# Housing Policy, Monetary Policy, and the Great Recession

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## ABSTRACT

Most research on the run-up in home prices before the Great Recession has focused on types of excessive demand—loose lending, foreign savings, loose monetary policy, speculation, bank deregulation, federal housing subsidies, etc. The focus on excess demand led to fatalism about the collapse in homebuilding that began in 2006 and the eventual recession and financial crisis that followed. Regardless of the sources of excess demand, a consensus developed that American spending had become unsustainably high because of a housing bubble and that demand needed to be reduced. Using a broad array of evidence, we find that constrained supply of new housing in key urban centers was the primary trigger for high home prices before the crisis. The recession and the financial crisis were the result of deliberate contractions of demand—both generally and specifically in residential investment—that were neither useful nor necessary. First, tightening monetary policy reduced aggregate spending and encouraged negative sentiment about real estate. Then, policy changes tightened lending standards and depressed housing markets for years after the 2008 financial crisis. A monetary policy regime targeting stable nominal income growth would have dramatically improved the economy during and after 2008.

*JEL* codes: E3, E6, R3

Keywords: monetary policy, inflation targeting, market monetarism, Great Recession, global financial crisis, housing bubble, housing supply, bailout, bank regulation, Federal Reserve Board, bank lending, mortgage market



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In the standard narrative, the Great Recession and the 2008 financial crisis were widely seen as a direct, and perhaps even inevitable, result of the housing bubble. In this paper we challenge that standard narrative. We show that many of the assumptions regarding the causes of the housing cycle, and also its linkages with the broader business cycle, are not well supported by either theory or evidence.

In the standard view of the housing and business cycle of the 2000s, there are at least eight interconnected assumptions:

1. Low interest rates, caused by either a highly expansionary monetary policy or a glut of global savings, contributed to a housing bubble.
2. The housing bubble was fed by an increased supply of credit to less qualified borrowers.
3. In the years leading up to 2006, there was excessive construction of new homes.
4. The boom was fed by deregulation of banking, pressure from government regulators, or both, which led banks to make too many mortgage loans.
5. There was an irrational house-price bubble that peaked in 2006, making a price bust inevitable.
6. Most bank failures during the Great Recession were owing to bad mortgage loans.
7. Declining homebuilding and banking problems, triggered by the housing cycle, caused a deep recession despite easy money.
8. Recovery from the recession was slow despite an expansionary monetary policy.

We will show that these assumptions are unwarranted. Monetary policy during 2003–2006 was somewhat stimulative, but not atypical for the expansion phase of the US business cycle. Lending during the housing boom was mostly

directed toward affluent households. Housing construction leading up to 2006 was strong, but not unusually strong. Government pro-housing policies do not explain the peak years of the housing boom. The high house prices of 2005–2006 can mostly be explained by fundamentals such as rising rents and expectations of future rent increases, particularly in "closed-access cities."[1] A steep national house-price decline was not inevitable. Furthermore, most bank failures were owing to bad loans to property developers, not mortgage defaults triggered by the severe recession of 2008–2009.

Changing sentiment about housing led to a decline in demand in 2006, and a subsequent tightening of lending standards depressed housing even further in later years. That tightening was followed by a collapse in low-tier housing markets that was unrelated to pre-2007 activity, and the great majority of mortgage defaults came well after the financial crisis of 2008. Contractionary monetary policy, not declining homebuilding, explains the steep recession of 2008. Monetary policy continued to be relatively contractionary during the recovery from the Great Recession despite near-zero interest rates, especially given the headwinds created by the collapsing housing market and the tightening of credit by commercial banks and federal mortgage regulators.

In the next section, we examine the causes and consequences of the boom phase of the housing cycle. In order to understand the role of monetary policy during and after the housing boom, it is first necessary to examine the causes of high home prices during the mid-2000s. In section II, we consider the role of monetary policy in the housing bust. At first, the unemployment rate remained low, even as housing construction plummeted. We show that monetary policy was a key factor from August 2007 to the end of 2008, when the economy slid into the Great Recession. During this period, the housing slump intensified and spread to areas where the market had previously held up relatively well. One theme is that the role of monetary stimulus in the boom is generally overrated, while most pundits have placed too little weight on the role of contractionary monetary policy in the 2008–2009 economic slump. In section III, we analyze the role of tighter lending standards, which adversely impacted the bottom half of the housing market during the recovery from the Great Recession. In the conclusion, we discuss the policy implications of this new view of the housing crash and the Great Recession. We argue that monetary and banking policy should be less procyclical and more focused on producing a stable economic environment for markets to work.

1. These are, specifically, Boston, Los Angeles, New York City, San Diego, and San Francisco and San Jose, which share the characteristics of permitting much lower rates of new housing expansion than other metro areas, even as local rents, home prices, and incomes have risen far above national norms.

## I. THE CAUSES AND CONSEQUENCES OF THE HOUSING BOOM

After the inflationary 1970s, monetary policy in the United States became focused on inflation control and economic stability. It was largely successful in this regard, and the period of 1984–2007 has come to be known as the Great Moderation. However, successive boom-and-bust cycles in the technology sector in the late 1990s and in housing in the 2000s led many to question the Federal Reserve's (Fed's) inflation targeting regime. Some argued that stabilizing the overall inflation rate could trigger asset price bubbles, and that the popping of those bubbles would destabilize the financial system and the broader economy.

The economist Hyman Minsky had warned, "Full employment is a transitory state because speculation upon and experimentation with liability structures and novel financial assets will lead the economy to an investment boom. An investment boom leads to . . . a financial structure that is conducive to financial crises."[2] As home prices continued to rise and new types of mortgages were developed, the economy seemed to be following Minsky's scenario. The idea that stability would eventually generate instability gained more and more adherents.

These worries seemed to be confirmed when the housing bust that began in 2006 was followed by the devastating financial crisis of 2007–2008 and a severe recession.

Expansionary Fed policy is frequently viewed as contributing to the housing boom, and the subsequent crisis is often seen as an inevitable or natural consequence of monetary excesses. Critics of the Fed point to the low interest rate policy of 2002–2005, which pushed short-term interest rates down to as low as 1 percent, as contributing to a housing bubble. Many pundits argued that monetary policy was too expansionary for the needs of the overall economy. In this hypothesis, interest rates are often used as an indicator of the stance of monetary policy. Unfortunately, this widely used measure of the stance of monetary policy is also among the least reliable.

In the academic literature, it is widely recognized that interest rates are not an adequate measure of the stance of monetary policy.[3] More sophisticated models often focus on the gap between the policy rate and a difficult-to-measure equilibrium or "natural rate of interest." But when real-world business cycles

2. Hyman Minsky, *Stabilizing an Unstable Economy* (New York: McGraw-Hill, 2008), 199.
3. See John B. Taylor, "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy* 37 (1993): 195–214; Leo Krippner, "Measuring the Stance of Monetary Policy in Conventional and Unconventional Environments" (CAMA Working Paper No. 6, Centre for Applied Macroeconomic Analysis, Crawford School of Public Policy, Australian National University, 2014).

are analyzed, those nuances are often lost. Thus, most pundits viewed policy as expansionary during 2008 despite a lack of evidence for that view.

Unfortunately, this is not a new issue. Here's Milton Friedman in 1997, expressing dismay that many were forgetting the lessons of the 1930s and 1970s:

> Low interest rates are generally a sign that money has been tight, as in Japan; high interest rates, that money has been easy. . . . After the U.S. experience during the Great Depression, and after inflation and rising interest rates in the '70s and disinflation and falling interest rates in the '80s, I thought the fallacy of identifying tight money with high interest rates and easy money with low interest rates was dead. Apparently, old fallacies never die.[4]

Note that Friedman refers to the Great Depression of the 1930s, which saw some of the tightest monetary policy in American history, and yet nominal interest rates fell close to zero—reflecting the weak economy and low (or negative) inflation expectations.

And here's Frederic Mishkin in the leading undergraduate money and banking textbook:

> It is dangerous to consistently associate an easing or tightening of monetary policy with a fall or rise in short-term nominal interest rates.[5]

And here's Ben Bernanke in 2003:

> The imperfect reliability of money growth as an indicator of monetary policy is unfortunate, because we don't really have anything satisfactory to replace it. As emphasized by Friedman . . . nominal interest rates are not good indicators of the stance of policy. . . . The real short-term interest rate . . . is also imperfect. . . .

Ultimately, it appears, one can check to see if an economy has a stable monetary background only by looking at macroeconomic indicators such as nominal GDP growth and inflation.[6]

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4. Milton Friedman, "Rx for Japan: Back to the Future," *Wall Street Journal*, December 17, 1997.
5. Frederic S. Mishkin, *The Economics of Money, Banking, and Financial Markets*, 11th ed. (New York: Pearson, 2016), 681.
6. Ben S. Bernanke, "The Influence of Milton Friedman's Monetary Framework on Contemporary Monetary Theory and Practice" (presented at the Federal Reserve Bank of Dallas Conference on the Legacy of Milton and Rose Friedman's *Free to Choose*, Dallas, TX, October 24, 2003), 3–4.

Notice that Bernanke mentions both inflation and nominal GDP growth as the preferred indicators of the stance of monetary policy. This reflects a concern that interest rates are distorted by the income and Fisher effects, as well as the economics profession's increasing skepticism about the usefulness of monetary aggregates (such as M1 or M2) owing to instability of the velocity of circulation. By Bernanke's two criteria, monetary policy was quite contractionary during 2008–2013.

Inflation and nominal GDP growth are both linked to the Fed's dual mandate, which calls for stable prices and high employment. One can think of both very high inflation and nominal gross domestic product (NGDP) growth as indications that policy is too expansionary to hit the Fed's policy targets, and *vice versa* for both very low inflation and low NGDP growth rates.

Bernanke may have mentioned NGDP growth because he was aware that inflation is affected by both aggregate supply and aggregate demand shocks, and that the Fed is primarily concerned with demand-side inflation, looking past temporary inflation spikes caused by supply-side factors such as commodity price shocks. In contrast, NGDP growth is the sum of inflation and real growth and, hence, implicitly picks up both sides of the Fed's dual mandate. Thus, NGDP growth (relative to trend) is probably the single most reliable indicator of the stance of Fed policy, relative to the Fed's policy goals. In this paper, we will use NGDP growth rates as a benchmark for evaluating whether monetary policy is effectively stimulative or contractionary.

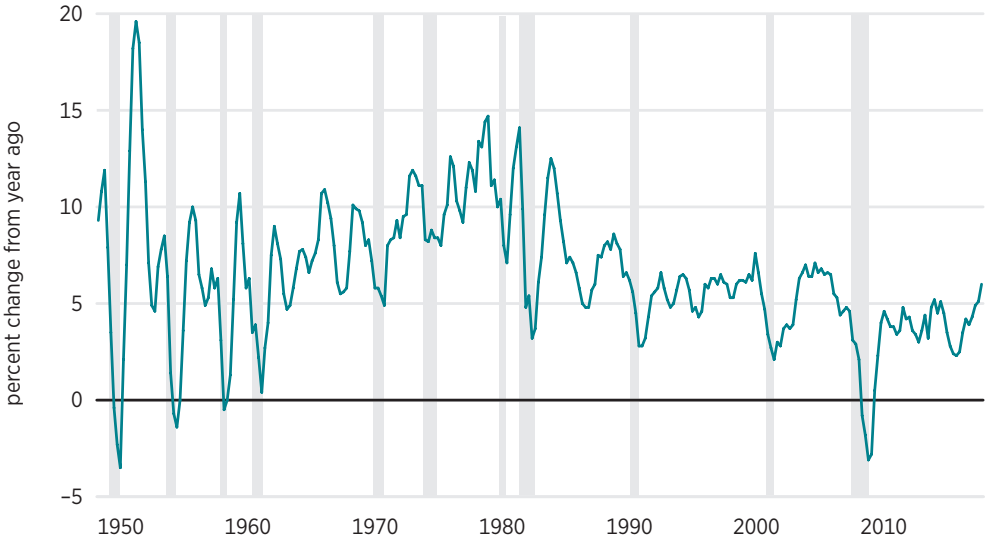
Inflation remained relatively low during the housing boom, and while nominal GDP ran slightly above trend, it was not unusually high for the expansion phase of the business cycle. As shown in figure 1, nominal GDP growth peaked at roughly 6 percent to 7 percent during the housing boom, comparable to the peak rates of the 1990s and lower than the peak growth rates of earlier business cycles. Interest rates were unusually low during the housing boom, but the more reliable indicators, such as inflation and NGDP growth, suggest that monetary policy was not unusually expansionary during this period.

Admittedly, in the long run, the 6 percent or 7 percent NGDP growth rate of 2004 and 2005 would not be compatible with the Fed's 2 percent inflation target, given much lower trend rates of real GDP growth.

An increasing number of economists have recently advocated NGDP targeting,[7] and in the early 2000s that sort of regime might have involved an

7. Jeffrey Frankel, Michael Woodford, Larry Summers, James Bullard, and Bennett McCallum are just some of the prominent economists who have praised NGDP targeting. See, for example, Jeffrey Frankel, "Should the Fed Be Constrained?" (working paper, February 6, 2019), https://papers.ssrn

FIGURE 1. PERCENTAGE CHANGE IN GDP FROM ONE YEAR AGO




Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "Gross Domestic Product (GDP)" (dataset), accessed June 25, 2020, https://fred.stlouisfed.org/series/GDP.

NGDP growth rate of closer to 5 percent. However, the fact that NGDP growth rates were not unusually high during the 2001–2006 housing boom suggests that monetary policy cannot by itself explain the anomalous 2001–2006 increase in housing prices. Something more is needed.

In both the 1970s and the 2000s, home price appreciation outpaced general price inflation. Ironically, the rapid increase in real estate values in the 1970s was attributed to an easy money policy that generated high consumer inflation because homes could serve as an inflation hedge and tax shelter.[8] According to that narrative, high consumer inflation was the cause of fast-rising home prices.

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.com/sol3/papers.cfm?abstract_id=3329591; Larry Summers, "Why the Fed Needs a New Monetary Policy Framework," Brookings, June 7, 2018, https://www.brookings.edu/research/why-the-fed-needs-a-new-monetary-policy-framework/; Bennett T. McCallum and Edward Nelson, "Nominal Income Targeting in an Open-Economy Optimizing Model," *Journal of Monetary Economics* 43, no. 3 (1999): 553–78.

8. Lawrence H. Summers, "Inflation, the Stock Market, and Owner-Occupied Housing," *American Economic Review* 71, no. 2 (1981): 429–34; S. Boragan Aruoba, Morris A. Davis, and Randall Wright, "Homework in Monetary Economics: Inflation, Home Production, and the Production of Homes," *Review of Economic Dynamics* 21 (July 2016): 105–24; Monika Piazzesi and Martin Schneider, "Inflation and the Price of Real Assets" (Federal Reserve Bank of Minneapolis Research Department Report 423, April 2009).

In addition, these rising home prices were associated with high and rising nominal interest rates.

Monetary policy was again blamed when home prices accelerated in the 2000s, in spite of the lack of high consumer inflation. Unlike during the 1970s, the "easy money" of the 2000s occurred in an environment of unusually *low* interest rates. In fact, there is no reliable model linking interest rates and monetary policy, much less asset price bubbles and monetary policy. Nominal GDP growth was not unusually high during either the late 1990s tech bubble or the mid-2000s housing bubble, at least compared to previous business cycle expansions. If one uses interest rates to measure the stance of monetary policy, then the late 1920s stock price bubble also does not fit the model. Real interest rates were quite high during the late 1920s, a time of near-zero inflation.[9]

It is important to keep in mind that Fed policy aims to stabilize not just housing construction or housing prices, but rather the overall macroeconomy. After all, housing construction is typically only about 3 percent to 6 percent of GDP. Thus, a housing boom is not by itself evidence of an excessively expansionary policy. One must consider the broader economy.

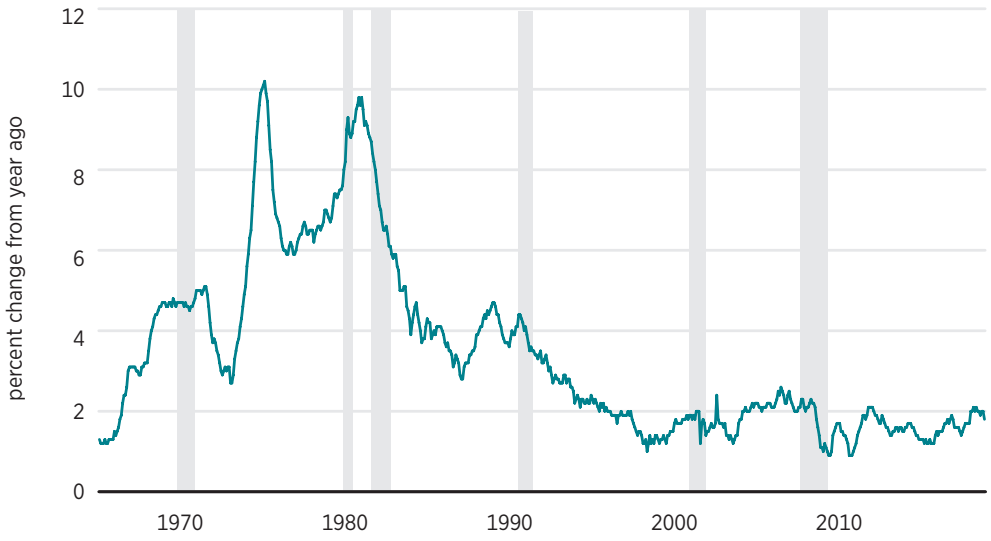
At this point, it will be useful to consider the natural rate of interest—that is, the interest rate consistent with macroeconomic stability. The Fed now defines macroeconomic stability as 2 percent personal consumption expenditure (PCE) inflation and unemployment close to the natural rate, and the Fed tries to set interest rates at a level that will best achieve those goals. During the 2001–2006 housing boom, the core PCE inflation rate averaged close to 2 percent, as shown in figure 2, and unemployment averaged a bit over 5 percent. While the Fed targets headline PCE inflation, the core rate is viewed as a more reliable indicator, owing to the transitory impact on oil price inflation. Thus, while interest rates may have appeared low by historical standards, the rates were apparently roughly appropriate in terms of achieving the Fed's macroeconomic policy goals. This is especially true when one compares the 2001–2006 period to earlier decades, when inflation often drifted far above or (occasionally) below the implicit targets of policymakers.[10]

John Taylor is one of the many observers who have made a connection between a low Fed policy rate, sharply rising home prices, and rising

9. Scott B. Sumner, *The Midas Paradox: Financial Markets, Government Policy Shocks, and the Great Depression* (Oakland, CA: Independent Institute, 2015).

10. In the 1930s, there was no explicit inflation target. But the rapid deflation of the 1930s was unwelcome to Fed policymakers, who tended to favor price stability.

FIGURE 2. PCE INFLATION EXCLUDING FOOD AND ENERGY




Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "Personal Consumption Expenditures Excluding Food and Energy (Chain-Type Price Index) (BPCCRO1Q156NBEA)" (dataset), last updated May 28, 2020, https://fred.stlouisfed.org/series/BPCCRO1Q156NBEA.

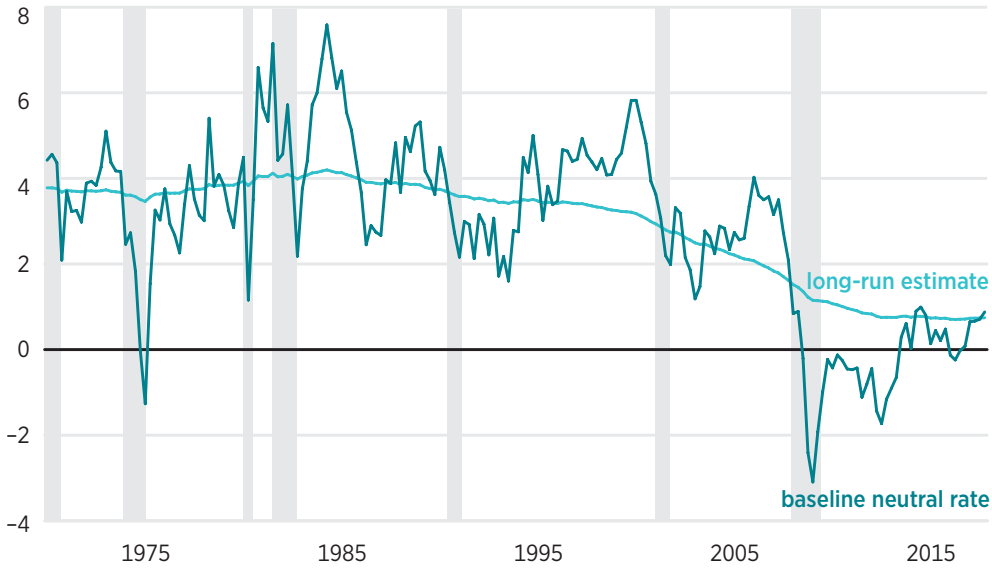
homebuilding between about 2002 and 2006. In a presentation to Fed officials in December 2007, he said,

> As the *Economist* recently put it, "By slashing interest rates (by more than the Taylor rule prescribed) the Fed encouraged a house-price boom...." With low money market rates, housing finance was very cheap and attractive—especially variable rate mortgages with the teasers that many lenders offered. Housing starts jumped to a 25 year high by the end of 2003 and remained high until the sharp decline began in early 2006. The surge in housing demand led to a surge in housing price inflation which had already been high since the mid 1990s.[11]

Taylor suggested that higher interest rates from 2002 to 2006 would have led to fewer housing starts, lower home prices, and more stable economic growth.[12] While there are certainly respectable arguments to be made for this

11. John B. Taylor, "Housing and Monetary Policy" (NBER Working Paper No. 13682, National Bureau of Economic Research, Cambridge, MA, 2007).
12. Taylor, "Housing and Monetary Policy."

