
Irrational Exuberance Revisited

Robert J. Shiller

Big market moves are historic events. And to understand historic events, a broad perspective is needed. We would not think of trying to understand the causes of World War II just in terms of changes in interest rates or inflation rates, and neither should we think of trying to understand events in the stock market in just such terms. As market observers, we need to understand more than just finance *per se*.

Understanding human psychology, culture, and institutions matters. Alan Greenspan's now famous phrase "irrational exuberance" is a good name for the variety of factors that has produced market excesses. I thought it was such a good term that in 2000 I wrote a book entitled *Irrational Exuberance*. I wish to talk about just what this term means. In particular, this presentation is about the psychology of the markets applied to the booms in the stock market in the 1990s and in the housing market just recently—essentially, a theory of bubbles based on all the perspectives I can muster from the social sciences. Finally, I will discuss new hedging vehicles for residential real estate.

The Psychology of Confidence

During a dinner speech on 5 December 1996, Alan Greenspan asked, "How do we know when irrational exuberance has unduly escalated asset prices?" As far as I can tell, that was the only time he ever uttered the words "irrational exuberance." He did not say there was irrational exuberance; he simply asked a question. Even though his words made no assertive statement, they spooked the markets. The Nikkei Index in Japan was open at the time and dropped 3.2 percent immediately on those words. Then, those words, and the reaction to them, spread around the world. I think the market response to his words more than the words themselves made "irrational exuberance" his most famous quote.

In the U.S. Federal Reserve's Economic Outlook of 20 October 2005, Chairman Ben Bernanke made the following statement about inflated home prices: "Although speculative activity has increased in some areas, at a national level, these price increases largely reflect strong economic fundamentals, including robust growth in jobs and incomes, low mortgage rates, steady rates of household formation, and factors that limit the expansion of housing supply in some areas." Bernanke is a very smart man, but based on this statement, he just

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does not get what is going on with home prices. In recent testimony, Bernanke did say that the clouds on the horizon are oil prices and home prices and that if home prices slow enough, it could weaken the economy. Note, however, no words about “bubble.”

A bubble is a market situation in which news of price increases spurs investor enthusiasm. Thus, it is based on psychology and emotion. The bubble expands by psychological contagion from person to person, and this contagion is important. It brings in more and more investors who, despite doubts about fundamental value, find themselves drawn to the investment partly through envy and a gambler’s excitement. Gambling behavior is part of human behavior, and anthropologists say it exists in every society and is an aspect of a human entrepreneurial spirit. My use of the word “gambler” could be provocative, but I am not criticizing gambling.

Bubbles are not purely psychological phenomena. They are an epidemic, and an epidemic requires contagion. An epidemic (bubble) can exist only if conditions favor contagion. For example, influenza, another contagious agent, tends to occur in the winter because people are inside more often than outside. Influenza is spread by droplets in the air, so when people are enclosed in a space, the contagion rate goes up. The contagion rate has to exceed the removal rate (the rate at which people recover from their illness), however, if an epidemic is to grow. One reason financial bubbles are mysterious is that their time pattern depends on the contagion rate of the enthusiasm, the spread of optimism and excitement for the market, and this contagion is hard to observe objectively.

The contagion rate is not just psychological. It depends on other things, such as monetary policy. The Fed can burst the bubble. It may not want to because of the collateral effects, but it has the opportunity to do so. Regulators in the past have stopped bubbles. After the Dutch tulip mania in 1637, authorities were aghast at what was happening and shut down the tulip markets.

I went on an expedition to find out who first defined the term “bubble.” The earliest clear statement I could find was in an extraordinary book by Charles MacKay written in 1841 called *Extraordinary Popular Delusions and the Madness of Crowds*, which was a best-seller. I recommend it still today. In it, he talks about tulip mania, an event that occurred 200 years earlier. In describing the event, he uses vivid phrases: “Individuals suddenly grew rich,” “A golden bait hung temptingly out before the people,” and “They rushed to the tulip marts like flies around a honey-pot.” As the bubble expanded, people who were not initially interested in the markets became interested, so it had elements of contagion. Then, MacKay writes about the inevitable bursting of the speculative bubble when the prices got too high. If prices get high, they are supported only by people’s expectations that they will go up further, which cannot go on forever. A bubble has an inherent internal contradiction that brings it to an end. A bubble does not need any event to end it. It will end itself.

