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Taylor Rules or Target Rules?

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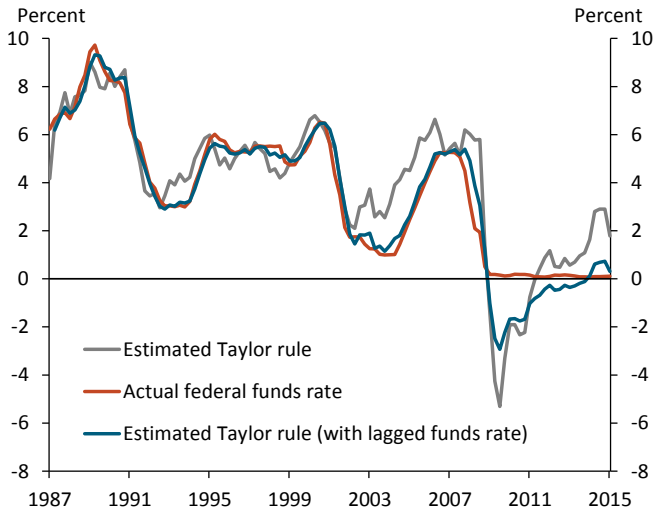
Economists have long debated whether policymakers should take a rule-based or target-based approach in the conduct of monetary policy. I examine the Federal Open Market Committee's actions in setting the federal funds rate and their projections for goal variables to assess whether monetary policy has more closely matched one approach over the past 30 years. Although policy actions were aligned with one rule-based measure through 2008, they are not easily categorized as following either a policy rule or a target rule.

A long-standing debate about how monetary policy should be conducted has re-emerged in recent months. One view, advocated by Stanford University economist John Taylor, is that policymakers should closely follow a rule, or simple formula, in setting the target for their policy instrument. The other view, advocated by former Federal Reserve Chairman Ben Bernanke, is that policymakers should set clear goals or "targets" for the longer-run objectives of policy and use "constrained discretion" in setting their policy instruments to achieve these goals over time. In this Macro Bulletin, I briefly describe these two approaches and examine the extent to which the Federal Reserve's actions have followed a "Taylor rule" or a "target rule" over the last 30 years.

Under the Taylor rule approach, the Federal Reserve would specify, announce, and follow a simple rule for setting a target for its traditional policy instrument, the federal funds rate. Following such a rule, Taylor says, would make policy systematic and predictable. Moreover, requiring the Fed to justify any deviation from the rule would make policymakers more accountable to Congress and the public. Taylor further argues that the Fed's deviations from rule-like behavior in the past contributed to the Great Recession and the sluggish economic recovery (2015).

Chart 1: Estimated Taylor rules



Sources: Federal Reserve Board, FRED, Federal Reserve Bank of Philadelphia, Haver Analytics and author's calculations.

To assess the extent to which past Fed behavior has been rule-based, I estimate two alternative policy reaction functions using real-time data. The specification of the rules is similar to the one advocated by Taylor; however, the parameters are estimated rather than pre-specified. In the first reaction function, I regress the federal funds rate on a constant, the deviation of real-time data on inflation—measured by the personal consumption expenditure (PCE) price index—from 2 percent and deviations of unemployment from real-time estimates of the natural rate. I piece real-time estimates of the natural rate together from two sources. From 1989:Q1 to 2008:Q4, I use Federal Reserve Board staff estimates of the natural rate from the Greenbook, and from 2009:Q1 to 2015:Q1, I use projections of the longer-term unemployment rate from the Federal Open Market Committee's Summaries of

Economic Projections (SEP).[1] For the period before 1989, in which similar real-time estimates are not available, I hold the natural rate at a constant 5.75 percent, the same as the Greenbook projection for 1989:Q1. In the second reaction function, I add a lagged federal funds rate to the right-hand side based on the view of some analysts that policy has been "inertial" or "history dependent."[2]

Chart 1 compares the two estimated rules with the actual effective federal funds rate. Prescriptions from both rules closely tracked the actual federal funds rate from 1987 to 2002. From 2003 to 2006, however, the prescriptions from the two rules diverged. The non-inertial rule prescribed a higher federal funds rate than the inertial rule, which continued to closely track the actual federal funds rate. From 2009 to 2011, when the actual funds rate was constrained by the zero lower bound, both rules prescribed a negative funds rate. Finally, in 2015:Q1, the non-inertial rule prescribed a 1.8 percent funds rate, while the inertial rule prescribed a rate much closer to the actual funds rate of 11 basis points.

