LECTURE TWO

FINANCIAL MARKETS

Central European University Lecture Series,

October 26–30, 2009

In this lecture I'll apply the concepts introduced in the first lecture—fallibility, reflexivity, and the human uncertainty principle—to the financial markets. Please brace yourselves, because I'll pack the experience of a lifetime into this one lecture.

Financial markets provide an excellent laboratory for testing the ideas I put forward in an abstract form in the previous lecture. The course of events is easier to observe than in most other areas. Many of the facts take a quantitative form, and the data are well recorded and well preserved. The opportunity for testing occurs

because my interpretation of financial markets directly contradicts the efficient market hypothesis, which has been the prevailing theory about financial markets. The efficient market hypothesis claims that markets tend toward equilibrium; that deviations occur in a random fashion and can be attributed to extraneous shocks. If that theory is valid, mine is false—and vice versa.

Let me state the two cardinal principles of my conceptual framework as it applies to the financial markets. First, market prices always distort the underlying fundamentals. The degree of distortion may range from the negligible to the significant. This is in direct contradiction to the efficient market hypothesis, which maintains that market prices accurately reflect all the available information.

Second, instead of playing a purely passive role in reflecting an underlying reality, financial markets also have an active role: they can *affect* the so-called fundamentals they are supposed to reflect. That is the point that behavioral economics is missing. That discipline focuses on only half of a reflexive process: the mispricing of financial assets; it does not concern itself with the effect the mispricing has on the fundamentals.

There are various pathways by which the mispricing of financial assets can affect the so-called fundamentals. The most widely traveled are those that involve the use of leverage—both debt and equity leveraging. The various feedback loops may give

the impression that markets are often right, but the mechanism at work is very different from the one proposed by the prevailing paradigm. I claim that financial markets have ways of altering the fundamentals and that the resulting alterations may bring about a closer correspondence between market prices and the underlying fundamentals. Contrast that with the efficient market hypothesis, which claims that markets always accurately reflect reality and automatically tend toward equilibrium.

My two propositions focus attention on the reflexive feedback loops that characterize financial markets. I described the two kinds of feedback, negative and positive, in the first lecture. Again, negative feedback is self-correcting, and positive feedback is self-reinforcing. Thus, negative feedback sets up a tendency toward equilibrium, but positive feedback produces dynamic disequilibrium. Positive feedback loops are more interesting because they can cause big moves, both in market prices and in the underlying fundamentals. A positive feedback process that runs its full course is initially self-reinforcing in one direction, but eventually it is liable to reach a climax or reversal point, after which it becomes self-reinforcing in the opposite direction. But positive feedback processes do not necessarily run their full course; they may be aborted at any time by negative feedback.

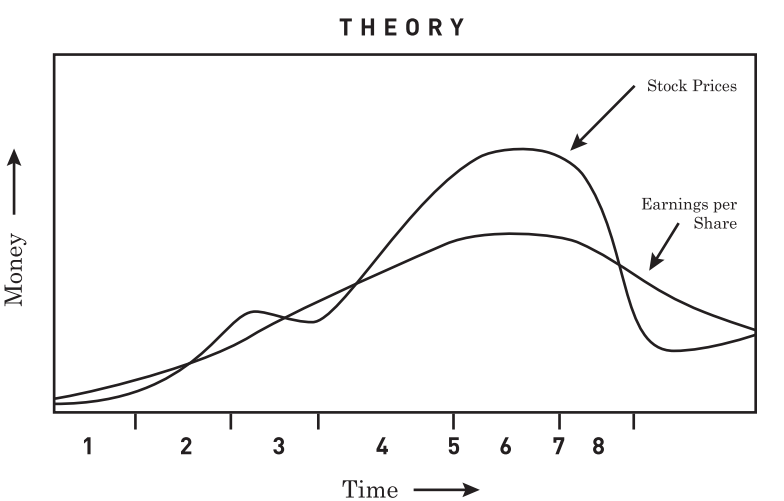
I HAVE DEVELOPED A THEORY about boom-bust processes, or bubbles, along these lines. Every bubble has two components: an underlying trend that prevails in reality and a misconception relating to that trend. A boom-bust process is set in motion when a trend and a misconception positively reinforce each other. The process is liable to be tested by negative feedback along the way. If the trend is strong enough to survive the test, both the trend and the misconception will be further reinforced. Eventually, market expectations become so far removed from reality that people are forced to recognize that a misconception is involved. A twilight period ensues during which doubts grow and more people loose faith, but the prevailing trend is sustained by inertia. As Chuck Prince, former head of Citigroup said: "As long as the music is playing, you've got to get up and dance. We're still dancing." Eventually a point is reached when the trend is reversed; it then becomes self-reinforcing in the opposite direction.

