Characterizing Federal Reserve Policy -- Taylor Rules

I. The Fed uses the Fed Funds rate as its instrument in conducting monetary policy (WHY?)

II. How does the Fed choose the appropriate level of the Fed Funds rate?

    The current description is that the Fed -- “Looks at Everything” -- inflation, unemployment, interest rates, yield curve, exchange rate, industrial production, leading indicators, ….

What is the problem with this -- policy is not transparent.

III. John Taylor of Stanford University has proposed a simple rule in which the Fed Funds rate is adjusted for movements in inflation and output.
The Taylor Rule:

\[ R_t = \pi_t + \alpha(\pi_t - \pi^*) + \beta(y_t - \bar{y}_t) + \bar{r} \]

where:

- \( R_t \) = the Fed Funds rate
- \( \pi_t \) = the inflation rate
- \( \pi^* \) = the target rate of inflation
- \( y_t \) = real GDP
- \( \bar{y}_t \) = potential GDP (full employment GDP)
- \( \bar{r} \) = long run average real interest rate
- \( \alpha, \beta \) = constants (typically positive)

Define \( r_t = R_t - \pi_t \) - the ex-post real interest rate. Then eq. (1) can be re-written as:

\[ r_t = +\alpha(\pi_t - \pi^*) + \beta(y_t - \bar{y}_t) + \bar{r} \]

Hence the Taylor rule says that the real interest rate (implied by the current Fed Funds rate and inflation) should be adjusted from the long run average real interest rate based upon deviations of inflation and output from their respective target levels.

When Taylor first proposed the rule, he set \( \alpha = \beta = 0.5 \).

If either \( \pi_t > \pi^* \) or \( y_t > \bar{y}_t \) then aggregate demand needs to be restrained. How - by raising real interest rates above the long run level \( \bar{r} \).
II. An historical analysis of monetary policy

Recently, the parameters of the Taylor rule have been estimated for different sample periods. These estimates are presented below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>60:1 - 79:4</td>
<td>87:1 - 97:3</td>
<td></td>
</tr>
<tr>
<td>(\alpha)</td>
<td>-0.187</td>
<td>0.533</td>
</tr>
<tr>
<td>(\beta)</td>
<td>0.252</td>
<td>0.765</td>
</tr>
</tbody>
</table>

Note critically that the coefficient on inflation was negative during the 60’s and 70’s. This means that increases inflation lower the real interest rate which causes demand to increase -- this results in even higher inflation. Hence, inflation becomes unstable.

The difference between the two episodes can be seen in the following graph.
It is assumed that output equals full employment: $y_t = \bar{y}_t$

Also, $\bar{r} = 2\%$

1960-1979: $R_t = 2.045 + 0.813 \pi_t$

1987-1997: $R_t = 1.174 + 1.533 \pi_t$

The early period results in an unstable rule.

**FIGURE 3.**

Two estimated monetary policy rules: 1960-79 versus 1987-97. The solid lines correspond to the estimated policy rules in Table 1. The lines are drawn assuming real GDP equals potential GDP ($y = 0$). The real interest rate line has a slope of 1.
III. Comparison of actual and predicted Fed Funds Rate

The Taylor rule is also useful in examining the path of the Fed Funds rate. The following graphs examine the Fed Funds rate predicted by the Taylor rule under two rules:

Rule 1: alpha = 0.5, beta = 0.5.
Rule 2: alpha = 0.5, beta = 1.0.

Note that the interest rate was too high for the first part of the 60’s, then too low - too expansionary.
For the 70’s we get the following picture:

Again, the rate was too low in the latter part of the 70’s. During the Volcker years, it was just about right. During the 80-82 recession and for a few years after, it was too high. Recently, interest rate policy has been consistent with the Taylor rule:
The Greenspan Era:

The Taylor rule predictions can be monitored via the St. Louis Fed’s web site of Monetary Trends. Here is what the latest version shows:
Monetary Trends

Federal Funds Rate and Inflation Targets

Actual and Potential Real GDP

PCE Inflation

Monetary Base Growth* and Inflation Targets

Monetary Base Velocity Growth

Real Output Growth

*Modified for the effects of reserve programs on reserve demand.

Calculated base growth is based on McCauley's Rule. See notes on page 19.