So, 1841 sounds like a long time ago, but for my scholarly perspective, I was not satisfied. I researched back to the tulip mania to find reference to a bubble. Old Dutch manuscripts of the time, however, do not include a definition of a bubble. But I did find evidence that hinted at one. A pamphlet from the year 1637, when the tulip mania bubble burst, contains a fictitious dialog between two men, Gaergoedt and Waermond. Gaergoedt has just made a lot of money in the tulip market, and he is very proud of himself. He is talking to Waermond, who is not in the tulip market. Gaergoedt talks expansively about the returns—10 percent, 100 percent, even 1,000 percent—trading tulips, and Waermond is skeptical. He is worried that he is getting in too late. (Note that this was the very first big speculative bubble, and already it was obvious investors had to worry about getting in too late.) Gaergoedt just says some nonsense: “It’s never too late to make a profit. You make money while sleeping.”

One can picture the emotional response that Waermond—a poor weaver who has been working all this time on his trade and never making much money—has to this kind of bragging behavior. Waermond is uncomfortable because he knows logically that the boom might be coming to the end. He does not know what to do. Then, finally, he asks the question, “Do you know anyone who has become rich with your trade?” Gaergoedt gleefully gives him some examples. These stories seemed to convince Waermond, and he seems ready to go into the tulip market, but he is saved by luck because Gaergoedt’s wife comes in with news that the tulip market has just crashed.

That is the end of that pamphlet, but it is interesting that this writer from 1637 chose to explain the tulip mania in the form of a dialog because it illustrates the contagion as it works. It is word of mouth, person-to-person contagion. The human species is very empathetic; we feel others’ feelings. The human species is also interconnected, and when we hear talk like this, it gets us emotionally involved, which is what happens in a bubble. I believe, but I cannot prove, that the writer of this pamphlet heard conversations like this in 1637 and made them the basis of the story. It is revealing of human nature. This same thing happens today.

Bubbles remain mysterious because they cannot be judged based simply on psychology. If it is just human psychology, then why don’t we have a bubble all the time? That is always a difficult question. The theory of bubbles connected to the stock market has four elements:

1. precipitating factors, or what gets the bubble started;
2. amplification mechanism, the epidemic that gets the bubble to propagate;
3. cultural factors; and
4. psychological factors.

Precipitating Factors. Precipitating factors are the truly exogenous factors that begin to change the demand for stocks and start the epidemic on its path. A critical precipitating factor for the stock market boom of the late 1990s was the internet revolution. In the late 1990s, the internet was such a spectacular technological advance that it made people believe they were entering a “new era” and allowed them to think that stock prices could really soar.

Amplification Mechanism. The amplification mechanism propels the precipitating factors into irrational exuberance. The simplest amplification mechanism, as seen with Gaergoedt and Waermond, is price to price. Prices start going up. It attracts attention. It spurs conversation and brings people into the market; they then buy and bid the price up more. The amplification mechanism can also be a price-to-GDP-to-price feedback. When the stock market is up, people feel optimistic and they spend more money, so the economy starts to boom. People see the booming economy, which encourages them to bid prices of stocks up even more. Finally, there is a price-to-earnings-to-price mechanism. When the stock market goes up, consumers spend more and corporate sales and earnings go up as long as costs are largely fixed. So, people can say that price was predicting the earnings growth. They believe that the reason the market is going up is because companies are doing so well when, in fact, it is all part of a cycle, albeit one that is self-limiting.

