducing households' debt burden. In a bubble, households expect house prices to increase and therefore take on greater debt than they otherwise would. As house prices rise, households use low down payment loans to stretch their resources to afford a more expensive home and take on additional debt through home equity loans to finance other expenditures. When the bubble bursts, they are left to manage these excessive debts without the equity they expected to gain through house price appreciation.

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[269] *See* Austin Kelly, *"Skin in the Game": Zero Downpayment Mortgage Default*, 17 J. HOUSING RES. 75, 94-95 (2008) (explaining the high risk involved with requiring no down payment on a mortgage, including the elevated risk of default).

[270] *Id.*; *see also* Jan K. Brueckner, *Mortgage Default with Asymmetric Information*, 20 J. REAL EST. FIN. & ECON. 251, 252 (2000) (explaining how sorting of risky borrowers into higher LTV loans arises due to asymmetric information in lending).

A leverage limit would make it more difficult for households to accumulate debt in a bubble. For many households, a leverage limit would be the binding constraint on how expensive a home they can buy. These households would respond by buying a cheaper home or choosing instead to rent. Even households with enough liquid resources to make a larger down payment would not borrow as much to purchase their homes. A leverage limit would also limit homeowners' ability to extract the equity in their home by refinancing or taking out a separate home equity loan. It would lower household mortgage debt and monthly mortgage payments, and, consequently, homeowners would be less likely to default in response to a change in their ability to pay.

Finally, a leverage limit would reduce the size of mortgage debt as an asset class, thereby reducing the systemic risk that mortgages as a whole pose to the financial system. The same forces that would lower the individual debt of households would also lower the aggregate stock of outstanding mortgage debt held by financial institutions. For example, from 2001 to 2008, the total amount of outstanding mortgage debt on one-to-four family homes held by depository institutions nearly doubled from $2.42 trillion to $4.8 trillion.[271] Reducing the overall stock of mortgage debt would limit the exposure of the financial system to the risks posed by a housing bubble.

3. Mitigating the Effect of a Bubble Through the Household Channel

A mortgage leverage limit would also mitigate the effect of housing bubbles on aggregate demand through the household channel. A leverage limit would make household consumption less sensitive to changes in house prices by lowering the overall exposure of households to housing bubbles. Prospective homeowners can respond to a leverage limit by either buying a less expensive home, making a larger down payment, or some combination of both. However, households that are financially constrained can only respond by buying a less expensive home, which *lowers* the sensitivity of their consumption to changes in house prices.

A simple example helps to make this effect clear. Suppose that a household has $10,000 available to make a down payment and that, in the absence of a leverage limit, lenders require a 5% down payment. Suppose the household purchases a $200,000 home, the most expensive for which it can afford the down payment. If the price of the home falls by 5%, then the household would lose its entire $10,000 in initial home equity. Finding itself

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[271] *Mortgage Debt Outstanding*, *supra* note 68.

suddenly $10,000 poorer, the household would cut back on its consumption commensurately.

Now suppose instead that a 90% leverage limit is in place and that the household again buys the most expensive home ($100,000) for which it can afford the down payment. Now if prices fall by 5%, the household loses $5,000—only half of the fall in wealth in the absence of the leverage limit. This smaller drop in wealth leads to a smaller drop in consumption.

A leverage limit has a similar effect on the upside. When house prices rise, homeowners can increase their consumption by saving less out of their income or by extracting the equity from the home through a second mortgage or a cash-out refinancing. A 5% increase in the value of a $200,000 home gives the homeowner an additional $10,000 in equity to extract. The fact that just a 5% increase in home value leads to a *100%* increase in the household's equity represents the effect of leverage. However if a leverage limit forces a household to purchase a $100,000 home, the same 5% increase in house prices yields only half as much additional equity—$5,000—to extract for spending.

This is the basic mechanism through which a leverage limit would mitigate the effect of a housing bubble through the household channel.[272] By reducing households' leveraged investments in housing, a leverage limit would make household consumption less sensitive to booms and busts in the housing market. This, in turn, would lower the macroeconomic spillovers of housing bubbles.

A leverage limit would not, however, reduce the sensitivity of consumption to house prices for all households. A leverage limit can actually increase this sensitivity for wealthier households who would respond not by reducing the value of the houses they buy but instead by increasing the size of their down payments. This possibility exists because most mortgages are—either de jure or de facto—non-recourse loans.[273]

To see why, suppose that a household again has $10,000 available for a down payment and that, in the absence of a leverage limit, it would purchase a $100,000 home with *no* down payment. If house prices were to fall by 10% and the household were to default, then the lender would bear

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[272] Households that are excluded from the housing market by the leverage limit will respond in a way that lowers the aggregate sensitivity of consumption to house prices. If house prices go up, then prospective homebuyers will lower their consumption in order to afford a down payment. If house prices go down, then prospective homebuyers will increase their consumption because they do not have to save as much for a down payment. Therefore, the behavior of prospective homebuyers will partially offset the positive relationship between house prices and consumption for homeowners.