Let me go back to the example I used when I originally proposed my theory in 1987: the conglomerate boom of the late 1960s. The underlying trend is represented by earnings per share, the expectations relating to that trend by stock prices. Conglomerates improved their earnings per share by acquiring other companies. Inflated expectations allowed them to improve their earnings performance, but eventually reality could not keep up with expectations. After a twilight period the price trend was reversed. All the problems that had been swept under the carpet surfaced, and earnings collapsed. As the pres-

ident of one of the conglomerates, Ogden Corporation, told me at the time: I have no audience to play to.

The chart below is a model of the conglomerate bubble. The charts of actual conglomerates like Ogden Corporation closely resemble this chart. Bubbles that conform to this pattern go through distinct stages: (1) inception; (2) a period of acceleration, (3) interrupted and reinforced by successful tests; (4) a twilight period; (5) and the reversal point or climax, (6) followed by acceleration on the downside (7) culminating in a financial crisis.

The length and strength of each stage is unpredictable, but there is an internal logic to the sequence of stages. So the sequence is predictable, but even that can be terminated by government



intervention or some other form of negative feedback. In the case of the conglomerate boom, it was the defeat of Leasco Systems and Research Corporation in its attempt to acquire Manufacturer Hanover Trust Company that constituted the climax, or reversal point.

Typically, bubbles have an asymmetric shape. The boom is long and drawn out; slow to start, it accelerates gradually until it flattens out during the twilight period. The bust is short and steep because it is reinforced by the forced liquidation of unsound positions. Disillusionment turns into panic, reaching its climax in a financial crisis.

The simplest case is a real estate boom. The trend that precipitates it is that credit becomes cheaper and more easily available; the misconception is that the value of the collateral is independent of the availability of credit. As a matter of fact, the relationship between the availability of credit and the value of the collateral is reflexive. When credit becomes cheaper and more easily available, activity picks up and real estate values rise. There are fewer defaults, credit performance improves, and lending standards are relaxed. So at the height of the boom, the amount of credit involved is at its maximum and a reversal precipitates forced liquidation, depressing real estate values.

Yet, the misconception continues to recur in various guises. The international banking crisis of 1982 revolved around sovereign debt, with which no collateral is involved. The creditworthiness of

the sovereign borrowers was measured by various debt ratios, such as debt to GDP or debt service to exports. These ratios were considered objective criteria, but in fact they were reflexive. When the recycling of petro-dollars in the 1970s increased the flow of credit to countries like Brazil, their debt ratios improved, encouraging further inflows and starting a bubble. Shortly after Paul Volcker raised interest rates in the U.S. to arrest inflation, the bubble burst.

Not all bubbles involve the extension of credit; some are based on equity leveraging. The best examples are the conglomerate boom of the late 1960s and the Internet bubble of the late 1990s. When Alan Greenspan spoke about irrational exuberance in 1996, he misrepresented bubbles. When I see a bubble forming I rush in to buy, adding fuel to the fire. That is not irrational. And that is why we need regulators to counteract the market when a bubble is threatening to grow too big; we cannot rely on market participants, however well informed and rational they are.

Bubbles are not the only form in which reflexivity manifests itself. They are just the most dramatic and the most directly opposed to the efficient market hypothesis; so they do deserve special attention. But reflexivity can take many other forms. In currency markets, for instance, the upside and downside are symmetrical so

that there is no sign of an asymmetry between boom and bust. But there is no sign of equilibrium either. Freely floating exchange rates tend to move in large, multi-year waves.

The most important and most interesting reflexive interaction takes place between the financial authorities and financial markets. Because markets do not tend toward equilibrium, they are prone to produce periodic crises. Financial crises lead to regulatory reforms. That is how central banking and the regulation of financial markets have evolved. Financial authorities and market participants alike act on the basis of imperfect understanding, and that makes the interaction between them reflexive.

While bubbles only occur intermittently, the interplay between authorities and markets is an ongoing process. Misunderstandings by either side usually stay within reasonable bounds because market reactions provide useful feedback to the authorities, allowing them to correct their mistakes. But occasionally the mistakes prove to be self-validating, setting in motion vicious or virtuous circles. Such feedback loops resemble bubbles in the sense that they are initially self-reinforcing but eventually self-defeating. Indeed, the intervention of the authorities to deal with periodic financial crises played a crucial role in the development of a "superbubble" that burst in 2007–2008.

