User’s Guide

Seven Simple Monetary Policy Rules Spreadsheet

The Excel workbook contains four worksheets. Two worksheets, Parameters and Forecasts, contain the inputs that go into calculating the federal funds rates from seven simple monetary policy rules. These federal funds rates are in the worksheet Policy Rule Funds Rates. Finally, in the worksheet Make Your Own Rule, you can see how inputting your own forecasts changes the federal funds rates from the seven simple monetary policy rules, and you can customize your own simple monetary policy rule, which will generate a federal funds rate path using forecasts and parameters that you enter.
Worksheet: Parameters

<table>
<thead>
<tr>
<th>A</th>
<th>Key Parameters for the Seven Simple Monetary Policy Rules</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>$\pi^*$, target inflation rate, median long-run value from Summary of Economic Projections (SEP) (%)</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>$r^*$, median implied long-run value from SEP (%)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>$r_{SEP}^*$, Laubach-Williams one-sided estimate, most recent value (%)</td>
<td>0.186546761</td>
</tr>
<tr>
<td>6</td>
<td>$1/b$, inverse Okun's coefficient</td>
<td>-1.8</td>
</tr>
<tr>
<td>7</td>
<td>$u_{SEP}^*$, Survey of Professional Forecasters' natural rate of unemployment (UBAR), median, most recent observation (%)</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>$u_{SEP}^*$, median long-run value from SEP (%)</td>
<td>4.8</td>
</tr>
<tr>
<td>9</td>
<td>$\rho$, interest rate inertia/smoothing parameter</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Sources: Board of Governors of the Federal Reserve System; Federal Reserve Bank of Cleveland; Federal Reserve Bank of Philadelphia; Federal Reserve Bank of San Francisco; Congressional Budget Office; and Haver Analytics.

Based on data and forecasts available as of June 23, 2016.

The **Parameters** worksheet contains the notation, definitions, and values of the parameters used in the seven simple monetary policy rules. Each row corresponds to a different parameter. Definitions and notation for the parameters are found in column A, cells **A3:A9**, while the corresponding values assigned to each parameter are found in column B, cells **B3:B9**. For example, the value for the parameter defined in **A9** ($\rho$, interest rate inertia/smoothing parameter) is 0.8, the value found in cell **B9**.
Forecasts of different economic variables from each of three different forecast sources are presented in the **Forecasts** worksheet. Each row corresponds to a forecast source and a variable being forecasted, and it contains the forecast values for that particular variable. Rows 4-7 contain forecasts from the Survey of Professional Forecasters (SPF), rows 8-13 contain forecasts from the Congressional Budget Office (CBO), and rows 14-17 contain forecasts from the FRBC staff small BVAR model (FRBC BVAR). Cells B4:B7 indicate the variable being forecasted by the SPF, while cells B8:13 and B14:B17 indicate the variable being forecasted by the CBO and FRBC BVAR, respectively. Forecasts for the variables are contained in columns C through P. For example, row 11 contains the CBO forecast for the output gap, which is found in cells C11:P11 for quarters 2015.4 through 2019.1 (the dating convention is YYYY.Q format, e.g. 2015.4 is the fourth quarter of 2015).

Data on the federal funds rate in the first two quarters listed in the **Forecasts** worksheet (here 2015.4 and 2016.1) are found in cells C3:D3. Note that throughout the spreadsheet, cells pertaining to data are shaded in red.
Federal funds rates from each of seven simple monetary policy rules are presented in the Policy Rule Funds Rates worksheet. Column C contains the average federal funds rate for the previous quarter. Calculated policy rule federal funds rates can be found in columns D-L and rows 3-23. Each row corresponds to a forecast source, a policy rule, and the federal funds rate path for the current quarter through eight quarters ahead. The rules in rows 3-9 use forecasts from the SPF; the rules in rows 10-16 use CBO forecasts; and the rules in rows 17-23 use FRBC BVAR forecasts. These forecasts can be found in the worksheet Forecasts. For example, row 3 shows federal funds rates from the Taylor (1993) rule using SPF forecasts, while rows 10 and 17 show the federal funds rates from the same rule using CBO and FRBC BVAR forecasts, respectively. Across each forecast source, a particular rule has the same general form, but may be parameterized differently. For example, the SPF-Taylor (1993) rule and the FRBC BVAR-Taylor (1993) rule both use an unemployment rate gap term, but $u^*$ in the SPF-Taylor (1993) rule is $u_{SPF}^*$, whereas the FRBC BVAR-Taylor (1993) rule uses $u_{SEP}^*$ (see the Parameters worksheet for definitions of each). The exact formula for a given rule across each of the three forecast sources can be found in a table located on the right-hand side of the Policy Rule Funds Rates worksheet (pictured below).
Each cell in the range D3:L23 contains a formula which calculates a federal funds rate by referring back to the worksheets Parameters and Forecasts. For example, the following formula calculating the SPF-Taylor (1993) rule federal funds rate for 2016.2 can be found in cell D3:

$$i_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(1/b)(\pi_t - \pi^*)$$

The terms Parameters!B$3, Parameters!B$4, Parameters!B$6, and Parameters!B$7 refer to the parameter values found in cells B3, B4, B6, and B7 in the Parameters worksheet, while Forecasts!E4 and Forecasts!E7 refer to the forecast values in cells E4 and E7 of the Forecasts worksheet.

