

## Ben S Bernanke: Gradualism

Remarks by Mr Ben S Bernanke, Member of the Board of Governors of the US Federal Reserve System, at an economics luncheon co-sponsored by the Federal Reserve Bank of San Francisco (Seattle Branch) and the University of Washington, Seattle, 20 May 2004.

*The references for the speech can be found on the Board of Governors of the Federal Reserve System's website.*

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As a general rule, the Federal Reserve tends to adjust interest rates incrementally, in a series of small or moderate steps in the same direction. Between January 2001 and June 2003, for example, the Fed reduced its policy rate, the federal funds rate, a total of 550 basis points in thirteen separate actions. Four of the actions were reductions of 25 basis points in the policy rate, and nine were reductions of 50 basis points. Moreover, the easing cycle that began in 2001 probably represented a more rapid adjustment than normal for the Fed - for good reason, I think, as I will discuss later. The easing that spanned the 1990-91 recession and subsequent recovery is a better example of how drawn out the process of adjusting rates can be. That episode lasted for more than three years, from June 1989 to September 1992, and involved twenty-four policy actions that cumulated to a total reduction of 675 basis points in the funds rate. Of these twenty-four actions, twenty-one were rate cuts of 25 basis points, and three were cuts of 50 basis points.

Gradual adjustment tends to characterize periods of rate increases as well as periods of decreases. Even the policy tightening that occurred during 1994-95, though distinctly more rapid than most episodes of rate adjustment, involved seven steps over a period of twelve months, with an ultimate increase in the policy rate of 300 basis points. Of these increases in the policy rate, three were of 25 basis points, three were of 50 basis points, and one was an unusually large 75 basis points. More recently, the eleven-month tightening cycle that began in June 1999 involved five increases of 25 basis points and one of 50 basis points. Researchers have documented that the Federal Reserve is not unique in its tendency to adjust the policy rate in a long sequence of steps in one direction: Central banks in most other industrial countries generally behave in a similar manner (Lowe and Ellis, 1998; Goodhart, 1999; Srour, 2001). This relatively slow adjustment of the policy rate has been referred to variously as interest-rate smoothing, partial adjustment, and monetary policy inertia. In today's talk I will use the term *gradualism*.

An alternative to gradual policy adjustment is what an engineer might call a bang-bang solution, or what I will refer to today as the "cold turkey" approach. Under a cold turkey strategy, at each policy meeting the Federal Open Market Committee (FOMC) would make its best guess about where it ultimately wants the funds rate to be and would move to that rate in a single step. In the abstract, the cold turkey approach is not without appeal: If you think you know where you want to end up (or are at least willing to make your best guess), why not just go there directly in one step rather than drawing out the process?

As I have already suggested, however, in practice the FOMC seems to take a gradualist approach. Why should this be the case? Are there times when other approaches, such as cold turkey, might be more appropriate? In my remarks I will briefly address these questions. As always, I emphasize that my colleagues in the Federal Reserve System do not necessarily share the views I will express today.<sup>1</sup>

### Gradualism and policymaker uncertainty

Several arguments have been made for the desirability of a gradualist approach to monetary policy. Today I will focus on three of these: (1) Policymakers' uncertainty about the economy should lead to more gradual adjustment of the policy rate; (2) gradualism in adjusting the policy rate affords policymakers greater influence over the long-term interest rates that most affect the economy; and (3) gradualism reduces risks to financial stability. I will begin by discussing the implications of uncertainty for policy choices and then consider the other two arguments for gradualism. I will

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<sup>1</sup> I thank members of the Board staff for useful comments and assistance.

conclude by briefly revisiting the empirical case for gradualism and then discussing some implications for current policy.

Many central bankers and researchers have pointed to the pervasive uncertainty associated with analyzing and forecasting the economy as a reason for central bank caution in adjusting policy. Because policymakers cannot be sure about the underlying structure of the economy or the effects that their actions will have on economic outcomes, and because new information about the economic situation arrives continually, the case for policymakers to move slowly and cautiously when changing rates seems intuitive.

