

WHY CYCLICALITY MATTERS TO ACCESS TO MORTGAGE CREDIT

PATRICIA A. MCCOY*
SUSAN M. WACHTER**

Abstract: Virtually no attention has been paid to the problem of cyclicalities in debates over access to mortgage credit, despite its importance as a driver of tight credit. Housing markets are prone to booms accompanied by bubbles in mortgage credit in which lenders cut underwriting standards, leading to elevated loan defaults. During downturns, these cycles artificially impede access to mortgage credit for underserved communities. During upswings, these cycles make homeownership unnecessarily precarious for many who attain it. This volatility exacerbates wealth and income disparities by ethnicity and race. The boom-bust cycle must be addressed in order to assure healthy and sustainable access to credit for creditworthy borrowers. Although the inherent cyclicalities of the housing finance market cannot be fully eliminated, it can be mitigated to some extent. Mitigation is possible because housing market cycles are financed by and fueled by debt. Policymakers have already begun to develop a suite of countercyclical tools to help iron out the peaks and troughs of the residential mortgage market. In this article, we discuss why access to credit is intrinsically linked to cyclicalities and canvass possible techniques to modulate the extremes in those cycles.

INTRODUCTION

Virtually no attention has been paid to cyclicalities in debates over access to mortgage credit, despite its importance as a driver of tight credit. Cyclicalities refer to the propensity of housing markets to undergo bubbles in which real estate values soar, then crash, wiping out home equity. These real estate booms are typically accompanied by bubbles in mortgage credit in which lenders cut underwriting standards, producing a surfeit of bad loans.

During downturns, these cycles artificially impede access to mortgage credit. During upswings, these cycles make homeownership unnecessarily precarious for those who attain it. When mortgage credit is expanding, a

© 2017, Patricia A. McCoy & Susan M. Wachter. All rights reserved.

* Liberty Mutual Insurance Professor, Boston College Law School. Email: patricia.mccoy@bc.edu.

** Albert Sussman Professor of Real Estate and Finance, The Wharton School, University of Pennsylvania. Email: wachter@wharton.upenn.edu.

cycle can ensue in which growth in home loans fuels a surge in home prices beyond sustainable levels based on fundamentals, setting up a future bust. At some point, home prices surpass the purchasing power of homebuyers. Then demand starts to fall and home prices start to slip. A slowdown in the economy ensues. Newly-unemployed borrowers who are having difficulty making their loan payments discover, due to loss in home equity, that they can no longer retire their loans by selling their homes or refinancing their mortgages. With no way out, distressed borrowers start defaulting on their loans, further depressing home prices and household purchasing power. Production is slashed, layoffs ensue, and the economy goes into recession.

At that point, the cycle reverts from a glut to a paucity of credit. Banks, reeling from loan losses, curtail lending in order to hoard cash. Without intervention, the economy may continue its downward cycle. With fiscal and monetary stimulus, the economy and the housing market can regain their footing. However, even when the economy starts to recover, banks remain risk averse and home loans remain difficult to get. The weak supply of loans is compounded by weak demand occasioned by job loss, consumer pessimism, and tarnished credit scores. Meanwhile, the loss in home equity wipes out the most important source of wealth for many households.

If we do not address this intrinsic cyclicity, the housing market will continue to experience boom-bust cycles, leaving destruction in their wake. This destruction includes widespread evictions, mass unemployment, severe contractions in credit, depressed homeownership rates, and heightened impediments to wealth formation for minority and lower-income households. Wealth and income disparities for the affected families will continue to widen in the process.

Although the inherent cyclicity of the housing finance market cannot be fully eliminated for reasons we explain, it can be mitigated to some extent. Mitigation is possible because housing market cycles are financed by and fueled by debt. Policymakers have begun to develop a suite of counter-cyclical tools to help iron out the peaks and troughs of the residential mortgage market. In this article, we discuss why access to credit is intrinsically linked to cyclicity and canvass possible techniques to modulate the extremes in those cycles.

I. WHAT MAKES HOUSING AND RESIDENTIAL MORTGAGE CREDIT PRONE TO CYCLICALITY?

Historically, the worst financial crises globally have resulted from real estate bubbles combined with imprudent mortgage lending by banks. (Herring & Wachter 1999, 1–2; Reinhart & Rogoff 2009, xlv–xlv, 158–62;

Schularick & Taylor 2012, 1032). What is it about housing that makes this asset class more volatile and destructive than other assets? After all, stocks and tulips are also susceptible to over-optimism. (Shiller 2015, 170–73).

Three features distinguish housing from other asset markets, which unlike housing, usually involve commodities. First, housing is intrinsically linked to credit markets because most families need financing in order to purchase a home, given the large cost of this asset. In the process, credit expansion follows price rises through short-sighted bank lending. (Bernanke & Gertler 1989, 15, 28; Herring & Wachter 1999, 11–12). Second, if housing values start to inflate artificially, there are no proven effective short-selling strategies to constrain them.¹ (Wachter 2016, 210–11). In part, housing values over-inflate because investors do not grasp the true overall level of risk as danger in the housing system mounts because the aggregate level of risky lending is hard to know. (Levitin & Wachter 2013, 18–19). Finally, defaults on home mortgages often result in eviction through foreclosure, which dumps empty properties on the market and further depresses the price of homes. (*Id.*, 6).

Residential property bubbles inflict particularly devastating damage on the financial system and the economy because most homes are financed by mortgage loans and form the single largest liability on household balance sheets. As such, bubbles in home values go hand-in-hand with credit bubbles. (Levitin & Wachter 2013, at 6–7, 9; Wachter 2016, 211). Mortgage financing makes housing bubbles especially severe because of their linkage to the banking system. Banks are inherently fragile, due to the term mismatch between their short-term liabilities (in the form of demand deposits) and their longer-term, illiquid assets (including loans). This term mismatch exposes banks to runs on deposits, which puts them at increased risk of solvency. (Diamond 2007, 197–99). To compound matters, banks have a high degree of counterparty exposure to one another and to other financial institutions through the web of correspondent accounts and the payment system. (Judge 2013, 1275–77).

One technique banks use to attempt to limit these risks—basing loan amounts on the appraised value of real estate—does not work because the

¹ One might ask why commercial investment-grade real estate can be shorted, when single-family homes cannot? First, commercial real estate can trade through real estate investment trusts (REITs), which can be sold short. Second, commercial properties generally do not go empty when they have to be exchanged in a distressed scenario, thereby reducing concerns about excess supply. Third, commercial properties produce cash flow in the form of rent whether they are distressed, and that cash flow can be priced. In a related vein, the income constraints of commercial property borrowers do not matter in the way they do in the residential sphere, because commercial real estate loans are largely based on the expected cash flow paid by tenants, whereas owner-occupied homes do not generate cash flow. Finally, if lending conditions freeze, equity investors can step in, which makes the commercial real estate market less reliant on debt financing.

appraised value reflects market value, which itself is artificially raised by over-lending. (Herring & Wachter 1999, 19). A second control, which generally works well in lending decisions for industrial and commodity lending, also fails. In typical industrial and commodity loans, this control consists of the fact that as lending over-expands industry capacity and operations, prices fall and the resulting losses and economic distress serve as a signal to stop lending. But in the real estate arena, the impact of eased lending is higher housing prices as demand expands with the easing of lending and the supply response is at best delayed. Because housing is owned as an investment as well as for consumption, higher housing prices increase demand. Potential homeowners form their expectations of future prices based on past gains. (Shiller 2015, 204–06). Although more forward-looking investors may see the opportunity for profit from short selling as is the case for other assets when they become inflated, there is no way for homeowners to sell their homes when prices are high and buy back their homes when prices deflate (Wachter 2016, 209–11), as discussed further below. Moreover, the higher prices stop defaults even when lenders are making loans that are not sustainable. Borrowers who cannot pay sell to avoid foreclosure as prices rise. Therefore, there is a false sense of optimism in real estate lending which can even cause lending standards to be lifted wholesale.

In a housing finance bubble, banks are prone to become over-leveraged in the rush to lend more. This tendency is exacerbated by moral hazard, both in the form of expected government bailouts and procyclical capital requirements that leave banks undercapitalized when funding is needed. The Dodd-Frank Wall Street Reform and Consumer Protection Act (the Dodd-Frank Act) does not solve for this because the expected short-run gains can be way over any required percentage of deal-required holdings. Thus, the new credit risk retention rule that requires sponsors of mortgage-backed securities to hold 5% of the credit risk of the underlying mortgages—and the further exemption from the 5% requirement for deals backed solely by qualified mortgages (Department of the Treasury et al. 2014, 77607)—does not stop moral hazard.²

Meanwhile, short-term managerial incentives encourage myopic lending. The current fees associated with making loans benefit the managers and shareholders. These profits are taken by both up-front. High home prices allow these loans to be made without any obvious sign of distress in the market because rising prices prevent defaults. The expected long-run losses which managers may be aware of (if they expect that prices are way out of line) are not of interest because this is in the long run when they may no

² However, the risk retention requirement makes sense for commercial mortgage-backed securities for the reasons explained in footnote 1.

longer be at the firm. The only thing that can be done now is to produce profits through fees when they can be produced, now. In fact, any expected long-term losses may only exacerbate the cycle as they push lenders who may be in the know to lend more now, as in the famous Countrywide “Hustle” loan program. (Levine 2016). Although not all lenders are myopic, those lenders that are will gain market share. (Wachter 2016, 211).

