

HOUSEHOLD DEBT AT THE TIPPING POINT: WHEN AND WHY DOES HOUSEHOLD BORROWING HURT THE ECONOMY?

ABSTRACT

While household credit booms and busts are not new phenomena, the financial crisis in 2008 and its devastating effects have spurred a deeper examination of the mechanics underlying these episodes. We review this growing literature and attempt to answer four primary questions: What drove the recent (and previous) household credit booms? What factors precipitated the tipping point in household borrowing in the economy? How did the following deleveraging efforts affect the economy? Can the literature guide us on how to avoid these destructive cycles or mitigate the damage in the future? Looking at the origins of the recent episode we find more evidence supporting the “irrational exuberance” demand-side view espoused by Robert Shiller than an exclusive supply-side explanation that stresses loosening mortgage credit standards as argued by Atif Mian and Amir Sufi. However, both perspectives likely are important and researchers remain far from reaching a consensus on the origins or implications and any of the other key aspects of the recent episode. The double leverage cycle and its violent unwinding triggered by “scary bad news” put forth by John Geanakoplos is the most compelling model of a tipping point. Whether deleveraging per se was responsible for the slow recovery remains uncertain as important structural factors such as demographic, technological or political changes were also at play during this time, confounding identification. Given the uncertainty surrounding the recent episode, few prescriptions are available for policymakers.

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The second sort of cyclical tendency is the "free" cycle, not forced from outside [like seasonal variation], but self-generating, operating analogously to a pendulum or wave motion.... To take another simile, such a disaster is somewhat like the "capsizing" of a ship which, under ordinary conditions, is always near stable equilibrium but which, after being tipped beyond a certain angle, has no longer this tendency to return to equilibrium, but, instead, a tendency to depart further from it.

Irving Fisher, "The Debt-Deflation Theory of Great Depressions," 1933, pp. 338-9.

The idea that excessive public and/or private debt accumulation can lead to a financial crisis is not new. Sovereign defaults and economic crises were recorded as early as the 1300s and have continued to the present day (Kindleberger, 1984). Irving Fisher (1933) recognized in real time that the Great Depression had financial roots. Hyman P. Minsky (1970), following John Maynard Keynes in many respects, offered a "financial-instability" hypothesis for capitalist economies that was largely ignored for decades only to be rediscovered by many economists in the wake of the recent financial crisis.

More recently, Carmen M. Reinhart and Kenneth S. Rogoff (2009) summarized hundreds of debt-fueled financial crises around the world that predated our recent crisis, reaching back many centuries. Moritz Schularick and Alan M. Taylor (2012) bolstered the argument that financial crises are "credit booms gone bust" rather than the mere bursting of asset bubbles or the result of shocks to the real economy. In formalizing Minsky's concept that private collateral-based leverage cycles driven by waves of optimism and pessimism may cause economic instability, John Geanakoplos (2010) granted a belated seal of approval to Fisher's and Minsky's pioneering but long-neglected insights linking debt to economic instability.

Yet the precise details, mechanisms and implications of credit booms originating in the household sector have remained somewhat murky until recently. Fisher focused on the broader economic effects of liquidating indebted businesses. Minsky also believed that business borrowing and investment, not residential mortgages and housing, were the engines of financial instability in the modern economy. Reinhart and Rogoff focused mainly on external sovereign debt while neither they nor Schularick and Taylor studied household debt separately from business borrowing—instead tracking total private borrowing—because disaggregated data were not readily available to them.

Recent research based on new and painstakingly assembled datasets has raised the macroeconomic profile of household borrowing from previously unknown (and presumably unimportant) to undeniably central for understanding not just the recent financial crisis but many previous episodes, as well. Jorda, Schularick and Taylor (2015a, 2015b) and a series of papers by Atif Mian, Amir Sufi and co-authors² have provided empirical support for a previously unknown chain of causation linking surges in household debt, financial crises and slow economic recoveries both in the U.S. and elsewhere. Moreover, their evidence shows that the recent financial crisis emanating from the U.S. housing market was but the latest example of a general pattern, not a unique episode.

Although these and other recent papers have advanced our understanding of the connections between household borrowing and the broader economy, several questions remain unsettled and require further investigation.

- 1) What drove the recent (and previous) household credit booms—shocks to credit supply, credit demand or both?
- 2) What factors precipitated the tipping point in household borrowing and in the economy—that is, what turned household borrowing from a boon to a bane for growth?
- 3) How did household and financial-sector deleveraging efforts after the tipping point was reached affect the economy and how will we know when deleveraging has run its course?
- 4) Can research into previous episodes help us prevent destructive household leverage cycles or recover from them more quickly than in the current episode?

In addition to documenting financial crises across a variety of countries that resulted from household borrowing booms, the recent literature has begun to explore the mechanisms at work both before and after the tipping point. Much less is known about the timing and causes of the inflection point itself, however.

Another challenging task for future research is to separate empirical regularities that appear in all crises from the unique aspects of a particular episode. Recently, Summers (2014), Gordon (2016), Lo and Rogoff (2015), Pistaferri (2016) and many others have suggested that slower economic growth experienced in the aftermath of the 2007-09 crisis may be due in part to slow-moving structural factors

² See, for example, Mian and Sufi (2009, 2014), Mian, Rao and Sufi (2013), Mian, Sufi and Verner (2015, 2017).

such as demographic, technological or political changes that would have been important even if the financial crisis had not occurred. Policymakers are handicapped by our imperfect understanding of the cyclical and secular forces at work.

