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# Bernanke's Bubble Laboratory

Princeton Protégés of Fed Chief  
Study the Economics of Manias  
By JUSTIN LAHART  
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PRINCETON, N.J. -- First came the tech-stock bubble. Then there were bubbles in housing and credit. Chinese stocks took off like a rocket. Now, as prices soar on every material from oil to corn, some suggest there's a bubble in commodities.

But how and why do bubbles form? Economists traditionally haven't offered much insight. From World War II till the mid-1990s, there weren't many U.S. investing manias for them to look at. The study of bubbles was left to economic historians sifting through musty records of 17th-century Dutch tulip-bulb prices and the like.

The dot-com boom began to change that. "You were seeing live, in action, the unfolding of lots of examples of valuations disconnecting from fundamentals," says Princeton economist Harrison Hong. Now, the study of financial bubbles is hot.

Its hub is Princeton, 40 miles south of Wall Street, home to a band of young scholars hired by former professor Ben Bernanke, now the nation's chief bubble watcher as Federal Reserve chairman. The group includes Mr. Hong, a Vietnam native raised in Silicon Valley; a Chinese wunderkind who started as a physicist; and a German who'd been groomed to take over the family carpentry business. Among their conclusions:



**Ben Bernanke**

Bubbles emerge at times when investors profoundly disagree about the significance of a big economic development, such as the birth of the Internet. Because it's so much harder to bet on prices going down than up, the bullish investors dominate.

Once they get going, financial bubbles are marked by huge increases in trading, making them easier to identify.

Manias can persist even though many smart people suspect a bubble, because no one of them has the firepower to successfully attack it. Only when skeptical investors act simultaneously -- a moment impossible to predict -- does the bubble pop.

## BUBBLOLOGY

- **Lots to Study:** Research on financial bubbles is hot in academia these days.
- **Jersey Boys:** The hub is Princeton, where three young economists use mathematical methods to study them.
- **One Finding:** Investment manias can persist even though many investors see that a bubble is forming.

As a result of all that and more, the Princeton squad argues that the Fed can and should try to restrain bubbles, rather than following former Chairman Alan Greenspan's approach: watchful waiting while prices rise and then cleaning up the mess after a bubble bursts.

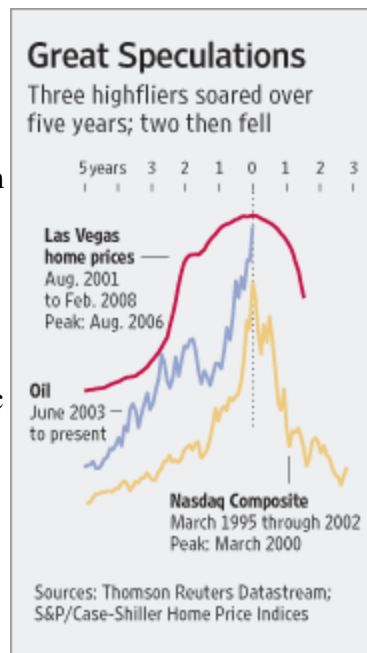
If the tech-stock collapse didn't make that clear, the damage done by the housing and credit bubbles should, argues José Scheinkman, 60 years old, a theorist Mr. Bernanke recruited in 1999 from the University of Chicago. "Advanced economies are very dependent on the health of the financial system. What this bubble did was destroy the capacity of the financial system to finance the U.S. economy," Mr. Scheinkman says.

The Fed is giving the activist approach some thought. In a speech scheduled for delivery Thursday night, Fed Governor Frederic Mishkin suggested that while it was inappropriate to use the blunt instrument of interest-rate increases to prick bubbles, if too-easy credit appeared to be fueling a mania, policy makers might craft a regulatory response that could "help reduce the magnitude of the bubble."

Yet the very concept of bubbles is at odds with the view of some that market prices reflect the collective knowledge of multitudes. There are economists who dispute the existence of bubbles -- arguing, for instance, that what happened to prices in the dot-com boom was a rational response to the possibility that nascent Internet firms might turn into Microsofts. But these economists' numbers are thinning.

When Mr. Bernanke became head of Princeton's economics department in 1996, he saw finance as a fertile field for economic research. Princeton was weak in it. Mr. Bernanke raised \$10 million from the Leon Lowenstein Foundation to create the Bendheim Center for Finance, named for the foundation's president, Robert Bendheim, an alumnus.

Mr. Bernanke hired finance experts who had broad interests and



were eager to work with the university's deepening bench of theorists. He lured Dilip Abreu, known for work in game theory, back from Yale, to which he had earlier defected. Making a virtue of an institutional weakness, the absence of a business school, Princeton assimilated the finance scholars into the economics department and freed them to pursue research.