[273] *See infra* note 274 and accompanying text.

the entire loss in value of the home. For most mortgages in the United States, if the borrower defaults then, as a matter of either law or practice, the lender has recourse only to the property, and not the other assets of the borrower, to recover the unpaid portion.[274]

Suppose instead that a 90% leverage limit were in place and that, in response to the limit, the household would buy the same $100,000 house by making a $10,000 down payment. Now if the value of the home were to fall by 10%, the household would bear the entire $10,000 loss. The leverage limit might then cause the household to cut consumption by *more* in response to a fall in house prices.

A low (or zero) down payment increases the value to the borrower of being able to walk away from the loan if house prices fall. Because the lender has recourse only to the mortgaged property, the borrower can, in effect, sell the home back to the lender at a price equal to the outstanding loan. In the language of finance, this is a put option on the home with an exercise price equal to the outstanding loan balance.[275] The value of the option increases with the borrower's leverage. The "default put option" insures the borrower against downside price risk and thus reduces the sensitivity of the borrower's consumption to house prices. By restricting the use of this insurance, a leverage limit can increase the size of the drop in consumption for some borrowers when house prices fall.

The empirical evidence, however, strongly suggests that a mortgage leverage limit would, on net, reduce the sensitivity of aggregate consumption to house prices. The vast majority of households that take out

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[274] There are a number of reasons mortgage lenders cannot or do not have recourse to assets of the borrower other than the home. The most important of these are procedural rules governing the issuing of deficiency judgments and rules limiting the number of actions creditors can take against a defaulting borrower. *See* Ron Harris & Asher Meir, *Non-Recourse Mortgages—A Fresh Start*, 21 AM. BANKR. INST. L. REV. 119, 124 (2013) (explaining the importance of rules governing deficiency judgments and the one-action rule, which are procedural rules that effectively create non-recourse mortgages). Moreover, federal bankruptcy law serves to cut off recourse to mortgage borrowers' other assets. *Id.* at 126. Post-foreclosure bankruptcy proceedings can be used to discharge any remaining unsecured balance on a mortgage loan that is subject to deficiency judgment. *Id.* at 127. Furthermore, Fannie Mae and Freddie Mac have adopted policies generally not to seek deficiency judgments. *Id.* at 126. The household would of course still bear the cost of default, which includes the cost of moving as well as the future loss of credit due to a poor credit history, but it would have $10,000 available to help in bearing these costs.

[275] In the theory of finance, the equity interest in a home combined with limited liability is equivalent to a call option, or the right to purchase the home at an exercise price equal to the outstanding debt on the home. A call option is, in turn, equivalent to owning the home, having a loan equal to the outstanding debt on the home, and owning a put option with an exercise price equal to the amount of this debt. This equivalence is referred to as put–call parity. *See* JONATHAN BERK & PETER DEMARZO, CORPORATE FINANCE 668-69 (2007) (providing examples of the put–call parity).

mortgages in excess of 90% CLTV have few additional financial assets with which to make greater down payments. Our analysis of data from the American Housing Survey shows that among households that bought a house with 90% or greater CLTV in 2005 and 2006, only 19% had additional financial assets available to make a larger down payment.[276] The 81% of high-CLTV households without additional financial assets would respond to the leverage limit by buying a lower-value home (or renting) rather than by increasing the dollar amount of their down payment. Second, there is compelling evidence that financially constrained households contributed disproportionately, relative to wealthier households, to the fall in consumption when the housing bubble burst.[277] This further reinforces the conclusion that the mitigating effect of a leverage limit on financially constrained households would outweigh any exacerbating effect on wealthier households. Third, macroeconomic studies that explicitly quantify the effects of the different forces that we have identified suggest that a CLTV limit will substantially lower the effect of house prices on aggregate consumption.[278]

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[276] *See* U.S. CENSUS BUREAU, H150/07, AMERICAN HOUSING SURVEY FOR THE UNITED STATES: 2007 (2008). The 2007 American Housing Survey asks only about household income, not assets. However, it does ask whether the household has received any income from dividends on stock or any interest income from savings accounts, CDs, or other interest-bearing accounts. We identify households with financial assets based on whether they reported that they had received any such investment income. Among households who had less than 90% CLTV at origination when they bought a house in 2005–2006, 40% reported having received investment income. This is consistent with the fact that the subprime market, which was characterized by high CLTV loans, was overwhelmingly made up of less wealthy borrowers with poor credit histories. *See* Gerardi et al., *supra* note 164, at 79-80 (explaining the connection between loan documentation and subprime mortgages); *see also* Paul S. Calem et al., *The Neighborhood Distribution of Subprime Mortgage Lending*, 29 J. REAL EST. FIN. & ECON. 393, 399 (2004) (reporting that "[t]he incidence of subprime financing clearly is highest among African-Americans and among lower income borrowers").