We frame our discussion of household debt, financial crises and economic growth by surveying recent research that addresses each of the questions posed above. We conclude with thoughts on fruitful directions for future research.

1) What Drives Household Credit Booms—Shocks to Credit Supply, Credit Demand or Both?

A framework that seems at first glance to be parsimonious and unambiguous—the hypothesis that innovations in the price or quantity of household credit must be due either to shocks to household credit supply or household credit demand—conceals a complex underlying reality. First, it is entirely possible that both credit demand and credit supply could be shocked at the same time. One possibility is a common innovation that affects both, such as a widespread reduction in the cost of exchanging and analyzing information; or changes in the beliefs of both lenders and borrowers about the future path of house prices or incomes. For example, a widespread shift toward more optimistic expectations of future house prices would increase households' desire to borrow as well as making banks and investors more willing to lend against housing even at unchanged interest rates.

Another scenario that would be difficult to disentangle using only a demand-or-supply framework is a rapidly unfolding leverage cycle that contains feedback loops (Geanakoplos, 2010). Households that have become, for some reason, more optimistic might bid up house prices which, because houses serve as collateral for lending, would provide lenders more comfort loosening their standards. Greater access to credit, in turn, could support even higher house prices, once again increasing lenders' appetite and so on. Conversely, an initial loosening of lending terms—due, perhaps, to deregulation or innovation—might support somewhat higher house prices, which then encouraged more aggressive lending, resulting in higher house prices and, as before, the cycle could continue. Can we reliably pinpoint the initial “flapping of a butterfly's wings” after a vortex like the recent cycle has been unleashed?

Despite these two sources of complexity, the supply-or-demand framework can be a useful organizing scheme. We survey supply- and demand-based explanations of household credit booms

separately as well as discussing research that is agnostic about the initial disturbance but which sheds light on a credit boom once it is underway. We do not judge which hypothesis is best supported by the evidence. We merely suggest that researchers focusing on one or the other side of the question should avoid becoming dogmatic in their interpretations of the evidence.

A. *Household credit booms as shocks to household credit supply.* The telltale signs of a positive credit supply shock in the face of an unchanged demand curve are a greater amount of lending and a lower interest rate. An exogenous decline in the safe real interest rate—for example, as a result of a global saving glut (Bernanke, 2005)—is one possibility. This could be interpreted as a positive credit-supply shock. It would increase the relative attractiveness of mortgage (and all other types of spread) lending to banks and investors, putting downward pressure on mortgage rates. Because borrowing costs are inputs to households' evaluation of the user cost of housing, lower mortgage rates induce homebuyers to borrow more and to bid up house prices (Himmelberg, Mayer and Sinai, 2005).

Other reasons why the credit-supply curve might shift outward are financial deregulation (Duca, Muellbauer and Murphy, 2011), market-expanding innovations (Dyran and Kohn, 2007; Kuhn, Schularick and Steins, 2017), or tax policies that expand home ownership such as the generous tax relief for mortgage interest payments (Cecchetti, Mohanty and Zampolli, 2011). Atif Mian and Amir Sufi have produced voluminous evidence that supports an interpretation of the recent U.S. household credit boom as primarily the result of positive shocks to credit supply (Mian and Sufi, 2009, 2014); Mian, Sufi and Verner (2015, 2017) provide evidence from a panel of foreign countries and a previous U.S. episode, the banking deregulation of the 1980s. Favilukis, Ludvigson, and Nieuwerburgh (2017) analyze a general-equilibrium model in which financial-market liberalization and the global saving glut unleash a simultaneous household borrowing and house-price boom. Rather than reflecting irrational house-price expectations, greatly expanded borrowing opportunities allow non-rich households in their model to smooth their spending over time. In the end, house prices became overvalued (in their terms, the risk premium on housing became very small) and many households became overextended. Despite this outcome, Favilukis et. al. argue that individual households were acting rationally.

The key assumption underlying the credit-supply hypothesis is that the borrowing desires of a significant number of households were constrained before credit-market deregulation and/or innovation allowed them to borrow more. Kuhn, Schularick and Steins (2017) use a newly created household-level dataset to argue that the long post-World War II U.S. household borrowing boom can be characterized as consisting of three phases. Between 1949 and 1970, household debt increased

mainly due an increase in the number of households able to access credit; they call this the era of increased financial inclusion. After the 1970s, household debt increased most on the intensive margin— i.e., more debt per borrowing household rather than a large increase in the number of households with debt. Finally, during the most recent two decades or so, an increasing number of low-income households were able to borrow larger amounts than ever before. In contrast to the earlier era of greater financial inclusion, the recent increase in borrowing by low-income households involved greater amounts of debt rather than entirely new groups of borrowers. These authors show that the latter two phases of the household borrowing boom cut across age levels, birth cohorts, education and income levels, suggesting that a common shock to credit supply is the best explanation for why borrowing increased so much.

