

The Irrationality of Markets

Robert Shiller

Robert Shiller: I'm glad to be here. It has been a very interesting meeting. I want to talk about my book *Irrational Exuberance* and also about further thoughts on the paper that I published in *JPFM*. The book, actually, was one of three books on behavioral finance that came out in 2000. I should mention the others. Hersh Shefrin wrote a book called *Beyond Greed and Fear* and Andrei Shleifer wrote a book called *Inefficient Markets* and then my book. It's a good year for behavioral finance books.

I would characterize Hersh's as a comprehensive textbook. It can serve well as a textbook. It covers the field, surveys the literature and it's very scholarly. *Inefficient Markets* is really a collection of Andrei's papers, which he fixed up to be very readable as a book. A lot of these papers have made a big impression on the profession and so his book is welcome. But mine is different. We're all a little bit different.

My book is a scholarly book, but it is written for a broader audience. Maybe that's not exactly it. I was conscious of the possibility that there would be a broader audience so I avoid things that intimidate people. There are actually two equations in it, but they're buried in the endnotes and you won't find them easily if you flip through it. I have a theory that general readers have math anxiety and the minute they see an equation, they're done. And, in fact, I think they don't like charts. Although I have four of them, I kept that down.

I compare this with *Stocks for the Long Run* by my good friend Jeremy Siegel. His book is filled with charts and is a success with a broader public, but I think his book is a success in spite of the charts. On the other hand, I tried to keep it at a very high level. I thought of this as a true scholarly book, complete with references to hundreds of scholarly journal articles. I just didn't put the things in that would not carry.

But another way of putting it, writing a book is kind of a lost tradition in academia, at least in economics or finance departments. Our academic environment encourages coming up with original re-

sults that appeal to other scholars. It encourages specialization. And that's good, but it has a downside. We sometimes become, as you know, too specialized. We don't know about the broader context of our own work. And there's an older tradition in academics, which is you try to give the big picture story. And I thought I was in that older tradition.

I envisioned this book as a sort of report to the President. After stock market crashes, such as the '87 crash, Presidents ask for reports, such as the Brady Commission Report. They should really be asking for the report during the boom that precedes the crash, but they never do. And so I thought I wanted to write a report about this event, which I rushed to get out before the event, before the inevitable market correction. I had a rushed schedule and, fortunately, it got published in March of 2000. It was exactly the peak of the stock market boom. The Standard & Poor's Composite Index peaked just two days after my book appeared in bookstores and has been way down ever since. In truth, I wish I could have written the book even earlier, if it could have helped prevent this bubble, and subsequent burst, which caused many personal financial tragedies.

And I'm glad Peter Dougherty, my editor, had had the experience of publishing a biography of Saddam Hussain and it was finished three days after the Gulf War ended. That was bad timing and so he was motivated not to repeat such an experience and to get mine out fast. He didn't want to have two such events in his career. Dougherty was a great editor and a big part of the relative success of this book.

I've presented this book more times than I can count, but this is a very different audience than I'm accustomed to presenting to. I'm accustomed to an audience that has never heard of recent research in psychology, never heard of behavioral finance and are very skeptical about the idea we might be in a bubble. Many in the audience feel that the market just has to go up. I'm going to modify my usual talk for you. I will talk here only about the first three parts of the book. Each of these parts details a major factor behind the bull market leading to the peak in early 2000. The three parts are: structural factors, cultural factors and psychological factors.

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But first, a historical perspective. If one looks at a plot NASDAQ index from its beginning in 1971 to the present they would see it really is a remarkably clear case of a bubble. There are thirty years of growth years and then bang, a drop in half. The Standard & Poor's Composite Index, which is a broader index of the whole U.S. stock market back to 1871, shows a less dramatic bubble-and-burst pattern, but still, it too shows the pattern well enough. And if you look back in history for a similar pattern, there's only one that stands out. That's the 1920's and the burst in 1929. There was also a strong up trend in the market in the 1950's and 60's and a burst in 1973-74, but it was a less dramatic picture of growth and sudden burst.