Subsequently, when property values slump and loan defaults spike, the ensuing losses jeopardize the solvency of banks and leave bank failures in their wake. (Brunnermeier et al. 2009, 11; Reinhart & Rogoff 2009, 141–42, 147–55). One bank’s failure can lead to the failure of others due to their interconnectedness. (Judge 2013, 1302–03). Bank failures can similarly spread when fire sales of assets by distressed banks depress the same categories of assets held by other banks. (Allen & Carletti 2013, 123; Diamond 2007, 196–97; Kaufman & Scott 2003, 372). Mounting losses and failures at banks will result in contraction of credit, with serious negative spillover effects for manufacturing, employment, and the larger economy.

There is another peculiar aspect to housing that exacerbates the downward stroke of the cycle, which involves the way in which defaults on residential mortgages are typically resolved. Most home mortgage defaults result in foreclosure and eviction of the occupants from the home. In the process, foreclosures pump empty, often decrepit homes onto the sales market, bloating supply and further depressing home prices. In a financial accelerator that amplifies the harm, falling prices trigger a fresh round of defaults and foreclosures, which put more downward pressure on home prices. (Bernanke & Gertler 1989, 15, 28; Levitin & Wachter 2013, 6, 20).

The recent financial crisis and its aftermath epitomized the potential magnitude of this type of crash. More than 9.6 million residential foreclosures were completed between second quarter 2005 and first quarter 2015.³ (Spader & Herbert 2017, 277). Meanwhile, from 2007 through 2010, the median price for new homes dropped 22% (Federal Reserve Bank of St. Louis 2016), and the median household’s net worth declined 38.8%. (Bricker et al. 2012, 16–17).

In markets featuring commodities, bearish investors can use short sales to place a brake on incipient bubbles by borrowing an asset and selling it at the prevailing, inflated price. If the investor correctly bets that the price will drop before the due date for returning the asset, he or she can later buy it at a lower price, return the asset to the original owner, and pocket the profit.

³ The 9.6 million includes rental properties that were investor-owned. Spader and Herbert (2017, 277–78) estimate that owner-occupied homes accounted for 4.8 to 5.8 million of the total 9.6 million foreclosures.

But this strategy does not work in real estate, because investors cannot convey title to land they do not own. And even if they could, they would not have assurance that they could buy the exact same parcel back. Purchasing another parcel as a substitute would be impossible because every piece of real estate is unique. (Wachter 2016, 210–11). Both problems impede short sales in owned residential housing, in particular as homeowners (unless they are investors) own to live in that neighborhood and in that home. As an extensive literature shows (Sinai & Souleles 2005, 763–64), they own to hedge the risk that rents may rise precluding their staying in the neighborhood and region to which they are attached for job and other reasons. Selling their home and becoming renters exposes them to risk of rent rises as well as to the very high transaction costs involved in buying and selling a house. This is in addition to the loss of their home. Most homeowners place a far higher value on their home than the market does because of personal associations.

In the run-up to the 2008 crisis, short sales strategies *were* devised for private-label mortgage-backed securities and collateralized debt obligations (Lewis 2010, 72–74), but those strategies were limited in scope and did not affect market-wide pricing. Those investors engaged in short sales for only a few issues of mortgage-related securities. Those bonds were marked to model, not to market, and lacked liquidity because they did not trade widely. As a result, the pricing of mortgage-related bonds did not change due to this short sales activity and those bonds remained underpriced, reflecting decreased perceived risk. (Levitin & Wachter 2013, 16).

Because of the absence of a robust short sale market in housing and related financial instruments, when housing values rise, the price sentiments of optimists prevail over those of pessimists, further driving up home prices. Mortgage lenders then reinforce the price expectations of optimists by deciding how much to lend based on appraisals, which impound the rise in home values. (Herring & Wachter 1999, 19, 74). Simultaneously, myopic lenders become brash about lending to weaker borrowers on looser terms, out of the conviction that rising collateral values will protect them if the borrowers default. Cautious lenders find it hard to compete with lax lenders and a race to the bottom in underwriting standards ensues. As easy credit expands the pool of prospective borrowers, homebuyers and current homeowners flock to take out or refinance mortgages, adding to the upward push on home prices. The result is over-leveraging, as weaker borrowers incur mortgage debts that they later cannot repay. (Engel & McCoy 2011, 15–42; Wachter 2016, 211–13).

As noted, in the short term, most observers fail to recognize the coming storm because the surge in home prices masks the rising default risk. (Levitin & Wachter 2013, 10, 12, 15–19; Wachter 2016, 209, 211–13).

While part of this myopia is behavioral in nature, part of it is structural. Even market actors who were so inclined could not take aggregate risk into account because they lack the information to know how much underwriting has declined at other banks or how leveraged those banks have become. Accordingly, most market actors caught up in a bubble fail to appreciate the impending tail risk and do not have the tools to price it. (Levitin & Wachter 2015, 1245; Wachter 2016, 220).

Other forces that might rein in a bubble also often break down. Managerial compensation typically adds to credit bubbles by rewarding loan officers and mortgage brokers for the volume of loans that they make, not the successful performance of loans. This encourages officers and brokers to expand the number of loans by qualifying weaker borrowers through riskier types of loans. (Engel & McCoy 2011, 32–33; Wachter 2016, 212). Investors in mortgage-related securities may not exercise adequate restraint both because of market mania and because those instruments are too opaque for them to understand the credit risk they are assuming. (Levitin & Wachter 2013, 16–19). Regulators often succumb to the same optimism as market actors and fail to intervene until it is too late. (Engel & McCoy 2011, 157–205; McCoy, Pavlov & Wachter 2009, 510; Wachter 2016, 212).

II. CYCLICALITY MATTERS TO ACCESS TO MORTGAGE CREDIT

Cyclicality is almost never mentioned in discussions of access to mortgage credit, even though impaired access to credit is a direct outgrowth of cyclicality. It is vital to address the extreme volatility in housing finance, however, not only for macroeconomic concerns but also to shine a light on countercyclical tools that could reduce homeowners' exposure to destructive swings in business cycles.

The expansion phase of the home mortgage bubble, of course, is marked by expansion in availability of credit. But this expansion is generally accomplished in ways that sow the seeds of a disastrous contraction in credit later on. While a bubble is inflating, lenders expand credit in problematic ways (sometimes openly, other times through fraud). One technique is to make loans to borrowers with weak credit scores who are questionable prospects for repayment. Another is by lending to applicants who lack the income to manage the new debt that they incur. Eliminating or reducing down payment requirements to dangerous lows is a third way to qualify more borrowers, but at the risk of saddling them with underwater mortgages when property values fall. Adjustable-rate mortgages and negative amortization loans can be used to qualify borrowers, but both products expose borrowers to potential future payment shock. (Engel & McCoy 2011, 15–42; Levitin & Wachter 2013, 12–13 & tbl. 1).

As noted, soaring home values hide a multiplicity of underwriting sins. That is because rising home equity provides an escape valve to borrowers who are having difficulty paying their mortgages. Distressed borrowers with sufficient home equity can sell their homes for enough to retire their mortgages. Alternatively, in a rising market, lenders usually will agree to refinance struggling borrowers into cheaper loans based on the value of the collateral.

Even in the bubble phase, some refinance practices siphon off homeowners' equity, which undermines the wealth formation potential that otherwise is inherent in homeownership. For instance, in the practice known as equity stripping, points and fees of refinance loans are added to the principal and refinanced (as too often is the case). The effect is to erode the homeowners' equity in the home. Multiple episodes of equity stripping can strip out all the equity, increasing the risk of default and leaving homeowners unable to access future credit.

Widespread use of piggyback second mortgages and home equity lines of credit secured by junior liens can similarly leave homeowners with insufficient equity to weather a decline in home prices. The combined loan-to-value (CLTV) ratio, which reflects the total outstanding indebtedness from first mortgages and junior liens, is the metric used to measure this trend. From 2002 through 2006, the average CLTV ratio on residential properties rose markedly, reaching a high of 89% in 2006, even though the average loan-to-value ratio for first mortgages remained relatively stable throughout that period. This means that most of the spike in borrowers' leverage during the housing bubble was due to piggyback seconds and other junior liens. (Levitin & Wachter 2015, 1256 fig. 3, 1258 & fig. 5). When a bubble spawns a proliferation in these sorts of second liens, home equity will drop as a percentage of home value, increasing the risk that heavily leveraged borrowers will owe more than their homes are worth when property values eventually drop.

This fate presages the fate of struggling homeowners more generally when the bubble bursts and property values slide across the board. If home prices plunge too far, borrowers will find their equity wiped out and their mortgages underwater. Borrowers who are having difficulty making their payments are left with no attractive options. They can no longer pay off their mortgages by selling their homes. Similarly, lenders will no longer agree to refinance their loans or extend second mortgages. Unless the borrowers can marshal other assets to cover their payments, they are almost certain to fall delinquent on their loans. At that point, all of remaining possible outcomes—foreclosure, loss mitigation, bankruptcy, or a short sale—will decimate the homeowner's assets and severely damage his or her credit record and score. (Levitin & Wachter 2013, 19; McCoy 2013, 728–29, 734–

35). Most of those households will revert to renters and all of them will be shut out of the mortgage market for at least several years. (Bhutta & Canner 2013, 45–49; Brevoort & Cooper 2013, 748).

As a recession begins in earnest, widening economic distress will tip other families into economic hardship. Some homeowners who were successfully managing their mortgage payments before will lose their jobs as construction and consumption dries up and layoffs ensue. Many of those jobless households will fall behind on their mortgages. Even those that do not may no longer have the income, assets, or the creditworthiness to qualify for new loans. (Levitin & Wachter 2013, 19).