Assessing whether policy was systematic and rule based throughout this period depends on the specification of the rule. The estimated non-inertial rule suggests policy may have been "too loose" from 2003 to 2006, supporting Taylor's view that policy deviated from rule-like behavior over this period and potentially contributed to the housing bubble and subsequent Great Recession. In contrast, the inertial rule suggests policy remained on track with the FOMC's earlier behavior.

An alternative approach to policy focuses on goals rather than instruments. Under this approach, policymakers adjust their policy instruments not necessarily according to a rule but as required to ensure that forecasts of goal variables are aligned with targets. This approach implies policymakers should avoid instrument settings that would cause projections of inflation and unemployment to undershoot or overshoot their targets. One rationale for such an approach is that the issues confronting policymakers may vary over time and be too complex for a simple rule to address. According to Bernanke, "monetary policy should be systematic, not automatic. The simplicity of the Taylor rule disguises the complexity of the underlying judgments that FOMC members must continually make if they are to make good policy decisions" (2015a).

Rather than relying on a rule for setting the federal funds rate, Bernanke argues, the Fed should clearly specify its goals and set its policy instruments to achieve those goals over the medium run:

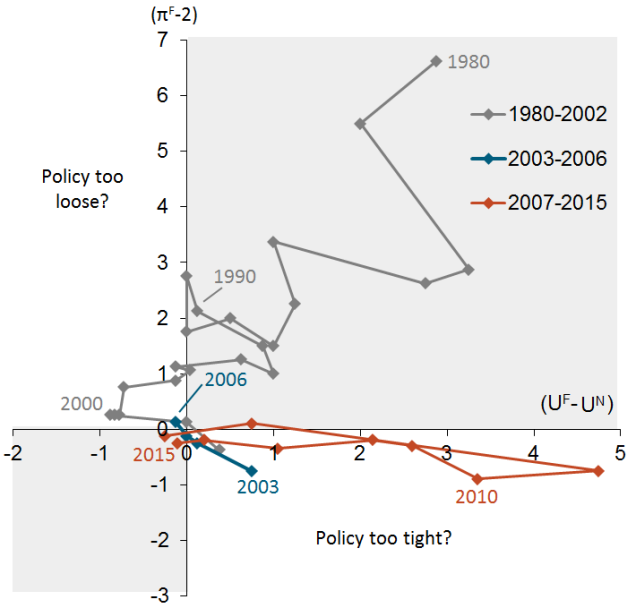
> "In a targets-based framework, the central bank forecasts its goal variables—inflation and employment, in the case of the Fed—and describes its policy strategy for bringing the forecasts in line with its stated objectives. Although targeting rules are not mechanical, they do provide a transparent framework that, importantly, is robust to changes in the structure of the economy or the effectiveness of monetary policy, so long as those changes can be incorporated into forecasts" (2015b).

To assess whether the FOMC has followed a target-rule approach, I examine whether the FOMC's economic projections are consistent with a key property of a forecast-targeting strategy. The approach is based on the idea that the Fed's goal is to minimize a loss function penalizing deviations of inflation from a 2 percent target and unemployment from its natural rate. In addition, I assume deviations of actual inflation from expected

inflation depend on the deviation of unemployment from the natural rate (the Phillips curve) as well as various shocks, and that policymakers can influence unemployment and thereby inflation over the medium term using their policy instruments. As shown by Svensson (see also Walsh), these assumptions imply, under optimal policy, that a projection for inflation to run below target should be associated with a projection for unemployment to run below its natural rate. If not, easier policy would bring both the inflation and unemployment projections closer to their targets. Likewise, under optimal policy, a projection for inflation to run above target should be associated with a projection for unemployment to run above the natural rate. If not, tighter policy would bring both projections closer to target.[3] Thus, any projection in which inflation was above target while unemployment was below target would suggest monetary policy was too accommodative, and any projection in which inflation was below target while unemployment was above target would suggest monetary policy was too tight.