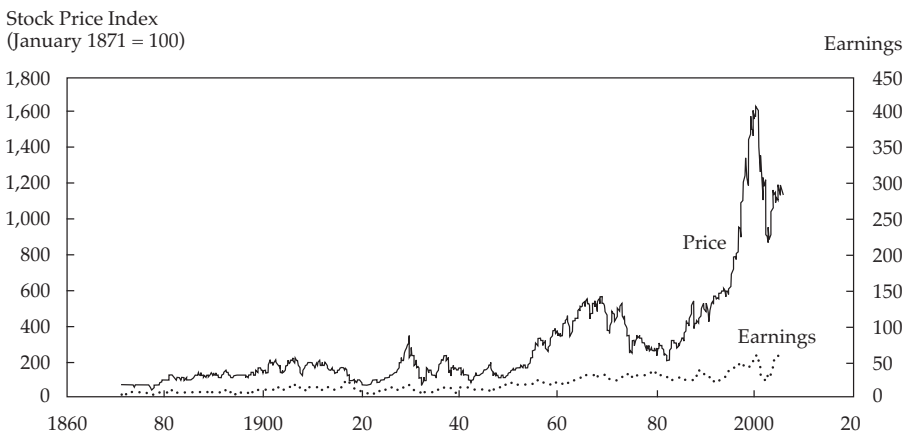
Cultural Factors. Cultural factors are the stories that surround the bubble. Stories are essential because humans are story-oriented animals. Listen to people on the way to and from a casino. Rarely are they talking about probability distributions or kurtosis or anything related to the science of gambling—probability and statistics. They are telling stories. They will say, “You know my friend? He went in. His wife told him not to go. But he did, and he won \$10,000.” That sort of story can justify a market boom. Many of these stories are stories about why the world is different this time. I call them “new era” stories.

Psychological Factors. To understand the vulnerability of markets to psychological errors, one has to understand the principles of psychology. One psychological factor is overconfidence. Most people (both men and women) think they are above average, and people have a tendency to believe in themselves, which is part of self-esteem. Another factor is the representativeness heuristic, which is a tendency to see patterns in data and expect them to repeat. Another factor is framing, which occurs when an individual lets his or her judgments be affected by the way a choice is presented, so people do not always judge things in a purely rational way. Finally, attention anomalies are mistakes that people make because of inattention. People get focused on one thing and miss the obvious.

Trends in the Stock Market

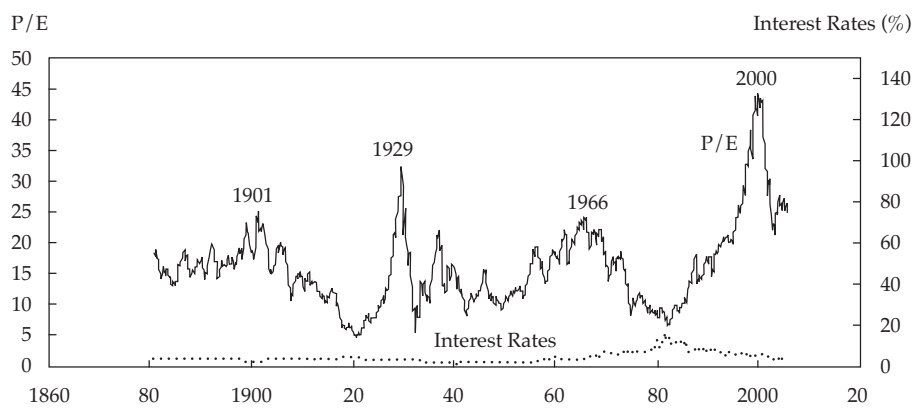
The stock market can be viewed from the perspective of bubble theory. The top line in **Figure 1** is the stock price from 1871 to 2005 corrected for inflation. It clearly has lots of ups and downs, with some ups that are quite sharp, such as the peaks in 1929 and 2000. These two peaks are cusp-shaped; they are classic bubbles. The market was increasing at an increasing rate, and then when nothing in particular happened, it suddenly turned. The bubble had its own end in sight.

Figure 1. S&P Composite Real Price and Earnings, January 1871–October 2005



Source: Shiller (2005).

