DOI: 10.6277/TER.2017.451.1

Residential Real Estate in the U.S. Financial Crisis, the Great Recession, and their Aftermath

Stephen Malpezzi*

Circa 2007 through 2009, the United States experienced a financial crisis, and a recession, that by many measures was the largest adverse economic event the U.S. has experienced since the Great Depression of the 1930s. Furthermore, these events had large negative repercussions on other economies around the world. The Great Financial Crisis and Great Recession were complex, and scholars will be arguing over important details of their causes and effects for decades to come. This paper reviews a number of contributing elements, focusing especially on two fundamentals of the twin "Greats:" excessive leverage, and excessive volatility in housing prices. The paper includes a package of 10 proposed reforms in real estate and financial markets that can mitigate the costs of future real estate-related downturns.

Keywords: financial crisis, recession, leverage, housing price volatility, government policy
JEL classification: E30, E60, R30

*Emeritus Professor, the James A. Graaskamp Center for Real Estate, Wisconsin School of Business, University of Wisconsin-Madison. Contact information: 1938 Washington Street, #10 Newton, MA 02466. E-mail: stephen.malpezzi@wisc.edu. I thank those editors and two anonymous reviewers for constructive comments. Robert Buckley, Richard Green, Erwan Quintin and Anthony Yezer also provided helpful discussion. They are not responsible for remaining errors of fact or interpretation.

經濟論文叢刊 (*Taiwan Economic Review*), 45:1 (2017), 5–56。
國立台灣大學經濟學系出版

臺灣大學學術期刊資料庫

1 Introduction

In this non-technical review, we examine selected aspects of the past decade (more or less) of U.S. economic performance (or lack thereof). The paper's title signals our focus, namely events revolving around the middle-late 2000s U.S. financial crisis (hereafter the Great Financial Crisis or GFC), the associated 2007-9 recession (hereafter the Great Recession or GR), as well as some of their precursors, and their aftermath.[1] Our special focus is the role played by real estate and related financial markets; even more particularly, our main focus will be on *residential* real estate. While we will discuss a range of issues, much of our focus will be on two key state variables: financial leverage, and housing prices.

Jazz master Miles Davis famously said "It's not the note you play, it's the notes you don't play." Hundreds of high quality and informative books and articles have already been written about these events, and hundreds more will be written.[2] One must approach writing a brief, selective, nontechnical paper such as this with some trepidation and humility. Nevertheless, there may be some value added in a short paper that pulls together some basic facts, and a storyline that ties together some of the large emerging literature.

2 The Great Financial Crisis and the Great Recession, in Brief

Circa July 2006, booming U.S. house prices turned down; on average, prices fell 30 percent in real terms before rebounding in 2012. The declines in more volatile major markets found in states like New York, California, Florida and Nevada were substantially larger; Los Angeles prices fell in half, by some measures, and Las Vegas by two-thirds. The impact on mortgage

[1] Among many precursors see the 1980s era U.S. Savings and Loan crisis, the 1997 Asian Financial Crisis, and the 1990s financial crises in several Scandinavian countries. See Caprio and Klingbiel (2002), Englund (1999), Malpezzi (2014), Mera and Renaud (2000) and Reinhart and Rogoff (2009).

[2] Any short reading list would have to start with Shiller's *Irrational Exuberance* (the 2006 second edition predicted the turn in housing markets; I recommend the current 2015 third edition). The list would certainly include Sorkin (2009) for a journalist's chronology, Mian and Sufi (2014) for one take on the role mortgages and house prices played in the crisis, and Lo (2012) for a literature review. Readers requiring institutional background on U.S. housing and financial markets can consult Green and Malpezzi (2003) and Green and Wachter (2005).

臺灣大學學術期刊資料庫

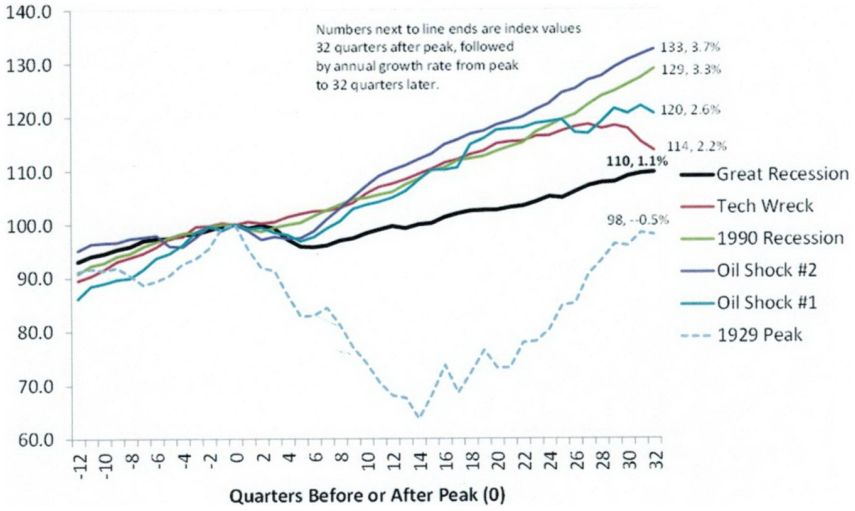


Figure 1: Index of Real GDP Before and After Business Cycle Peak

markets and their derivative securities was severe, leading to several traditional bank runs (depositors clamoring for their funds back) as well as a much more severe run on short term money markets. Among many other notable 2007 events, subprime lenders New Century Financial Corporation and American Home Mortgage filed for bankruptcy; and the largest originator, Countrywide was downgraded to near-junk bond status on its way to eventual takeover by Bank of America. U.S. subprime problems were already spilling overseas, for example to UK's Northern Rock. In September 2008 the collapse of Lehman Brothers heralded a massive global financial shock.

On the "real side" of the economy, the U.S. entered recession in December 2007 (Q4 2007 when presenting quarterly data), according to the National Bureau of Economic Research. Figure 1 presents real index numbers for U.S. GDP around the five most recent business cycles, normalized and centered at their individual peak quarters, presenting 3 years of data before each peak and 8 years afterwards.[3] The recession was the deepest since

[3]The first oil shock was the recession that officially began in November 1973. The second oil shock started in January 1980 but only lasted six months, according to NBER's reckoning; another recession began very shortly thereafter, that ran from July 1981 to November 1982. We combine those two recessions into one in the Figure and in our discussion. The July 1990 to March 1991 recession included sharp declines in U.S. military spending after the collapse

臺灣大學學術期刊資料庫

the 1930s Great Depression, with a 5 percent decline in real GDP. The recovery came in June 2009, but while the post "Great Recession" recovery has been long, it has been shallow, with growth rates roughly half of that normally observed in expansions.

The Great Recession has thus earned its unofficial but widely used moniker. But for perspective, Figure 1 also overlays the 1930s era Great Depression (officially, two recessions dated August 1929 to March 1933; and May 1937 to June 1938). Without minimizing the cost of the 5 percent peak-to-trough decline in real GDP in the Great Recession, the corresponding decline in the Depression was about a third; and that from a much lower beginning level, with much less of a social safety net.

Estimating the full cost of the crisis and its aftermath is difficult. Much depends on what counterfactual we assume about the time path of output, employment and so on in the absence of the crisis. This benchmark is, of course, unknowable with any degree of precision. Luttrell, Atkinson, and Rosenblum (2013) estimated the total cost of the GFC on lost U.S. output at somewhere between $6–14 trillion; Ollivaud and Turner estimate that 19 OECD countries that experienced their own financial crises, some of which could be econometrically linked to the U.S., typically lost 5 or 6 percent of GDP. Dullien et al. (2010) found large costs in developing countries as well. While some countries, notably China, avoided a measured contraction at the time, according to the World Bank, global GDP fell between 2008 and 2009, whether measured at market or purchasing power parity exchange rates (Figure 2), the largest of only 3 contractions in a half century.

Of course, the global business cycle is driven by much more than U.S. cycles, but few observers would argue that the declines in GDP in many countries more or less coincidentally with the Great Recession and the related Great Financial Crisis were completely independent of spillovers from those U.S. events.

As already noted, the Great Recession, the Great Financial Crisis, and associated events are complex. What caused the crisis? Like the Great Depression and other such watershed events, it is unlikely that there will ever

---

of the Soviet Union, as well as some fallout from the Savings and Loan Crisis of the 1980s. The "Tech Wreck" spanned March to November 2001, and was, overall, a mild recession, though not in selected industries. Also, note that Figure 1 presents 8 years/32 quarters of data post each cycle's peak; but as of this writing only 31 quarters are available post-Great Recession.

臺灣大學學術期刊資料庫

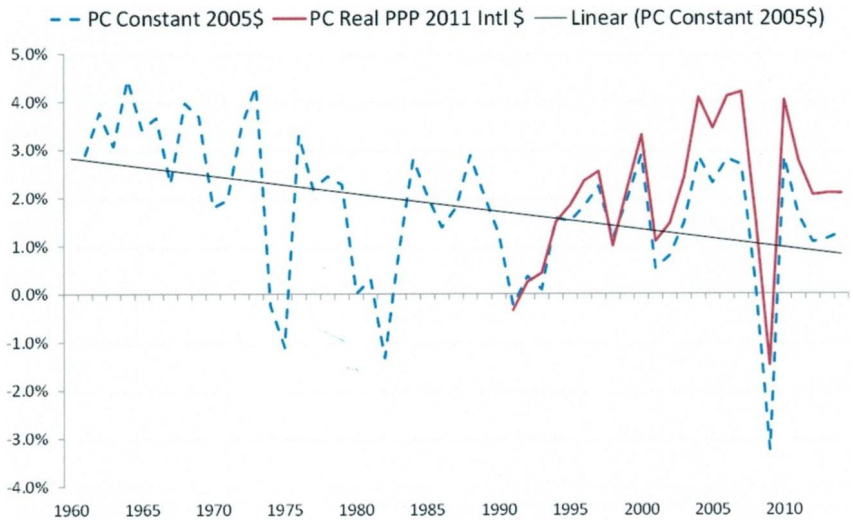


Figure 2: Annual Growth in World GDP Per Capita, 1960–2014

by a simple, tidy set of agreed-upon explanations. In my own class notes on the crisis, I present four slides listing 91 potential "causes," some proximate and some deeper; some economic, some financial, some political, some sociological, some psychological; each of which has been mooted by one or more observers of the crisis.[4]

How to make sense of all this? We might distinguish three classes of

[4]Examples, in no particular order, and without endorsing or ranking any particular "cause" here: the rise of subprime lending, "too-big-to-fail" financial institutions, financial deregulation, poor underwriting practices, risky mortgage designs (e.g. option ARMs), the Community Reinvestment Act, perverse incentives in Fannie Mae and Freddie Mac ("Government Sponsored Enterprises"), perverse incentives among private investors, myopic expectations, adaptive expectations, a global savings glut, political resistance to appropriate financial policies, non-recourse mortgages, a widening distribution of income, financial economists who failed to understand the operation of housing markets, housing economists who failed to understand the risks building up among counterparties in ever-more complex housing based derivatives, fraud by lenders, fraud by borrowers · · · and so on. And of course, the causes we will focus on in this note: increased leverage, and a boom and bust (some dare call it a bubble) in house prices. The "full" list is available upon request, even though at 91 elements it's still demonstrably incomplete as an accounting of all the possible causes that have been raised.

臺灣大學學術期刊資料庫

narratives, or "meta-thinking" about the crisis.

The first meta-narrative is some version of "It's complicated. But if we had paid attention, we could have mitigated, if not prevented, the crisis."

The second meta-narrative is some version of "It's complicated. So complicated, and path-dependent, that it was not foreseeable or preventable."

The third meta-narrative is some version of "It's _____, stupid." For "_____," one inserts one's favorite whipping boy, such as the Community Reinvestment Act, Fannie and Freddie, the repeal of Glass-Steagall, or Greenspan's lowering of interest rates after the 2001 recession.

A very interesting self-contained example of the three types of meta-analyses can be found in the *Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States.* The Commission was established by Congress and the Administration in 2009, comprising 10 commissioners with varying expertise and political leanings. The majority report, favored by the Democratic-leaning members, was an example of the first narrative; the minority report, favored by those leaning Republican, was an example of the second narrative; and a single member issued his own dissenting report favoring the third type of narrative.

Overall, the entire report contains a wealth of information and analyses; all three individual reports repay careful reading. Spoiler alert: As will become clear below, I'm firmly within the first camp: "It's complicated, and we should have been paying attention; we could have reduced the costs of the crisis with better policy choices." However that does not mean I endorse the entire majority report, nor do I reject all the points made by the minority report.

Broadly, we weren't paying attention; those who were, were systematically sidelined or ignored in policy debates. In fact, there were powerful forces working against those who were paying attention.

More specifically, while a surprisingly large fraction of those 91 putative causes have some credible explanatory power (to say nothing of perhaps another 91 I omitted in my class notes), in this paper we will focus on two broad, interrelated causes; namely financial leverage, and the boom and bust in housing prices.

So, if there are many potential contributors to the crisis, why do we focus on two, leverage and housing prices? First, many of the other potential contributors, to the extent they do contribute, work through increasing leverage and/or the volatility of housing prices. For example, poor underwriting standards and poorly designed mortgage instruments can increase

臺灣大學學術期刊資料庫

leverage as well as the volatility of prices. Furthermore, leverage and housing prices can themselves be part of a mutual feedback loop.

There is another major advantage of beginning our study of the GFC with such an apparently narrow focus. Leverage, at various levels or units of observations, and housing prices are *observable*. Leverage and prices can be measured more readily by market participants, regulators and analysts than, say, concepts like underwriting quality (which may be measureable in principle but hard to measure well in practice) or even slipperier concepts like moral hazard. Of course it's important to try to better measure underwriting quality, and moral hazard. And of course our measures of leverage and housing prices can and should be substantially improved. But at our current (and likely near future) state of data, leverage and house prices can tell us a lot.

3 Housing and the Business Cycle: An Overview

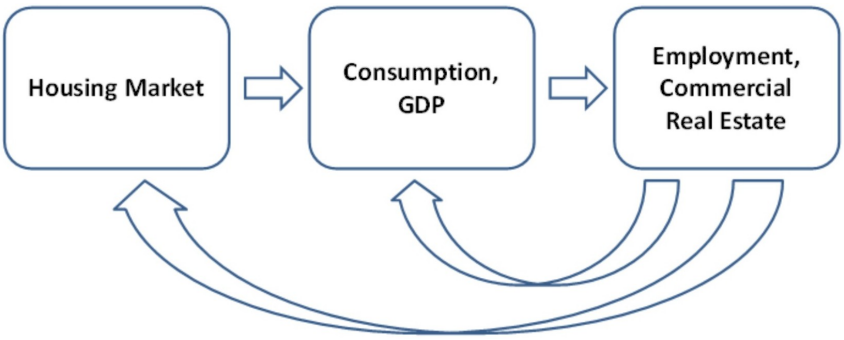
"Mainstream" academic macroeconomists have been slow to fully recognize housings role in the economy, with a number of notable exceptions, according to Leung (2004) prescient survey. Since then, unsurprisingly, the GFC and GR have caught the attention of many academic macroeconomists. If we were to update Leung's survey paper today, it would surely be a much longer paper, though perhaps not yet long enough: we still have much to learn despite the relative explosion of research on macroeconomics and housing in the past decade.