At the bottom of the lending cycle, consumers with past delinquencies are not the only ones affected. Creditworthy individuals will also feel the contraction as the mortgage market overcorrects. During and after a bubble burst, banks will respond by slashing credit in order to preserve capital and limit future buyback requests. (McCoy & Wachter 2017, 24; Reinhart & Rogoff 2009, 165–67, 171–73). Lending standards will tighten to such a degree that even loan applicants whom banks would deem creditworthy under normal conditions are turned down for credit. Precisely this type of contraction in credit ensued following the 2008 crisis, when lending remained tight despite record low interest rates and home prices post World War II. (Levitin & Wachter 2013, 20). Researchers at the Urban Institute estimated, for instance, that 5.2 million more mortgages would have been made between 2009 and 2014 if lenders had used the same credit standards used in 2001, when lending was relatively safe. (Bai, Goodman & Zhu 2016).

These extreme swings in cycles undermine the prospects for wealth formation through homeownership. Homeownership is the single most important avenue for building wealth for minority and lower-income households, largely because families can use their monthly housing outlays to build equity. (Herbert, McCue & Sanchez-Moyano 2016, 1–2). Indeed, this effect is so large that the median minority or lower-income family has fewer total assets than the median family in this group who owns a home. For instance, in 2013, the median value of the primary residence for nonwhite and Hispanic families who owned homes was \$143,000, while the median value of all assets owned by nonwhite and Hispanic families that year (including renters) was \$57,400.⁴ (Board of Governors of the Federal Reserve System 2014, 91, 595). When the same analysis is run by income, in 2013, the me-

⁴ The opposite pattern obtains for non-Hispanic whites, where the total assets of the median family exceed the median value of a family's primary residence. Thus, the median primary residence was worth \$180,000 in 2013 for white, non-Hispanic families. That same year, the median white, non-Hispanic family held \$236,800 in total assets. (Board of Governors of the Federal Reserve System 2014, 91, 595).

dian primary residence was worth \$80,000 for homeowners in the lowest income quintile, while the median value of all assets owned by the lowest quintile earners was only \$14,600. (*Id.*, 79, 583). These numbers mean that families who did not own homes had *less* than \$57,400 or \$14,600 in total median assets respectively for minority families and bottom-quintile wage earners.

The volatility of housing finance impedes wealth formation both for households seeking homeownership and for those who already own homes. (Herbert, McCue & Sanchez-Moyano 2016, 5–6). After a mortgage bubble, millions of distressed borrowers can be ousted from homeownership after being evicted from their homes. Other, creditworthy tenants who should normally qualify for loans but are turned down due to overly tight credit lose the chance to build equity by buying homes. Following the most recent crisis, these conditions artificially pushed the U.S. homeownership rate from 2010 through 2013 2.3 percentage points (230 basis points) lower than if borrowing constraints that prevailed in 2001 had been in effect. (Acolin, Bricker, Calem & Wachter 2016, 6).

Meanwhile, the wealth-building potential for existing homeowners is also harmed. Owners who remain in their homes lose home equity as a tri-fecta of reduced demand for mortgages, reduced supply, and foreclosures depressing surrounding property values push home values in many locales down too far. This overcorrection will be temporary for many homeowners who can sit it out. But in the hardest-hit communities, the rash of vacant homes and accompanying crime—particularly in minority and lower-income neighborhoods in inner cities—will eviscerate home equity in those communities for decades to come. (Mian, Sufi & Trebbi 2015, 2629). This problem is so serious that some Rust Belt cities, such as Detroit, are considering eliminating whole blighted neighborhoods and relocating the few residents who remain. (Detroit Blight Removal Task Force Plan).

As the latest real estate crash showed, homeownership is a double-edged sword. (Dickerson 2014, 82, 85). For families who remain employed and have affordable mortgages, homeownership is an important path to building wealth. But for families who are victims of the crash, either because they received unsafe mortgages, lost their jobs in the ensuing recession, or owned a house on a block plagued by foreclosures, homeownership proved disastrous, usually leaving them in worse financial condition than before.

This does not have to be the case. Unless the inherent cyclicity in housing and mortgage markets is confronted and addressed, however, homeownership will remain just as unstable as it was from recent experience.

III. ADDRESSING THE CYCLICALITY IN MORTGAGE CREDIT SUPPLY

In order to iron out the cyclicality in housing and credit, we need to accomplish three tasks. The first is to articulate what we hope to achieve in reducing cyclicality, from the standpoint of access to credit. Second, we need to understand which risk management and regulatory interventions in the past may have *exacerbated* procyclicality. Finally, we need to identify and implement countercyclical tools that can reduce the volatility in housing and mortgage lending cycles.

A. How Reducing Cyclicality Can Improve Access to Mortgage Lending

The fallout from 2008 painfully drove home the costs of expanding the supply of mortgage credit beyond levels that are sustainable. As we have discussed, when housing bubbles and credit bubbles coincide, market participants become prone to magical thinking and pump out mortgage loans to borderline borrowers on the gambit that home prices will never fall. Although access to credit will balloon in the short term, eventually it will burst, resulting in eviction for possibly millions of homeowners and loan denials for countless others who otherwise would be worthy home borrowers. In the aftermath, trust among the institutions that make up the mortgage supply chain erodes, as each party seeks to hand off losses, or to avoid paying off for losses. The historical actual losses become embedded in risk models going forward, affecting required rates of return. The withdrawal of some lenders and the requirement of higher returns and standards to withstand a similar level crisis from others affect lending standards, particularly for the marginal borrower.

Because over-lending can inflict devastating harm, maximizing homeownership and the supply of mortgages *per se* should never be society's goal. Rather, we should put homeowners on the path to success by ensuring that their mortgages are on safe and affordable terms. In the next section, we discuss certain past market and regulatory techniques that ended up exacerbating the volatility in housing finance. We close by identifying countercyclical techniques that are better suited to curb the violent boom-bust swings in homeownership and mortgage credit.

B. Why Market and Regulatory Structures Failed to Restrain Reckless Lending Culminating in the Recent Crisis

During the years leading up to the financial crisis of 2008, market participants and regulators used a number of techniques that were touted to constrain risk but failed. These techniques turned out to be infected by procyclicality. On the surface, these practices gave market actors and regulators

assurance that proper risk controls were in place. But that assurance proved misplaced, giving investors and regulators false confidence, which pumped more air into the housing and credit bubbles.

As this suggests, procyclical regulation and risk management practices are problematic because they are too lenient during bubbles and too strict during economic declines, which exacerbates oscillations in the business cycle. In order to reduce cyclicity in the supply of mortgage credit, we therefore need to identify structures and practices that worsen bubbles and address them.

1. Procyclical Market Structures and Practices

In the mortgage origination market, it is widely understood that deterioration in loan underwriting standards and the quality of appraisals contributed to the 2008 crisis. But equally importantly, the growth in access to credit was financed by a vast influx of capital into the housing finance market. Secondary market participants devised a host of structures and techniques to inspire confidence. Those structures and techniques were faulty to begin with. They later failed and deepened the crisis in the process.

a. The Mortgage Origination Market

i. Loan Underwriting Standards

Federal banking regulators largely took a hands-off approach to mortgage underwriting standards leading up to 2008, in part because they were sanguine that bankers and other lenders had sufficient reasons to limit the default risk of the loans they made and investors had sufficient reasons to limit the risk of their investments in mortgage-backed securities. In testimony to Congress after the crisis, former Federal Reserve Board chairman Alan Greenspan acknowledged his own previous belief that these actors had “the incentive to evaluate the credit quality of what they were selling.” (Greenspan 2008, 3).

During the mid-2000s credit boom, that trust proved misplaced. As we have documented elsewhere, key mortgage lending standards deteriorated. (Levitin & Wachter 2013, 12 fig. 1, 13 tbl. 1; McCoy, Pavlov & Wachter 2009, 497 fig. 1, 505 fig. 3). The single most important determinant of default risk—the average combined loan-to-value ratio—went up during this period, while another crucial loan quality indicator—the percentage of full-documentation underwriting—went down. The growing proportion of non-traditional mortgage products such as adjustable-rate mortgages (ARMs), interest-only ARMs, and negative amortization mortgages with potential payment shock compounded the credit risk. (McCoy, Pavlov & Wachter

2009, 497 fig. 1, 505 fig. 3). Despite this burgeoning risk, spreads declined. (*Id.*, 505 fig. 3). This reduction in underwriting standards, coupled with the proliferation of risky, nontraditional products and the lack of sufficient risk premia, acted procyclically by enabling legions of weak borrowers to flood the housing market and push up home prices.

ii. Mortgage Appraisals

Appraisals are essential to home mortgage lending because combined loan-to-value (CLTV) ratios are the single most important predictor of default. (Campbell & Cocco 2011, 3; Elul et al. 2010, 6–7 & tbl. 1). Appraisals use several methodologies for estimating the value of homes that serve as the collateral. These estimates enable lenders to compute the CLTV ratio and determine whether a loan applicant's down payment or home equity will be sufficient to contain default risk.