Now let us consider S&P earnings, which are also available back to 1871. There's been a slow trend of growth in real earnings. This growth rate has proceeded up to 1990 at 1.7 percent a year for real earnings, and then it seems to have gone up at a higher rate. Then came the 1990-91 recession. It came back to trend and then it kept going up. Now earnings are going down but apparently the market, during the bull phase ending in 2000, "thought," judging from the high market price of claims on earnings, that earnings will, grow much faster than 1.7% a year in the future. And so, I invite people to look at this and just think, is it plausible that we're now on a new higher trend after a hundred years on the old trend? Well, who knows? Of course, that's the issue. But new era thinking is part of what makes people think that we might be on a new trend. I'll come back to that.

Let's look at the Graham and Dodd price earnings ratio for the U.S. stock market 1881 to the present. Benjamin Graham and David Dodd, in their 1934 book *Securities Analysis*, say that, in computing price earning ratios, you should use a five-year or ten-year moving average of earnings in the denominator. The reason is earnings are volatile. Fortunately, S&P earnings never became negative for a year, although I think NIPA earnings did. But there are these periods of recession when earnings are low and it causes spikes in the usual ratio. The Graham and Dodd ratio is a much more presentable series. Hardly anyone uses the Graham-Dodd ratio, but John Campbell and I used it when we testified before the Federal Reserve Board.

Incidentally, we testified before the Board December 3, 1996, and then two days later Alan Greenspan made his "irrational exuberance" speech, after hearing my speech about irrational markets. But I didn't use the term. "Irrational exuberance" is his term but I have adopted it since it is

so apt a name for what we have been experiencing in our market. Anyway, this is the ratio and you can see it actually got up above 46 in 2000. It had never been this high. The only time it came close was 1929.

And the other thing about the ratio that's interesting is that if you look at a scatter diagram with this price-earnings ratio on the horizontal axis and with subsequent ten-year stock market returns on the vertical axis, and with one scatter point for each year since 1881-1990, you see that the price-earnings ratio appears to predict these long-term returns. That's not a great fit. If you draw a line through the scatter point, you wouldn't say great fit, but it looks like there is a fit. But another way of characterizing it is that when the price earnings ratio has been low, let's say, between five and ten, the subsequent return was always very high, between 10% and 20% a year in real terms for the next ten years. And when the price earnings ratio has been high, let's say between 20 and 25, the real return over the next ten years has been meager or negative. When I wrote the book this price earnings ratio was over 40. And if you were to take a line fit here and see what it predicted, you'd get an astonishingly bad return, so bad that I don't believe it will be so bad.

Campbell and I thought it was enough to predict that returns would be disappointing. But the interesting thing here about this diagram is how much it appears to conflict with the random walk theory. It's very common to hear people say that the random walk theory seems to be recommended by the data. But this is all the data for the United States, and it does not seem to look at all like the random walk theory. So, why is it that we have the impression that the stock market is a random walk?

Well, I think it's because many researchers are using data from day in, day out from 1967 to 1968 and they're very proud that they have 360 observations, but it's not the same thing to look at on a daily basis. It's much more like a random walk on a daily basis. But what we really should care about is what the market does over years or decades. There's also discussion about whether this is statistically significant or not, and that's a whole other thing. But it looks like what comes up, comes down, what comes down, comes up. And this is the data of the United States, all of it, for the whole market.

Voice: What about data from other countries?

Robert Shiller: Campbell and I presented data for 12 countries at the board in December of '96, and it looked to be supportive of our notion that ratios predict returns, but, unfortunately, the data that we have for all these countries, the Morgan Stanley

Capital International, does not go back more than thirty years. They are largely European countries and they are correlated with each other. The current high price earnings ratios are widely justified by arguing that we are coming into a new era with high productivity growth and hence higher than historic earnings growth in the next decade. And they look at the Internet and the new technology and this is the story that developed around the current market.