[277] *See* MIAN & SUFI, *supra* note 74, at 31-45; Atif Mian et al., *Household Balance Sheets, Consumption, and the Economic Slump*, 128 Q.J. ECON. 1687, 1723 (2013) (finding that "constraints bind more for a given decline in home value for poorer households").

The counties with the highest measures of household leverage in the United States experienced the greatest subsequent decrease in new durable consumption when the housing bubble burst. *See generally* Mian & Sufi, *supra* note 77 (using cross-sectional measures of household leverage to explain the 2007 recession).

[278] *See* Matteo Iacoviello & Stefano Neri, *Housing Market Spillovers: Evidence From an Estimated DSGE Model*, AM. ECON. J.: MACROECONOMICS, April 2010, at 125, 155-56 (finding that an increase in allowed LTV from 77.5% to 92.5% increases the sensitivity of consumption to house prices and doubles the percentage of the variance in consumption growth—from 6% to 12%—that is a result of housing collateral); *see also* Ian Christensen, *Mortgage Debt and Procyclicality in the Housing Market*, BANK CAN. REV., Summer 2011, at 35, 38-39 (finding that lowering the maximum LTV ratio from 95% to 80% would lower the sensitivity of consumption to house prices in Canada).

4. The Costs of Limiting Mortgage Leverage

A mortgage leverage limit would produce costs as well as benefits. These costs represent the lost social gains from loans that would otherwise be made.[279] We think that in the case of very high leverage loans, the benefits of preventing the loan in terms of reduced systemic risk would very likely outweigh the costs, but a definitive conclusion would require empirically estimating these costs and benefits—a task beyond the scope of this Article.

Some of these costs stem from distorting homeownership. To analyze these distortions, it is useful to distinguish between the effect on the *extensive* margin of homeownership—whether a household owns their home—and the effect on the *intensive* margin of homeownership—how expensive of a home a household owns. For many households, the effect of a leverage limit on homeownership would be only on the intensive margin. A modest leverage limit would not prevent households with funds available to make a down payment from purchasing a home. Such a limit might lower the quantity of housing consumed by some of these borrowers, but it would have virtually no effect on *whether* they own a home. Indeed, many of the loans that would be affected by our proposal have little to do with expanding access to homeownership. These include loans for investment purposes, loans for second homes, cash-out refinance loans that convert a prime mortgage to a high-CLTV subprime mortgage, and Alt-A loans to borrowers who, on the basis of their credit score and assets, would be eligible for a prime loan.

Moreover, given the subsidies to mortgage debt that already exist—such as the home mortgage interest tax deduction, the tax preference for capital gains on sale, and government actions to ensure low and stable mortgage interest rates—the effect of a leverage limit on the intensive margin of homeownership is more likely to correct existing distortions to housing consumption and to counteract the effect of regressive subsidies than to introduce any new distortions.[280] If these tax subsidies were repealed, then the effect of a leverage limit on the intensive margin might pose important

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[279] There may also be costs associated with borrowers switching from secured mortgage debt to unsecured debt if the mortgage leverage limit is binding for them.

[280] These tax subsidies could, in principle, be justified by positive externalities from homeownership, but they in fact have little effect on the extensive margin of homeownership and largely distort the intensive margin of housing consumption and the use of mortgage credit, as well as redistribute income toward the wealthy. *See* Edward L. Glaeser & Jesse M. Shapiro, *The Benefits of the Home Mortgage Interest Deduction*, 17 TAX POL'Y & ECON. 37, 58 (2003) (arguing that tax subsidies encourage the rich to concentrate in particularly high-income communities).

costs.[281] But these subsidies seem so politically entrenched that it is plausible to take them as fixed when analyzing the costs of a leverage limit.

In our view, a more significant objection to a leverage limit is that it might reduce access to homeownership by less wealthy households who have limited resources to make a down payment on a house. This would contravene a long-standing policy commitment to expanding homeownership. Indeed, the Housing and Community Development Act of 1974 loosened mortgage leverage limits that were then in place in the name of increasing access to homeownership.[282]

But even for these potential homebuyers, it is not obvious that a modest leverage limit would substantially reduce access to homeownership. First, while a leverage limit would require households to save more before buying their first home, it would also increase their incentive to save for a down payment.[283] Second, a leverage limit would lower rates of mortgage default, resulting in lower interest rates on mortgages and more affordable mortgage credit.[284] Third, a leverage limit would constrain the runaway growth in house prices during boom periods, which would help keep homeownership affordable across the housing cycle.[285] Consistent with these countervailing effects, a number of studies estimate that a modest mortgage leverage limit would have a relatively small effect on the rate of homeownership.[286]

In addition, there are straightforward ways to ensure access to homeownership while preserving the benefits of a mortgage leverage limit. The simplest policy would be an explicit government subsidy for low income borrowers to meet the down payment requirement. This was the approach taken in the 2003 American Dream Downpayment Act.[287] Providing cash grants to low income households to use for down payments on a home would transparently achieve the goal of expanding access to

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[281] While the optimal leverage limit would be lower in the absence of these subsidies, it would not impose costs on all households but only on those for whom the limit is binding.