Although appraisals are essential to lending, they are nevertheless procyclical in nature because they are based on comparable sales. During bubbles, appraisals incorporating inflated values from comparables are used to justify more lending, which fuels more home appreciation. (Herring & Wachter 1999, 19). This is particularly true for home lending because income-based methods of evaluating risk do not apply. The incidence of fraudulent appraisals compounds the problem. (Engel & McCoy 2011, 30–31). Banks view high and rising prices as reducing their portfolio risk because the collateral of their previous loans is now higher in value. (Herring & Wachter 1999, 11–12, 19–20). Later, after the bubble bursts, appraisals artificially prolong economic downturns when property values are starting to rise by limiting extensions of mortgages based on lower, outdated comparables. Bank capital is now eroded and lenders withdraw from home lending.

b. *Securitization Safeguards*

During the housing bubble, the growth of nontraditional and subprime mortgages was financed through private-label mortgage-backed securitization, which was mediated by Wall Street. Unlike Federal National Mortgage Association (“Fannie Mae”) and Federal Home Loan Mortgage Corporation (“Freddie Mac”) securitizations of conforming prime loans, which guaranteed credit risk, private-label securitizations shifted both credit risk and prepayment risk onto private investors. (McCoy, Pavlov & Wachter 2009, 497). Accordingly, the architects of private-label securitization devised a number of techniques that appeared to reduce the credit risk associated with private-label mortgage-backed securities (MBS). The most important of these tech-

niques were structure, ratings, credit enhancements, and representations and warranties.

i. Structure, Ratings and Pricing

Perhaps the most novel innovation of private-label securitization was its use of *structure* to manage the credit risk presented by the underlying loans and collateral. This structure divided the bonds in any given issue into tranches, which were arranged in a waterfall along three dimensions: time (*i.e.*, bond maturity), payment priority, and coupon. Tranching according to coupon and maturity sought to manage prepayment risk and credit risk; tranching according to payment priority also sought to manage credit risk. The tranches were rated by one or more of the three leading credit rating agencies, Standard & Poor's, Moody's, and Fitch. (Engel & McCoy 2011, 47).

The top four investment-grade tranches were paid off first in order of sequence, starting with the AAA tranche, then the AA, and next the A tranches, and ending with the BBB. In the event of defaults in the underlying loan pool securing the bonds, the top tranche was entitled to all cash flows until it was paid in full, followed by the next (AA) tranche, and so forth down the waterfall. Coupon rates were lowest for the AAA piece and rose along with risk as the credit rating of each tranche declined. (Engel & McCoy 2011, 47). The top tranches were primarily bought by overseas investors and by U.S. commercial banks, insurers, and pension plans, which were statutorily required to limit their bond purchases to investment-grade investments. (Bernanke et al. 2011, 1–2; Engel & McCoy 2011, 48, 58–59). More than 90% of the private-label MBS issued during the housing boom were rated AAA at inception. (Levitin & Wachter 2013, 14).

Below the investment-grade tranches sat the mezzanine or junk-grade tranches (rated BB and below). (Engel & McCoy 2011, 47). These were mainly bought by collateralized debt obligation (CDO) managers, overseas investors, and hedge funds. (Bernanke et al. 2011, 14; Levitin & Wachter 2013, 16).

The bottom-most tranche was the equity or unrated tranche. This tranche paid the highest coupon rate and was the last to be paid off and the first to absorb losses. The bond underwriters or the issuer were supposed to retain the equity tranche in order to give both “skin in the game” to ensure the quality of the underlying loans. (Engel & McCoy 2011, 47).

Meanwhile, most of the BBB pieces were securitized and sold. In fact, it was the marketing of the supposedly AAA tranches of the CDOs which were made up entirely of BBB pieces (supposedly the diversification of these triple B tranches would reduce their risk) that brought the extra capital

that fueled the final stages of the credit bubble and house price rise. (Cordell, Huang & Williams 2012, 9–10; Levitin & Wachter 2013, 16).

The safeguards imbedded in this structure broke down starting in 2007, when the private-label MBS market imploded. Chief among those safeguards were the credit ratings. The credit ratings on private-label MBS were compromised by the inherent conflict of interest of the rating agencies. The agencies competed with one another to win repeat business from underwriters and issuers, because the issuers were the ones who paid them. The Securities and Exchange Commission later reported that the agencies on occasion overrode their risk forecasting models and raised ratings on behalf of their clients in order to land business and, with it, fees. (Engel & McCoy 2011, 47–51).

Despite the inherent conflicts in the issuer-pays system, investors relied heavily on the ratings, in part because private-label securities were so opaque that investors could not evaluate their creditworthiness. The adoption of the same ratings that were used for sovereign issuers and corporate bonds gave investors the impression that a AAA-rated subprime MBS was just as safe as a bond of a AAA-rated company. In January 2008, however, there were only twelve AAA-rated companies worldwide, while there were 64,000 asset-backed instruments rated AAA. (Blankfein 2009, ¶ 7). In the mortgage-backed space, most of those private-label instruments were stuffed with dubious subprime or nontraditional loans with virtually no track record. Consequently, contrary to appearances, a AAA rating in the private-label MBS market was markedly weaker than the same rating on a corporate bond. (Levitin & Wachter 2013, 12).

This came to light in 2007, when the rating agencies successively downgraded thousands of tranches of private-label MBS. As the value of the downgraded MBS plummeted in response, there was such a severe loss of confidence that by August 2007, the new-issuance market for private-label MBS was dead. By late January 2008, Standard & Poor's had downgraded or threatened to downgrade almost 50% of the U.S. subprime mortgage-backed securities rated in the eighteen months beginning on January 1, 2006 and more than one-third of CDOs sold during that period. (Engel & McCoy 2011, 72, 78, 87–88).

In turn, the downgrades put pressure on banks to take write-downs on private-label bonds in their portfolios, eroding their capital, and required banks, insurers, and pension funds to offload any MBS downgraded below investment grade. (*Id.*, 72–73). In these ways, the credit rating system that was touted as the bulwark of structured finance ended up magnifying the crisis by disastrous proportions.

Meanwhile, the retained equity piece was supposed to protect investors in the higher tranches by giving incentives to the equity piece owners (sup-

posedly the lenders or the underwriters) to minimize the default risk of the mortgages they securitized. But private-label MBS were highly leveraged, with the equity piece equaling 1.6% of the average MBS deal in 2005. (Begley & Purnanandam 2014). That left scant equity to absorb losses when defaults eventually hit. The high extent of defaults in the underlying collateral⁵ demonstrated that the equity piece incentives failed to work as they should have.

Some equity piece holders eventually realized that it was in their interest to offload that credit risk as much as possible by selling the equity tranches for repackaging as CDOs. By 2005, investor conference call transcripts were regularly containing statements by subprime lenders of their intent to resecuritize their residual tranches into CDOs. (Engel & McCoy 2007, 2066–68 & n.129). In 2010, the Federal Reserve Board confirmed that this occurred, reporting to Congress that securitizers in the private-label residential MBS market “often ultimately succeeded in selling [the equity] piece to other market participants.” (Board of Governors of the Federal Reserve System 2010, 44).

The equity piece problem intensified procyclicality in at least two ways. During the bubble, the presence of the equity investors encouraged investors to pile into the investment-grade tranches of private-label MBS, which increased capital flowing into the U.S. housing market and pushed up home prices. Later, the equity pieces’ failure to stem defaults on private-label securitized mortgages led to massive write-downs and sell-offs of private-label MBS, resulting in the insolvency of most top U.S. commercial banks.

Finally, private-label MBS were underpriced for the credit risk they presented, which meant that the third safeguard—pricing—also failed to constrain risk. Risk-based pricing reflected the exuberant expectations of markets in general. Some insiders, famously, John Paulson for example, knew the risk was mispriced and selectively sold short the worst of the MBS. But generally these securities were marked to model and held in portfolio. As long as housing prices continued to increase fueled by continued credit infusions and easing credit, the defaults to be expected from lowered lending standards were held at bay.

ii. Credit Enhancements

Structure, ratings, and pricing were not the only ways that Wall Street investment banks sought to contain the credit risk inherent in private-label

⁵ By first quarter 2014, the cumulative serious delinquency (90+ day) rate for subprime mortgages originated in 2006 and 2007 exceeded 50%. (Treasury Borrowing Advisory Committee 2014, 13).

MBS. In addition, private-label bonds offered investors protection in the form of *credit enhancements*. These credit enhancements were intended to manage default risk by providing added cushions with which to absorb any losses on the underlying loans. (Engel & McCoy 2011, 48).

Credit enhancements (over and above the senior-subordinate structure itself) take three main forms: overcollateralization, excess spread, and financial guaranties, with the first two being most common. (Board of Governors of the Federal Reserve System 2010, 41–43). In overcollateralization, the total value of the collateral is to exceed the total amount outstanding on a given MBS issue. Deals generally specify minimum overcollateralization ratios that must be met.

In excess spread, the weighted average coupon paid by the borrowers exceeds the coupon due on the bonds. The difference between the two (after deducting for servicer and trustee fees) is deposited into a loss absorption reserve for the protection of investors. (Mandel, Morgan & Wei 2012, 37).

In a 2010 report to Congress, the Federal Reserve Board concluded that conditional cash flows in the form of excess spread “either failed *ex ante* to prevent originators and securitizers from originating low quality loans, or failed *ex post* to limit the losses from poor underwriting practices.” (Board of Governors of the Federal Reserve System 2010, 43 (emphasis in original)). The same problems appeared in overcollateralization. In theory, overcollateralization means that the first tier of any loan losses will be covered by the excess collateral. Defaults would have to reach higher-than-expected levels before investors lost money on their bonds. But, like structure, overcollateralization has a procyclical bent. When property values are rising, overcollateralization gives investors confidence that they have additional protection from defaults. In declining markets, however, the total value of the underlying collateral can fall below the amount needed to maintain the minimum overcollateralization ratio. That, in turn, will require the securitization trust to pay off some of the outstanding debt owed to investors through asset sales in order to restore the ratio to its contractually obligated level. The fire sales of assets put downward pressure on asset prices generally, causing the collateral to further decline in value. (Bessis 2015, § 2.3.4, 18).