In a classic article published in 1967, William Brainard of Yale University showed in the context of a simple economic model why this intuition might make sense. Specifically, Brainard showed that when policymakers are unsure of the impact that their policy actions will have on the economy, it may be appropriate for them to adjust policy more cautiously and in smaller steps than they would if they had precise knowledge of the effects of their actions.

An analogy may help to clarify the logic behind Brainard's argument. Imagine that you are playing in a miniature golf tournament and are leading on the final hole. You expect to win the tournament so long as you can finish the hole in a moderate number of strokes. However, for reasons I won't try to explain, you find yourself playing with an unfamiliar putter and hence are uncertain about how far a stroke of given force will send the ball. How should you play to maximize your chances of winning the tournament?

Some reflection should convince you that the best strategy in this situation is to be conservative. In particular, your uncertainty about the response of the ball to your putter implies that you should strike the ball less firmly than you would if you knew precisely how the ball would react to the unfamiliar putter. This conservative approach may well lead your first shot to lie short of the hole. However, this cost is offset by the important benefit of guarding against the risk that the putter is livelier than you expect, so lively that your normal stroke could send the ball well past the cup. Since you expect to win the tournament if you avoid a disastrously bad shot, you approach the hole in a series of short putts (what golf aficionados tell me are called lagged putts). Gradualism in action!

In a policy context, the analogous situation is one in which policymakers hope to guide the economy in a particular direction but fear overshooting, either to the inflationary upside or the recessionary downside. Overshooting the objective of stable, non-inflationary growth is perceived as costly by policymakers because overshooting creates unnecessary volatility in the economy and delays the achievement of macroeconomic stability. Like the golfer with the unfamiliar putter, monetary policymakers are far from certain about the impact that a policy change of a given size will have on the economy, as already noted. Given this uncertainty, the Brainard argument suggests a gradual approach to policy adjustment. In contrast, by applying the stronger policy impetus that may be called for by the cold turkey approach, policymakers might inadvertently drive the economy away from its desired path, increasing economic volatility.

Brainard's argument relies on a specific form of uncertainty, namely, policymakers' uncertainty about the effects of their actions on the economy, but other types of uncertainty may also provide a rationale for policy gradualism. For example, because economic data can be quite noisy, policymakers must inevitably operate with imperfect knowledge about the current state of the economy. Generally, all else being equal, the noisier the economic data, the less aggressive policymakers should be in responding to newly arriving information (Orphanides, 2003). A cold-turkey approach, by contrast, carries the risk that policymakers will take strong action in response to information that may later be revealed to have been seriously inaccurate.

Another potential advantage of gradualism is that, by taking small steps, policymakers give themselves the opportunity to assess the effects of their actions and perhaps to refine their views on how large a policy change will ultimately be needed (Sack, 1998). In terms of the golf analogy, by taking a few strokes of moderate firmness one may learn more about the elasticity of the unfamiliar putter and thereby improve the accuracy of subsequent shots. A related benefit of the strategy of taking a small step and then reassessing the situation is that it allows policymakers to avoid excessive reliance on unobservable constructs, such as potential output or the neutral federal funds rate (Orphanides, Porter, Reifschneider, Tetlow, and Finan, 2000; Orphanides and Williams, 2002). In contrast, because they need to determine the optimal policy setting before each action, policymakers following the cold turkey approach may need to rely heavily on estimates of such concepts.

Although the idea that uncertainty should induce policy caution seems plausible, research since Brainard's original contribution has shown that this conclusion is *not* a general principle but depends instead on the type of uncertainty facing policymakers. A simple variant of the miniature golf analogy can illustrate one important case in which the Brainard intuition fails. Suppose that the hole lies on an elevated plateau, so that your putt must be strong enough to make it up the hill and onto the flat area that holds the cup. If the ball does not make it up the hill, it will roll backward and out of bounds. In this case, if you are using an unfamiliar putter, your best strategy is to hit the ball harder than otherwise, not more softly. Because you don't know how far the putter will send the ball, you want to be sure that you do not inadvertently putt too softly and end up out of bounds. Compared with our initial example, the key difference in this case is that undershooting the objective imposes an especially high cost. Likewise, in an economic context, a high cost of undershooting the objective leads the optimal policy to be more aggressive and less gradualist, all else being equal.