And it's a journalistic story. It's not told in scholarly journals. It's told in newspapers and magazines. The simple point I want to make here is I think the story is too simple and it's written by people who don't look at the data and don't think about the complexity of the real world. It is just too simplistic to say that the computer is boosting productivity, productivity will boost the profits, and hence, profits will boost the markets.

Let us look briefly at the Gordon profitability numbers. Robert Gordon at Northwestern has computed careful estimates of U.S. productivity since 1871. And he picks intervals, growth over various intervals, excluding wars or recessions, at the beginning or end date because these years are atypical. So, note that the first period is 1871 to '91, the middle period is 1950 to '64, and his data, the last period ends at '96. The title of Gordon's paper is "One Big Wave." One can easily see from his data that indeed there has been one big wave in U.S. productivity growth since 1871. He said U.S. productivity history is very simple. It was growing until the '50's and early '60's, and then it declined; very simple. Low growth in the 19th century and the recent years. High growth between these two extremes. The interesting thing is what about real S&P earnings growth, did that show one big wave? Not at all. It shows no correlation. And what about the growth rate of prices? No correlation.

I'm saying journalists just like to simplify the world. We can talk in terms of economic theory. Why shouldn't productive growth boost earnings and boost prices? We can go on in that and considering economic theory gets us into myriads of complexities. I'm just going to tell you that historically, productivity growth hasn't coincided with earnings growth. So, even if there is a new era, there's no reason from the historical correlation to think that the market is going to do well.

The thing I want to stress in the book is why we had the bubble that peaked in early 2000. That's the first thing. Because we have all these theories about speculative bubbles, but then, you know, why not a bubble in 1980 and 1970. The first thing is what was different in the years leading to 2000? I talk in my book about feedback and amplification mechanisms. Incidentally, many people asso-

ciated with this Institute are quoted in the footnotes of this book, and so I am telling you what you already know. I didn't always cite you properly. I have to apologize. I actually apologized to some people personally, but I just told you I would scare off my readership if I discuss scholarly research in too much detail.

The first part of the explanation for the boom that peaked in 2000 that I give in my book *Irrational Exuberance* was structural factors and we must look first among such factors for precipitating factors, at what ultimately caused this unusual bull market. We're looking at a major historic event, the kind of thing that happens every 50 years. Why does it happen now? You have to think like a historian. People who specialize in explaining historic events tend to give lists of causes. That's because I think historians are respectful of the way history evolves. There are multiple causes for everything.

And so, I have a dozen precipitating factors here. I've actually thought of more since then. But the idea that I'm presenting is the reason the bubble is so mysterious is because there are so many different causes. It's the confluence of many factors. Usually half of the factors impinging the stock market are going up and half are going down. But when you get them all pushing in the same way, that really boosts the market. I'll just talk about the first precipitating factor, the Internet.

My discussion of the World Wide Web has something to do with psychology. The World Wide Web first became available in 1994. And that's when people got on the Internet. Well, it was an exponential growth path since then. I view this as an important technological innovation that will boost productivity somewhat. But the significant thing, it's not its importance in the history of technology; it is its visibility to the general public.

In contrast to most technological innovations, we are using it at home and in our offices every day. Let us compare it with another great innovation, nuclear power. I sometimes ask people, I can do this, how many people have ever been to a nuclear reactor? [A few hands are raised.] You see whenever I talk to professional institutional investors, I get actual hands. When I talk to other people, usually nobody raises their hands. But then I can say, how many of you have operated a nuclear reactor? Any hands up? [No hands are raised.] No one is going to raise his or her hands on that one. But if anyone raised his or her hand on that, then I'd say how many of you have operated it an hour a day for the last year? But see in contrast, the Internet with World Wide Web is very different from other inventions. Everyone is using it as part of his or her daily routine.

