

Bubbling along

Laurence H. Meyer looks back on his time at the US Fed and asks whether its systems for forecasting and moderating stock market bubbles needs some modification.



During my first several years on the Federal Reserve Board of Governors, the US economy seemed to be breaking all the old rules. In particular, equity valuations seemed to be ignoring previously well-established norms about fair valuation; and inflation remained low, or even declined, as the unemployment rate fell to levels that in the past had been associated with rising inflation. This last year has seen a dramatic downward correction in those equity valuations.

Large swings in equity prices provide challenges to monetary policy. They can increase the threat of the economy over-heating on the way up and they can increase the vulnerability of the economy to a sharp decline in demand when an asset bubble bursts. So how should monetary policy makers respond to a development such as the equity price bubble that emerged in the second half of the 1990s?

An asset bubble, simply defined, is a large and unsustainable increase in the prices of a subset of real or financial assets above their fundamental, long-term values. Unfortunately, such bubbles are inherently difficult, if not impossible, to identify in real time. Indeed, Alan Greenspan, the Fed's chairman, has suggested that the best way to know whether a particular increase in asset prices is a bubble is to see whether those prices subsequently fall by 40% or more! So the first question is whether we have the operational means to detect bubbles in real time with a confidence that would allow us to take preemptive policy actions early enough to make a difference.

It would be useful to have a simple rule indicating to monetary policy makers how they should respond to rising asset prices and potential asset bubbles, even if how they applied such a rule to economic developments was within their discretion. But first we need to identify the objectives of monetary policy, its instruments and the transmission mechanism to aggregate demand.

In the US, the Congress has required that the Fed set monetary policy to achieve dual objectives: full employment and price stability. Most models of the monetary policy process, therefore, begin explicitly or implicitly with an objective function according to which losses are proportional to deviations of output from its full employment level and inflation from the Fed's target.

Virtually all central banks use a short-term interest rate as their policy instrument. In the case of the US, this is the federal funds rate. At each of the Federal Reserve Open Market Committee's eight meetings a year, the Fed sets a target for the federal funds rate that applies until the next meeting. The Manager of the System Open Market Account is then responsible for conducting open market operations to maintain the actual rate as close as possible to the target rate.

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Spending decisions, however, are not linked directly to the federal funds rate. The power of monetary policy comes from its influence on a wider range of financial variables that do directly impact on spending decisions, including short- and longer-term private interest rates, equity and other asset prices, and foreign exchange rates. These indices of broader financial conditions are, of course, also affected by developments other than monetary policy, including changes in the perception of risk, in inflation expectations and in fiscal policy.

A simple way to represent the strategy of monetary policy is the Taylor rule, named after the Stanford economist who is currently Undersecretary for International Affairs at the US Treasury. This formula sets out how monetary policy makers adjust, or should adjust, the federal funds rate in response to developments in output and inflation. It can be thought of as a representation of how policy makers on average have conducted policy in the past and/or of how policymakers should conduct policy in order to achieve their objectives. It is best not to think of the Taylor rule as a formula that policy makers are obliged to follow, but rather as a simple representation of systematic guidelines that inform the discretionary choices of policy makers.

The Taylor rule begins with the concept of an equilibrium real federal funds rate. This is the real federal funds rate (i.e. the nominal rate less the expected inflation rate) that is appropriate when output and inflation are at levels consistent with the policy maker's objectives in terms of full employment and price stability. Given the equilibrium real rate, the Taylor rule then prescribes that monetary policymakers should adjust the nominal funds rate so as to move the real funds rate in proportion to deviations of output and inflation from their respective objectives.

The logic of this adjustment reflects two features of the underlying model of the economy. First, the consensus model holds that increases in real rates, via their impact on broader financial conditions, lower aggregate demand and hence production and employment. Second, it holds that inflation depends on inflationary expectations (and, perhaps, also past inflation) and on the balance between aggregate demand and supply in the product and labour markets. This balance is proxied by the percentage gap between actual and potential output, or the difference between the unemployment rate consistent with steady inflation (the non-accelerating inflation rate of unemployment, or the NAIRU) and the actual rate of unemployment.

If output falls below its full employment level or if the unemployment rate rises above the NAIRU, then a decline in the real funds rate would stimulate aggregate demand and hence raise production back towards its potential level and lower the unemployment rate back to the NAIRU level. If inflation rises above its objective, a rise the real funds rate would have the opposite effects.

In terms of this framework, we can now identify how policy makers should respond to changes in asset prices. The conventional wisdom is that they should respond only indirectly to changes in asset prices. It says that they should respond only to the extent and in proportion to the effect of changes in asset prices on output and inflation relative to monetary policy objectives. In other words, policy makers should continue to follow the simple Taylor rule.