FIGURE 3. MODEL ESTIMATE OF LONG-RUN NEUTRAL RATE




Source: Board of Governors of the Federal Reserve System, "An Estimate of the Long-Term Neutral Rate of Interest Accessible Data," figure 5, last updated September 5, 2018, https://www.federalreserve.gov/econres/notes/feds-notes/estimate-of-the-long-term-neutral-rate-of-interest-accessible-20180905.htm#fig5.

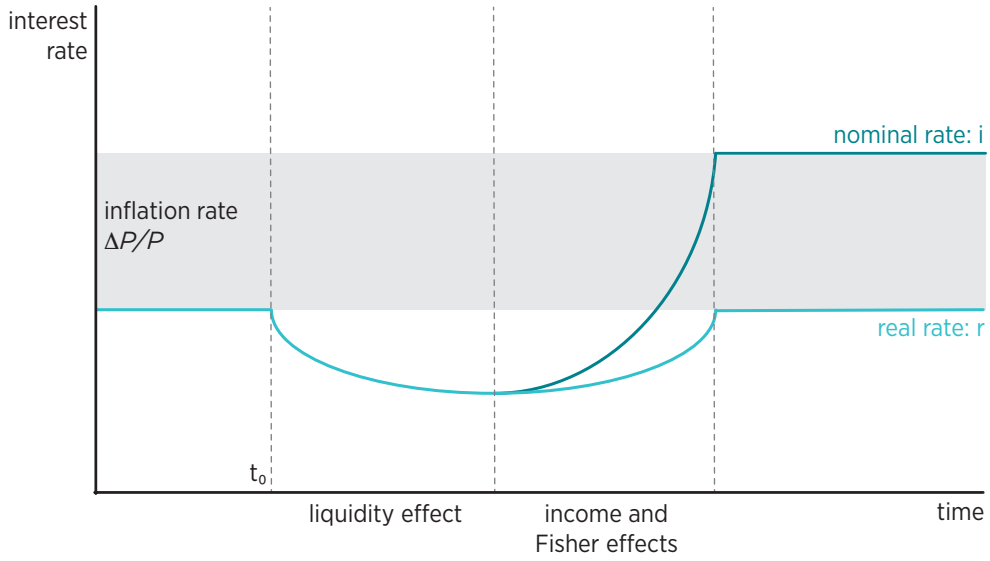
claim, we agree with Ben Bernanke[13] that the role of easy money has been overstated.

Although Taylor rule research proved to be highly useful during the 1990s in developing a monetary regime that could keep inflation close to target, this rule is based on the assumption that the natural rate of interest is fairly stable, whereas a recent study by John Roberts shows that the natural (or "neutral") interest rate has been trending downward since the 1980s, as shown in figure 3.[14]

Indeed, if the Fed had followed the Taylor rule in recent years, it would have been forced to raise rates significantly, pushing inflation even further below the Fed's 2 percent target. Because the equilibrium interest rate cannot be measured directly, inflation and NGDP growth are more reliable than interest rates as indicators of the stance of monetary policy, relative to what is required to achieve the targets of Fed policy.[15]

13. In contrast, Ben Bernanke argued against the view that low rates caused the housing boom. Ben Bernanke, "The Taylor Rule: A Benchmark for Monetary Policy?," *Brookings*, April 28, 2015.
14. John M. Roberts, "An Estimate of the Long-Term Neutral Rate of Interest," *FEDS Notes*, September 5, 2018.
15. Evan Koenig shows that a Taylor rule utilizing the slope of the yield curve has done much better over the past decade. Evan F. Koenig, "Has U.S. Monetary Policy Gone Off Track?," Federal Reserve Bank of Dallas, June 6, 2019.

FIGURE 4. INTEREST RATE RESPONSE TO INCREASE IN MONETARY GROWTH




Source: Jeffrey Rogers Hummel, "Central Bank Control over Interest Rates: The Myth and the Reality" (Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, 2017), 10.

It is also unclear whether, during the boom, monetary policy played much of a role in holding down longer-term interest rates, which are the rates that matter most for the housing market. Consider the first rate cut of the 2001–2004 cycle, which occurred on January 3, 2001. Because the 50-basis-point cut was larger than expected, short-term interest rates declined on the news. However, long-term nominal interest rates rose sharply, while long-term real interest rates rose more modestly. This can be explained by considering both the liquidity effect and the income and Fisher effects of a monetary policy change, as shown in figure 4.

The injection of more liquidity into the economy will temporarily depress short-term interest rates. If this policy is expected to lead to more rapid economic growth and higher inflation, however, short-term rates will be expected to eventually rise to higher levels. Because longer-term interest rates are a weighted average of expected future short-term rates plus a term premium, the expectation of higher future short-term rates can push long-term rates higher, even if short-term rates are falling.

The opposite can also occur. For instance, longer-term interest rates declined during 2004–2006, even as the Fed steadily raised its short-term interest rate target from 1 percent to 5.25 percent. At the time, this pattern was termed

a "conundrum," as it was assumed that boosts in shorter-term interest rates would also push up longer-term rates. In fact, longer-term rates were correctly signaling a long-run decline in the natural interest rate.

Some of the criticism of precrisis monetary policy is undoubtedly linked to an awareness of what came next. We will demonstrate that the housing bust and Great Recession were not inevitable, and thus it is not appropriate to judge policy as being too expansionary solely on the basis of the subsequent slump.

## The Housing Price Bubble

Consider real housing prices in five English-speaking countries in figure 5.

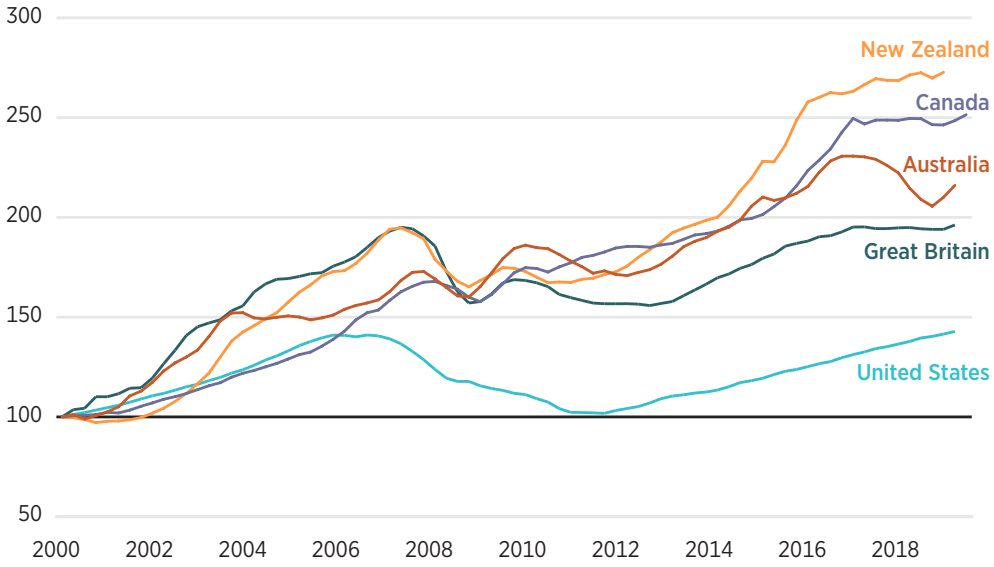
Notice that real home prices in all five economies rose sharply in the period up until 2006, but only the United States saw a major and persistent decline after 2006. In the United Kingdom, real housing prices are again close to the 2006 peak, and in Canada, Australia, and New Zealand they have moved even higher.[16] A slump is not inevitable after a period of sharp price gains. And even within the United States, house prices have reached or even exceeded peak levels in many local markets.

After the tech crash of 2001, a US housing boom was appropriate for both cyclical and secular reasons. A well-functioning economy needs an adequate level of investment to maintain full employment. When business investment slumped in 2001, other sectors such as consumption, exports, and nonbusiness investment needed to increase, both to pick up the slack in labor markets and to keep the economy operating close to the production possibilities frontier. Asset prices needed to adjust to move resources from declining sectors to growing sectors. In this case, the most important price movement was lower real interest rates, which facilitated a rise in residential investment that helped re-employ resources that idled when business investment slumped in 2001.

This is not to suggest that a tech bubble needed to be replaced with a housing bubble. A housing price bubble was neither inevitable nor appropriate. In most of the country, the redirection of capital into housing involved moderate increases in prices relative to rents, which triggered moderate increases in new supply. In those places, the changes in prices and rents were not large enough to be destabilizing.

16. Australian housing prices recently dipped slightly, but they remain far above 2006 levels, which were regarded as a bubble at the time. Some argue that a heavy reliance on commodities explains the stability in Australian and Canadian prices. But commodities are a highly volatile sector of an economy, so one would expect commodity-intensive economies to have more unstable housing markets.

FIGURE 5. HOUSING PRICE INDEX FOR AUSTRALIA, BRITAIN, CANADA, NEW ZEALAND, AND THE UNITED STATES




Source: OECD (Organisation for Economic Co-operation and Development) Data, "Housing Prices" (dataset), accessed June 10, 2020, https://data.oecd.org/price/housing-prices.htm.

As noted above, long-term real interest rates appear to be declining over the long run, in part for demographic reasons. This decline partially reflects a higher propensity to save among baby boomers approaching retirement age. Eventually, the demographic bulge will lead to a decline in active laborers. Saving money today is a way to fund consumption in the future. An inflow of savings from countries in East Asia and Northern Europe has also depressed interest rates.

The lower interest rates triggered by today's saving *should* be inducing an increase in investment, including residential investment, which is a way of using labor today to provide consumption far into the future. Indeed, housing construction creates shelter services for decades or even centuries into the future. Many other types of physical capital are less durable than housing. The popular myth that residential housing is not "productive" is just that, a myth.

These are the macroeconomic factors that provide a backdrop for the national housing market during the boom years. However, these factors cannot fully account for some of the more extreme localized surges in home prices that happened in the years leading up to 2005. The moderate and appropriate changes in the national housing market happened to coincide with some large shifts in home values in key coastal urban centers where building was

constrained by regulation. Unfortunately, these two trends have been conflated as having the same cause. In fact, in the cities where home prices were the highest, fast-rising rents were owing to a *lack* of capital flows into residential investment.

If there are structural flaws in the banking and housing sector, the proper way to address those flaws is through more sensible regulation, not through artificially depressing NGDP growth to levels that create mass unemployment in order to prevent a housing boom. In 1929, the Fed raised interest rates repeatedly, with the goal of popping what it regarded as a stock market bubble. Stocks continued rising until the interest rate reached a level high enough to depress the broader economy (in the fall of 1929).[17]

In *Shut Out*,[18] Kevin Erdmann provides evidence that high home prices were not fundamentally caused by loose lending and loose monetary policy. When the housing data are examined at the local level, it is clear that during 2000–2006, the country was in the midst of a regime shift to a new housing market, characterized by localized price spikes where it was difficult to undertake new construction. This pattern was obscured by national data, which did feature substantial new construction but mostly in areas where construction was not constrained and price increases were less extreme. Unusually high home prices during the boom period were widely treated as the result of a temporary speculative boom rather than a structural change in the housing market.

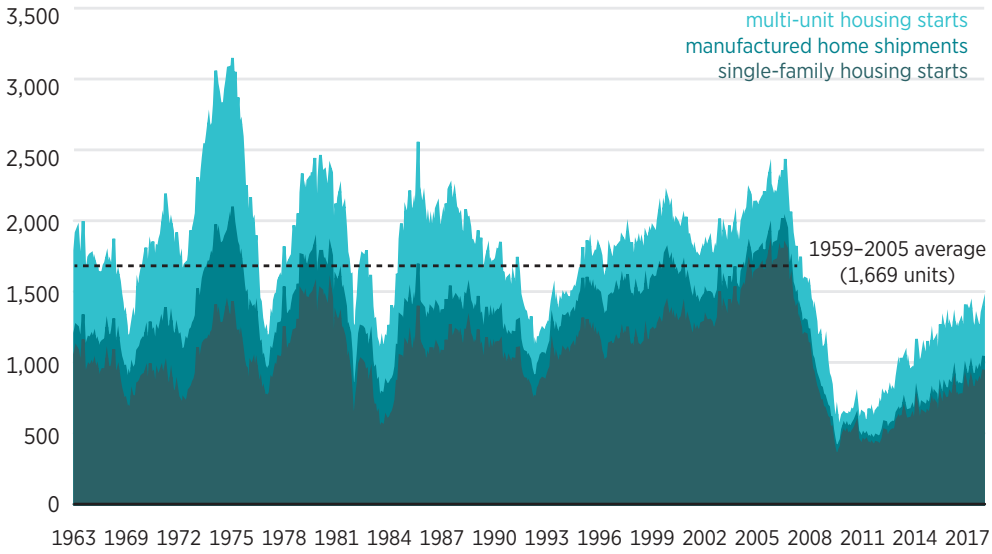
Cyclical factors *were* increasing the overall rate of homebuilding, but these factors were not the reason that house prices in coastal California shot up to quadruple the level of prices in most other cities. This is easier to see today, as prices in popular coastal markets remain far above those in the heartland. This mistaken diagnosis of the housing boom led to an equally mistaken diagnosis of the bust, as falling prices were assumed to reflect the inevitable bursting of a bubble. As we will see in section II, this misconception led policymakers astray during the crucial period that led up to the Great Recession.

## Residential Investment

After the housing boom ended, it was widely assumed that there had been an excessive level of building during the boom period. In truth, the supply of housing units was not out of the ordinary. Whether measured in terms of new housing

17. Sumner, *The Midas Paradox*.
18. Kevin Erdmann, *Shut Out: How a Housing Shortage Caused the Great Recession and Crippled Our Economy* (Lanham, MD: Rowman & Littlefield, 2019).

FIGURE 6. HOUSING STARTS AND SHIPMENT BY TYPE, UNITED STATES



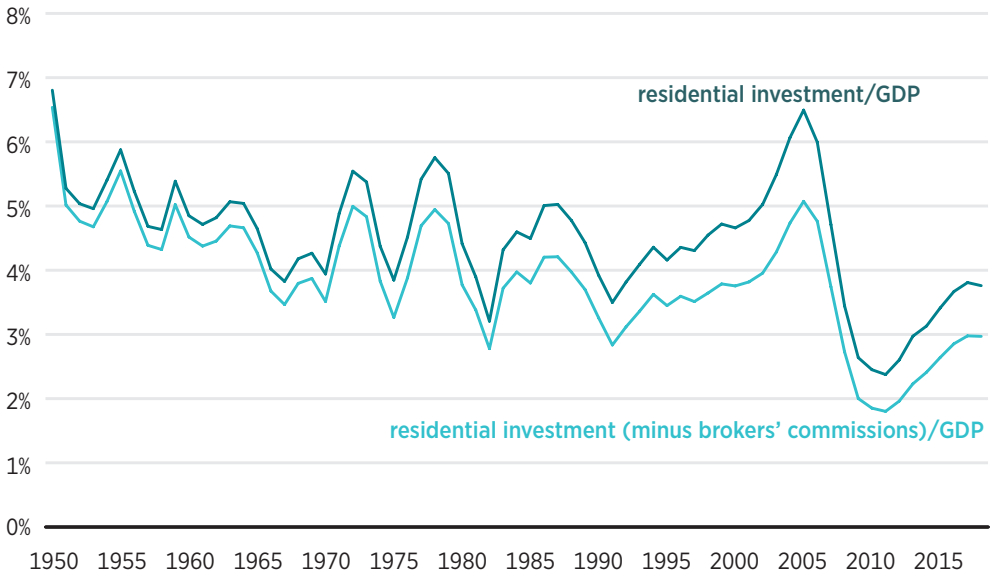

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "Shipments of New Manufactured Homes; Privately Owned Housing Starts: 1-Unit Structures" (dataset), accessed March 9, 2018, https://fred.stlouisfed.org/series/HOUST1F; FRED Economic Data, Federal Reserve Bank of St. Louis, "Housing Starts: 2–4 Units" (dataset), accessed March 9, 2018, https://fred.stlouisfed.org/series/HOUST2F; FRED Economic Data, Federal Reserve Bank of St. Louis, "Privately Owned Housing Starts: 5-Unit Structures or More" (dataset), accessed March 9, 2018, https://fred.stlouisfed.org/series/HOUST5F; US Census Bureau, "MHS Latest Data: Shipments of New Manufactured Homes by Month," April 2020, https://www.census.gov/data/tables/time-series/econ/mhs/latest-data.html.

starts or in terms of the total inventory of existing homes per capita, housing supply was within historical norms.[19]

The false perception of overbuilding was partly based on the fact that construction of new single-family homes did reach record levels in 2005–2006. But most of that increase was a shift of market share out of manufactured and multi-unit homes. Rates of building in both of those categories, even in 2005, were well below the rates of previous decades. An important reason for this shift in market share toward single-family homes is that the closed-access cities that have strict limits on new housing supply are the cities where multi-unit housing would previously have been built in larger quantities. The NIMBY phenomenon that led to housing scarcity in closed-access cities induced households to migrate from large multi-unit buildings in dense coastal cities to single-family homes in cheaper cities.[20] Figure 6 shows that, despite the

19. Erdmann, *Shut Out*; Kevin Erdmann, "Housing Was Undersupplied during the Great Housing Bubble" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, April 2018).
20. NIMBY, meaning "not in my backyard," refers to a political phenomenon in which local property owners object to new building projects, such as housing developments, near them.

FIGURE 7. PRIVATE FIXED INVESTMENT IN STRUCTURES BY TYPE




Source: Bureau of Economic Analysis, "GDP & Personal Income" (dataset), table 1.1.5 and table 5.4.5, last updated July 30, 2019, https://apps.bea.gov/iTable/index_nipa.cfm.

boom in single-family home construction, total rates of homebuilding in 2005 were near historical norms.

In addition to new home construction, the measure of residential investment by the Bureau of Economic Analysis (BEA) includes several other categories of activity, including improvements on existing structures and brokers' commissions.

Overall residential investment, as measured by the BEA, briefly peaked at a percentage of GDP at levels slightly higher than typically seen before the 1980s. But figure 7 shows that this additional spending was on brokers' commissions. Again, this was partly a symptom of closed access, which pushed up relative home prices and hence caused brokers' commissions to rise faster than GDP. Ironically, what was actually a symptom of barriers to new construction was interpreted as overinvestment in housing. The brief spike in the other categories of residential investment was a temporary reprieve from a long-term downtrend.

## Housing Consumption

The homebuilding of the early 2000s often facilitated an escape from high costs in closed-access cities, providing a way to reduce spending on housing.

Americans were moving out of coastal California, New York, and Boston toward inland California, Arizona, Florida, and Nevada. In terms of rental value, American housing accounted for 15.2 percent of total personal consumption expenditures in 1995, and it still accounted for 15.2 percent in the booming market of 2005. In 2017, housing had edged up to 15.9 percent of total expenditures, but that was mostly because the collapse of the housing boom blocked the new housing stock that would have helped to hold down rents.

This is a key source of confusion. Since most American households own their homes, the costs of homeownership are conflated with the costs of housing consumption. When and where homes could be built at reasonable rates so that rents would be capitalized into prices that closely tracked construction costs, this distinction was less important.

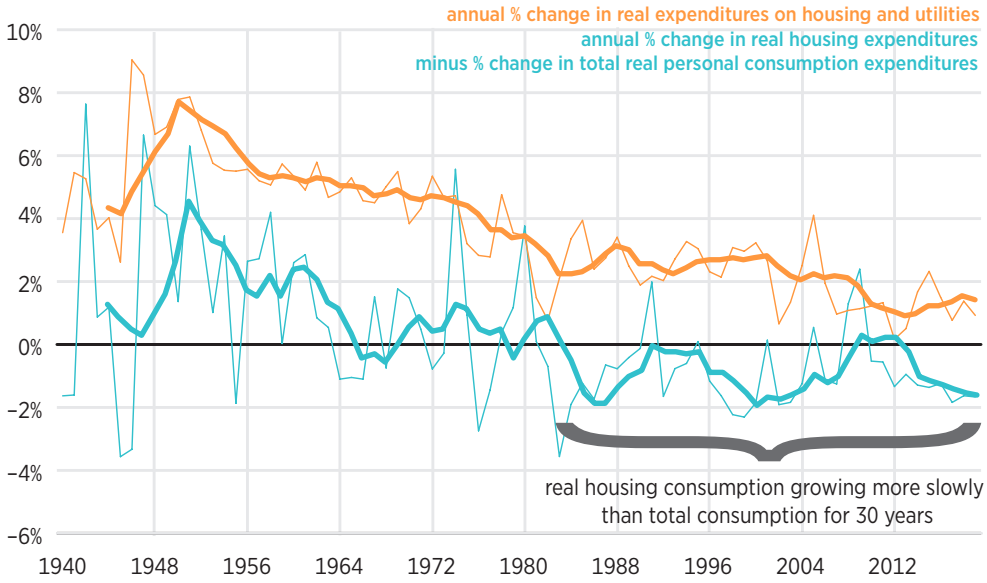
During the housing boom, the ratio of home prices to rents increased in many cities. Although these increases were taken as a sign of irrational buyer expectations, they were, in fact, highly correlated with the speed at which rents were rising. Closed-access cities saw faster rising rents, which became capitalized in the price of homes.