And so, it's learning by doing; constant exposure directs attention to the Internet and encourages people to incorporate it into their world view. So, we're actually active with it, and we can see how it boosts productivity. But the broad sweep of technological progress in human history has much more depth than any one of us knows about. Technological progress is the result of thousands or millions of people making little innovations, almost none of which we ever hear about. We hear about grand ideas, but often those grand ideas don't work. And then some guy back in a shop figures out something that makes them gradually work. Technological progress is as much in those little details as in the little visible breakthroughs.

Now, beyond the precipitating factors that I discussed in the book, we have also other structural factors that must be considered to understand the stock market boom. Of particular importance are amplification mechanisms that enlarge the market response to precipitating factors. I'm talking about feedback. There's feedback price to price. Price increases encourage investors to buy, thereby causing more price increases, so the upward cycle begins again. That's feedback. I think there's also feedback price to economic activity to price. The stock market booming has caused people to spend more and that caused GDP to go up, which caused the earnings of corporations to go up and that fed back into the price.

I said in my book that feedback operates through confidence and expectations, but I think it operates through more channels than that. I've been doing questionnaire surveys of expectations of investors since 1989 and I'm comparing the new Paine Weber/Gallup people who started a few years ago. They get very different results: They have these extravagant expectations. The public expects the market to go up 15 percent according to Paine Weber/Gallup. My poll said only 4.6 percent up. One must be cautious when interpreting poll questions. The people in this room don't have to be cautioned, you know that. But still you may be wondering how could they be getting 15 percent and I'm getting 4.6 percent expectation.

Well, it was the wording in the question. In my question, I mention the possibility that the market could go down. I said, "If you expect a decrease in the market, put a minus." So, about a third of my respondents put a minus. But when Paine Weber/Gallup posed their question, they didn't mention the possibility of any decreases. They didn't even show a tabulation of people expecting decreases. So, I called them up. I said, "What about decreases?" And the guy said, "Nobody tells us they expect the market to decrease." I said, "It can't be that nobody in your sample

expects the market to go down." He said, "Okay, we asked for the return on the market and there are a few who said negative, but we truncated it." He said they put them at zero because there were so few such answers. I talked to the guy and he said to me that no reasonable person would expect the market to go down. This is a few years ago. And I said, "Well, I think there are a few people on my floor. This is the finance department. I'm sure I could find you a few who think it's very likely to go down next year." He was throwing mud.

We also have to consider the whole ambiance of these telephone interviews. Someone calls you up; you don't want to embarrass yourself. Some finance guy calls you up and asks what return do you expect on the market. Return just sounds like it ought to be a positive number. He's not asking you if it might go down. The other thing I ask my surveys is about confidence. I asked, "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." In 1999, 96% said they agreed strongly or agreed somewhat and only 2% disagreed. I also asked about crash expectations. I asked, "How much do you agree with this statement? If there is another crash like October 18, 1987, the market will surely be back up to its former levels in a couple years or so." 91% said they agreed strongly or agreed somewhat and only 6% disagreed. But, according to received wisdom among finance professionals, the correct answer is strongly disagree, right? The Market isn't "surely" going to do any predictable thing.

Aaron Lynch: Right, it has to be wrong.

Robert Shiller: And I've asked the following question since '89, "If the Dow dropped 3 percent tomorrow, I would guess that the day after tomorrow the Dow would increase, decrease, stay the same or no opinion." In 1989 it was split between up and down, 35% picked increase and 34% picked decrease. So, they were right then, they didn't know basically. But in 1996 it became almost two to one. 46% picked increase and 24% picked decrease. And in 1999 it became almost three to one, 56% picked increase and 19% picked decrease.

Voice: What's your answer? My answer would be that the stock market follows a random walk.

Robert Shiller: So, you mean that the correct answer would be "no opinion."

Voice: No, I have an opinion then. My opinion is that the stock market will remain unchanged.