Of course central bankers and other policy-focused macroeconomists have paid more attention to housing. Central bankers have long realized that as an interest-rate sensitive investment, with strong linkages to consumption and employment, housing is an important channel for monetary policy. See Borio and McGuire (2004), Davis and Palumbo (2001) and Goodhart and Hofmann (2001) for example.

Figure 3 presents a very simple schematic model of the U.S. economy. GDP comprises consumption and investment in a closed economy. (In an open economy we also import and export, which we neglect here). The consumption and investment can be private, or government. In this section we will focus on private consumption and investment, the larger and more volatile sources.

Consider what is sometimes labelled a "garden variety" recession. In a business cycle, a common pattern is for housing investment to "lead" the

臺灣大學學術期刊資料庫



Housing typically leads the business cycle; employment and nonresidential real estate feed back into the rest of the economy

Figure 3: Housing and business cycles

cycle. Suppose the economy has been growing, but at some point, for some reason – overbuilding, high interest rates, aliens from outer space, whatever – housing investment tanks.

Housing investment itself is part of GDP so GDP growth slows. But as construction workers are laid off, and people cut back on the purchases associated with house sales like furniture, lawnmowers and so on, the economy slows further. House sales (existing as well as new) slow down. Prices start to soften. Homeowners (two thirds of US households) begin to get nervous about the value of what for many is their largest asset. Consumption then starts to fall.

In the U.S., private consumption is the biggest chunk of GDP, usually comprising 65-70 percent of the dollar value in a given year or quarter. As consumption goes down, GDP falls. Firms see their sales fall; inventories may rise, but this is because they missed the turn in the business cycle, not because firms want to build stocks. Employers slow hiring, and increase the pace of layoffs. Firms are reluctant to investing in a new store, or warehouse, or sign a new office lease. Nonresidential real estate investment falls too.

At some point though, traditionally, the market turns, often as the Fed lowers interest rates. The housing market starts to right itself. Sales increase, along with furniture $\cdots$ and the process works in reverse. Housing leads the economy out of the recession.

When we go into a severe recession, as in 2007–08, feedback effects may become especially important. When unemployment is high, for example, it

臺灣大學學術期刊資料庫

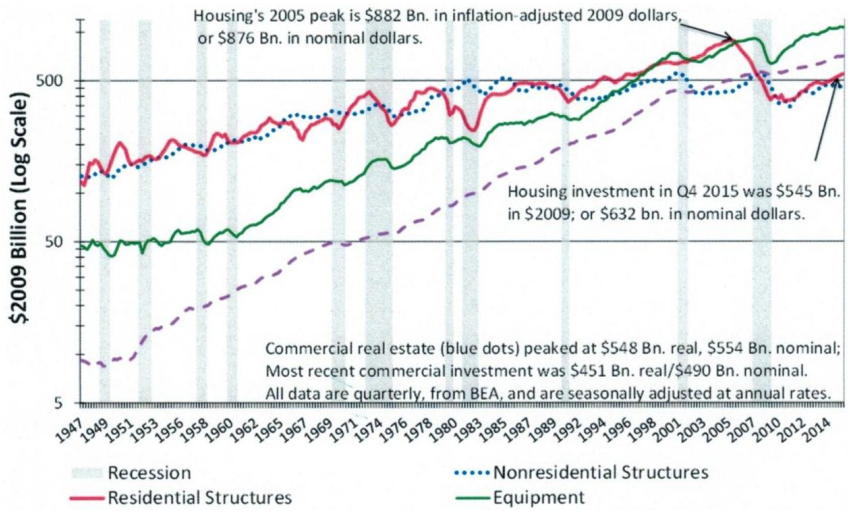


Figure 4: Real Investment

may be harder for the housing market to get going again. Housing's leading role may erode more than usual.

Of course this story is highly stylized. Any given actual business cycle is NOT that simple; but often this story is not too far from at least partial truth, as Green (1997) and Leamer (2007) point out.[5] In any event, this simple diagram gives us a start. Let us examine some investment data to see how well the story holds up.

Figure 4 shows the major categories of private investment in billions of real (2009) dollars.[6] Notice that 9 of the 10 post 1947 recessions, all except the 2001 "Tech Wreck," are associated with a decline in housing investment,

[5]Ghent and Owyang (2010) examine metropolitan-level correlations between housing activity and general economic activity. Their results do not, in general, support the housing-as-leading-sector hypothesis at this disaggregated level.

[6]One major investment category, changes in business inventories, is omitted. It's a very volatile number that is often negative, so we can't represent it on a logarithmic chart. More substantively, it is the category of investment that least concerns us here. In an accounting sense, changes in inventories make significant contributions to quarterly GDP fluctuations, it is in no small part volatile "investment" that's driven by unanticipated demand fluctuations by firms; while increasing GDP's volatility, inventory changes make little net contribution to trend GDP, even over relatively short periods. See Mills (1957).

臺灣大學學術期刊資料庫

as research by Leamer, Green and others have discussed in greater detail. Notice too that the largest decline, by far, in housing investment is the one that preceded the 2007-9 Great Recession; and that despite 8 years of economic expansion, housing investment remains far below trend.

In addition to the dollar values in Figure 4, it is useful to benchmark investment as a share of GDP. U.S. housing investment is around 4–5 percent of GDP on average, but is much more volatile than housing consumption. In recent years housing investment has ranged from a 2005 peak of 6.6 percent of GDP to a 2011 low of 2.5 percent during the bust. In fact these investment shares are understated, by as much as a percentage point or so, on average, because the current National Income and Product Accounts only includes structure and some land development expenses; investment in land *per se* is excluded from these accounts.[7] Nonresidential real estate recently runs about 3-4 percent of GDP; while it did not face anything like the contraction we saw in housing investment, it's still lagging below trend.

Housing, and real estate in general, is of course a much larger share of total investment. Total gross investment averages about 17 percent of U.S. GDP, ranging in recent years from peaks of about 20 percent, to a Great Recession trough of about 13 percent. Of this total investment, housing averages about a quarter, and nonresidential real estate recently averages about 17 percent; that is, taken together, a lower bound (land-free) estimate is that private real estate comprises about 40 percent or so of total investment.

To further motivate our focus on housing and leverage, Table 1 steps back from recent U.S. experience to examine a selection from Reinhart and Rogoff (2009) famous study of financial crises and recessions from 66 countries, some recent, some going back as far as 8 centuries ago. Table 1 presents a key table from that study providing examples of financial crises connected to housing price cycles. Reinhart and Rogoff find that recovery from garden variety recessions – absent a severe financial crisis, rather from and inflation-fighting interest rate hike – usually takes a year or two at most. But they find that recovery from recessions associated with housing booms/busts and financial crises often take 7 or 8 years. It takes time to deleverage and work through the bad debts.

To put our motivation another way, consider the following thought ex-

[7] See Jorgenson (2009) for details and a revised system of accounts that would include land investment, among other improvements. Davis and Heathcote (2007) provide ongoing estimates of the value of U.S. residential land.

臺灣大學學術期刊資料庫

Table 1: Reinhardt and Rogoff: Cycles of Real House Prices and Banking Crises

	Year of Crisis	Peak	Trough	Duration of Downturn (years)	Decline (percent)
Advanced economies: The Big Five					
Finland	1991	1989: Q2	1995: Q2	6	−50.4
Japan	1992	1991: Q1	Ongoing		−40.2
Norway	1987	1987: Q2	1993: Q1	5	−41.5
Spain	1977	1978	1982	4	−33.3
Sweden	1991	1990: Q2	1994: Q4	4	−31.7
Asian economies: The Big Six					
Hong Kong	1997	1997: Q2	2003: Q2	6	−58.9
Indonesia	1997	1994: Q1	1999: Q1	5	−49.9
Malaysia	1997	1996	1999	3	−19.0
Philippines	1997	1997: Q1	2004: Q3	7	−53.0
South Korea	1997	NA	2001: Q2	4	−20.4
Thailand	1997	1995: Q3	1999: Q4	4	−19.9
Other emerging economies					
Argentina	2001	1999	2003	4	−25.5
Colombia	1998	1997: Q1	2003: Q2	6	−51.2
Historic episodes					
Norway	1898	1899	1905	6	−25.5
United States	1929	1925	1932	7	−12.6
Current cases					
Hungary	2008	2006	Ongoing		−11.3
Iceland	2007	Nov-07	Ongoing		−9.2
Ireland	2007	Oct-06	Ongoing		−18.9
Spain	2007	2007: Q1	Ongoing		−3.1
United Kingdom	2007	Oct-07	Ongoing		−12.1
United States	2007	Dec-05	Ongoing		−16.6

Source: Reinhart and Rogoff (2009), Table 10.8, p. 160. Data as presented there. House price declines for "ongoing" cases have generally increased in magnitude since R&R publication, as noted in text.

臺灣大學學術期刊資料庫

periment. Whatever the reader's current priors about many potential causes of the U.S. crisis – subprime, mistakes in securitization, Wall Street, the GSEs, fraud, macro policy mistakes, and on and on $\cdots$ suppose that as in a classical Greek play, some *deus ex machina* had imposed the following conditions: (a) all mortgagors were required to retain significant equity in their houses, while all mortgagees were required to limit their own institutional leverage; and (b) that house prices followed time paths qualitatively similar to the 1970s, 80s and early 90s, i.e. with moderate growth and volatility. On the face of it, how could we have generated the 2007-9 crisis *without* high leverage and volatile housing prices? Moderate leverage and stable underlying asset markets can help protect the financial system and the aggregate economy, even when we make mistakes in other government and private actions and policies.

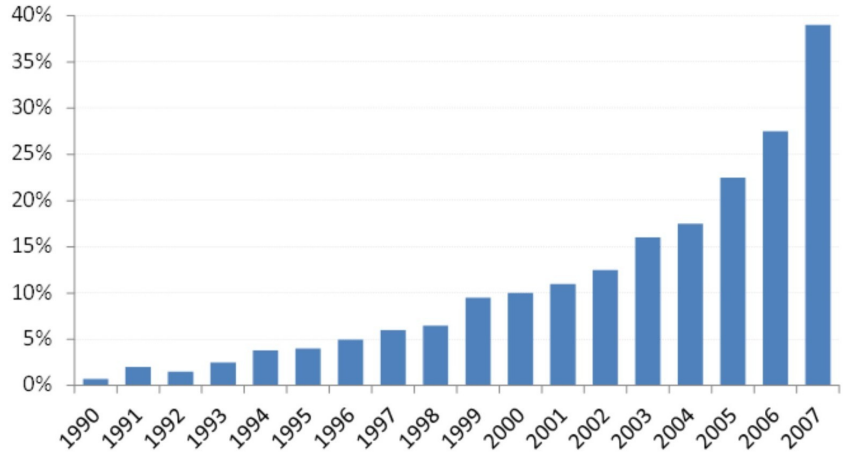
4 Leverage: A First Look

Substantial evidence exists that high leverage, including but not limited to highly levered mortgagors and mortgagees, is deeply connected both to default risks and losses, and also to the size of spillovers to the broader economy.

Leverage operates at, and can be measured at, different levels. The loan-to-value ratio (LTV) is the obvious measure of leverage for individual mortgage loans, and in one way or another underpins measures at higher levels. Those higher levels include mortgages aggregated in one way or another, e.g. by design or parameters: subprime versus prime, conforming versus jumbo, adjustable rate versus fixed rate, are just a few of the ways we can group and categorize loans; as well as by vintage (date of origination), location of the collateral (state or metropolitan area), and so on. Leverage can also be measured by class of financial institutions and intermediaries involved, e.g. "private label" versus those involving the government sponsored enterprises (GSEs, mainly Fannie Mae and Freddie Mac); loans insured by the Federal Housing Association, or not; and so on. Finally, we can aggregate across all or at least many kinds of institutions and mortgage types to study the implications for systemic risk across the entire financial system. In this paper, we will examine just a few measures, and some representative studies.

Let us first comment briefly on loan-level leverage. For example Corbae and Quintin (2015) point out that among purchase loans insured by the FHA, Fannie Mae and Freddie Mac, the fraction of originations with

臺灣大學學術期刊資料庫



Source: Pinto (2010), p. 26. FHA loans include first mortgage only; Fannie Mae LTVs include second liens.

Figure 5: Percent of Fannie Mae and FHA home purchase mortgages with loan-to-value at/above 97%

cumulative leverage in excess of 97 percent of the home value was under 5 percent in 1990, but rose to almost 40 percent in 2007 (Figure 5). Did high loan-to-value ratios play a significant role in the great financial crisis? Quantitatively, how big might this impact have been? Corbae and Quintin build and calibrate a rigorous model in which heterogeneous households select from mortgages with different LTVs, and then face income and housing shocks, as in the crisis. With this model, they first show they can replicate the actual time path of defaults and other outcomes before and after the crisis; then they undertake a counterfactual experiment, in which high LTV loans are not on offer. Comparing these two scenarios suggests that the increased number of high leverage loans originated prior to the crisis can explain about 60 percent of the rise in foreclosure rates.

There are a number of other papers also showing rising leverage as a precursor to the crisis; see, for example, Bokhari, Torous, and Wheaton (2013), Duca, Muellbauer, and Murphy (2010), Pinto (2010), Mian and Sufi (2010) and Foote et al. (2008).[8] Furthermore, dozens of microeco-

[8]One contradictory study by Glaeser, Gottlieb, and Gyourko (2013) analyzes loan-to-value ratios from DataQuick and finds flat or slightly declining LTVs in the run-up to the

臺灣大學學術期刊資料庫

nomic studies demonstrates the role that loan-level LTV plays in individual mortgage default; see, for example, Quercia and Stegman (1992), LaCour-Little and Malpezzi (2003) and Vandell (2003).

What happens when we aggregate leverage? Adrian and Shin (2010) analyze bank-level data. They demonstrate that bank leverage was highly pro-cyclical, i.e. that leverage increased rapidly when asset prices (and hence risk) was increasing. They also present aggregate data across all banks that shows the boom in overall bank leverage during the runup to the crisis. These results are consistent with the institutional leverage cycles predicted by Geanakoplos (2010) general equilibrium model of the behavior of financial institutions.

