

Understanding Recent Trends in House Prices and Home Ownership.¹

By Robert J. Shiller²

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This paper looks at a broad array of evidence concerning the recent boom in home prices, and considers what this means for future home prices and the economy. It does not appear possible to explain the boom in terms of fundamentals such as rents or construction costs. A psychological theory, that represents the boom as taking place because of a feedback mechanism or social epidemic that encourages a view of housing as an important investment opportunity, fits the evidence better. Three case studies of past booms are considered for comparison: the US housing boom of 1950, the US farmland boom of the 1970s, and the temporary interruption 2004-5 of the UK housing boom. The paper concludes that while it is possible that prices will continue to go up as is commonly expected, there is a high probability of steady and substantial real home price declines extending over years to come.

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While home price booms have been known for centuries, the recent boom is unique in its pervasiveness. Dramatic home price booms since the late 1990s have been in evidence in Australia, Canada, China, France, India, Ireland, Italy, Korea, Russia, Spain, the United Kingdom, and the United States, among other countries.³ There appears to be no prior example of such dramatic booms occurring in so many places at the same time.

Within the United States, the current boom differs from prior booms in that it is much more of a national, rather than regional, event. In the current boom, successive rounds of regional home price booms have occurred that eventually became what can be called a national boom.

The boom showed its first beginnings in 1998 with real (inflation-corrected) home price increases first exceeding ten percent in a year on the west coast, in the glamour cities San Diego, Los Angeles, San Francisco and Seattle. The incipient boom then attracted only moderate attention since it was confined to the west coast, and the cumulative price gain was still not dramatic. But the boom quickly spread east, with 10% one-year real home price increases appearing in Denver and then Boston in 1999. These cities kept on appreciating at a high rate.

³ According to OECD data, in 2006 nominal home price inflation exceeded 10% a year in 8 of 18 OECD member countries. Real price increases exceeded 10% a year in five of these countries. Japan was the only country to show a nominal or real price decline in 2006, and house prices there have been declining steadily since 1992. See *OECD Economic Outlook*, May 2007, Statistical Annex, Table 59, House Prices.

As years went by yet new cities started seeing substantial real home price increases. Even though it was a recession year, Miami, Minneapolis, New York, and Washington DC began to see 10% real price increases in 2001. Then there arrived the late entrants, who compensated for their delay with the intensity of their price boom. Las Vegas first saw a 10% annual real home price increase in 2003, and real home prices shot up 49% in 2004. Phoenix first saw a 10% real price increase in 2004 and then real home prices shot up 43% in 2005. And still, as of that date most of the other cities were still going up at substantial rates. The result of this succession of booms, in so many places has been a massive increase in national home prices over a period of nearly a decade. The boom was tempered somewhat by the fact that some cities never experienced booms. In Atlanta, Charlotte, Chicago, Cleveland, Dallas and Detroit there was no year since 1998 in which real home prices increased by 10% in a year, though even these cities showed some increases.

Figure 1 shows, with the heavy line, the S&P/Case-Shiller National Home Price Index for the United States, corrected for inflation using the Consumer Price Index. This shows the market situation at the national level. Nationally, real home prices rose 86% between the bottom in the fourth quarter of 1996 and the peak 9.25 years later in the first quarter of 2006.

This dramatic price increase is hard to explain, since economic fundamentals do not match up with the price increases. Also shown on the figure is an index of real owner occupied rent (thin line). Real rent has been extremely stable when compared with price. Real rent increased only 4% from the 1996-IV to 2006-I. The rent figures indicate that

there has been virtually no change in the market for housing services, only in the capitalization of the value of these services into price.

The boom in real home prices since 1996-IV cannot be explained by rising real construction costs either, even though there appears to be a common idea, among the general public, that it might. Using data from Engineering News Record (2007), and correcting it for inflation with the CPI-U, one finds that while the real price of ½-inch gypsum wallboard rose 41% from the trough in real home prices in 1996-IV to the peak in real home prices in 2006-I, the real price of 5/8-inch plywood rose only 9%, and the real price of 2x4 common lumber actually *fell* 32%. Labor costs are the single most important component of building costs, and these showed little change as common-labor earnings have stagnated. The Engineering News Record Building Cost Index corrected for inflation showed relatively little change over this interval. In fact the index corrected for CPI inflation showed a slight decline from 1996-IV to 2006-I, as can be seen in Figure 1, dotted line.

Note that real owners' equivalent rent and real building costs track each other fairly well, as one might expect. But neither of them tracks real home prices at all, suggesting that some other factor—I will argue market psychology—plays an important role in determining home prices.

The boom may be coming to an end in the United States where a sharp turnaround in home prices can be seen in the bold line in Figure 1, with real home prices falling 3.4% since the peak in the first quarter of 2006. Anecdotal reports are also appearing within the last year of a softening of the boom or even outright falls in home prices in other countries as well, but the data already in do not yet show this, and, on the contrary, some

countries still seem to be appreciating fast. The latest S&P/Case-Shiller Home Price Indices (for May 2007) even show a slight strengthening of the housing market in a number of cities.

When there are declines, they may be muted at first, and disguised by noise. Home sellers tend to hold out for high prices when prices are falling.⁴ The 17% decline in the volume of US existing home sales since the peak in volume of sales in 2005 is evidence that this is happening now.

The market for homes is clearly not efficient, and shows enormous momentum from year to year, as Karl Case and I first demonstrated in 1988. We attributed this inefficiency to the high transactions costs associated with this market, which make exploitation of the inefficiency prohibitively expensive. In May 2006 the Chicago Mercantile Exchange, in collaboration with the firm I co-founded, MacroMarkets LLC, created futures and options markets for US single family homes that are cash-settled using the S&P/Case-Shiller home price indices. Some day these markets may have the effect of making home prices more efficient, but these markets still are not big enough to affect the cash market very much. Given the tendency for long trends in home prices, and given the downward momentum in price and high valuation relative to rent, the possibility of a substantial downtrend in home prices over many years into the future must be considered.

The implications of this boom and its possible reversal in coming years stand as a serious issue for economic policy makers. It may be hard to understand from past experience what to expect next, since the magnitude of the boom is unprecedented. The

⁴ Genesove and Mayer (2001) have shown with data on individual purchases and sales that people who bought their homes at high prices are reluctant to sell at a lower price, apparently due to regret or loss aversion.

implications of the boom have produced difficult problems for rating agencies who must evaluate the impact of the boom on securities such as the collateralized debt obligations (CDOs) that have burgeoned in the U.S. from virtually nothing at the beginning of the housing boom to approximately \$375 billion issued in 2006. The trickiest problem these agencies face in assessing these securities, many of which are backed by subprime mortgages, is correlation risk (the risk that many of the real-estate-backed assets will default at the same time) a risk that is directly connected to the risk of a macro real estate bust that may or may not follow the unprecedented boom.

In this paper, I will consider, from a broad perspective, the possible causes of this boom, with particular attention to speculative thinking among investors. I will argue that a significant factor in this boom was a widespread perception that houses are a great investment, and the boom psychology that helped spread such thinking. In arguing this, I will make some reliance on the emerging field of behavioral economics. This field has appeared in the last two decades as a reaction against the strong prejudice in the academic profession against those who interpret price behavior as having a psychological component. The profession had come to regard all markets as efficient, and to reject those who say otherwise. Now, however, behavioral economics is increasingly recognized, and has developed a substantial accumulation of literature that we can use to give new concreteness to ideas about psychology in economics.

Feedback and Speculative Bubbles

The venerable notion of a speculative bubble can be described as a feedback mechanism operating through public observations of price increases and public

expectations of future price increases. The feedback can also be described as a social epidemic, where certain public conceptions and ideas lead to emotional speculative interest in the markets and, therefore, to price increases; these, then, serve to reproduce those public conceptions and ideas in more people. This process repeats again and again, driving prices higher and higher, for a while. But the feedback cannot go on forever, and when prices stop increasing, the public interest in the investment may drop sharply: the bubble bursts.

This basic notion of the underpinnings of speculative bubbles can be traced back hundreds of years in the writings of commentators on speculative markets. The germ of the idea seems to go back to the time of the tulip mania in Holland in the 1630s (Shiller 2003). But academic economists have long been cool to the idea that such feedback drives speculative prices, and it has remained, until recently, largely in the province of popular journalists. Academic economists who wrote about them (Galbraith 1954, Kindleberger 1978) found that the academic profession, while in some dimensions interested in their work, largely distanced itself from their views. Part of the academic resistance has to do with unfortunate divisions in the profession: the notion of a speculative bubble is inherently sociological or social-psychological, and does not lend itself to study with the essential tool bag of economists.

