

FRBSF ECONOMIC LETTER

Number 2003-34, November 14, 2003

Should the Fed React to the Stock Market?

The late 1990s witnessed the emergence of the greatest speculative bubble in financial market history. Investors bid up stock prices to unprecedented valuation levels as they extrapolated a temporary surge in corporate earnings growth far into the future. When these optimistic projections failed to materialize, the bubble burst, setting off a chain of events that eventually dragged the U.S. economy into a recession during 2001. In the aftermath of these events, a much-debated question is whether U.S. monetary policy should have reacted more aggressively to the parabolic run-up in stock prices. It has been argued that a policy of “leaning against the bubble” could have spared the economy from the long and painful process of unwinding bubble-induced excesses. This *Economic Letter* examines the issue of whether central banks should react directly to asset prices. In addition, it presents empirical evidence which shows that lagged movements in the Standard & Poors (S&P) 500 stock index can help explain movements in the U.S. federal funds rate since 1987.

Asset prices and the economy

Changes in the prices of assets, such as stocks or houses, can have important consequences for the economy. During the late 1990s, consumers became wealthier as their stock portfolios appreciated. This “wealth effect” boosted personal consumption expenditures, which account for about two-thirds of GDP. Rapidly rising stock prices also helped fuel a boom in business investment by lowering firms’ cost of capital. Surging tax collections from investors’ capital gains realizations allowed governments at all levels to increase spending or cut taxes. More recently, rising house prices, together with innovations in mortgage lending, have allowed consumers to tap the equity in their homes to pay for a variety of goods and services. Through these channels and others, increases in asset prices may cause demand growth to outstrip potential increases in supply, thus contributing to inflationary pressure.

Central banks’ goals are to keep inflation low while promoting sustainable real growth. Given that swings in asset prices can affect both goals, some economists have argued that central banks can improve macroeconomic performance by responding directly to asset prices. Based on simulations from a small economic model, Cecchetti, et al. (2000) conclude that performance can be improved if the central bank raises the short-term nominal interest rate in response to temporary “bubble shocks” that push the stock price index above the value implied by economic fundamentals.

Bernanke and Gertler (2001) reach a different conclusion; they allow “fundamental shocks” (such as a technological innovation that raises productivity and profits) to also be a source of movement in stock prices. They assume that the central bank cannot tell whether an increase in stock prices is driven by a bubble shock or a fundamental shock. Since both types of shocks ultimately affect real output and inflation, they conclude that the central bank can do just as well by responding only to those goal variables; they find no significant additional benefit to responding directly to stock prices.

A limitation of the above models is the assumption that asset price bubbles randomly inflate and burst regardless of any central bank action. Hence these models cannot address the important questions of whether a central bank should try to prevent bubbles from forming or whether a central bank should try to deflate a bubble once it has formed.

Costs of ignoring bubbles

Advocates of preventing stock market bubbles point out that bubbles can distort economic and financial decisions, creating costly imbalances that can take years to dissipate. During the late 1990s, surging market values for technology-related companies led many firms to vastly overspend on computers, networking equipment, and software, at the expense of other items. It is now clear that a portion of that technology capital was never put into productive service. This wasteful spending was nevertheless counted in real output statistics, thus contributing to overestimates of the economy’s trend growth rate. The overhang of the excess capital acquired during the bubble has contributed to low levels of capacity utilization and a sluggish rebound in business investment relative to the average recovery (see Lansing 2003).

The stock market bubble distorted other areas of the U.S. economy as well. Firms hired large numbers of permanent employees to satisfy an episode of demand growth that was not sustainable. When the bubble burst, demand growth slowed and firms had to lay off employees. Now, two years after the recession’s official end-date in November 2001, labor market weakness persists. The rapid appreciation of stocks held in employee pension plans led many firms to reduce cash contributions to their plans, which made reported earnings look better. When stock prices dropped, the value of plan assets shrank, contributing to an underfunding problem in excess of \$200 billion among S&P

500 companies (see Kwan 2003). Foreign investors' eagerness to participate in the booming U.S. stock market of the late 1990s drove up the value of the dollar on foreign exchange markets, contributing to a dramatic expansion of the U.S. current account deficit. The deficit now exceeds 5% of GDP, implying that the U.S. economy must draw in about \$1.5 billion per day from foreign investors to finance domestic spending. Finally, the collapse in capital gains tax revenues after the bubble burst has forced elected officials to make difficult and unpopular choices to address the resulting budget shortfalls.