Robert Shiller: Okay. Well, one thing about survey questions is that they have many interpretations and when one dissects them later, one wishes one could clarify them. I actually wrote this question

in 1989 and I can't change it without disrupting the continuity of the surveys. So—

Voice: I didn't understand the question? What was the question?

Voice: He's asking empirically what happened.

Robert Shiller: The categories didn't seem to include having an opinion that the market is unpredictable.

Voice: Or 50/50.

Robert Shiller: Which might have been better. Let me move on.

The second part of my book is cultural factors and the new media is something that I stress. And in writing this, it made me reflect that academics in my department hardly ever mention the news media. It's as if we have certain compartmentalized thinking, since the media are obviously important. The media represent an institution that manages public opinion. They're professionals and they're in a competitive business where they have to get public attention or they're out of business, and they learn how to do it. And one thing that they do as media professionals is learn how to attract and hold audiences. You grow into it or you get fired if you don't. You could end up becoming a professor or something if you don't do it. One thing you learn is that the stories have to be timely, and you have to catch what the public is interested in.

One thing I describe in my book is that when the market starts going up, they pile onto it with "new era" theories. The news media justify the stock market increases by some creative story that the economy will do wonderfully better in the future. For my book, I wanted to understand how they come up with these "new era" stories. So, I looked up all of the biggest stock price changes in the world and I had my students go to the microfilm newspapers in the countries with the biggest stock market booms of the last 30 years or so and read the news, and there was always a new era story. The biggest one ever was the Philippines. That was when Ferdinand Marcos left; so, that is a new era story, I guess. But for some of the others like Taiwan in 1986–87, the newspapers were writing about the incipient chip and electronics industry that was coming. They were absolutely right; it was coming. Taiwan today is a major chip manufacturer. But the market overreacted to it. Journalists will always find some new era story. They're good; this is their job. They find something that accounts for why we're entering a new era and the audience is receptive and they'll write this up.

Then there was the Gulf War, which cut off oil supplies and oil prices surged sparking a stock market boom in oil-rich Venezuela in 1990–91.

Now, of course, there were people in Venezuela who pointed out this is the Gulf War and when the war is over, the prices will come back down, but somehow that got ignored.

The next part of my book is a study of psychological factors. I don't have to tell the people in this room about psychological factors, maybe I'll just emphasize examples of three things; anchoring, overconfidence and attention, as being particularly useful for people who understand in valuing a market. But, all of you here know what I am referring to, so I will move on to the other part of my talk.

I just wanted to say something about my surveys and in my article entitled "Measuring Bubble Expectations and Investor Confidence" in *The Journal of Psychology and Financial Markets* (2000). I published indexes of confidence since '89 for the United States. I'm not sure they're the best indexes, but I have these results and I have them in Japan, too. I'm a little uncomfortable about the relationship between this book and my paper. They came out in the same year and refer to each other. But when you read my book, I have a clear argument why we have the bubble. When you read this paper, you do not get such a clear picture. You see data that's jumping all over the place and is not showing any simple patterns. I'll tell you the bubble index was supposed to be a measure of the public's perception that we are in a bubble. In other words, the public perceiving that the market is going up and it won't keep going up. The bubble expectations index was based on these five indicators:

1. The percentage of respondents who think the market is too high and who also expect an increase in the market.
2. The percentage of respondents who, when asked for a detailed pattern of expectations, say they expect an increase, then a decrease.
3. The percentage of respondents who agree with a statement that they expect a drop in the market ultimately but that it will rise for a while.
4. The percentage of respondents who say they see excessive optimism among other investors.
5. The percentage of respondents who expect an increase in the Market and who also think that the probability of a crash is greater than 10%.

These five indicators showed some co-movements, and so there is indeed evidence of changes in bubble expectations over time. But, the changes are rather short run and there was little trend in the bubble during the great bubble of the late 1990s.