In my book *Irrational Exuberance* (2000, 2005), named after a famous remark of Alan Greenspan, I developed this popular notion of bubbles. I argued that various principles of psychology and sociology whose importance to economics has only recently become visible to most economists through the developing literature on behavioral economics help us to lend more concreteness to the feedback mechanism that creates

speculative bubbles. These principles of psychology include psychological framing, representativeness heuristic, social learning, collective consciousness, attention anomalies, gambling anomalies such as myopic loss aversion, emotional contagion, and sensation seeking.

I argued that the feedback that creates bubbles has the primary effect of amplifying stories that justify the bubble; I called them “new era stories.” The stories have to have a certain vividness to them if they are to be contagious and to get people excited about making risky investments. Contagion tends to work through word of mouth and through the news media. It may take a direct price-to-price form, as price increases generate further price increases.

News commentators on speculative phenomena clearly have the idea that contagion may be at work but tend to stay away from a really sociological view of speculative bubbles. They do not hear professional economists refer to such feedback often, so they are not confident of such a view. They tend to revert back to the comfortable notion that markets are efficient or that everything that happens in speculative markets ultimately comes from actions of the monetary authority. The social epidemic model, with its psychological and sociological underpinnings, is too poorly understood by economists in general to be represented as an authoritative view in media accounts.

I argued that a new era story that has been particularly amplified by the current housing boom is that the world is entering into a new era of capitalism, which is producing phenomenal economic growth, and at the same time producing both extreme winners and unfortunate losers. The phenomenal growth seen recently in China and India

is part of the story, and the growing abundance of rich celebrities and extravagantly paid CEOs is another. The new era story warns people that they have to join the capitalist world and buy their homestead now, before it is priced out of reach by hordes of wealthy new investors. I also listed a number of other driving factors, partially or totally independent of this story that also helped drive the housing boom.

That the recent speculative boom has generated high expectations for future home price increases is indisputable. Karl Case and I first discovered the role of high expectations in producing the California home price boom in the late 1980s. We did a questionnaire survey in 1988 of home buyers in the boom city Los Angeles (as well as Boston and San Francisco) and compared the results with a control city, Milwaukee, where there had been no home price boom then.

The homebuyers were asked: "How much of a change do you expect there to be in the value of your home over the next 12 months?" For Los Angeles in 1988, the mean expected increase was 15.3% and the median expected increase was 11%. The mean was higher than the median in Los Angeles since about a third of the respondents there reported extravagant expectations, creating a long right tail in the distribution of answers. For Milwaukee in 1988 the mean expected increase was only 6.1%, and the median was only 5%. From this and other results from the survey we concluded that the 1980s boom in Los Angeles relative to Milwaukee appears to be driven by expectations.

Case and I are now, beginning in 2003, repeating the same survey annually in the same cities. In 2003, with the same question as above, the reported expectations in Los Angeles were almost as heady as they were in 1988: the mean expected increase was 9.4%, the median 10%. This time, however, the expectations of a good fraction of the

people in Milwaukee had converged upwards towards those of Los Angeles: the mean expected increase was 8.6%. The median expected increase remained still low, at 5%. Given that the Milwaukee housing market had not boomed substantially as of 2003, one wonders why the expectations of a good fraction of its inhabitants matched those of people in Los Angeles. Expectations of home price increase are probably formed from national, rather than local evidence for many people, especially at a time of national media captivation with the real estate boom.

By 2006, as the housing market in Los Angeles was still going up but showed definite signs of weakening, the answers for the same question produced a mean expected price increase of only 6.1% and a median expected price increase of only 5%. In Milwaukee, the mean expected increase also cooled somewhat, to 6.8%, while the mean remained at 5%.

By 2007, after the housing market in Los Angeles dropped 3.3% (between May 2006 and May 2007, according to the S&P/Case-Shiller Home Price Index), the answers for the same question (preliminary results) produced a mean expected one-year price increase of -0.7% and a median expected one-year price increase of 0%. In Milwaukee, the answers showed a mean expectation of 6.5% and a median of 3%.⁵

Thus, our expectations data show remarkable confirmation of an essential element of the bubble story: times and places with high home price increases show high

⁵ Our survey also asks for ten-year expectations. These remain high in our 2007 (preliminary) results. In Los Angeles, the reported expectation for the average annual price increase over the next ten years was 9.6% and the median was 5%. In all the cities we surveyed in 2007, only one respondent in 40 expects a decline over the next ten years. Thus, there is little alarm about the state of the housing market for relevant investor horizons, and that perhaps explains why consumer confidence has not been harmed by the weakening housing market. It may also help explain why there is not panic selling, and suggests that home prices may yet recover.

expectations of future home price increases, and when the rate of price increases changes, so too do expectations of future price increases, in the same direction.

Many people seem to be accepting that the recent home price experience is at least in part the result of a social epidemic of optimism for real estate. But the idea that the single most important driver of the housing boom might be such a story, and not something more tangible like the policies of the central bank, has never really taken hold in public consciousness. People love to exchange stories of crazy investors or property flippers, but most just cannot seem to integrate such stories into a view of the movements of economies and markets. They do not accept that the market outcomes are the result of a world view, a *Zeitgeist*, that is encouraged by stories and theories whose contagion as ideas is amplified by the excitement surrounding the price increases.

We should still be careful not to overemphasize bubble stories in interpreting market movements. There are other factors that drive prices. Of course, monetary policy, which has the potential to affect the level of interest rates and hence the discount rate, is an important factor. But, even beyond monetary policy, it must be appreciated that there are many factors that drive decisions to purchase long-term assets such as housing. The decision to buy a house is a major life decision for most people, and is affected by all the factors that people consider when deciding on their life style and purpose. The decision is postponable, and so anything that attracts attention to or away from housing can have a significant effect on the state of new construction.

Housing seems not to have been a very speculative asset until the last few decades, except in a few places where there is a story that encourages people to think that housing may be especially scarce. The conventional view among economists until

recently has been that housing prices are driven primarily by construction costs. For example, this view was neatly laid out in 1956 by Grebler, Blank and Winnick.

It is not surprising that people did not view housing as a speculative asset: almost all of the value of houses has been value of structure, which is a manufactured good. From this view, there would be no reason to think that one can make money by buying houses and holding them for resale than that one can make money by buying tables and chairs and holding them for resale. People apparently knew that home prices were dominated by structure prices. The recent real estate boom has changed this. According to a recent study by Davis and Heathcote, the percent of home value accounted for by land in the United States rose from 15% in 1930 to 47% in 2006.

Whether this higher fraction of value attributed to land is a stable new equilibrium or is a temporary phenomenon induced by a speculative bubble remains to be seen. Today, agricultural land sells for less than \$2000 an acre, or about \$300 per lot-sized parcel, a miniscule number compared to the cost of a structure. Of course, this is usually land in the wrong place, far from the urban areas and jobs and schools that people want to get on with their lives. But there is reason to expect that as existing urban land becomes very expensive relative to structures, there will be efforts to substitute away from that land, and so the fraction of value attributed to land in housing may be expected to mean-revert. Such substitution takes time.

New urban areas can be built elsewhere on land that is now cheap. Cities can economize on land by raising the population density and building high-rises. Already there is a movement advocating cities which, like Manhattan, or various urban areas in Europe and Asia, emphasize public transport, tall buildings bringing large numbers of

people together. Such cities are highly attractive to many people because of the diversity of opportunity and entertainment there, and also simply because of the feeling of excitement of crowds. Such cities make very economical use of land. Many more such cities can be built in the future, though, especially in the US, such new cities run against conventional notions of suburbia and automobile-based life.

Christopher Leinberger (2007) has shown that there is an increasing demand for “walkable urban centers,” and finds that prices of living space in such centers goes at a premium. This premium reflects tastes for a city with lots of attractions nearby, within walking distance. This taste is not being rapidly fulfilled because of coordination problems and zoning restrictions. But, some developers have been able to crack this nut. He gives as an example Reston Town Center built on then-cheap land in the country that surrounds Washington DC. It was planned starting in 1961 by developer Robert E. Simon, whose initials form the first part of the town name. He launched a campaign to get the Fairfax County Board of Supervisors to pass an ordinance allowing high-density housing there. The Town Center was dedicated in 1990. It is now a cluster of high rises that mimics a city center. Values per square foot are comparable there to those of large city centers. This and other examples prove that the quality of life in downtown glamour cities is reproducible, if only zoning does not stand in the way.⁶ It is plausible, then, that the economic pressure for more such spaces will eventually give way into the further development of such projects. The supply of houses will increase without substantial land shortage problem.

