Federal Reserve Bank of Cleveland

The Taylor Rule: A Guidepost for Monetary Policy?

by Charles T. Carlstrom and Timothy S. Fuerst

"It seems to me that a reaction function in which the real funds rate changes by roughly equal amounts in response to deviations of inflation from a target of 2 percent and to deviations of actual from potential output describes reasonably well what this committee has done since 1986. … If we wanted a rule I think the Greenspan Fed has done very well following such a rule, and I think that is what sensible central banks do."

Remarks by then Federal Reserve Governor Janet Yellen at the January 1995 FOMC meeting

The "rule" Yellen seems to advocate has become known as the Taylor rule, and it has caught the attention of researchers, policymakers, and the press. In a seminal 1993 paper, John Taylor, the current undersecretary of Treasury, claimed that adhering to a simple rule or strategy whereby the central bank sets the federal funds rate in response to two variables—inflation and deviations from potential output—is a useful way to conduct monetary policy. He maintained that such a rule could keep inflation low and stable without the "go–stop" fluctuations in output that had plagued the economy during the 1970s. Taylor went further and claimed that the actual policy moves made by the FOMC since 1987 are well characterized by such a rule.

Clearly, the FOMC considers a myriad of data when making decisions. Yet many agree that a simple rule like the one Taylor described does approximate the FOMC's actual policy moves over the past 15 years. In what sense is this true? This *Economic Commentary* explains what the Taylor rule is, discusses how well it predicts the actual federal funds rate, and perhaps gives some insight into why it has sparked so much interest.

The Taylor Rule

There is a long history in economics extolling the virtues of rules. One reason is that policymakers, just like individuals, sometimes need help sticking to a goal that requires long-term commitment. Rules can help policymakers stick to long-term goals when they are tempted to deviate from them to gain something good in the short run. Pursuing short-term gain may undermine long-term goals in the same way that rolling over and hitting the snooze button on the alarm threatens one's goal of getting to work on time. But even though rules are effective, policymakers are understandably reluctant to chain themselves to ironclad rules. Despite their reluctance, the Taylor rule has had a big impact in monetary policy circles, as well as economics. Figure 1 suggests why. The Taylor rule seems to track, very successfully, broad policy moves since 1987. This success seems remarkable because Taylor's rule is so simple: It is set according to only four components.

The first factor is the Fed's long-term inflation target. This is the inflation rate that will prevail on average over time although the actual inflation rate will differ, sometimes significantly, from this target at any point in time. While Taylor claimed that a 2 percent inflation target is preferred to 5 percent, there is no agreement on whether it should be 2, 0, or, for that matter, –1 percent. Taylor simply assumed a long-run inflation target of 2 percent (the average inflation rate since 1985 has been 2.6 percent). It should be kept in mind, however, that there is nothing magical about 2 percent inflation, and the rule can be modified for a different inflation target.

Once a topic to be found only in scholarly economic journals, the Taylor rule is popping up regularly in news magazines, finance journals, and central bankers' speeches. Does the Fed follow the rule? Should it? This *Commentary* explains what the Taylor rule is, discusses why it seems to describe Fed interest-rate setting, and argues that the rule is most valuable as a guideline rather than a prescription.

The second factor is the "natural" real, or inflation-adjusted, federal funds interest rate. This is the rate that is consistent with "neutral" monetary policy. That is, if the real funds rate is equal to the natural real rate, then monetary policy will be consistent with both the inflation and output targets. This natural rate undoubtedly moves through time. Because of the difficulty of measuring it, however, Taylor assumed that the natural real rate is constant at 2 percent. He picked this number because it is approximately the average real interest rate over a long-time horizon. In more complicated rules one can potentially incorporate this rate moving around as shocks hit the economy.

The sum of the first two factors, the natural real rate and the Fed's long-term inflation target, determine the long-run (nominal) federal funds rate. In Taylor's original rule this amounted to four percent per year. The two remaining factors address the way policy should respond in the short run to changing circumstances, namely, to changes in output and inflation. These third and fourth components of the Taylor rule are the current rates of inflation and output.