The interaction of uncertainty and concerns about undershooting may well have affected Fed policy during the easing cycle that began in 2001. During that cycle, the FOMC faced a worrisome trend of disinflation, a trend that if left unchecked might have brought the economy close to the zone of falling prices, or deflation. The FOMC had two options during that episode: gradual easing, which some observers advocated as a way of saving the remaining "interest rate ammunition"; or a more preemptive approach, to try to nip in the bud any further decline of inflation toward the deflation boundary. In this particular episode, the risk of doing too little appeared to exceed the risk of doing too much, and the FOMC undertook a relatively aggressive strategy of rate cuts, as I mentioned in the introduction. Similar considerations presumably played a role during the 1994-95 tightening cycle, when concerns that inflation might rise significantly induced a relatively more rapid tightening. Indeed, interesting research by Ulf Söderström (2002) has shown that uncertainty about the persistence of inflation should induce more aggressive policies. For example, if policymakers are worried that inflation may be difficult to control once it is "out of the bottle," so to speak, a more preemptive approach to controlling inflation may be justified.

Although we can draw no general conclusions about the effects of policymakers' uncertainty on the pace of policy adjustment, empirical studies and simulations of realistic economic models suggest that, normally, relatively gradual policy adjustment produces better results in an uncertain economic environment (Sack, 1998, 2000; Rudebusch, 2001; Söderström, 2002; Orphanides, 2003). In practice, then, a desire on the part of policymakers to be conservative in the face of many different forms of uncertainty is probably an important reason for gradualism in monetary policy.

### **Gradualism and the determination of long-term interest rates**

A rather different, but nevertheless complementary, argument for gradualism builds on the observation that private-sector expectations play a crucial role in the determination of long-term interest rates and other asset prices and yields. Specifically, by leading market participants to anticipate that changes in the policy rate will be followed by further changes in the same direction, policy gradualism may increase the ability of the Fed to affect long-term rates and thus influence economic behavior.

Informal discussions of monetary policy sometimes refer to the Fed as "setting interest rates." In fact, the FOMC does not set interest rates in general; rather, the Committee "sets" one specific interest rate, the federal funds rate.<sup>2</sup> The federal funds rate, the interest rate at which commercial banks borrow and lend to each other on a short-term basis (usually overnight) is not important in itself. Only a tiny fraction of aggregate borrowing and lending is done at that rate. From a macroeconomic perspective, longer-term interest rates - such as home mortgage rates, corporate bond rates, and the rates on Treasury notes and bonds - are far more significant than the funds rate, because those rates are the most relevant to the spending and investment decisions made by households and businesses. These longer-term rates are determined not by the Fed but by participants in deep and sophisticated global financial markets.

Although the FOMC cannot directly determine long-term interest rates, it can exert significant influence over those rates through its control of current and future values of the federal funds rate. The crucial link between the federal funds rate and longer-term interest rates is the formation of private-sector

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<sup>2</sup> Even this statement is not quite accurate. The Fed does not set the federal funds rate in an administrative sense but only controls it indirectly by varying the supply of bank reserves.

expectations about future monetary policy actions. Loosely speaking, long-term interest rates embody the expectations of financial-market participants about the likely future path of short-term rates, which in turn are closely tied to expectations about the federal funds rate. Thus, to influence long-term interest rates, such as thirty-year mortgage rates or the yields on corporate bonds, the FOMC must influence private-sector expectations about future values of the federal funds rate. The Committee can do this by its communication policies, by establishing certain patterns of behavior, or both. I will focus here on the effect on expectations of the FOMC's patterns of behavior, of which gradualism is an example.