⁶ Glaeser and Gyourko (2002) present evidence that zoning restrictions are an important reason for high prices in urban areas. Comparing across major US metropolitan areas, they found no substantial correlation between housing density and housing prices, as one would expect to see if mere high demand for urban land drove home prices.

Concern about pollution, the environment and energy costs may also provide an impetus to move towards such cities. But the expectation that such new urban areas will be built is not a certainty yet, and will unfold if it does over many years.

Concern about economic inequality, which has been growing for decades now in most countries of the world, also has the potential to reduce barriers to the increase in the supply of housing and to bring prices down. For example, one of the first actions Gordon Brown took upon becoming Prime Minister was to offer a number of proposals to encourage the construction of millions of new homes to relieve people priced out of the housing market.

Gyourko, Mayer and Sinai have gotten great attention for a paper arguing that it may be reasonable to suppose that great cities will indefinitely outperform the economy in general. They found that some “superstar cities” have shown long-term, that is 50-year, appreciation above national averages. But, their study found only relatively small excess returns to homes in those cities. They use Census decadal owners’ evaluations of the value of their homes. They report much smaller differences across cities than people expect. Their paper found that Los Angeles grew at 2.46% a year real 1950-2000, but this is far below the kind of expectations we have seen recently. According to our surveys, homebuyers in Los Angeles had a mean expectation for ten-year nominal price growth of 9.4% and a median of 10% in 2003. Moreover, in the decadal Census data there is no correction for quality change, and yet homes have been getting larger in the superstar cities, so the actual appreciation of existing homes was likely even less than 2.46% a year.

Considering the really long term, the centuries over which these cities persist, it is hardly reasonable to expect much more than a 1% a year advantage in those cities in the long term, for that would mean doubling every 69 years relative to other cities. If New York City were on the same price level as other cities at the time of the American Revolution, at a 2% per year relative advantage in appreciation a home there would now cost a hundred times as much as the same home in other cities—hardly plausible.

The Coldwell-Banker Home Price Comparison Index compares the price of a standard home across cities. They price “a single-family dwelling model with approximately 2,200 square feet, 4 bedrooms, 2 1/2 baths, family room (or equivalent) and 2-car garage . . . typical for corporate middle-management transferees.” They report that Beverly Hills, California, the home of movie stars, was the study’s most expensive market in 2006, with the price of the standard home there at \$1.8 million. The average price of their standard home, averaging over all cities in 2006, was \$423,950. Thus, the home in Beverly Hills is only 4 times more expensive than the average home. If we can assume that Beverly Hills emerged into maximum movie-star status over the space of a hundred years, this amounts to only a little over 1% a year excess return. Thus, a 1% a year advantage is about the reasonable limit. For most investors in the recent boom environment, this is way under their expectations. Moreover, as Gyourko, Mayer and Sinai themselves pointed out, even the small advantage in appreciation that they claimed to find for the superstar cities has been offset by a lower rent-price ratio in those cities.

Home Ownership and Consumption of Housing

Speculative booms in houses are unusual because purchasing a house is both an investment decision and a consumption decision. Moreover, the decision to purchase rather than rent is a decision not only to consume different kinds of housing services but also to lead a different kind of life; this difference has political ramifications, and so the purchase decision enters the arena of politics.

In the United States, the home price boom since the late 1990s was accompanied by a substantial increase in the home ownership rate (the percent of dwelling units owned by their occupants, as recorded by the U.S. Census). As can be seen from Figure 2, in the U.S. there were actually two time periods in the last century over which the home ownership rate increased, from 1940 to 1960, and again during the recent home price boom, since the mid 1990s. Between these two periods the homeownership rate was fairly constant. The first period of increase, between 1940 and 1960, showed the more dramatic increase; this increase was substantially the result of new government policies to encourage home ownership after the surge of mortgage defaults during the Great Depression of the 1930s.

The increase since 1994 in home ownership appears to be due in large part to the remarkable housing boom. The boom psychology encouraged potential homeowners and encouraged lenders as well. Home buyers were encouraged by the potential investment returns. Mortgage lenders were encouraged since the boom reduces the default rate on lower-quality mortgages. The subprime mortgage market was virtually nonexistent before the mid 1990s, and rose to account for a fifth of all new mortgages by 2005. Denial rates

for mortgage applications plunged after around 2000. The new loans went disproportionately to lower income borrowers, and to racial and ethnic minorities.⁷

The change appears to be the result of changes in public expectations for the real estate market, rather than changes in government policy. Unlike the 1940s-60s boom in homeownership, the current boom is not largely due to government initiatives to increase the homeownership rate. Instead, there has been a uniform background of government approval for homeownership over a long time period.

There has long been a popular view that homeownership is a thing to be encouraged, and as a result philanthropists and government officials have tried to do so.

The U.S. Civil War 1860-65 was blamed by contemporaries on a low level of home ownership in the South: “Ownership of real estate by its citizens is the real safeguard for the government. Where such a condition is almost universal, as in the Northern States, a revolution to destroy the government which guarantees that title is next to an impossibility. Had the system prevailed in the South, the people would not have been dragooned into rebellion”⁸

The cooperative bank movement of the 19th and 20th centuries was motivated by a similar view. This movement was lauded in 1889 for its effects on poor people: “It has taken them out of the tenement houses and freed them from the baneful influences which are apt to exhale therefrom.”⁹

There is some empirical support for the view. DiPasquale, Forslid and Glaeser (2000) have found that homeowners tend to be more involved in local government, are

⁷ Gramlich, Edward M., *Subprime Mortgages*, 2007.

⁸ “The Renovation of the South,: *Liberator*, 35:32, p. 126, August 11, 1865

⁹ “Cooperative Banks in Massachusetts,” *The Bankers Magazine and Statistical Register*,” 43(8):610, February 1889.

more informed about their political leaders and join more organizations than renters do, even after controlling for other factors. The evidence for this view has led to widespread political support for policies that encourage homeownership over much of the world.

On the other hand, contrary to expectations suggested by much of the literature on homeownership, homeownership rates across countries are not well explained in terms of any economic or demographic variables. Fisher and Jaffe (2002) could explain only 50% of the cross-country variability of homeownership rates. They found that in cross-country studies the homeownership rate is *negatively* correlated with GDP per capita.

There is, however, likely to be a limit on how far public policy should attempt to encourage homeownership. There are many sensible reasons for people to rent rather than own: people who cannot currently bear the responsibilities of household management, who are likely to move soon or who have other plans for their time, should rent rather than own. Renting rather than owning encourages a better diversification of investments; many homeowners have very undiversified investment portfolios, and these investments are often highly leveraged. Moreover, creating too much attention to housing as investments may encourage speculative thinking, and therefore, excessive volatility in the market for homes. Encouraging people into risky investments in housing may have bad outcomes. It is possible that some countries have overreached themselves in encouraging homeownership (UN-Habitat 2002).

One might suppose that the increase in home ownership is associated with an increased share of consumption allocated to housing. However, as can also be seen from the figure, which shows housing as a percentage of personal consumption expenditures from 1929 to 2007, the share of consumption expenditures allocated to housing has

stayed fairly constant at about 15% over the time interval, except for a temporary dip during World War II.¹⁰ Housing expenditures include both the rent of tenant-occupied housing and the imputed rental value of owner-occupied housing. The U.S. Bureau of Economic Analysis computes the latter based on rents of similar tenant-occupied housing.¹¹ Thus, their calculations indicate that the amount of housing consumed has not increased as a fraction of total consumption; the increase in the homeownership rate reflects merely the switch from renting to owning of comparable-valued properties. Their numbers are not affected by the home price boom since the numbers are based on rents, not prices, of homes.

Residential Investment

Residential investment is a volatile component of GDP in the U.S. and it has had a highly significant relation to the business cycle. Residential investment represents essentially all economic activity directly related to housing structures. It is comprised of three main components: construction of new single family homes, construction of new housing units in multifamily structures, and “other structures,” which includes improvements as well as brokerage commissions.

Figure 3, which was inspired by the work of Edward Leamer, as presented in his paper at the 2007 Jackson Hole conference, shows residential investment as a percent of GDP (quarterly 1947-I to 2007-II). We see that residential investment has gone through

¹⁰ Corresponding to this, the PCE deflator gave the price of housing shelter a weight of 15.0% in December 2004. The consumer price index, in contrast, gave housing shelter a weight of 32.7% in that month. See Brian C. Moyer, “Comparing Price Measures—The CPI and the PCE Price Index, National Association for Business Economics, 2006, http://www.bea.gov/papers/pdf/Moyer_NABE.pdf.