They are building on work done by the late Hyman Minsky, whose once-ignored ideas about investing manias are now in vogue, and the late economic historian Charles Kindleberger, whose 1978 "Manias, Panics and Crashes" is a classic. But compared with Mr. Minsky or another student of bubbles, Yale's Robert Shiller, the Princeton trio focuses less on mass psychology than on mathematical models. These they use to show how bubbles can be created even in markets that include rational, calculating investors.

### **Hard to Short**

Bubbles don't spring from nowhere. They're usually tied to a development with far-reaching effects: electricity and autos in the 1920s, the Internet in the 1990s, the growth of China and India. At the outset, a surge in the values of related businesses and goods is often justified. But then it detaches from reality.

Mr. Hong, growing up in Sunnyvale, Calif., and teaching at Stanford, had a front-row seat to the technology boom. Recognizing a mania, he resisted investing in tech stocks himself -- until they were about to crest.

He recalls his thought process: "My sister's getting rich. My friends are getting rich....I think this is all crazy, but I feel so horrible about missing out, about being left out of the party." In 2000, "I finally caved in," he says. "I put in some money just as a hedge against other people getting richer than me and feeling better than me." But 2000, of course, was the year the bubble burst.

Mr. Hong, who came to Princeton two years later, and now is 37, argues that big innovations lead to big differences of opinion between bullish and bearish investors. But the deck is stacked in favor of the optimists.

One who believes a stock is too high can short it, borrowing shares and selling them in hopes of replacing them when they're cheaper. But this can be costly, both in the fees and in the risk of huge losses if the stock keeps rising. Many big investors rarely short stocks. When differences between bullish investors and bearish ones are extreme, many of the bears simply move to the sidelines. Then, with only optimists playing, prices go higher and higher.

In housing and the credit markets, the innovation was slicing and dicing loans in novel ways. As investors bought the resulting mortgage securities, they provided abundant capital for home buyers; buoyed by this and falling interest rates, house prices surged.

Betting against house prices is hard; only a few sophisticated investors found roundabout ways to do it, in derivatives markets. Most skeptics about the housing boom just sat it out; the optimists were unchecked.

At some point in a bubble, optimists' enthusiasm runs its course. Prices turn down. There's an expectation that at this point, investors who were skeptical may see prices as more reasonable and start buying. If they don't, that's a signal that prices had gotten way too high -- and then they tumble.

## On the Bubble

Three of the Princeton economics department's young stars:

### Harrison Hong, 37

Born in Vietnam

B.A., University of California - Berkeley.  
Ph.D., MIT

Researched how differences of opinion and short-sales constraints can help start a bubble, and analysts' role in bubble formation. Most recent research explores commodity valuation.



### Wei Xiong, 32

Born in China

B.S., University of Science and Technology of China;  
M.A., Columbia;  
Ph.D., Duke, 2001

Examined how investors' disparate beliefs and over-confidence lead to frequent trading in bubble periods. Used China's dual-share class to study investors' speculative behavior.



### Markus Brunnermeier, 39

Born in Germany

Diploma in Economics, University of Regensburg; M.A., Vanderbilt; Ph.D., London School of Economics.

Developed a model, borne out by hedge-fund behavior in dot-com era, suggesting rational investors are better off riding a bubble than trying to attack it. Recent research looks at evolution of the credit crisis.



The insights of bearish investors "are more likely to be flushed out through the trading process when the market is falling, as opposed to when it's rising," Mr. Hong and Harvard's Jeremy Stein write. They say this explains why prices fall more rapidly than they go up. Over 60 years, nine of the 10 biggest one-day percentage moves in the S&P 500 were down.

When a lot of borrowed money is involved -- as it often is in a bubble -- once prices peak, the speed of their fall is intensified as investors sell urgently to pay down debt. That pattern offers a strong argument, in Mr. Hong's view, for government to restrain bubbles and the borrowing that fuels them.

### The Trading Signal

At the height of the tech bubble, Internet stocks changed hands three times as frequently as other shares. "The two most important characteristics of a bubble," says Wei Xiong, are: "People pay a crazy price and people trade like crazy."

After finishing undergraduate studies in China at age 18, Mr. Xiong came to the U.S. intent on becoming a particle physicist. He earned a master's from Columbia but decided physics was too mature for him to make a mark. He switched to economics and earned a Ph.D. from Duke University. He was just 24 when Mr. Bernanke hired him in 2000.