B. Household credit booms as shocks to household credit demand. The distinguishing characteristics of a positive demand shock in the face of an unchanging supply curve are increased lending and *higher* interest rates. At first glance, the data appear inconsistent with this explanation of the household borrowing boom. As Figure 1 shows, the 30-year mortgage rate fell from 9.1 percent in the fourth quarter of 1994, to 5.7 percent in the second quarter of 2005, a 340 basis-point decline. Meanwhile, the amount of home mortgage debt outstanding increased from \$3.2 trillion to \$8.4 trillion and the annual growth rate of mortgage loans outstanding increased from 5.6 percent to 13.8 percent. One would expect a demand-driven borrowing boom of this magnitude to have put upward pressure on the mortgage rate.

Strictly speaking, the relevant counterfactual is what would have happened to household debt and mortgage rates had there been no demand shock *and nothing else changed, either*. As noted, it is possible that important changes were taking place that masked the demand shock, such as the global saving glut. It is possible that, had there been no positive demand shock, mortgage rates would have fallen even lower as desired global saving increased. Much of the recent innovative research on this question has used disaggregated data to seek clarification on exactly this point.

Federal Reserve Chair Alan Greenspan was among the most vocal and visible advocates of the view that increased demand was driving mortgage borrowing. Greenspan persistently used the term “home-equity extraction” to describe rapid increases in mortgage borrowing during his tenure, belying his sanguine view of rising house prices (Greenspan and Kennedy, 2008). According to Greenspan, it was as if households were tapping into a swelling reservoir of wealth that previously had been trapped and, at least for some time, which seemed to refill itself as quickly as it could be emptied via cash-out

refinancing and other borrowing strategies. While Greenspan cited financial innovation as being helpful in allowing households to extract more wealth from their homes more quickly than ever before, his account of the housing and borrowing boom portrayed homeowners as the prime movers. Apparently, they were belatedly waking up to their own vastly improved income and wealth prospects manifested in part by rapidly rising house prices. Aggressive borrowing therefore reflected “rational exuberance;” what required explanation was why all families were not joining the gold rush.

Some recent research provides evidence that casts doubt on the credit- supply narrative; by default, this means they support the credit-demand hypothesis. Glaeser, Gottlieb and Gyourko (2013) estimated that the decline in mortgage rates can explain at most one fifth of the house-price boom. Various changes in lending terms—including lower down-payment requirements and slacker loan-approval criteria—likewise were quantitatively minor factors, based on their empirical estimates. Even taking into account the relatively inelastic housing-supply response in some local markets, much of the increase in average house prices (and concomitant mortgage borrowing) remains unexplainable unless one entertains the possibility of a shift in demand. Lacking a more convincing story, they suggest “wildly unrealistic expectations about future [house-]price appreciation” as a plausible explanation.

The idea that homebuyers’ house-price expectations had become disconnected from fundamentals and “reasonable” expectations was, of course, the conclusion of Case and Shiller (2003). Based on survey evidence around the country reaching back to the late 1980s, Case and Shiller documented widespread expectations among recent homebuyers that long-term double-digit percentage house-price appreciation was likely, even in unglamorous places like Milwaukee—in other words, many households displayed “irrational exuberance.” Foote, Gerardi and Willen (2012) demonstrated that it was not just unsophisticated individuals who harbored delusions of housing riches; many mortgage lenders and investors also were swept up by the euphoria and, in many cases, suffered personal losses when housing markets crashed.

Focusing more precisely on the respective roles of house prices and mortgage-credit availability, Justiniano, Primiceri and Tambalotti (2015) employed a calibrated general-equilibrium model of the housing and mortgage markets to study the economic effects of household leveraging and deleveraging. They found that an increase in house prices driven by shifting household tastes for homeownership could account fully for the increased mortgage borrowing actually observed. Conversely, a positive credit-supply shock modeled as higher permitted LTV ratios could not match the joint evolution of house

prices and mortgage borrowing. In either case, household leveraging and deleveraging *per se* exerted minor effects on the economy due to often-neglected general-equilibrium effects.

Kaplan, Mitman, and Violante (2017) construct a structural equilibrium model of the U.S. economy in order to meet the challenge of identifying the effects of credit supply shocks and shifts in expectations within micro data. The model offers three potential drivers of aggregate housing investment, house prices, rents and mortgage risk spreads: changes in household income, changes in credit conditions, and changes in beliefs about future housing demand. Offering a nuanced conclusion, they assert that shifts in beliefs about future housing demand were the dominant force. By itself, relaxed credit conditions had little effect on prices and rents in the model. However, it was a necessary condition for the observed movements in leverage and homeownership.

In particular, two features of actual housing markets that anecdotal or partial-equilibrium accounts often overlook are new housing construction and internal re-allocation of the owner-occupied stock. While the number of households in the U.S. increased by 11.6 million in the decade ending in the first quarter of 2005, the number of occupied or for-sale owner-occupied housing units increased by 15.4 million (Census Bureau). Hence, there was a vigorous supply response to the housing boom, reducing the disruptive impacts of whatever shock(s) had hit the economy. Meanwhile, re-allocation of owner-occupied units from those with skeptical views about the housing market toward those with an optimistic view is unobservable but could play an important dampening effect in a house-price boom. In their general-equilibrium model, Justiniano, Primiceri and Tambolotti estimated that this effect was significant; in its absence, the house-price boom would have been 50 percent larger.³