[282] Housing and Community Development Act of 1974, Pub. L. No. 93-383, 88 Stat. 633.

[283] Juan Carlos Hatchondo et al., *Mortgage Defaults and Prudential Regulations in a Standard Incomplete Markets Model* 28-29 (Fed. Reserve Bank of Richmond, Working Paper No. 11-05R, 2014).

[284] *Id.* at 3-4.

[285] *See supra* notes 258-67 and accompanying text.

[286] *See* Peter Linneman et al., *Do Borrowing Constraints Change U.S. Homeownership Rates?*, 6 J. HOUSING ECON. 318, 330 (1997) (estimating that simultaneously lowering the LTV limit from 95% to 80% and lowering the maximum debt-to-income limit from 33% to 28% would lower the homeownership rate by 3 percentage points); Hatchondo et al., *supra* note 283, at 28 (estimating that an LTV limit of 90% would have almost no effect on homeownership and that an LTV limit of 80% would reduce homeownership from 66% to 64%).

[287] American Dream Downpayment Act, Pub. L. No. 108-186, 117 Stat. 2685 (2003) (codified at 42 U.S.C. § 12701 (2012)).

homeownership while still achieving the benefits of a mortgage leverage limit for economic stability.

Second, the federal government could allow for an exception to the mortgage leverage limit for loans to low income households and provide an explicit government guarantee for those risky low down payment mortgages to encourage them while still protecting the financial system.[288] Indeed, this is the general approach taken by the existing Veterans Administration and Federal Housing Administration home loan programs, which contributed to the substantial rise in homeownership rates following World War II.[289] As Professor Ian Ayres and Joshua Mitts point out in a recent paper, a relatively small number of high leverage mortgages pose only modest costs for economic stability.[290]

In our view, if there is a public policy goal of expanding homeownership through subsidizing mortgage loans to low income households, then the subsidy should be explicit and transparent. The current practice of allowing

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[288] Such a program would require government-imposed underwriting standards to combat the moral hazard problem caused by the government guarantee, much like those the FHA program currently imposes.

[289] Fetter, *supra* note 256, at 112.

[290] Ian Ayres & Joshua Mitts, *Three Proposals for Regulating the Distribution of Home Equity*, 31 YALE J. ON REG. 77, 112-13 (2014). Ayres and Mitts raise a subtler objection to prohibiting high leverage mortgage loans. They worry that setting a CLTV cap like the 90% cap we suggest would result in a large segment of borrowers clustering right at 90% CLTV. *Id.* This would leave the economy particularly vulnerable to a drop in house prices of a little more than 10% since a large number of mortgages would go underwater at the same time. *Id.* This would make it difficult for the financial system and economy to absorb the resulting sharp rise in mortgage defaults. *Id.*

We think this "clustering" objection is not ultimately a substantial concern. For one, a 90% CLTV cap would move mortgages with *greater* than 90% CLTV down to 90%. With a CLTV cap in place, a fall in house prices of greater than 10% would therefore produce no more negative equity mortgages than it would without a cap. Indeed, it would result in a smaller amount of total mortgage debt with negative equity because the CLTV cap would result in smaller loans and even eliminate some of these loans altogether. *See supra* subsection IV.B.3. Moreover, it may well be that, in the absence of a cap, an initial fall of 5% would create enough foreclosures to further depress house prices all the way down to 10%. In short, it would be surprising if moving what would be even higher CLTV mortgages down to 90% would increase economic instability.

Furthermore, the CLTV cap would encourage clustering of CLTV at the cap at mortgage *origination* (including to some degree for cash-out refinancings and home equity loans as well as purchase mortgages). However, the CLTV of a mortgage evolves after origination. Nominal changes in house prices, which generally trend upward with inflation, increase the denominator of the CLTV ratio. Amortization of the loan through principal payments decreases the numerator of the CLTV ratio. The result is that there would be little clustering near the CLTV cap in the overall stock of outstanding mortgages at any point in time. And it is the distribution of CLTV in the *stock* of mortgages that matters for financial stability.

In any case, the targeted exception to our proposed CLTV cap for mortgages to low income borrowers could be designed to mitigate any potential clustering problem, in ways that Ayres and Mitts suggest, if the clustering problem turns out to be of practical significance.

extremely high leverage mortgages to proliferate in a housing boom is an opaque and costly form of public subsidy. As recent events demonstrate, the costs of such high leverage loans are ultimately borne by society more generally through the severe economic fluctuations that they can produce. Perversely, these costs fall disproportionately on low income households. Explicit subsidies—either cash grants for down payments or explicit government guarantees for high leverage loans to low income borrowers— can achieve the goal of expanding homeownership at much lower social cost.

Other costs of a leverage limit stem from restricting the use of mortgages to finance other types of consumption. A leverage limit would make housing a less liquid asset by preventing households from extracting all of the equity from their home through mortgage borrowing. Consider, for example, a household that faces an unexpected health expense. A leverage limit might prevent the household from paying for that health expense by borrowing against their home. But note that the existing subsidies for mortgage debt in the tax code produce a distortion *in favor* of financing consumption through mortgage borrowing. A modest leverage limit might reduce this existing distortion rather than cause a new one.