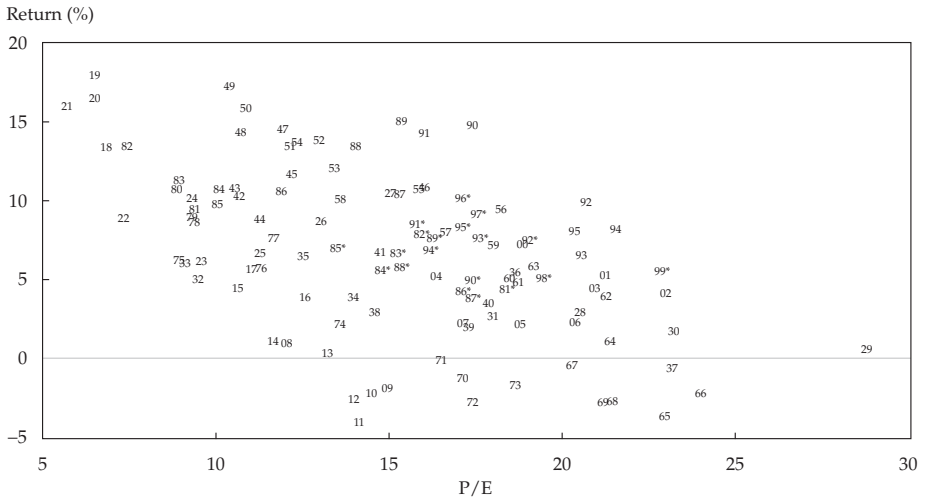
The top line in **Figure 2** is the P/E for January 1871 to October 2005, and the bottom line is long-term interest rates. The P/E is computed using Graham and Dodd's 1934 definition, which is price divided by 10-year rolling-average earnings. In this period, one can see a few historic peaks, most notably in 2000. Also note that since roughly 1970, an inverse relationship seems to have existed between interest rates and P/E. That relationship was talked about a lot around 2000; the so-called Fed model said that the frothy market was justified by the lower interest rates. Since 2000, that correlation has broken down, and also before 1970, there really was not a correlation. Thus, people seem to have been exaggerating the impact of interest rates on the stock market.

Figure 2. Real S&P P/E and Interest Rates, January 1881–October 2005

Source: Shiller (2005).

The stock market boom of the 1990s was a worldwide phenomenon. Brazil, China, France, Germany, the United States—all went up and down around the same time. Meanwhile, India, Japan, and South Korea did not share that same pattern, but even between 1998 and 2000, those countries all had dramatic booms. It seems as if the contagion reached these countries last, perhaps because the attention of people in these countries was on something else (e.g., the Asian financial crisis) and it took longer for the excitement to start there. Whatever the differences across countries, eventually the contagion spreads worldwide because the market culture is becoming worldwide more and more.

Figure 3 is a scatter diagram showing how P/E predicts future returns. Note that my colleague John Campbell and I showed an earlier version of this diagram to Alan Greenspan two days before he gave his irrational exuberance speech. A regression would not indicate a terribly good fit, but it is a good enough fit to suggest that there is something to this model. I see a negative slope to that scatter, and what it shows is that when the P/E has been high, subsequent returns have been low, and when the P/E has been low, subsequent returns have been high. For the years 1919, 1920, and 1921, the P/E was about 7—quite low—and the subsequent real returns were more than 15 percent a year. When the P/E has been high, say, 20–25 times, the subsequent 10-year returns have been just a little above zero. So, this relationship indicates that investors should expect low returns over the next 10 years because the P/E is about 25 times. Obviously, this is not a solid forecasting tool, but I still think that we are in exuberant times and that the market is still highly priced.

Figure 3. Subsequent Annualized 10-Year Return vs. P/E, 1881–1995

Notes: The numbers in the figure represent a year, and an asterisk next to a number indicates the 19th century. For example, 90* refers to the year 1890. P/E is for January of the indicated year.

Figure 4 shows the One-Year Confidence Index, which I started calculating in 1989 based on a survey both of individual and institutional investors and which is now maintained by the Yale School of Management.¹ The index equals the percentage of people who think the stock market will go up over the next year. It rose rapidly through the 1990s both for individual and institutional investors, but after 2000, it either flattened out or began sagging slightly. Nevertheless, confidence is still high.

Figure 5 shows the Valuation Confidence Index, which is the percentage of investors who think the market is *not* overvalued. Interestingly, the percentage for both individual and institutional investors declined through the 1990s and bottomed out right before the peak of the market. After the market crashed, it shot back up again, which is maybe one of the best pieces of evidence that the stock market boom was a bubble.