Financial guaranties by third-party monoline insurers, although less common, provided another layer of credit enhancements in a substantial number of private-label MBS. The strength of these guaranties hinged on the insurer’s credit rating. Before 2008, most monoline financial guaranty companies had stellar AAA ratings. Starting in January 2008, however, the rating agencies downgraded the bond insurers due to mounting claims for losses on the bonds they had guaranteed. Each downgrade pushed down the value of the bonds they had insured and placed those bonds in danger of

further downgrades. (Engel & McCoy 2011, 86; McCoy 2015, 1410). With each new round of downgrades, the value of the affected private-label MBS dropped, eating into the capital of banks who owned them and jeopardizing the banks' solvency. In this way, financial guaranties proved procyclical in nature as well.

iii. Representations and Warranties

The representations and warranties included in the mortgage loan purchase agreements for residential MBS were another feature of securitization deals intended to provide investors assurance that the underwriting standards were adequate. In these contractual provisions, originators make extensive warranties about the quality and legality of the loans being sold into a pool. In addition, mortgage loan purchase agreements generally impose liability on originators for violations of representations and warranties. (McCoy & Wachter 2017, 7–8). Under the typical mortgage loan purchase agreement, originators must buy back any loans that are in breach of the representations and warranties. (*Id.*, 17). In this way, representations and warranties are intended to provide both deterrence and compensation.

In practice, however, representations and warranties had a damaging procyclical effect. Although contractually errors in reps and warranties would require lenders to buy back mortgages, the put back option is not exercised generally unless loans fail. Investors in MBS and insurers had such contractual agreements in place but did not generally test for whether significant breaches were occurring until after the default crisis. Thus, reckless lending practices, some of which included fraud, were not detected. The trust that derived from contractual obligations to buy back bad loans was not reinforced by verification.

Instead, during the credit bubble, representations and warranties gave false confidence to MBS buyers that the underlying loans conformed to proper underwriting standards. This bullishness encouraged investors to overinvest in cut-price MBS. Meanwhile, rising home values disguised the empty value of representations and warranties during the bubble, delaying their enforcement until years after the bubble and deepening their cyclical effects. (*Id.*, 3). The deluge of delinquent mortgages in 2007 and 2008 demonstrated that private-label representations and warranties failed in their central mission. The existence of representations and warranties led to trust without verification, which encouraged the very practices which would undermine the market.

Eventually, after the bubble burst, investors did sue originators for the breach of private-label representations and warranties. Penalties were exacted from originators in the billions of dollars. The result has been that

banks cut back their lending, even of Federal Housing Administration (FHA) and government-sponsored enterprise (GSE) loans, as they no longer trust in the default insurance that FHA and the GSEs provide will hold in a future crisis. Bank lenders point to this litigation, combined with loan losses, for their contraction of credit and tightening lending standards. After 2008, this reaction was so pronounced that fears over buy-back exposure led to a drop in lending to creditworthy borrowers (*Id.*, 2–3), which persists today.

iv. Credit Default Swaps

Many investors in private-label MBS did not rely solely on the safeguards imbedded in securitization deals such as structure, ratings, pricing, credit enhancements, and representations and warranties to protect them against credit risk. They hedged that risk as well. In particular, large investors in residential MBS sought assurance that they would not be hit by losses in their warehoused loans by taking out credit default swaps (CDS). These CDS essentially were insurance against falling house prices and were provided by AIG and other financial companies. The growth in CDS was enabled by federal deregulation through new federal legislation enacted in 2000.⁶ That change and a change in state regulation allowed these products to no longer be regulated as insurance, with the necessary reserves, but solely to be considered financial products,⁷ where pricing for risk alone mattered.

As long as a swap issuer such as AIG remained rated as AAA and the underlying bonds being protected maintained their value, the swaps needed no reserving. But these products were not adequately priced for risk, as they were priced assuming current housing prices would hold. By 2007, Goldman Sachs questioned whether AIG's products were creditworthy and pressed for more collateral, thereby contributing to the unraveling of the credit spiral. (Engel & McCoy 2011, 73–74, 220–23; McCoy, Pavlov & Wachter 2009, 530; McDonald & Paulson 2014, 17–22).

⁶ In the Commodity Futures Modernization Act of 2000, Congress exempted all over-the-counter (OTC) derivatives, including OTC credit default swaps, from federal regulation under the Commodity Exchange Act. (Greenberger 2010, 99–115).

⁷ In 2000, the New York Insurance Department issued an opinion that naked CDS did not constitute “insurance” for purposes of regulation because the buyer did not own the reference bond being protected. Later, in 2004, the New York legislature amended its Insurance Code to make clear that CDS were not insurance. (Dinallo 2008; Gkonos & Cawley 2009, 3–4; New York Insurance Law § 6901(j)-(1); Office of the General Counsel, New York Insurance Department 2000).

2. Procyclical Regulatory Interventions

Elsewhere, we have detailed how federal regulators succumbed to the same false optimism that seized market actors in the period culminating in 2008. In general, their false optimism manifested itself in deregulation, both of mortgage lending standards and the mortgage securitization market. (Engel & McCoy 2011, 157–223; McCoy, Pavlov & Wachter 2009, 509–10). However, throughout that period, federal regulators did employ two affirmative regulatory techniques—capital adequacy and provisioning requirements—that were intended to prevent excessive risk-taking in mortgage lending by commercial banks. Perversely, both of these measures actually worsened cyclicalities in mortgages, as we discuss.

a. Risk-Based Capital

In the period immediately surrounding the 2008 financial crisis, the Basel II capital accord set minimum capital standards for depository institutions, including commercial banks. These capital requirements were intended to make banks resilient enough to absorb unexpected losses in their portfolios. (Kroszner 2008).

The “risk-weighting” feature of the Basel rules required maintenance of more capital for higher-risk assets but less for assets that were deemed safer. (McCoy 2016, 1187). This sliding scale of capital requirements was implemented by designating different risk weights for different asset classes. Basel II prescribed two techniques for deciding on the appropriate risk weights, unfortunately both of which contributed to procyclicality. Smaller and medium-sized banks were required to use the first method, which involved deriving the risk weights from external credit ratings issued by Moody’s, Standard & Poor’s, and Fitch. Because the credit ratings for private-label MBS and CDOs turned out to be inflated, banks ended up holding too little capital against those assets and scores were undercapitalized when mortgage delinquencies spiked. (*Id.*; Repullo, Saurina & Trucharte 2010, 662–63).

The other risk-weighting system applied to the largest, internationally active banks and also proved procyclical. Under the Internal-Ratings-Based, or IRB, approach, Basel II permitted the largest banks to generate their risk weights through their own internal statistical models. Furthermore, IRB banks could use as little as five years of data when calculating their estimates. (Basel Committee on Banking Supervision 2001, 71). During the 2000s credit bubble, this five-year look-back period could not capture the full business cycle for private-label MBS and CDOs, as they were new instruments. (Ren 2011, 21–22; Repullo, Saurina & Trucharte 2010, 661). The assumption was made that these new instruments did not increase default

risk, despite the easing of lending standards and the artificially elevated house prices and combined loan-to-value ratios affecting the underlying mortgages. In the process, the world's largest, systemically important banks seriously underestimated the risk of their residential mortgage-related investments and ended up over-investing in those assets. When the eventual losses hit, almost all of the U.S. too-big-to-fail banks were left undercapitalized and required massive government bailouts. (Comstock 2011).

Basel II's risk-weighting system had another procyclical design flaw, which was that it assigned substantially lower risk weights to home mortgages that were securitized than to mortgages held in portfolio. This treatment was based on the assumption that securitization removed the inherent credit risk in mortgages off of banks' books. The resulting disparity in risk weights provided banks with a powerful incentive to make high-risk mortgages and then off-load those loans through securitization. (Jones 2000, 36–37). Later, that strategy came back to haunt banks after investors filed suits against them for breach of representations and warranties.

After 2008, in true procyclical fashion, the Basel capital standards dragged out the recovery process, as well. Because so many banks had depleted their capital, they had to spend years replenishing their equity. New lending would have required those banks to raise even more capital. In the face of regulators' capital demands and burdened with mortgage losses, bank lenders responded by going into a defensive crouch and curtailing lending. (Bai, Goodman & Zhu 2016).

b. Provisioning

Provisioning rules, which require banks to set aside loan loss reserves, were also implemented in a procyclical manner during the recent credit bubble. Provisioning requirements provide a counterpart to capital adequacy requirements by requiring reserves for expected losses instead of unexpected ones. Like capital rules, provisioning is meant to bolster the ability of banks to withstand loan losses in the event of economic downturns.