This framework already allows for the indirect response to the extent that the changes in asset prices affect output and inflation. Specifically, if wealth owners become more optimistic about earnings growth and bid up the price of equities, the resulting wealth effects and the decline in financing costs for firms

would increase consumer spending and business investment, thereby increasing overall aggregate demand and raising output relative to potential. Monetary policy would respond by raising the real federal funds rate in proportion to the effects on output and inflation.

But should monetary policy makers do more than what is called for in this indirect response? Specifically, should they respond directly to changes in asset prices? It is useful here to make a distinction between simply responding to changes in asset prices and responding to the possible emergence of an asset bubble. In the typical models underlying the indirect approach, changes in asset prices, working through to consumer spending and business investment, have the same effect whether they reflect fundamentals or speculation. If the policy concern is about the potential damage associated with the emergence and subsequent correction of asset bubbles, we need to go a step further and construct a measure of asset bubbles.

This is a demanding task. One could use a measure of fundamental value for equity prices, for example one based on a long average of the price-earnings ratio. Alternatively, one could develop a more sophisticated model of equity prices and use it as a measure of the deviation of equity prices from fundamental values.

An increase in asset prices based on fundamentals is easier to handle through the indirect approach. It is just another factor affecting overall aggregate demand and hence output and inflation relative to objectives. A speculative rise in asset prices, on the other hand, is different. Here the policy concern may be less the inflationary consequences of the surge in equity prices than the deflationary consequences of the ensuing correction.

The question is whether responding to the inflationary potential of the

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speculative rise in equity prices is enough to limit the emergence of a bubble and the adverse effects of the subsequent correction. The divergence of asset prices from fundamental values becomes an index of an accident waiting to happen. In these circumstances, the idea of a direct monetary policy approach is at least an interesting one.

However, it leaves open the question of whether responding on the basis of imperfect measures of equity bubbles would improve upon the results under the indirect approach. The case for the direct approach depends on whether we can demonstrate that responding directly to asset prices improves the performance of output and inflation relative to their objectives.

This is a potentially fruitful topic for research and I have an open mind about it. But I begin with some skepticism, based on two major considerations. The first is the inherent difficulty of identifying asset bubbles, especially in time to take action to prevent them from becoming dangerously large. The second is that the Taylor rule appears so well designed in relation to the objective function, directing policy makers to respond to precisely the deviations that give rise to costs in terms of the loss function.

Indeed, occasional asset bubbles may be inevitable in a capitalist economy, particularly a dynamic one that goes through occasional waves of innovation and technical change. My views in this respect are shaped by both the insights of my former Washington University colleague, the late Hyman Minsky, and by my reading of the long historical experience of the American economy.

Minsky always argued that economic expansions naturally give rise to conditions that encourage increased risk-taking and higher valuations of risky assets. His work focused on the tendency toward excess during expansions. Time and again, during

periods of prolonged favourable macroeconomic experience, individuals take on increased risk in portfolios, bid up asset prices to unsustainable levels and take on new levels of debt. This process increases the vulnerability of the economy to adverse shocks and, thereby, heightens the potential for such shocks to cause a sharp correction of asset prices, debt service problems and bankruptcies that would aggravate what otherwise might have been a milder downturn.

The historical precedents for the recent technology-related asset bubble may shed additional light on the circumstances that are especially conducive to the formation of asset bubbles. In a paper that I wrote in 1999,* I suggested that, in very broad brush terms, more than 100 years of US economic history could be viewed as a series of relatively long productivity cycles – periods of about a quarter century of higher and then lower productivity growth. Typically, productivity growth has averaged about 1½% per year during low productivity periods and about 3% during high productivity periods. Although it is difficult to be precise about those relationships, the cycles in productivity appear to be related to cycles in the pace of innovation, with high productivity periods coincident with or following a bunching of innovations.

One of the regularities that has often appeared in periods following an acceleration in productivity is a surge both in equity prices and in investment in the innovating industries, followed by a correction in both. Even when the innovations were fundamentally important and productivity enhancing, the associated corrections highlight the difficulty that businesses inevitably encounter in successfully exploiting them. In addition, the swings in asset prices reflect the tendency to overestimate the extent or persistence of the profit opportunities that follow from innovations.

It also seems that some expansions

are more likely than others to encourage the development of asset bubbles. In particular, expansions driven by demand shocks seem less likely to encourage asset bubbles than expansions driven by supply shocks, specifically expansions accompanied by and driven by accelerations in productivity.