Adelino, Schoar and Severino (2016) constructed a large ZIP-code-level dataset to investigate whether mortgage-credit expansion—particularly to weaker borrowers—was a plausible explanation for the borrowing boom, as suggested by Mian and Sufi (2009) and others. In contrast to the credit-supply hypothesis, Adelino, Schoar and Severino found that borrowers of all income levels and FICO scores participated in the borrowing boom—i.e., not just households that previously had limited access. Moreover, mortgage delinquencies among middle- and high-income and prime mortgage borrowers spiked more than among weaker borrowers. The authors believe that these patterns are more consistent with a demand-side view of the housing and borrowing boom in which optimism about house

³ To estimate the price-dampening effect of internal re-allocation of the housing stock from pessimists to optimists, they compared a closed-economy version of the model which contains all lenders and borrowers to an open-economy version in which all lenders are abroad.

prices was widespread. Coming to similar conclusions, Foote, Loewenstein and Willen (2016) found that while borrowing in the subprime sector of the mortgage market grew rapidly, borrowing by high-income (and less likely to be credit constrained) individuals grew at similar rates, and the distribution of debt remained stable. Furthermore, had lending not increased in the subprime sector, there would have been a reallocation of total debt toward the *wealthy*. Similarly, Cooper, Cynamon and Fazzari (2016) documented a run-up in debt-to-income ratios far up the income distribution, consistent with a widespread change in expectations and attitudes. Albanesi, DeGiorgi, and Nosal (2017) agree with the distributional challenge to the credit-supply hypothesis and further find that real estate investors played a critical role in the rise of mortgage debt for the middle and top of the credit score distribution. Notably, they find that the rise in mortgage delinquencies is virtually *exclusively* accounted for by these investors. Albanesi, DeGiorgi, and Nosal also challenge the positive correlation between credit growth during the boom and the depth of the recession as masking important regional demographics, such as the prevalence of young, minority or low education workers.

C. *Agnostic views of the source of household credit booms.* Finally, some research does not clearly advocate a supply-only or demand-only view of the household borrowing boom but provides useful insights nonetheless. Dynan and Kohn (2007) explored the probable causes and possible consequences of the unfolding credit boom. They surveyed a range of explanations for the boom, concluding that, on the demand side, demographic changes likely were important. In particular, the burgeoning population of baby boomers in their high-borrowing years likely exaggerated the shift in borrowing behavior. Another benign explanation for surging household debt was the higher average education level of the population over time. People with more education may borrow more than those with less education both to finance their educations and to bring forward some of their lifetime earnings. A distinguishing characteristic of relatively high-skill workers is that their lifetime earnings profiles are steeper, providing them a stronger incentive to borrow to smooth their consumption. On the supply side, Dynan and Kohn suggested that financial innovation had reduced the barriers to and costs of borrowing for many households.

A contribution that does not fit neatly into either the supply or demand categories is an accounting exercise that raises the question of how much actual borrowing households did during the post-war period. Mason and Jayadev (2015) parse net changes in the aggregate household debt-to-income ratio into its components—namely, changes that reflect inflation, interest payments, income growth and defaults as distinct from the amount of purchasing power made available to households.

They conclude that, during the 1980s, an apparent increase in the debt-to-income ratio is more than fully accounted for by high interest payments. In other words, households could not increase their consumption because their borrowing was so expensive. In contrast, the large increase in the aggregate debt-to-income ratio between 2000 and 2007 indeed corresponded to a large net increase in resources available to spend or invest. The post-2007 crash has virtually reversed the prior increase in debt-to-income ratios through a combination of defaults and lower net lending. Mason (2017) draws an important distinction that the majority of household debt is incurred to finance asset accumulation, rather than consumption. Echoing his earlier findings, the secular rise in household debt is primarily a monetary phenomenon: the result of higher interest rates, lower real income growth and inflation. However, the equity extraction during the early 2000s represent an important deviation from the historical trend where increased access to housing credit led to increased consumption rather than productive asset investment.

John Geanakoplos (2010) and others have formalized the concept of the leverage cycle, which seems particularly relevant in the wake of the recent financial crisis with its startling degree of household leveraging and deleveraging (see Figure 2). As noted above, the idea that capitalist economies with widespread collateralized borrowing harbor elements of instability is an old one (Fisher, 1933; Minsky, 1970). Geanakoplos highlighted the role of heterogeneous beliefs in creating self-reinforcing cycles of increasing and then decreasing leverage.

During the leveraging phase of the cycle, optimists use debt to acquire assets, pushing up the asset price in the process. Because lenders use the market value of the asset to collateralize their loans, a higher asset price supports more borrowing. The optimists thus can buy more, pushing up the price even further. As asset prices rise, the measured leverage ratio—the value of the collateral divided by the equity position of the borrower—does not rise to alarming levels because the borrower is booking (paper) capital gains even as debt increases. Hence, the borrower's financial position appears to be improving.

At some point, a shock may upset this process. Geanakoplos suggests that the most common shock to interrupt the upswing of a leverage cycle is “scary bad news” about the asset. In the case of the housing market, it could have been something as relevant as rising vacancy or foreclosure rates or as irrelevant as the retirement in early 2006 of Alan Greenspan, to whom some had attributed mystical powers. The arrival of very bad news increases uncertainty and asset volatility (see Figure 3). This causes lenders to tighten margins (i.e., increase collateral requirements), which can choke off some demand for

the asset, allowing the asset price to decline. But now the borrower's leverage ratio increases because, while the numerator (value of posted collateral) falls, the denominator (borrower's equity position) falls by the same dollar amount. The essence of leverage is that changes in the collateral's value are multiplied by the leverage ratio into proportionately larger changes in the borrower's equity position. For example, a \$100 asset financed with \$80 of debt and \$20 of equity produces a leverage ratio of five. If the asset value falls by \$20, to \$80, the equity position becomes zero.⁴ In other words, the leverage ratio becomes infinite; the borrower is insolvent.