In other words, the price of a house is the present value of its rental values for all future periods, after owner expenses. In cities where rents are rising and are expected to continue to rise, owning a house is more like owning stock in a corporation in a new booming industry with a bright future. In other cities, owning a home is more like owning shares in a corporation with a high dividend but bleak growth prospects. Assets that are expected to have growing future net cash flows fetch higher prices.

Rent inflation on existing urban units forces households to downsize. Cash outlays for housing have risen along with incomes, but growth in real housing consumption (i.e., physical quantity) has been slow. Figure 8 shows that growth in real housing consumption peaked at nearly 8 percent during the Korean War and has trended lower for 60 years—down to only about 1 percent during the 2010s. Indeed, during the past 30 years, real housing consumption has actually grown at a slower pace than overall consumption, *even during the boom period of the early 2000s*. The so-called housing bubble was not a housing consumption bubble.

In cities where new housing could be amply supplied, rents were moderating. The American housing market before the crisis was a mixture of (mostly coastal) cities where real housing consumption was stagnant but rent inflation was high and (mostly interior) cities where real housing consumption was growing moderately and rent inflation was moderate. The net effect of these trends has been that, for 30 years, Americans have continued to spend about 15 percent

FIGURE 8. REAL HOUSING CONSUMPTION GROWTH




Note: The thick orange and blue lines represent five-year moving averages. Annual real housing consumption (the thin blue line) briefly grew faster than total consumption in 2005, but the five-year moving average (the thick blue line) didn't rise above the growth rate of total consumption until 2009 as a result of total consumption declining during the recession.

Source: Bureau of Economic Analysis, "National Data: National Income and Product Accounts," table 1.5.3, last updated March 26, 2020, https://www.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey. Data were retrieved using the "Housing and Utilities" category.

of total spending on housing, but the real value of that housing has been increasing at a slower pace than Americans' real income. This helps to explain the perception of stagnant living standards—many millennials in coastal areas live in smaller homes than their parents did.

## Misdiagnosis of Structural Changes as a Cyclical Housing Bubble

The most highly productive regions in the 21st-century American economy include many of the closed-access cities where supply is constrained, which has led to a steep rise in the cost of living as workers engage in a bidding war for limited housing. It has also led to an increase in segregation by economic class, as households with lower incomes are forced out of those cities by households that can outbid them for the limited supply of housing.

This is a key challenge of postindustrial economic growth. If the leading economic centers will not allow the real housing stock to increase at a rate equal to real income growth, then those cities will represent a declining portion of the national population. The rate at which their populations decline relative to the

rest of the country is mostly determined by policies that lead their residents to reduce their real consumption of shelter through compromises in size and amenities. During the housing boom, Americans were compromising less on size and amenities, putting more pressure on inadequate urban housing stocks. The total population of the closed-access metropolitan areas actually began to decline, even in absolute numbers, despite strong economies.

Researchers such as William Fischel at Dartmouth College,[21] Ed Glaeser at Harvard University,[22] Richard Florida of the University of Toronto,[23] and Enrico Moretti from the University of California, Berkeley[24] have been writing about the importance of key urban centers and housing for years. The impact of closed-access policies has been quantified by researchers such as Peter Ganong and Daniel Shoag, as well as Elisa Giannone, who have documented a new pattern of migration.[25]

Historically, migration to booming economic regions has led to a convergence of incomes. Today, skilled workers continue to migrate toward those highly productive areas, while less skilled workers have begun migrating toward less productive cities in order to reduce housing costs.

From this perspective, the 2000–2006 housing boom should not be viewed as a cyclical event, likely to revert back to "normal." Rather, it is part of a structural change in the US housing market. Much of the mortgage lending during the boom was facilitating the geographical reallocation of households as the relative cost of housing rose in closed-access cities. Rather than viewing the housing market as shifting from periods of irrational highs to rational lows, it is more useful to view the mid-2000s housing market as part of a process of migration that can move at faster or slower speeds.

By virtue of both their size and their extremely high home prices, the closed-access cities represented much of the unusual rise in real estate values. According to data from Zillow.com,[26] from 1998 to 2006, the value of residential real estate in closed-access metropolitan statistical areas (MSAs) increased from

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21. William A. Fischel, *Zoning Rules! The Economics of Land Use Regulation* (Cambridge, MA: Lincoln Institute of Land Policy, 2015).
22. Edward L. Glaeser, *Triumph of the City* (New York: Penguin, 2011).
23. Richard Florida, *The New Urban Crisis* (New York: Basic Books, 2017).
24. Enrico Moretti, *The New Geography of Jobs* (New York: Houghton Mifflin Harcourt, 2012).
25. Peter Ganong and Daniel Shoag, "Why Has Regional Income Convergence in the U.S. Declined?" (NBER Working Paper No. 23609, National Bureau of Economic Research, Cambridge, MA, July 2017); Elisa Giannone, "Skill-Biased Technical Change and Regional Convergence," *Society for Economic Dynamics Meeting Papers* 190 (2017).
26. These data were obtained via private e-mail correspondence dated April 12, 2016. The authors added the total market values of residential real estate in the Boston, Los Angeles, New York, San

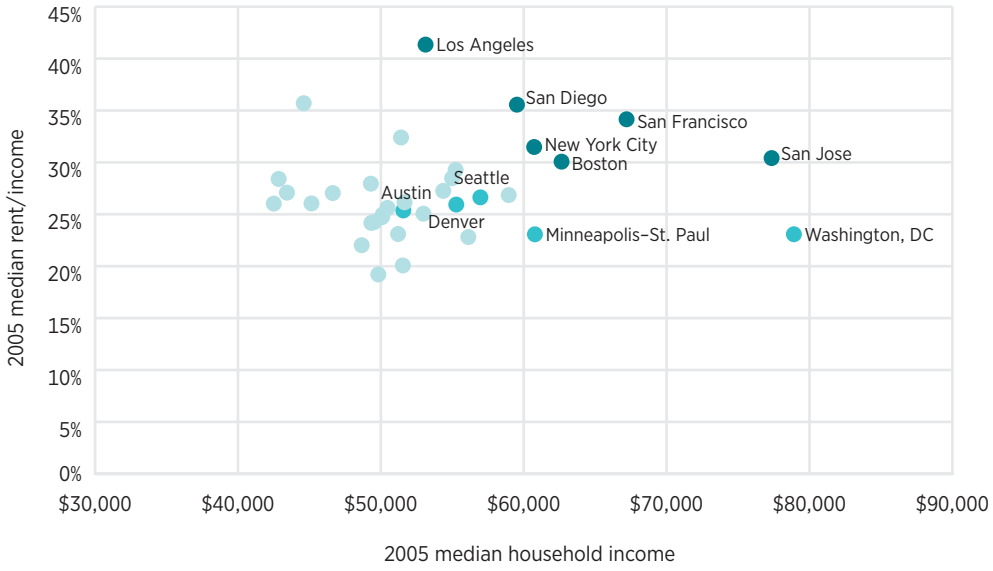
19 percent of the US total to 24 percent. It continues to represent more than 24 percent of the total.

But it was cities in Arizona, Nevada, inland California, and Florida that became the symbols of the bubble. Call those the "contagion" cities, which attracted migrants priced out of expensive coastal markets. Those were the cities where home prices shot up in spite of elastic supply and high building rates. Even in those cities, however, the surge in lending was merely a facilitating factor in this deeper story of population reallocation. The marginal new growth in the contagion cities at the height of the credit boom was from the closed-access cities, from households moving away from cities with greater economic potential but higher housing costs. The surge in housing demand that pushed the contagion cities into a price bubble was actually an increase in demand for a substitute for closed-access housing. The primary new source of demand was not irrational exuberance, though certainly in a market undergoing such rapid growth there will be property speculation. Rather, the primary source of demand was households looking to economize on housing consumption by moving out of the expensive coastal cities.

The severity of local housing supply constraints is intense. The closed-access cities are denoted in dark blue in figures 9 and 10, and it is apparent that they form distinct clusters. Figure 9 compares metropolitan area incomes with rent affordability. Before the mid-1990s, there was no systematic relationship between MSA median income and MSA median rent affordability. Where incomes and rents were high, more homes were built, pulling the ratios back down to normal levels. But by 2005, a handful of cities had become outliers, as seen in the upper right quadrant of figure 9. This is a peculiar development. Households with higher incomes usually spend less of their income on rent than other households. Today, rents in these cities (shown in dark blue) haven't just scaled with unusually high MSA median incomes. Rather, rents are taking a higher *portion* of incomes, even though incomes are higher. Contrast the closed-access cities with Washington, Minneapolis–St. Paul, Seattle, Denver, and Austin (shown in medium blue). All of those cities have been booming. If rents in those cities had been extremely high in 2005, they could have blamed those high rents on high demand. But in those cities, rents as a portion of incomes remained in line with norms.

Diego, and San Francisco metropolitan areas and divided that sum by the estimated total market value of residential real estate in the United States.

FIGURE 9. INCOME AND RENT AFFORDABILITY IN 35 LARGEST METROPOLITAN STATISTICAL AREAS




Note: Dark blue dots denote closed-access cities. Medium blue dots denote cities with strong income growth and more liberal residential construction policies than the closed-access cities.

Source: Zillow, "Median Household Income" and "Rent Affordability" (datasets), downloaded Q1 2019, https://www.zillow.com/research/data/.

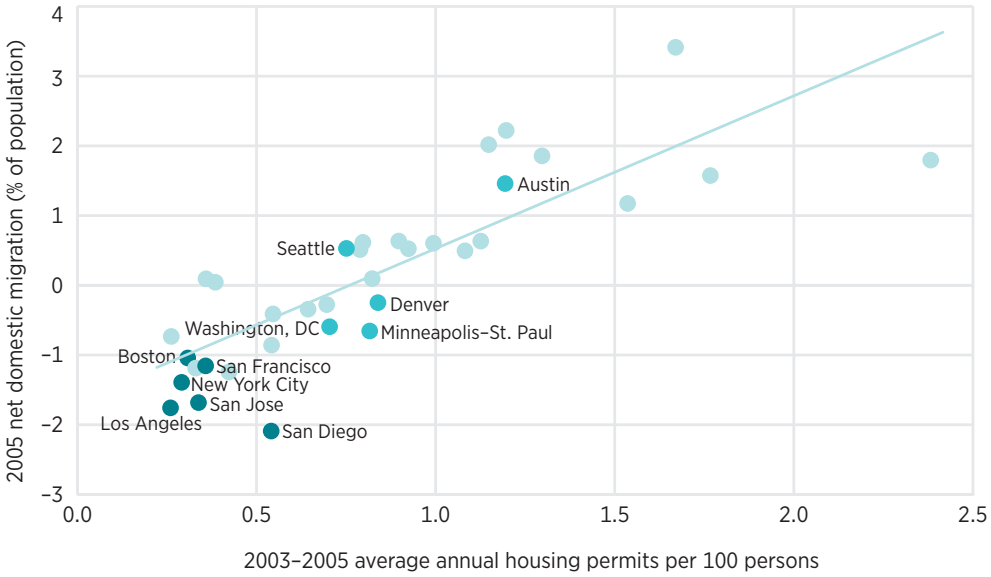
Figure 10 explains this process. The closed-access cities are outliers, first and foremost, in terms of very low rates of homebuilding. Because of that, they are also outliers in terms of domestic outmigration. The relationship between migration and rates of homebuilding is very strong. Low building rates led to a bidding war for existing units, which forced poorer households to move away, so those cities slowly became enclaves for households with higher incomes.

It is true that prices spiked somewhat in many cities in 2005, including in cities such as Seattle and Washington, DC. In those cities, some constraints on new construction exist, but they are less severe than in closed-access cities. Of all the cities highlighted here, there is one where prices didn't spike at all. That city, Austin, also happens to be the only place where new homes were permitted at a rate of more than one per hundred residents during the boom.

## Alternative Views of the Housing Bubble

At its peak, the population shift out of the closed-access cities became strong enough to briefly destabilize the housing markets in contagion cities. For

FIGURE 10. HOUSING PERMITS AND DOMESTIC MIGRATION IN 35 LARGEST METROPOLITAN STATISTICAL AREAS




Note: Dark blue dots denote closed-access cities. Medium blue dots denote cities with strong income growth and more liberal residential construction policies than the closed-access cities.

Source: US Census Bureau, American Community Survey, "ACS Migration/Geographic Mobility Data Tables," accessed June 10, 2020, https://www.census.gov/topics/population/migration/data/tables/acs.html; US Census Bureau, "Building Permits Survey," accessed February 2016, https://www.census.gov/construction/bps/msamonthly.html; Bureau of Economic Analysis, "Personal Income, Population, Per Capital Personal Income (CAINC1)," accessed February 2016, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1.

instance, according to IRS data,[27] the number of residents that moved annually from Los Angeles to Phoenix nearly tripled between 2002 and 2005, from about 7,500 to about 19,600.

According to American Community Survey data,[28] the closed-access cities are also outliers in terms of the tendency of outmigrants to have low incomes. It is typical for the closed-access cities to lose about 1 percent of households with

27. Internal Revenue Service, "SOI Tax Stats - Migration Data," last updated January 3, 2020, https://www.irs.gov/statistics/soi-tax-stats-migration-data.

28. These data were compiled from American Community Survey (ACS) microdata on the average household income of respondent households, comparing income of households that moved away from a metropolitan area during the year to the average income for all respondents in a metropolitan area. ACS data also identify a household's tenure (renter, owner with mortgage, or owner without a mortgage). Metropolitan areas were subdivided into income quintiles, and using ACS microdata, we compiled the total number of respondents who moved into or out of a metropolitan area within each income quintile and tenure category. We thank Michael Kelley for compiling the ACS data.

lower incomes—typically renters—each year. There was a spike in that outmigration during the boom.

During the peak boom years, there was also a spike in outmigration from the closed-access cities among homeowners, who frequently captured windfall profits by selling their homes and moving to the contagion cities. The influx of capital and people briefly created a bubble-type market in the contagion cities.

Eventually, those frothy markets attracted speculative activity and increased lending. But Fernando Ferreira and Joseph Gyourko found that lending was a lagging factor in frothy markets.[29] In fact, the New York Federal Reserve Bank's *Household Debt and Credit Report* indicates no unusual rise in debt—relative to the national average—in New York and New Jersey during the boom, even though home prices in those states spiked. Even in Arizona, per capita debt didn't start to outpace the rise of per capita debt in the rest of the country until the fourth quarter of 2005, when home prices were already near their peaks.[30]

This phenomenon underlies the perception that credit markets were creating financial instability. Credit did contribute to the boom conditions, both by allowing closed-access home prices to be bid up to levels that induced outmigration of existing homeowners and by funding new homeowners and speculators in the cities where migration spikes caused local price bubbles. Yet credit markets only became destabilizing as a result of the local supply shortages and the migration surges that developed as a result. Markets such as Austin, Texas, didn't avoid bubble prices because they lacked potential speculators and lenders willing to serve them. Rather, they avoided the bubble because they had ample new construction and were less exposed to a sudden increase in population flows from the coasts.

Some observers missed the role of rising rents driven by supply constraints and blamed other factors for the crisis. The Financial Crisis Inquiry Commission (FCIC) summarized the causes of the financial crisis: "While the vulnerabilities that created the potential for crisis were years in the making, it was the collapse of the housing bubble—fueled by low interest rates, easy and available credit, scant regulation, and toxic mortgages—that was the spark that ignited a string of events, which led to a full-blown crisis in the fall of 2008."[31] Unfortunately, in

29. Fernando Ferreira and Joseph Gyourko, "Anatomy of the Beginning of the Housing Boom: U.S. Neighborhoods and Metropolitan Areas, 1993–2009" (NBER Working Paper No. 17374, National Bureau of Economic Research, Cambridge, MA, August 2011).
30. Federal Reserve Bank of New York, *Household Debt and Credit Report (Q4 2019)*, 2019, Table 32: Total Debt Balance per Capita by State.
31. Financial Crisis Inquiry Commission, *The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*, January 2011, xvi.

more than 400 pages of exposition on the causes of the financial crisis, including two dissenting views, the FCIC spent only one paragraph discussing the issue of rent. The commission wrote, "Home prices had risen from 20 times the annual cost of renting to 25 times. In some cities, the change was particularly dramatic. From 1997 to 2006, the ratio of house prices to rents rose in Los Angeles, Miami, and New York City by 147%, 121%, and 98%, respectively."[32] This appears to suggest that prices were rising at unreasonable rates, and thus the topic of rising rents was dismissed as a causal factor. The commission went on to describe the crisis as a cyclical bubble. Yet the primary factor driving up prices in closed-access cities was, in fact, rising rents.[33]

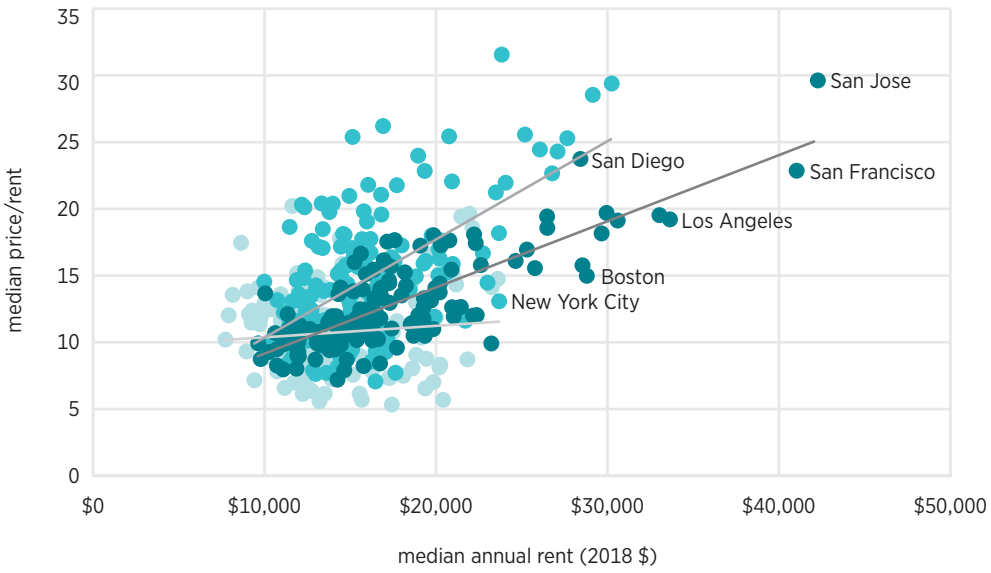
Figure 11 compares the median rental value and the price-to-rent ratio in the 150 largest MSAs at three points in time: 1991, before the urban supply crisis became dominant (light blu dots); 2007, near the peak of the boom (medium blue dots); and 2018 (dark blue dots). Since the 1990s, the closed-access cities have become outliers in terms of home prices, but the reason they are outliers in terms of price is *because* they are outliers in terms of rent.

At all three points in time, median price-to-rent ratios in the average city with affordable rents remained at a ratio of roughly 10 to 1. These are the dots on the left side in figure 11, for all three periods. In 1991, there was less variance in rental costs between cities, and price-to-rent ratios were fairly similar in all cities (light blue dots). This is because differences in rent were owing to either different amenities in different cities or temporary changes in local economic activity that would moderate as labor and capital moved in to compete for those opportunities. Rents, where they were relatively high, were not expected to continue

32. Financial Crisis Inquiry Commission, *Financial Crisis Inquiry Report*.

33. A body of research focused on the cause of those rising rents. See Edward L. Glaeser, Joseph Gyourko, and Raven E. Saks, "Why Have Housing Prices Gone Up?," *American Economic Review* 95, no. 2 (2005): 329–33. For an attempt at developing a measure of land use regulatory restrictions, see Joseph Gyourko, Albert Saiz, and Anita A. Summers, "A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index" (Wharton Working Paper No. 558, Wharton Financial Institutions Center, University of Pennsylvania, 2006). The fact that the closed-access metropolitan areas collectively issued housing permits at less than half the national average while costs there soared is a clear sign of a supply constraint. Most measures of regulatory barriers rate these cities as highly regulated, and simple observation of the political machinations in those markets confirms that. For our purposes, though, the cause of rising urban rents is not particularly important. Researchers on the sources of rising urban rents are motivated by the shared premise that urban rents are a significant problem whose source needs to be identified. Researchers on the causes of the financial crisis have generally shared the premise, explicitly or implicitly, that rising urban rents were unimportant. Regardless of the details of the cause, rising rents have been a significant underlying factor in macroeconomic trends in spending, home prices, borrowing, and inflation. Research on macroeconomic and monetary policy needs to take this into account.