Of course, there are a number of potential measures of institutional leverage beyond simple aggregate capital ratios. Successive Basel capital rules (Basel I, II and III; and several significant changes within the three regimes) have taken us towards more and more complex measures of capital and leverage. The efficacy of these measures, and their use by regulators, including the Basel regimes, are debated among academics, regulators, and the industry. Lin et al. (2013), Christopher and Julapa (2013) and Yang and Zhang (2014) are among papers tackling this issue. At least one study, by Demirguc-Kunt, Detragiache, and Merrouche (2013), suggests that simple leverage ratios might outperform more "sophisticated" Basel regime measures. Specifically, Demirguc-Kunt et al. studied the efficacy of alterative kinds of capital ratios: the Basel risk-adjusted ratio, a simple leverage ratio, the Tier 1 and Tier 2 ratios, and the tangible equity ratio. They found that there was little difference in predicted returns to these institutions whatever alternative measure was used, before the crisis. But once the crisis hit, a stronger capital position was associated with better market performance. In particular, during the crisis the relationship between a bank's stock return and its capital was stronger when capital was measured by the leverage ratio, compared to the performance predicted by risk-adjusted capital ratios. In addition, higher quality forms of capital (Tier 1 capital and tangible common equity) were better predictors of performance than lower quality capital.

In the event, it is no surprise Figure 6 shows that indeed we did get highly levered on housing in the early 2000s. In 2002 household mortgages were equivalent to about 45 percent of GDP, itself a record high; a scant six

crisis.

臺灣大學學術期刊資料庫

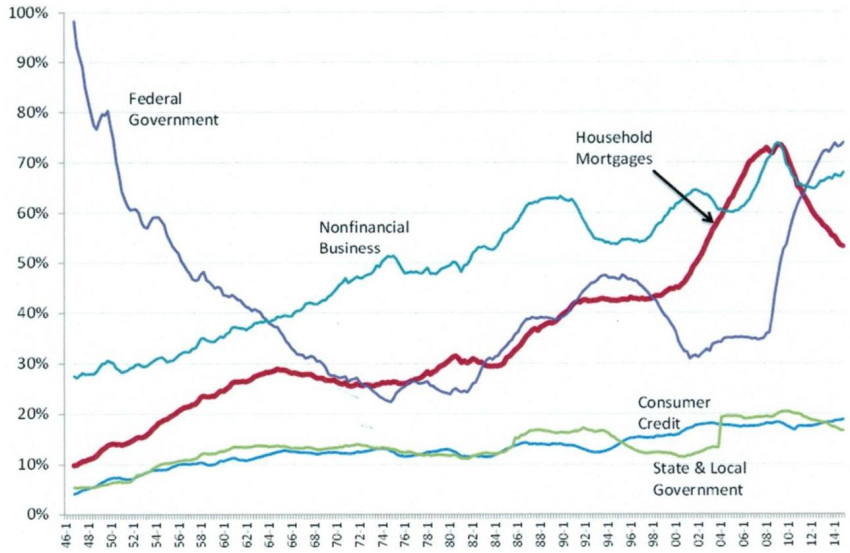


Figure 6: Postwar Debt as a Fraction of GDP

years later it stood at almost 75 percent of GDP.

The fragility of the U.S. economy was due not only to mortgages, but to other debt as well. Businesses also became highly levered in the early 2000s (and before).

Figure 7 is the same debt data as Figure 6, but stacked, so we can see how it all fits together. Overall, the U.S. economy has been de-levering since 2009, but very slowly. A substantial decline in mortgage debt has been partly offset by increases in government debt. That increase in government debt is not surprising, as the U.S. ran deficits to stimulate the economy during the recession.

GDP growth has been very slow compared to typical expansions, as discussed above. Post Great Recession, stimulus spending has largely ended, and the growth of Federal debt has slowed; along with the decline in mortgage debt outstanding, overall U.S. debt has stabilized as a share of GDP. Of course, all we know for sure is that the U.S. economy's overall leverage is still high, relative to past experience. Other countries, e.g. Japan, have higher rates, and research connecting overall debt levels to growth is, as yet, still awaiting sufficiently robust results to discuss "optimal" debt capital

臺灣大學學術期刊資料庫

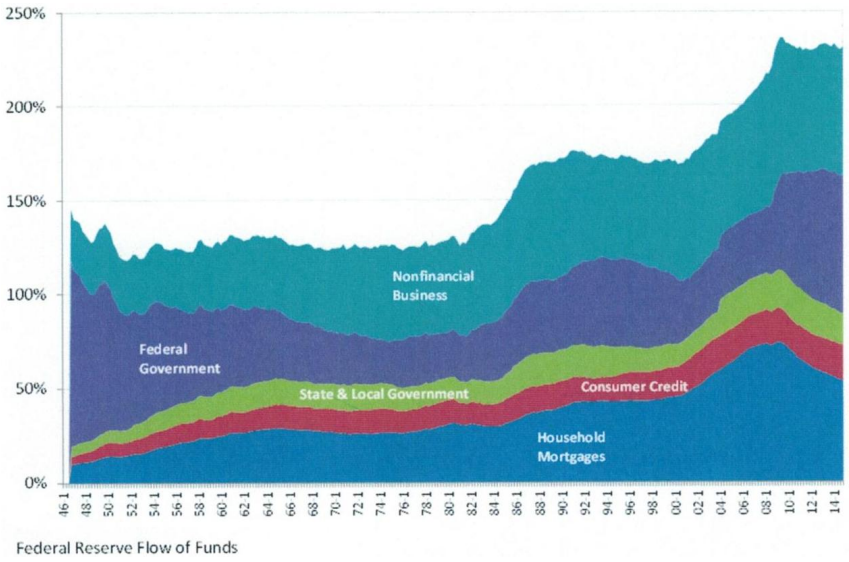


Figure 7: Postwar Debt as a Fraction of GDP

structures" for countries.[9] But Figure 6, taken together with the findings of Reinhart and Rogoff (2009) certainly give pause.

Federal Reserve data presented in Figure 8 shows that the aggregate statistics for housing leverage are looking better in the last few years, for two separable reasons. First, there was of course a significant runoff of mortgage debt connected to increases in foreclosures and short sales. Second, rising house prices in most markets since 2012 have rebuilt homeowners' equity positions. Of course, as we will discuss in more detail in the next section, these aggregates, while informative, do mask large differences across metropolitan areas, and of course across households.

Now we turn briefly to the highest level of leverage aggregation, to the question of systemic risk. There is a large pre-crisis literature on systemic

[9]In a well-known episode, Reinhart and Rogoff followed their 2009 paper with a 2012 study (adding Vincent Reinhart), in which they argued that their data suggest 90 percent of government debt-to-GDP as a threshold for lowering growth rates. Herndon, Ash, and Pollin (2013) found a data error in RRR, which was widely reported, and which weakened their results. Less widely reported was the fact that Herndon et al. showed that RRR's threshold was heavily influenced by a small number of observations, and that results, even when corrected for the original error, were far from robust.

臺灣大學學術期刊資料庫

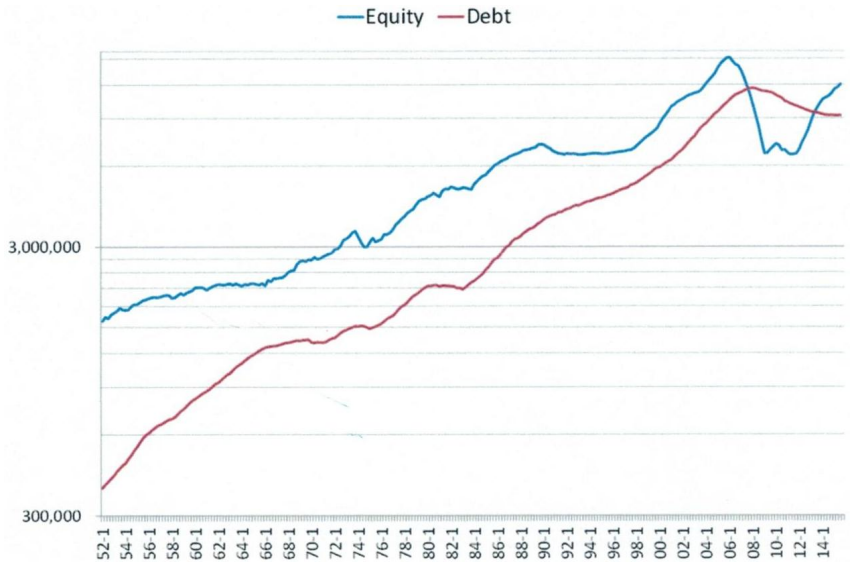


Figure 8: Real Homeowners' Debt and Equity

risk, including, famously, the U.S. Panic of 1907, quelled in part by the personal intervention of J.P. Morgan that was one of the motivators of the creation of the Federal Reserve System (Bruner and Carr, 2008). But the events of 2007-9 have brought systemic risk very much to the fore.

Consider, as one specific example, the shattering effect the September 2008 collapse of Lehman Brothers had on the financial system. Lehman was the fourth largest investment bank in the United States; but with a maximum 2007 market capitalization of $59 billion, it was a good deal smaller than the larger IB's Goldman Sachs, Morgan Stanley and Merrill Lynch (total 2007 market cap of about $340 billion); and *hardly* huge relative to the overall financial markets involved, much less the U.S. economy.[10]

How could the bankruptcy of a $59 billion investment bank catalyze a crisis in a financial system that in the aggregate is on the order of $120 trillion? First, Lehman's own book was highly leveraged, holding assets about

[10]End of 2007 data from the Federal Reserve put the overall U.S. mortgage and GSE securities markets at roughly $20 trillion; other major financial markets (equities, bonds) on the order of $50 trillion. BIS reported a pre-crisis global credit default swap market of almost $60 trillion; U.S. GDP was about $15 trillion in 2007.

臺灣大學學術期刊資料庫

31 times its equity. Second, as Kalemli-Ozcan, Sorensen, and Yesiltas (2012) report, other large banks were also highly levered, with asset/equity ratios ranging from 12 to 50 (their Table 5), and other non-bank financial institutions ("shadow banks") were also highly levered (Pozsar et al., 2010).[11] Third, the opaque nature of counterparty risk – who was lending to whom? – also magnified the effects of a bank failure. To quote Yellen (2013) survey:

> *Losses arising from leveraged investments caused a few important, but perhaps not essential, financial institutions to fail. At first, the damage appeared to be contained, but the resulting stresses revealed extensive interconnections among traditional banks, investment houses, and the rapidly growing and less regulated shadow banking sector. Market participants lost confidence in their trading partners, and, as the crisis unfolded, the financial sector struggled to cope with a massive withdrawal of liquidity, the collapse of one of its most prominent institutions, and a 40 percent drop in equity prices. The effects of the crisis were felt far beyond the financial sector as credit dried up and a mild recession became something far worse.*

Another good example of the problems of systemic risk, i.e. beyond the individual institution, was the near-simultaneous collapse of AIG's position in the credit default swap market. CDS are, by original design, a type of insurance against (surprise!) credit defaults. But the CDS market grew well beyond this, as more and more participants took positions, not to hedge an investment in the underlying asset, but rather simply to bet on their view of the asset (hence the CDS market's rapid growth to north of $50 trillion). AIG's CDS operation, although a subsidiary of AIG the large insurance company, failed to take note of the meaning of the word "insurance." They became large sellers of CDS contracts, without prudent hedging of those positions. As they were outside the banking system, per se, and as the subsidiary's activities lay outside the normal insurance markets, they were effectively unsupervised. When AIG went down in September 2008, neither market participants nor regulators knew where the counterparty risk was in this house of cards.[12] All in, in the month following the

[11] Kalemli-Ozcan, Sorensen, and Yesiltas (2012) also point out that simple ratios do not always fully capture the quality of assets.

[12] As it transpired, Citibank, JP Morgan and Goldman Sachs were among the institu-

臺灣大學學術期刊資料庫

Lehman bankruptcy, the AIG bailout, and other events, global equity markets declined roughly $10 trillion.

We've already noted that the problems of AIG came as a surprise to most market participants and, apparently, regulators. Yellen (2013) discusses the role network analysis can play in understanding how counterparties build systemic risk in a market such as that for credit default swaps. Drawing on several models including Allen and Gale (2000), Freixas, Parigi, and Rochet (2000) and Shin (2009), Yellen how networks of interconnected lenders can be characterized by the degree of completeness (how many nodes connect to how many other nodes) and whether such markets tend towards bilateral relationships, bank to bank, or by the use of one or more central clearing counterparties.

Figure 9 presents a schematic representation of one such network, from a Fed analysis of a CDS network at one particular time. Each circle represents the net exposure of a bank, with red denoting net sellers and blue denoting net buyers of CDS protection. Banks A and B in particular are large net sellers, and as such might be good candidates for careful watching by regulators. Yellen makes the point that such network analysis should be ongoing and argues for more such data collection to enable better monitoring of such markets.

Figure 10 shows the spikes in the so-called TED spread (LIBOR less T-Bills) that is an oft-cited measure that can be interpreted as a market view of systemic risk (Brunnermeier 2009). When it spikes, a higher TED spread suggests that financial institutions perceive increasing risks of lending to each other. Of course there are a number of other measures of systemic such as the VIX and other ratios; see Benoit et al. (2013) for discussion.

5 House Prices: A First Look

While in this paper we argue that the causes of the GFC and GR were varied

tions at risk from AIG's collapse. A brief contemporaneous account can be found at Mollenkamp et al. (2008). There is still a very active debate about the relative merits of how regulators treated Lehman and AIG, among other institutions; see Bair (2012), Paulson (2013), Bernanke (2015) and Geithner (2015) for non-technical accounts by some of the then-regulators; Admati and Hellwig (2014), Blinder (2010), Calomiris and Haber (2014) are among broad-ranging critiques of those events from different perspectives; Ball (2016) is a particularly detailed and scathing critique of the treatment of Lehman.

臺灣大學學術期刊資料庫

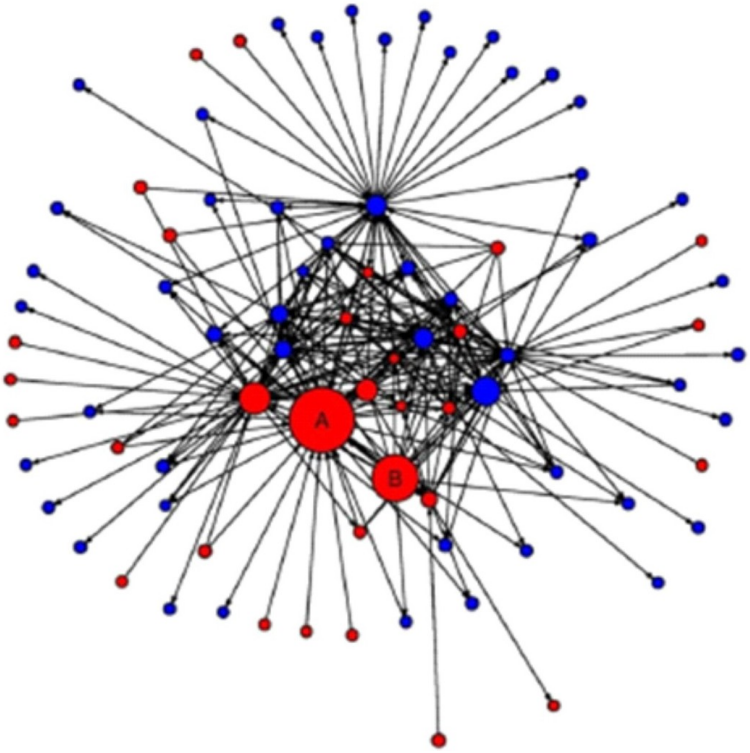


Figure 9: Yellen: A network in the credit default swap market

and layered and complicated, that does not mean that every cause should be given equal weight. *Primus inter pares*, this paper claims, was the early 2000s boom in U.S. house prices. Other causes, such as interest rates, land-use regulation, subprime lending, poor underwriting, high loan-to-value ratios, and so on, were sometimes deeper causes of house price rises; sometimes effects of rising house prices; sometimes both. The price of housing is not a mono-cause in the sense of meta-narrative "type three," but rather a useful focal point that helps make sense of how many of these causes fit together. If, somehow, despite these other causes, housing prices had *not* boomed, had *not* later experienced the inevitable post-boom bust, then the crisis might not have occurred; or at least would have taken on a very different and less severe character and timeline.