I only did this for institutional investors, and I think maybe I should have done it for individual

investors. I haven't been surveying individual investors as much. I've done institutional investors every six months since 1989 in the U.S. and in Japan, but I've only done intermittent individual investor surveys. Now I'm thinking they're really very different, institutional and individual investors. Institutional investors are very professional, consistent in their judgments, relatively speaking. And the real passions come out of individual investors, but I didn't survey them very often.

But, anyway, so I'm coming up with new bubble indexes for the same data. I should actually extrapolate, but I just wanted to close with my latest effort. Incidentally, now the School of Management at Yale has agreed to continue my surveys and post the results on a web site. We think that having a stock market confidence index would be a great public interest. So, the problem is, if I put directly out what is in the *JPFM*, it's so confusing. I don't know how a newsperson would write it up. Institutional investors change their thinking in six months all the time. There is a problem of interpretation when you see a lot of short run noise and you don't see any consistent trend over the whole period. What I am proposing to do for the new Yale web site is to create single-question indexes and not average them and keep it to four.

We are producing four confidence indexes. The first one is "one-year confidence." It's the percent of the population expecting an increase in the Dow, in one year. The second one is "buy-on-dips confidence." It's the percent of the respondents expecting a rebound the next day should the drop ever drop 3 percent in one day. The third one is "crash confidence." It is the percent of the respondents who attach little probability, less than 10 percent, to a stock market crash in the next six months. The fourth one is "valuation confidence." It is the percent of the respondents who think that the market is not too high. These four indexes measure four very different notions of investor confidence. It will not be surprising if they do not move up and down together in lockstep through time. That way, I have four indexes that all have similar interpretations.

Survey research, incidentally, is very unrewarding and unsatisfying for academics. We have to be kind of a sucker for punishment to keep doing this for 10 years. My Japanese colleagues and I have only been ready to do this because we believe it is so important to hold a consistent and uninterrupted index of public thinking through time. There are no strong trends in any of these series for institutional investors, though buy-on-dips confidence has a hint of an upward trend. What is more striking is a lot of short-run movements. That's

what I really see with institutional, a lot of noise. It's a complicated market. Maybe I should have expected that.

Vernon Smith: Well, if the stock market was apparently unpredictable, why would opinion be predictable?

Robert Shiller: Well, the market does look somewhat predictable. Note that valuation confidence showed a long swing down during the bull market. During the whole bull market, people were more and more aware of people saying that it's overvalued. But then recently they've lost it. They've just forgotten that the market is overvalued.

David Dreman: The correlation between the crash index and the one-year confidence index appears substantial. What about people who project long-term rates of return, are they projecting long-term rates of return, four, five, ten percent and still expecting a crash?

Robert Shiller: I have the average percentage probability of a crash in my *JPFM* paper. It didn't tell a great story (only partly because of sampling error) since it was very erratic and hard to summarize. None of those pictures told a great story, but what it is encouraging me to think is that expectations are just very complicated. There are many factors. I can easily imagine that, in truth, people have mental compartments. And in one mental compartment they're asking about the crash, in another mental compartment when they're asked about the crash, they close the crash compartment and they go into another mode of thinking, and that's why there isn't more relationship among these different confidence indexes.

Voice: How do you explain that crash then, after all the media were as optimistic in March of 2000 as before and yet that happened to the people of the market? So, what you explain you have a list of items that affect it, such as media but what has happened that explains the decline?

Robert Shiller: What decline? Oh, the market?

Voice: Yes, the markets, precisely.

Robert Shiller: Incidentally, the thing I stress in my book is there are so many things impacting the market.

First of all, the earnings outlook worsened. Then there are foreigners and foreigners have been heavy buyers. The Americans have been net sellers to foreigners. The confidence has moved abroad, and I'm not even tabulating them. And there's something economists talk about called supply and demand and many things affect them. There are other factors that I never even surveyed, like the power of regret, the feeling that you didn't get in or the effects of salience or attention on the impulse to buy. I mean, there are so many factors that affect the stock market. So, I'm afraid to say,

it's going to be too complicated a story. So, that's it. That's what I have to say.