Can bubbles be identified?

Despite the many problems propagated by bubbles, some have argued that central banks should ignore bubbles. Their argument consists of two parts: (1) central banks cannot reliably determine if a run-up in stock prices is actually a bubble until after it has burst; (2) an interest rate hike of sufficient magnitude to prick a suspected bubble would likely send the economy into a recession, thereby sacrificing the benefits of the boom that might otherwise continue.

To identify a bubble in real time, policymakers would need to judge whether a valuation metric, such as the price-earnings (P/E) ratio for the aggregate stock market, has crossed into bubble territory. But rendering such a judgment may be difficult in practice, particularly if the bubble is triggered by investor overreaction to an actual fundamental improvement in the underlying economy. For example, a pickup in measured productivity growth during the late 1990s appeared to offer to some fundamental justification for the rise in the market P/E ratio. Others have countered that the difficulties in identifying bubbles do not justify ignoring them altogether. Central banks routinely apply judgment to a whole host of issues affecting monetary policy. One example is the size of the so-called "output gap," defined as the difference between actual GDP and potential GDP. The output gap is notoriously difficult to measure in real time, yet it remains an important input to central bank inflation forecasts.

Regarding the second part of the argument, some worry that a policy designed to prick an emerging bubble could have unintended negative consequences. Opponents of bubble-popping often cite the example of the Great Depression, claiming it was exacerbated by the Fed's overzealous attempts to rein in speculative stock market excesses. A counterargument is provided by Borio and Lowe (2002), who perform an exhaustive historical study of financial market bubbles in many countries. According to the authors, opponents of bubble-popping fail to take sufficient account of the asymmetric nature of the costs of policy errors when faced with a suspected bubble: "If the economy is indeed robust and the boom is sustainable, actions

by the authorities to restrain the boom are unlikely to derail it altogether. By contrast, failure to act could have much more damaging consequences, as the imbalances unravel" (p. 26). They also argue that emerging bubbles can be more readily identified if central banks look beyond asset prices to include other variables that signal a threat to financial stability. Specifically, they find that episodes of sustained rapid credit expansion, booming stock or house prices, and high levels of investment, are almost always followed by periods of stress in the financial system.

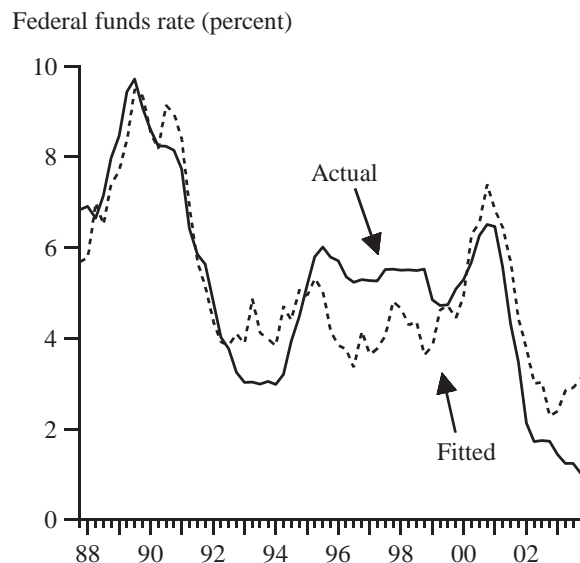
Empirical evidence

Clearly, economists have yet to reach a consensus on whether central banks should react directly to asset prices. But what do central banks actually do? Interestingly, empirical evidence suggests that U.S. monetary policy has reacted directly to the stock market during the term of Federal Reserve Chairman Alan Greenspan.