Figure 11 shows average real U.S. house prices over the past 40 years (as

臺灣大學學術期刊資料庫

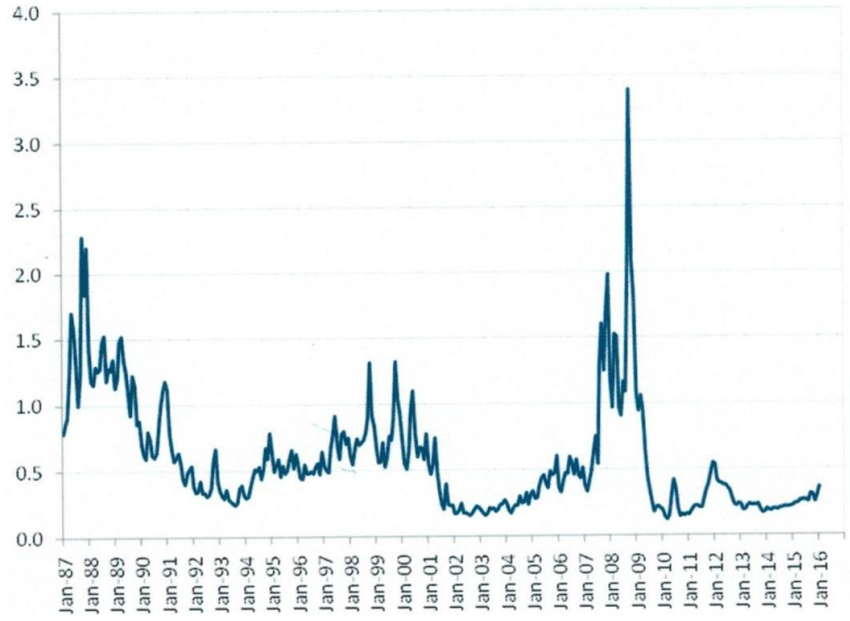


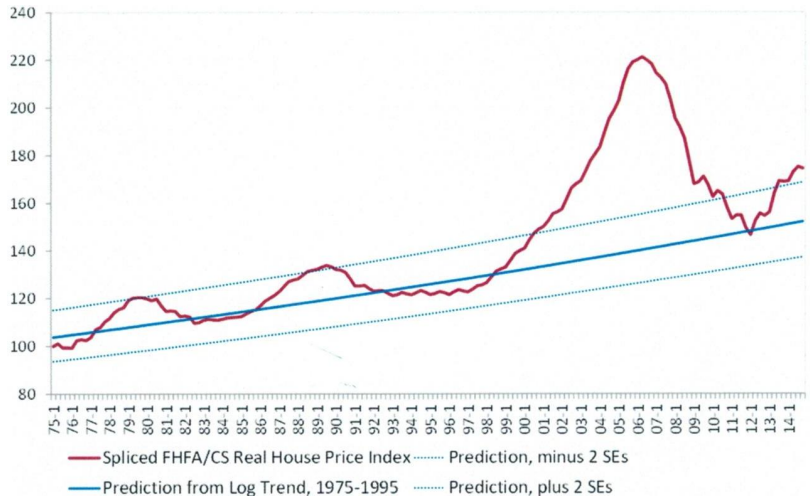
Figure 10: TED Spread: 30 Day LIBOR minus 30 Day T-Bills

far back as reasonably reliable data permit). The data splice the best recent national price indexes, from Case Shiller, with earlier data from the Federal Housing Finance Agency; the index is based Q1 1975=100, and are deflated using the GDP deflator. The solid blue line is the trend during this period, extended out of sample; the dotted lines show the trend plus and minus two standard errors. The Figure is purely descriptive; we will have more to say about more sophisticated modeling of house prices below. But the picture helps set the stage for much of this paper.

From 1975 to 1995, average U.S. prices grew at about 0.4 percent per annum (inflation adjusted). During the boom, 1996 through 2006, real prices grew by about 7 percent per annum. But "every housing boom is followed by something else that starts with the letter 'B,"' as long run analyses have repeatedly demonstrated Ambrose, Eichholtz, and Lindenthal (2013), Malpezzi and Maclennan (2001), and Shiller (2015).

After the 2006 bust, the U.S. housing market bottomed in 2012. Since then average housing prices have shown a strong recovery, and have now once more broken the two standard error barrier that preceded modest down-

臺灣大學學術期刊資料庫



FHFA Index 1975 to 1986; Case-Shiller 1987–2015 (Q1).

Figure 11: Spliced Quarterly Real House Price lndex

turns circa 1979 and 1990. The annual real growth rate over this 3 year period is back up to 6 percent. While clearly less of a boom than we experienced in the early 2000s – 3 years of 6 percent growth is very different from a decade of 7 percent growth – a number of housing market observers have begun to discuss the possibility of a new "bubble" Kusisto (2015), La Monica (2015), and Vasel (2015). We will return to this question below.

Studies such as Malpezzi and Maclennan (2001), and Shiller (2015) have delved into pre-1975 prices. There is a clear tradeoff, in that the farther back we go, the less reliable our housing price data. In the event, nothing in these studies of longer run prices is basically inconsistent with the basic arguments in this paper about the effects of booms and busts.

National averages of housing prices are not always a good guide to local market conditions Follain and Giertz (2012) and Holly, Pesaran, and Yamagata (2011) A number of observers have suggested that specific U.S. markets may be in a bubble, and are certainly experiencing increases above the national averages Cole (2015), Corcoran (2015), and Durden (2015). Let us now examine some metropolitan-specific housing price indexes.

Figure 11, above, spliced early FHFA repeat sales data with later Case-Shiller national data. Case-Shiller repeat sales indexes are only publicly avail-

臺灣大學學術期刊資料庫

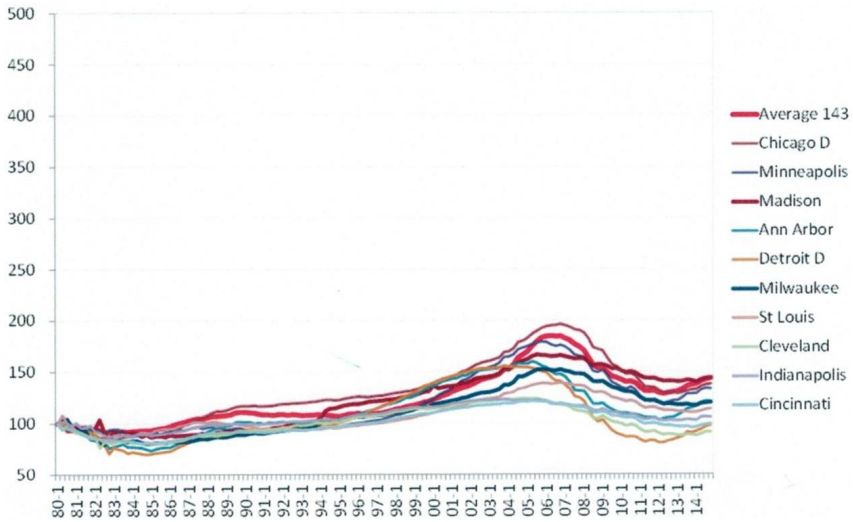


Figure 12: Inflation-Adjusted FHFA House Price Indexes: Selected Midwest Markets

able for 20 metropolitan areas, so for our metropolitan indexes below, we use all FHFA data. The farther back we go, the fewer our sample of metropolitan areas. Starting at 1980, we can glean indexes for 143 metropolitan areas.

Figure 12 presents these price indexes for a dozen Midwestern metropolitan areas. (The capital D after a name, as in "Chicago D" denotes a metropolitan division rather than a standard metropolitan area. A number of larger US metropolitan areas have subsidiary "divisions" which are themselves usually quite large. See Frey et al. (2004) for further details of these definitions.) The thick red line is the average for 143 metropolitan areas/divisions that have complete data back to 1980.

While these Midwestern markets do show booms and busts, even a cursory examination will show that these markets mostly "boomed" and "busted" less than the national average. Data on more individual markets are available on request; here let's just compare the Midwestern markets to extremes.

Figure 13 shows the 12 most volatile markets of the 143. These extremely volatile markets are mainly in California, New York and New England.

Not even casual observers of U.S. housing markets are surprised by Fig-

臺灣大學學術期刊資料庫

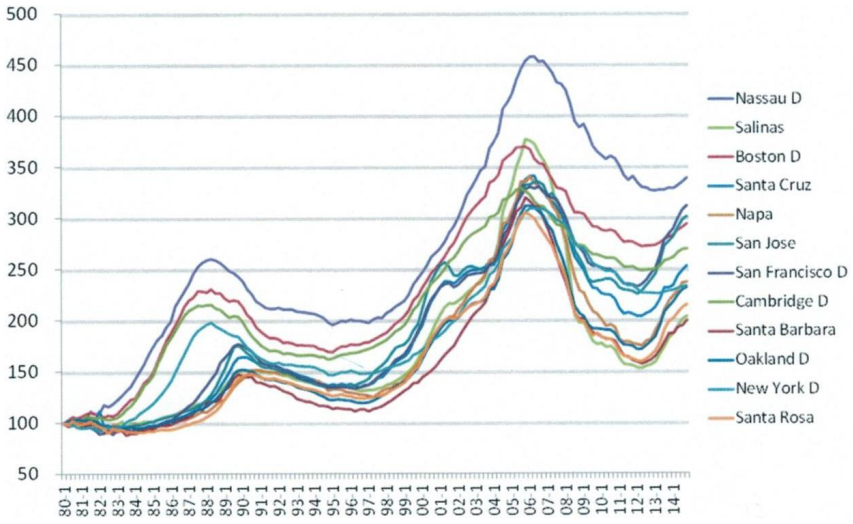


Figure 13: Inflation-Adjusted FHFA Housing Price Indexes: Twelve Volatile Markets

ure 10; the real surprise to many is Figure 14, where we see there were a number of markets where there was hardly any boom or bust. Some of these very stable markets included places like Rockford which had slow economic growth during the period. But you can also see that some of the stable markets are places like Houston and Dallas that had very rapid growth in GDP and employment.

Why do some markets exhibit large booms and busts? Are these B&B's "bubbles?" What is a housing "bubble?"

All economists recognize that asset prices can boom and can bust. A boom is simply a rapid rise. A bust is the other thing starting with "b" that often follows a boom. Booms and busts are *ex post* – they are purely descriptions of patterns that occurred.

To economists, a bubble is something more: it's understanding *ex ante* that prices have departed from underlying fundamentals. Economists find discussion of "bubbles" more problematic than booms and busts, since we never know for certain what the fundamentals are; any test, or measurement of a bubble, requires strong maintained hypotheses. Some economists are more comfortable entertaining these maintained hypotheses than others.[13]

[13]For elaboration, compare two Nobel prize lectures, Fama (2014) and Shiller (2014).

臺灣大學學術期刊資料庫

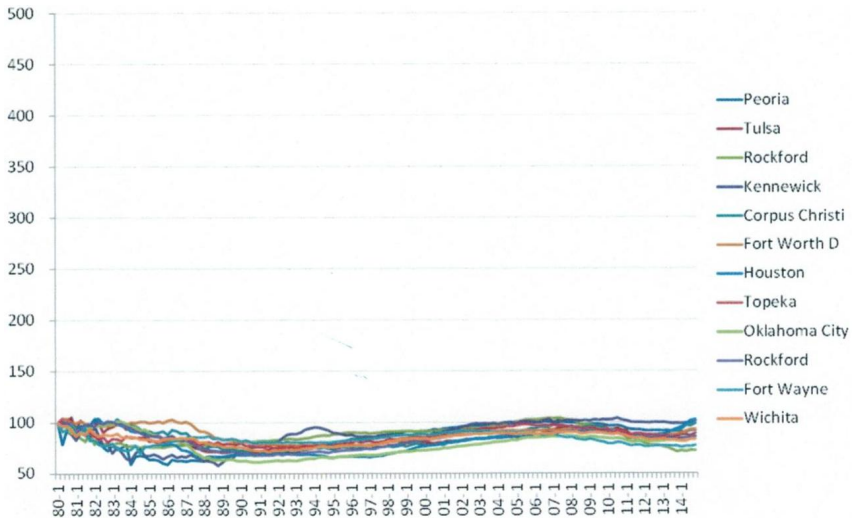


Figure 14: Inflation-Adjusted OFHEO House Price Indexes: Twelve Low Volatility Markets

In real estate markets, fundamentals can be expected rents and vacancies, along with an appropriate discounting; or they can be deeper determinants, that themselves drive rents and discount rates, such as incomes, demographics, and supply conditions.

Let us go back to Figure 11. Even without a model, even without an appeal to fundamentals, it is unlikely that anyone who understands exponential growth could imagine that the pattern of prices we saw between the late 90s and 2006 could be sustained indefinitely. The late economist Herb Stein famously said, "When something can't go on forever, it will stop." Just so. From 1975 to 1996, according to Figure 11, real housing prices grew at about 0.5 percent per year. Between 1996 and 2006, real housing prices grew at about 7 percent per year. This average, as already noted, masked wide variation, including much higher rates of appreciation in some of the bubble-icious U.S. markets. How could one imagine that housing, an asset

As will become evident, I find Shiller's perspective more fruitful. I recognize that we need strong maintained hypotheses to measure/test bubbles, but that's true for all econometrics. Also, note that there are different conceptions of bubbles, and much more to be said on the subject beyond the scope of this paper; Meltzer (2002) provides a brief introduction and citations to relevant literature.

臺灣大學學術期刊資料庫

which in normal times comprises roughly half of the tangible capital stock, could increase in value 7 percent real indefinitely? That only makes sense if one is willing to accept that housing asymptotically becomes, by value, most of the tangible capital in the US economy. Such a world is hard to comprehend.