According to a model he developed with Mr. Scheinkman, investors dogmatically believe they are right and those who differ are wrong. And as one set of investors becomes less optimistic,

another takes its place. Investors figure they can always sell at a higher price. That view leads to even more trading, and, at the extreme, stock prices can go beyond any individual investor's fundamental valuation.

China's stock market gave Mr. Xiong, Mr. Scheinkman and New York University's Jianping Mei a laboratorylike setting to study. Chinese companies issued two classes of shares, representing identical stakes. Only Chinese could buy Class A shares, and, until 2001, only foreign investors could buy Class B shares.

When other countries have used such setups, the foreign-owned shares have traded at higher prices. But in China between 1993 to 2000, the economists found, Class A shares averaged more than five times the price of Class B shares and were traded five times as frequently -- a hint they were infected with bubble virus.

Companies with fewer A shares outstanding tended to see both higher trading volume and higher prices. That was consistent with a theory Mr. Xiong developed with Messrs. Scheinkman and Hong: In markets with lots of disagreement about values, the optimists are better able to dominate when there are fewer shares available.

Today, there's disagreement over commodity prices: to what extent do they reflect fundamentals like Chinese demand, and to what extent investment mania? Trading points toward a bubble: Daily volume on crude-oil contracts is running 50% above last year. Yet the initial findings of work Mr. Hong has done with Motohiro Yogo of the Wharton School -- comparing cash prices and futures prices -- suggest that "prices for commodities are expensive," but not a bubble, Mr. Hong says.

Mr. Xiong's father-in-law and brother trade stocks in China. At the start of 2007, he cautioned his brother to get out, to no avail. But Chinese stocks are higher today, despite falling since November. "If he actually followed my advice I'm not sure what he would think of me," Mr. Xiong says.

### **Why Bubbles Persist**

Bubbles often keep inflating despite cautions such as Mr. Greenspan's famous warning of "irrational exuberance." Tech stocks rose for more than three years after he said that, in late 1996. Markus Brunnermeier, 39, thinks he understands why this happens.

Growing up near Munich, Germany, he expected to become a carpenter like his father. A building slump dissuaded him, and after stints in a tax office and the army he enrolled at the University of Regensburg.

He had struggled to understand why West Germany, where he lived, was so much more prosperous than East Germany. At Regensburg, he came across the work of Friedrich Hayek, the Nobel prize-winning Austrian economist known for a spirited defense of free-market capitalism. Mr. Hayek noted that while East Germany's government set prices, in the west the market set them -- and provided information about supply and demand that helped the

economy adjust.

Inspired by Mr. Hayek's work, Mr. Brunnermeier studied economics. But in the 1990s, soaring tech stocks made him skeptical of the quality of information that prices convey. As a graduate student at the London School of Economics, he wrote a survey of research on bubbles and crashes that turned into a book.

Under the Hayek view, bubbles don't make sense. As soon as some group of traders irrationally pushes prices way up, more-rational traders should take advantage of the mispricing by selling -- bringing prices back down. But the tech boom reinforced an oft-quoted warning from John Maynard Keynes: "The market can stay irrational longer than you can stay solvent."

So investors who spot the bubble attack only if each is confident that other skeptics are on board. In work done with Mr. Abreu, Mr. Brunnermeier concluded that if all the rational investors could agree to bet against the bubble, they could make big profits. But if they can't coordinate, it's risky for any one of them to bet against a bubble. So it makes sense to ride it up and then get out quickly as soon as the bubble's existence becomes common knowledge.

That's what Pequot Capital Management did. The hedge-fund company boarded the Internet bandwagon early, investing in America Online in 1994. It was heavily invested in tech stocks through the late 1990s. When they started falling in March 2000, Pequot got hurt. But it was agile enough to take bearish positions on the stocks, and its funds posted strong performances for the year.

Looking through security filings, Mr. Brunnermeier and Stanford's Stefan Nagel found that hedge funds on the whole "skillfully anticipated price peaks" in individual tech stocks, cutting back before prices collapsed and shifting into other tech stocks that were still rising. Hedge funds' overall exposure to tech stocks peaked in September 1999, six months before the stocks peaked. They rode the bubble higher and got out close to the right time.

Mr. Brunnermeier saw the bubble, too. He thought people were crazy for buying tech stocks. But as both the hedge funds' gains and his theoretical work suggest, even if you know there's a bubble, it might be smart to go along.

"I was always convinced that there was an Internet bubble going on and never invested in Internet stocks," he says. "My brother-in-law did. My wife always complained that I studied finance and her brother was making a lot of money on Internet stocks."

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