FIGURE 11. MEDIAN RENTAL VALUE AND PRICE-TO-RENT RATIO IN 1991, 2007, AND 2018




Note: Light blue dots represent 1991. Medium blue dots represent 2007. Dark bue dots represent 2018. The regression equations are as follows: In 1991, y = 0.0001x + 9.6, $R^2$ = 0.01. In 2007, y = 0.0007x + 3.2, $R^2$ = 0.36. In 2018, y = 0.0005x + 4.2, $R^2$ = 0.64.

Source: Authors' calculations based on data from Zillow Research, "Mortgage Affordability, Rent Affordability, and Price-to-Income Ratio" and "Median Household Income" (datasets), accessed August 18, 2018, https://web.archive.org/web/20180816122514/https:/www.zillow.com/research/data/, under "More Metrics" heading.

to rise faster than inflation. As a result, there was no significant relationship between rent and price-to-rent ratios in 1991.

By 2007, some cities were becoming outliers in terms of rental cost. The most expensive places were the closed-access cities, which allow very little new building compared to other cities. Their regulations prevent an inflow of capital and labor that would normally tend to equalize costs. By 2007, price-to-rent ratios were becoming positively correlated with housing costs (medium blue dots in figure 11), with one-third of the difference in this ratio explained by rents. Long-term real interest rates had declined to relatively low levels, which increased the value of those future expected rents, and this likely caused the slope of the relationship between rents and price-to-rent ratios to rise even more.

So the FCIC had dismissed the factor that was, in fact, the core source of high housing costs—fast-rising rents—and policymakers instead focused on pushing down home prices by clamping down on lending.

The results of these policy choices are clear in the 2018 data (dark blue dots in figure 11). Because little has been done to create more housing supply in the closed-access cities, rents have continued to rise rapidly, and the dots have

moved to the right. In addition, home prices have been depressed by tightened credit regulations. The slope of the relationship has actually declined from 2007, in spite of the fact that long-term real interest rates are even lower than they were in 2007. Nonetheless, rent is an even more important factor now, accounting for two-thirds of the difference in price-to-rent ratios between cities.

The negative wealth shock to the US housing market over the past decade (the downward move in price-to-rent ratios) has generally been viewed as an inevitable relapse after a decade of homes being overpriced owing to loose monetary policy and lending. This has led to a series of highly costly errors of interpretation. The evidence suggests the following:

- Monetary policy wasn't responsible for the high prices.
- The negative wealth shock was counterproductive, failing to address the root cause of high housing costs.
- The depth of the housing bust in 2012 no longer looks like a return to equilibrium, but rather a market artificially depressed by a contractionary monetary policy and a procyclical set of credit regulations.

The lack of attention paid to rising rents and migration as triggers for rising home prices made the event appear to be a Minsky-style boom and bust. If prices were simply figments of greed and fear rather than reflections of supply problems, then what else could rising mortgage debt reflect other than late-cycle excesses? The idea that rising prices were the result of irrational demand became widespread. In the *Washington Post*'s series of "worst ideas of the decade," economics reporter Greg Ip wrote, "Countless delusions and mistakes brought on our financial crisis, but none did as much damage as the belief that home prices never go down. . . . At the start of this decade, this belief became the lynchpin of an entire investment philosophy."[34]

The idea that that belief was the pivotal problem pushing up prices led to the general sense that a collapse in prices that would undermine that belief must be part of the solution. At the September 2007 Federal Open Market Committee (FOMC) meeting, when the Fed agreed to lower interest rates for the first time in the cycle, moral hazard was mentioned 25 times. At one point, FOMC Vice Chair Donald Kohn felt it necessary to warn his colleagues, "We shouldn't hold interest rates higher than they need to be in order to impose additional cost on

34. Greg Ip, "The Worst Ideas of the Decade: Housing Prices Always Rise," *Washington Post*, 2020, https://www.washingtonpost.com/wp-srv/special/opinions/outlook/worst-ideas/housing-bubble.html.

borrowers to teach lenders a lesson. Too many innocent bystanders would be hurt in that process."[35]

There were several schools of thought explaining the housing boom. Some researchers, such as Yale finance professor Robert Shiller, echoed the sentiment of the *Washington Post*, focusing on irrational buyer sentiment.[36] Others, like economist John Taylor, FOMC board member Richard Fisher, and the *Wall Street Journal* editorial board focused on monetary policy directly, blaming it for low interest rates that induced overinvestment and speculation.[37] Fed Chair Ben Bernanke agreed that low interest rates were a key factor but attributed these low rates to an inflow of foreign savings, not inappropriate Fed policy.[38] The FCIC focused on lax lending regulations, some of which were the responsibility of the Fed.

The debate between these experts is less important than their shared premises. They all agree that high housing prices reflected unsustainable excesses. That view implies a need for the housing industry to contract, whether through the tool of an increased Fed funds target rate, tightened regulatory oversight of lenders, or some other factor.

For instance, even though Bernanke has disagreed with Taylor and Fisher about the direct role of monetary policy in creating a housing bubble, at the March 2006 FOMC meeting he said,

> I see the economy as still being basically quite strong, and it needs to moderate to become consistent with its long-run potential. The vehicle by which that is going to happen is the slowing in the housing market. I think we ought to raise the rate today and not to signal an immediate end for several reasons. First, we could think of our policy in terms of the mortgage rate rather than the funds rate. The mortgage rate is currently about the same as it was when we began tightening in June 2004, and it is still providing support to the housing market. If we failed to act today or signaled that we are definitely done, we would create a rally in the long-term bond market and in the mortgage market. We

35. FOMC, "Meeting of the Federal Open Market Committee on September 18, 2007" (transcript, Federal Reserve Board of Governors, Washington, DC, September 18, 2007), 111, https://www.federalreserve.gov/monetarypolicy/files/FOMC20070918meeting.pdf.
36. Robert J. Schiller, *Irrational Exuberance*, 2nd ed. (Princeton, NJ: Princeton University Press, 2009).
37. Taylor, "Housing and Monetary Policy;" Richard W. Fisher, "Responding to Turbulence (With Reference to Bob Dylan, Alan Brooke, Washington Irving, Anna Fisher, and Marcus Nadler)" (remarks before the Money Marketers of New York University, Dallas Federal Reserve Bank, September 25, 2008); "Bernanke's Bear Market," *Wall Street Journal*, August 6, 2007.
38. Bernanke, "The Taylor Rule."

> would create, I think, some risk of re-igniting what is currently a cooling market. I think that would be a mistake.[39]

So Bernanke believed that a tighter monetary policy was appropriate and that this policy would be transmitted through declining residential investment. In fact, it is not clear that there was excessive residential investment that needed to be corrected.

Most of the toxic assets and defaulted mortgages originated in 2006 and 2007—largely after the March 2006 FOMC meeting and after residential investment began to collapse.[40] The shared presumptions of these schools of thought is very clear in the many popular accounts of the period. The documentary *Inside Job* and the popular film *The Big Short* focus on ill-advised activities in 2006 and 2007 that ultimately became destabilizing. But the connection between those activities and the rising home prices in the years leading up to 2005 is merely asserted, without any real evidence being provided.

The debate about the relationship between mortgage lending and the housing bubble has coalesced around two important schools of thought. Some researchers emphasize the role of excessive lending, especially to lower-income borrowers. Atif Mian and Amir Sufi outline this view in their 2016 paper, "Household Debt and Defaults from 2000 to 2010: The Credit Supply View."[41]

Other researchers have developed an alternative framework, including Adelino, Shoar, and Severino;[42] Albanesi, De Giorgi, and Nosal;[43] and Foote,

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39. FOMC, "Meeting of the Federal Open Market Committee on March 27–28, 2006" (transcript, Federal Reserve Board of Governors, Washington, DC, March 27–28, 2006), 139, https://www.federalreserve.gov/monetarypolicy/files/FOMC20060328meeting.pdf.
40. Gene Amromin and Anna Paulson, "Default Rates on Prime and Subprime Mortgages: Differences and Similarities," *Federal Reserve Bank of Chicago*, September 2010, figures 1A and 1B. Also see Fannie Mae, *2015 Credit Supplement*, February 19, 2016, 18, https://www.fanniemae.com/resources/file/ir/pdf/quarterly-annual-results/2015/q42015_credit_summary.pdf. The Fannie Mae defaults were much higher for 2006 and 2007, and to a lesser extent for 2008, than for other years. Additionally, note that the default rates for the 2004 and 2005 cohorts were relatively low for the first four or five years and then accelerated after 2008.
41. Atif R. Mian and Amir Sufi, "Household Debt and Defaults from 2000 to 2010: The Credit Supply View" (Kreisman Working Papers Series in Housing and Law Policy No. 28, University of Chicago Law School, June 17, 2016).
42. Manuel Adelino, Antoinette Schoar, and Felipe Severino, "Loan Originations and Defaults in the Mortgage Crisis: The Role of the Middle Class" (Tuck School of Business Working Paper No. 2546427, Hanover, NH, March 2016).
43. Stefania Albanesi, Giacomo De Giorgi, and Jaromir Nosal, "Credit Growth and the Financial Crisis: A New Narrative" (NBER Working Paper No. 23740, National Bureau of Economic Research, Cambridge, MA, August 2017).

Loewenstein, and Willen,[44] who dispute the Mian and Sufi claim of excess mortgage credit supply. They found no shift in homeownership or borrowing by less qualified households in the years leading up to the financial crisis. Rather, marginal new homeownership was skewing toward households with college degrees and high or rising incomes.

In spite of their differences, there is a tacit agreement between the two groups that the housing boom was unsustainable and the bust was inevitable. This premise is wrong. Both groups missed the permanence of rising rents and the migration they triggered from closed access to contagion housing markets.

In most of the country, excesses of lending, borrowing, or speculating didn't lead to unprecedented price spikes. Where housing supply was more elastic, the subsequent collapse of housing starts and prices where prices hadn't spiked has generally been attributed to an oversupply of new homes. This is implausible. Whereas the bubble was regional, the collapse has been almost universal—from depressed Detroit to booming Seattle.

The common factors that connect all of those cities during the housing slump are contractionary monetary policy and tightened lending regulations, not excess housing supply. The cities that were growing during the 2000s did not have the sort of oversupply of housing that could have led to years of excess supply to work off. The explanation that has been applied to the housing collapse in every city doesn't apply well to any of them.

The specific factors cited in the FCIC report became destabilizing only *as a result* of an unprecedented collapse of the housing market and the broader economy. Regional constraints on housing construction had pushed up rents, and these rising rents were followed by monetary policy errors and procyclical regulatory changes. Whereas the conventional narrative sees the housing price increases as unwarranted and the crash as inevitable, we would argue that the price increases mostly reflected fundamentals. Thus, the housing crash was not inevitable, but rather largely owing to policy errors.

A staff report from the Federal Reserve Bank of New York, *The Supply Side of the Housing Boom and Bust of the 2000s* by Andrew Haughwout et al., provides an example of how assumptions about a housing bubble led researchers astray. In the paper's literature review, the authors note, "While an elastic supply of housing can limit the price rise associated with a temporary period of irrational exuberance in demand, given the durability of housing the larger supply response during

44. Christopher L. Foote, Lara Loewenstein, and Paul S. Willen, "Cross-Sectional Patterns of Mortgage Debt during the Housing Boom: Evidence and Implications" (NBER Working Paper No. 22985, National Bureau of Economic Research, Cambridge, MA, December 2016).

the boom means that prices may fall below their pre-boom levels once demand again reflects fundamental factors."[45] That quotation has the following footnote:

> The tendency for house prices to "overshoot" on the down side will be magnified if lending standards are significantly tightened during the bust phase of the housing cycle and to the extent that the bursting of the housing bubble weakens fundamental housing demand due to higher rates of unemployment.

Procyclical credit tightening and excessively tight money will lead to overshooting to the downside, regardless of whether there is a bubble or not. Overshooting to the downside cannot, by itself, confirm whether the contraction was owing to previous overbuilding or procyclical tightening. In order to make that determination, we must look closely at housing supply and at trends in lending.

The introduction of the NY Fed study states, "While it is now clear that too much housing was built in the United States in the boom phase, identifying how much and where overbuilding occurred remain important issues."[46] While the assumption of untenable overbuilding is widely held by researchers, there is actually little evidence to support this claim.

The authors use state-level data that show that, for a given amount of population growth, almost all states built more homes from 2000 to 2005 than they had from 1990 to 2000.[47] But, as shown in figures 6, 7, and 8 above, and as further noted by Kevin Erdmann previously, the 1990s was an especially low point in housing production in practically every sense: new units relative to population growth, real housing expenditures, residential investment, the number of housing units per capita or per adult, or total housing starts and shipments. Haughwout et al. argue that there are demographic reasons to expect housing production to have slowed since the 1970s and 1980s. But housing production in the 1990s was likely unsustainably low.[48] As argued above, units per capita, rent inflation, real spending growth on housing, and other measures all suggest that the rate of housing production was not unusually high during the 2000s.[49]

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45. Andrew Haughwout et al., "The Supply Side of the Housing Boom and Bust of the 2000s" (Staff Report No. 556, Federal Reserve Bank of New York, March 2012), 4.
46. Haughwout et al., "Supply Side of the Housing Boom and Bust," 1.
47. Haughwout et al., figure 11.
48. See figure 1 in Erdmann, "Housing Was Undersupplied." While the number of housing units per adult increased moderately from 2000 to 2008, it had been higher in the late 1980s and early 1990s.
49. See figures 6 and 8, above. For rent inflation, see the CPI shelter component compared with core CPI inflation. Shelter inflation, rent inflation, and owners' equivalent rent inflation have all routinely

Haughwout et al. estimate that over the long term, about 1.4 million annual housing starts is the rate necessary to replace torn-down units and supply new households. But the housing stock is also affected by shipments of manufactured homes, which aren't included in the housing starts measure, and by the rate of teardowns, which is very difficult to track.

The authors used both their 1.4-million-unit estimate and the Census Bureau's estimate of rising vacancies to estimate oversupply. Both measures pointed to an oversupply of about 3 million units. However, their estimate of cumulative housing starts had nearly reached its peak before vacancies began their largest move up. Cumulative housing starts peaked in 2007 while vacancies didn't peak until 2010.[50]

There was a marked decline in household formation beginning in 2006. Haughwout et al. suggest that by 2012, "Due to the weakness of the economy, the rate of household formations has fallen well below trend. Thus, while from a pure production standpoint we no longer have an excess supply, vacancy rates remain above their longer run equilibrium values."[51] But if weakness in the economy explains vacancies in 2012, Haughwout et al.'s estimate of overbuilding based on vacancies in 2010 is also called into question.

From 2000 to 2003, vacancies had risen by about one million units. Those units were generally rental units in the Midwest and South, where there weren't building booms. After 2005, the decline in household formations was entirely among homeowners, and the additional two million vacant units were, on net, almost all owned units.

Households increasingly found it difficult to purchase homes, so there were fewer households, fewer new homes, fewer homeowners, and a spike in vacancies. Household formation is, itself, strongly impacted by the state of the housing market.

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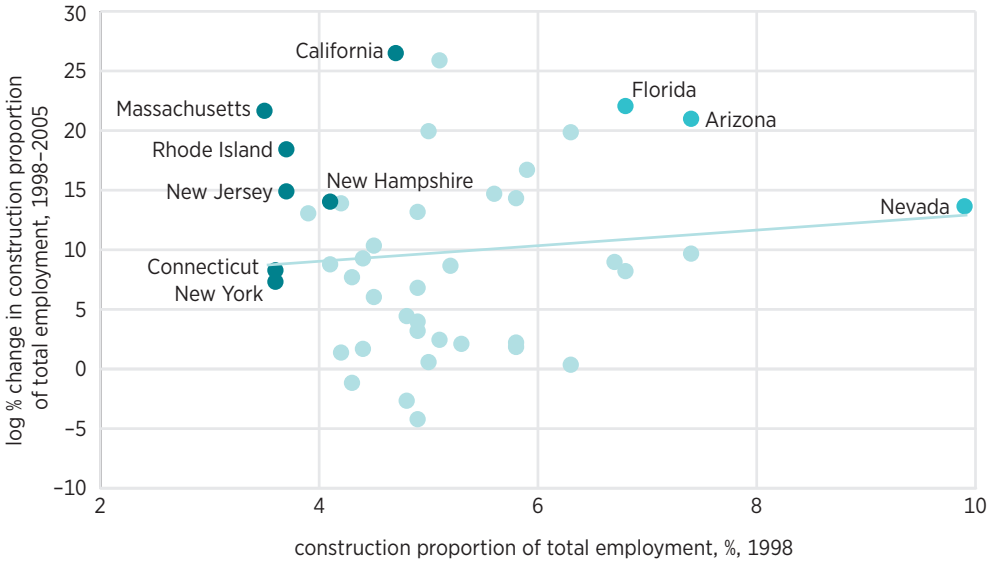
been higher than core CPI inflation since 1995. See Federal Reserve Bank of St. Louis, FRED Economic Data, "Consumer Price Index for All Urban Consumers: Shelter in U.S. City Average" (dataset), last updated June 10, 2020, https://fred.stlouisfed.org/series/CUSR0000SAH1; Federal Reserve Bank of St. Louis, FRED Economic Data, "Consumer Price Index for All Urban Consumers: Rent of Primary Residence in U.S. City Average" (dataset), last updated June 10, 2020, https://fred.stlouisfed.org/series/CUUR0000SEHA; Federal Reserve Bank of St. Louis, FRED Economic Data, "Consumer Price Index for All Urban Consumers: Owners' Equivalent Rent of Residences in U.S. City Average" (dataset), last updated June 10, 2020, https://fred.stlouisfed.org/series/CUSR0000SEHC; FRED Economic Data, "Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average" (dataset), last updated June 10, 2020, https://fred.stlouisfed.org/series/CPILFESL. See also Erdmann, *Shut Out*.

50. Haughwout et al., figures 7 and 8.

51. Haughwout et al., 7–8.

FIGURE 12. LONG-TERM GROWTH (CONSTRUCTION EMPLOYMENT, 1998) VS. BUBBLE GROWTH (CONSTRUCTION EMPLOYMENT, 1998 VS. 2005)




Note: Dark blue dots represent states associated with closed-access cities. Medium blue dots represent states associated with contagion markets.

Sources: Authors' calculations based on data from Bureau of Labor Statistics, "Employment, Hours, and Earnings - State and Metro Area," accessed September 16, 2018, https://www.bls.gov/data/#employment; Bureau of Labor Statistics, "Local Area Unemployment Statistics," accessed June 25, 2020, https://www.bls.gov/lau/.

We argue that a more judicious conclusion from this evidence is that the first million units of vacancies before 2006 resulted from temporary migratory shifts, and many of the two million vacancies that followed were the result of a weakening economy and tightening lending standards, not previous overbuilding. By late 2007, a large quantity of vacancies resulted from a negative demand shock in housing, but most researchers continue to attribute those vacancies to a positive housing supply shock. For example, an investor presentation from Freddie Mac published in November 2019 used a vacancy estimate of oversupply that continued to reflect similar conclusions to those of Haughwout et al.[52] That misconception likely contributed to subsequent monetary policy errors.

State-level vacancy data provide insight into these questions. In figure 12, we use two independent variables as estimates of building activity for each of 43 states for which there is data. The first variable is the percentage of the state's employees who worked in the construction sector in 1998, before the rise of the

52. *Freddie Mac Investor Presentation*, November 2019. "Vacant Housing Over/Undersupply" figure, 18, http://www.freddiemac.com/investors/pdf/investor-presentation.pdf.

housing boom. The second variable is the relative change in the percentage of the state's employees in the construction sector between 1998 and 2005.[53] As figure 12 shows, these measures are not correlated. States associated with closed-access markets are shown in dark blue, and states associated with contagion markets are shown in medium blue. Fast-rising prices during 1998–2005 were strongly correlated with rising construction during the boom time and were not correlated with 1998 construction activity. Both closed-access and contagion regions experienced both rising prices and rising construction activity. The difference is that the closed-access regions have inelastic long-term housing supply, which here is evident in the low baseline level of construction employment, and the contagion regions have more elastic long-term housing supply.

Did rising construction reflect an increase in real demand—rising incomes, migration, etc.—that created a price bubble because there was not enough housing supply? Or did rising construction reflect an increase in unsustainable borrowing and speculation that created an oversupply of housing, as asserted by Haughwout et al. and most other researchers?

Table 1 shows the results of regressions using the same two independent variables as shown in figure 12. The first column shows the correlation between rental vacancies in 2005 and construction employment. There is little correlation between construction levels in 1998 and rental vacancies in 2005, but there is meaningful and negative correlation between increased construction activity during the boom and rental vacancies in 2005. Where construction employment increased, vacancy rates were lower. In states where construction employment hadn't increased at all, rental vacancies were likely to be about 12 percent. Where construction employment had increased by 20 percent from 1998 to 2005, rental vacancies were likely to be about 8 percent. Excess building wasn't creating vacancies. Rather, new building was responding to a demand for new units.