One could therefore divide investors who relied on continued house price appreciation as falling into one of two camps: those who were abysmally ignorant of exponential growth processes; and those who, like Citigroup's former CEO Chuck Prince, knew that the party would end, but believed if you were an investor, "As long as the music is playing, you've got to get up and dance."

In any event, at first glance it may seem that this discussion of bubbles versus booms and busts is merely a semantic argument. No, there is substance there, obviously; but also important differences in policy implications. Hardcore believers in strong housing market efficiency, "no bubbles," will find it difficult to take large booms as evidence of any departure from fundamentals; they'll take 2005 house prices at face value, no cause for alarm. On the other hand, those who study housing prices and believe they can, at least in a probabilistic sense, find substantial departures from fundamentals may find it difficult to explain how and why such bubbles form; and are completely flummoxed if asked to forecast turning points. The next few paragraphs present one simple model of bubble formation; I do not know of any reliable way to predict turning points.[14]

Why might housing markets form bubbles? Leung and Tse (2012) is a good example of a sophisticated dynamic model with representative agents that demonstrates how markets can form bubbles; Malpezzi and Wachter (2005) build a simpler dynamic stock-adjustment simulation model, in the spirit of Wheaton (1999), Gatzlaff (1994) and Riddel (1999), that shows how the interaction of two key parameters, adaptive expectations and inelastic supply, interact to create booms and busts. Figures 15 and 16 present two representative simulations. In these particular simulations M&W hold the adaptive expectations operator constant, while varying the price elasticity of housing supply.[15] The results are perfectly intuitive: in Figure 15, some

[14]See Gerardi, Foote, and Willen (2010) for some contrasting examples of economists' pre-crash view of housing prices; see Liang and Malpezzi (2005) and Shiller (2008) for discussion of the difficulty of picking turning points.

[15]The particular simulations in the figures shown here assume a total price elasticity of

臺灣大學學術期刊資料庫

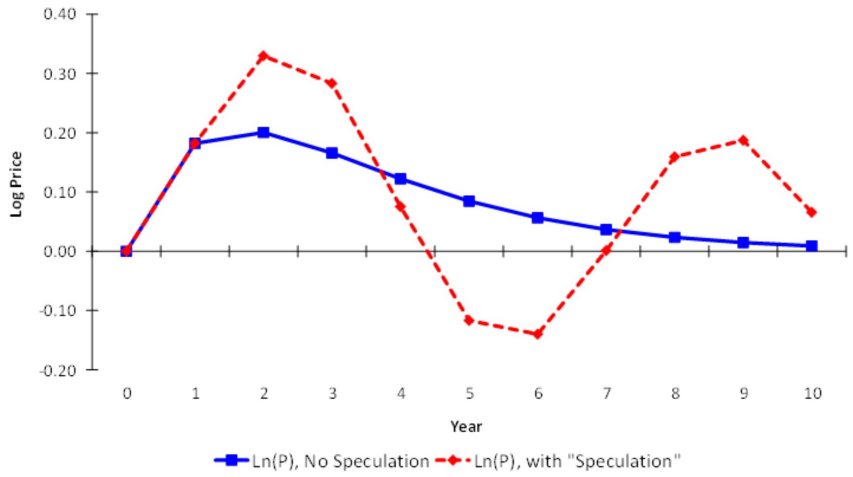


Figure 15: Malpezzi and Wachter Simulations of Housing Supply Dynamics with Inelastic Supply

initial inelasticity translates a demand shift into an initial price rise, which starts the boom; then the adaptive expectations operator raises demand further. Eventually sufficient stock is built to slow prices, and eventually to turn them down.

In Figure 16, representing the elastic market, in contrast, most of the adjustment to a demand shift is on the quantity side, as developers build relatively quickly.

What "inelasticizes" some housing markets – metropolitan areas – and not others? In some part it's the nature of the good: housing is long-lived, lumpy, a large expenditure relative to income, usually leveraged, and takes a long time to build. But those characteristics don't explain cross-market differences. Certainly demand conditions vary across metropolitan areas. But a large and growing literature focuses on differences in supply conditions

supply of either 0.2 (inelastic), or 10.0 (elastic). The contemporaneous price elasticity of demand is fixed at −0.8; but the model can incorporate responses to price changes in previous periods, too. If these have a positive elasticity of demand, we interpret this as "speculation." In these two particular cases the speculative elasticity is either zero (no speculation) or 0.1 (modest speculation). Malpezzi and Wachter cite literature supporting the reasonableness of this particular calibration; qualitative results, and the intuition behind it, are robust to moderate changes in parameters.

臺灣大學學術期刊資料庫

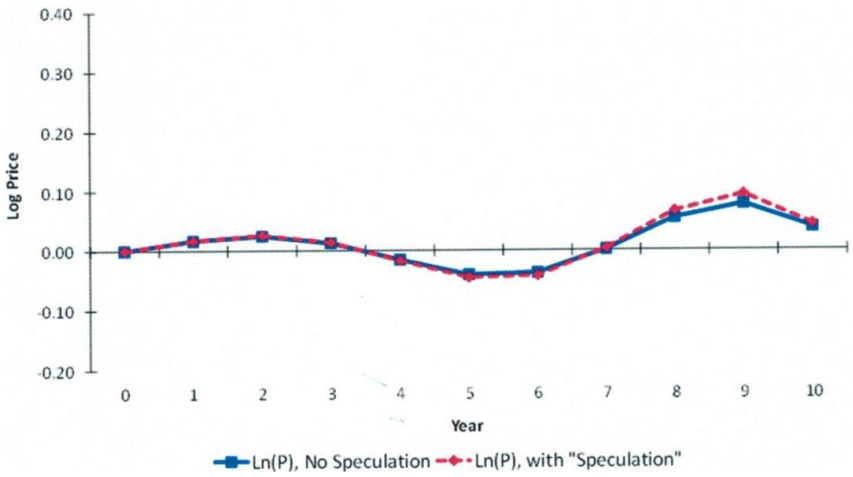


Figure 16: Malpezzi and Wachter Simulations of Housing Supply Dynamics with Elastic Supply

across markets, specifically natural constraints – physical geography – and man-made constraints, particularly land use and development regulations.[16] Cheshire and Sheppard (2005), Glaeser, Gyourko, and Saks (2005), Green, Malpezzi, and Mayo (2005), Pollakowski and Wachter (1990), Chen and Leung (2008), Quigley and Rosenthal (2005) and Saiz (2010) are representative of dozens of studies that now confirm the central role of supply constraints in understanding housing market volatility.[17]

Of course natural constraints – large bodies of water, topography – are very expensive to change and we usually treat as given. Regulatory constraints are another matter. Fischel (1990) and Malpezzi (1996) highlight the need to consider benefits of these regulations as well as costs; but those studies and others suggest that many of the metropolitan areas with the

[16] In this paper, we focus on housing; fewer papers have examined the role commercial real estate played in the crisis. Duca and Ling (2015) is a notable exception.

[17] Davidoff (2013) is an exception to this view. Davidoff points out that in the early 2000s some markets thought to be reasonably elastic had significant booms and busts, such as Las Vegas. He also points out the difficulty of actually separating supply and demand effects econometrically. Markets such as Las Vegas certainly had strong demand pressures, but Davidoff's critique of the "traditional" supply literature suggests we still have much to learn about measuring and modeling housing supply.

臺灣大學學術期刊資料庫

most volatile prices have regulations that don't readily meet cost-benefit tests. Bertaud (2010) and Malpezzi (1999b) and Malpezzi (1999a) provide details about some of the specific regulations – zoning, floor area ratios, subdivision regulations, building codes, rent controls, restrictions on lease contracts, etc. – that may be considered in particular markets. Subjecting these interventions to cost-benefit tests can be a step towards "elasticizing" some markets and reducing volatility.

It is important to take away the correct lessons about heterogeneity in metropolitan housing markets, as we have just discussed in the preceding paragraphs; but it is also important to avoid drawing incorrect conclusions.

Chief among these incorrect take-aways is faux diversification. In figure 17 we summarize some of our price data from 147 metropolitan areas using FHFA repeat sales indexes. For each metropolitan area we compute the 12 quarter rolling correlation between that metro area's price changes, and national price changes proxied by the average price change in those 147 metro areas. The two blue lines summarize the average price changes: quarterly average change and 12 quarter moving average of the changes, respectively. The red line presents the rolling average of the 147 metro areas' correlation coefficients over time.

From Figure 17, it is readily apparent that the correlation across metropolitan areas is becoming more positive over time. Low (ideally negative!) correlations are, of course, the holy grail of portfolio diversification, but this diversification is going away. In particular, when some markets start booming (late 90s, early 2000s), the correlation does drop a bit as some markets pull ahead of others. But when the bust comes, it hits many (not all!) markets together. Correlation increases just when we need low correlation the most. The marketers of mortgage-backed securities who argued that diversification across metropolitan areas would hold investors harmless from price declines were either ignorant of such trends, or chose to ignore an obvious risk.

In fact, a recent paper by Loutskina and Strahan (2011) notes that there can be downsides to geographical diversification. They argue that mortgage lenders who concentrate in one or a few markets develop superior information about that market. They may be in a better position to evaluate and price risks, and make more informed underwriting decisions. Their analysis suggests that the rise in geographic diversification may have actually reduced screening of the quality of underwriting by lenders prior to the 2007 crisis.

Pace Loutskina and Strahan, metropolitan differences in the time path

臺灣大學學術期刊資料庫

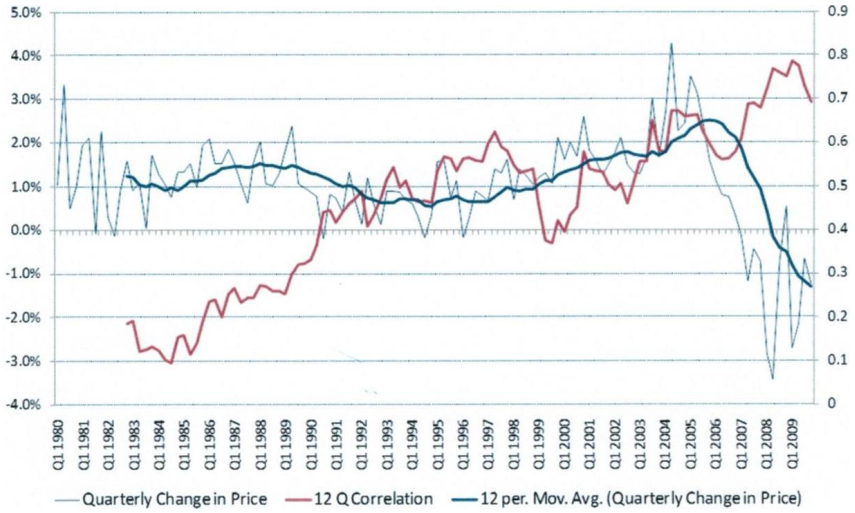


Figure 17: Change in Average Quarterly Nominal FHFA Price Changes; and Average 12 Quarter Correlation of 147 MSA Nominal Price Changes with Average Price Change

of house prices suggest that there is some value to regional diversification. But early 2000 era MBS purveyors bought into regional diversification easily as a silver bullet; low correlations go away just when you need them most!

6 A Few Additional Salients of the Economic Environment

In this section we will examine a few other key determinants of housing market, this time more on the demand side, namely mortgage markets (rates and flows); and incomes and wealth.

First we examine interest rates. It would be difficult to find any real estate economist, or practitioner, who would argue that interest rates don't have a profound effect on real estate markets. As research such as that by Goodman Jr (1995), Pozdena (1990) and Schwab (1983) shows, it would be even more difficult to find a real estate economist or practitioner who could reliably specify what, exactly, that relationship is.

Figure 18 shows the rough correlation between the Fed's short-term policy rate, and long-term (30 year fixed rate) mortgage rates. In the inflationary 70s and early 80s, both rose rapidly, especially after Paul Volcker became

臺灣大學學術期刊資料庫

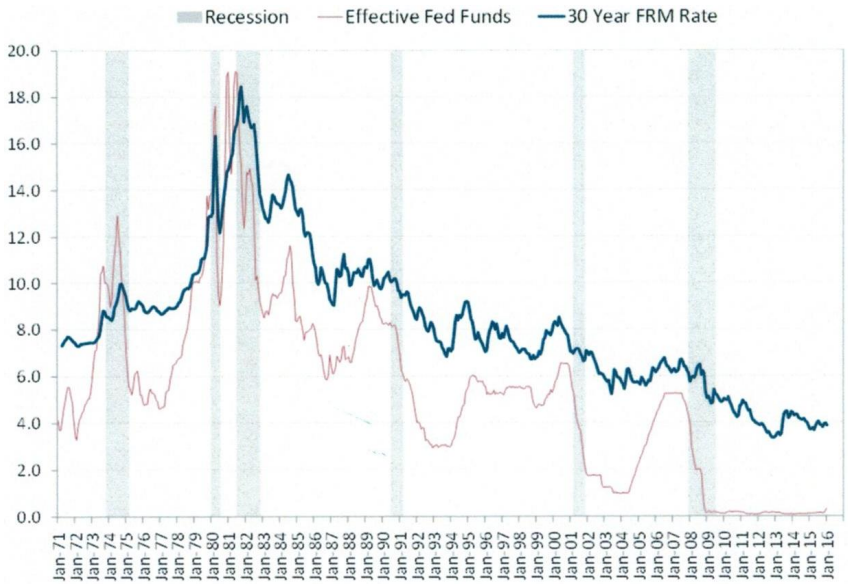


Figure 18: Monthly Federal Funds and Mortgage Rates

Fed Chair in 1979 and tightened Fed policy to break inflationary expectations. Both rates declined thereafter, with a few pops up occasionally in the mid-90s, and just before the Tech Bubble burst a decade and a half ago.

When that bubble burst, the Fed became concerned about a weakening economy; their response was the (in)famous "Greenspan Put" circa 2001, that dropped the Fed Funds from 6 to below 2 in a matter of months; the corresponding fall in mortgage rates was roughly from 8 to 6. After 2004 the Fed began to pull up its policy rate, because of concerns about heading off incipient inflation,[18] raising from 1 percent to a little over five in two years; but this time mortgage rates hardly budged. When the Great Recession started, the Fed fought back with a plunge in their eponymous Funds rate from a little under 6 to zero in short order. Mortgage rates fell as the recession hit; and broadly continued to fall slowly to accompany our long but anemic recovery.

[18]Circa 2005, GDP growth was accelerating, and inflation was creeping up, leading the Fed to raise rates. Concern about housing prices was cited less often, but given the boom in house prices these were also beginning to be cited in Fed statements. See La Monica (2015) and Henderson (2006), for example.

臺灣大學學術期刊資料庫

Stepping back from cyclical stories, in many ways the big story is the long run trend down in nominal mortgage rates since those 1980 peaks. That's in no small part to the decline in inflation, and (not quite the same thing) declines in *expectations* about *future* inflation.