¹¹ Mayerhauser and Reinsdorf 2006.

cycles that correspond closely to the ten recessions since 1950, as marked on the figure by business cycle dates computed by the NBER. Notably, residential investment as a percent of GDP has had a prominent peak before almost every recession since 1950, with a lead varying from months to years. There are only a couple of examples of such peaks that are not accompanied by recessions. Most striking from the figure is that ends of recessions were always marked by sharp upturns in residential investment, within months of the end of the recession. The latest recession (2001) shows the least drop in residential investment as compared with all prior recessions shown, suggesting that the relation between housing investment and the business cycle may be changing.

Figure 3 also shows the real federal funds rate (end of month, monthly) computed by subtracting the rate of increase of the CPI-U for the latest twelve months. Note that the relation of the real funds rate to recessions is rather more ambiguous than the relation of residential investment to recessions.

The extraordinary behavior of residential investment in recent years, especially since 2000, stands out. Residential investment rose to 6.3% of GDP in the last quarter of 2005, the highest level since 1950. We will consider the year 1950 as a case study below. But, we can note at first here that the 1950 economy was of course very unusual, for it followed World War II, a period when residential construction had been sharply curtailed for the war effort. After the war, there was a phenomenal baby boom, which translated into a sharply increased demand for housing after the war had decreased the supply. No fundamental shock approaching the magnitude of the World War II shock appears to have been at work in the post-2000 residential investment boom.

The right-most part of the figure can be used to illustrate a popular story for the latest home price boom, a story that it was all caused by the Fed. The real funds rate was cut sharply after 2000, and the housing boom (as measured by investment) took off. Then, in 2003, the Fed started raising real interest rates, and, following that, with a lag of a couple years, residential investment fell sharply. This story, which one repeatedly hears casually suggested, puts the full blame for the housing boom and bust on the Fed. The accuracy of this story in corresponding to the data since 2000 can be visualized in the chart by noting the almost mirror-opposite of the two series since 2000.

But, the story is clearly an oversimplification at best as a model, because the same relation between residential investment and the funds rate had never been seen before in the entire period since 1950. In fact, before 2000, one sees rather more a positive, not negative relation between the real funds rate and residential investment as a percent of GDP. From the figure, it appears that just as good a story for a number of recessions would be that the Fed cut rates in response to weakening housing investment prior to the recession than that it caused the declines in housing investment by raising rates.¹²

Broad Historical Comparisons

There have been many real estate booms in history and real estate cycles that may be variously described as speculative booms or mere construction booms without any speculative enthusiasm.

¹² In his remarks at the Jackson Hole Symposium (2007) , John B. Taylor discussed a model of U.S. housing starts in terms of just the federal funds rate, involving lags, estimated with quarterly data 1959 to 2007. He concluded that the model “tracks historical data on housing starts very closely” for the period 2000 to 2007, though he did not present an analysis of the model’s success in the period before 2000.

Figure 4 shows the unusualness of the boom in a broad historical perspective using three series of home prices, series for the Netherlands, Norway and the United States, countries for which long historical price indices are available that make some attempt to control for changing size and quality of homes. The Dutch series was created by Piet Eichholtz at Maastricht University, and applies to Amsterdam only. The Norwegian series, created by Øyvind Eitrheim and Solveig Erlandsen, covers Bergen, Oslo and Kristiansand, and, from 1897, Trondheim, through 2003. The series was updated to 2006 and deflated by Harald Magnus Andreassen of First Securities in Norway. In all three countries the same general observations emerge: there has been an enormous home price boom since the 1990s, which dwarfs anything seen before.

Case Studies of Booms

Let us pursue here three case studies that illustrate the dynamics of real estate booms, with special attention to the psychology of the activity. We will consider here the 1950 home construction boom, which stands out in the figure above, the 1970s U.S. farmland boom, and the sudden reversal in the market for homes in the United Kingdom in 2005, when a speculative market that was generally recognized as finished and in decline suddenly reversed and began booming again.

The 1950 U.S. Construction Boom

The only time when construction activity in the U.S. was higher as a percent of GDP than it was in 2005 was the year 1950, when residential investment rose to 7.3% of GDP. Construction activity was described at the time as at record levels in all major

regions of the United States. Why? It is not enough to dismiss this as a boom to correct shortages induced by World War II, since 1950 was already five years after the end of the war. In 1947, two years after the war, construction as a percent of GDP was as low as 4.3%, well below the postwar average of 4.8%. Moreover, in the following year, 1951, residential investment as a percent of GDP fell to 5.0%, just a little above the historical average.

Throughout this time, around 1950, there was no boom in real home prices, as can be seen from Figure 4. Home prices were rather flat, after having increased a lot at very end of World War II. It appears also that there were not expectations, at least at the beginning of the year, for further home price increases. A *Washington Post* opinion survey of builders, realtors and bankers in the greater Washington DC area published January 22, 1950 found 126 persons who thought that prices would remain the same in 1950, 46 who expected a price rise, and 38 who expected a price decline. Expectations of increase were about matched by expectations of decrease, and, in fact, given inflation, people effectively were expecting a fall in real prices. This was no speculative bubble. So, why were home sales setting all time records?¹³

The press in 1950 offered a number of reasons for the boom. First there were the concrete reasons. The Housing Act of 1950 reduced interest rates on FHA-insured loans by 0.25% and raised the guarantee of VA loans from 50% to 70%. “Increased competition” from these government-subsidized loans was said to have led private lenders to improve their terms: offering 30-year mortgages where once they had offered

¹³ “Prices on 1950 Homes to Level, Survey Shows,” *Washington Post*, Jan 22, 1950, p. R3.

only 20-year, and offering no-down-payment loans, controversial new products that were seen as necessary to stay competitive.¹⁴

This stimulus to housing demand appeared to come from Congress and mortgage lenders, not monetary policy. Fed policy at the beginning of 1950 was described as “neutral” with fears of rekindling inflation offset by evidence of weakness in the business situation and slumping commodity prices.¹⁵

But, beyond these concrete factors, the newspaper accounts refer to other psychological factors that are suggestive of the kind of things that affect general public thinking, and are hard for most of us to remember later. First of all, even though expectations of price increases did not seem to be a factor, there was repeated mention of people giving up waiting for price declines in housing (after the immediate postwar inflation) and a spreading feeling that “used house prices are not going down much more,”¹⁶

The flight to suburbia was underway, and this flight was associated with a new American life style and a new sense of community: “nobody worries about keeping up with the Joneses and everybody becomes a good neighbor.”¹⁷ To the extent that the 1950 construction boom was associated with a change of consumer tastes towards suburban living away from center city living, there would be no reason to expect the surge in demand to boost existing home prices over all.

The beginnings of the war in Korea, with North Korea’s surprise invasion of South Korea on June 25, and the first clash between North Korea and the US on July 5,

¹⁴ “Easier Money for Homes,” *Wall Street Journal*, June 2, 1950, p. 2.

¹⁵ “Uncertainty Felt by Money Market,” *New York Times*, January 3, 1950, p. 52.

¹⁶ “Rising Costs, Easy Financing, Spur Home Sales,” *Washington Post*, July 16, 1950, p. R4.

¹⁷ “Life in the New Suburbia,” *New York Times*, Jan 15, 1950, p. SM9.

led many to war fears, even fears of a “third world war.” The possibility seemed very real that government restrictions on prices and construction might be in place again. Indeed, President Truman warned of possible rationing and price ceilings in July and asked for limited powers to control production and credit. Congressional debate began to consider price ceilings on real estate transactions. By December, with CPI inflation rapidly building, price and production controls were seen as “inevitable” and the beginnings of price controls were put in place.¹⁸ It is hard to know exactly what people expected, but we do know that in 1950, according to a number of contemporary observers, buyers were “now resigned to the fact that if they are ever going to have a home, they hadn’t better wait any longer.”¹⁹

The new war against communists, coupled with the 1949 Soviet atomic bomb and the possible involvement of the Soviet Union in the war, led to an atomic bomb scare. Columnist Drew Pearson wrote:

However, in this year 1950, half way through this modern and amazing century, we are in real danger of bogging down in an ‘age of fear.’ Faced with the awful knowledge that others have the atomic bomb, faced with fear of the hydrogen bomb, of bacteriological warfare, of new trans-oceanic submarines and transatlantic rockets, we are in definite danger of relapsing into an age of fear, an age when we do not go forward because we are paralyzed with fright.²⁰

The fear led to concerted plans for civil defense, the construction of bomb shelters, and much talk about where the bombs might hit. It also led to a boom of new construction in the suburbs and countryside which allowed people to escape the risk of a possible nuclear attack on the center city, a powerful force that reshaped the country

¹⁸ “Wage, Price Controls Seen by Top Aides: Snyder, Valentine Feel Time is Nearing for Application,” *Washington Post*, December 5, 1950, p. 1.