The provisioning rules in effect through 2008 only mandated reserves for losses *incurred*, not for losses anticipated in the future. (Zilberman & Tayler 2014, 2–4). This rear-view method exacerbated procyclicality by allowing banks to make excess numbers of loans during bubbles while maintaining inadequate reserves. Indeed, while the housing bubble was inflating from 2002 through mid-2006, U.S. banks increased their share of high-risk lending while cutting their loan loss reserves. (Levitin & Wachter 2013, 12 fig. 1, 13 tbl. 1; McCoy, Pavlov & Wachter 2009, 497 fig. 1, 505 fig. 3). This was possible because as housing prices increased, due to the eased standards, in fact, loan losses decreased. (Engel & McCoy 2011, 212

figs. 11.1 & 11.2). Later, in 2007 and 2008, reserves proved insufficient to cover bank lenders' losses on home mortgages and related assets and those losses spilled over, wiping out banks' equity cushions. During the aftermath, the regulatory and market pressure on banks to rebuild reserves *plus* capital pushed them into retrenchment including severe contraction in lending, because new loans would have required even more new loan loss reserves.

C. Reducing Cyclical Access to Mortgage Credit

In order to assure firmer footing for access to mortgage credit for the long term, it is not enough to end fraudulent practices and regulate the use of highly risky loan products. In addition, we need to iron out the boom and bust dynamics that make housing finance so volatile and potentially destructive of household wealth, both at home and abroad.⁸ This requires introducing greater countercyclicality into the housing finance system—both through macroprudential tools and otherwise—while excising the procyclical features of that system.

Countercyclical regulation has two objectives: to make financial institutions more resilient to downturns and to prick incipient bubbles before they can do harm. (McCoy 2016, 1193–94). Although private-label residential mortgage securitization remains moribund, more work needs to be done to root out the extensive procyclicality inherent in that segment of the structured finance market. In contrast, countercyclical measures are underway in three other areas—namely, mortgage lending standards, capital adequacy requirements, and provisioning rules—and so we close this Article by focusing on a survey of those techniques.

1. The Ability-to-Repay Rule

The countercyclical toolkit includes a set of techniques known as *sectoral tools* that target industries that are uniquely vulnerable to bubbles. Not surprisingly, the most common of these sectoral tools address housing and mortgage finance. Sectoral tools in housing usually aim to stop the deterioration in residential loan underwriting standards during economic upturns. The most important of these techniques includes maximum loan-to-value ratios, debt-to-income caps, and rules governing borrowers' ability to repay.

Due to concerns about credit access, the United States has declined to impose caps on loan-to-value ratios for residential loans as a matter of law. However, currently the only secondary market buyers—Fannie Mae, Fred-

⁸ In recent years, other countries without subprime and nontraditional mortgage loans, notably Ireland and Spain, similarly had a real estate bust. (Wachter 2015, 37–42).

die Mac, and the Government National Mortgage Association (“Ginnie Mae”)—do impose caps of their own, albeit without control over second-lien lending, which is currently limited.

In lieu of mandatory lending limits, Congress enacted an ability-to-repay test for virtually all mortgage lenders in the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010. The statute states that “no creditor may make a residential mortgage loan unless the creditor makes a reasonable and good faith determination . . . that, at the time the loan is consummated, the consumer has a reasonable ability to repay the loan,” including all associated taxes, insurance, and homeowners’ assessments. (Dodd-Frank Act, § 1411(a)(2)). The new Consumer Financial Protection Bureau (CFPB) adopted an implementing regulation and the requirement took effect in January 2014. (Consumer Financial Protection Bureau 2013).

The ability-to-repay rule did not leave the meaning of a “reasonable determination” of ability to repay to lenders’ discretion, but couched it in objective requirements in certain important respects. For instance, the rule requires underwriting decisions to be based on “verified and documented information” about the borrower’s income and assets. This basically bans the low-documentation and no-documentation loans that mushroomed during the housing bubble. The verification requirement significantly lowers the opportunities for loan fraud and should lower expected default rates on home mortgages.

Another provision in the ability-to-repay requirement prohibits a technique that was commonly used during the housing bubble to make monthly payments appear smaller in order to qualify loan applicants. Under Dodd-Frank, lenders must treat interest-only mortgages and negative amortization loans as fully amortizing when determining an applicant’s ability to repay. This will have the effect of making such determinations more conservative. Similarly, when evaluating ability to repay for adjustable-rate loans, lenders must base their determinations on monthly payments at the fully indexed rate, not a low initial teaser rate.

In Dodd-Frank, Congress also harnessed stronger oversight and enforcement mechanisms to give these provisions bite. Lenders are subject to federal examination and enforcement for violations of the ability-to-repay rule.⁹ In addition, injured borrowers can sue lenders for violation of the rule for three years after origination and have a defense to foreclosure based on

⁹ The Consumer Financial Protection Bureau (CFPB) examines non-depository institutions and depository institutions with total assets of more than \$10 billion for compliance with the ability-to-repay rule. State and federal prudential banking regulators supervise smaller depository institutions for adherence to the rule. (Dodd-Frank Act, §§ 1024(a)(1)(A), 1025–26). The Dodd-Frank Act further authorizes state attorneys general to sue banks and nonbank mortgage lenders for violations of the ability-to-repay rule and other Bureau rules. (*Id.* § 1042(a)).

such violations without time limit. As a counterbalance to the threat of private lawsuits, the regulations provide that any mortgage that meets the requirements for a qualified mortgage¹⁰ gives the lender a presumption of compliance with the ability-to-repay rule. (Dodd-Frank Act § 1412).

While the jury is still out, and while the lack of controls on CLTV may in time be a real concern, the objective requirements imbedded in the ability-to-repay rule and the prospect of government and private enforcement should help curb a race to the bottom in residential mortgage lending standards based on inability to repay.

2. Capital Rules

The Basel III Capital Accord was the first capital initiative to seriously seek to reverse the procyclicality in capital standards. As part of that effort, Basel III incorporates several provisions that are designed to make banks increase their capital during bull markets. Banks must now assess risks over the entire business cycle and not just five years. In addition, the new Basel Accord layers a simple 3% leverage ratio on top of the risk-based capital ratio. This new leverage ratio is harder to manipulate than the risk-based formulas, which should better help assure a meaningful capital floor. Meanwhile, the *countercyclical buffer* provision of Basel III imposes a capi-

¹⁰ That presumption is irrebuttable for all qualified mortgages except for higher-priced qualified mortgages, which only afford a rebuttable presumption. For higher-priced covered transactions, in order to rebut the presumption of ability to repay, a borrower must prove that the lender failed to make a reasonable and good-faith determination of his or her repayment ability at the time of consummation, by showing that his or her income, debt obligations, alimony, child support, and the borrower's monthly payment (including mortgage-related obligations) on the mortgage at issue and on any simultaneous loans of which the lender was aware at consummation would leave the borrower with too little residual income or assets with which to meet living expenses, including any recurring and material non-debt obligations of which the lender was aware at the time of consummation. The value of the dwelling (including any real property attached to the dwelling) that secured the loan is excluded from the calculation of residual assets. (12 C.F.R. § 1026.43(e)(1)). A higher-priced covered transaction is defined to include most home mortgages that have 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 a first-lien covered transaction, or by 3.5 or more percentage points for a subordinate-lien covered transaction. (*Id.* § 1026.43(b)(4)). Except for certain government-insured or government-guaranteed loans, in order for a mortgage to be a qualified mortgage, it must be fully amortizing, total points and fees must be limited to 3% of the total loan amount, the debt-to-income ratio may not exceed 43%, and the loan term must be equal to or less than 30 years. In addition, the lender must verify and document the income and financial resources that the borrower relied on to qualify for the loan. Adjustable-rate loans must also be underwritten to the maximum interest rate during the first five years. Any prepayment penalties in qualified mortgages are heavily restricted. (Dodd-Frank Act §§ 1412, 1414(a)); Consumer Financial Protection Bureau 2013).

tal surcharge on banks when credit over-expands.¹¹ Basel III also authorizes regulators to assess an added *capital conservation buffer* of up to 2.5% on global systemically important banks, which would otherwise face limitations on dividend payments to shareholders and bonuses to management if they failed to adopt that buffer. (Department of the Treasury et al. 2013, 62031, 62171). Meanwhile, regulators require the largest banking organizations to conduct capital stress tests to evaluate whether they will have sufficient capital to withstand periods of economic stress. (Group of Thirty 2010, 45, 48–50).

Observers have raised questions about whether these Basel reforms will work. (Admati & Hellwig 2013, 169; McCoy 2016, 1204–05 & n.118). Will the continued use of the internal-ratings-based approach leave the largest, too-big-to-fail banks prone to future capital declines? Will Basel III require banks to hold sufficient capital? Will the countercyclical and capital conservation buffers be meaningful, since implementation is entrusted to regulators' discretion?

Furthermore, under Basel III, regulatory arbitrage remains a serious concern. The capital adequacy requirements in Basel III do not apply to independent nonbank lenders. (Board of Governors of the Federal Reserve System et al. 2016b, 37). Even if they did, it is unlikely that bank and nonbank lenders would be subject to the same capital rules, because federal regulators have concluded that the rules that apply to banks do not fit the business models of large nonbank mortgage servicers. (*Id.*, 37–39). In recent years, the nonbank mortgage lending sector has resurged and has a growing market share. (McCoy & Wachter 2017, fig. 3). Despite this growth, loopholes in Basel III allow this sector to escape capital adequacy oversight. As a result, nonbank lenders operate without the countercyclical controls discussed above. This creates an unlevel playing field vis-à-vis their bank competitors, and one which becomes less level during a boom.