Since 1996, I have asked the following question to individual investors: “Do you agree with the following statement: ‘The stock market is the best investment for long-term holders who can just buy and hold through the ups and downs of the market.’” Surprisingly, the percentage of individual investors

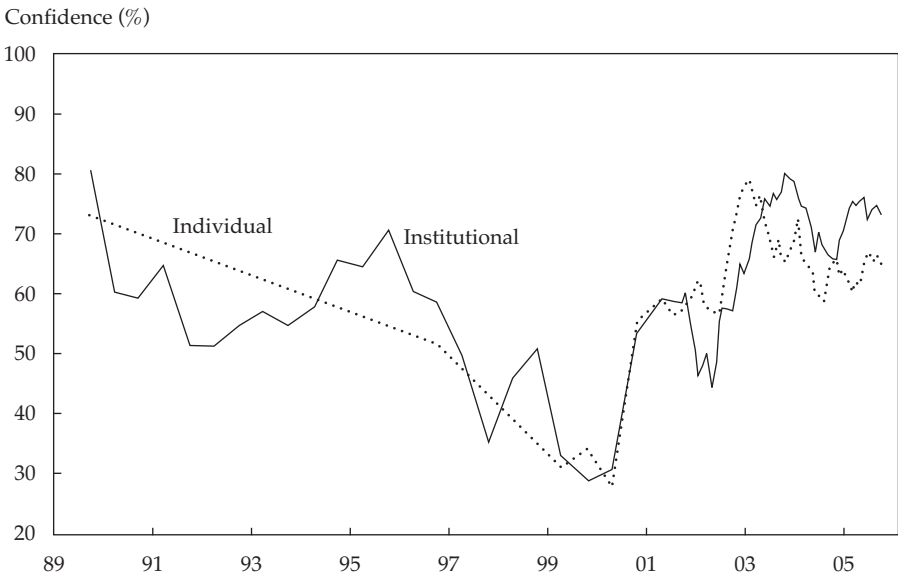
¹For more information on the confidence indices, see <http://icf.som.yale.edu/confidence.index/index.shtml>.

Figure 4. One-Year Confidence Index: U.S. Six-Month Averages, 1989–2005



Note: Data for 2005 are through September.

Figure 5. Valuation Confidence Index: U.S. Six-Month Averages, 1989–2005



Note: Data for 2005 are through September.

responding that they strongly agree did not grow through the 1990s, but it certainly declined afterwards. So, the experience of the declining market has weakened people's enthusiasm for the stock market.

Another question I have been asking is, "Do you agree with this statement: 'If there is another crash like October 19, 1987, the market will surely be back up to its former levels in a couple years or so.'" The percentage of investors saying they strongly agree has never been as high as 50 percent, but it grew through the 1990s and has fallen sharply since then. These opinions should not be changing so fast; people should know that the stock market has a history of more than 100 years, and the last few years do not add much evidence about the behavior of the stock market. People are focusing on the latest events, and they are changing their confidence in the market rather sharply.

Trends in Real Estate

Although the stock market bubble has burst, we are currently in what appears likely to be a housing bubble. This is significant. It is, in an important sense, a new phenomenon. Since 1980, I have been counting (using electronic searches) the times the phrase "housing bubble" appears in newspapers. The phrase was not used at all before 1987. Then, it began to appear right after the stock market crash in 1987 but died out again. It suddenly reappeared in 2002.

We have entered a speculative phase, and now, a lot of people think we are in a housing bubble. Many people are buying real estate today because they think real estate prices will go up for a while. This mentality, of course, propels the bubble, for a while.

Regulators should pay attention. Nontraditional mortgages have helped fuel the housing boom. We have seen a deterioration in lending standards and a proliferation of adjustable-rate mortgages (ARMs) and option ARMs. People with very small down payments are buying houses, and too many of them are considered lower income or have poor credit histories. Unfortunately, the regulators do not move fast.

Because no long historical time series for home prices exists, I had to create one, shown in **Figure 6**. I looked at every price index for homes to try to get a quality control price index—pricing a standard home, which is not constant over time because homes have gradually gotten bigger over the past century. I found a number of series, but I had to fill in gaps to create this index. Notice that starting in 1890, home prices in real terms did not grow much until 1997, when they started shooting up—apparently a bubble period.

Back in the 1950s, economists reasoned that home prices are driven by building costs. They found that the change in real home prices very roughly mirrored the change in building costs. But that relationship seems to have broken

Figure 6. Long-Term Trends in Single-Family Homes, 1890–2005



Notes: For home prices, 1890 = 100. For building costs, 1890 = 50.

down; recently, no correlation exists between the two. Furthermore, the jump in home prices cannot be explained by population increases because the population has been growing steadily—with no sudden jump after 1997. Finally, interest rates cannot explain the sudden increase in home prices after 1997 because interest rates have been on a rather steady decline since the early 1980s, with no sudden move down after 1997. Therefore, I think the increase is psychological.