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Output and Inflation Stabilization

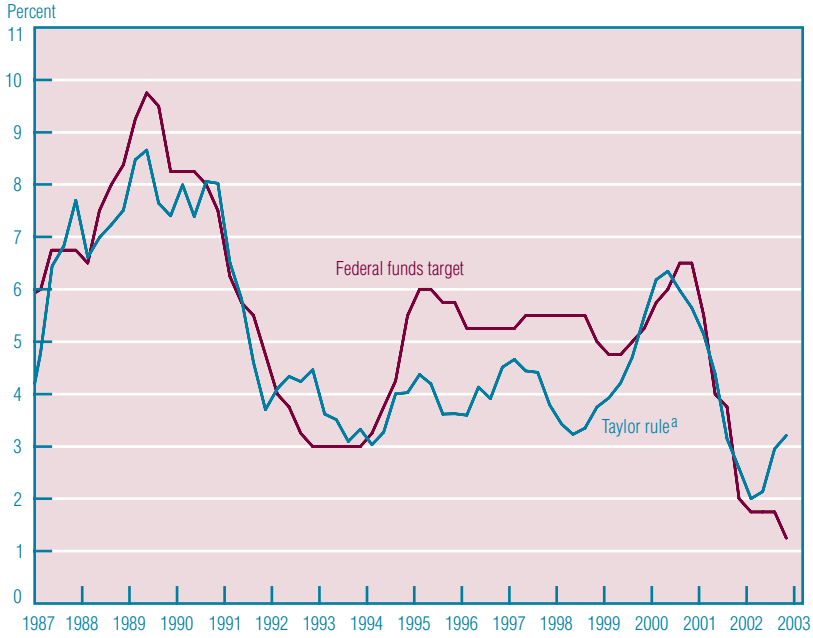
The Taylor rule prescribes that the Fed "lean against the wind" when setting interest rates; that is, that it raise interest rates when current output rises higher than potential. The rule also prescribes a similar response to inflation—raise interest rates when the inflation rate over the past year is higher than its long-term target.

But mere leaning will not be enough when it comes to inflation. Taylor cautioned that interest rates must rise by *more than* the increase in inflation. Given that nominal interest rates naturally increase one for one with movements in anticipated inflation, just increasing the funds rate one for one with inflation is like treading water. Therefore, the Fed must increase the *real* funds rate with inflation to make any headway in reducing inflation. This more-than-proportional response of the nominal funds rate to inflation is known as the Taylor principle. The Taylor principle prescribes that the real federal funds rate should be made greater than the natural rate of interest whenever inflation is above target.

Not following the Taylor principle may open the economy up to inflationary spirals. Increases in inflation would reduce real interest rates, which would then further increase inflation. Of course, the same logic works in reverse. The end result is that inflation has no anchor that would pull it to its long-run target. In a very real sense then, monetary policy has no long-run target. While such spirals seem like fantasy, some economists have suggested that one reason inflation got out of control during the 1970s is because the Fed did not react aggressively enough to inflation.

For a given level of the nominal funds rate, the real funds rate will tend over time to equal the natural real rate of interest. But in the short run, these two need not be equal. If the real funds rate is held lower than the natural rate of interest, the money supply will increase, thus pushing down the real funds rate below the natural rate. Inflation and output will also tend to be higher when the real funds rate is lower than the natural real rate of interest. By how much should the Fed change the real funds rate in response to changes in output and inflation?

FIGURE 1 TAYLOR RULE VERSUS FEDERAL FUNDS TARGET RATE



SOURCES: Board of Governors of the Federal Reserve System. "Selected Interest Rates, *"Federal Reserve Statistical Releases*, H. 15; the Congressional Budget Office; and the Bureau of Economic Analysis.
a. Inflation is measured from the Personal Consumption Expenditures Chain Type Price Index, 4-quarter change. The output gap is calculated as the percent deviation of potential GDP from real GDP as measured by the Congressional Budget Office and the Bureau of Economic Analysis, respectively.

In the simplest form of the rule (which was used in figure 1), Taylor argued that the Fed should increase the real funds rate by one-half a percentage point for every percentage point deviation that inflation is above target or that output is above potential. (Likewise, the Fed should decrease the real funds rate by the same amount for deviations below target or potential.) Thus, Taylor felt that monetary policy (in terms of the real funds rate) should respond equally to inflation and output deviations. While the Taylor rule, of course, satisfies the Taylor principle, there are many other rules or policies that also satisfy this principle. Conversely, there are Taylor-type rules (in which the nominal funds rate responds to inflation and output) that do not satisfy the Taylor principle.

Is Recent Monetary Policy Consistent with the Taylor Rule?

While the Taylor rule clearly tracks broad movements in the funds rate, just as clearly, it produces large and persistent misses (see figure 1). Critics of the rule's usefulness suggest that judging how well the Taylor rule describes actual fed policy requires that we look primarily at its performance since 1993—the date Taylor first proposed it. Because the rule was defined with the benefit of pre-1993 data, it can't help but describe those periods well, these critics might argue. But if the rule captures the real determinants of Fed decisionmaking, it should also describe the Fed's behavior "out of sample," that is, for a period whose data wasn't used when calculating the original rule. Yet after 1993 the funds rate has usually deviated substantially from the Taylor target.