¹⁹ “Rising Costs, Easy Financing, Spur Home Sales,” *Washington Post*, July 16, 1950, p. R4.

²⁰ “Dangers Noted in ‘Age of Fear,’ Drew Pearson, *The Washington Post*, June 26, 1950, p. B11.

away from center cities.²¹ One contemporary observer wrote of the suburban developers: “They’re cashing in on the steady trek of city families to the suburbs, a trend that may be getting a little extra push from the war scare and atom bomb developments.”²²

It is difficult to capture all the thinking that goes into people’s decision to buy a home this year rather than another year. One gets a sense that those who were writing in 1950 were having as much difficulty in understanding mass thinking about real estate as we have today. One realtor who was interviewed in 1950 said simply “I also believe there is a psychological factor in home buying which is now expressing itself in a mass desire to buy homes.”²³

This psychological factor in 1950 may bear some resemblance to the psychological factors at work in the early 2000s, even though in 1950 there was no classic speculative boom, and there apparently was little enthusiasm for housing as “the best investment.” There are still similarities with 1950, in a sense that home prices are not going down, that one may have to buy now or miss out on an opportunity to buy at all, and a war and a general feeling of anxiety about personal safety.

²¹ “Country Homes: War in Korea Boosts City Dwellers’ Demand for Rural Residences,” *Wall Street Journal*, August 23, 1950, p. 1.

²² “Suburban shopping: More Centers Going Up on the Outskirts, Lure Trade from Downtown,” *Wall Street Journal*, August 15, 1950, p. 1.

²³ “Prices on 1950 Homes to Level, Survey Shows,” *Washington Post*, Jan 22, 1950, p. R3.

The 1970s Boom in U.S. Farmland Prices

Farmland prices went through an extraordinary boom in the 1970s. Figure 5 shows real US farmland prices since 1900. Two big events stand out in this century-plus of data: a boom in the 1970s, a bust in the 1980s, and a renewed boom in the 2000s.

The farmland boom of the 1970s was sometimes attributed at the time to rising food prices. In fact, the farm products component of the US Producer Price Index rose a total of 9% relative to the Consumer Price Index from 1970 to 1980, and then leveled off. These movements are not big enough to justify the farmland boom and bust.

More important than the food prices may be the “great population scare” of the 1970s. In 1972, a Club of Rome study *Limits on Growth*, authored by Donella H. Meadows and her colleagues at MIT predicted that expanding population growth would soon lead to exhaustion of resources, and a prominent scenario in their analysis was mass starvation around the world. The book received extraordinary attention, even though it was criticized by the economics establishment as alarmist and without substantial evidence. The effects of this scare were felt all over the world. For example, China instituted her one-child policy in 1979.

Changes in the behavior of institutions were part of the boom phenomenon. Tax institutions changed in the direction of support for the boom. US Federal tax law was changed in 1976 to allow farm estates left to a member of the immediate family to be valued at a capitalization of rents, rather than the high market prices, for computation of estate taxes, and to be paid over 15 years. Thus, it appears that the boom stimulated Congress to place farmland in a special privileged category for capital-gains tax purposes.

In the high-inflation years of the late 1970s, a theory began to take hold among institutional investors that farmland is a good inflation hedge. In 1980, the *New York Times* wrote:

Investment funds, traditionally leery of investment in **farmland**, are starting to flow more rapidly into agriculture. Several major insurance companies have stepped up their purchase of **farmland** in the past two years and a number of other institutions "are beginning to express greater interest in **farmland**," according to Irving S. Wolfson, executive vice president of the Phoenix Mutual Life Insurance Company of Hartford.²⁴

Meanwhile, investment funds specializing in farmland investments were set up, such as the American Agricultural Investment Management Co and Oppenheimer Industries.

Newspaper accounts of the time described the 1970s as due in part to speculative foreign investors:

Although much of the foreign money is hard to trace, European Investment Research Center, a private consulting firm based in Brussels, estimates that foreigners invested some \$800 million in farmland last year. That would come to a startling 30% of all foreign direct investment in the U.S., according to the Commerce Dept. "What we are witnessing," says Kenneth R. Krause, a senior economist for the Agriculture Dept., "is the biggest, continuing wave of investment in American farmland since the turn of the century." . . . Amrex Inc., a San Francisco-based real estate firm, is holding a meeting in Zurich next week to introduce buyers to sellers who represent as much as \$750 million worth of U.S. farmland. Some observers warn that the industry is attracting its share of hucksterism as well. West German newspapers are being flooded with real estate advertisements, apparently from small U.S. brokers, that often offer only an anonymous post office box number for an address.²⁵

The boom period coincided with a common theme in newspapers of the time that there was concern that farmland was rapidly shrinking as it was converted to homes, shopping centers and parking lots, thereafter likely never to return to cultivation. It seemed like a brand new idea: who had ever thought that a farm, once converted, would *never again*

²⁴ Ann Crittenden, "Farmland Lures Investors," *New York Times*, November 24, 1980 p. D1.

²⁵ "Foreign investors flock to U.S. farmlands," *Business Week*, March 27, 1978, p. 79.

revert back to farmland? Eventually, a 1980 federal study “National Agricultural Lands Study” sounded this alarm. In describing this study, US Agriculture Secretary Bob Bergland noted then that the idea that farmland was being consumed was a new one: “This question never has been seriously addressed because, for as long as I can remember, all of us thought we had land to spare.”²⁶

This boom even had a hit song associated with it, Joni Mitchell’s “Big Yellow Taxi,” which had the refrain:

They paved paradise
And put up a parking lot
With a pink hotel, a boutique
And a swinging hot spot.
Don’t it always seem to go
That you don’t know what you’ve got
Till it’s gone
They paved paradise
And put up a parking lot.

Joni Mitchell’s song *Big Yellow Taxi* had an unusual appeal to thinking people, and had a very long life, issued in 1970, it reached a peak of #24 on the Billboard chart in 1975, just before the most rapid price increases of the farm price boom. (Curiously, the same song was recorded by the Counting Crows in 2003, near the peak of the recent farmland boom, and reached 42 on the Billboard chart.)

The end of the boom coincides with President Carter’s Soviet grain embargo, which lowered the price of grains that farms produced, as well as the sharp rise in interest rates during Volcker’s term, and the recessions of 1980 and 1981-2.

After the correction following 1980, the 1970s explosion of farm prices was described as a dramatic bubble. One account, in 1983, wrote that values “overexpanded

²⁶ “Shortage of U.S. Farmland Predicted; Land Shortage, Higher Cost of Food Foreseen,” *Washington Post*, January 17, 1981, p. B1.

in the belief that inflationary runups in land prices would never end.”²⁷ It does appear that it was a bubble, and spurred by stories and lore that emphasized the emerging scarcity of farmland. It was perhaps a more rational one than the housing bubble we appear to be in recently, for at least farm land is not reproducible, as housing structures are.

The Turnaround in London Home Prices in 2005

Figure 6 shows an index of real greater-London existing house prices, for a case study that concerns the downturn in real prices from the second quarter of 2004 to the second quarter of 2005. That downturn is not the most striking feature of the figure. It is much more striking that real home prices more than doubled from 1983 to 1988 and then fell 47%, came almost all the way back down, by 1996, producing an almost-perfect inverted-V pattern in home prices over a period of thirteen years. Also very striking is the boom in home prices from 1996 to the present, which shows real home prices nearly tripling. But here, we are focusing instead on the much smaller 6% downturn in real home prices over the year from 2004-II to 2005-II. This downturn was quickly reversed: real home prices resumed heading up at a rate of 9% a year from 2005-II to 2007-I, not so much smaller than the 12% a year real price increase from 1996 to 2004.

This small downturn is interesting now because it looks very much like the downturn that we have seen in U.S. prices in the last year. If one places a piece of paper over the figure positioned so as to block out all data after the second quarter of 2005, one will see a price path that closely resembles that seen in figure 1 for the US above. The decline in London home prices was interpreted by many as the end of the home price

²⁷ “Debt Still Plagues Farmers,” *Business Week*, March 21, 1983, p. 109.

boom, but the downdraft was suddenly and decisively reversed. It is very common to hear forecasts that the U.S. home market is near a bottom now, and will resume its upward climb soon. These are forecasts for a repeat of the London experience after 2005.