The second column shows the correlation between construction employment and rental vacancies in 2009, after the crisis. The correlation between vacancies and increased boom-era construction employment *remained negative*. Even as late as 2009, states where building had increased had lower rates of vacancy than states where building had not increased. But now, in 2009, there was a *positive* correlation between rental vacancies and the level of construction employment in 1998. The rise in vacancies was owing to an adverse demand

53. The measure is the log percent change in the portion of employees working in construction. For instance, an increase from 4 percent to 4.4 percent would be measured as about 10 percent.

TABLE 1. STATE CONSTRUCTION EMPLOYMENT AND STATE RENTAL VACANCIES

| | Correlation between rental vacancies in 2005 and construction employment before crisis | Correlation between rental vacancies in 2009 and construction employment before crisis | Correlation between the rise in unemployment rate, 2007–2010, and construction unemployment before crisis | Correlation between change in construction unemployment after crisis, 2005–2017, and construction employment before crisis | Mean | Standard Deviation |
|---|---|---|---|---|---|---|
| Change in construction employment, 1998–2005 | −0.217 | −0.122 | 0.007 | −0.295 | 9.8 | 7.8 |
| *p* value | 0.00015 | 0.03825 | 0.80633 | 0.15725 | | |
| Construction percentage of employment in 1998 | 0.163 | 1.115 | 0.627 | −6.302 | 5.1 | 1.3 |
| *p* value | 0.61301 | 0.00301 | 0.00118 | 0.00001 | | |

Note: The dependent variables are the 2005 rental vacancy rate, the 2009 rental vacancy rate, the change in the unemployment rate from 2007 to 2010, and the change in construction employment from 2005 to 2017. See footnote 53 for an explanation of the mean and standard deviation values for the change in construction employment.

Sources: Authors' calculations based on data from Census Bureau, "Housing Vacancies and Homeownership," table 1, "Rental Vacancy Rates by State: 2005–Present," accessed February 27, 2020, https://www.census.gov/housing/hvs/data/rates.html; Bureau of Labor Statistics, "Employment, Hours, and Earnings - State and Metro Area," accessed September 16, 2018, https://www.bls.gov/data/#employment; Bureau of Labor Statistics, "Local Area Unemployment Statistics," accessed June 25, 2020, https://www.bls.gov/lau/.

shock in places with robust construction in 1998, not an oversupply of homes during the housing boom.[54]

The third column shows the correlation between construction employment and the rise in the unemployment rate from 2007 to 2010 There is very little correlation between rising unemployment from 2007 to 2010 and boom-era increases in construction, but there is meaningful and positive correlation between rising unemployment from 2007 to 2010 and the 1998 level of construction employment. For each additional 1 percent of employees who worked in construction in 1998, a state was likely to experience an additional 0.6 percent rise in unemployment after 2007.

The fourth column shows the correlation between construction employment before the crisis and the change in construction employment after the

54. As a general rule, vacancy rates for owned homes are much lower than for rented units, but correlations of vacancies of owned homes with construction employment show some patterns similar to those of vacancy rates for rented units. The coefficients (and *p* values) for 2005 vacancies of owned homes are −0.047 (0.00002) for boom-era construction employment and 0.122 (0.051) for preexisting 1998 construction employment. For 2009 vacancies, they are −0.014 (0.321) for boom-era construction employment and 0.304 (0.0008) for preexisting 1998 construction employment.

crisis, here using the change from 2005 to 2017. If the bust were a reversal of a bubble, the correlation with the change in construction from 1998 to 2005 would have been significant and negative.

There is a weak negative correlation between the change in construction employment from 1998 to 2005 and the change in construction employment from 2005 to 2017. However, there is a strong negative correlation between the 1998 level of construction employment and the 2005–2017 change in construction employment. If a state had high construction employment in 1998, it was likely to suffer large declines in construction employment during 2005–2017. That suggests that the bust was owing to a demand shock that affected long-standing patterns of building and migration. We will discuss the character of that collapse in more detail in the sections below.

The view that the housing crash was the inevitable result of a speculative bubble led to a misdiagnosis of the cyclical downturn that began in late 2007. In 2008, policymakers missed the importance of a slowdown in aggregate demand, and thus they overlooked the need for a more expansionary monetary policy. The Fed was under pressure to "take away the punch bowl," to discipline the market. The recession was seen not as a failure of monetary policy, but as the inevitable result of a housing bubble that had to burst.

Richard Fisher of the Dallas Fed was one of the voting members on the FOMC who were proponents of the credit-fueled premise. After the initial panic in August 2007, he said, "I'm very concerned that we're leaning the tiller too far to the side to compensate risk-takers when we should be disciplining them."[55]

Many people, including Fisher, continued to maintain this view throughout the crisis. A year later, *after* the Lehman failure and the ensuing chaos, Fisher said, "I was and I remain skeptical that lowering the Fed funds rate is the most effective antidote for such a pathology, given that, in my book, rates held too low, too long during the previous Fed regime were an accomplice to that reckless behavior."[56]

Unfortunately, the economic instability created by erratic monetary and regulatory policies led to a major recession without doing anything to address the fundamental problems with the housing market.

While the imposition of procyclical credit regulations and contractionary monetary policy after 2007 were the fundamental causes of the recession, during much of the slump, the primary complaints lodged against the Treasury and the Fed were that policy was too accommodative. The memoirs of Ben Bernanke and

55. FOMC, "Meeting of the Federal Open Market Committee on September 18, 2007."
56. Fisher, "Responding to Turbulence."

Timothy Geithner can be seen as a defense of attempts to support the economy against critics that claimed they did too much.[57] Thus, we need to consider the role of monetary policy in more detail.

## Housing, Consumption, and Monetary Policy

The housing boom of the early 2000s was widely seen as contributing to excessive levels of consumption. Atif Mian and Amir Sufi find that "the entire effect of housing wealth on spending is through borrowing, and, under certain assumptions, this spending represents 0.8% of GDP in 2004 and 1.3% of GDP in 2005 and 2006. Households that borrow and spend out of housing gains between 2002 and 2006 experience significantly lower income and spending growth after 2006."[58] They document how this spending came mainly from credit- and income-constrained households, for whom home equity provided a temporary method to boost current consumption.

The view that housing-related borrowing fueled consumption that was destabilizing seems to have been at least implicitly based on the assumption that these homeowners' capital gains were temporary. But the capital gains in the closed-access cities were based on increases in rents that have persisted. As long as those cities maintain their current restrictive housing policies, it is not obvious why real housing prices would revert back to the lower levels seen in the 20th century. Many households sold expensive homes in closed-access cities and bought less expensive homes in open-access cities. They shifted the risk of ownership in newly volatile closed-access real estate to new owners and transitioned their own portfolios to other asset classes. Others took out home equity loans in order to fund current consumption. These were economic rentiers, newly wealthy because of the future flow of high rents their properties were expected to capture, and they were engaging in consumption smoothing.

The trade deficit increased to more than 5 percent of GDP during the height of the housing boom, which gives the impression of unsustainable consumption. Foreigners were sending the funds they had earned through exports to the United States back to the United States for investment. If the motivating factor driving that investment were unsustainable US spending, funded with debt

57. Ben Bernanke, *The Courage to Act: A Memoir of a Crisis and Its Aftermath* (New York: W.W. Norton & Co., 2017); Timothy Geithner, *Stress Test: Reflections on Financial Crises* (New York: Crown, 2014).
58. Atif Mian and Amir Sufi, "House Price Gains and U.S. Household Spending from 2002 to 2006" (NBER Working Paper No. 20152, National Bureau of Economic Research, Cambridge, MA, May 2014).

that must eventually be repaid, then the net flow of investment income should be from the United States to foreign countries. During the housing boom, however, the United States was earning more income from foreign investments than foreigners were earning from US investments.[59] Even though the United States continues to run a 3 percent trade deficit, net foreign income to the United States has risen even higher since the crisis. The trade deficit is being funded by highly profitable foreign assets owned by American firms. There is no reason to view the trade deficit or the rate of American consumption either today or in 2005 as unsustainable, as long as nominal spending growth is gradually brought to a rate consistent with 2 percent inflation.[60]

The rise in the market value of closed-access real estate reflected fundamental economic conditions. Therefore, the only way for monetary policy to prevent housing wealth from boosting consumption would have been to depress economic activity severely enough that the gains in housing wealth were offset by losses in income. This is essentially what happened in 2008. The housing boom was primarily the product of a secular change in interest rates and zoning regulations, not a transitory bubble. Monetary policy is too blunt an instrument to target either home prices or consumption in that context. The decline in the housing market in 2008 was, at the time, welcomed as a return back to a sustainable equilibrium. In contrast, a policy of stabilizing NGDP growth in 2007–2009 would have been seen as excessively expansionary, fueling more borrowing and consumption.[61]

As can be seen in housing markets in Australia, Canada, New Zealand, and the United Kingdom, there is a new normal for prices in many urban markets, especially in Anglophone countries. Returning prices-to-rent ratios to the 20th-century norm will require building more urban housing units. That hasn't happened, and so a return to 20th-century price levels is actually the "disequilibrium" outcome, not the high prices of the 2005–2006 housing boom. In the next section, we will use this interpretation of the housing bubble to reevaluate the role of monetary policy during the housing slump.

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59. Bureau of Economic Analysis, "International Transactions, International Services, and International Investment Position Tables," table 4.1, "U.S. International Transactions in Primary Income," March 19, 2020, https://apps.bea.gov/iTable/iTable.cfm?reqid=62&step=6&isuri=1&tablelist=56&product=1.

60. For a more detailed discussion of the role closed-access housing plays in trade trends, see Erdmann, *Shut Out*, chap. 8.

61. Kevin Erdmann, "The Danger in Using Monetary Policy to Address Housing Affordability: A Lesson from the Great Recession" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, March 2019).

## II. MONETARY POLICY AND THE HOUSING BUST

The contractionary phase of the housing cycle can be divided into four segments. The Fed had begun gradually raising its target interest rate in mid-2004. In the initial downturn from mid-2006 to mid-2007, the overall economy continued to do well, as NGDP growth slowed modestly but continued at just under 5 percent per year. This is an indication that monetary policy was having a slightly contractionary impact but was consistent with the Fed's long-run inflation target.

Many local housing markets held up well during this period, especially in heartland states such as Texas. Prices declined in sand-state markets where the increase had been most pronounced—most notably in Arizona, Florida, and Nevada.[62] Nationwide, housing construction declined from a peak in early 2006. Stock prices showed no indication of a recession ahead, but a slight yield curve inversion did provide a recession warning. Population growth in the sand states began to slow, owing to a slowdown in both domestic and international migration.

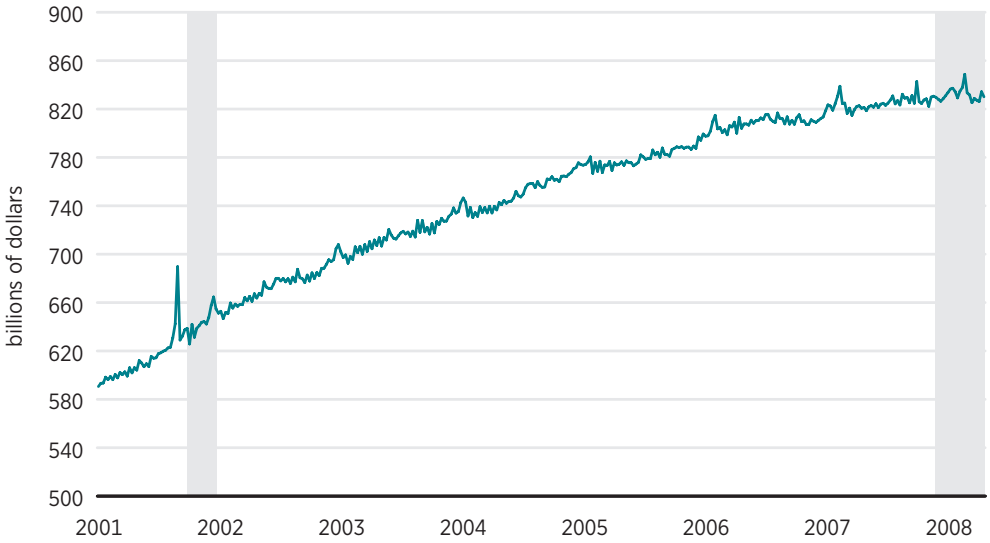
The second phase of the slump occurred between mid-2007 and mid-2008. NGDP growth (year over year) slowed to just under 3 percent in the second quarter of 2008 and to roughly 2 percent in the third quarter. Monetary policy was becoming contractionary relative to the 5.3 percent trend rate of NGDP growth from 1990 to 2007. After mid-2007, the unemployment rate started to edge slightly higher. Housing construction and home prices continued to decline, and the stresses on the banking system got much worse

At the last meeting of the FOMC before the target rate was cut from 5.25 percent, in August 2007, the *Wall Street Journal* issued a stinging rebuke: "Credit panics are never pretty, but their virtue is that they restore some fear and humility to the marketplace. . . . It's tempting to blame Wall Street and other bankers for all those bad residential loans, and they are paying the price now. But they were also lending into a housing asset bubble fed by easy monetary policy. Risky mortgages always look better when home prices look like they'll never decline. Current Fed Chairman Ben Bernanke was along for the Greenspan ride, so he's hardly blameless. No doubt he'd love to play the hero role now, signaling easier money this week."[63]

The Federal Reserve didn't lower rates at that meeting, and this was immediately followed by the panic that the *Wall Street Journal* editors thought might be necessary. The TED spread, measuring risk in interbank lending, shot up

62. The "sand states" are Arizona, California, Florida, and Nevada.
63. "Bernanke's Bear Market."

FIGURE 13. ST. LOUIS ADJUSTED MONETARY BASE




Note: Shaded gray areas indicate recessions.

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "St. Louis Adjusted Monetary Base (DISCONTINUED)" (dataset), last updated December 19, 2019, https://fred.stlouisfed.org/series/BASE.

immediately and remained elevated until early 2009. As a result, the Fed finally began reducing its target interest rate in September 2007.

This second period has been widely misunderstood. Between September 2007 and May 2008, the Fed repeatedly cut its interest rate target, leading many pundits to wrongly assume that monetary policy was becoming "easier." In fact, interest rates are not a reliable indicator of the stance of monetary policy. The Fed was not taking any concrete actions to reduce market interest rates, such as injecting money into the economy. Instead, rates were declining owing to a combination of a weakening economy and tighter lending standards for home mortgages.

Another common misconception is that the Fed took no affirmative actions to tighten monetary policy. Rather, it is claimed that at worst, it was guilty of *errors of omission*—failing to offset a decline in money velocity. But velocity was actually *increasing* during late 2007 and early 2008, and more than 100 percent of the slowdown in NGDP growth was due to the Fed sharply slowing the growth in the monetary base. Figure 13 shows there was almost no increase at all in the base during the 10-month period from mid-July 2007 to early May 2008. The economy tipped into recession in December 2007 owing to a tight monetary policy. It was

much more than errors of omission. Fortunately, the recession remained fairly mild during the first half of 2008, as rising velocity pushed NGDP slightly higher.

Another misconception is that the housing bust pushed the unemployment rate sharply higher. In fact, the unemployment rate increased only slightly from January 2006 to April 2008 despite housing construction plunging by more than 50 percent:

> January 2006: starts = 2,303,000; completions = 2,058,000;
> average = 2,180,000; unemployment rate = 4.7 percent
>
> April 2008: starts = 1,008,000; completions = 1,014,000;
> average = 1,011,000; unemployment rate = 5.0 percent
>
> October 2009: starts = 527,000; completions = 745,000;
> average = 636,000; unemployment rate = 10.0 percent

And this is not because unemployment is a lagging indicator. The unemployment rate actually began rising slightly before the economy tipped into recession, and real output also grew from 2006 to 2008. It was only during the period from April 2008 to October 2009 that output plunged sharply and the unemployment rate doubled from 5 percent to 10 percent. Rather than the housing bust being the cause of the Great Recession, it would be more accurate to say that the Great Recession explains the bulk of the housing price decline, especially the portion that occurred after late 2007. As long as NGDP was growing at a reasonable rate, the sharp decline in residential construction was mostly offset by an increase in employment and output in other sectors, such as services and nonresidential construction.

Surprisingly, the GAO found that bank failures, which largely came well after the 2008 market meltdown, primarily resulted from exposure to commercial loans, not subprime residential loans. Certainly, there was some irresponsible lending, and subprime mortgages were more likely to default than conventional mortgages. They played a significant role in the crisis. However, an FDIC study found that more than 86 percent of bank failures during 2008–2011 were primarily owing to commercial loans, not subprime mortgages. Because nominal income is the resource from which firms service their debts, a sudden decline in nominal GDP often leads to a financial crisis.[64]

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64. Government Accountability Office, *Financial Institutions: Causes and Consequences of Recent Bank Failures*, January 2013; Federal Deposit Insurance Corporation, Office of Inspector General, *Acquisition, Development, and Construction Loan Concentration Study*, October 2012.

The primary cause of the Great Recession was a tight money policy that caused NGDP growth to slow sharply in late 2007 and early 2008 and then plunge dramatically after mid-2008. This was the third phase of the slump, when a highly contractionary monetary policy became the dominant factor in the developing crisis. Between the second quarter of 2008 and the second quarter of 2009, NGDP plunged by more than 3 percent. Indeed, the 2.2 percent decline from the fourth quarter of 2007 to the second quarter of 2009 was the worst performance over six quarters since the 1930s. In late 2008 and 2009, declining velocity was the problem, as the monetary base increased sharply. Now the problem actually was errors of omission, as the Fed was too slow to respond to falling velocity with sufficiently aggressive monetary stimulus.

Because most wage contracts and debt contracts are written in nominal terms—not indexed to inflation—a sharp decline in NGDP growth often causes high unemployment and a wave of debt defaults. This was the pattern in the United States during the early 1930s, Japan during 1992–1995, and Argentina during the early 2000s. The impact of the Fed's highly contractionary monetary policy on unemployment and debt defaults was entirely predictable: both problems worsened dramatically. During this time, Europe also saw a major decline in NGDP growth and a corresponding surge in both unemployment and debt defaults.

During mid-2008, the US inflation rate was impacted by a dramatic increase in oil prices, which peaked at $147 per barrel in July. Annual inflation measured by the PCE rose to more than 4 percent, well above target, while the Consumer Price Index (CPI) inflation peaked at 5.5 percent in July 2008. The Fed was under increasing pressure to tighten monetary policy in order to prevent inflation expectations from becoming unanchored.

In fact, the real problem was excessively tight money, and in this case, the slowdown in NGDP growth provided a much better guide to monetary policy than rising inflation. Recall that Bernanke had argued in 2003 that the stance of policy is best measured in reference to inflation and NGDP growth.[65] One advantage of NGDP growth is that inflation can be distorted by transitory supply shocks, which are beyond the scope of monetary policy. NGDP provides a much better indication of whether demand pressures are excessive. The slowdown in NGDP growth during 2008 was an indication that money was too tight.

A particularly unfortunate policy error occurred in mid-September 2008, in an FOMC meeting two days after the investment bank Lehman Brothers

65. Bernanke, "The Influence of Milton Friedman's Monetary Framework on Contemporary Monetary Theory and Practice."

failed—the largest bankruptcy in US history. The Fed decided not to reduce the Fed funds target from the level of 2 percent, which had been the target rate since April, citing balanced risks of recession and high inflation. Inflation really had been elevated over the previous 12 months, owing to the oil price shock. But on the day of the meeting, 5-year Treasury inflation-protected securities (TIPS) spreads had fallen to only 1.23 percent, far below the Fed's implicit target of 2 percent. Not only were the risks of recession and inflation not balanced, the actual risk was of *excessively low* inflation going forward, which of course is what actually occurred.[66] The equilibrium interest rate was now falling rapidly, so by holding the target Fed funds rate constant, the Fed was effectively tightening monetary policy.

In early October, the Fed did finally cut its target interest rate to 1.5 percent, but that action was completely neutralized by a simultaneous decision to begin paying interest on bank reserves for the first time in the Fed's 95-year history. The Fed acknowledged that the payment of interest on bank reserves was a contractionary policy, as it essentially sterilized the reserves that were then being injected into the banking system to provide liquidity. Because the Fed was still fearful of inflation, it did not want these bank rescue operations to reduce interest rates and stimulate the broader economy. The S&P 500 index had only dropped by about 8 percent from the Friday before the Lehman Brothers failure to October 1, 2008. It crashed 24 percent during the first 10 days of October, perhaps because stock investors correctly saw that monetary policy was far too tight to prevent a severe recession.[67]

In retrospect, it is difficult to understand how Fed policy could have been so far off course. In his memoir, Bernanke acknowledges that the Fed erred in not easing policy after Lehman failed, citing distractions from the banking crisis. An examination of the Fed transcripts shows a deeply divided organization, with a sizable contingent of policy hawks worried about inflation and cautioning against aggressive stimulus. In some respects, this is understandable, as the Fed did eventually adopt some rather unconventional policies during the recession, notably quantitative easing (QE), a program that entailed purchasing trillions of dollars of Treasury bonds and mortgage-backed securities. However, there is

66. It is true that TIPS spreads can be distorted by illiquidity during a financial crisis. But even if this is the case, it simply means that money is too tight for a different reason, and the economy is starved of liquidity.