These misses, however, do not distract proponents of the Taylor rule. They argue that the rule was never meant to be followed rigidly. In fact, the term Taylor "rule" is a misnomer. Taylor actually proposed it not so much as a mechanical rule but instead as a guidepost for monetary policy. With guideposts, deviations from the prescribed "rule" and, at times, even substantial ones, are permitted. The idea of using the rule as a guidepost as opposed to having absolute discretion, however, is that it obligates policymakers to provide a compelling argument for why they have allowed the deviations. Taylor recognized that special factors will always occur that will (and should) cause the

Fed to deviate substantially from the course prescribed by any rule. Following the Taylor rule therefore does not require that the funds rate respond only to changes in inflation and the output gap, but instead requires that these are the only variables the central bank should *consistently and systematically* respond to.

For example, the funds rate was consistently above the Taylor rule target through the latter half of the 1990s. Yet the rule's proponents argue that productivity growth increased in 1995, and this was translating into faster economic growth. Faster economic growth, they argue, manifests itself in higher real rates of interest and thus a higher natural real interest rate. While Taylor treated this factor as a constant, policymakers who believed higher productivity was here to stay (because computers had created a "New Economy") would have adjusted the Taylor rule up accordingly. Even if the fed funds rate deviated from the rate prescribed by the Taylor rule during this period, many claim policy decisions did not necessarily deviate from the spirit of the rule. That is, monetary policy may have followed a Taylor rule in which the natural rate of interest was not simply assumed to be constant. Instead, it was estimated based on economic theory.

Similarly, several unique circumstances may explain why monetary policy has recently been "easier" than would be predicted by the Taylor rule (that is, the fed funds interest rate has been lower). One possibility is the remarkable decline of equity prices over the last 12 months. This large and sustained decline is without parallel during Greenspan's tenure, which makes it impossible to test this hypothesis by looking at the past. A second possibility is the latent sense of insecurity linked to the 9/11 attacks and the military interventions in the Middle East. Supporters of the Taylor rule would just argue that once these special circumstances are over, policymakers will increase the funds rate to once again be in line with the rule.

Guideposts and Credibility

We have focused on the Taylor rule as one potential guidepost for monetary policy. There are many others. It is important to recognize that this rule can easily be adjusted to accommodate inflation targets other than the 2 percent level suggested by Taylor or structural changes in the economy that affect the natural real federal funds rate. Since Taylor suggested his original rule, considerable work has been done on whether central banks should respond more, or less, aggressively to inflation or the output gap.

This work suggests that the exact form of the Taylor rule is probably not that important. What is important, however, is that potential guideposts satisfy the Taylor principle. That is, the nominal interest rate must increase more than one for one with increases in inflation. Along with reliable guideposts that satisfy the Taylor principle comes credibility.

Credibility gives the central bank the latitude to temporarily deviate from any guidepost without risking the possibility of reigniting inflation. Indeed, credibility implies that policy can even deviate from the Taylor principle for short periods of time. Guideposts provide the predictability and credibility of firm rules without making it impossible or very difficult to respond to unforeseen events.

The Taylor rule should not be thought of as a strict policy prescription, but instead as a guideline or rule of thumb for monetary policy. Following a rule rigidly has obvious drawbacks. But adhering to a rule generally, so long as it satisfies the Taylor principle over the long run, provides hard-won credibility that allows for periodic deviations from the rule with no loss of control over inflation.

Recommended Reading

Ben S. Bernanke, 2003, "'Constrained Discretion and Monetary Policy," Remarks before the Money Marketers of New York University, New York, N.Y., February 3.

*The Economis*t, 1996, "Monetary Policy Made to Measure," August 10.

Edward M. Gramlich, 1998, "Monetary Rules," The Samuelson Lecture, Remarks before the 24th Annual Conference of the Eastern Economic Association, New York, N.Y., February 27.

Laurence H. Meyer, 2002, "Rules and Discretion," Remarks at the Owen Graduate School of Management, Vanderbilt University, Nashville, Tenn., January 16.

Lars E.O. Svensson, 2003, "What Is Wrong with Taylor Rules? Using Judgment in Monetary Policy through Targeting Rules," *Journal of Economic Literature*, (June, forthcoming).

John B. Taylor, 1993, "Discretion versus Policy Rules in Practice," Carnegie-Rochester Conference Series on Public Policy 39, pp. 195–214.

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