Finally, the federal funds rates in D3:L23 are summarized in the Summary portion of the table. The maximum, 75th percentile, median, 25th percentile, and minimum of all federal funds rates calculated for a given quarter are presented in rows 24-28 in the range D24:L28. For example, cell D24 contains the maximum of all federal funds
rates calculated for 2016.2 (i.e., those in cells D3:D23); D25 contains the 75th percentile of these same federal funds rates; and cells D26, D27, and D28 contain the median, 25th percentile, and minimum of these same federal funds rates, respectively.
Worksheet: Make Your Own Rule

In **Step 1**, you can input your own forecasts for the inflation and unemployment rate variables that go into policy rule calculations (the table has been initialized with the FRBC BVAR forecasts). Cells in red denote data on these variables and the federal funds rate over three prior quarters. You may enter in your own forecasts by overwriting the cells in white. In particular, a forecast for PCE inflation (year-over-year percent change) may be entered in row 3, cells F3:Q3; core PCE inflation (year-over-year percent change) in row 4, cells F4:Q4; and the unemployment rate in row 5, cells F5:Q5. Note that you only need to enter a forecast for PCE inflation in year-over-year percent changes and not in quarter-over-quarter percent changes. In row 6, cells F6:Q6, the forecast for PCE inflation in quarter-over-quarter percent changes is automatically calculated based on the forecast for PCE inflation in year-over-year percent changes that you enter in row 3.

In **Step 2**, we present the following general policy rule:

\[ i_t = \rho i_{t-1} + (1-\rho)[r^* + \pi_t + \alpha(\pi_t - \pi^*) + \beta(1/b)(u_t - u^*)] \]

which takes in seven parameters: \( \pi^*, r^*, 1/b, u^*, \rho, \alpha, \) and \( \beta \). You can customize this rule by specifying the values of these parameters. The definitions of these parameters are in column B, cells B10:B16. The parameter values have been initialized with \( \alpha, \beta, \) and \( \rho \) chosen to match the Taylor (1993) rule, while the remaining parameter values are initialized using the values from the Parameters worksheet (from the SEP in the case of \( \pi^*, r^*, \) and \( u^* \)). You can change the values of these parameters by changing the numbers in column C, cells C10:C16. The rule also takes in your forecasts of \( \pi_t \) (year-over-year PCE inflation) and \( u_t \) (the unemployment rate). Federal funds rates are computed using this rule in **Step 3**.

In **Step 3**, rows 20-26 calculate federal funds rates from the seven simple monetary policy rules using your forecasts from **Step 1** and the parameter values found in the Parameters worksheet. Rule labels (‘Taylor (1993) rule’ through ‘Low weight on output gap rule’) are found in column B, cells B20:B26. All of these rules are calculated using the unemployment rate gap and \( u_{SEP}^* \). For example, the federal funds rate for 2016.2 found in cell D20 is generated using the following formula for calculating the Taylor (1993) rule:
=Parameters!$B$4+'Make Your Own Rule'!F3+0.5*('Make Your Own Rule'!F3-Parameters!$B$3)+0.5*Parameters!$B$6*('Make Your Own Rule'!F5-Parameters!$B$8)

The terms Parameters!$B$3, Parameters!$B$4, Parameters!$B$6, and Parameters!$B$8 refer to the parameter values found in cells B3, B4, B6, and B8 in the Parameters worksheet, while 'Make Your Own Rule'!F3 and 'Make Your Own Rule'!F5 refer to the forecast values in cells F3 and F5 of the table in Step 1 where you put in your own forecast.

Finally, row 27 (labeled ‘Your Customized Policy Rule’ in cell B27) calculates federal funds rates from the general policy rule whose parameters you specified in Step 2. The rule also uses the forecasts you specified in Step 1. For example, the federal funds rate for 2016.2 found in cell D27 is generated using the following formula for calculating your customized policy rule:

=CS14*C27+(1-CS14)*($CS11+F3+CS15*(F3-CS10)+CS16*CS12*(F5-CS13))

where all of the cells referenced correspond to either parameter values that you entered in Step 2 or forecast values you entered in Step 1.

The federal funds rate paths from the seven simple monetary policy rules using your forecasts and the customized policy rule using your forecasts and your parameters are depicted graphically below the table.