In December 2015 the Fed increased its policy rate for the first time since onset of the GR. As of this writing, the first 25 bps increase has been in effect for several months; the financial press is full of speculation about whether the economy is strong enough that we'll see follow-up increases of several percentage points, as we did circa 2005. Figure 19, above, suggests that if the pattern of the past 30 years is any guide, we can expect increases in the Federal Funds rate to be accompanied by increases in mortgage rates – but, as long as inflation remains under control, the sort of sharp increase in mortgage rates that we saw in the 1980s are unlikely.

Nevertheless, as of this writing, somewhat higher mortgage rates are probably in the offing; conventional wisdom has it that higher rates will translate into lower prices. What does the data tell us about past such experiences?

Figure 19 shows that reality is not so simple. In the 1980s, the spike in mortgage rates was associated with a decline in inflation-adjusted prices.[19] But in the early part of the next decade, prices declined even as rates fell. Perhaps most inexplicably, from the simple view, mortgage rates mostly declined through both the boom of the early 2000s, and the post 2006 bust. (And, for that matter, the post-2012 climb back).

Anyone involved in real estate over the past decade knows the real story: "mortgages are cheap, if you can get one." Rates are low, but qualifying for a mortgage has become more difficult. It's not just mortgage rates, loosely the "price" of taking out a loan, but also capital flows – the "quantity" of loans on offer, along with the associated rules of the game for qualifying.

Figure 20 revisits Figure 19, but now compares house prices to the flow of mortgage lending. House prices and capital measures are more connected. In particular, house prices plummeted, and flows of funds into mortgages fell off a cliff, at about the same time in 2006. A turnaround of both took hold

[19]Figure 19 presents real housing prices, and real rates, deflating each quarter's housing price using the GDP deflator, and using moving average price indexes for deflation of mortgage rates. Qualitative results, specifically that rates and prices are not always negatively correlated as so often posited, are robust to the particular way we model inflationary expectations.

臺灣大學學術期刊資料庫

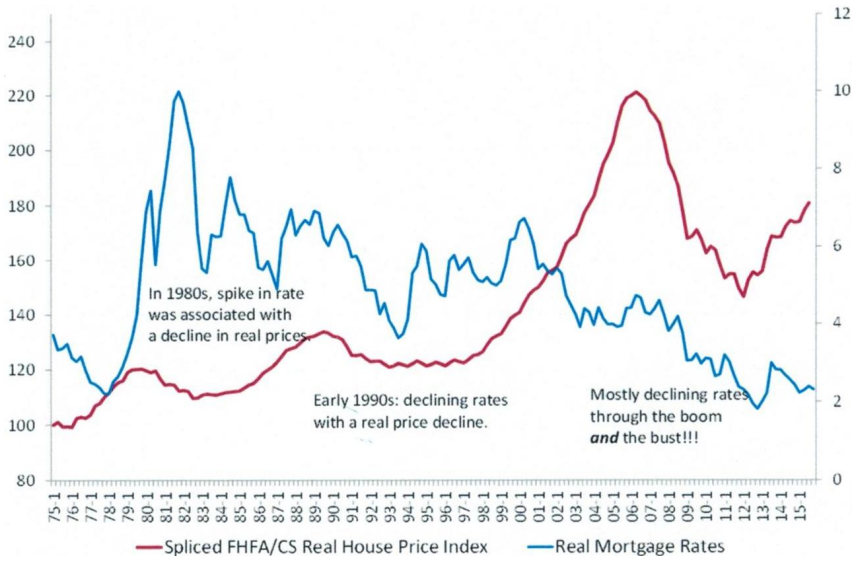


Figure 19: Real House Price Index and Real Mortgage Rates

about 3 years ago, although net growth in mortgages is just creeping back to the levels we saw in the pre-boom 90s.

Of course, this relationship between mortgage flows and housing prices brings up the mother of all endogeneity problems. Causality goes both ways; more capital strengthens housing and real estate markets, and stronger housing and real estate markets attracts more capital. The relative strength of these effects, and their feedback loops, are not yet well specified.

To clarify, Figures 19 and 20 are not the basis of a claim that interest rates don't matter. But the relationship between interest rates and house prices is not a simple one, and other financial condition measures matter too, sometimes more.

Next we will briefly examine one other central aspect of the U.S. economic environment, namely the interaction between incomes, their distribution, and wealth.

Figure 21 presents Census data on average incomes within each income quintile, inflation-adjusted, indexed to 1967=100. In the 1970s, the bottom quintile matched or exceeded the growth of other quintiles, albeit from the lowest base. From 1980 to about 2000, the top quintile outperforms the rest. But the real story perhaps is general stagnation in the top two quintiles

臺灣大學學術期刊資料庫

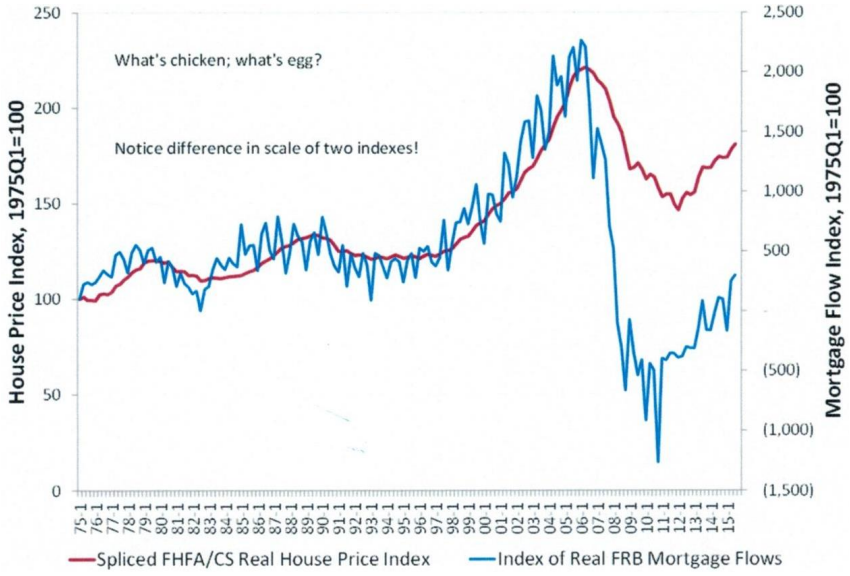


Figure 20: Real House Price Index and Real Mortgage Flow Index

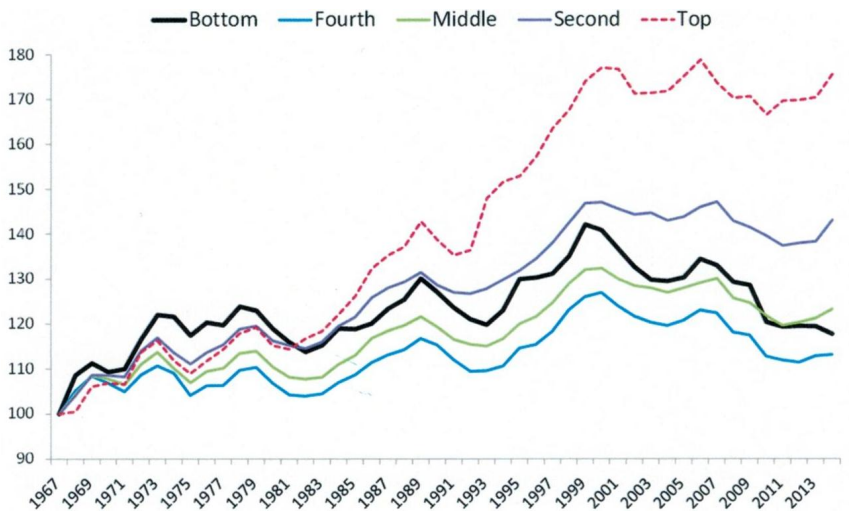


Figure 21: Index of Average Real Household Income Within Each Quintile

臺灣大學學術期刊資料庫

Table 2: Family holdings of selected assets, by income quintile/decile, 2013 Survey of Consumer Finances

	Estimated Unconditional Mean Total Holdings, Thousands of 2010 Dollars					
	Stocks	Any Financial Asset	Primary Residence	Other residential property	Equity in nonresidential property	Sum of all Real Estate
Percentile of income						
Less than 20	2.3	25.6	45.7	4.2	1.8	51.7
20–39.9	3.5	40.8	74.1	7.6	2.9	84.6
40–59.9	7.9	76.8	98.7	13.5	7.2	119.3
60–79.9	14.3	160.4	177.0	26.2	15.1	218.3
80–89.9	33.1	327.7	279.2	68.2	24.5	371.9
90–100	315.2	1,616.0	640.5	247.1	113.7	1,001.3
All families	40.6	255.2	171.2	41.8	19.3	232.3

since about 2000, and the decline of the rest.

Among many other issues this raises, such poor performance is industry since we are such a broad-based industry and it's terrible for economic growth.

Increasingly research provides evidence that growth rates are higher if income distributions are broader.

Figure 21 gave us a look at income; what about wealth? Table 2 presents some basic data from the Federal Reserve's Survey of Consumer Finances on major classes of assets by the household's position in the income distribution. Table 2 presents the unconditional average holdings of households in each category of each type of asset. Other tables showing the fraction of households holding some of each asset, and their median holdings, and average holdings, conditional upon holding the asset, are available upon request. These other Figures show broadly similar patterns: real estate is an important asset across the board, but is an especially important asset for people of moderate and low incomes.

Looking first at the bottom line for all families, taken together, average holdings of all real estate – primary residences, other residential property such as second homes, and equity in nonresidential property – is on average just a little bit shy of the average holdings of financial assets. The average holding of all U.S. families comprise about $232,000 in real estate assets, compared to $255,000 in financial assets. Of course these averages mask

臺灣大學學術期刊資料庫

very different holdings by individuals both across and within categories of the income distribution.

The average financial assets of any kind held by households in the bottom 20 percent of the income distribution are valued at about $26,000. The equity in their primary residences are almost double, at about $46,000. And if we add in the modest amounts of the second homes and other residential property as well as equity and commercial real estate, they are just about double at $52,000. Of course within this group the holdings of both financial assets and real estate assets will be highly skewed; only about 37 percent of this group are homeowners, compared to 65 percent of all families and 94 percent of the top decile.

In the middle of the income distribution, average holdings of financial assets are about $77,000. Equity in their primary residences is about $99,000 and if we add in other real estate, their average holdings rise to $119,000. It's only when we get to the top decile of the income distribution that financial assets outweigh real estate assets.

Taken together these results suggest a few important things. First, as housing prices go up and down the financial position of low and moderate income households in particular are heavily affected. Secondly given the breadth of real estate holdings within the entire distribution of households it's unsurprising that research such as that by Davis and Palumbo find that changes in the asset price of housing map into changes in consumption. Stock market and other financial holdings are much more concentrated at the top of the income distribution where the marginal propensity to consume is lower.

7 Why the Crisis?

Reinhart and Rogoff claim that Sir John Templeton was right when he stated "the most dangerous words in the English language are: 'This time is different."' With respect, and without really disagreeing with Reinhart, Rogoff, or Templeton, I prefer the tagline: "Every financial crisis is different. And every financial crisis is the same." While important details vary, there are common elements to (nearly) every financial "crisis." Renaud (2000) provides one concise list of 8 inter-related elements commonly found in financial crises across countries and throughout recent history.

1. *Overvalued assets.* This paper, and many others with more rigorous

臺灣大學學術期刊資料庫

models and empirical work, argues that housing prices became unmoored from fundamentals in the early 2000s. That is a theme of this paper and many others; see Figures 9–12, above, and associated discussion. And of course as housing prices became overvalued, so too did certain mortgages and derivative securities.

2. *Cash flows are not properly analyzed*. This is, of course, closely related to #1 (and #x, below). Many investors relied on superficial and inadequate analysis by ratings agencies, rather than undertaking proper due diligence. The ratings agencies themselves have a business model that is riven with built-in conflicts of interest (Benmelech and Dlugosz, 2010). In addition, in the early 2000s, holders of MBS were not held as strictly to mark-to-market accounting standards as they might have been; in 2007, these standards were tightened.[20] Industry critics such as Wallison (2008) and Whalen (2008) have argued that marking assets to market actually exacerbated the crisis. More careful researchers such as Laux and Leuz (2010) push back and provide evidence that, if anything, overvaluation of these assets prior to marking to market (see #1) exacerbated the crisis.
3. *Excess loan concentration in real estate*. We have already discussed this in connection with the section on leverage, above; but we can also examine it at a more micro level. The role of excessive loan concentration (or its flip side, diversification) is especially complex. Certainly an argument can be made that excessive concentration in MBS and related derivatives was the central feature of Lehman's implosion (Christopoulos, Mylonakis, and Diktapanidis, 2011). But many investors/security designers claimed that geographic loan diversification would limit losses if prices did turn down. Figure 17, above, and associated discussion argues that this reliance on geographic diversification was, in fact, a faux diversification, obvious to anyone who examined the time varying properties of metropolitan covariances.
4. *Portfolios not monitored*. One way this problem was manifested in the crisis was in problems with servicing. Servicers are not compensated in an optimal fashion from the investor's perspective, creating a principal-agent conflict. Levitin and Twomey (2011) document that servicers' compensation is skewed in a manner that provides excess

[20] See for example Financial Accounting Standards Board Statement #157, http://www.fasb.org/st/summary/stsum157.shtml.

臺灣大學學術期刊資料庫

incentives for forcing foreclosure, rather than actually maximizing the NPV of the loan, which could involve a workout or a short sale. "The costs of this principal-agent conflict are thus externalized directly on homeowners and indirectly on communities and the housing market as a whole." Levitin and Twomey show how the Federal government's main attempt to address the foreclosure program, the famously ineffective Home Affordable Modification Program (HAMP) was unable to address these servicer incentive problems. Davis, Malpezzi, and Ortalo-Magné (2009) and Foote et al. (2009) are among those who put forward alternative plans with better incentive structures, but there was little political support for such efforts.