Figure 1 plots an estimated Fed policy rule using quarterly data over the period 1987:Q3 to 2003:Q3. The estimated rule is constructed along the lines of the well-known "Taylor rule." Specifically, the quarterly average federal funds rate is regressed on a constant term, the inflation rate in the previous quarter (as measured by the four-quarter percent change in the GDP price index), and the output gap in the previous quarter (as measured by the percent deviation of real GDP from a fitted long-run trend).

Figure 2 adds the annualized percent change in the S&P 500 stock index during the previous quarter to the regression equation. The use of data from the previous quarter helps ensure that the direction of causation

Figure 1
Fitted versus actual federal funds rate
without stock market variable



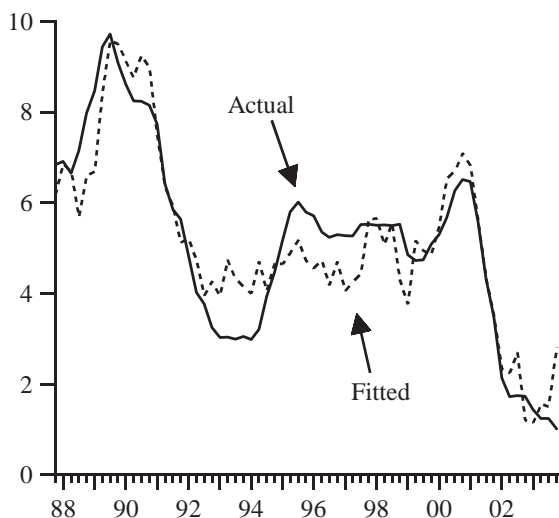
runs from the stock market to the funds rate, and not vice versa. Including the stock market variable significantly improves the empirical fit of the estimated policy rule. This is most notable toward the end of the data sample, when the actual federal funds rate dropped from 6.5% in 2000:Q4 to 1.0% in 2003:Q3. During this time, the S&P 500 index lost nearly one-third of its value. The above results reinforce the findings of Rigobon and Sack (2003), who employ high frequency data on stock market movements and interest rate changes from 1985 to 2000. They find that a 5% decrease (increase) in the S&P 500 over the course of a week raises the probability of a 25-basis-point interest rate cut (hike) by 64%.

While the data indicate that the Fed reacts directly to the stock market, statistical regressions do not reveal the motives behind this behavior. One possibility is that forward-looking policymakers view movements in the stock market as useful predictors of future economic activity. Another possibility is that policymakers act out of concern for market valuation. In an effort to divine the Fed's motives, Hayford and Malliaris (2001) studied Federal Open Market Committee (FOMC) transcripts during Greenspan's term. The authors conclude that FOMC members paid significant attention to the valuation of the stock market and that, on some occasions, concerns about the stock market directly influenced the conduct of U.S. monetary policy. In one notable instance (February 1994), the transcripts suggest that FOMC members were worried that raising the funds rate by 50 basis points might trigger a crash in the stock market, which was thought to be overvalued at the time. In this case, the stock market's possible reaction appeared to act as a

Figure 2

Fitted versus actual federal funds rate with stock market variable

Federal funds rate (percent)



constraint on policymakers' desire to tighten policy against the threat of rising inflation.

Conclusion

Although central banks control only short-term interest rates, their ability to influence longer-term rates and other asset prices is part of the transmission mechanism of monetary policy. Movements in asset prices can have important consequences for real output and inflation. Still, economists do not agree on whether central banks should react directly to asset prices, or, more specifically, whether central banks should take steps to prevent or deflate asset price bubbles. The arguments against doing so emphasize issues pertaining to difficulty and risk, but there are strong counterarguments that favor action when faced with a suspected bubble.

Kevin J. Lansing
Senior Economist

References

[URLs accessed November 2003.]