Chart 2 shows the midpoint of the central tendency of FOMC participants' projections for inflation and unemployment relative to the Committee's objectives. The vertical axis shows projections made midyear for the following year's Q4/Q4 inflation rate relative to 2 percent. I piece the projections together from two sources—the FOMC's semiannual monetary policy report to Congress released each July (covering 1980 to 2007) and the FOMC's quarterly "Summary of Economic Projections" released in the second quarter of each year (covering 2008 to 2015).[4] Inflation in these reports is measured by the Consumer Price Index from 1979 to 1999, the headline PCE price index from 2000 to 2004, and the core PCE price index from 2005 to 2015.[5] The horizontal axis shows projections from these same reports made midyear for the following year's Q4 unemployment rate relative to the natural rate. The natural rate is assumed a constant 5.75 percent from 1980 to 1988, based on Greenbook estimates from 1989 to 2008, and based on SEP projections of the longer-term unemployment rate from 2009 to 2015.

Chart 2: FOMC projections



Note: Shading represents target-rule consistent regions.
Sources: Federal Reserve Board, David Romer, and author's calculations.

The FOMC projections shown in the chart did not consistently follow the target-rule approach. In keeping with a target rule, projected inflation and unemployment were both above target in the 1980s and early 1990s as the Committee sought to bring inflation down. However, from the mid-1990s to 2000, projected inflation was above target while unemployment was below target, suggesting monetary policy may have been too accommodative. One possible explanation for this inconsistency with the target-rule approach is that the FOMC may have had a lower estimate of the natural rate than the Board staff and was therefore willing to allow the projected unemployment rate to fall below the staff's estimate. Finally, during most of the period

since the financial crisis and Great Recession, projected inflation has been below target while projected unemployment has been above target, suggesting policy may have been too tight. A likely explanation for this deviation from the target rule is that policy was constrained by the zero lower bound. In addition, even without the constraint of the zero lower bound, some economic shocks may have been so severe—and the lags associated with monetary policy so long—that it may not have been possible to prevent inflation and unemployment from diverging in opposite directions from their objectives over a horizon of a year or two.

Policy actions over the last 30 years cannot easily be categorized as consistently following either a Taylor rule or a target rule. During the late 1980s and 1990s, prescriptions from both the inertial and non-inertial Taylor rules closely match the actual path of the effective federal funds rate. However, in the late 1990s, the target rule suggests policy may have been too accommodative. This apparent deviation from the target rule might be explained by policymakers' skepticism about estimates of the natural rate of unemployment and their willingness to allow the economy to reach historically low levels of unemployment. While the non-inertial Taylor rule suggests policy may have been too accommodative from 2003 to 2006, the projections from the FOMC for the same period suggest policy may have been too tight in 2003 but about right by 2006. Since then, the zero lower bound has likely constrained policymakers under both the Taylor-rule and target-rule approaches.

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[1] The Greenbook contains the Board staff's U.S. economic forecast. Real-time Greenbook estimates of the natural rate of unemployment were collected and published by Romer.

[2] The estimation period is 1987:Q1 to 2001:Q4, which corresponds to a period in which many analysts attribute moderate fluctuations in output and inflation to good monetary policy. Importantly, the sample ends well before the beginning of the housing price bubble that some analysts attribute to overly accommodative monetary policy.

The estimated Taylor rule is: $ffr_t = \underset{(0.23)}{4.54} + \underset{(0.13)}{1.22}*(\Pi-2)_t - \underset{(0.20)}{1.40}*(U-U^N)_t$.

The estimated Taylor rule with a lagged funds rate is: $ffr_t = \underset{(0.16)}{1.34} + \underset{(0.04)}{0.67}*ffr_{t-1} + \underset{(0.10)}{0.46}*(\Pi-2)_t - \underset{(0.10)}{0.67}*(U-U^N)_t$.

Both regressions were estimated using Newey-West standard errors (in parentheses) with a maximum lag of four.

[3] This result is also known as the Qvigstad rule, named for the former deputy governor of the Norges Bank.

[4] Data from the semi-annual monetary reports to Congress come from Romer.

[5] The measure of inflation changes over time due to data limitations, but the projections do not jump as the measure of inflation changes. Moreover, at a one and a half year horizon, headline and core inflation tend to converge in the projections.

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