5. *"Connected" lending, weak underwriting*. The role of poor underwriting, and in particular mortgage brokers in the subprime crisis has been much remarked upon, e.g. Lang and Jagtiani (2010) and Berndt, Hollifield, and Sandås (2010). Another area where such issues arise is the principal agent problem in the construction of mortgage-backed securities, in particular when the holders of the riskiest tranches played a role in the selection of mortgages to be included in the security as in the Magnetar case (Eisinger and Bernstein, 2010), or the ABACUS deal from Goldman Sachs (Mählmann, 2013).
6. *Counterparty risk ignored*. Lehman, discussed above, while large, nearly froze the financial system driving – driving the Ted spread up 300 basis points, not simply because of the size of their losses so much as the fact that for some time no one knew where the losses resided. For another example central to the crisis AIG, the financial entity that wrote a huge portion of the credit default swap market, was largely unknown to the Fed and other regulators See Sjostrom Jr (2009).
7. *Fraud.* Fraud can occur on the lender side or on the borrower side. Francis (2010) discusses some potential elements of fraud focusing on lenders; Carrillo (2011) demonstrates the existence of significant fraud on the borrower side, in some markets.
8. *Asset-liability mismatch and a run on the bank.* In truth, borrowing short and lending long is one of the central tasks of any working financial system; but such term intermediation has to be undertaken carefully. This inevitably leads to a "run on the bank," but exactly what the bank is varies. The classic run on the bank scene in the movie It's a Wonderful Life shows a case where the bank was a savings

臺灣大學學術期刊資料庫

and loan. In this crisis, as discussed above, the repo market was the heart of the mismatch problem. Hördahl and King (2008) discuss the role of repo markets, and Bottazzi, Luque, and Páscoa (2012) provide an analytic framework.

8 What Does the Future Hold?

One would have to be extraordinarily smart, brave, or silly to opine with great certainty on how to avoid future housing-related financial crises. There are no "silver bullet" solutions. But I do think we have some robust solutions that can mitigate their effects.

The next crisis will be different than the last, in significant ways difficult to predict. We don't want to erect a new Maginot Line, fighting the last war. On the other hand, if every financial crisis has commonalities, these may be the place to focus our efforts. At the risk, no the certainty, that I'll omit some important reforms, let me present a counterpart to Renaud's list. Renaud gave us 8 interrelated common factors in financial crises; here, in no particular order, is my current top 10 list of reforms.

1. *Keep a lid on leverage*. Both at the borrower level, and the aggregate/institutional level. Remember that not everyone needs to be a homeowner. Renting is OK, it's another form of intermediation. Providing incentives and "nudges" to encourage saving could help encourage homeownership without the risk of ultra-high LTV loans.
2. *Elasticize housing supply where we can*. Land use and development regulations should be connected to real, measured externalities. Regulation per se is neither good nor bad; use the same cost-benefit principles for the design of regulatory environments that we'd use for other private and public activities.
3. *Improve our monitoring of housing and financial markets*. Timely, accurate information is critical, but our national database is lacking. Despite best efforts of FHFA, NAR, Case-Shiller, we still have limited information on house prices and rents, measured correctly, in a timely manner. Default/foreclosure data can be improved. And let's mine the data from the GSEs more systematically; these should be treated as public goods, to the extent possible.
4. *Look forward – and backwards, and sideways – in appraising the underlying assets*. Static, backward-looking methods of housing appraisal

臺灣大學學術期刊資料庫

lead us astray. As Yezer (2013) suggests, they indicate the value of housing in the past. As Figures 9–11 illustrate, rapid increases in house prices over several years are associated with slower increases – declines even – in future periods. Current appraisals neglect to take advantage of this knowledge. As Yezer states, "as long as individual home buyers and mortgage lenders continue to rely on appraisal values to make long term housing investment and financing decisions, the necessary conditions to produce housing bubbles will remain." Proposals by Yezer, and separately by Davis, Oliner, and Pinto (2014), would incorporate arm's-length forecasts of housing prices to make appraisals at least somewhat forward looking, although formidable technical and political problems would need to be surmounted.

5. *Capital is good.* More capital, procyclical capital. Beef up capital requirements during booms, and lower them (on the margin) during busts. Admati et al. (2011) and Admati and Hellwig (2014) discuss specifics.
6. *Get serious about analytics.* There are many technical challenges, e.g. how to price these complex assets in a thin market? How can we redesign the system to better balance moral hazard and adverse incentives with the need to provide credit, and housing, to a wide swath of our population? Type I and Type II errors are inevitable. How can we minimize these – and what is our loss function? Many risks are "fat in the tails," and anyway rare events do occur. Perhaps most importantly, focus on the design of robust regulatory mechanisms.
7. *Beef up government regulatory and economic expertise*. The housing boom and bust, and the associated GFC, highlighted the fact that regulators were often overmatched (OFHEO versus Fannie Mae and Freddie Mac) and that housing and financial expertise was thin on the ground in government agencies. HUD's policy and research staff has been systematically gutted over several decades, and remaining staff are overcommitted; Treasury has little real housing expertise (National Research Council, 2008). The best housing analysis during the crisis mainly came out of the Fed system.
8. *Diversify, diversify, diversify.* But don't rely on faux diversification. Recognize that correlation among asset returns is itself volatile, in fact endogenous, adding another layer of risk.
9. *Better, simpler mortgage design.* More standardization and information

臺灣大學學術期刊資料庫

of loans. Which designs should be default choices? See parallels to making 401K participation the default option for a new hire. Attack asymmetric information with better disclosures. Permit only "qualified borrowers" to take out option ARMs and similar risky, hard to understand instruments.

10. *Keep subsidies and finance separate*. Renaud (1999) provides a discussion in developing country context, but the principles enunciated in that paper are just as applicable to the United States. Strengthen FHA as the primary federal government homeownership program. Clean up and rationalize subsidies for low income households; focus on-budget subsidies, rather than the mortgage interest deduction,[21] and taxes on financial system. Emphasize homeownership for those for whom it makes economic sense. But not everybody should be a homeowner. International experience suggests that up-front down-payment assistance coupled to market rate mortgages can be a fruitful approach.
11. *Don't neglect political economy*. Some of the overarching problems relate to the U.S.'s recent dysfunctional politics. Democrats and Republicans, Congress and successive Administrations, have been ineffective at best. Media are often fixated on personalities, simplistic descriptions of the problem, and silver-bullet solutions. As already noted, government economists are often overstretched.
12. *Financial education*. In American high schools, and even colleges, it is possible to receive a degree without any real study of the basics of the time value of money, mortgages, and other basic financial concepts. On the face of it, a more rigorous and early education in financial mathematics would seem a good place to start, in high school, if not sooner. On the other hand, research to date on the effects of financial education on "downstream" financial behavior has shown weak, if any, effects Hastings, Madrian, and Skimmyhorn (2013) and Willis (2011). But given how little many Americans know about their mortgages (Bucks and Pence, 2008) it seems hard to argue that a stronger curriculum might help. These could be coupled with more counsel-

[21] The mortgage interest and property tax deductions have surprisingly little impact on homeownership. Many on the cusp of homeownership don't itemize, even after purchase. If you want to encourage homeownership, phase the deduction into a well-designed tax credit. See Green and Reschovsky (2001).

臺灣大學學術期刊資料庫

ing at the point of taking out a mortgage, as well as when in default. The effects of such counseling seem strongest when it's in-person (as opposed to online or over the telephone), and when it's of some sufficient duration Collins (2007) and Quercia and Spader (2008).

References

Admati, Anat and Martin Hellwig (2014), *The Bankers' New Clothes: What's Wrong with Bsnking and What to Do About it*, Princeton: Princeton University Press.

Admati, Anat R., Peter M. DeMarzo, Martin F. Hellwig, and Paul C. Pfleiderer (2011), "Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity Is Not Expensive," MPI Collective Goods Preprint, No. 2010/42.

Adrian, Tobias and Hyun Song Shin (2010), "Liquidity and Leverage," *Journal of Financial Intermediation*, 19, 418–437.

Allen, Franklin and Douglas Gale (2000), "Financial Contagion," *Journal of Political Economy*, 108, 1–33.

Ambrose, Brent W., Piet Eichholtz, and Thies Lindenthal (2013), "House Prices and Fundamentals: 355 Years of Evidence," *Journal of Money, Credit and Banking*, 45, 477–491.

Bair, Sheila (2012), *Bull by the Horns: Fighting to Save Main Street from Wall Street and Wall Street from Itself*, New York: Free Press.

Ball, Laurence (2016), *The Fed and Lehman Brothers*, Cambridge: National Bureau of Economic Research.

Benmelech, Efraim and Jennifer Dlugosz (2010), "The Credit Rating Crisis," in Daron Acemoglu, Kenneth Rogoff, and Michael Woodford (eds.), *NBER Macroeconomics Annual 2009*, vol. 24, Chicago: University of Chicago Press, 161–207.

Benoit, Sylvain, Gilbert Colletaz, Christophe Hurlin, and Christophe Pérignon (2013), "A Theoretical and Empirical Comparison of Systemic Risk Measures," HEC Paris Research Paper, No. FIN-2014-1030.

Bernanke, Ben S. (2015), *The Courage to Act: A Memoir of a Crisis and Its Aftermath*, New York: Norton.

Berndt, Antje, Burton Hollifield, and Patrik Sandås (2010), "The Role of Mortgage Brokers in the Subprime Crisis," in Mark Carey, Anil Kashyap, Raghuram Rajan, and René Stulz (eds.), *Market Institutions and Financial Market Risk*, Chicago: National Bureau of Economic Research.

臺灣大學學術期刊資料庫

Bertaud, Alain (2010), "Land Markets, Government Interventions, and Housing Affordability," Working Paper, Brookings Institution.

Blinder, Alan S. (2010), *After the Music Stopped: The Financial Crisis, the Response, and the Work Ahead*, New York: Penguin Books.

Bokhari, Sheharyar, Walter Torous, and William Wheaton (2013), "Why Did Household Mortgage Leverage Rise from the Mid-1980s until the Great Recession?" Working Paper.

Borio, Claudio and Patrick McGuire (2004), "Twin Peaks in Equity and Housing Prices?" *BIS Quarterly Review*, 7, 79–96.

Bottazzi, Jean-Marc, Jaime Luque, and Mário R Páscoa (2012), "Securities Market Theory: Possession, Repo and Rehypothecation," *Journal of Economic Theory*, 147, 477–500.

Bruner, Robert F. and Sean D. Carr (2008), *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*, New York: John Wiley & Sons.

Bucks, Brian and Karen Pence (2008), "Do Borrowers Know Their Mortgage Terms?" *Journal of Urban Economics*, 64, 218–233.

Calomiris, Charles W. and Stephen H. Haber (2014), *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit*, Princeton: Princeton University Press.

Caprio, Gerard and Daniela Klingbiel (2002), "Episodes of Systemic and Borderline Financial Crises," in Daniela Klingebiel and Lud Laeven (eds.), *Managing the Real and Fiscal Effects of Banking Crises*, Washington, DC: World Bank.

Carrillo, Paul E. (2011), "Testing for Fraud in the Residential Mortgage Market: How Much Did Early-Payment-Defaults Overpay for Housing?" *Journal of Real Estate Finance and Economics*, 13, 1–29.

Chen, Nan-Kuang and Charles Ka Yui Leung (2008), "Asset Price Spillover, Collateral and Crises: With an Application to Property Market Policy," *Journal of Real Estate Finance and Economics*, 37, 351–385.

Cheshire, Paul and Stephen Sheppard (2005), "Land Markets and Land Market Regulation: Progress Towards Understanding," *Regional Science and Urban Economics*, 34, 619–637.

Christopher, Henderson and Jagtiani Julapa (2013), "Can Banks Circumvent Minimum Capital Requirements? The Case of Mortgage Portfolio under Basel II," *Journal of Mathematical Finance*, 3, 60–68.

Christopoulos, Apostolos G., John Mylonakis, and Pavlos Diktapanidis (2011), "Could Lehman Brothers' Collapse Be Anticipated? An Examination

臺灣大學學術期刊資料庫

Using Camels Rating System," *International Business Research*, 4, 11–19.

Cole, Marine (2015), "Get Ready for Another Real Estate Bubble," *Fiscal Times, March*, 3, 2015.

Collins, J. Michael (2007), "Exploring the Design of Financial Counseling for Mortgage Borrowers in Default," *Journal of Family and Economic Issues*, 28, 207–226.

Corbae, Dean and Erwan Quintin (2015), "Leverage and the Foreclosure Crisis," *Journal of Political Economy*, 123, 1–65.

Corcoran, Barbara (2015), "NY Real Estate May be in a New Bubble," *Bloomberg Business*, April 30.

Davidoff, Thomas (2013), "Supply Elasticity and the Housing Cycle of the 2000s," *Real Estate Economics*, 41, 793–813.

Davis, Morris A. and Jonathan Heathcote (2007), "The Price and Quantity of Residential Land in the United States," *Journal of Monetary Economics*, 54, 2595–2620.

Davis, Morris A., Stephen Malpezzi, and François Ortalo-Magné (2009), "The Wisconsin Foreclosure and Unemployment Relief Plan (Wi-Fur)," James A. Graaskamp Center for Real Estate, **URL**: http://www.bus.wisc.edu/realestate/wi-fur/.

Davis, Morris A., Stephen D. Oliner, and Edward J. Pinto (2014), "House Prices and Land Prices under the Microscope: A Property-Level Analysis for the Washington, DC Area," Working Paper, American Enterprise Institute.

Davis, Morris A. and Michael G. Palumbo (2001), "A Primer on the Economics and Time Series Econometrics of Wealth Effects," Washington, DC: Board of Governors of the Federal Reserve System.

Demirguc-Kunt, Asli, Enrica Detragiache, and Ouarda Merrouche (2013), "Bank Capital: Lessons from the Financial Crisis," *Journal of Money, Credit and Banking*, 45, 1147–1164.

Duca, J. V., J. Muellbauer, and A. Murphy (2010), "Housing Markets and the Financial Crisis of 2007–2009: Lessons for the Future," *Journal of Financial Stability*, 6, 203–217.

Duca, John V. and David C. Ling (2015), "The Other (Commercial) Real Estate Boom and Bust: The Effects of Risk Premia and Regulatory Capital Arbitrage," SSRN Working Paper, No. 2663194.

臺灣大學學術期刊資料庫

Dullien, Sebastian, Detlef J. Kotte, Alejandro Márquez, and Jan Priewe (2010), "The Financial and Economic Crisis of 2008–2009 and Developing Countries," Working paper.

Durden, Tyler (2015), "Bad News for America's Biggest Housing Bubble: San Francisco Home Prices Suffer Biggest Drop in Three Years," *Zero Hedge*, March 31.

Eisinger, Jesse and Jake Bernstein (2010), "The Magnetar Trade: How One Hedge Fund Helped Keep the Bubble Going," *ProPublica*, April 9.

Englund, Peter (1999), "The Swedish Banking Crisis: Roots and Consequences," *Oxford Review of Economic Policy*, 15, 80–97.

Fama, Eugene F. (2014), "Two Pillars of Asset Pricing," *American Economic Review*, 104, 1467–1485.

Fischel, William A. (1990), "Do Growth Controls Matter?" Working Paper, Lincoln Institute of Land Policy.

Follain, James R. and Seth H. Giertz (2012), "A Look at Us House Price Bubbles from 1980–2010 and the Role of Local Market Conditions," Working Paper, Lincoln Institute of Land Policy.

Foote, Chris, Jeff Fuhrer, Eileen Mauskopf, and Paul Willen (2009), "A Proposal to Help Distressed Homeowners: A Government Payment-Sharing Plan," **URL**: http://www.bos.frb.org/economic/ppb/2009/ppb091.htm.