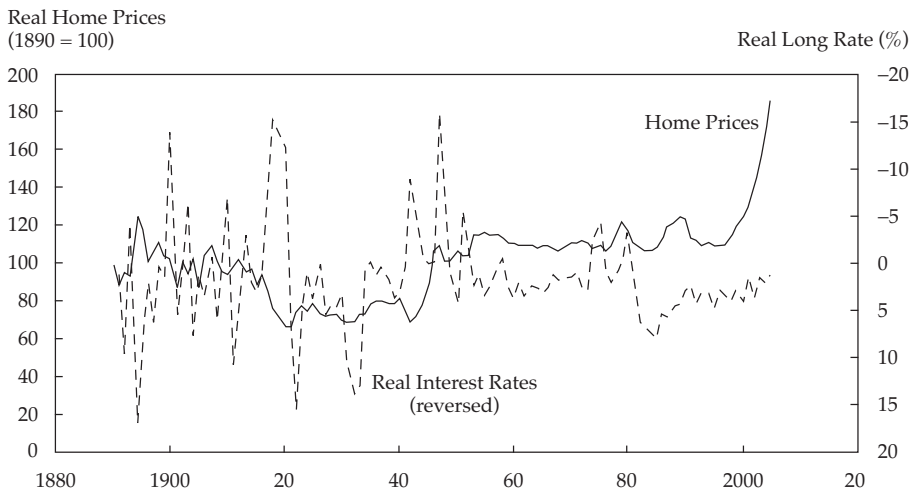
Home prices have not gone up in real terms over long periods of time. Thus, a house has not been a great investment, unless, of course, one has a sufficiently high valuation of the “dividends” the house pays in terms of housing services.

Why haven’t home prices gone up? The price of a house relates mostly to its structure. And houses are getting cheaper to build, not more expensive, because of technical progress. In 1890, homes were handmade by skilled artisans. Now, people can purchase modular, prefabricated homes, circumventing the skilled artisans. Land has been getting more expensive, but if a person wants a house and does not care where it is, land can cost almost nothing. The population spreads out into formerly rural areas, taking the pressure off of prices in city centers.

Why do people believe home prices will do well in the long term? I think it is partly because of inflation confusion: Homes cannot be split like shares when they become highly priced, and so the rise in nominal home prices caused by inflation is much more apparent than the rise in stock prices. Another possible explanation is popular perceptions of the decline in real interest rates.

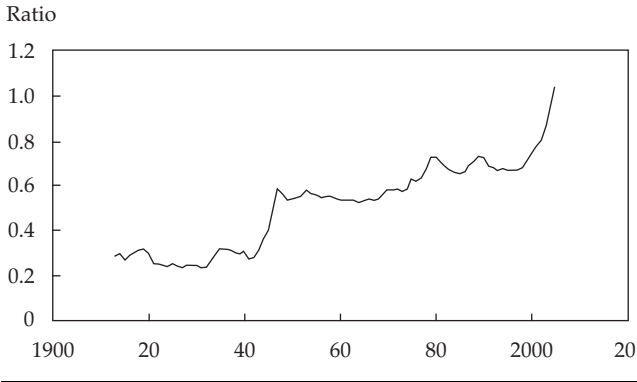
I constructed a long-term real interest rate series back to 1890, shown in **Figure 7**, and compared it with the same home price series shown in **Figure 6**. But popular perceptions notwithstanding, declining real interest rates actually cannot justify the home price boom today. Real interest rates have been declining since the early 1980s (note the inverted scale), but they do not match up well with home prices. I separately tested the relationship between government expenditure and home prices and found no meaningful relationship. And remarkably, the unemployment rate shows no correlation with real home prices. The United States had two high periods of unemployment (the 1890s and the 1930s), and neither of those periods experienced a decline in real home prices. Finally, people are now saying that the boom in housing prices cannot deflate because no recession looms on the horizon.