During demand-driven expansion, real interest rates tend to rise as above-trend growth raises utilisation rates. Rising real interest rates, in turn, ensure that there will be countervailing forces in play on equity valuations. The cyclical improvement in earnings will encourage a rise in equity valuations, while the rise in interest rates will tend to lower equity valuations.

By contrast, during expansions driven to an important degree by supply shocks, especially by accelerations in productivity growth, rising resource utilisation rates do not lead as quickly to higher inflation, or a perceived threat of higher inflation. In the absence of an inflation threat, policy makers may be more hesitant to raise the real interest rate. As a result, a cyclical expansion might proceed for quite a while with no marked tendency toward higher real interest rates, or at least with substantially smaller increases in real interest rates than would occur during an expansion driven by demand shocks.

In the US expansion of the second half of the 1990s, the earliest concern about the possibility that equities might be overvalued was Alan Greenspan's comment in December 1996 about the possibility of "irrational exuberance". Looking back, it is not at all obvious that equities were overvalued at the time. With benefit of hindsight we can see that we were at the time in the early stages of an acceleration in productivity. Indeed, it seems clear that the asset bubble in the US was confined to technology sector. The ratio of the NASDAQ to the broader Willshire index is a good proxy for the emergence of the technology asset

* "What Happened to the New Economy?", New York Association of Business Economics and Downtown Economists, June 6 2001

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bubble and its subsequent correction. This ratio jumped sharply in the second half of 1999 and into early 2000, precisely at the point that the equation errors suggest significant overvaluation in overall equity valuations. Technology stocks then fell by 70% peak to trough, more than meeting the Greenspan 40%+ definition of a bubble, while non-technology stocks declined by only 15%.

US nominal interest rates were nearly stable from the end of 1995 to the third quarter of 1998, with only a single $\frac{1}{4}$ point tightening during this period. Growth was consistently in the 4 - 4 $\frac{1}{2}$ % range and unemployment had declined from about 5 $\frac{1}{2}$ % to 4 $\frac{1}{2}$ %, a level that in the past would have been consistent with building inflationary pressures. But, since core inflation was declining throughout the period, the real federal funds rate was rising.

Policy makers, though, were becoming increasingly uncertain about their estimate of the NAIRU, the critical unemployment threshold below which inflation pressures were expected to build. This uncertainty spawned two reactions inside the Fed. One line was that policy makers should attenuate their response to the unemployment rate, because of the uncertainty about the NAIRU. In this case, the real federal funds rate should not rise or not rise as aggressively as it otherwise might in response to the falling unemployment rate, pending direct evidence of rising inflationary pressure.

The second line was to continuously update estimates of the NAIRU, using all available information, including information about inflation. Here the lower-than-expected inflation was interpreted as evidence of a decline in the NAIRU. The estimate of the NAIRU should then be updated continuously and monetary policy might then continue to be about as aggressive as otherwise relative to this continuously adjusted estimate of the gap.

In either interpretation, the real funds rate does not increase as aggressively as would have otherwise been the case. At the same time, the productivity acceleration may have resulted in an increase in the equilibrium real federal funds rate. The gap between the real federal funds rate and its equilibrium value widened when the Fed eased by 75 basis points from the end of September to mid-November 1988 and remained wide until it began to tighten policy in mid-1999.

The Fed eased policy in response to a seizing up of the fixed-income markets and in response to a global financial crisis that was widely expected to result in a sharp slowing in the US economy. In the event, US growth was virtually unaffected, as domestic demand soared and offset the drag from lower foreign demand for US goods.

In retrospect, it could be argued that the failure to move in a more timely fashion to reverse the decline in the funds rate, once fixed-income markets were again operating more smoothly and once it became clear that the US economy would defy the slowdown elsewhere, might have fed the equity bubble. But even this is not clear, given that much of what now appears to have been a significant overvaluation in equities occurred during the period when the Fed was raising interest rates from mid-1999 to mid-2000.

The point here is that the special features of an expansion driven by a productivity acceleration induce policy makers to be more cautious about raising the real interest rate in response to rising utilisation rates and, at least, provides a fertile environment for the formation of asset bubbles.

It remains the strongly held view at the Federal Reserve – shared by many other central banks – that monetary policy should not target asset prices, nor respond directly to movements in them. To do so would

substitute policy makers' judgment for that of the market. To go beyond the indirect approach to monetary policy and make a frontal assault of the wealth of American citizens, the Fed would have to be awfully confident of its assessment that an equity bubble was emerging and of the seriousness of the danger associated with it.

