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The Science (and Art) of Monetary Policy

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During most of the 1990s, the United States experienced exceptionally good times, and the Federal Reserve received some of the credit for the booming economy and low inflation. [Figure 1](#) shows the marked decline in the civilian unemployment rate from a peak of 7.8% in June 1992 to a low of 3.9% in September 2000. In May 1997, the unemployment rate fell below 5% for the first time since 1973—and it stayed there for the rest of the decade. Although some were concerned that inflation would re-ignite because of tight labor markets, instead it remained in check. In fact, the inflation rate, measured by the Consumer Price Index (CPI), actually *declined* through most of the 1990s. When the more volatile food and energy components of the CPI are removed, the resulting measure of inflation has remained below 3% since 1993.

The last eighteen months, however, have presented the Federal Reserve with particularly difficult policy decisions. In the summer of 1999, concerned that inflation was threatening, the Fed raised its target for the federal funds interest rate. From a level of 4.74% in May 1999, the funds rate rose as a result of Fed policy until it peaked at 6.54% in August 2000. As 2000 drew to a close, increasing signs of economic slowing led the Fed to cut interest rates, lowering its target for the funds rate twice in January, once in March, and once in April.

This swing in interest rates, together with some criticism that the Fed might have raised rates too much in 2000 and not cut them enough in 2001, raises the question of whether there are any guiding principles that the Fed has followed, or could have followed, in making its decisions. Are there rules for designing and implementing good monetary policy that all economists agree on? Or is policymaking inherently a subjective task, one that depends critically on combining both good economics and insightful judgment?

Is monetary policy a science?

A recent article by three leading monetary economists, Rich Clarida, Jordi Gali, and Mark Gertler, is titled “The Science of Monetary Policy.” The word “science” in the title suggests that economists now have all the knowledge they need to design and implement good monetary policy. If that were so, the public’s focus on Alan Greenspan as the Chairman of the Federal Reserve would be misplaced—monetary policy would not depend on an individual’s judgment. Instead, just as sending a rocket to Mars or building a bridge depends critically on the input from scientists and engineers, implementing the science of monetary policy would require only a staff of good economists.

Currently, many economists are in agreement with three basic principles that form the core of the “scientific” approach to monetary policy. Each of these principles is designed to guide central bankers.

Principle 1: Focus on the output gap. A huge literature in the 1980s and 1990s showed how excessive inflation can result if a central bank aims for output objectives that are too ambitious. If, for example, the central bank engages in expansionary policies in an attempt to keep output above potential, the net result will only be a higher average rate of inflation. Well-meaning central banks could find themselves generating rates of inflation well above what they had wanted without any gains in long-term output.

Many solutions to this problem have been suggested. The simplest is to have the central bank adopt a realistic output objective. Specifically, the central bank should strive to stabilize output around potential output, sometimes also called full-employment output. This objective is usually expressed by saying the central bank should stabilize the *output gap*, the difference between actual real output and potential. In the words of economist Lars Svensson, “...there is considerable agreement among academics and central bankers that the appropriate [monetary policy objective] both involves stabilizing inflation around an inflation target and stabilizing the real economy, represented by the output gap” (Svensson 1999).

Principle 2: Follow the Taylor Principle. The second principle in the “scientific” approach to monetary policy is to follow the Taylor Principle. This principle states that the central bank’s policy interest rate should be increased more than one for one with increases in the inflation rate. Named after Stanford University economist John Taylor, the Taylor Principle ensures that an increase in the inflation rate produces a policy reaction that increases the real rate of interest—the interest rate corrected for inflation. The rise in the real interest rate reduces private spending, slows the economy down, and brings inflation back to the central bank’s inflation target. Conversely, if inflation falls below the central bank’s target, the Taylor Principle calls for a more than one for one cut in the central bank’s policy interest rate. This reduces the real rate of interest, stimulates private spending, and pushes inflation back to its target level.

Policies that violate the Taylor Principle can lead to serious problems. If a rise in inflation is met by a less than one for one increase in the policy rate, then real interest rates actually fall. This fuels further economic expansion, pushing inflation even higher. Rather than acting to bring inflation back down to its target level, such a policy can cause inflation to spiral out of control.

One way to implement the Taylor Principle is to follow a Taylor Rule, also named after John Taylor, which specifies exactly how much to change the federal funds rate in response to changes in inflation and the output gap.

Principle 3: Be forward-looking. Monetary policy actions affect the economy with a lag. An interest rate cut may not have its maximum impact on real output for twelve or even eighteen months, and the effects on inflation may take longer still. Central banks cannot wait to act until inflation has increased or the economy has gone into a recession. These lags mean that central banks must be forward-looking. For example, when the Fed raised interest rates in 2000, inflation was still quite low, once the volatile food and energy components were removed. The Fed acted because it was concerned that inflation would otherwise begin to rise.