Given the powerful anti-bubble effects of a leverage limit and what appear to us to be the modest costs if appropriately designed, we think it likely that a modest CLTV cap would produce positive net benefits for society. But confirming that intuition by quantifying the tradeoffs outlined here is beyond the scope of this Article.

5. Using Corrective Taxes Instead of a Cap

An alternative way to control the externalities associated with high LTV loans would be through corrective taxation. As we have argued, however, irrational exuberance in a bubble would undermine such an approach. To see the intuition for this point, suppose that there are two types of loans: high LTV loans that impose a systemic risk externality and low LTV loans that do not. Suppose that it is efficient for some households to get a high LTV loan, but for most households it is efficient to get a low LTV loan. The key question is: what policy instrument is the best way to determine who gets a high LTV loan?

One approach would be to assess a tax on high LTV loans to correct the externality. Such a tax fundamentally puts the choice of who gets a high LTV loan in the hands of individuals. Whoever is willing to pay the tax can get a high LTV loan. Consider, however, the selection that results. The individuals who get a high LTV loan are the ones who value it most. In the neoclassical model, this selection leads to normatively attractive outcomes.

A tax is harnessing decentralized information about the social value of high LTV loans. But in a bubble this is, potentially, adverse selection: the individuals who value high LTV loans the most are the ones who are most irrationally exuberant about housing. These are not necessarily the ones for whom the *social* value of a high LTV loan is greatest.

The upshot is that it might be optimal to abandon the self-selection into high LTV loans entailed by corrective taxation in favor of more direct allocation rules based on observable proxies for the most socially valuable high LTV loans. The ban on high LTV loans with an exception for low income households that we suggest is an example of such an approach. The problems posed by irrational exuberance in a bubble mean that such a rule may well perform better than simply allowing anyone willing to pay a tax to get a high LTV loan.

C. *Limiting Debt-to-Income Ratios*

A debt-to-income (DTI) limit on mortgage loans is another useful tool for limiting the incidence and mitigating the effects of housing bubbles.[291] A DTI limit prevents borrowers from obtaining a mortgage that causes their monthly debt payments to exceed a given fraction of their monthly income. The ability-to-repay rule under the Dodd–Frank Act imposes no limit on DTIs, but it does define a safe harbor for "qualified mortgages" that requires the mortgage borrower to have a "back-end" DTI—that is, a DTI calculated using all of the borrowers' debt payments, including non-mortgage debt—of no more than 43%.[292] Lenders are free to make loans with DTIs above 43%, subject only to the risk that they will be found liable if they fail to determine reasonably borrowers' ability to repay and the borrower defaults.[293] As we explained in Part III, the threat of liability under the ability-to-repay rule will not be effective at mitigating the risks posed by housing bubbles. In a housing bubble, such risky loans are

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[291] *See* Crowe et al., *supra* note 266, at 315 (suggesting that DTI limits can curb pressure of speculative demand on real estate prices); Ahuja & Nabar, *supra* note 266, at 8-10 (documenting that DTI limits are associated with lower growth in property loans for a sample of thirty countries from 2000–2010); Igan & Kang, *supra* note 266, at 25 (demonstrating that introducing a DTI limit lowers household debt and transaction activity in the housing market in South Korea); Lim et al., *supra* note 266, at 25 (documenting that the introduction of DTI limits is followed by slower credit growth across a sample of forty-eight countries from 2000–2010).

[292] *See* Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z), 78 Fed. Reg. 6408, 6505 (Jan. 30, 2013) (codified at 12 C.F.R. pt. 1026). The rule defines this ratio in terms of gross monthly income. *Id.* For the purpose of regulating mortgage risk, disposable or after-tax income is a better measure.

[293] *Id.* at 6505-06.

precisely the ones that will proliferate. In contrast, a bright-line DTI limit, applied to the entire mortgage market, would help rein in bubbles in much the same way as a mortgage leverage limit. In fact, the combination of a CLTV limit and DTI limit would work in complementary ways.

We suggest that every mortgage be subject to a "cumulative DTI" limit. By "cumulative," we mean that the debt payments used to calculate a mortgage's DTI for purposes of the limit would include the payments on all mortgages secured by the same house. This makes the limit more closely targeted at mortgage debt than a back-end DTI ratio limit would be.[294] Here we simply identify the mechanisms through which a DTI limit would work as well as the major tradeoffs involved. As with our other analyses, we leave the quantitative analysis of costs and benefits of such a limit, as well as the calibration of its optimal level, to future work.

A DTI limit would help rein in the explosive growth in mortgage debt that accompanies a housing bubble. Between 2002 and 2008, the ratio of outstanding household debt to disposable personal income rose from around 100% to 130%.[295] As Professors Atif Mian and Amir Sufi point out in their important research on this issue, mortgage debt grew at a brisk pace even in zip codes where average real income growth was negative.[296] A DTI limit would tether the growth of mortgage debt more firmly to the growth of income.