As Figure 3 suggests, optimistic investors incur huge losses and, in the case of insolvency, the assets are transferred to more pessimistic owners. In the process, the asset is revalued downward even more. The decline in market price due to one investor's insolvency then feeds back to other lenders and borrowers through increased caution, falling prices, and so on.

Building on the general concept of the leverage cycle, Geanakoplos pointed out that the recent financial crisis actually consisted of a "double leverage cycle." At one level, households borrowed from mortgage lenders, who allowed rising housing values to collateralize additional borrowing. At the same time—and to an extent unappreciated by the Federal Reserve and other financial regulators—mortgage lenders and purchasers of mortgage-backed securities (MBS) refinanced these assets (especially MBS) by pledging them as collateral in the repo market. The second round of leveraging fed back to the primary market through cheaper mortgages, as the secondary market bid aggressively for additional collateral to pledge in repo.

While house prices continued to increase, losses were miniscule and lending margins became more generous—in the primary market through higher loan-to-value ratios and in the secondary market via smaller collateral haircuts. Thus, a relatively small amount of equity, supplemented by paper gains and shrinking collateral margins, was leveraged twofold. The unwinding of both leverage cycles at virtually the same time resulted in the most dramatic financial collapse since the Great Depression.

2) What factors precipitate a tipping point in household borrowing and in the economy?

⁴ The initial leverage ratio of five, multiplied by a 20-percent loss in collateral value, results in a 100-percent decline in the borrower's equity position.

Despite the advances made so far, we still have a poor understanding of what triggers a tipping point in a leverage cycle—or more precisely, the respective tipping points in two linked leverage cycles. John Geanakoplos speculated that “scary bad news” most often flips an expanding into an unwinding leverage cycle. By definition, however, news is unpredictable.

One set of financial innovations that plausibly played a significant role in tipping one or both recent leverage cycles includes financial instruments that allowed pessimistic investors to use leverage (embedded in derivatives) to bet against the housing and mortgage markets. As dramatized in the book and movie by Michael Lewis, *The Big Short*, the standardization of credit default swaps (CDS) on private-label mortgage-backed securities in 2005, plus the exchange listing in 2006 of futures and options contracts based on house-price indexes in ten major metro areas plus a nationwide index, allowed investors for the first time to take large leveraged bets against house prices and mortgage performance. Prior to 2005, the housing market was, unlike other major asset classes, unbalanced in the sense that bullish bets could be made with leverage but bearish bets could not. In terms of Figure 3, one could imagine the build-up of leveraged bearish bets against housing and mortgages themselves as the “scary bad news” that tipped the housing market; or perhaps increased uncertainty and volatility took hold in the form of a few house-price declines—such as Boston in late 2005 and some sand states in 2006.

Few other attempts to understand the tipping point(s) at a deeper level have been as successful as that of Geanakoplos. The concept of a “Minsky moment”—when an unsustainable trend, which Minsky himself termed “Ponzi finance,” turns to panic and flight—is appealing as an ex post description but lacks enough specificity to allow confident predictions.

Indeed, most of the research discussed above implicitly appeals to the Herbert Stein theory of tipping points—“trends that can’t continue, won’t”—if they address the inflection point at all. It may be too much to ask of a theory of credit supply or credit demand that allows for significant shocks also to explain when and why the shock has run its course.

3) How do household and financial-sector deleveraging efforts after the tipping point affect the economy and how do we know when deleveraging has run its course?

Many scholars have attempted to identify and quantify deleveraging and its effects on the economy. In addition, there have been several promising attempts recently to link the magnitude of the preceding household debt boom to the extent of post-crisis economic growth slowdown.

Ueda (2012) drew on the Japanese experience of protracted deleveraging since the 1990s to draw lessons for the U.S. Echoing Geanakoplos, Ueda stressed the negative feedback loops among falling asset prices, financial instability and stagnant economic activity. Termed by some “Japanization,” the long-lasting sluggishness of the economy and the protracted weakness of asset prices and the financial sector frightened some U.S. and European observers to fear that we, too, could become trapped in a low-growth, deflation-prone equilibrium. As government debt soared and political gridlock increased—another characteristic of Japan’s experience—The Economist magazine famously portrayed U.S. President Barack Obama and German Chancellor Angela Merkel glumly wearing kimonos under the title, “Turning Japanese.”⁵

Karen Dynan (2012) and Dynan and Wendy Edelberg (2013) dug into household-level data in the U.S. to determine if deleveraging was exerting an independent effect on household spending over and above the role of economic fundamentals, such as income growth and negative wealth effects. They concluded that there was some evidence of a deleveraging effect although it didn’t appear to be overwhelming. The model developed by Philippon and Midrigan (2016) found that the zero lower bound on interest rates greatly exacerbated the negative effects of deleveraging (which were minor absent constrained monetary policy) on aggregate consumption and employment. Relatedly, Lo and Rogoff (2015) concluded that household debt overhang was a significant detriment to full economic recovery in many countries. Only a few countries, including the U.S. and the U.K., had experienced any noticeable household deleveraging. Until the process was completed—which Reinhart and Rogoff (2009) suggested could take a decade or more—it would be difficult to assess whether and to what extent economies had suffered true long-run damage.