The Bank of England had begun tightening rates in November 2003 when the base rate was 3.5% and completed the tightening in August 2004, when the base rate reached 4.75%. The decline in home prices began about six months before they stopped tightening. But it is hard to see why this modest tightening should have been responsible for the decline in home prices. Similar interest rate increases in 1997 and 1999 had not stopped the housing boom, and interest rates were still lower in 2005 than at the ends of these prior tightening cycles. Despite the tightening, 2016 index-linked gilt yields fell over the same interval, from 1.93% to 1.79%, which, if anything, would suggest that home prices should rise, not fall. After home prices bottomed, index-linked gilt yields continued essentially the same downward trend until September 2006, and then began to rise. Thus, it is hard to see an explanation for the price behavior at this time in terms of interest rate changes.

The 2004-5 downturn in UK home prices was the subject of thousands of newspaper articles at the time. Some of these articles spoke of the “end of the housing boom” or “the last desperate gasp of a defunct housing boom” as if this end were self-evident. Even those that were relatively optimistic did not predict the strong recovery that actually transpired. One reporter wrote that “even optimists forecast prices will rise by no more than 2 per cent annually in the next few years—and pessimists expect an outright fall.”²⁸

²⁸ “Buyers Beware: Britain’s Buy-to-Let Boom May Turn Out to Be a Bust,” *Financial Times*, May 30, 2005, p. 14.

An important theme in these articles was comparison with other countries. In an article in *The Independent* entitled “Property Market Cools in Britain, But in US It’s the Latest Gold Rush” it was noted that “Just as in Britain, dinner party conversations that used to be about schools or sports now have one constant topic: property prices, and the outrageous price the neighbours got for their house across the street.”²⁹ Continuing housing booms in France, Ireland and Spain (where the boom was still strong) and the Netherlands (where a boom had converted into a soft landing of slower price increases) were also noted. Since the Bank of England had raised rates, while other central banks had not, blame for the weakening housing market was often attributed to the temporary effects of these rate increases, rather than to any change in market psychology, thereby discouraging any sudden change in expectations about long-run home price increases.³⁰

There is a sort of coordination problem with psychological expectations in a time of a boom. If people infer their expectations from recent price changes not just at home but in other places, then it may be hard for sharply changed expectations ever to take root. People believe that a change in market psychology drives the housing market, and if they look both near and far to gauge the psychology of others, then it will be hard to see a change.

Moreover, the kind of expectation for home prices that is implicit in the common 21st century world view, that increasing home prices are the result of our capitalist institutions and the phenomenal economic growth that the adoption and perfection of these institutions around the world has brought about, is not likely to be changed suddenly by the appearance of short-run price declines.

²⁹ *The Independent*, June 1, 2005, p. 56.

³⁰ Jane Padgham, “Britain Slips Down House Price League as Rate Rises Kick In,” *The Evening Standard* (London) January 28, 2005, p. 45.

It is hard to find in any account in the news media any objective reason for the resurgence of the boom after the second quarter of 2005. The Bank of England did not substantially cut the base rate: there was only a small 25 basis point cut in August of 2005, and in fact the rate was then increased, by over a percentage point by May of 2007. The tiny and relatively brief rate cut could hardly be held responsible for the massive turnaround in the housing market.

The return of the boom came as a complete surprise. An October 2005 article said: “Between January and April sales were about 25% below average. It’s quite staggering how things have turned around in the last couple of months. We are now back to average levels, and are seeing more transactions than at this time last year.” The best this article could come up with as an explanation was “house prices have not fallen as much as some analysts were warning. This has given buyers the confidence to re-enter the market as the fear of losing money on a property purchase is eroding.”³¹ From a behavioral economics perspective, that explanation is not silly, as it is part of a broader story of speculative feedback.

This London case study should caution any who feel that a substantial decline in home prices in the US is inevitable, given the recent declines, but not really offer much comfort for real estate optimists either, given the isolation, and special character, of the brief London downturn.

Conclusion

The view developed here of the boom in home prices since the late 1990s has it operating as a classic speculative bubble, driven largely by extravagant expectations for

³¹ “Doomsters May Be Wrong,” *Sunday Times* (London), October 23, 2005, p. 5.

future price increases. As such, the situation may well result in substantial declines in real home prices eventually.

The case studies above suggest that there are a wide variety of considerations and emotions that impact on a decision whether or not to buy a house. If there are fears of war or terrorism (as we saw in the case of the 1950 boom) or fears of environmental destruction (as we saw in the case of the farmland boom of the 1970s) then there may be major changes in home prices or construction activity even if there is no change in the traditional list of fundamentals.

Institutional changes tend to come in connection to the speculative psychology, not just as exogenous advances in financial or bureaucratic technology. Thus, we saw the lengthening of mortgage maturities during the real estate boom of 1950, the development of real estate investing institutions and changes in the tax law during the farmland boom of the 1970s. From these examples, it should be no surprise that we have seen the proliferation of new mortgage credit institutions, the deterioration of lending standards, the growth of subprime loans, and the rapid expansion of the CDO market, in the real estate boom of the 2000s.

Monetary policy does not come out as central in the case studies examined here. Monetary policy is in an important sense concentrated on the extreme short-term. The fundamental target variable in the U.S. is the federal funds rate, an overnight rate. And yet, economic decision makers are focused on a lifetime decision problem. Economic decision makers have to decide on the long-term, 50-year-plus, value of their investments. The difference of maturities is a factor on the order of 10,000 to one. Using

monetary policy to manage such decisions is a little bit like adding a grain of sand a day to a scale that is weighing a car.

People's opinions about long-term decisions, notably how much housing to buy and what is a reasonable price to pay, change in the short term only because their opinions about the long-term change. But, these opinions about the long-term are hard to quantify because they are usually not expressed. They are usually expressed only in story form, in attention given to homespun theories, and the like.

People base life decisions upon vague expectations for the future, and if they have the false impression that they have a unique property that is going to become extremely valuable in the future, then they may consume more, driving the economy, and they may drive up prices today. That is what we have seen happening over much of the last decade.

The psychological expectations coordination problem appears to be a major factor in explaining the extreme momentum of home price increases. Investors who think that home prices will continue to go up because they perceive prices as going up generally around the world may not change this expectation easily since they will have trouble coordinating on a time to make the change. A housing supply response to high prices will tend to bring prices down, but the increment to housing supply in any one year is necessarily tiny given the nature of construction technology, and that supply can be absorbed easily if expectations are still strengthening. If, however, price declines continue in the United States, there could be a more coordinated response to enforce declining expectations around the world. If the United States shows substantial price declines, then the underlying popular story of the boom, related to the perception of a triumph of capitalism and the explosive growth of the world's economies, may become

old. The United States, the premier example of a capitalist economy, has the potential to lead price expectations downward in many countries.

The example, considered above, of the recovery from decline in London in 2005 serves as a good reminder that speculative markets are inherently unpredictable, and that the incipient downturn in the United States could reverse and head back up. No one seems to have a good understanding what causes these reversals. Still, the examples we have of past cycles indicate that major declines in real home prices—even 50% declines in some places—are entirely possible going forward from today or from the not too distant future. Such price declines have happened before. In the last cycle in the United States, as shown in figure one, real home prices fell only 15% from the peak in the third quarter of 1989 to the fourth quarter of 1996, but some cities' real prices fell much more. Los Angeles real home prices fell 42% from the peak in December 1989 to the trough in March 1997. We saw from Figure 6 that real home prices in London fell 47% from the third quarter of 1988 to the fourth quarter of 1995.

The boom cycle that followed these declines, after the late 1990s, was even bigger than that preceded them, and so it is not improbable that we will see such large real price declines extending over many years in major cities that have seen large increases. Since the number of cities involved in the recent boom is so much higher than in the last boom, we could see much more than the 15% real drop in real national home price indices that we saw last time.