However, even within the spirit of an indirect approach to monetary policy there may be some adjustments that could reduce the prospects for, or at least limit the size of, equity bubbles. Ensuring that real interest rates rise, where justified, in an expansion driven by a productivity acceleration would maintain at least some friction between rising earnings expectations and rising real interest rates. This might do something to make it less likely that an asset bubble would emerge, or to reduce its size.

A more forward-looking monetary policy, responding to forecasts of output gaps and inflation and not just reacting to actual movements in these variables, would contribute to a more timely indirect response, particularly when are dramatic increases in equity values. In addition, the target set for the funds rate should rise to keep pace with the increase in the equilibrium real interest rate that is expected to accompany an acceleration of productivity. Theoretical analysis suggests, and empirical analysis confirms, that the equilibrium real rate will rise at least in line, percentage point for percentage point, with the structural productivity growth rate. Such a rise would reintroduce the friction between earnings optimism and rising rates that limits open-ended increases in equity prices during demand-led expansions.

Staff at the Federal Reserve Board have been working on estimates of the variation in the equilibrium real rate of interest over time. This confirms that it tends to move percentage point for percentage point in line with underlying productivity growth. While this might seem to

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open up promising policy options, retaining the standard indirect approach but nevertheless allowing monetary policy to lean against otherwise open-ended increases in equity values, such an approach has difficulties in practice.

First, it takes time to appreciate that there has been an increase in underlying productivity growth. While the data now suggests that higher productivity growth began in 1996 and further increases occurred through 1998, many – including myself – were not convinced of this until late 1998 or early 1999. Indeed, the data were not definitive until the revisions in the summer of 1999 and again in the summer of 2000. Second, we are still iterating the revised productivity data to reach an understanding of how large the acceleration in productivity has been. There continues to be a high degree of uncertainty about what the underlying rate of productivity growth was and will be. Finally, we can estimate the equilibrium real interest rate only with considerable imprecision.

Nevertheless, it seems to me that work on varying equilibrium real rates over time is an important. If we build more confidence in the estimates, they might provide some basis for movements in the real funds rate consistent with the basic principles of the Taylor rule.

Analysis of the appropriate monetary policy in the face of a bursting of an asset bubble is quite a bit simpler. On the surface, it appears that the response here is basically the same as it would be to other abrupt adverse shocks to the economy. But there are some special considerations that have to be taken into account.

First, the generally aggressive policy response to the bursting of an asset bubble will generally reflect the likelihood that asset price movements on the way down will be more discontinuous and abrupt than on the way up. This sometimes leads to the

claim that monetary policy responds asymmetrically to increases and decreases in asset prices. Policy makers, it is said, are willing to tolerate, even celebrate, an open-ended rise in asset prices, but respond quickly and aggressively to limit any decline.

As Alan Greenspan has noted, it is not policy that is asymmetric, but markets. This asymmetry partly reflects the different dynamic pattern associated with up and down movements. But it also reflects the potential for sharp declines to be accompanied by a dramatic decline in liquidity in financial markets, resulting in increased risks of broader financial instability. Sometimes – in 1987, 1998 and again in the most recent experience – policy eased quickly and sharply to accommodate a dramatic increase in the demand for liquidity that accompanied a correction of asset prices, or other financial market turbulence.

Second, the bursting of an asset bubble is often not a spontaneous event, but one triggered by some shock – for example, an unexpected change in policy or an unexpected slowdown in aggregate demand. In the case of the technology bubble, there was a combination of tighter monetary policy, an adverse energy shock, a resulting slowdown in the pace of the expansion and an apparent reassessment of the profitability of owning and using high tech equipment. The result of the latter shock was both a decline in equity valuations and a retrenchment in high tech investment, above and beyond the effect on equity valuations. An easing of monetary policy might have to be very aggressive in this case because a significant easing would be required just to offset the effect on financial conditions of the decline in equity prices.

Clearly, monetary policy is a very blunt instrument during a period of the potential emergence of an asset bubble. It will be difficult for it to slow

the economy in the face of a continued rise in equity prices. There is also the danger that the cumulative monetary restraint implemented in such circumstances may ultimately slow the economy more than is desired or expected. But we should at least be alert to the conditions that facilitate the emergence of asset bubbles and continue to work on approaches that could militate against open-ended speculative increases in equity prices.

Laurence H. Meyer is a Distinguished Scholar at the Center for Strategic and International Studies in Washington DC and Senior Advisor to Macroeconomic Advisers. He was a Governor of the US Federal Reserve Board from June 1996 to January 2002.

This article is an edited version of a public lecture delivered at the LSE on May 23.