Figure 7. Home Prices and Real Interest, 1890–2005



Another factor to examine is rental prices. Since 1913, real rents of primary residences, as reported by the U.S. Bureau of Labor Statistics (BLS), have gradually declined. Thus, home prices have gone up recently without any concomitant increase in real rents. But rents are different from home prices. A renter does not have any speculative interest in the property, but the buyer does. **Figure 8** shows the ratio of my home price index to the BLS rent index, which can be thought of as the P/E for housing. Since 1913, this ratio has exhibited a strong uptrend. Some have criticized the BLS rent index for not accounting properly for quality change, but at the very least, the available data do not show that recent home price increases are justified by rent increases.

Figure 8. Ratio of Shiller Home Price Index to Rent of Primary Residence Index, 1913–2004



Eichholtz (1997) computed a housing price index that went back to 1628, which includes the tulip mania, for the upscale Herengracht neighborhood of Amsterdam. Although it has shown boom and bust cycles, it has not shown an uptrend. If I were to ask people what they thought the return on housing should be in a glamorous metropolitan area, a lot of people would answer even better than the stock market—say, 10 percent a year. Think about it. Amsterdam has been a booming metropolis since 1628. It was the financial center of the world in the 1600s. It ought to have done well. Could it have done 10 percent a year since 1628? No. Compounding 10 percent a year for 370 years would produce a total return of 443,031,891,418,593,000 percent, which would bring us beyond the galaxy—not possible. Real prices have actually doubled in 350 years, and that is only a 0.2 percent increase a year. Thus, this beautiful downtown section in Amsterdam has not changed in price adjusted for inflation.

Why can someone buy an apartment there today and pay the same price as in 1628, adjusted for inflation? Because people do not have to live there. Other locations are competing with the Herengracht neighborhood. Amsterdam is now spread out over a huge area and is continuing to spread. Prices are not going to go up in the center because people can go somewhere else. It is elementary supply and demand, and that is why home prices will not go up strongly in real terms over long periods of time.

Expectations of future price appreciation, however, are quite different. I asked homeowners in Los Angeles and Milwaukee the following: “On average over the next 10 years, how much do you expect the value of your home to change each year?” The results are shown in **Table 1**. These are extraordinary expectations, especially because home prices are already high. Milwaukee had lower expectations until recently, so what I think is happening now is the bubble has gotten so much publicity that even in Milwaukee people are getting optimistic.

Table 1. Long-Term Expectations for Housing Appreciation, Los Angeles and Milwaukee

City/Measure	1988	2003	2004	2005
<i>Los Angeles</i>				
Mean	14.3%	13.0%	22.5%	22.7%
Median	10	8	10	9
<i>Milwaukee</i>				
Mean	7.3%	11.7%	13.4%	13.6%
Median	5	5	5	7.5

I then asked people whether they agreed that real estate is the best investment for long-term holders, who can just buy and hold through the ups and downs of the market. In Los Angeles, more than 50 percent said they strongly agree. But as I have just demonstrated for real home prices in Amsterdam over a 350-year history, real estate has about a 0 percent real return in the long run. These survey respondents do not know that. In Milwaukee, however, respondents seemed more rational; only about one-third thought that real estate is the best long-term investment.

Hedging Vehicles for Real Estate

According to the Federal Reserve Board, real estate owned by households is the second largest asset class in the United States, valued at \$21.6 trillion in the fourth quarter of 2005. But until recently, unlike for stocks and bonds, investors could not hedge real estate risk efficiently. Many investors are exposed to real estate risk because it is concentrated in one geographical area, and especially for ordinary retail investors, real estate may be the biggest part of their portfolios. Many are hoping to use this “asset” when they retire, but it may be in one of these volatile sections.

Various attempts have been made to develop hedging vehicles for real estate. The first such attempt was in London in 1991. The London Futures and Options Exchange (London Fox) started trading property futures in 1991 on U.K. home price indices. It was a cash-settled futures market, but it lasted only a few months because the volume of trade was disappointing, eventually leading to London Fox officers making fraudulent trades to inflate the volume of trade.

Around 2002, a futures market in U.K. housing began: City Index and IG Index. These are spread-betting firms in London, and they have some trading of home price indices in the United Kingdom, but they are not very successful. In 2004, Hedgestreet.com set up an online trading site aimed at retail investors with price indices for single-family homes. As far as I can tell, it is not a big success, although it just announced that it is teaming up with the Chicago Board Options Exchange to develop new products.