Suppose the FOMC decided at a given meeting to raise the federal funds rate 25 basis points. What effect would that action likely have on mortgage rates and other longer-term interest rates that the Committee would like to influence? This question can be answered only if we know the effect of the action on market expectations about the future course of short-term rates. To take an extreme and unrealistic example, if the FOMC had established a reputation for reversing any changes made in the funds rate at the subsequent meeting, an increase in the funds rate today would not affect market expectations of future values of the rate (beyond one meeting). In this example, the FOMC's action would have essentially no effect on long-term interest rates.

How can the FOMC ensure that its policy actions feed into longer-term rates and thus influence the economy? An interesting result, noted in an early paper by Marvin Goodfriend (1991) of the Federal Reserve Bank of Richmond and developed more formally by my Princeton colleague Michael Woodford (2000, 2003), is that gradualist policies may allow the Fed to gain greater influence over long-term interest rates.<sup>3</sup> The reason is the effect of past episodes of gradualist behavior on market expectations. In a gradualist regime, an increase in the federal funds rate not only raises current short-term rates but also signals to the market that rates are likely to continue to rise for some time. Because they reflect the whole path of expected future short-term rates, under a gradualist regime long-term rates such as mortgage rates tend to be relatively sensitive to changes in the federal funds rate. Thus, gradualism helps to ensure that the FOMC will have an effective lever over economic activity and inflation.

Of course, gradualism is not the only approach that might be used to try to increase the FOMC's influence on long-term rates. Cold turkey policies would also likely lead to a strong response of long-term rates to changes in the funds rate, because under this approach changes in the funds rate could be presumed to be long lasting. However, theoretical analyses have tended to show that, in models in which financial-market participants are assumed to be forward-looking, optimal monetary policies generally involve some degree of gradualism (Woodford, 2000, 2003). One advantage of the gradualist approach in this context is that it can provide a powerful lever on long-term rates with relatively modest volatility in short-term rates. Less variable short-term rates reduce the risk that the policy rate will hit the zero lower bound on interest rates; they may also reduce stress in the financial system, as I will discuss shortly. More subtly, Woodford (2000) has also shown in theoretical models that purely forward-looking policies such as the cold turkey approach may not be consistent with the existence of a rational expectations equilibrium in the economy. In practical terms, Woodford's result suggests that such policies may lead to excessive volatility in expectations and hence in financial markets.

The fact that market expectations are key in determining long-term yields has an important implication, which is that the current level of the federal funds rate provides only partial information about overall monetary and financial conditions. In particular, a given setting of the funds rate may be consistent with a range of monetary conditions, depending on the direction and pace of future expected changes in the policy rate. For example, monetary conditions in the United States have recently tightened noticeably, even though the funds rate has remained unchanged for some time at 1 percent - a consequence of the expectations about future rates engendered in the financial markets. I will return to this point in my concluding remarks.

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<sup>3</sup> See Amato and Laubach (1999) for further discussion. These authors use simulations of a small macroeconomic model to show that gradualism can improve the Fed's ability to affect long-term rates and thus stabilize the economy.

## Gradualism and financial stability

A third explanation of gradualism is that a slower adjustment of policy rates enhances financial stability. For example, some researchers have argued that gradual adjustment of short-term rates gives commercial banks more time to adjust to changes in the costs of short-term funding and thereby increases the stability of bank profits (Cukierman, 1991). Slow adjustment of short-term rates may reduce financial stress for other economic actors as well - for example, households with adjustable-rate mortgages and businesses with heavy needs for short-term financing.

A variant of the financial stability argument is that the Fed chooses to move interest rates gradually to minimize the risk of "shocking" the bond market. According to this argument, sharp changes in the policy rate risk creating large capital gains and losses for bondholders, which increase market volatility and pose risks for banks and other financial institutions that hold bonds. Because the Fed has a broad responsibility to maintain orderly and well-functioning financial markets, the argument goes, the central bank will avoid policies that create unnecessary financial stress, all else being equal.