An interesting theoretical contribution to the deleveraging debate appeared in Eggertsson and Mehrotra (2014). The authors modeled a deleveraging shock in which households’ credit capacity is reduced due to a large decline in collateral values. This can result in chronically weak demand, culminating in “secular stagnation” of the type proposed by Summers (2014). Policy options would be limited but not non-existent in the face of a potential “permanent recession.”

⁵ The cover appeared on the July 30, 2011, edition: <http://www.economist.com/node/21524874>.

Mian, Rao and Sufi (2013) find significant effects of deleveraging on consumption in the aftermath of the crisis. Mian, Rao and Verner (2015, 2017) extend the perspective to the medium-run growth prospects of economies that have been through the boom and bust of a household leverage cycle. They find strong evidence that large household debt booms are associated with weaker growth in the aftermath of the crisis. Two of the important mechanisms they identify are downward nominal wage rigidity and damage to financial institutions from loan losses. Due to sticky nominal wages, a weak post-crisis economy suffers rising real wages, hampering recovery. Lenders that suffered large losses on household defaults cannot play their part in financing a recovery.

Likewise, Lombardi, Mohanty and Shim (2017) found evidence in a large panel of countries—54 economies observed from 1990 to 2015—that large build-ups of household debt predict weaker long-term growth. Moreover, they showed that higher pre-crisis debt ratios predict more severe post-crisis slowdowns in consumption growth. They found a tipping point of sorts in that household debt-to-GDP ratios above 80 percent intensified the negative long-run effects on growth. For consumption growth, the inflection point appeared to be 60 percent.

A contrary view of deleveraging appears in Justiniano, Primiceri and Tambalotti (2015). They find that the macroeconomic consequences of both leveraging and deleveraging are relatively minor. This is because, in their general-equilibrium setting, the responses of borrowers and lenders to credit-supply shocks roughly cancel each other out in the aggregate. As discussed above, their model and empirical results point toward a demand shock in the form of very optimistic house-price expectations as the most plausible explanation for the recent leverage cycle.

4) Can research help us prevent destructive household leverage cycles or recover from them more quickly than the current episode?

Researchers remain far from reaching a consensus regarding the causes of the recent household leverage cycle. Thus, agreement on appropriate preventive measures does not yet exist, either. Policymakers likewise are struggling to respond.

Some economists emphasize the harmful role of financial liberalization, which would suggest some regulatory retrenchment. One could argue that the Dodd-Frank Act of 2010—officially, the Wall Street Reform and Consumer-Protection Act—was motivated by this view of the crisis. Much of the

research reviewed here that has appeared since Dodd-Frank was signed into law suggests that this is an incomplete view, at best. Another version of the credit-supply hypothesis focuses on the depressing effect of the global saving glut on U.S. interest rates. By its very nature, this factor cannot be addressed by U.S. policymakers alone. Nor has this powerful influence subsided; global capital flows continue and real interest rates remain very low around the world. Indeed, very low real interest rates may be part of a “new normal.”

The explanations that highlight changes in household and lender attitudes toward housing or borrowing and lending are even less amenable to policy interventions than those that stress credit supply. Stronger consumer protections and greater awareness of the need to increase financial literacy among households taking on major financial obligations have accompanied the arrival of the Consumer Financial Protection Bureau, part of the Dodd-Frank Act. Yet, there are limits to how much public policy can or should “protect people from themselves.” As Jonathan Zinman (2015) notes, the “puzzlingly high equilibrium debt burden” we observe among a broad swath of the population may be due to biased decision-making, rather than a lack of financial knowledge or adequate consumer protection. If some or many people are very impatient or lack financial self-control, intermittent booms and busts in household borrowing—especially when turbo-charged by rising collateral values—may be unavoidable.

One response to the severe crisis we experienced is to ask whether the mortgage market itself can be improved. According to Campbell and Cocco (2015), the U.S. housing and mortgage crisis was a “perfect storm” for mortgage defaults. Our mortgage market is unusual, being dominated by relatively expensive long-term, high-LTV fixed-rate mortgages with built-in refinancing options that are costless to exercise. Each of those features is expensive; together, they generate a significant interest-rate mark-up over the government bond yield. This instrument is particularly vulnerable to a disinflationary shock that results in falling house prices, low interest rates and weak income growth—precisely what happened. Exercising the prepayment option would protect the borrower by refinancing into a lower mortgage rate. But this option cannot be exercised if the borrower falls into negative equity—which happened to about one third of U.S. mortgage borrowers during the crisis. Beginning with thin layers of equity—due to the typically high LTVs at origination—meant that borrowers entering the housing market near the peak of the bubble were particularly vulnerable. Most estimates suggest about 10 million homeowners exited homeownership under some degree of distress during the crisis, representing almost one-fifth of all mortgaged homeowners. Surely, there must be a better system.