67. This is clearly speculative. But it is worth noting that asset markets responded extremely strongly to decisions by the Fed and the European Central Bank in late 2008 and 2009, with asset prices soaring on more expansionary than expected moves, and vice versa.

also some indication that the Fed may have been held back by a misdiagnosis of the fundamental nature of the problem.

Many people inside and outside the Fed initially missed the dangerous decline in aggregate demand. The "real problem" was seen as a housing bubble that had to burst, and that triggered a major banking crisis. In fact, much of the real problem was nominal: a fall in NGDP growth expectations that deeply depressed asset prices, devastating the balance sheets of highly leveraged banks such as Lehman Brothers. This is not to absolve the managers of banks that got into trouble—one can argue that greater caution was advisable when housing prices had risen so sharply. Some individual banks certainly took excessive risks.

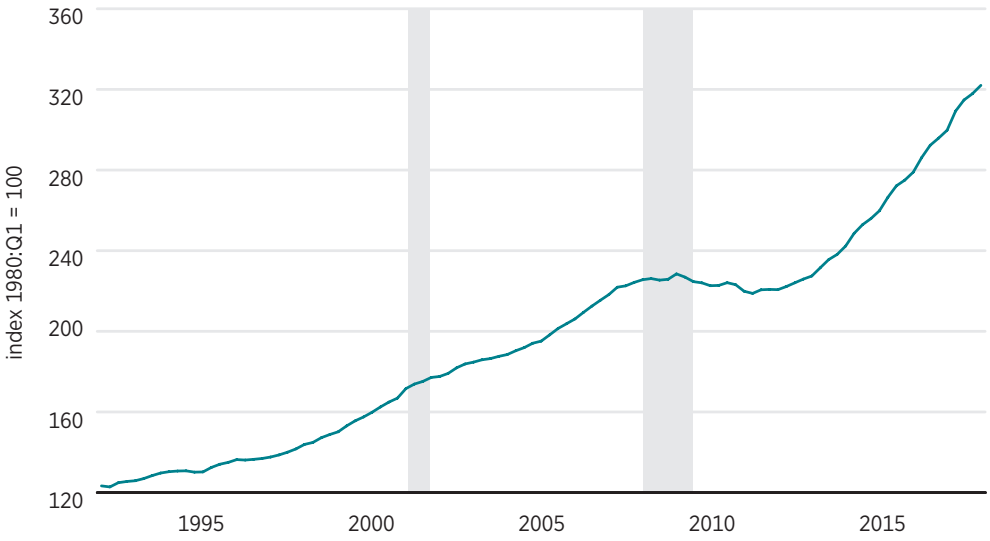
But blaming the problem on greedy bankers misses the deeper forces that pushed the slump well beyond housing and, indeed, across most sectors of the economy. Greed is part of human nature, and it is always true that some banks will take risks when opportunities arise. But the overall economy held up reasonably well, even as housing construction fell by half. It was only when a tight money policy pushed NGDP much lower in late 2008 that the slump spread far beyond residential housing. Falling NGDP is *always contractionary*, even when there is no financial crisis.

In the second half of 2008, the recession spread to previously strong sectors of the economy, such as commercial real estate, services, and manufacturing. That put even more pressure on commercial borrowers. As we saw, most of the bank failures that occurred were attributable to bad commercial loans, not subprime mortgages. A manageable problem that was causing distress at a limited number of banks became a major crisis that threatened to bring down the entire banking system.

Texas real estate prices, shown in figure 14, provide a good indication of the impact of falling NGDP on housing. Unlike Arizona, California, Florida, and Nevada, Texas had not experienced a housing bubble in the mid-2000s.[68] Thus, the Texas market held up fairly well through mid-2008, even as some of the hotter real estate markets cooled off in 2006 and 2007. But in mid-2008, even Texas real estate began slumping, as falling NGDP was now depressing all major sectors of the US economy. While the Texas real estate market has some unique

68. Note that the resilience of the Texas housing market was not because of a lack of subprime lending. Texas had active subprime lending. Prices were less volatile there because ample supply means that homeowners do not earn economic rents through political exclusion, so prices remain near the cost of construction. See Christopher J. Mayer and Karen M. Pence, "Subprime Mortgages: What, Where, and to Whom?" (Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, DC, 2008), table 5.

FIGURE 14. HOUSE PRICE INDEX FOR TEXAS




Note: Shaded gray areas represent periods of recession.

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "All-Transactions House Price Index for Texas (TXSTHPI)" (dataset), last updated May 26, 2020, https://fred.stlouisfed.org/series/TXSTHPI.

characteristics, many other heartland states avoided a housing price bubble but then saw prices decline during the Great Recession.

At various times during the Great Recession, Bernanke had to work hard to develop monetary policies that were acceptable to both the hawks and the doves on the FOMC. These compromise policies were not expansionary enough to promote a rapid economic recovery, but they were more aggressive than policy in the eurozone, where the recovery was far weaker.

One common misconception is that the failure of monetary policy was all about the zero lower bound, which was the point beyond which the Fed could no longer ease policy by reducing nominal interest rates. According to this view, monetary stimulus becomes almost impossible once nominal interest rates fall to zero.

In fact, the zero lower bound was not the primary problem. The Fed has a number of other tools to stimulate the economy, including QE and forward guidance. Ben Bernanke repeatedly insisted that the Fed could have done more, but it chose not to. As an academic, Bernanke observed that central banks never

run out of ammunition, a point recently reemphasized by Jay Powell.[69] But even if the zero lower bound were a constraint on policy, the Fed did not reduce its target interest rate to 0.25 percent until mid-December 2008, after the severe six-month decline in spending was nearly over. Monthly estimates of GDP by Macroeconomic Advisers show that by December 2008, both nominal and real GDP were nearing their recession lows, as seen in figures 15 and 16.

It was during the period from December 2007 to December 2008 that almost all the damage was done from tight money, and the Fed was not limited by the zero lower bound during that period. In the eurozone, the zero lower bound was not reached until 2013, *more than five years after the initial downturn*. The zero lower bound was not the primary cause of the global slump that began at the end of 2007. Rather, monetary policy was simply too contractionary.

The zero lower bound was also blamed for the slow recovery, particularly for the fact that inflation remained below the Fed's 2 percent target. But inflation mostly stayed below the target from late 2015 to early 2020, when rates were once again above zero, suggesting that the "lowflation" problem was much deeper than a zero lower bound on interest rates.

While the housing slump certainly made the Fed's job more difficult by depressing the natural rate of interest, it is important to recognize that contractionary monetary policy also played a role in lower equilibrium interest rates. Tight money leads to expectations of slower nominal GDP growth—what Keynes called a reduction in "animal spirits"[70]—and this also depresses equilibrium interest rates. Once a contractionary monetary policy takes effect, the Fed must continually reduce the policy rate merely to keep policy from tightening.

The last phase of the housing slump occurred between mid-2009 and 2012, a period of gradual recovery in the overall economy. During this period, much tighter lending standards made it especially hard for many households to obtain a mortgage. Homeownership rates of young households and households with moderate and low incomes declined sharply during this period. During this 2009–2012 period, the average FICO score on denied applications was higher than it had been on accepted applications before 2008.[71] Thus, the bottom half of the housing market did especially poorly during this period.

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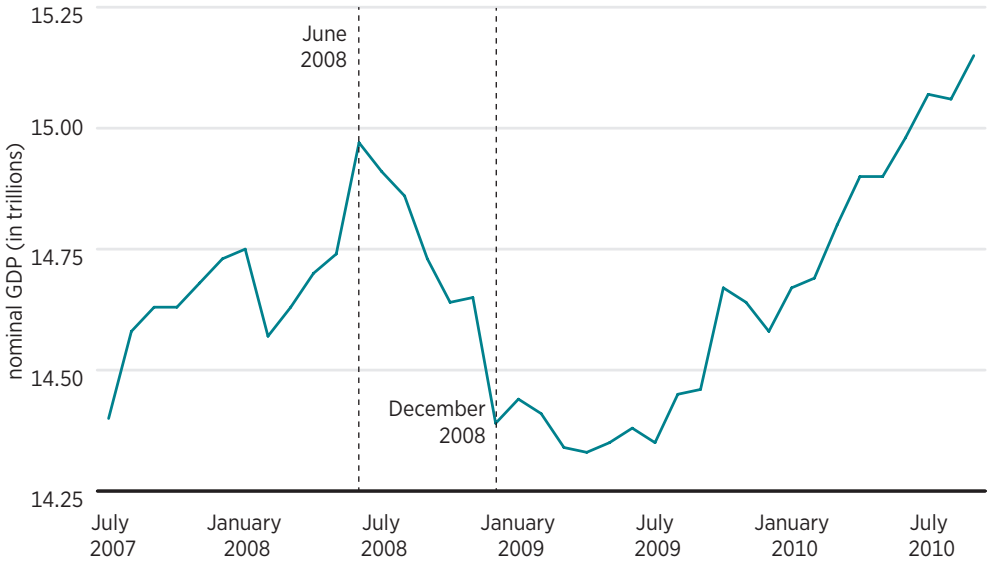
69. Ben Bernanke, "Japanese Monetary Policy: A Case of Self-Induced Paralysis?" (working paper, Princeton University, 1999). See also Jeff Cox, "Powell Is Correct That the Fed Is Not Out of Ammunition 'by a Long Shot,'" CNBC, May 18, 2020.
70. John Maynard Keynes, *The General Theory of Employment, Interest and Money* (London: Palgrave Macmillan, 1936).
71. Ken Fears, "Softening the Credit Choke Hold," National Association of Realtors, December 2, 2015.

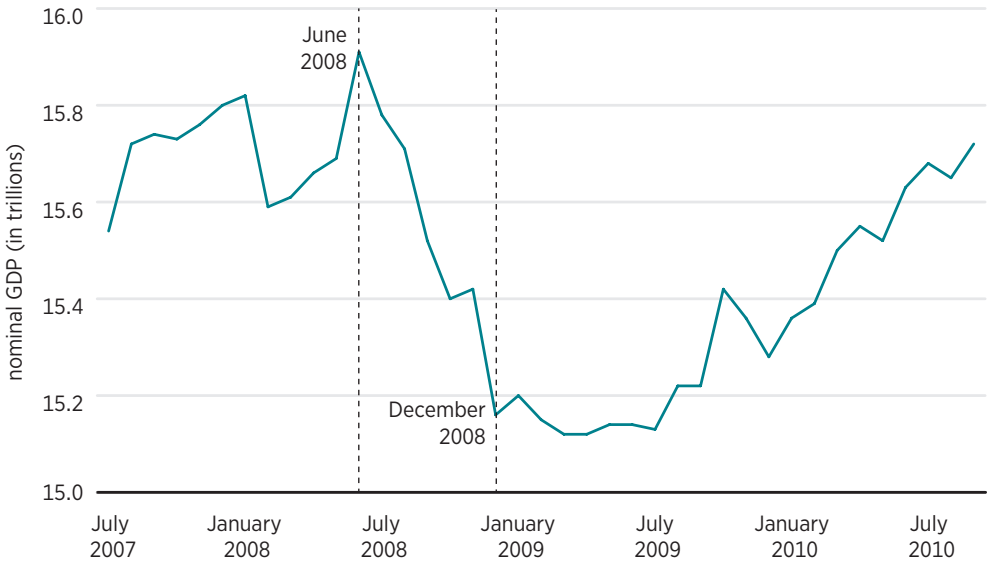
FIGURE 15. MONTHLY ESTIMATES OF NOMINAL GDP, JULY 2007 THROUGH JULY 2010




Note: The dotted lines mark the beginning and end of a severe six-month decline in spending.

Source: Macroeconomic Advisers, "US Monthly GDP," YCharts, accessed June 25, 2020, https://ycharts.com/indicators/us_monthly_gdp.

FIGURE 16. MONTHLY ESTIMATES OF REAL GDP, JULY 2007 THROUGH JULY 2010




Note: The dotted lines mark the beginning and end of a severe six-month decline in spending.

Source: Macroeconomic Advisers, "US Monthly Real GDP," YCharts, accessed June 25, 2020, https://ycharts.com/indicators/us_monthly_real_gdp.

There is much disagreement as to what sort of regulatory regime is optimal for mortgage lending. But almost all experts agree that regulation should not be procyclical, i.e., looser in booms and tighter in recessions. Indeed, many experts favor macroprudential regulations, which are tighter during booms and looser during recessions. In fact, however, the United States has taken exactly the opposite approach. Federal banking regulations are looser during booms and then get tighter during slumps, which makes the cyclical swings more extreme. Thus, the severity of the Great Recession is partly owing to an excessively contractionary monetary policy and partly owing to a regulatory regime that became more restrictive at the worst possible time. As the economy began booming once again during the late 2010s, banking regulations were being loosened somewhat, although lending standards for mortgages remain tighter than precrisis norms, especially in entry-level markets.

## III. THE POST-RECESSION HOUSING SLUMP

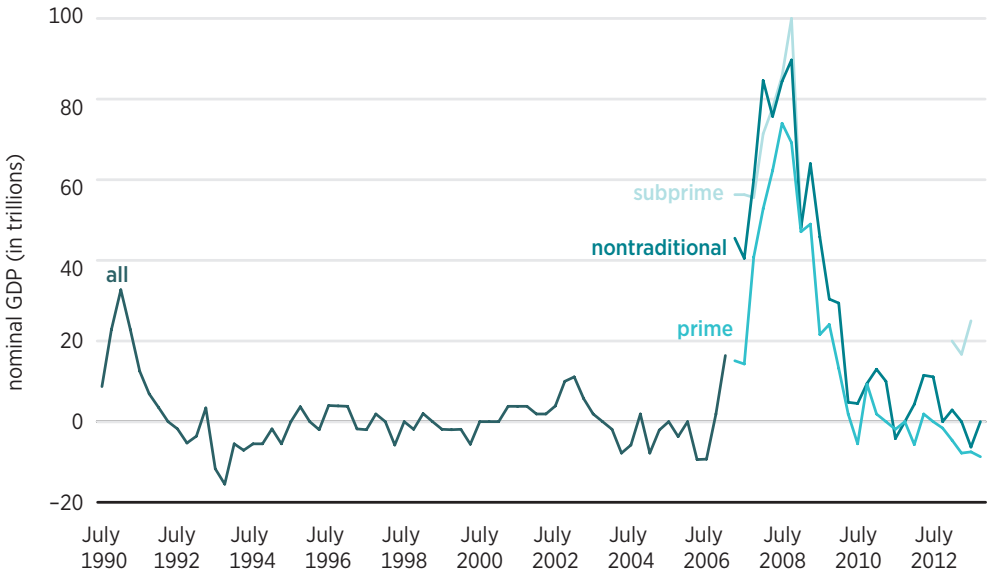
Even after the Great Recession ended in mid-2009 and both output and equity prices began rising, the housing slump continued for another three years. After nominal GDP began growing in late 2009, tight lending standards became a primary headwind in the economic recovery. Economic growth was stunted by the new lending regime, which continued to limit growth in residential investment in neighborhoods where potential buyers could not get funding under the new regime. For homeowners in lower-tier markets across the country, the worst housing bust occurred after the recession of 2008.

### Lending Standards

As we described above, the Federal Reserve began trying to dampen sentiment in the housing market as early as the spring of 2006, when Bernanke said that he expected continued increases in the target interest rate to slow down housing markets.[72] From the second quarter of 2006 to the second quarter of 2007, residential investment declined by 16 percent. The initial decline in buyer interest was not primarily driven by lending constraints, as total mortgages outstanding continued to increase.[73]

72. FOMC, "Meeting of the Federal Open Market Committee on March 27–28, 2006," 139.
73. Bureau of Economic Analysis, "National Income and Product Accounts," table 5.3.5, "Private Fixed Investment by Type," last updated May 28, 2020, https://apps.bea.gov/iTable/iTable.cfm?req

FIGURE 17. SENIOR LOAN OFFICER OPINION SURVEY ON BANK LENDING PRACTICES: NET PERCENTAGE OF DOMESTIC RESPONDENTS TIGHTENING STANDARDS FOR MORTGAGE LOANS




Note: For data starting in the second quarter of 2007, changes in standards and demand for prime, nontraditional, and subprime mortgage loans are reported separately.

Source: Board of Governors of the Federal Reserve System, "Senior Loan Officer Opinion Survey on Bank Lending Practices," last updated January 30, 2020, https://www.federalreserve.gov/data/sloos/sloos-202001-chart-data.htm.

D.R. Horton, the largest homebuilder in the United States, reported that, of the homes it completed in the third quarter of 2006, 40 percent of the contracted buyers declined to take the homes, more than twice the usual figure, electing to let the builder keep their escrow deposits instead. The builder attributed the rise in cancellations to decreased homebuyer confidence and the inability of buyers to sell their existing homes. By 2007, however, it began to mention increased difficulty in getting a mortgage.[74]

### Phase 1 (mid-2007 to mid-2008): Collapse of Private Securitization Markets

After mid-2007, lending standards tightened sharply (see figure 17). Sentiment was continuing to worsen, and lenders were joining buyers in having doubts about investments in real estate.

id=19&step=3&isuri=1&nipa_table_list=145&categories=survey; Federal Reserve Bank of New York, *Household Debt and Credit Report* (Q4 2019), tables 3 and 4.

74. See D.R. Horton, "SEC Filings," 10-Q and 10-K filings, accessed June 25, 2020, available at http://investor.drhorton.com/financial-information/sec-filings.

In the four quarters ending with the second quarter of 2007, mortgages outstanding had grown by $867 billion. After mid-2007, bank lending began to dry up. More importantly, lending through private securitizations collapsed when the panic in those securities developed over the summer of 2007.

For some buyers, government-sponsored enterprises (GSEs) picked up the slack. Mortgages outstanding continued to grow, albeit more slowly. In the four quarters ending with the second quarter of 2008, mortgages outstanding grew by $367 billion, even while every other measure in housing markets was dropping—housing starts, sales, prices, equity, etc. During those four quarters, mortgages outstanding held in the privately securitized pools or by other private funds declined by $366 billion, but mortgages guaranteed by the GSEs increased by $589 billion, more than making up for that loss.[75]

Nevertheless, this phase was associated with a decline in the dollar amount of mortgages originated, and an increase in the credit score of the median borrower. Borrowers with lower credit scores who had been served by the private market now had fewer options.

Even as the GSEs were taking up some of the slack, they began tightening their own lending standards. At the end of 2007, the average FICO score of mortgages guaranteed by Fannie Mae was about 721. That figure had been relatively stable through the housing boom, even rising a bit after the turn of the 21st century. In the first two quarters of 2008, their average FICO score increased to 728, then to 738. Policy was becoming increasingly procyclical.

### Phase 2 (mid-2008 to mid-2010): Conservatorship of the GSEs

On September 6, 2008, the GSEs were taken into conservatorship. Under federal management, they continued to tighten their standards. By this phase, mortgages from the Federal Housing Administration (FHA), guaranteed through Ginnie Mae (GNMA), were also picking up much of the slack. The FHA tends to serve more marginal borrowers with lower average credit scores. But the FHA was also tightening its lending standards. The net effect was that the average credit score of originated mortgages for mortgages of all types continued to rise to more than 760.

Originations to credit scores above 760 continued at the precrisis pace. Originations to lower credit scores continued to drop. At the GSEs after 2008, mortgages outstanding to lower FICO scores declined. At the end of 2008, Fannie Mae guaranteed about $2.7 trillion in mortgages outstanding. About $1.2 trillion

75. Board of Governors of the Federal Reserve System, "Mortgage Debt Outstanding (Table 1.54)," December 2018, https://www.federalreserve.gov/data/mortoutstand/mortoutstand20181231.htm. GSE mortgages outstanding = sum of lines 40, 46, 58, and 61. Private pools and funds = lines 69 and 76.

had been originated to borrowers with FICO scores over 740, and about $1.5 trillion had been originated to borrowers with FICO scores under 740. By 2015, the Fannie Mae book had expanded slightly to about $2.8 trillion. But by then, the distribution was $1.7 trillion above 740 and $1.1 trillion below 740. Fannie Mae had shed about $400 billion worth of mortgages to borrowers with FICO scores under 740.[76] Freddie Mac also shifted its lending in a similar fashion.