It is important to realize that not all price distortions are due to reflexivity. Market participants cannot possibly base their decisions on knowledge—they have to anticipate the future, and the future is contingent on decisions that people have not yet made. What those decisions are going to be and what effect they will have cannot be accurately anticipated. Nevertheless, people are forced to make decisions. To guess correctly, people would have to know the decisions of all of the other participants and their consequences, but that is impossible.

Rational expectations theory sought to circumvent this impossibility by postulating that there is a single correct set of expectations and people's views will converge around it. That postulate has no resemblance to reality, but it is the basis of financial economics as it is currently taught in universities. In practice, participants are obliged to make their decisions in conditions of uncertainty. Their decisions are bound to be tentative and biased. That is the generic cause of price distortions.

Occasionally, the price distortions set in motion a boom-bust process. More often, they are corrected by negative feedback. In these cases market fluctuations have a random character. I compare them to the waves sloshing around in a swimming pool as opposed to tidal waves. Obviously, the latter are more significant but the former are more ubiquitous. The two kinds of price distortions intermingle so that in reality boom-bust processes rarely follow the exact course of my model. Bubbles that follow the pattern I

described in my model occur only on those rare occasions when they are so powerful that they overshadow all the other processes going on at the same time.

It will be useful to distinguish between near-equilibrium conditions, which are characterized by random fluctuations, and far-from-equilibrium situations, in which a bubble predominates. Near-equilibrium is characterized by humdrum, everyday events that are repetitive and lend themselves to statistical generalizations. Far-from-equilibrium conditions give rise to unique, historic events in which outcomes are generally uncertain but have the capacity to disrupt the statistical generalizations based on everyday events.

The rules that can guide decisions in near equilibrium conditions do not apply in far-from-equilibrium situations. The recent financial crisis is a case in point. All the risk management tools and synthetic financial products that were based on the assumption that price deviations from a putative equilibrium occur in a random fashion broke down, and people who relied on mathematical models that had served them well in near-equilibrium conditions got badly hurt.

I have gained some new insights into far-from-equilibrium conditions during the recent financial crisis. As a participant I had to act under immense time pressure, and I could not gather all of

the information that would have been available—and the same applied to the regulatory authorities in charge. That is how far-from-equilibrium situations can spin out of control.

This situation is not confined to financial markets. I experienced it, for instance, during the collapse of the Soviet Union. The fact that the participants' thinking is time-bound instead of timeless is left out of the account by rational expectations theory.

I was aware of the uncertainty associated with reflexivity, but even I was taken by surprise by the extent of the uncertainty in 2008. It cost me dearly. I got the general direction of the markets right, but I did not allow for the volatility. As a consequence, I took on positions that were too big to withstand the swings caused by volatility, and several times I was forced to reduce my positions at the wrong time in order to limit my risk. I would have done better if I had taken smaller positions and stuck with them. I learned the hard way that the range of uncertainty is also uncertain and at times can become practically infinite.

Uncertainty finds expression in volatility. Increased volatility requires a reduction in risk exposure. This leads to what John Maynard Keynes called "increased liquidity preference." This is an additional factor in the forced liquidation of positions that characterizes financial crises. When the crisis abates and the range of uncertainty is reduced, it leads to an almost automatic rebound in the stock market as the liquidity preference stops rising and eventually falls. That is another lesson I have learned recently.

I need to point out that I introduced the distinction between near- and far-from-equilibrium conditions in order to make some sense out of a confusing reality, and it does not accurately describe reality. Reality is always more complicated than the dichotomies we introduce into it. The recent crisis is comparable to a hundred-year storm. We have had a number of crises leading up to it. These are comparable to five- or ten-year storms. Regulators who had successfully dealt with the smaller storms were less successful when they applied the same methods to the hundred-year storm.

These general remarks prepare the ground for a specific hypothesis to explain the recent financial crisis. It is not derived from my theory of bubbles by deductive logic. Nevertheless, the two of them stand or fall together.

So here it goes. I contend that the puncturing of the subprime bubble in 2007 set off the explosion of a super-bubble, much as an ordinary bomb sets off a nuclear explosion. The housing bubble in the United States was the most common kind, distinguished only by the widespread use of collateralized debt obligations and other synthetic instruments. Behind this ordinary bubble there was a much larger super-bubble growing over a longer period of time that was much more peculiar.

The prevailing trend in this super-bubble was the ever increasing use of credit and leverage. The prevailing misconception was the

belief that financial markets are self-correcting and should be left to their own devices. President Reagan called it the "magic of the marketplace," and I call it market fundamentalism. It became the dominant creed in the 1980s, when Ronald Reagan was president of the United States and Margaret Thatcher was prime minister of the United Kingdom.