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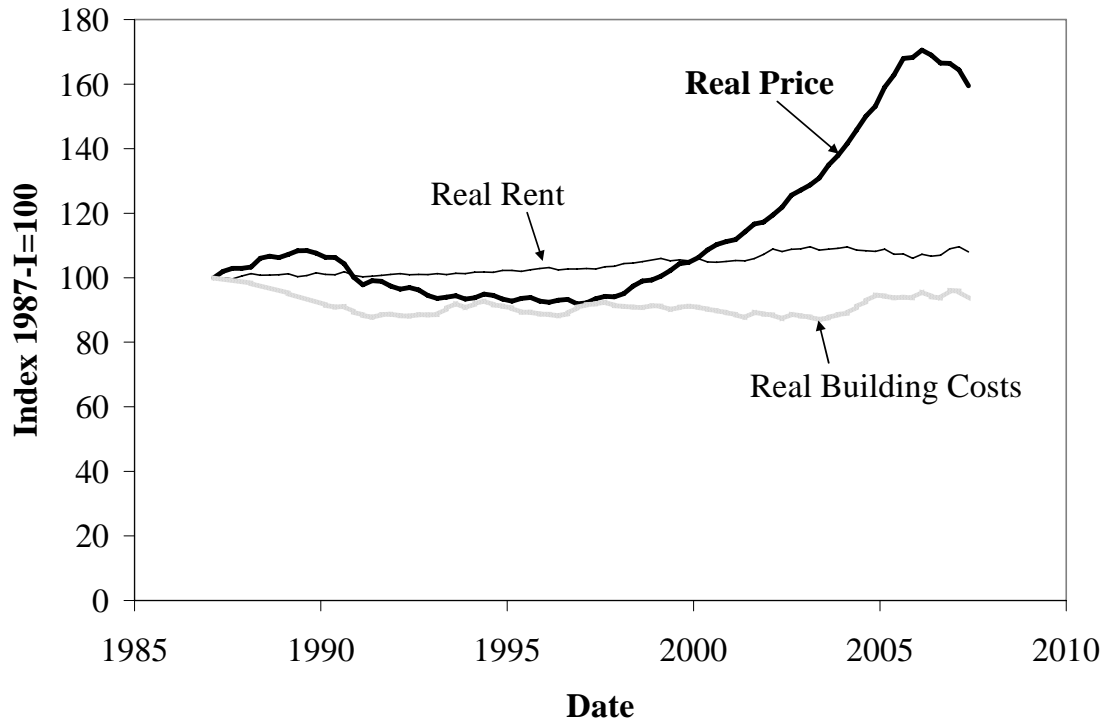


Figure 1: Real US Home Prices, Real Owners Equivalent Rent, and Real Building Costs, quarterly 1987-I to 2007-II. Source: authors calculations. Real US Home Price is the S&P/Case-Shiller U.S. National Home Price Index deflated by the Consumer Price Index (CPI-U) for the first month of the quarter rescaled to 1987-I=100. Real Owners Equivalent Rent is the U.S. Bureau of Labor Statistics Owners Equivalent Rent December 1982=100 from the CPI-U divided by the CPI-U, all items, 1982-4=100, both for the first month of the quarter, rescaled to 1987-I=100. Real building cost is the McGraw-Hill Construction/Engineering News Record Building Cost Index for the first month of the quarter (except for the years 1987, 1988 and 1989 where the index is only annual) deflated by the CPI-U for that month.

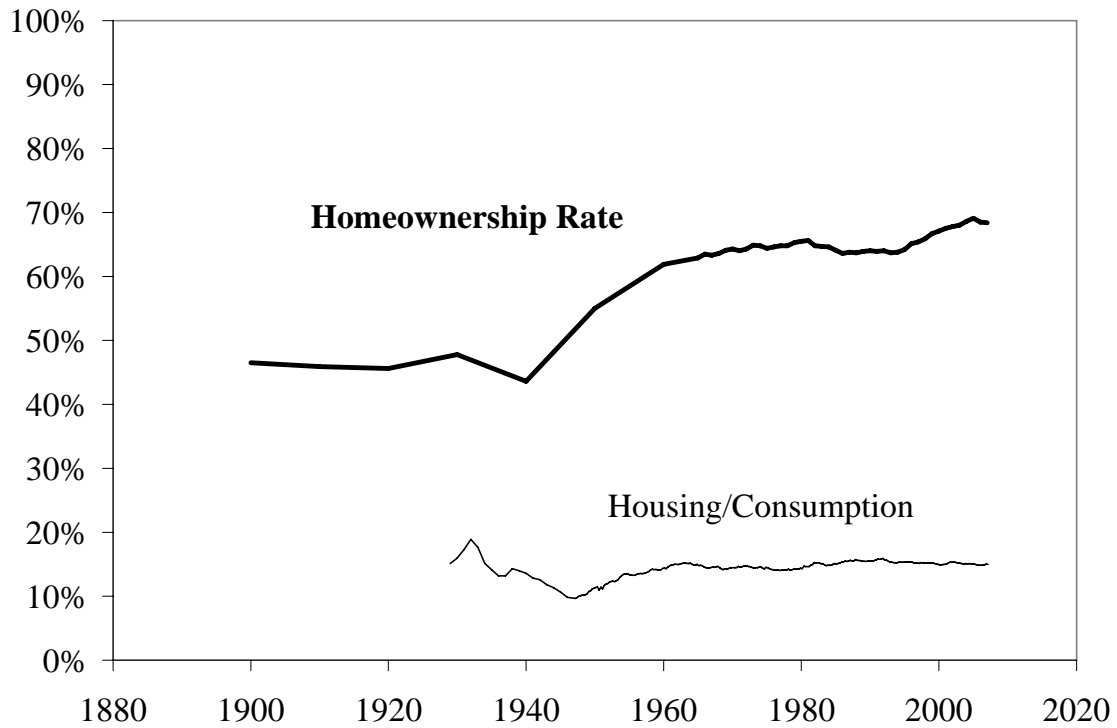


Figure 2. Home Ownership and Housing as a Share of Consumption. Source: The home ownership rate, percentage of homes that are occupied by their owner (decadal 1900 to 1960, annual 1965 to 2007) is from the U.S. Census. Housing/Consumption (annual 1929 to 1946, quarterly 1947-I to 2007-I) is calculated by the author as the ratio of housing expenditures to personal consumption expenditures, National Income and Product Accounts, Table 2.3.5.

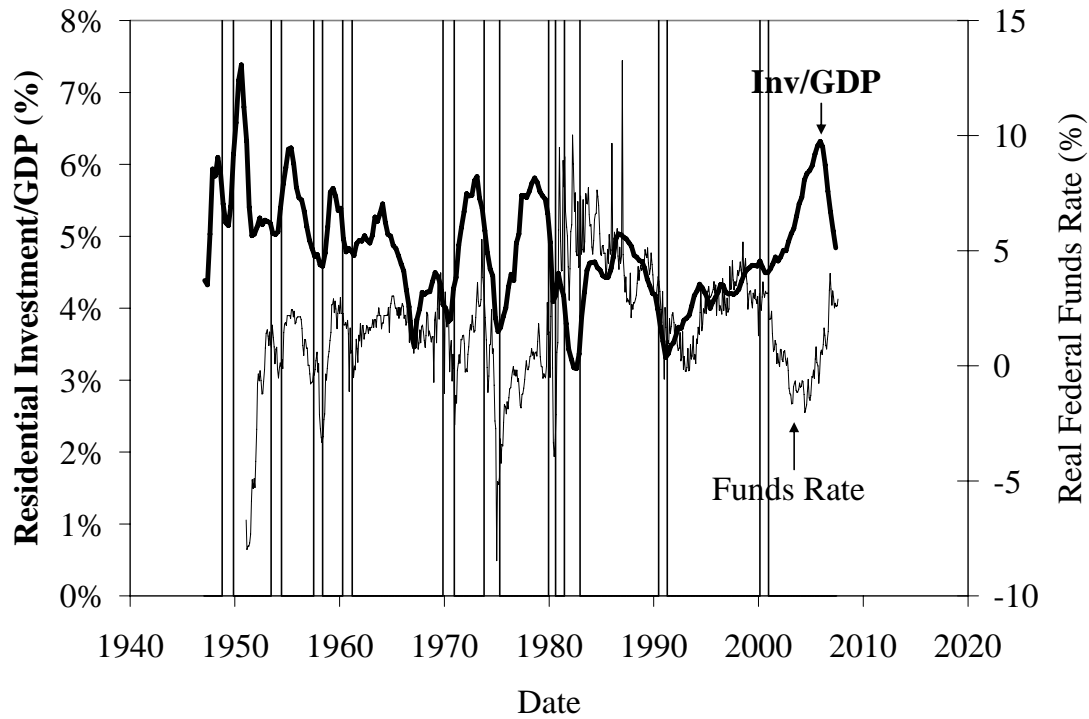


Figure 3: Residential Investment as Percent of GDP (quarterly, 1947-I to 2007-II) and Real Federal Funds Rate (monthly January 1947 to July 2007). Source: author's calculations. Residential Investment and GDP are nominal values from National Income and Product Accounts. Real federal funds rate, end of month, is computed by subtracting the rate of increase of CPI-U for the 12 months up to and including the month. Recessions as defined by the National Bureau of Economic Research are shown as the narrow areas between adjacent vertical lines.