By the end of 2009, the dimensions of the foreclosure crisis were coming more into focus. The Fannie Mae 2009 credit supplement report highlights Arizona, Florida, and Nevada as particular areas with excess losses. Those three states represented 10.9 percent of Fannie's book of business. Yet they represented 32.8 percent of Fannie's 2009 credit losses. Delinquency rates in those states, collectively, were 11.8 percent, compared with 5.38 percent for Fannie Mae mortgages overall. According to that report, there were some differences in loan terms between those states and other states—a higher likelihood of interest-only payments, adjustable interest rates, and mortgages for homes that were not the primary residence. But there was little difference between the borrower quality of loans in those states and the typical Fannie Mae mortgage. The typical Fannie Mae mortgage had been originated to a borrower with a FICO score of 730, compared with 729 in those states. About 3.9 percent of all Fannie Mae mortgages had been originated to borrowers with FICO scores under 620, compared with 4.4 percent of the mortgages in those states. The most significant difference was that the equity on the average Fannie Mae mortgage had declined by only 3 percent as a result of declining home prices, but the average equity in those three states had declined by 29 percent, and the average borrower was now underwater. Yet Fannie Mae continued to react to these developments by cutting off much of its lending to borrowers with moderate and lower FICO scores.[77]

The tighter standards are reflected in the size of the new mortgages Fannie Mae was originating. The average value of homes that received Fannie Mae mortgages in 2006 was roughly $250,000, about the same as the average current market value of all homes on its books. Many homes lost value after 2006, so that by 2010, the average market value of homes on Fannie Mae's books was about $200,000. But the average market value of homes for which it originated new

76. Fannie Mae, Quarterly and Annual Results, various years, "Risk Characteristics of Single-Family Conventional Business Volume and Guaranty Book of Business" (table), available at https://www.fanniemae.com/portal/about-fm/investor-relations/quarterly-annual-results.html.
77. Fannie Mae, 2009 Credit Supplement, February 26, 2010, "Credit Profile by State" (table), 9, https://www.fanniemae.com/resources/file/ir/pdf/quarterly-annual-results/2009/2009_10K_credit_summary.pdf.

mortgages in 2010 was about $320,000.[78] Lending for more affordable homes had dried up.

During the second phase of the contraction, mortgages outstanding at all the other types of lenders were shrinking. The American mortgage lending market was now under direct federal control, and the federal government used that control to sharply tighten credit standards. Mortgage origination volumes to borrowers with credit scores above 760 were higher in 2009 and 2010 than they had been in 2006. For credit scores under 760, originations had fallen by two-thirds.[79]

### Phase 3 (mid-2010 to present): Regulation Z, Dodd-Frank, and the Consumer Finance Protection Bureau

After the mortgage market had come under direct control of the federal government, it applied the stricter standards of the federally managed agencies to banks and nonbank mortgage originators. The average credit score of new mortgages at Fannie Mae in 2019 was still 749, and it was 751 at Freddie Mac, far above the averages during and before the housing boom.[80]

Regulation Z, which has covered mortgage regulation since the Truth in Lending Act was passed in 1968, was amended in July 2008 to require additional precautions from lenders, especially on mortgages to riskier borrowers that tend to carry higher interest rates. Lenders could be penalized if it was later determined that they had not properly assessed the ability of the borrower to pay off the mortgage.

Eventually, the broad financial reform bill, the Dodd-Frank Wall Street Reform and Consumer Protection Act, was passed in July 2010, further codifying these new liabilities and mandates. The Consumer Financial Protection Bureau was created to oversee the new regulations. In January 2014, the current Ability-to-Repay/Qualified Mortgage Rule arrangement was implemented. Lenders are limited to the fees they can charge, while also adhering to expensive new

78. Fannie Mae, *Quarterly and Annual Results*, 10-K filings from 2006 and 2010, "Risk Characteristics of Single-Family Conventional Business Volume and Guaranty Book of Business" (table), available at https://www.fanniemae.com/portal/about-fm/investor-relations/quarterly-annual-results.html. The authors used the categories "average loan amount," "original LTV ratio," and "estimated mark-to-market LTV ratio" to estimate average home values.
79. Federal Reserve Bank of New York, *Household Debt and Credit Report (Q4 2019)*, table 6.
80. Fannie Mae, "United States Securities and Exchange Commission Form 10-K," 2019, "Key Risk Characteristics of Single-Family Conventional Business Volume and Guaranty Book of Business" (table), 77–78, https://www.fanniemae.com/resources/file/ir/pdf/quarterly-annual-results/2019/q42019.pdf; Freddie Mac, "United States Securities and Exchange Commission Form 10-K," 2019, "Single-Family New Business Activity" (table), 71, http://www.freddiemac.com/investors/financials/pdf/10k_021320.pdf.

underwriting mandates. Lenders are protected from liabilities if they sell mortgages to the GSEs. Those loans are protected under the qualified mortgage (QM) standard. But the GSEs themselves have severely limited the range of mortgages they are willing to accept.

There are ambiguous rules about what income qualifies for the ability to repay and what proof is required to protect lenders from regulatory liabilities. This uncertainty about potential liabilities has prevented lenders from engaging with the borrowers that are no longer served by the GSEs. Anthony DeFusco, Stephanie Johnson, and John Mondragon at Northwestern University found that lenders increased rates on non-QM loans, but they also greatly reduced the quantity of originations of those loans.[81] Furthermore, Stefan Gissler, Jeremy Oldfather, and Doriana Ruffino, with the Fed, found evidence that in the long period of debate leading up to the new rule's implementation in 2014, uncertainty about the implementation of the rule reduced lending activity significantly.[82] The effects on the housing market have been clear and consequential.

## Housing Prices

The presumption that high home prices were a temporary bubble also influenced public sentiment and public policy about lending standards. Because it seemed that a housing bubble had been created by loose lending, it was assumed that the inevitable cyclical correction should be associated with tighter credit and falling home prices.

A combination of new underwriting requirements, limits on fees and spreads, and various explicit and implicit liabilities for lenders when borrowers default has made it difficult for entry-level borrowers to buy homes. The exact mechanisms for this tightening are not always obvious, but the effects are very clear in many types of housing data. The number of first-time borrowers fell sharply during the crisis, homeownership rates in all age groups below 65 years have fallen to the lowest levels in over 40 years, and both sales and prices in entry-level markets around the country collapsed after 2008.

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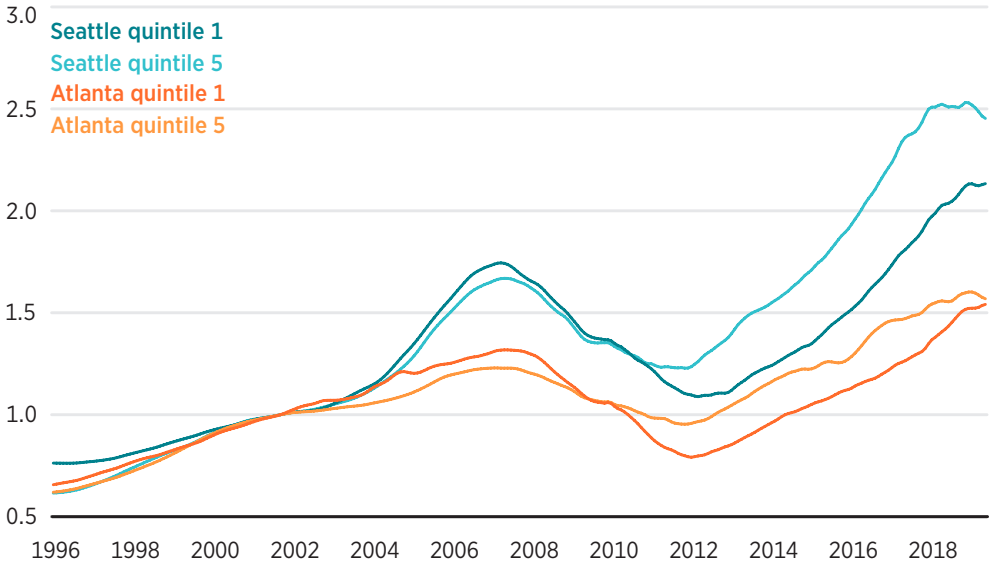
81. Anthony A. DeFusco, Stephanie Johnson, and John Mondragon, "Regulating Household Leverage" (working paper, Northwestern University, May 7, 2019). They also note that "while the policy was able to achieve large changes in the distribution of debt-to-income, we estimate that this would have caused only a minimal reduction in the aggregate default rate."
82. Stefan Gissler, Jeremy Oldfather, and Doriana Ruffino, "Lending on Hold: Regulatory Uncertainty and Bank Lending Standards" (working paper, Board of Governors of the Federal Reserve System, March 28, 2016).

FIGURE 18. MEDIAN HOME PRICE, INDEXED TO 2001, TOP AND BOTTOM QUINTILES OF ZIP CODES, ATLANTA AND SEATTLE




Note: We arranged zip codes into quintiles by median home price within each metropolitan area.

Source: Zillow, "Zillow Home Value Index: ZHVI All Homes," accessed September 9, 2019. https://www.zillow.com/research/data.

The housing bust can be divided between the pre-financial-crisis phase, when prices collapsed mainly in the closed-access and contagion cities, and the post-financial-crisis phase, when prices collapsed in low-tier segments of metropolitan areas throughout the country. Thus, the crisis had two distinct periods, the monetary phase and the credit phase. During 2008, the Fed was combating commodity-based inflation when the real problem was too little aggregate demand. In the credit phase (2009–2012), the Federal Reserve had become somewhat more stimulative (albeit still too contractionary). However, tightening credit standards prevented low-tier, credit-dependent housing markets from recovering.

As figure 18 shows, phase two was especially devastating to lower-tier markets (quintile 1). The vast majority of foreclosures happened during this period.

To better understand these trends, it is useful to view individual metropolitan areas in isolation. Looking within a single metropolitan area allows us to control for local factors such as incomes and housing supply. During most periods, substitution between various market segments tends to lead to highly correlated

price changes across the metropolitan area. Thus, before the crisis, both the low- and high-tier housing markets appreciated at a similar rate in most cities.[83]

Figure 18 shows that the post-2008 slump was not a simple reversal of precrisis patterns. Before 2007, home prices in Atlanta increased moderately across the metro area. In Seattle, which has housing supply constraints that are somewhere between those of open-access and closed-access cities, home prices increased by much more. In both cities, however, prices in low-priced zip codes (quintile 1) and high-priced zip codes (quintile 5) increased at similar rates. Even in 2007 and 2008, both low- and high-tier segments were being impacted by slowing NGDP growth, the collapse of privately securitized mortgage markets, and collapsing sentiment about future home prices. High-priced zip codes and low-priced zip codes in Atlanta declined moderately, and both high- and low-priced zip codes in Seattle declined a bit more sharply.[84]

Then, from 2009 to 2012, a new pattern emerged. The price decline in the high-priced zip codes in both Atlanta and Seattle slowed somewhat, while in low-priced zip codes in both cities, the price collapse accelerated after 2008. This pattern repeated itself across the country. For low-priced zip codes in most cities, the post-2008 collapse was larger than the pre-2008 decline. This was not a reversal of boom-era price patterns. Tighter lending regulations disproportionately impacted low- and moderate-income borrowers, which removed buyer demand from low-tier markets.

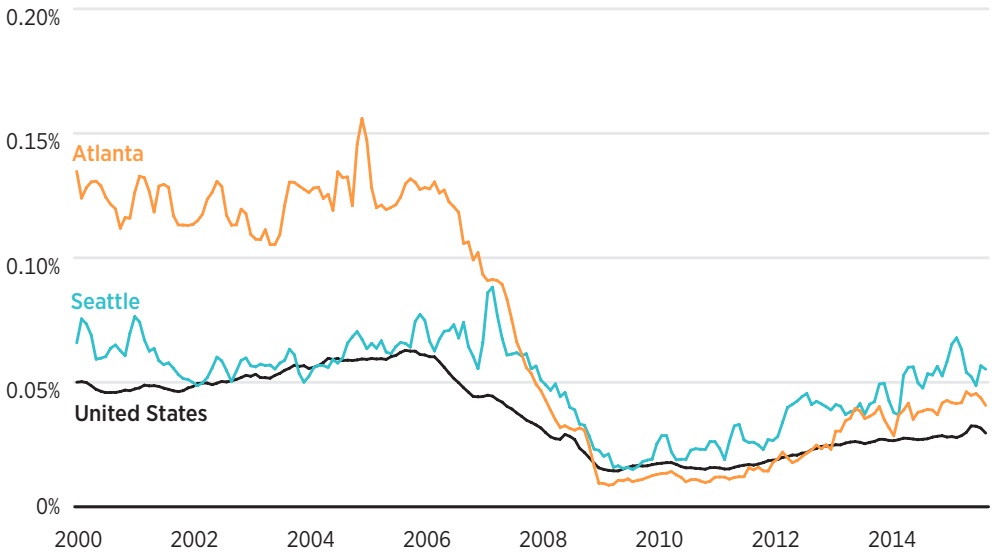
## Housing Construction and Inventories

Where researchers have noticed falling prices in the lower quintiles, it has been attributed to overbuilding. But there wasn't much evidence of excess building in any growing city. Certainly not enough to explain a 20 percent or 30 percent price collapse four years after housing starts began to decline. Figure 19 shows the rate of housing permits over the same time frame in Atlanta and Seattle, compared to the US average. There was no housing supply spike in Atlanta during the

83. There can be a variation of pricing trends throughout a metropolitan area, but much of that variation is local and idiosyncratic. It tends to disappear when areas are aggregated, as we have done in figure 18, by aggregating zip codes into five quintiles arranged by price.

84. In the closed-access cities, where high- and low-end prices had diverged during the boom, the boom pattern did reverse, and generally, by the financial panic of late 2008, the extra price appreciation of low-priced zip codes had reversed. So, generally, in both types of cities, whether low-tier and high-tier price trends had diverged during the boom or moved in unison, by the end of 2008, the average amount of price appreciation from 2000 to 2008 was about the same for zip codes with the lowest prices as it was for zip codes with the highest prices within each metropolitan area.

FIGURE 19. RATIO OF MONTHLY HOUSING PERMITS TO POPULATION, 2000–2015




Source: US Census Bureau, "Building Permits Survey," accessed February 2016, https://www.census.gov/construction/bps/msamonthly.html; Bureau of Economic Analysis, "Personal Income, Population, Per Capital Personal Income (CAINC1)," accessed February 2016, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1.

boom, and building rates began to collapse in 2006. Thus, tight credit is a more plausible explanation than overbuilding for the price declines of 2009–2012.

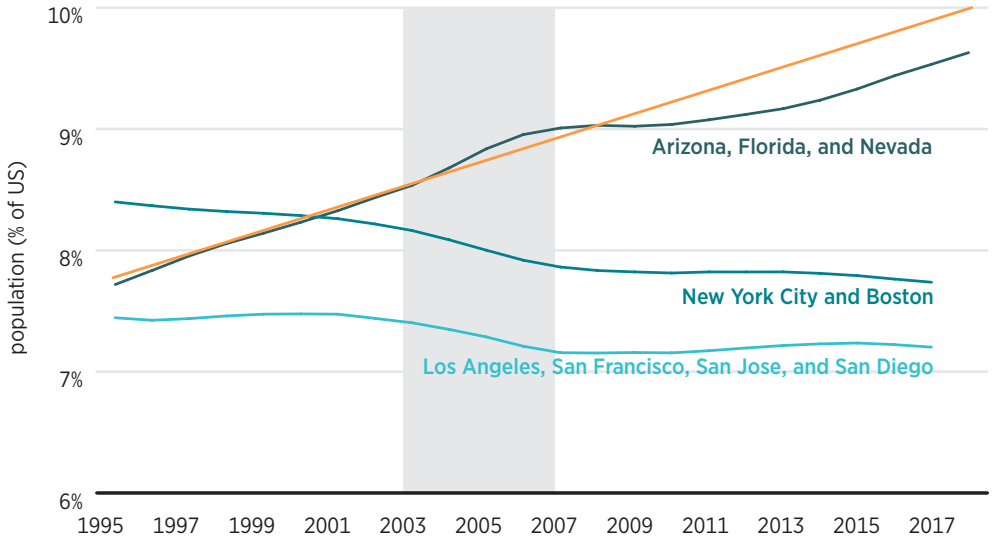
In almost every metropolitan area, homebuilding rates collapsed during the Great Recession, regardless of whether it was a city with an endemic shortage like San Francisco, a growing city like Atlanta, or a Rust Belt city where building rates had never been high. In cities with high incomes where buyers can still qualify for mortgages under the postcrisis standards, building has subsequently recovered to near the precrisis levels. As shown in figure 19, the rate of building in high-income Seattle has recovered more than in moderate-income Atlanta, even though Seattle has stricter regulatory barriers to homebuilding than Atlanta.

Before the financial crisis, the rate of building across metropolitan areas was negatively correlated with income because of the perverse closed-access problem that prevents the most economically prosperous urban centers from growing. But the recovery has been positively correlated with income, as shown in figure 20, because the postcrisis housing market has been strongly impacted by lending regulations. In the richest cities (such as Seattle), building rates have recovered to their boom levels. In metro areas where per capita incomes are below $50,000, building rates in 2017 were still less than half of what they had

FIGURE 20. POSTCRISIS RECOVERY OF HOUSING UNITS AND MSA PER CAPITA INCOME


Source: US Census Bureau, "Building Permits Survey," accessed February 2016, https://www.census.gov/construction/bps/msamonthly.html; Bureau of Economic Analysis, "Personal Income, Population, Per Capital Personal Income (CAINC1)," accessed February 2016, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1.

FIGURE 21. POPULATION OF CLOSED-ACCESS AND CONTAGION CITIES AS A PERCENTAGE OF THE US TOTAL, 1995–2018




Note: The orange line is a linear approximation of the pre-2003 trend. The shaded area roughly denotes the period when privately securitized subprime and alt-A mortgages were very active.

Source: Bureau of Economic Analysis, "Personal Income, Population, Per Capital Personal Income (CAINC1)," accessed February 2016, https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1.

been in 2005. Instead of using zoning reforms to make it easier to build homes in cities with more economic opportunities, new tighter credit regulations make it harder to build homes in cities with more limited economic opportunities.

Figure 21 indicates how much the financial crisis undercut longstanding migration patterns. It compares the populations of the contagion cities (dark blue line), the California closed-access cities (light blue line), and the Northeastern closed-access cities (medium blue line), all expressed as a proportion of the US total. The rise in contagion-city populations has been relatively stable since World War II. One way to describe the 2003–2006 housing boom is that it was simply an acceleration of this long-standing migration pattern. That is visible in figure 21 where the population trend moved down in all of the closed-access cities and steepened in the contagion cities after 2003.

After 2006, migration inflows into the contagion cities, which had been strong for decades, suddenly stopped. Thus it was an unexpected drop in demand, not overbuilding, that explains why vacancies rose in contagion cities.

Inventories of unsold homes started to rise in late 2005, increasing to very high levels in 2007 and 2008, which led to a widespread consensus that unsold inventory was the result of overbuilding. In fact, a careful review of rising inventories shows how the confused perception that there were too many houses influenced Fed policy decisions. Homebuilders were responsive to contracting demand for new homes, but the FOMC maintained a contractionary posture far longer than it had in previous housing market cycles.

During a business cycle event that includes a significant housing component, there is a typical cycle of events: (1) New home sales peak. (2) Housing starts peak with a lag as homebuilders react to declining sales. (3) Inventory peaks, in absolute numbers, as builders respond to falling demand and starts eventually decline more than sales. (4) Inventory peaks, in terms of months of supply, when demand starts to recover and home sales begin to rise again. So, inventory in terms of total number of units is generally a reflection of builder supply response. Inventory in terms of months of supply is a ratio of total units divided by the rate of new sales. Its nadir is generally a reflection of recovery in demand that leads to a return to growing sales.

Let's compare the 2005 cycle with two previous cycles that included a systematic rise and decline in homebuilding. Sales peaked in those cycles in 1972 and 1978. In 2006, the cyclical pattern in housing was similar to those previous cycles. Sales peaked in July 2005. There were 464,000 new homes for sale—about 4 months' supply. Housing starts peaked by January 2006. Builders managed to get inventory to peak by July 2006 at 572,000 units. Months' supply was

7.3 at that point. Months' supply had peaked in 1973 at 9.4 months and in 1979 at 7.1 months. In 2006, the response time from peak sales to peak inventory was 12 months. It had been 10 months in 1973 and 7 months in 1979.[85]

As of July 2006, the housing cycle looked quite normal, and the first three steps of a typical housing contraction were already in the books. The only step remaining was for sales to recover so that months of inventory could also start to decline. In February 1975, sales began to recover 17 months after inventories had peaked. In the next cycle, the double-dip recession interrupted a budding recovery, but even then, in October 1981, sales began to rise 29 months after inventories had peaked. In both cases, sales recovered after the Fed began to aggressively lower the target interest rate.

This time, it would take a full 56 months for sales to rise from their low point—inventories had peaked in July 2006, and new sales didn't bottom until February 2011.[86] In spite of that long lag, builders eventually cut new building back far enough so that months of inventory peaked in January 2009 at 12.2 months. By then, inventories had declined significantly from their peak, down to 341,000, in spite of the fact that sales had never begun to recover to help work off remaining inventory.

If demand had recovered on a schedule similar to the 1972 cycle, sales would have bottomed by early 2008. The FOMC had begun lowering its target rate in September 2007 but, as we argued previously, too slowly to offset the fall in equilibrium interest rates.

The transcripts of FOMC meetings in 2008 offer a glimpse into the distorted way that Fed staff had begun to think about the housing market. Even when they had originally attempted to cool the market in early 2006, their intention was to achieve a soft landing so that activity leveled off or slowed somewhat, but not enough to become destabilizing. In fact, by the time they started lowering the federal funds rate, they had achieved the soft landing. Inventories were declining while months of inventory climbed. In absolute numbers, inventories were higher than they had been in the earlier cycles, but if sales had recovered in early 2008, inventory would have settled back at normal levels in a few months.