Foote, Christopher L., Kristopher Gerardi, Lorenz Goette, and Paul S. Willen (2008), "Just the Facts: An Initial Analysis of Subprime's Role in the Housing Crisis," *Journal of Housing Economics*, 17, 291–305.

Francis, Louise (2010), "Banking on Robbery: The Role of Fraud in the Financial Crisis," Paper presented at the Casualty Actuarial Society E-Forum.

Freixas, Xavier, Bruno M. Parigi, and Jean-Charles Rochet (2000), "Systemic Risk, Interbank Relations, and Liquidity Provision by the Central Bank," *Journal of Money, Credit and Banking*, 611–638.

Frey, William H., Jill H. Wilson, Alan Berube, and Audrey Singer (2004), "Tracking Metropolitan America into the 21st Century: A Field Guide to the New Metropolitan and Micropolitan Defintions," Working Paper, The Brookings Institution.

Gatzlaff, Dean H. (1994), "Excess Returns, Inflation and the Efficiency of the Housing Market," *Real Estate Economics*, 22, 553–581.

Geanakoplos, John (2010), "The Leverage Cycle," in Daron Acemoglu, Kenneth Rogoff, and Michael Woodford (eds.), *NBER Macroeconomics Annual 2009*, vol. 24, Chicago: University of Chicago Press, 1–65.

臺灣大學學術期刊資料庫

Geithner, Timothy F. (2015), *Stress Test: Reflections on Financial Crises*, New York: Broadway Books.

Gerardi, Kristopher, Christopher L Foote, and Paul Willen (2010), "Reasonable People Did Disagree: Optimism and Pessimism About the Us Housing Market before the Crash," FRB of Boston Public Policy Discussion Paper, No. 10–15.

Ghent, Andra C. and Michael T. Owyang (2010), "Is Housing the Business Cycle? Evidence from Us Cities," *Journal of Urban Economics*, 67, 336–351.

Glaeser, Edward L., Joshua D. Gottlieb, and Joseph Gyourko (2013), "Can Cheap Credit Explain the Housing Boom?" in L. Glaeser Edward and Todd Sinai (eds.), *Housing and the Financial Crisis*, Chicago: University of Chicago Press.

Glaeser, Edward L., Joseph Gyourko, and Raven E. Saks (2005), "Why Have Housing Prices Gone Up?" *American Economic Review*, 95, 329–333.

Goodhart, Charles and Boris Hofmann (2001), "Asset Prices and the Conduct of Monetary Policy," Paper presented at the conference on Asset Prices, Exchange Rates, and Monetary Policy, Stanford University.

Goodman Jr, John L. (1995), "Interest Rates and Housing Demand, 1933–1995: Common Sense Versus Econometrics," Paper presented to the American Real Estate and Urban Economics Association, Washington D.C.

Green, Richard K. (1997), "Follow the Leader: How Changes in Residential and Non-Residential Investment Predict Changes in GDP," *Real Estate Economics*, 25, 253–270.

Green, Richard K. and Stephen Malpezzi (2003), *A Primer on U.S. Housing Markets and Housing Policy, American Real Estate and Urban Economics Association Monograph Series*, Washington, D.C.: Urban Institute Press.

Green, Richard K., Stephen Malpezzi, and Stephen K. Mayo (2005), "Metropolitan-Specific Estimates of the Price Elasticity of Supply of Housing, and Their Sources," *American Economic Review*, 95, 334–339.

Green, Richard K. and Andrew Reschovsky (2001), "Using Tax Policy to Increase Homeownership among Low-and Moderate-Income Households," Working Paper.

Green, Richard K. and Susan M. Wachter (2005), "The American Mortgage in Historical and International Context," *Journal of Economic Perspectives*, 19, 93–114.

臺灣大學學術期刊資料庫

Hastings, Justine S., Brigitte C. Madrian, and William L. Skimmyhorn (2013), "Financial Literacy, Financial Education, and Economic Outcomes," *Annual Review of Economics*, 5, 347–373.

Henderson, Neil (2006), "Key Federal Rate Raised to 5.25%, a 5-Year High," *Washington Post*, June 30.

Herndon, Thomas, Michael Ash, and Robert Pollin (2013), "Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff," Working Paper, University of Massachusetts.

Holly, Sean, M. Hashem Pesaran, and Takashi Yamagata (2011), "The Spatial and Temporal Diffusion of House Prices in the UK," *Journal of Urban Economics*, 69, 2–23.

Hördahl, Peter and Michael R. King (2008), "Developments in Repo Markets During the Financial Turmoil," *BIS Quarterly*, December, 37–52.

Jorgenson, Dale W. (2009), "A New Architecture for the U.S. National Accounts," *Review of Income and Wealth*, 55, 1–42.

Kalemli-Ozcan, Sebnem, Bent Sorensen, and Sevcan Yesiltas (2012), "Leverage across Firms, Banks, and Countries," *Journal of International Economics*, 88, 284–298.

Kusisto, Laura (2015), "Housing Bubble? Despite Rising Prices, Most Economists Still Say No," *Wall Street Journal*, May 26.

La Monica, Paul R. (2015), "Warning Signs in the Housing Market," CNN Money, March 25.

LaCour-Little, Michael and Stephen Malpezzi (2003), "Appraisal Quality and Residential Mortgage Default: Evidence from Alaska," *Journal of Real Estate Finance and Economics*, 27, 211–233.

Lang, William W. and Julapa A. Jagtiani (2010), "The Mortgage and Financial Crises: The Role of Credit Risk Management and Corporate Governance," *Atlantic Economic Journal*, 38, 123–144.

Laux, Christian and Christian Leuz (2010), "Did Fair-Value Accounting Contribute to the Financial Crisis?" *Journal of Economic Perspectives*, 24, 93–118.

Leamer, Edward E. (2007), "Housing Is the Business Cycle," in Jackson Hole (ed.), *Proceedings of the Economic Policy Symposium*, Federal Reserve Bank of Kansas City, 149–233.

Leung, Charles Ka Yui (2004), "Macroeconomics and Housing: A Review of the Literature," *Journal of Housing Economics*, 13, 249–267.

Leung, Charles Ka Yui and Chung-Yi Tse (2012), "Flippers in Housing Market Search," Working Paper.

臺灣大學學術期刊資料庫

Levitin, Adam J. and Tara Twomey (2011), "Mortgage Servicing," *Yale Journal on Regulation*, 28, No. 1.

Liang, Yongping and Stephen Malpezzi (2005), "Housing Price Dynamics: Can We Pick the Turning Points?" Working Paper.

Lin, Che-Chun, Larry J. Prather, Ting-Heng Chu, and Jing-Tang Tsay (2013), "Differential Default Risk among Traditional and Non-Traditional Mortgage Products and Capital Adequacy Standards," *International Review of Financial Analysis*, 27, 115–122.

Lo, Andrew W. (2012), "Reading About the Financial Crisis: A Twenty-One-Book Review," *Journal of Economic Literature*, 151–178.

Loutskina, Elena and Philip E. Strahan (2011), "Informed and Uninformed Investment in Housing: The Downside of Diversification," *Review of Financial Studies*, 24, 1447–1480.

Luttrell, David, Tyler Atkinson, and Harvey Rosenblum (2013), "Assessing the Costs and Consequences of the 2007–09 Financial Crisis and Its Aftermath," *Economic Letters*, 8, No. 7.

Mählmann, Thomas (2013), "Hedge Funds, Cdos and the Financial Crisis: An Empirical Investigation of the "Magnetar Trade"," *Journal of Banking and Finance*, 37, 537–548.

Malpezzi, Stephen (1996), "Housing Prices, Externalities, and Regulation in U.S. Metropolitan Areas," *Journal of Housing Research*, 7, 209–241.

——— (1999a), "A Simple Error Correction Model of House Prices," *Journal of Housing Economics*, 8, 27–62.

——— (1999b), "The Regulation of Urban Development: Lessons from International Experience," background paper for the 1999 World Development Report, World Bank.

——— (2014), "The Savings and Loan Crisis of the 1980s: Prequel to the Great Financial Crisis," class lecture notes.

Malpezzi, Stephen and Duncan Maclennan (2001), "The Long-Run Price Elasticity of Supply of New Residential Construction in the United States and the United Kingdom," *Journal of Housing Economics*, 10, 278–306.

Malpezzi, Stephen and Susan M. Wachter (2005), "The Role of Speculation in Real Estate Cycles," *Journal of Real Estate Literature*, 13, 143–164.

Meltzer, Allan H. (2002), "Rational and Irrational Bubbles," Working Paper.

Mera, Koichi and Bertrand Renaud (2000), *Asia's Financial Crisis and the Role of Real Estate*, New York: ME Sharpe Inc.

臺灣大學學術期刊資料庫

Mian, Atif and Amir Sufi (2010), "Household Leverage and the Recession of 2007–09," *IMF Economic Review*, 58, 74–117.

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

Mills, Ewin S. (1957), "The Theory of Inventory Decisions," *Econometrica*, 25, 222–238.

Mollenkamp, Carrick, Susanne Craig, Serena Ng, and Aaron Lucchetti (2008), "Lehman Files for Bankruptcy, Merrill Sold, Aig Seeks Cash," *Wall Street Journal*, September 16.

National Research Council (2008), *Rebuilding the Research Capacity at Hud*, Washington, D.C.: National Academies Press.

Paulson, Henry M. Jr. (2013), *On the Brink: Inside the Race to Stop the Collapse of the Global Financial System*, New York: Business Plus.

Pinto, Edward (2010), "Government Housing Policies in the Lead-up to the Financial Crisis: A Forensic Study," SSRN Working Paper, No. 1675959.

Pollakowski, Henry O. and Susan M. Wachter (1990), "The Effects of Land-Use Constraints on Housing Prices," *Land Economics*, 315–324.

Pozdena, Randall (1990), "Do Interest Rates Still Affect Housing?" *Federal Reserve Bank of San Francisco Economic Review*, Summer, 3–14.

Pozsar, Zoltan, Tobias Adrian, Adam B. Ashcraft, and Haley Boesky (2010), "Shadow Banking," SSRN Working Paper, No. 1640545.

Quercia, Roberto and Jonathan Spader (2008), "Does Homeownership Counseling Affect the Prepayment and Default Behavior of Affordable Mortgage Borrowers?" *Journal of Policy Analysis and Management*, 27, 304–325.

Quercia, Roberto G. and Michael A. Stegman (1992), "Residential Mortgage Default: A Review of the Literature," *Journal of Housing Research*, 3, 341–379.

Quigley, John M. and Larry A. Rosenthal (2005), "The Effects of Land Use Regulation on the Price of Housing: What Do We Know? What Can We Learn?" *Cityscape: A Journal of Policy Development and Research*, 8, 69–110.

Reinhart, Carmen M. and Kenneth Rogoff (2009), "This Time Is Different: Eight Centuries of Financial Folly," Princeton: Princeton University Press.

臺灣大學學術期刊資料庫

Renaud, Bertrand (1999), "The Financing of Social Housing in Integrating Financial Markets: A View from Developing Countries," *Urban Studies*, 36, 755–773.

——— (2000), "Real Estate Booms and Banking Busts: The Asian Experience," Working Paper.

Riddel, Mary (1999), "Fundamentals, Feedback Trading, and Housing Market Speculation: Evidence from California," *Journal of Housing Economics*, 8, 272–284.

Saiz, Albert (2010), "The Geographic Determinants of Housing Supply," *Quarterly Journal of Economics*, 125, 1253–1296.

Schwab, Robert M. (1983), "Real and Nominal Interest Rates and the Demand for Housing," *Journal of Urban Economics*, 13, 181–195.

Shiller, Robert J. (2008), "Historic Turning Points in Real Estate," *Eastern economic journal*, 34, 1–13.

——— (2014), "Speculative Asset Prices," *American Economic Review*, 104, 1486–1517.

——— (2015), *Irrational Exuberance*, 3rd ed., Princeton: Princeton University Press.

Shin (2009), "Financial Intermediation and the Post-Crisis Financial System," Working Paper.

Sjostrom Jr, William K. (2009), "The AIG Bailout," *Washington & Lee Law Review*, 66, 943.

Sorkin, Andrew Ross (2009), *Too Big To fall*, New York: Viking Press.

Vandell, Kerry D. (2003), "Handing over the Keys: A Perspective on Mortgage Default Research," *Real Estate Economics*, 21, 211–246.

Vasel, Kathryn (2015), "Is It Time to Worry About Another Housing Bubble?" CNN Money, May 4.

Wallison, Peter J. (2008), "Fair Value Accounting: A Critique," *AEI Financial Services Outlook*, July.

Whalen, R. C. (2008), "Subprime Crisis-Cause, Effect and Consequences," *Journal of Affordable Housing and Community Development*, 17, 219.

Wheaton, William C. (1999), "Real Estate" Cycles": Some Fundamentals," *Real Estate Economics*, 27, 209–211.

Willis, Lauren E. (2011), "The Financial Education Fallacy," *American Economic Review*, 101, 429–434.

Yang, Tyler T. and Jessie Y. Zhang (2014), "Mortgage Defaults and Risk-Based Capital: Post-Global Financial Crisis Development and Implications for Emerging Markets," in Susan Wachter, Man Cho, and Moon

臺灣大學學術期刊資料庫

Joong Tcha (eds.), *The Global Financial Crisis and Housing: A New Policy Paradigm*, Cheltenham, UK: Edward Elgar, 231–261.

Yellen, Janet (2013), "Interconnectedness and Systemic Risk: Lessons from the Financial Crisis and Policy Implications," Board of Governors of the Federal Reserve System, Washington, DC.

Yezer Anthony, M. J. (2013), "Current Financial Reform Has Failed Because It Has Not Considered the Fundamental Cause of the Financial Crisis," Working Paper.

投稿日期: 2015年6月30日, 接受日期: 2016年8月19日

臺灣大學學術期刊資料庫

住宅不動產市場: 美國金融危機、大衰退及其後果

Stephen Malpezzi
威斯康辛大學麥迪遜分校商學院

大約從 2007 年至 2009 年, 美國經歷了金融危機與經濟衰退, 就諸多衡量標準而言, 這是美國自 1930 年代大蕭條以來所經歷最嚴重的經濟倒退。同時, 此事件對世界其他經濟體也造成巨大的負面影響。此次「大金融危機」與隨之而來的「大衰退」, 其前因後果相當複雜, 學者們對其原因和影響重要細節的爭論將會持續幾十年。本文回顧了一些可能的原因, 特別著重過度槓桿和房價過度波動這兩個根本的因素。本文也提供關於房地產和金融市場的 10 項改革建議, 可望減少未來與房地產市場相關的衰退所造成的成本。

關鍵詞: 金融危機, 經濟衰退, 槓桿, 房價波動, 政府政策
JEL 分類代號: E30, E60, R30

臺灣大學學術期刊資料庫