I suspect that this second variant of the financial-stability argument has some merit, but the case is not as straightforward as it may seem at first. A problem with the argument is that policy gradualism does not necessarily insulate bondholders from capital gains and losses. Indeed, we have just seen that, under a gradualist approach, a small change in the policy rate may have a relatively large effect on longer-term rates, because of its implications for private-sector expectations about the future path of short-term rates. Large movements in long-term rates translate, of course, into wide swings in bond prices and thus potentially large capital gains and losses.

To the extent that the FOMC is concerned about stabilizing the bond market, the key is not necessarily keeping changes in the policy rate small but in making policy changes as easy to forecast as possible. Of course, complete predictability of policy cannot be achieved because the FOMC must react to incoming information in order to achieve its macroeconomic objectives. However, the FOMC can attempt to minimize bond-market stress in at least two ways: first, through transparency, that is, by providing as much information as possible about the economic outlook and the factors that the FOMC is likely to take into account in its decisions; and second, by adopting regular and easily understood policy strategies. In the latter respect, gradualism may be helpful to some degree, because it establishes a relatively forecastable pattern of adjustment by the central bank. By varying the pace of policy adjustment, the FOMC may also be able to provide additional signals to bond markets about its views and intentions.

## Is the Fed really gradualist?

In my remarks today I have taken as self-evident that the FOMC conducts monetary policy by gradualist principles and have focused on reasons that gradualist policies may help to promote the Federal Reserve's objectives. Although theory and empirical analysis generally suggest that the Fed *should* be gradualist, not everyone agrees, as an empirical matter, that the Fed actually *has been* gradualist in its policies.

The alternative view, most closely associated with Glenn Rudebusch of the Federal Reserve Bank of San Francisco, is that slow adjustment is not an intrinsic feature of Fed behavior (Rudebusch, 2001, 2002; Lansing, 2002). Rather, Rudebusch has argued, in practice the FOMC responds relatively promptly to changes in the economy. The reason that monetary policy *appears* to adjust gradually, according to Rudebusch, is that the economy itself evolves slowly, which in turn leads policy to change slowly as well. To illustrate, suppose that the FOMC did not adjust policy gradually but set the federal funds rate at each meeting precisely as needed to offset the effects of shocks to the economy. Suppose also that shocks to the economy tend to die away slowly or that the economy's adjustment mechanisms lead it to respond only gradually to disturbances. In this scenario, observed interest rates would appear to be adjusting slowly, but in reality the apparent gradualism would reflect only the slow adjustment of the underlying economy that the Fed is trying to influence. To support his view, Rudebusch has presented evidence that longer-term rates respond to changes in the funds rate less than they would if the FOMC were intent on pursuing a gradualist approach.

Distinguishing "true" gradualist policies from policies that respond to gradual changes in the economic environment is difficult, as the two hypotheses imply similar behavior by policymakers. However, recent studies that have taken up Rudebusch's challenge have generally found that both an intrinsically gradualist approach to policy and gradual changes in the underlying economic environment are needed to explain the historical patterns of U.S. monetary policy (English, Nelson,

and Sack, 2003; Gerlach-Kristen, 2004). If correct, these more-recent studies confirm that gradualism is an accurate description of actual Fed behavior as well as a normative prescription of economic theory. Clearly, though, the extent to which the Fed has pursued gradualism over its history remains an interesting question for further research.

## Conclusion

In my talk I discussed three sets of reasons for gradualist policies: policymaker uncertainty, improved control of long-term interest rates, and the reduction of financial stress. The debate about the sources of gradualism is ongoing and I cannot hope to render a definitive verdict today on the relative merits of these rationales. My sense, though, is that policymakers' caution in the face of many forms of uncertainty and their desire to make policy as predictable as possible both contribute to the gradualist behavior we seem to observe in practice.

I will close by briefly discussing some implications of the gradualist approach for current monetary policy. Before doing so, I remind you once again that the views I express are my responsibility alone.