It is unlikely that Congress will extend minimum capital requirements to nonbank mortgage lenders in the current political environment. Thus, the onus is on Fannie Mae, Freddie Mac, Ginnie Mae, and private-label investors to both maintain lending standards and to demand that their counterparties retain sufficient capital levels. Already, nonbank lenders are making growing numbers of FHA mortgages to weaker borrowers with FICO scores below 660. (Lux & Greene 2015, 18–25). In sum, federal regulators have made some progress toward introducing countercyclical elements to the capital regime for banks. That agenda has not been fully implemented,

¹¹ In October 2013, the Federal Reserve and the Office of the Comptroller of the Currency promulgated a final rule authorizing a countercyclical buffer. (Department of the Treasury et al. 2013, 62031, 62171). The rule was phased in starting in January 2016.

however, and remains subject to serious arbitrage concerns, particularly in the case of nonbank lenders.

3. Provisioning

Recent years have also seen progress toward adoption of countercyclical provisioning requirements for residential mortgages. The purpose of these requirements is to require lenders to create higher loan loss reserves when credit is loose while allowing them to draw down those reserves when credit is tight. (McCoy 2016, 1206).

Although more could be done, U.S. accounting standard-makers have recently incorporated countercyclical elements into their loan loss requirements. Under a new Financial Standards Accounting Board standard, effective 2019, lenders must base their loan loss reserves on expected credit losses, regardless whether losses have probably been incurred. (Board of Governors of the Federal Reserve System et al. 2016a; Financial Accounting Standards Board 2016, 1–2). In addition, lenders must record all projected losses over the maturity of loans at the time of origination. Although these measures represent progress, observers have criticized them as not sufficiently countercyclical because it may be years before some losses become expected for residential mortgages, given their long maturity. Moreover, the Financial Accounting Standards Board's new provisioning standards do not apply in the same way to nonbank lenders or aggregators because warehouse losses are *de minimis* and default losses are passed on to investors.

CONCLUSION

No discussion of access to mortgage credit can be complete without confronting the problem of cyclicity. Housing finance is inherently prone to boom and bust cycles that can decimate the homeownership tenure and prospects of millions of U.S. households. During expansions, mortgage bubbles place large numbers of borrowers in jeopardy of foreclosure due to aggressive marketing of loans that they cannot afford. Other borrowers who do retain their homes lose substantial sums of wealth as their home equity vanishes. Later, after the bubble bursts, the severe contraction in credit causes loan applicants who would normally qualify for mortgages in normal times to be turned down and shut out of home purchases.

If homeownership is to attain solid footing, mitigating the cyclicity in the housing finance system will be imperative. That will require rooting out procyclical practices and requirements that fuel booms and busts. In their place, countercyclical measures must be instituted to modulate the highs and lows in the lending cycle. In the process, the goal is not to max-

imize homeownership *per se*; rather, it is to ensure that residential mortgages are made on safe and affordable terms.

To date, some progress has been made in addressing the procyclical aspects of bank regulation that affect mortgage lending. The Consumer Financial Protection Bureau's (CFPB's) ability-to-repay rule will help prevent another race to the bottom in lending standards. During expansions, FASB's new provisioning standard will prod lenders to establish higher loan loss reserves that reflect expected future credit losses. Meanwhile, federal banking regulators have revamped the capital adequacy rules for banks by superimposing a simple leverage ratio on top of the risk-based capital rules, by raising minimum capital requirements through countercyclical and capital conservation buffers and otherwise, and by requiring capital stress tests for larger banks. However, regulatory arbitrage remains a serious concern because market share is increasingly shifting to nonbank mortgage originators who are not subject to the capital adequacy rules.

Taming procyclicality in industry practices in housing finance is much farther behind and will require significantly more work. There is no easy fix for the procyclical effect of mortgage appraisals because appraisals are based on neighboring comparables. Similarly, procyclicality will require serious attention if the private-label securitization market returns. Although the Dodd-Frank Act made modest reforms designed at curbing inflation of credit ratings, the issuer-pays system that drives grade inflation remains in place. Similarly, underpricing the risk of MBS and CDS will continue to be a problem in the absence of an effective short-selling mechanism and the effective identification of market-wide leverage.

BIBLIOGRAPHY

12 C.F.R. § 1026.43 (2015).

Acolin, Arthur, Jesse Bricker, Paul Calem and Susan Wachter. 2016. Borrowing Constraints and Homeownership. *American Economic Review: Papers and Proceedings*. 106: 625–29.

Admati, Anat and Martin Hellwig. 2013. *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It*. Princeton: Princeton University Press.

Allen, Franklin and Elena Carletti. 2013. What Is Systemic Risk? *Journal of Money, Credit and Banking*. 45: 121–27.

Bai, Bing, Laurie Goodman and Jun Zhu. January 28, 2016. Tight credit standards prevented 5.2 million mortgages between 2009 and 2014. *Urban Wire*. The Urban Institute. Available from <http://www.urban.org/urban-wire/tight-credit-standards-prevented-52-million-mortgages-between-2009-and-2014> [https://perma.cc/L7K3-H56T].

Basel Committee on Banking Supervision. 2001. The Internal Ratings-Based Approach. Available from <http://www.bis.org/publ/bcbsca05.pdf> [https://perma.cc/Q5UP-37ED].

Begley, Taylor and Amiyatosh Purnanandam. 2014. The role of the equity tranche in the private-label RMBS market. *Vox*. Available from <http://voxeu.org/article/equity-tranche-and-mortgage-backed-securities-markets> [https://perma.cc/YUG7-V58A].

Bernanke, B.S., C. Bertaut, L. Pounder DeMarco and S. Kamin. 2011. International capital flows and the returns to safe assets in the United States, 2003–2007. International Finance Discussion Paper No. 1014, Board of Governors of the Federal Reserve System. Available from <https://www.federalreserve.gov/pubs/ifdp/2011/1014/ifdp1014.htm> [https://perma.cc/8QPK-NWAX].

Bernanke, B.S. and M. Gertler. 1989. Agency costs, net worth, and business fluctuations. *American Economic Review*. 79: 14–31.

Bessis, Joël. 2015. *Risk Management in Banking*. 4th ed. Chichester, Sussex: John Wiley & Sons, Ltd.

Bhutta, Neil and Glenn B. Canner. 2013. Mortgage Market Conditions and Borrower Outcomes: Evidence from the 2012 HMDA Data and Matched HMDA-Credit Record Data. *Federal Reserve Bulletin*. 99: 1–58.

Blankfein, Lloyd. February 8, 2009. Do not destroy the essential catalyst of risk. *Financial Times*. Available from <http://www.ft.com/cms/s/0/0a0f1132-f600-11dd-a9ed-0000779fd2ac.html#axzz4JmbNoLCb>.

Board of Governors of the Federal Reserve System. 2014. 2013 SCF Chartbook. Available from <http://www.federalreserve.gov/econresdata/scf/files/BulletinCharts.pdf> [https://perma.cc/V3DY-GNQL].

Board of Governors of the Federal Reserve System. 2010. Report to the Congress on Risk Retention. Available from <https://www.federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf> [<https://perma.cc/6JUL-EFSA>].

Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, National Credit Union Administration and Office of the Comptroller of the Currency. June 17, 2016 (2016a). Joint Statement on the New Accounting Standard on Financial Instruments – Credit Losses. Available from <http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20160617b1.pdf> [<https://perma.cc/8FJP-6235>].

Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency and National Credit Union Administration. June 2016 (2016b). Report to the Congress on the Effect of Capital Rules on Mortgage Servicing Assets. Available from <http://www.federalreserve.gov/publications/other-reports/files/effect-capital-rules-mortgage-servicing-assets-201606.pdf> [<https://perma.cc/25ZW-PVE7>].

Brevoort, Kenneth P. and Cheryl R. Cooper. 2013. Foreclosure's Wake: The Credit Experiences of Individuals Following Foreclosure. *Real Estate Economics*. 41: 747–92.

Bricker, Jesse, Arthur B. Kennickell, Kevin B. Moore, and John Sabelhaus. 2012. Changes in U.S. Family Finances from 2007 to 2010: Evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin*. 98: 1–80. Available from <https://www.federalreserve.gov/pubs/bulletin/2012/pdf/scf12.pdf> [<https://perma.cc/BCQ6-8NDF>].

Brunnermeier, Markus K., Andrew Crocket, Charles Goodhart, Avinash D. Persaud and Hyun Shin. 2009. The Fundamental Principles of Financial Regulation. Geneva Reports on the World Economy. Available from <http://www.princeton.edu/~markus/research/papers/Geneva11.pdf> [<https://perma.cc/4SQ3-JALF>].

Campbell, John Y. and João F. Cocco. 2011. A Model Of Mortgage Default. Working Paper.

Comstock, Courtney. January 28, 2011. Only One U.S. Bank Was Not At Risk Of Failing During The Financial Crisis . . . And It Wasn't Goldman. *Business Insider*. Available from <http://www.businessinsider.com/only-one-us-bank-not-at-risk-of-failing-and-it-wasnt-goldman-2011-1> [<https://perma.cc/DR4X-D4YS>].

Consumer Financial Protection Bureau. 2013. Ability-to-Repay and Qualified Mortgage Standards Under the Truth in Lending Act (Regulation Z). *Federal Register*. 78: 6408–6620.

Cordell, Larry, Yilin Huang and Meredith Williams. 2012. Collateral damage: Sizing and assessing the subprime CDO crisis. Working Paper 11–30/R, Federal Reserve Bank of Philadelphia. Available from https://papers.ssrn.com/sol3/papers2.cfm?abstract_id=1907299 [<https://perma.cc/37TR-W86H>].

Department of the Treasury et al. 2014. Credit Risk Retention: Final rule. *Federal Register*. 79: 77602–766.