- Bernanke, B., and M. Gertler. 2001. "Should Central Banks Respond to Movements in Asset Prices?" *American Economic Review* 91, pp. 253–257.
- Borio, C., and P. Lowe. 2002. "Asset Prices, Financial and Monetary Stability: Exploring the Nexus." Bank for International Settlements. Working Paper 114. <http://www.bis.org/publ/work114.htm>
- Cecchetti, S., H. Genberg, J. Lipsky, and S. Wadhwani. 2000. "Asset Prices and Central Bank Policy. Geneva Reports on the World Economy 2." London: Centre for Economic Policy Research and ICMB. <http://www.cepr.org/pubs/books/P135.asp>
- Hayford, M.D., and A.G. Malliaris. 2001. "Is the Federal Reserve Stock Market Bubble-Neutral?" In *Asset Price Bubbles: Implications for Monetary and Regulatory Policies*, ed. G.C. Kaufman. Elsevier Science Ltd., pp. 229–243.
- Kwan, S. 2003. "Underfunding of Private Pension Plans." *FRBSF Economic Letter* 2003-16 (June 13). <http://www.frb.org/publications/economics/letter/2003/el2003-16.html>
- Lansing, K.J. 2003. "Growth in the Post-Bubble Economy." *FRBSF Economic Letter*, 2003-17 (June 24). <http://www.frb.org/publications/economics/letter/2003/el2003-17.html>
- Rigobon, R., and B. Sack. 2003. "Measuring the Reaction of Monetary Policy to the Stock Market." *Quarterly Journal of Economics* 118, pp. 639–670.

ECONOMIC RESEARCH
FEDERAL RESERVE BANK
OF SAN FRANCISCO

PRESORTED
STANDARD MAIL
U.S. POSTAGE
PAID
PERMIT NO. 752
San Francisco, Calif.

P.O. Box 7702
San Francisco, CA 94120
Address Service Requested

Printed on recycled paper
with soybean inks



Index to Recent Issues of *FRBSF Economic Letter*

DATE	NUMBER	TITLE	AUTHOR
5/30	03-14	Minding the Speed Limit	Walsh
6/6	03-15	What Makes the Yield Curve Move?	Wu
6/13	03-16	Underfunding of Private Pension Plans	Kwan
6/20	03-17	Growth in the Post-Bubble Economy	Lansing
6/27	03-18	Financial Development, Productivity, and Economic Growth	Valderrama
7/4	03-19	Pension Accounting and Reported Earnings	Kwan
7/18	03-20	Is Official Foreign Exchange Intervention Effective?	Hutchison
7/25	03-21	Bank Lending to Businesses in a Jobless Recovery	Marquis
8/1	03-22	Disclosure as a Supervisory Tool: Pillar 3 of Basel II	Lopez
8/15	03-23	Understanding State Budget Troubles	Daly
8/22	03-24	Improving the Way We Measure Consumer Prices	Wu
8/29	03-25	The Present and Future of Pension Insurance	Kwan
9/12	03-26	Are We Running out of New Ideas? A Look at Patents and R&D	Wilson
9/19	03-27	The Fiscal Problem of the 21st Century	Jones
9/26	03-28	Earnings Inequality and Earnings Mobility in the U.S.	Daly/Valletta
10/3	03-29	Mortgage Refinancing	Krainer/Marquis
10/10	03-30	Is Our IT Manufacturing Edge Drifting Overseas?	Valletta
10/24	03-31	Good News on Twelfth District Banking Market Concentration	Laderman
10/31	03-32	The Natural Rate of Interest	Williams
11/7	03-33	The Bay Area Economy: Down but Not Out	Daly/Doms

Opinions expressed in the *Economic Letter* do not necessarily reflect the views of the management of the Federal Reserve Bank of San Francisco or of the Board of Governors of the Federal Reserve System. This publication is edited by Judith Goff, with the assistance of Anita Todd. Permission to reprint portions of articles or whole articles must be obtained in writing. Permission to photocopy is unrestricted. Please send editorial comments and requests for subscriptions, back copies, address changes, and reprint permission to: Public Information Department, Federal Reserve Bank of San Francisco, P.O. Box 7702, San Francisco, CA 94120, phone (415) 974-2163, fax (415) 974-3341, e-mail sf.pubs@sf.frb.org. **The *Economic Letter* and other publications and information are available on our website, <http://www.frbsf.org>.**