In May 2006, the Chicago Mercantile Exchange (CME) opened a futures market based on the S&P/Case–Shiller Metro Area Home Price Indices, which were originally developed in the 1980s.² Cash-settled futures are available in 10 U.S. cities, as is a national composite index, with the highest weightings given to New York (27 percent), San Francisco (12 percent), and Chicago (9 percent). The futures are traded on CME Globex. The value for each contract is 250 times the value of any index. With the opening composite index at \$231, the value of one futures contract is \$57,750. So, a homeowner wishing to hedge a \$570,000 house could sell 10 contracts for a complete hedge. The CME has also created an options market, based on the same home price index.

These new markets may start slowly and grow, but as people get used to liquid markets for home prices, they should garner more and more interest. Perhaps within a few years, investors will be hearing on the news that New York closed up 2 points and Los Angeles closed down 2 points, just like the stock market. The cash market for homes is inefficient right now. It has very strong momentum compared with the stock market, not at all the random walk that financial theory describes. I hope that the housing market will become more like the stock market and that investment professionals will have the opportunity to participate in these markets on behalf of their clients on a global scale.

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²*Editor's Note:* Professor Shiller is a co-founder of, and stockholder in, MacroMarkets LLC, the producer of a series of home price indices that are licensed to the CME and that form the basis for the futures contracts referenced in this article.

Question and Answer Session

Robert J. Shiller

Question: Who would naturally be on the long side of a futures trade given that so many individual investors, in particular, are already long real estate?

Shiller: Yes, indeed, a lot of people are saying everyone wants to be short the market these days because we are all worried that the prices are going to go down. But all that means is that the futures market is likely to go into backwardation (futures prices lower than spot prices).

I believe the futures market for housing will be one of those markets (like the oil futures market) that is frequently seen in backwardation. With backwardation in place, the longs will see that they are buying cheaply and will have an incentive to come in. Even when the futures market is not actually in backwardation, it will be attractive to longs if the price increase “predicted” in the futures market is less than the actual expected price increase.

It is important to note that even though I have said home prices have not gone up much in the long run, taking long positions in the futures market is likely to be a good investment for longs. Note also that because of a low correlation between home prices and other investments, long futures is a good diversifying investment too.

Question: Could the tax deductibility of mortgage interest be a material factor in explaining trends in housing prices?

Shiller: The federal income tax came into force in 1913, which is exactly the beginning of our series. Then, it was a millionaire’s tax, but it became important after World War II. I don’t think that explains the phenomenon well because the boom in the housing market really occurred in many countries. I think it started first in London. It wasn’t first in the United States. I haven’t heard a good tax explanation for all of these events around the world.

Question: Do you expect Fannie Mae and other government-sponsored enterprises to be active participants in the futures markets?

Shiller: We would love to have Fannie and Freddie hedge their portfolios in our markets. We’ve been trying to tell them that. I’m hoping that they will because they have an exposure to real estate risk, and I think they are in a somewhat risky situation because home prices may start falling. If they do fall, it could cause mortgage defaults, so they should be hedged against this.

Question: What are the macroeconomic implications of a housing price boom followed by a crash?

Shiller: The real estate boom that we've been in is quite a dramatic event, and it has been driving the economy substantially. The personal savings rate is negative now, at least in part because people view themselves as "saving" through increased home prices. But if home prices start to fall, their "saving" could suddenly evaporate, which could affect confidence and then consumption expenditure, which, in turn, could cause a recession.

If history is a guide, we might have a recession as part of the unraveling of a housing boom, but recessions tend to be rather short lived, 6–18 months typically, and we would see declining prices in real estate for five years or more. Keep in mind that this home price boom is essentially unprecedented. The only one that's similar is the post–World War II boom, but the World War II boom was different because during the war, 25 percent of the men were in uniform, which shut down the construction industry. The government also didn't want people building houses and diverting materials from the war effort. When the soldiers came back, that was a fundamental shock that drove the housing market. Recently, we haven't had a fundamental shock. There has been no world war. We're in a really different set of circumstances. This is more of a speculative shock this time.

Question: Does your caution about residential housing apply equally to the commercial realty market?

Shiller: Yes, I think that the correlation between home prices over the recent sample period and especially commercial apartment buildings has been fairly substantial; they are substitutes for each other. So, if we see a drop in home prices, we might see a drop in commercial real estate prices as well.