Given the mortgage system we have, policy responses have focused on relieving borrowers' negative equity through principal write-downs; easing payment burdens through modifications or refinancing; and, at the macro level, reducing interest rates to very low levels. Kaplan, Mitman, and Violante (2017) find that, while a debt-forgiveness program cannot prevent a sharp drop in house prices and aggregate expenditures (regardless of timeliness), it can significantly mitigate foreclosure rates. In addition, such a program has the capacity to reduce the aggregate decline in non-durable consumption given the long-term reduction in mortgage servicing for benefitting borrowers.

Finally, Mason (2017) suggests that resolving the problem of household debt requires more fundamental considerations. Namely, security and social status in the U.S. depends on asset ownership, which is primarily financed through household debt. Debt-financed home ownership can be viewed as a substitute for stronger tenant protections that would make renting a more viable alternative. Moreover, Mason argues that the financial system is designed to preserve the value of existing financial claims. He suggests that, if the rise of household debt is in fact a serious problem, then a more fundamental realignment of these features may be in order.

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Figure 1

30-Year Mortgage Rate and Growth of Mortgage Debt

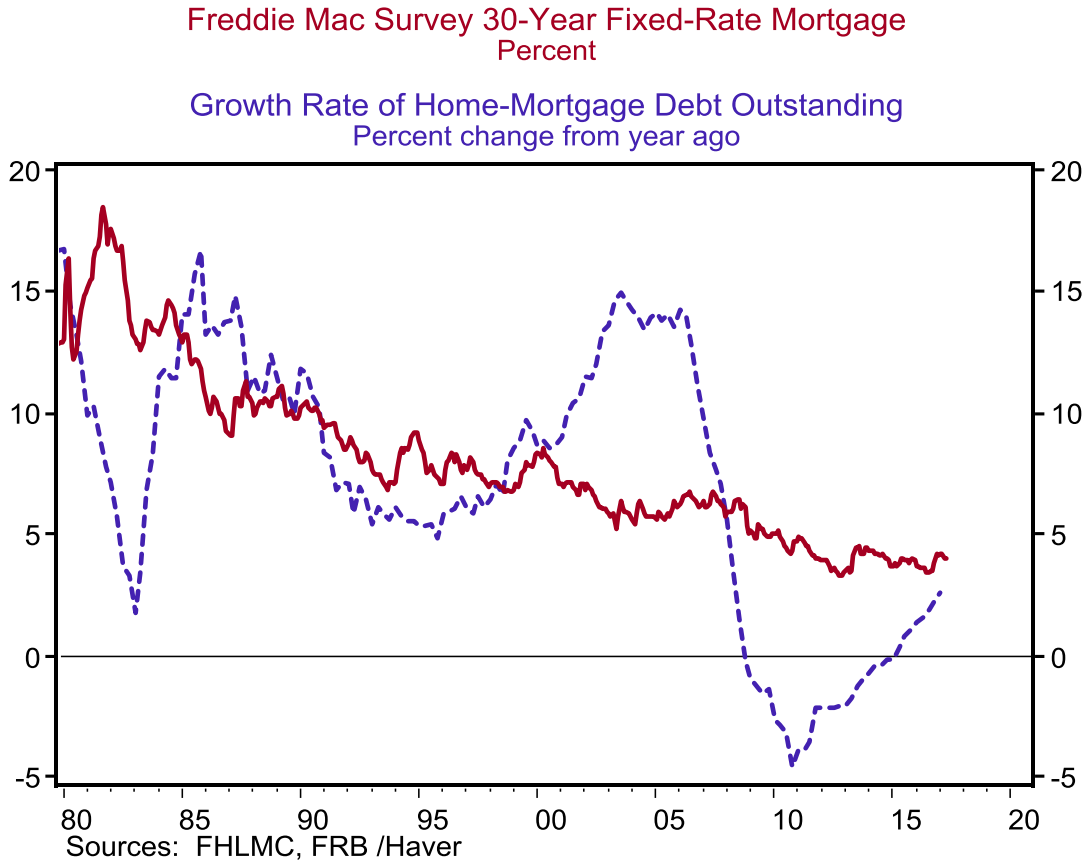
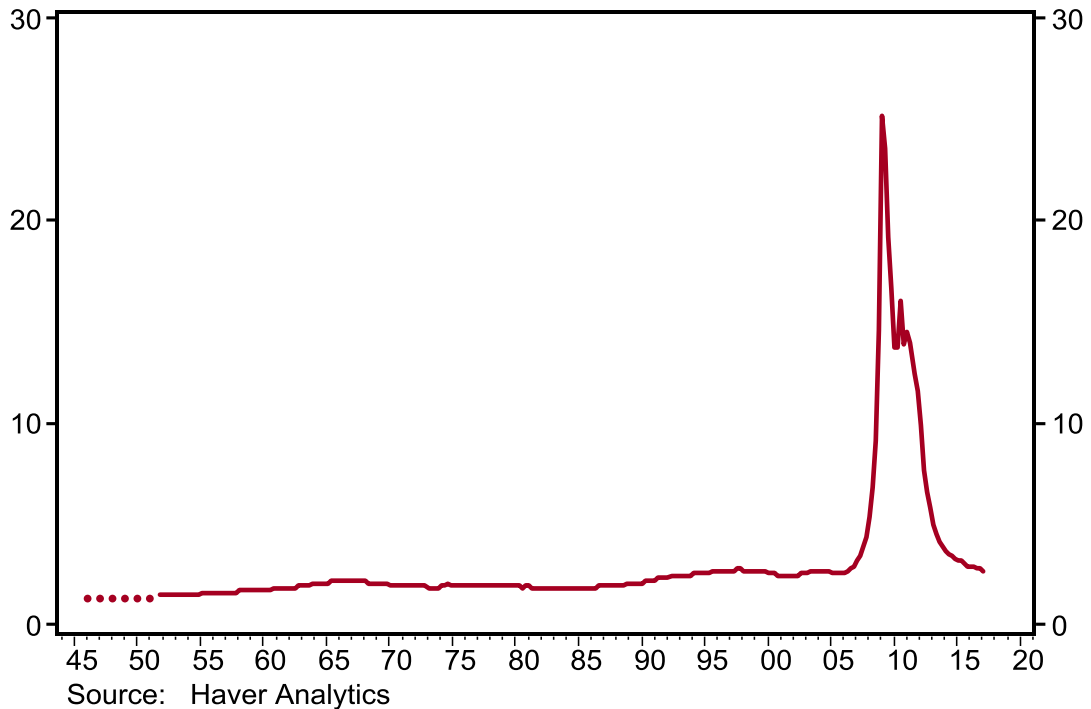