Department of the Treasury et al. 2013. Regulatory Capital Rules: Regulatory Capital, Implementation of Basel III, Capital Adequacy, Transition Provisions, Prompt Corrective Action, Standardized Approach for Risk-Weighted Assets, Market Discipline and Disclosure Requirements, Advanced Approaches Risk-Based Capital Rule, and Market Risk Capital Rule: Final rule. *Federal Register*. 78: 62018–291.

Detroit Blight Removal Task Force Plan. How does this reinforce the city's vision? Available from <http://report.timetoendblight.org/vision/> [<https://perma.cc/T6Q8-NX6U>].

Diamond, Douglas W. 2007. Banks and Liquidity Creation: A Simple Exposition of the Diamond-Dybvig Model. *Federal Reserve Bank of Richmond Economic Quarterly*. 93: 189–200.

Dickerson, Mechele. 2014. *Homeownership and America's Financial Underclass: Flawed Premises, Broken Promises, New Prescriptions*. New York: Cambridge University Press.

Dinallo, Eric R. November 20, 2008. Hearing to Review the Role of Credit Derivatives in the U.S. Economy. Testimony before the U.S. House of Representatives, Committee on Agriculture.

Dodd-Frank Wall Street Reform and Consumer Protection Act. 2010. Pub. L. No. 111-203, 124 Stat. 1376.

Elul, Ronel, Nicholas S. Souleles, Souphala Chomsisengphet, Dennis Glennon and Robert Hunt. 2010. What “Triggers” Mortgage Default? Federal Reserve Bank of Philadelphia Working Paper No. 10-13. Available from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1596707 [<https://perma.cc/665Q-XY7Z>].

Engel, Kathleen C. and Patricia A. McCoy. 2011. *The Subprime Virus*. Oxford: Oxford University Press.

Engel, Kathleen C. and Patricia A. McCoy. 2007. Turning a Blind Eye: Wall Street Finance of Predatory Lending. *Fordham Law Review*. 75: 2039–2113.

Federal Reserve Bank of St. Louis. 2016. Median Sales Price for New Houses Sold in the United States. *FRED Economic Data*. Available from <https://fred.stlouisfed.org/series/USSTHPI> [<https://perma.cc/JES2-A455>].

Financial Accounting Standards Board. 2016. Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments. *Accounting Standards Update No. 2016-13*. Available from http://www.fasb.org/jsp/FASB/Document_C/DocumentPage?cid=1176168232528&acceptedDisclaimer=true [<https://perma.cc/M8MR-Z4V5>].

Gkonos, James and Mark Cawley. February 28, 2009. Current Developments in State and Federal Regulation of Swaps and Derivatives. *Emerging Issues, LexisNexis*.

Greenberger, Michael. 2010. Out of the Black Hole: Regulatory Reform of the Over-the-Counter Derivatives Market. *Make Markets Be Markets*. New York: The Roosevelt Institute. 99–115. Available from <http://makemarketsbemarkets.org/report/MakeMarketsBeMarkets.pdf> [<https://perma.cc/K3L9-Z5M9>].

Greenspan, Alan. October 23, 2008. Testimony of Dr. Alan Greenspan. Testimony before the U.S. House of Representatives, Committee on Government Oversight and Reform. Available from <https://democrats-oversight.house.gov/sites/democrats.oversight.house.gov/files/migrated/20081023100438.pdf> [<https://perma.cc/UC9J-P7XA>].

Group of Thirty. 2010. Enhancing Financial Stability and Resilience: Macroprudential Policy, Tools, and Systems for the Future. Available from http://group30.org/images/PDF/Macroprudential_Report_Final.pdf [<https://perma.cc/KX3R-ZDED>].

Herbert, Christopher E., Daniel T. McCue and Rocio Sanchez-Moyano. 2016. Update on Homeownership Wealth Trajectories Through the Housing Boom and Bust. Harvard University Joint Center for Housing Studies working paper. Available from http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/2013_wealth_update_mccue_02-18-16.pdf [<https://perma.cc/H4MF-NGBG>].

Herring, Richard J. and Susan M. Wachter. July 1999. Real Estate Booms and Banking Busts: An International Perspective. The Wharton School Research Paper No. 99-27.

Jones, David. 2000. Emerging Problems with the Basel Capital Accord: Regulatory capital arbitrage and related issues. *Journal of Banking and Finance*. 24: 35–58.

Judge, Kathryn. 2013. Interbank Discipline. *UCLA L. Rev.* 60: 1262–1323.

Kaufman, George G. and Kenneth E. Scott. 2003. What Is Systemic Risk, and Do Bank Regulators Retard or Contribute to It? *Independent Review*. VII: 372–91.

Kroszner, Randall S. May 14, 2008. Risk Management and Basel II. Speech at the Federal Reserve Bank of Boston AMA Conference, Boston, MA. Available from <https://www.federalreserve.gov/newsevents/speech/kroszner20080514a.htm> [<https://perma.cc/CB6B-843M>].

Levine, Matt. May 23, 2016. Countrywide Mortgage Hustle Turns Out Not to Be Fraud. *Bloomberg View*. Available from <http://origin-www.bloombergvew.com/articles/2016-05-23/countrywide-mortgage-hustle-turns-out-not-to-be-fraud> [<https://perma.cc/6P9H-2LS5>].

Levitin, Adam J. and Susan M. Wachter. 2015. Second Liens and the Leverage Option. *Vanderbilt Law Review*. 68: 1243–94.

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

Lewis, Michael. 2010. *The Big Short: Inside the Doomsday Machine*. New York: W.W. Norton & Company.

Lux, Marshall and Robert Greene. June 2015. What's Behind the Non-Bank Mortgage Boom? M-RCBG Associate Working Paper Series No. 42. Available from <https://www.hks.harvard.edu/centers/mrcbg/publications/awp/awp42> [<https://perma.cc/K7VM-2XR3>].

Mandel, Benjamin H., Donald Morgan and Chenyang Wei. July 2012. The Role of Bank Credit Enhancements in Securitization. *Federal Reserve Bank of New York Economic Policy Review*. 35–46.

McCoy, Patricia A. 2013. Barriers to Foreclosure Prevention During the Financial Crisis. *Arizona Law Review*. 55: 723–73.

McCoy, Patricia A. 2016. Countercyclical Regulation and Its Challenges. *Arizona State Law Journal*. 47: 1181–1237.

McCoy, Patricia A. 2015. Systemic Risk Oversight and the Shifting Balance of State and Federal Authority Over Insurance. *University of California Irvine Law Review*. 5: 1389–1441.

McCoy, Patricia, Andrey Pavlov and Susan Wachter. 2009. Systemic Risk Through Securitization: The Result of Deregulation and Regulatory Failure. *Connecticut Law Review*. 41: 493–541.

McCoy, Patricia A. and Susan Wachter. 2017. Representations and Warranties: Why they did not stop the crisis. *Evidence and Innovation in Housing Law and Policy*. Lee Fennell and Benjamin Keys, eds. New York: Cambridge University Press.

McDonald, Robert and Anna Paulson. 2014. AIG in Hindsight. Federal Reserve Bank of Chicago Working Paper WP 2014-07.

Mian, Atif, Amir Sufi and Francesco Trebbi. 2015. Foreclosures, House Prices, and the Real Economy. *The Journal of Finance*. 70: 2587-2634.

New York Insurance Law § 6901(j-1).

Office of the General Counsel, New York Insurance Department. June 16, 2000. Opinion Letter.

Reinhart, Carmen M. and Kenneth S. Rogoff. 2009. *This Time is Different: Eight Centuries of Financial Folly*. Princeton: Princeton University Press.

Ren, Haocong. 2011. Countercyclical Financial Regulation. World Bank Working Paper No. 5823.

Repullo, Rafael, Jesús Saurina and Carlos Trucharte. 2010. Mitigating the Pro-cyclicality of Basel II. *Economic Policy*. 64: 659–702.

Schularick, Moritz and Alan M. Taylor. 2012. Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crises, 1870–2008. *American Economic Review*. 102: 1029–61.

Shiller, Robert J. 2015. *Irrational Exuberance*. 3d ed. Princeton: Princeton University Press.

Sinai, Todd and Nicholas S. Souleles. 2005. Owner-Occupied Housing as a Hedge Against Rent Risk. *Quarterly Journal of Economics*. 120: 763–89.

Spader, Jonathan and Christopher Herbert. 2017. Waiting for Homeownership: Assessing the Future of Homeownership, 2015–2035. *Boston College Journal of Law & Social Justice*. XXXVII: 267–94.

Treasury Borrowing Advisory Committee. November 4, 2014. [Untitled]. Available from <https://www.treasury.gov/resource-center/data-chart-center/quarterly->

refunding/Documents/November%202014%20Quarterly%20Refunding%20Charge%201%20FINAL.pdf [<https://perma.cc/DP6C-AX3M>].

Wachter, Susan M. 2016. Informed Securitization. *Principles of Housing Finance Reform*. Susan M. Wachter and Joseph Tracy, eds. Philadelphia: University of Pennsylvania Press. 209–21.

Wachter, Susan. 2015. The Housing and Credit Bubbles in the United States and Europe: A Comparison. *Journal of Money, Credit and Banking*. 47: 37–42.

Zilberman, Roy and William Tayler. 2014. Financial Shocks, Loan Loss Provisions and Macroeconomic Stability. Lancaster University, Management School, Department of Economics, Working Paper No. 2014/023. Available from <http://eprints.lancs.ac.uk/71600/> [<https://perma.cc/KML3-GVKV>].