To illustrate, suppose that a DTI limit of 50% was in place and consider a household with a mortgage that is right at the DTI limit. To afford a 10% larger mortgage, the household's income would also need to increase by 10%. In this way, a DTI limit would constrain the growth of mortgage debt through home purchases, second-lien mortgages, and cash-out refinances.

Like a leverage limit, a DTI limit would mitigate the effects of bubbles through both the banking and household channels. Consider first the banking channel. If borrowers hold less debt relative to their income, then a shock to their ability to repay is less likely to result in default. Put differently, the affordability trigger in the double-trigger model of mortgage default is less likely to occur. A DTI limit would also increase home equity levels because households would face an additional constraint on their ability to

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[294] Under a back-end DTI, borrowers who acquire non-mortgage debt before they take on a mortgage are treated quite differently from those who acquire such debt afterward. This creates a strategic incentive to put off non-mortgage borrowing until after purchasing a home.

[295] *How Has the Percentage of Consumer Debt Compared to Household Income Changed Over the Last Few Decades? What is Driving These Changes?*, FED. RES. BANK S.F. (July 2009), http://www.frbsf.org/education/publications/doctor-econ/2009/july/consumer-debt-household-income, *archived at* http://perma.cc/AC4D-GC8G.

[296] Mian & Sufi, *supra* note 131, at 1453.

take on leverage. This increase in equity would lower defaults through the contemporaneous equity effect.

A DTI limit would also mitigate the effects of bubbles through the household channel. Lower debt would decrease the sensitivity of household consumption to house prices. When house prices rise, it would be more difficult for households to borrow to increase consumption. By avoiding a boom in consumption in response to a house price boom, a DTI limit would also lower the fall in consumption when a bubble bursts. Moreover, house prices themselves would be less susceptible to debt-fueled swings. As a result of these forces, the aggregate effect of a DTI limit would be to lower the house price risk faced by homeowners.[297]

Importantly, a DTI limit would be useful over and above a leverage limit. To see this, note that a leverage limit would have only limited effect on constraining the mortgage debt of current homeowners. In a bubble, rising home prices would allow existing homeowners to increase their debt at an alarming rate even with a leverage limit in place. For example, suppose that a 90% leverage limit were in place and consider a household that buys a $100,000 home with a 10% down payment ($10,000). Suppose next that house prices rise by 10%. Because the home is now worth $110,000, the homeowner's equity in the house would double to $20,000. By selling the house, this equity of $20,000 could be used to purchase a $200,000 home. Here, a 10% increase in house prices allows a household to increase its mortgage debt by 100%!

A DTI limit would throw additional sand into the gears of a debt spiral by preventing many households from using leverage to ratchet up their debt. In the above example, if a DTI limit were also in place, households could only double their debt if they did not exceed the DTI limit. A DTI limit would also prevent households from using a second mortgage or cash-out refinance to bring the equity in their homes down to the leverage limit whenever house prices increase.[298]

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[297] As with CLTV limits, a DTI limit can in theory increase risk for some households. If a household responds to the limit by increasing its down payment, then it is more exposed to a fall in house prices. However, for the same reasons that we explained above, constrained households are more likely to respond by reducing their consumption of housing. *See supra* subsection IV.B.3. As a result, the aggregate effect of a DTI limit will likely lower the sensitivity of household consumption to home prices.

[298] In this way, a DTI limit would also help mitigate the "clustering" concern raised by Ayres and Mitts. *See* Ayres & Mitts, *supra* note 290, at 112-16 (proposing, as a solution to "low-equity clustering," that a mortgage must meet DTI, periodic payment, and repayment conditions to qualify for the home mortgage interest rate deduction).

The costs of a DTI limit are similar to those of a leverage limit. Households that are affected by the limit will either purchase smaller homes or choose to rent instead. As a result, the solutions to preserving homeownership are also similar. If low income households are provided with money for a down payment, their monthly mortgage payments will take up less of their income. For higher-income households, the impact of a DTI limit will be offset in part by their savings behavior.

A suitably chosen DTI limit could provide substantial benefits by mitigating the effects of a housing bubble. While these benefits do not come without costs, providing mortgage assistance to first-time homebuyers with lower income and wealth can substantially mitigate any effect on homeownership.

D. *Limiting "Teaser" Payment Loans*

While we believe a mortgage leverage limit and a debt-to-income limit are the simplest and most effective regulatory tools to deal with the risks posed by housing bubbles, additional mortgage regulation could help to reduce these risks further. In Part I, we discussed how a number of contractual structures that proliferated in the subprime market during the recent boom, including hybrid ARMs and payment-option loans, were premised on overoptimistic beliefs in continued house price appreciation.[299] These structures share a common feature: they *temporarily* lower the monthly payment required for a given level of mortgage debt.