Figure 2

Estimated Consolidated Leverage Ratio of All Mortgaged Homeowners

Estimated Aggregate Leverage Ratio of All Mortgaged Homeowners
Estimated ratio of real estate to homeowners' equity of all mortgaged homeowners



Source: Federal Reserve Board, Financial Accounts of the United States; last observation is Q1.2017. Includes households and non-profit organizations.

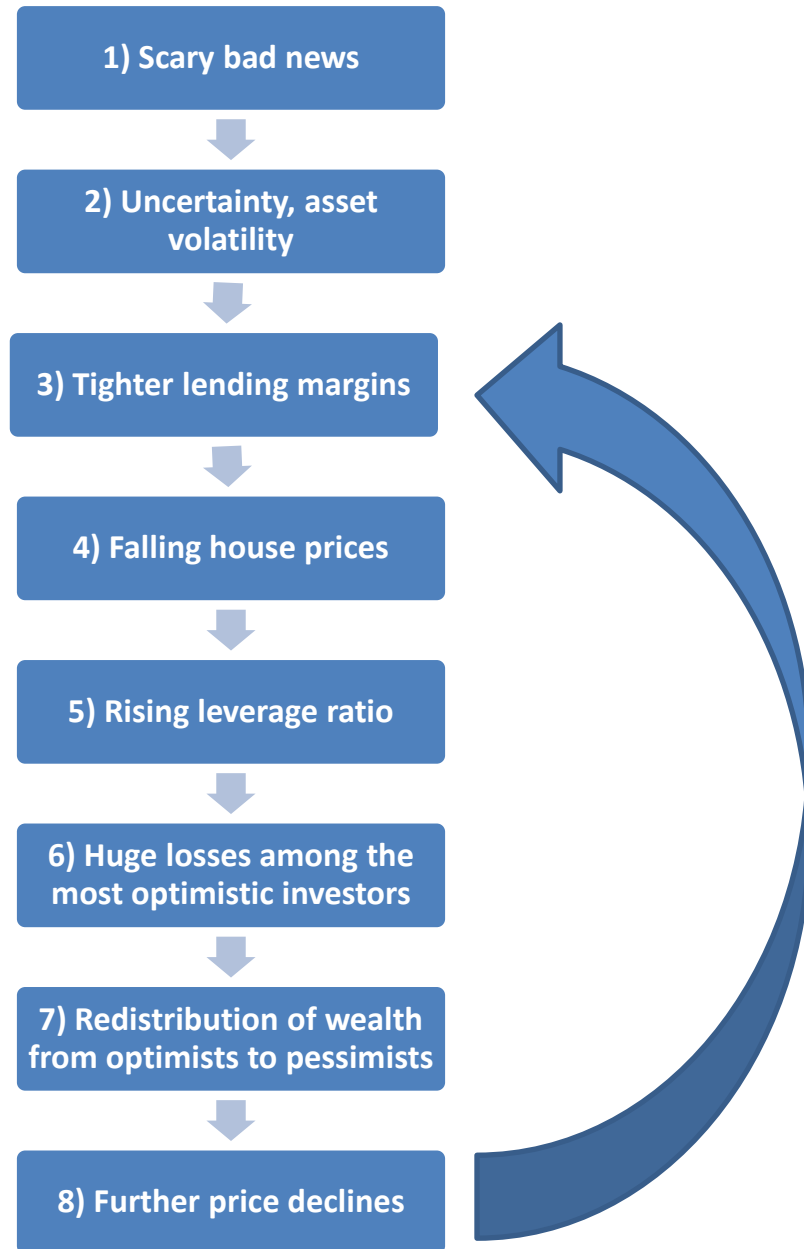
The mortgaged leverage ratio is calculated as two thirds of household real estate (because approximately two thirds of homeowners owe mortgage debt) divided by homeowners' equity of mortgaged homeowners, or, Mortgaged leverage ratio

$$= [\text{Mortgaged homeowners' value of real estate}] / [\text{Mortgaged homeowners' equity}]$$

$$= [(2/3) \times \text{Household Real Estate}] / \{[(2/3) \times \text{Household Real Estate}] - \text{Household Mortgage Debt}\}$$

Figure 3

Unwinding of a Leverage Cycle



Source: Geanakoplos (2010)