The term confidence index doesn't work as well for the stock market because it's just a terribly complicated market. We can speak of consumer confidence as a simple intuitive concept, but we can't similarly speak of investor confidence. Since investing is a much more complicated activity than consuming, we will need multiple indexes to describe the state of mind of investors.

Brian Bruce: I just have one observation about the names. In trying to understand what they're saying, you know, like No. 4, Valuation Confidence, people who think the market is not too high, that means they're confident that the values are reasonable. Crash confidence, it's kind of like it's almost flipped, it says that the market will crash.

Robert Shiller: Okay, so I can change it maybe—any suggestion, no crash confidence.

Voice: No. 4 you should switch around. It's hard to understand the not the negative.

Voice: People will skip the not.

Robert Shiller: I'll work on that. The term buy-on-dips confidence doesn't offend anyone? I think these names are good, in the sense they convey something about what they mean. And I think now I'm just going to do single question indexes because I can't average them to make any sense out of it.

Voice: Bob, I mean, are they sentiment or are they confidence?

Robert Shiller: Well, this is trying to make the meaning obvious. There are other people already doing investor surveys; maybe people in this room are already doing them. I don't know, but what is the simplest important message from these results? Confidence is important. Keynes talks about confidence in his 1936 book, *The General Theory of Employment, Interest and Money*, and it was really at the center of his theory. That is why there is so much interest in the consumer sentiment and consumer confidence indexes. But no one to date has been a great success in measuring investor confidence.

Tim Loughran: You can cut to the quick by just writing options on them.

Robert Shiller: Writing options on these indexes?

Tim Loughran: Yes.

Robert Shiller: That's interesting.

Voice: I know how to price them.

Mary Ross: I wanted to ask you, culturally and psychologically, a lot of the U.S. psychological make-

up has always been confidence. I'm wondering if it's sort of built into our culture so much that we have to always believe things will be better, whereas, you see in other countries there might be more of a mature reality aspect to their thinking?

Robert Shiller: But not Japan. That's my only comparison. I think they're not more humble than we. I don't know. But, yes, I'd like to compare on more cultures. But the reality of survey work is it's very frustrating and sometimes you want to stop. This work goes on year after year and no one has been paying much attention. My book is the first time anyone has paid attention to these questions. They've been on my website and I haven't been really pushing them. But it seems to me this is interesting stuff. And the history we have for two countries makes it even more so. Another reason why people don't start questionnaire work is because it's not interesting until you have a lot of history. And nobody keeps going with it because it's frustrating. There are probably people here who can sympathize. You've had some survey work presented at these institutes.

Mary Ross: Yes, through Don MacGregor.

Robert Shiller: That's another reason why people stopped doing it because you can't control it well enough and you get discouraged. Okay. They are what they are.

Vernon Smith: You can say the same thing about the Gordon's productivity theory; I don't know what that means. I mean, if you go back in the hump that there weren't any women in the labor force, that doesn't mean they weren't in production, it wasn't counted. And so the whole composition of that thing is totally changed. So, to relate, maybe it's fitting to try to relate that to the stock market because they're both just—

Robert Shiller: Well, I was making a thing that the story is over-simplified. I can think of a reason why productivity won't correlate with profits or with stock prices anyway. It's just interesting to look at the data and see no correlation.

Greg Forsythe: Maybe one way of getting more out of this, if you think of this 10-year period as being pre-bubble in the U.S., you have now 10 or 11 years post bubble in Japan, what do these things look like and how they evolved over the years?

Robert Shiller: We're getting it. We'll have it in a month. Unfortunately, this book set me back on a lot of other projects, but we're moving on that.

Vernon Smith: You get behind when you're writing.

Robert Shiller: Yes, right.