Some scholars and consumer advocates have criticized mortgages with these features because borrowers may be unaware that their future monthly payments will increase or may fail to appreciate the consequences of these increases.[300] We agree that such mortgages can exploit consumer biases. An additional, arguably greater, concern about these "teaser" mortgage loans is that they can help fuel a housing bubble. As house prices rise in a bubble, teaser payment structures allow borrowers to stretch their resources to take out larger loans. Lenders in a bubble push these loans by using the lower initial monthly payments to increase demand, counting on house price appreciation to fuel refinances or sales.[301] Even with a CLTV limit in place, these practices would encourage homebuyers to leverage up to the regulatory limit. The Dodd–Frank Act's ability-to-repay rule attempts to

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[299] *See supra* notes 49-53 and accompanying text.

[300] *See* BAR-GILL, *supra* note 9, at 156-73 (developing a behavioral economics theory of the deferred cost structure of subprime mortgage contracts and describing their negative consequences for borrowers).

[301] *See supra* notes 49-53 and accompanying text.

ensure that borrowers do not take out loans larger than they can afford to repay, but as we explained in Part III, it would do little to restrain such loans in a bubble.[302]

To both protect consumers and safeguard the economy from housing bubbles, we suggest restricting the use of mortgage terms that temporarily reduce the monthly payments on the loan. Interest-only and payment-option loans could be prohibited or allowed only in limited circumstances. For example, borrowers could be eligible for these loans only if the CLTV on the loans were substantially lower, on the order of 80%. Hybrid ARMs should be required to keep the initial interest rate fixed for a sufficiently long period—seven years or so—to ensure there is enough equity in the home before the payment amount resets. An exception could again be made for loans with sufficiently low CLTV.

There are undoubtedly some households that would benefit from these mortgage products. For example, these loans might make sense for younger borrowers who expect their incomes to grow over the life of their loans. Restricting loan choices would impose costs on these borrowers by limiting their ability to smooth their consumption of housing over time. But these mortgage products have substantial social costs. They facilitate the expansion in credit that fuels housing bubbles, exacerbating the risks they pose to the economy. Our analysis suggests that restricting these contractual structures along the lines outlined here would be a sensible reform.

E. *GSE Reform and the Architecture of Housing Finance*

Finally, our analysis has important implications for the reform of the secondary market institutions that currently fund the vast majority of mortgages. Reform of the GSEs—Fannie Mae and Freddie Mac—was deferred in the immediate aftermath of the crisis, but legislative efforts are now underway to create a new set of institutions to maintain a stable secondary market for mortgages. The latest bipartisan bill produced by Senators Johnson and Crapo would replace the GSEs with a newly created Federal Mortgage Insurance Corporation (FMIC) to provide guarantees of MBS.[303] Private investors, who would remain the main suppliers of capital for the housing finance system, would then purchase the MBS.

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[302] *See supra* notes 234-42 and accompanying text.

[303] Housing Finance Reform and Taxpayer Protection Act of 2014, S. 1217, 113th Cong. §§ 101, 201–210 (as reported by Sen. Johnson, Sept. 18, 2014). The basic structure of the bill was drafted by Senators Corker and Warner and introduced in 2013. S. 1217, 113th Cong. (as introduced in the Senate, June 25, 2013); *see also* Shaila Dewan, *Senators Draft Housing Finance Overhaul*, N.Y.

Importantly, for an MBS to be eligible for a government guarantee, the bill would require private investors to take a 10% first-loss position ahead of the FMIC guarantee, or require private guarantors holding at least 10% equity capital to insure the MBS.[304] This private credit risk sharing provision was motivated by a concern that the FMIC guarantee would result in moral hazard in originators' underwriting standards.[305]

The requirement that private investors be exposed to the first 10% in losses on FMIC-guaranteed MBS echoes the Dodd–Frank Act's risk retention requirement for private-label MBS. It thus suffers from some of the same problems in the face of a bubble. In particular, in a bubble, overoptimism about house prices would induce these private investors to weaken underwriting standards, undermining the hoped-for incentive benefits of the private 10% first-loss provision.

Rather than relying on just an indirect, incentive-based approach to maintaining underwriting standards, the new system should use strong, direct underwriting standards as a matter of federal law. The Johnson–Crapo bill imposes only minimal underwriting standards. In particular, loans would have to meet the definition of a "qualified mortgage" under the ability-to-repay rule[306] and have a down payment of 3.5% for first-time homebuyers and 5% for others in order to be eligible for the FMIC guarantee.[307] Some homeownership advocacy groups have opposed even

TIMES (Mar. 11, 2014), http://www.nytimes.com/2014/03/12/business/two-senators-draft-plan-to-phase-out-freddie-mac-and-fannie-mae.html?_r=0, *archived at* http://perma.cc/4HBV-V9VD (noting that the original bill was drafted by Senators Corker and Warner).