One policy framework that satisfies these three principles is *inflation forecast targeting*. Under an inflation forecast targeting procedure, the central bank is concerned with stabilizing inflation at low levels and with stabilizing the output gap. Because of the lags in policy, the emphasis is on responding to the central bank's forecast of future inflation. If the forecast says inflation will rise, the central bank should act to slow the economy down—it doesn't wait until inflation actually has increased. Because inflation forecast targeting is based on the three policy principles, it has gained many adherents among academic and central bank economists.

Economists have significantly advanced their understanding of the principles of good monetary policy in recent years. Yet the public clearly believes that implementing monetary policy is not something that can be delegated to unknown government economists in Washington. The public believes leadership matters, and that it matters that Federal Reserve Chairman Alan Greenspan is in charge of policy. Is there more to achieving good monetary policies than simply following the economist's scientific principles?

Is monetary policy an art?

Perhaps the public believes Alan Greenspan's leadership matters because they believe monetary policy is, in part, an art. It requires the fine touch of a master policymaker, one whose feel for the correct moment to change interest rates cannot be reduced to a few scientific principles. But if making policy isn't a science, what exactly is nonscientific about it? The best way to understand the "art" of policymaking is to revisit our three policy principles.

How can we focus on the output gap when we don't know what it is? It's all very well to tell central banks to focus on the output gap, but how are they supposed to know what the gap is? When major shifts in productivity growth occur—as happened in the 1970s with the productivity slowdown and again in the 1990s with the productivity speedup, measuring the output gap can be difficult. The output gap is the difference between something we can measure (real GDP) and something we can't (the economy's potential output level). Trying to determine how new information technologies would affect productivity growth and whether the growth speedup would be sustained was a major issue confronting policymakers in the 1990s. As the economy grew rapidly during the second half of the decade, economists were uncertain whether real output was rising above potential, in which case interest rate hikes would be called for, or whether both actual *and* potential output were growing more rapidly, leaving the output gap stable.

A similar problem had beset the Fed during the 1970s. Then, the problem was the productivity slowdown. Some economists have argued that the Fed failed to recognize at the time that potential was growing more slowly than before. As a consequence, the Fed interpreted the slowdown in actual growth as a reflection that output was falling below potential. In fact, both actual and potential declined relative to their previous trends. Because the gap had not fallen, policy was too expansionary in the early 1970s, helping to fuel inflation.

Implementing the Taylor Principle. The Taylor Principle calls for adjusting the policy interest rate more than one for one with changes in inflation. But how much more? If inflation rises by 1 percentage point, should the federal funds rate be increased by 1.5 percentage points? 2 percentage points? Or 1.01 percentage points? The Taylor Principle alone does not offer guidance.

Responding strongly to changes in inflation will help keep inflation more stable around a low average level, but it also will result in larger fluctuations in output and employment. A weaker response results in greater fluctuations in the inflation rate but more stable output and employment. Hence, there is a trade-off between inflation stability and employment stability. Making the right trade-off requires good judgment.

The art of forecasting. Implementing inflation forecast targeting means the central bank has to be able to forecast future economic conditions. This is not an easy task. Last summer, economic forecasts did not foresee the growth slowdown that began during the third quarter. The Fed had to respond quickly in early 2001 as signs of an economic slowdown developed.

Good forecasts are based on good data, good economic models, *and* good judgment. Mechanical forecasts based on a few key indicators inevitably ignore information that might be relevant. While statistical models provide a baseline for developing economic forecasts, good forecasters always supplement the models' predictions with judgmental adjustment.

Conclusion

Economists have contributed much to making the design of monetary policy more scientific. From the articulation of general principles for good policy to the construction of small models that can be used to simulate the impacts of alternative policies, recent research by academic and central bank economists has contributed to our knowledge about monetary policy. Despite these advances, however, conducting policy is far from routine. General principles are important, but they're not sufficient—policymakers also need quantifiable guidance. They need to know whether the current output gap is +2% or -2%. They need to know whether the funds rate should be increased by 150 basis points or 200 for every 1 percentage point rise in inflation. And they need to know how much inflation will rise or fall over the next six months. This level of guidance is still missing from the science of monetary policy. The art of conducting policy lies in the ability to translate the general principles into actual policy decisions.

There is a long tradition of trying to take discretion out of monetary policy—Milton Friedman's proposal that the Fed should just ensure a constant annual growth rate for the money supply was an example of a policy designed to remove the role of the individual policymaker. While economists have identified broad principles to guide policymakers, making policy is not a science. Good policy will probably always require good policymakers, as it requires combining the science of the economist with the art of the practitioner.

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