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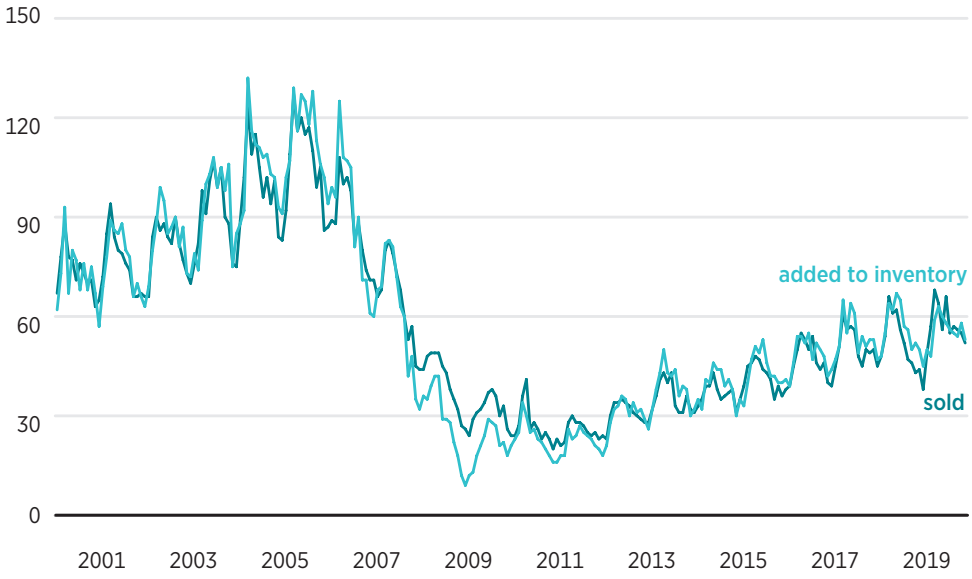
85. Sales and inventory data are from US Census Bureau, "New Residential Sales," accessed January 22, 2020, https://www.census.gov/construction/nrs/historical_data/index.html. Specifically, we consulted "Houses Sold" and "Houses for Sale" monthly data.

86. February was the bottom month for "New One Family Houses Sold: United States, Thousands, Monthly, Seasonally Adjusted Annual Rate." Sales of new homes under $200,000 appear to have finally bottomed in 2019. US Census Bureau, "New Residential Sales."

FIGURE 22. HOUSES SOLD VS. HOUSES ADDED TO INVENTORY, JUNE 1995 THROUGH JUNE 2019




Source: US Census Bureau, "New Residential Sales," accessed January 22, 2020, https://www.census.gov/construction/nrs/historical_data/index.html. Specifically, the authors consulted "Houses Sold" and "Houses for Sale" monthly data.

Inventory remained high *because of* declining sales. Figure 22 makes this visually clear in a comparison of homes sold and homes added to inventory.

The difference between those two measures each month is the change in inventory. Inventories were declining in 2008 because builders were adding fewer homes to the inventory than they were selling. But it is visually obvious that even a small increase in sales in 2008 could have quickly absorbed this inventory.

In January 2008, Fed staff told the FOMC members, "We continue to expect that sales will reach bottom in the first half of this year and then begin to edge up as mortgage credit availability improves. This stabilization in demand should allow single-family housing starts to level out at about 660,000[87] units by midyear."[88] This would have been a reasonable prediction if the United States had avoided a sharp fall in NGDP.

87. Seasonally adjusted annual rate.
88. FOMC, "Meeting of the Federal Open Market Committee on January 29–30, 2008" (transcript, Federal Reserve Board of Governors, Washington, DC, January 29–30, 2008), 23, https://www.federalreserve.gov/monetarypolicy/files/FOMC20080130meeting.pdf.

From 1972 to 2004, new home inventory had remained within a band from about 300,000 units to 400,000 units, only occasionally and temporarily moving much above or below that. It had reached 572,000 at the peak of inventory in 2006, but by August 2008 it had moved back down to 409,000, in spite of the lack of assistance from rising demand.

Mortgage credit availability did not improve as Fed staff had hoped. In fact, it worsened considerably in 2008. Yet as demand failed to recover, Fed staffers had a peculiar reaction to new home inventory.

At the August meeting, William Dudley, who was the manager of open market operations at the time, said,

> One thing that may signal the next phase, maybe the beginning of the end, is when people really do get a sign that the housing sector is starting to bottom, probably first in activity and then in price. Once that happens, the huge risk premium embedded in some of these mortgage-related assets will then collapse. That means that the mark-to-market losses in a lot of institutions will start to fall. So I think that is going to be a very, very important metric once housing starts to really bottom and people get some visibility about how much home prices will go down.[89]

Fed economist David Wilcox responded,

> The major factor that provides some reason for optimism is that construction starts are now low enough that builders are making progress in chipping away their inventory of unsold homes. The months' supply figures remain extraordinarily high because the denominator is very low; but in terms of units of unsold homes, my recollection is that we've chipped away about half the run-up in terms of absolute number of units in inventory. We also have starts continuing to come down materially from their current level. So we think that the process will begin to get inventories into a more normal alignment.[90]

By August, even though the FOMC members recognized that stability in housing was a key to broader stability, they had now started treating declining

89. FOMC, "Meeting of the Federal Open Market Committee on August 5, 2008" (transcript, Federal Reserve Board of Governors, Washington, DC, August 5, 2008), 11–12, https://www.federalreserve.gov/monetarypolicy/files/FOMC20080805meeting.pdf.
90. FOMC, "Meeting of the Federal Open Market Committee on August 5, 2008," 30.

starts as if they were part of the solution. Wilcox was *optimistic* because housing starts were so low. But the final corrections in new home inventory are always associated with *rising* housing starts. In addition to the two cycles in the 1970s, this was also the case in 1992 and 1997. The housing market and the broader economy needed a boost in demand. Instead, the Fed was pleased with an ongoing decline in housing.

Fed staff had made a similar comment in April 2008, and they echoed this sentiment again in September: "Starts have fallen so much now that, in fact, builders are making significant progress in working down the inventory of unsold new homes and even months' supply has tipped down of late. So we think that some things are looking a little better for us there."[91] At both of those meetings, citing inflation worries, the FOMC held the federal funds rate at 2 percent.

Unmoved by the broad panics that followed, in a speech on September 25, FOMC voting member Richard Fisher described the September rate decision speech as if it were dovish. In that speech, he mentioned Minsky's warning that the emergency loans that followed that decision would "set the stage for serious inflation."[92] This was the cusp of the worst single quarter of deflation and nominal economic collapse since the 1940s. New home inventory was well past due for a dose of demand. Monetary policy was disastrously tight. And yet, Fisher continued to warn of excesses:

> [Washington Irving] understood booms propelled by greed and tomfoolery and busts born of fear, and that these underlying forces are deeply rooted in human DNA. If this is a DNA issue, perhaps no financial system—no matter how enlightened its central bank or sophisticated its regulatory architecture or wise its Congress or executive—can prevent nature from running its course.[93]

In fact, by allowing NGDP to fall sharply, the Fed was artificially creating that course.

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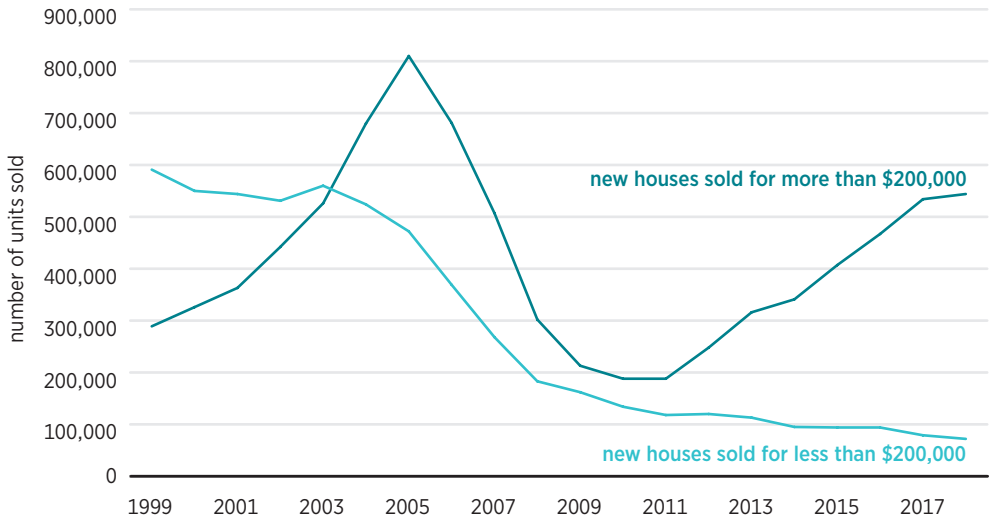
91. FOMC, "Meeting of the Federal Open Market Committee on September 16, 2008" (transcript, Federal Reserve Board of Governors, Washington, DC, September 16, 2008), 21, http://www.federalreserve.gov/monetarypolicy/files/FOMC20080916meeting.pdf.
92. Fisher, "Responding to Turbulence."
93. Fisher, "Responding to Turbulence."

FIGURE 23. NEW HOUSES SOLD BY PRICE




Source: US Census Bureau, "New Residential Sales, Houses Sold by Sales Price," accessed June 19, 2020, www.census.gov/construction/nrs/historical_data/index.html.

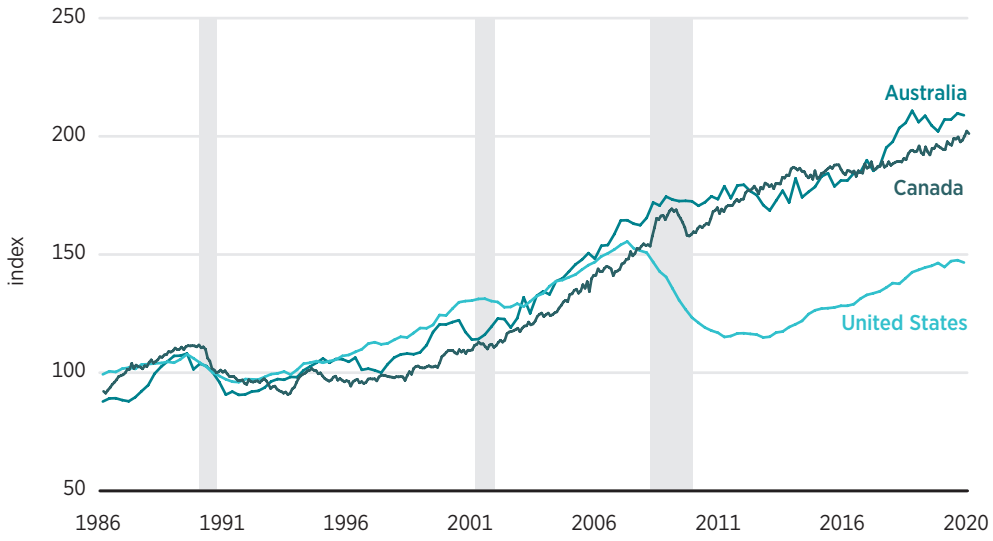
## Construction Employment and Vacancies

By 2009, the Fed had begun monetary stimulus, but mortgage markets continued to deteriorate. The lack of funding for entry-level homes is also clear in the Census Bureau's measure of homes built for sale by price. Before the crisis, more than 500,000 homes were built annually at price points below $200,000. Today, as shown in figure 23, fewer than 100,000 homes are being built annually at that price point. This is not because inflation has caused bracket creep for homes. Prices collapsed during this period of time, and in many of the most affordable markets, prices are not substantially higher than they were in 2005. Rather, this market is no longer being supplied in substantial quantities.

A tightening of lending standards has pushed the prices of existing low-tier homes below replacement cost. As a result, builders have difficulty building new units in those markets at prices that can compete with the low prices of existing units. The compression of price-to-rent ratios in those markets means lower prices, less supply, and rising rents for households that aren't able to borrow in this new regime.

Rising rents for young and working-class households are reducing their real incomes, and the decline in building has meant the loss of millions of

FIGURE 24. CONSTRUCTION EMPLOYMENT IN AUSTRALIA, CANADA, AND THE UNITED STATES




Note: Shaded gray areas represent recessions.

Source: FRED Economic Data, Federal Reserve Bank of St. Louis, "Employment by Economic Activity: Construction: All Persons for the United States, Q1 1991 = 100," "Employment by Economic Activity: Construction: All Persons for Canada, March 1991 = 100," and "Employment by Economic Activity: Construction: All Persons for Australia, Q1 1991 = 100" (datasets), accessed June 15, 2020, https://fred.stlouisfed.org/graph/?g=o7yb.

construction jobs that might otherwise have made up for some of the losses in manufacturing employment; see figure 24.

Construction employment had topped out at 7.7 million, where it remained from February 2006 to July 2007. It would bottom at 5.4 million in January 2011, about the time when new home sales finally began to slowly increase.[94] Appropriately stimulative Fed policy in 2008 would have prevented much of the loss of construction employment and would have eliminated the remaining overhang of housing inventory. An oversupply of housing did not cause a construction employment shock that led to the Great Recession and the financial crisis. Rather, the Fed induced a delayed recovery in homebuilding demand that led to a financial crisis and then to a construction employment shock. Lending regulations that have all but killed the entry-level single-family market have prevented the construction employment shock from recovering.

The notion of housing excess was so entrenched that, even in 2011, Ben Bernanke believed that construction remained slow because the inventories of

94. FRED Economic Data, Federal Reserve Bank of St. Louis, "All Employees, Construction (USCONS)" (dataset), February 25, 2020, https://fred.stlouisfed.org/series/USCONS.

the boom were still being worked off *six years after inventories had peaked*. Bernanke wrote in his memoir, "Normally, a rapid rebound in home construction and related industries such as realty and home improvement helps fuel growth after a recession. Not this time. Builders would start construction on only about 600,000 private homes in 2011, compared with more than 2 million in 2005. To some extent, that drop represented the flip side of the pre-crisis boom. Too many houses had been built, and now the excess supply was being worked off."[95] Even without the help of rising sales, however, new home inventory had reached a 38-year low by the end of 2009.

In terms of prices and construction, Australia, Canada, and the United States all had quite similar housing booms up until 2006. Thus, it is not clear why the United States required a contraction in construction during a period when Canada and Australia saw continued growth. A comparison of trends in construction employment with Canada and Australia highlights the effects of the US housing crash on employment, both cyclically and secularly. First, construction employment dropped along with the steep NGDP contraction in the United States. Even after the recession ended, however, construction remained low, which slowed the recovery in construction jobs.

Construction employment declines were broad based across the United States, falling by 30 percent from 2007 to 2011. Of the 43 states with data, the peak-to-trough decline in construction employment exceeded 15 percent in all and exceeded 20 percent in all but two. The shock was national.

The contagion cities experienced rising vacancies after migration began to decline. Rental vacancies increased from about 9 percent in 2005 to 14 percent in 2009, then fell back to about 9 percent by 2013.[96] Among the closed-access cities, rental vacancies were low throughout the period. Their average vacancy rate was about 6 percent in 2005, 6 percent in 2009, and 6 percent in 2013.

Out of the 20 most populous metropolitan areas, 11 were not closed-access or contagion cities. Rental vacancies had risen among those 11 cities earlier in the decade but were not associated with increased local building. Rental vacancies were relatively flat in those cities after 2003, averaging near 12 percent from 2003 to 2010, then declining.

95. Bernanke, *The Courage to Act*, 503.

96. In each case, we use the population-weighted average of the cities referenced. The vacancy rate of owned homes is much lower and less volatile than rental vancancies. Nationally, it increased from 1.7 percent in 2004 to 2.8 percent in 2008, most of that coming after 2005, when homebuilding was in steep decline.

The evidence that there was a systemically important amount of overbuilding anywhere is weak. While a period of lax underwriting occurred, the lack of a connection between that lending and oversupply of housing requires a wholesale reexamination of macroeconomic policies during the crisis. The conventional approach assumes the counterfactual, "What would have happened if the United States didn't have so many dangerous mortgages during the worst collapse in housing market demand since the Great Depression?" But the counterfactual that is relevant is "What would have happened to those dangerous mortgages and mortgage securities if the worst collapse in housing market demand since the Great Depression hadn't occurred?" Between 2006 and 2011, Fed officials treated a 30 percent drop in construction employment as an inevitable correction. If that presumption was mistaken, then the crisis that occurred may have been caused by monetary policy, not reckless lending and excessive construction. This points to the need to rethink the relationship between monetary policy and asset markets.

## IV. CONCLUSION: A NEW FRAMEWORK IS NEEDED FOR THE HOUSING BOOM AND MONETARY POLICY

In this paper, we have shown that the conventional view of the recent housing cycle and Great Recession is not persuasive on either empirical or theoretical grounds. We have presented an alternative explanation that is based on the idea that both monetary policy and banking regulations were more procyclical than has been widely recognized. Thus, both monetary and credit policies became much more restrictive during 2008, and these restrictive policies greatly increased the severity of the Great Recession. We fear that a widespread misdiagnosis of the causes and the nature of the housing cycle and the Great Recession has led policymakers to draw the wrong conclusions about how to prevent future economic crises.

During the 1970s, the Fed really did engage in excessive stimulus as inflation and NGDP growth hit double digits. During that period, residential price appreciation was strong, but stock prices stagnated in real terms. In contrast, core PCE inflation hasn't even topped 2.5 percent over the past two decades, yet excess monetary stimulus has often been blamed for *high* asset prices before the 2008 crisis, and even today:

> San Francisco Fed President John Williams said in a speech on Sept. 28 [2015] that he sees "signs of imbalances" emerging in asset prices—especially real estate. After saying that conditions

> haven't yet reached a tipping point, he recalled that in the mid-2000s it was too late to "avoid bad outcomes" by raising interest rates once the housing boom was in full swing.
>
> Williams told reporters on Oct. 1 [2015] that his housing market warning is "not about fighting bubbles, or trying to deal with financial stability"—it's more a response to why interest rates need to rise even though inflation remains low. "The reason you don't just let an economy rip—let it grow, and grow, and grow, and just see what happens, is because that usually ends badly."[97]

If our view is correct, it would be a mistake for policymakers to slow the economy in an attempt to prevent bubbles, which, in any case, are not easy to identify in real time. Instead, we would recommend a policy regime aimed at stabilizing the broader economy, allowing for healthy growth in living standards. That regime would have three components.

1. Reforms to zoning regulations that would allow for more construction of new housing, especially in highly productive cities where growth is currently constrained by high housing prices.
2. A banking regulatory regime that avoids procyclical swings in regulation. The optimal set of banking regulations is beyond the scope of this paper, but the experience of the Great Recession shows that, at a minimum, the United States needs to avoid a situation where lending regulations are most lax during booms and tightest during recessions. This sort of procyclical regulatory pattern almost certainly exacerbated the severity of the Great Recession.
3. NGDP targeting, or something closely related. Monetary policy is a complex issue, and here we can only indicate the broad outlines of a new approach. Rather than targeting inflation and unemployment, a monetary regime that leads to a relatively stable rate of NGDP growth will provide an environment conducive to a stable labor market and a stable financial system. Fluctuations in NGDP growth tend to destabilize the labor market and create a boom-and-bust cycle in the credit markets. Attempts to use monetary policy to pop bubbles in individual asset markets, such as real estate, will often end up destabilizing the overall economy.

97. Jeanna Smialek, "Home Price Rebound Creeps into Policy Debate of Bubble-Wary Fed," *Bloomberg Brief: Real Estate*, November 23, 2015, 12.

There are two primary advantages to stable NGDP growth. First, because most labor contracts specify nominal wages, unstable NGDP growth causes undesirable changes in total employment. Michael Woodford shows that while NGDP targeting may not be precisely optimal, it produces relatively good results in a New Keynesian model of the business cycle.[98] This is especially true when interest rates are at zero, which is widely expected to occur during future recessions. As a result, during recent years, an increasing number of prominent macroeconomists have endorsed NGDP targeting.

Second, a number of studies have also suggested that NGDP targeting is more effective than inflation targeting in producing financial stability.[99] Once again, this is owing to the fact that most debt contracts are specified in nominal terms. Thus, NGDP is both the total income available to companies to pay workers and also the total income available to borrowers to repay loans. Rather than focus on asset price bubbles, policymakers would do better to create an environment of nominal income stability, which avoids introducing extra volatility into labor and financial markets.

And when mistakes do happen, a level targeting regime, i.e., a commitment to return to the previous trend line, can allow for faster recoveries. Implementing such a regime now will help the United States avoid future economic crises.

98. Michael Woodford, "Methods of Policy Accommodation at the Interest-Rate Lower Bound" (working paper, Columbia University, New York, 2012).
99. Kevin Sheedy, "Debt and Incomplete Financial Markets: A Case for Nominal GDP Targeting," *Brookings Papers on Economic Activity* 45 (Spring 2014): 301–73; Evan Koenig, "Like a Good Neighbor: Monetary Policy, Financial Stability, and the Distribution of Risk," *International Journal of Central Banking* 9, no. 2 (2013): 57–82; James Bullard and Riccardo DiCecio, "Optimal Monetary Policy for the Masses" (Federal Reserve Bank of St. Louis Working Paper 2019-009C, 2019).

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