[304] *See* Housing Finance Reform and Taxpayer Protection Act of 2014, S. 1217, 113th Cong. § 303 (as reported by Sen. Johnson, Sept. 18, 2014) (requiring that the terms and conditions for insurance provided under the Act include a "first loss position that satisfies the requirements of section 302[] or . . . a guarantee in satisfaction of the requirements of section 311"); *see also id.* § 302(a) (requiring that private creditors face a "first loss position of . . . not less than 10 percent of the principal or face value").

[305] *See* Phillip Swagel, *Progress on Housing Finance Reform*, N.Y. TIMES (Jul. 8, 2013, 12:01 AM), http://economix.blogs.nytimes.com/2013/07/08/progress-on-housing-finance-reform/?_php=true&_type=blogs&_r=0, *archived at* http://perma.cc/GF5N-GDLH (praising the first loss requirement "because . . . investors with their funds at stake have a powerful incentive to enforce prudent underwriting").

[306] *See* Housing Finance Reform and Taxpayer Protection Act of 2014, S. 1217, 113th Cong. § 2(29)(A)(i)(II) (as reported by Sen. Johnson, Sept. 18, 2014) (requiring "to the greatest extent possible" that qualifying mortgages meet standards "substantially similar to the regulations issued by the Bureau of Consumer Financial Protection under section 129C(b) of the Truth in Lending Act").

[307] *See id.* § 2(29)(A)(iv) (mandating a minimum down payment for first-time homebuyers of 3.5% and gradually increasing the down payment requirement up to a maximum of 5%).

these minimal leverage limits.[308] In our view these mortgage leverage limits should be strengthened, not weakened, to mitigate the risks posed by a future housing bubble.

The Johnson–Crapo bill would also establish a "Market Access Fund," funded by a portion of the fees paid for FMIC guarantees, to address the housing needs of low income households.[309] The statutory language envisions this fund being used to provide capital to take the 10% first-loss piece for pools of mortgages to low income borrowers.[310] However, the statute adds a proviso "that amounts for such additional credit support do not replace borrower funds required of an eligible mortgage loan."[311] In other words, the Market Access Fund could not be used to provide grants to borrowers to help them make a required down payment on a mortgage loan. In our view, this restriction is unwise. Directing these subsidies directly to the down payments of low income borrowers, in combination with tougher limitations on the CLTV of mortgages, would help make the housing finance system more robust to a housing bubble while also achieving homeownership goals.[312]

CONCLUSION

A primary goal of mortgage regulation should be to protect the economy from housing bubbles. We analyze the Dodd–Frank Act's two principal reforms to the mortgage market—the risk retention and ability-to-repay rules—and show that they share a deep common structure. Together they are intended to protect naive investors and borrowers from opportunistic banks. Both are motivated by asymmetric theories of behavioral biases. And

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[308] *See, e.g.*, Letter from Ctr. for Am. Progress to Senators Corker and Warner (June 26, 2013), *available at* http://www.americanprogress.org/issues/housing/news/2013/06/26/68162/corker-warner-housing-finance-bill-an-important-start-but-falls-short-on-serving-americas-families/ (recommending that "[t]o provide flexibility for the system to serve low-wealth borrowers," the Senate should "remove the 5 percent down-payment requirement from the legislation and instead permit the FMIC to address down-payment requirements in coordination with other regulators"); *see also* NAT'L CMTY. REINVESTMENT COAL., JOHNSON–CRAPO HOUSING FINANCE REFORM LEGISLATION, *available at* http://nlihc.org/sites/default/files/NCRC_Johnson-Crapo_Access.pdf (recommending that the legislation be amended to "[r]emove the down payment requirements[,]" as they would "needlessly shut out many qualified borrowers").

[309] *See* Housing Finance Reform and Taxpayer Protection Act of 2014, S. 1217, 113th Cong. § 504 (establishing the Market Access Fund for the purpose of "address[ing] the homeownership and rental housing needs of underserved or hard-to-serve populations").

[310] *See id.* § 504(c)(2) (stating that the Market Access Fund can be used to "cover[] a portion of any capital required to obtain insurance from the Corporation under this Act").

[311] *Id.*

[312] *See supra* note 284 and accompanying text.

both reshape the incentives of sophisticated market participants to reduce their exploitation of the naive.

The sine qua non of a bubble, however, is marketwide overoptimism about future house prices. Overoptimism affects the decisions of securitizers and lenders, just as it does those of investors and borrowers. In a bubble, securitizers are eager to hold dangerous levels of credit risk and lenders systematically underestimate default risk. As a result, neither risk retention nor the ability-to-repay rule will meaningfully mitigate the risks posed by bubbles.

We outline a regulatory approach that is well-suited to mitigating the risks posed by housing bubbles. This approach includes comprehensive regulation of mortgage leverage and of other contractual practices that encourage larger loans.

Our analysis moves beyond the existing literature in behavioral law and economics that focuses on asymmetric theories of behavioral biases. The mistakes of firms—and their interaction with those of consumers—have important implications for the design of regulation. In the wake of the recent financial crisis and the Great Recession, it is time for behavioral law and economics to start taking bubbles seriously.