As you know, in reaction to gathering economic momentum and an apparent stabilization in inflation, the FOMC at its May 4 meeting characterized the risks to both sustainable growth and inflation as being roughly in balance. The Committee's statement ended with the following sentence: "At this juncture, with inflation low and resource use slack, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured."

As a number of FOMC members have noted in public forums, the federal funds rate's current setting of 1 percent (which implies a negative real funds rate) cannot be sustained in a growing economy and eventually will have to be normalized. The Committee's statement suggests that, based on current information, it appears likely that this normalization can proceed gradually. As I have discussed today, given the highly uncertain environment in which policy operates, a gradual adjustment of rates has the advantage of allowing the FOMC to monitor the evolution of the economy and the effects of its policy actions, making adjustments along the way as needed. On the margin, a more gradual process may also help ease the transition to higher rates for participants in money markets and bond markets, as well as for households, banks, and firms.

In my own view, economic developments over the next year are reasonably likely to be consistent with a gradual adjustment of policy. It is true that the inflation rate rose in the first quarter, a point to which I will return in a moment. However, policy involves lags and thus must of necessity be based on forecasts. As we look ahead, core inflation appears likely to remain in the zone of price stability during the remainder of 2004 and into 2005. Although slack utilization of resources, which moderates wage and price pressures, is an important reason that inflation is likely to remain subdued, my forecast of controlled inflation is based on more than output gap arguments. Other factors likely to keep inflation at modest levels include continuing rapid gains in productivity, which have kept growth of unit labor costs at a very low level; unusually high price-cost margins in industry, which provide scope for firms to absorb future cost increases without raising prices; globalization and intensified competition in product markets; and the recent strengthening of the dollar. There are also indications that commodity prices, with the important exception of energy prices, may be peaking. Long-term inflation expectations also appear well contained, although inflation expectations over shorter horizons have risen, perhaps partly in reaction to the rise in energy costs.

Not everyone agrees with my relatively sanguine inflation forecast; indeed, some observers have questioned whether the current low level of the federal funds rate is not already excessively stimulative in light of the gathering recovery and the recent inflation data. I would like to make two observations.

First, I do agree that the flare-up in inflation in the first quarter is a matter for concern, and that the inflation data bear close watching. Should the rise in inflation show signs of persisting, I am confident that the Federal Open Market Committee will adjust policy as necessary to preserve price stability. As the qualified and probabilistic language of the FOMC's statement makes clear, the likelihood that the pace of rate normalization will be "measured" represents a forecast about the future evolution of policy, *not* an unconditional commitment on the part of the Committee. Although I expect policy to follow the usual gradualist pattern, the pace of tightening will of necessity respond to evolving economic conditions, particularly the strength of the ongoing recovery in the labor market and developments on the inflation front.

Second, however, concerns that that monetary policy is “behind the curve” may not fully take into account a point I made earlier, that the level of the federal funds rate by itself does not fully describe broad monetary conditions. A given level of the funds rate can be consistent with easing or tightening monetary conditions, depending on market expectations about future short-term rates. In part because of the FOMC’s communication strategy, which has linked future rate changes to the levels of inflation and resource utilization, and in part because of the gradualist policies that the FOMC has pursued in the past, markets have responded to recent data on payrolls, spending, and inflation by bringing forward a considerable amount of future policy tightening into current financial conditions. Notably, in the past few months, long-term interest rates have risen 100 basis points or more, equity markets have been subdued despite robust earnings reports, and the dollar has strengthened. These developments - the sort of “front-loading” of monetary tightening predicted by our analysis of gradualism - will reduce the financial impetus being provided to the economy and thus provide some check to nascent inflationary pressures.

In short, the low level of the federal funds rate notwithstanding, broad monetary conditions have already begun to normalize, a development that should tend to limit future inflation risks. Of course, at some point the FOMC will have to validate the general expectation of rising short-term rates; expectations management is not an independent tool of monetary policy. The good news is that, because of the impact of private-sector expectations about policy on current long-term rates, a significant portion of the financial adjustment associated with the tightening cycle may already be behind us.