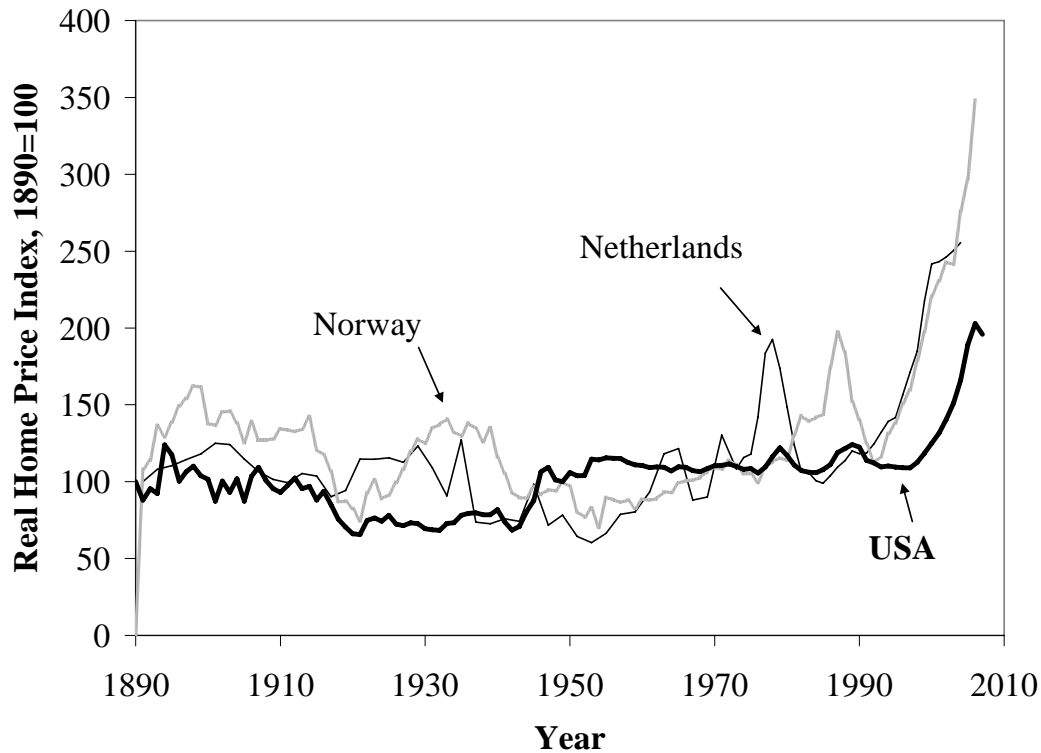


Figure 4. Home price indices deflated for consumer prices and rescaled to 1890=100, Netherlands, Norway and USA. The Netherlands index (semi-annual 1890-1973 then annual 1974-2004) is produced by Piet Eichholtz of Maastricht University; it is for the Herengracht region of Amsterdam 1900-1973, which he updated to 2004 using other data for the city of Amsterdam. The Norway index (annual) is a Norges Bank series (Eitrheim and Erlandsen, http://www.norges-bank.no/Pages/Article_42332.aspx) 1890-2003 updated to 2006 and deflated by Harold Magnus Andreassen of First Securities ASA, Oslo. The USA index (annual 1890-2007) is from Robert Shiller, *Irrational Exuberance*, Princeton, 2005, updated using the S&P/Case-Shiller National Home Price Index for the United States.

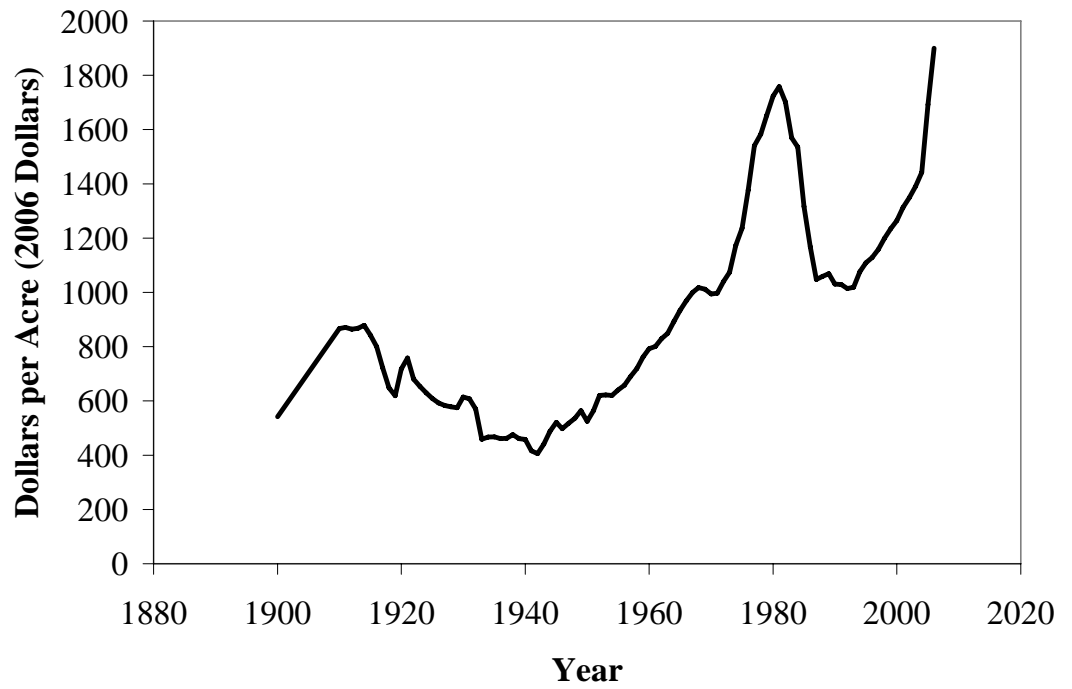


Figure 5: Real farmland values, in US 2006 dollars, per acre, decadal 1900 to 1910, annual 1911-2006. Source: author's calculations. The nominal USDA-NASS is divided by the CPI-U for the first month of the year and rescaled to 2006 dollars.

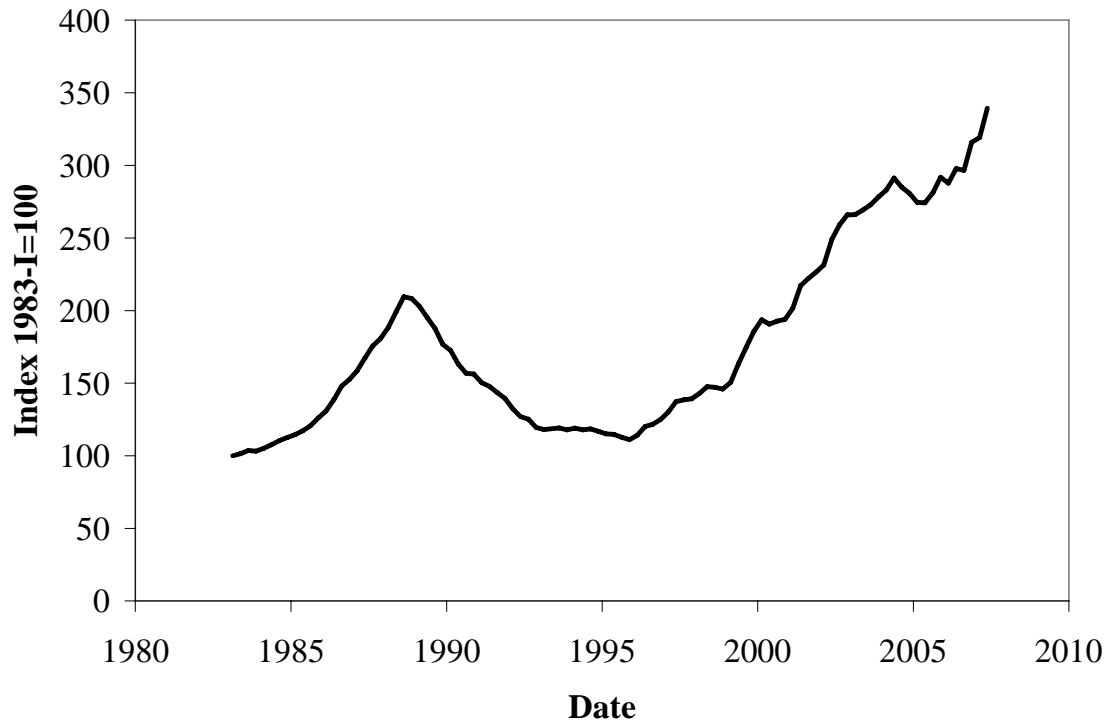


Figure 6: Greater London real home price index, quarterly, 1987-I to 2007-II. Source: author's calculations. The Halifax Greater London existing house price index is divided by the U.K retail price index and rescaled to 1987-I=100.