What made the super-bubble so peculiar was the role that financial crises played in making it grow. Since the belief that markets could be safely left to their own devices was false, the super-bubble gave rise to a series of financial crises. The first and most serious one was the international banking crisis of 1982. This was followed by many other crises, the most notable being the portfolio insurance debacle of October 1987, the savings and loan crisis that unfolded in various episodes between 1989 and 1994, the emerging market crisis of 1997–1998, and the bursting of the Internet bubble in 2000. Each time a financial crisis occurred, the authorities intervened, merged away or otherwise took care of the failing financial institutions, and applied monetary and fiscal stimuli to protect the economy. These measures reinforced the prevailing trend of ever increasing credit and leverage, but as long as they worked, they also reinforced the prevailing misconception that markets can be safely left to their own devices. It was a misconception because it was the intervention of the authorities that saved the system; nevertheless these crises served as successful tests of a false belief, and as such, they inflated the super-bubble even further.

Eventually the credit expansion became unsustainable and the super-bubble exploded. The collapse of the subprime mortgage market in 2007 led to the collapse of one market after another in quick succession because they were all interconnected, the firewalls having been removed by deregulation. And that is what distinguishes the most recent financial crisis from all those that preceded it. Those functioned as successful tests that reinforced the process; the subprime crisis of 2007 constituted the turning point. The collapse then reached its climax with the bankruptcy of Lehman Brothers on September 15, 2008, which precipitated the large-scale intervention of the financial authorities.

It is characteristic of my boom-bust model that it cannot predict whether a test will be successful or not. This holds for ordinary bubbles as well as the super-bubble. I thought that the emerging market crisis of 1997–1998 would constitute the turning point of the super-bubble, but I was wrong. The authorities managed to save the system and the super-bubble continued growing. That made the bust that eventually came in 2007–2008 all the more devastating.

After the bankruptcy of Lehman Brothers financial markets had to be put on artificial life support. This was a shock not only for the financial sector but also for the real economy. International trade was particularly badly hit. But the artificial life support worked, and financial markets stabilized. The economy gradually revived. A year later, the whole episode feels like a bad dream and people would like to forget it. There is a widespread desire to treat the crisis as just an-

other crisis and return to business as usual. But reality is unlikely to oblige. The system is actually broken and needs to be fixed.

My analysis offers some worthwhile clues to the kind of regulatory reform that is needed. First and foremost, since markets are bubble-prone, the financial authorities have to accept responsibility for preventing bubbles from growing too big. Alan Greenspan and others have expressly refused to accept that responsibility. If markets can't recognize bubbles, Greenspan argued, neither can regulators—and he was right. Nevertheless, the financial authorities have to accept the assignment, knowing full well that they will not be able to meet it without making mistakes. They will, however, have the benefit of receiving feedback from the markets, which will tell them whether they have done too much or too little. They can then correct their mistakes.

Second, in order to control asset bubbles it is not enough to control the money supply; you must also control the availability of credit. This cannot be done by using only monetary tools; you must also use credit controls. The best-known tools are margin requirements and minimum capital requirements. Currently they are fixed irrespective of the market's mood, because markets are not supposed to have moods. Yet they do, and the financial authorities need to *vary* margin and minimum capital requirements in order to control asset bubbles.

Regulators may also have to invent new tools or revive others that have fallen into disuse. For instance, in my early days in finance, many years ago, central banks used to instruct commercial banks to limit their lending to a particular sector of the economy, such as real estate or consumer loans, because they felt that the sector was overheating. Market fundamentalists consider that to be crass interference with the market mechanism, but they are wrong. When our central banks used to do it we had no financial crises to speak of. The Chinese authorities do it today, and they have much better control over their banking system. The deposits that Chinese commercial banks have to maintain at the People's Bank of China were increased seventeen times during the boom, and when the authorities reversed course the banks obeyed them with alacrity.

Or consider the Internet boom. Alan Greenspan recognized it quite early when he spoke about irrational exuberance in 1996. But apart from his famous speech, he did nothing to avert it. He felt that reducing the money supply would have been too blunt an instrument to use, and he was right. But he could have asked the Securities and Exchange Commission to put a freeze on new share issues since the Internet boom was fueled by equity leveraging. He did not, because that would have violated his market fundamentalist beliefs. That was wrong.

Third, since markets are potentially unstable, there are systemic risks in addition to the risks affecting individual market par-

ticipants. Participants may ignore these systemic risks in the belief that they can always dispose of their positions, but regulators cannot ignore them because if too many participants are on the same side, positions cannot be liquidated without causing a discontinuity or a collapse. They have to monitor the positions of participants in order to detect potential imbalances. That means that the positions of all major market participants, including hedge funds and sovereign wealth funds, need to be monitored. Certain derivatives, such as credit default swaps and knockout options, are particularly prone to create hidden imbalances; therefore, they must be regulated and, if appropriate, restricted or forbidden. The issuing of synthetic securities needs to be subject to regulatory approval, just as the issuing of ordinary securities is.

Fourth, we must recognize that financial markets evolve in a one-directional, nonreversible manner. The financial authorities, in carrying out their duty of preventing the system from collapsing, have extended an implicit guarantee to all institutions that are "too big to fail." Now they cannot credibly withdraw as long as that guarantees there are institutions that are too big to fail. Therefore, they must impose regulations that will ensure that the guarantee will not be invoked. Too-big-to-fail banks must use less leverage and accept various restrictions on how they invest the depositors' money. Deposits should not be used to finance proprietary trading. But regulators have to go even further. They must regulate the compensation packages of proprietary traders to ensure that risks and rewards

are properly aligned. This may push proprietary traders out of banks into hedge funds where they properly belong.

Just as oil tankers are compartmentalized in order to keep them stable, there ought to be firewalls between different markets. It is probably impractical to separate investment banking from commercial banking as the Glass-Steagall Act of 1933 did. But there have to be internal compartments keeping proprietary trading in various markets separate from each other. Some banks that have come to occupy quasi-monopolistic positions may have to be broken up.

Finally, the drafters of the Basel Accords made a mistake when they gave securities held by banks substantially lower risk ratings than regular loans: they ignored the systemic risks attached to concentrated positions in securities. This was an important factor aggravating the crisis. It has to be corrected by raising the risk ratings of securities held by banks, which will probably discourage the securitization of loans.

All of these measures will reduce the profitability and leverage of banks. This raises an interesting question about timing. This is not the right time to enact permanent reforms. The financial system and the economy are very far from equilibrium, and they cannot be brought back to near-equilibrium conditions by a straightforward corrective move, just as when a car is skidding you

must first turn the wheel in the direction of the skid before you right the car. What needed to be done in the short term was almost exactly the opposite of what is needed in the long term. First, the credit that evaporated had to be replaced by using the only source that has remained credible—namely, the state. That meant increasing the national debt and extending the monetary base. As the economy stabilizes, the monetary base must be shrunk as fast as credit revives—otherwise, deflation will be replaced by the specter of inflation.

We are still in the first phase of this delicate maneuver. The banks are in the process of earning their way out of a hole. To reduce their profitability now would be directly counterproductive. Regulatory reform has to await the second phase, when the money supply needs to be brought under control; and it needs to be carefully phased in so as not to disrupt recovery. But we cannot afford to forget about it.

You have seen that my interpretation of financial markets—call it the theory of reflexivity—is very different from the efficient market hypothesis. Strictly speaking, neither theory is falsifiable by Popper's standards. I predicted the bursting of the super-bubble in 1998. I was wrong then; am I right now? And some proponents of the efficient market hypothesis are still defending it in the face of all the evidence.

Still, there is a widespread feeling that we need a new paradigm, and I contend that my theory provides a better explanation than the available alternatives. Behavioral economics, which is gaining increased recognition, deals with only half of reflexivity: the misinterpretations of reality; it does not study the pathways by which mispricing can change the fundamentals.

I realize that my theory of financial markets is still very rudimentary and needs a lot more development. Obviously, I cannot fully develop it on my own. So I may have been premature in putting forward my theory as the new paradigm. But the efficient market hypothesis has been conclusively disproved and a new interpretation of financial markets is urgently needed. Even more than that, the entire edifice of global financial markets, which was erected on the false premise that markets can be left to their own devices, has to be rebuilt from the ground up.

This concludes the lecture, but I also want to make an announcement.

I have decided to sponsor an Institute for New Economic Thinking—INET for short. It will be a major institution, fostering research, workshops, and curricula that will develop an alternative to the prevailing paradigm. I have committed $50 million over ten years, and I hope others will join me to bring the budget up to $10 million a year or more.

I hope reflexivity will be one of the concepts that will be explored, but clearly it should not be the only concept. I recognize a potential conflict between being a protagonist and a financial sponsor at the same time. To protect against it, I want to erect a Chinese wall between me and the Institute. To this end, I will extend my financial support through Central European University, and I will not personally participate in the governance of INET. The jury that selects grantees will be expressly instructed to encourage other alternatives besides the theory of reflexivity.

The plan is to launch INET at a workshop on the lessons of the financial crisis at King's College, Cambridge, on April 10 and 11, 2010. And I hope that the new economic thinking will find a home here at the Central European University.

Thank you.