

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

DIVISION OF MONETARY AFFAIRS

Date: June 5, 2001
To: Don Kohn
From: Bill English and Antulio Bomfim
Subject: Measures of the Equilibrium Real Federal Funds Rate Employed in the May Bluebook

This memorandum provides a brief description of the different measures of the equilibrium real federal funds rate that were used in the creation of the chart shown in the May bluebook.¹ The chart (a revised copy of which is attached) showed the range between the highest and lowest of five such measures.² Recent values of each of the five series are shown in Table 1.

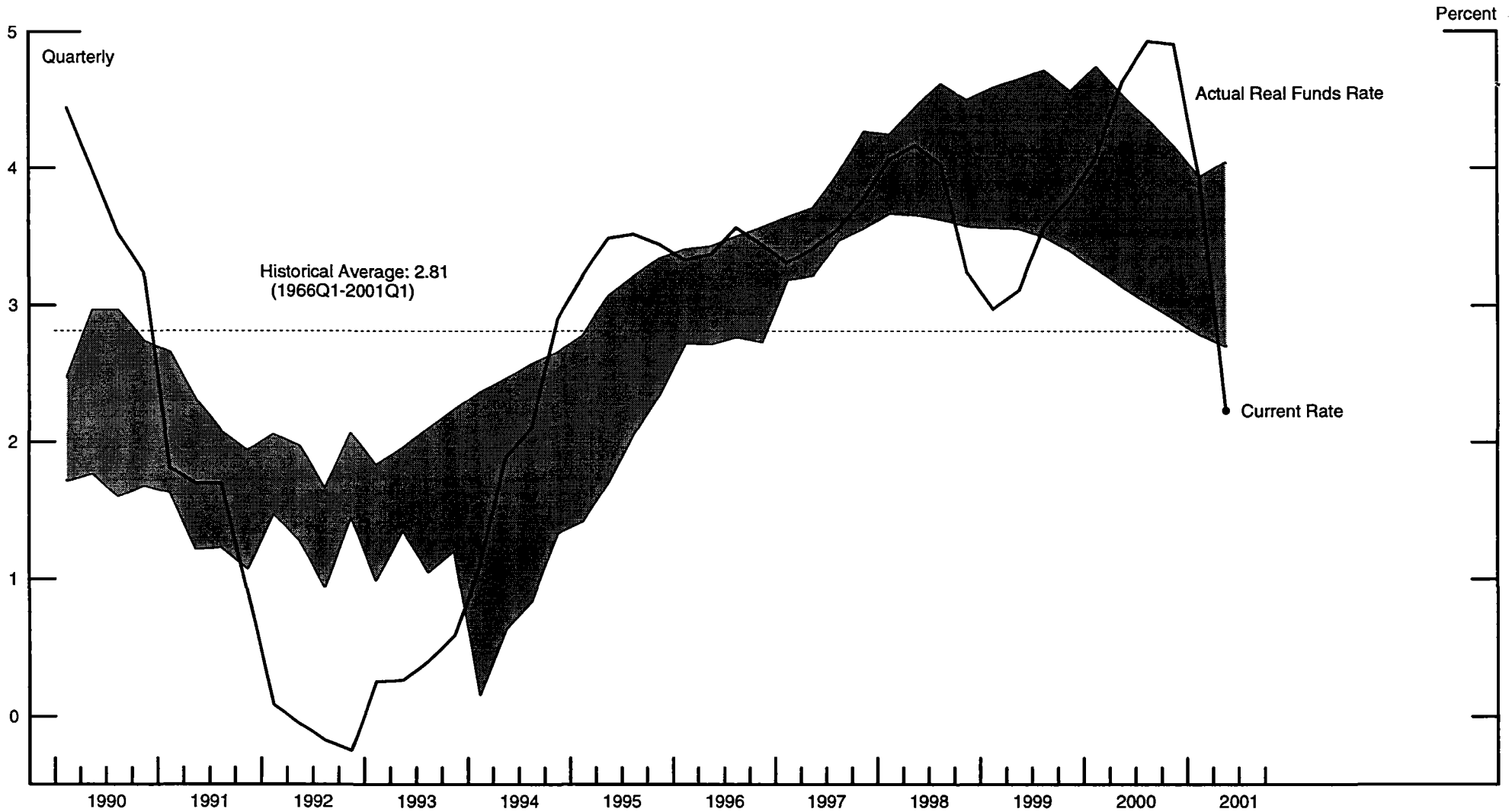
The equilibrium real rate concept employed in the construction of these measures is based on the medium-term dynamics of the economy, a time frame that seems most relevant for the conduct of monetary policy. As a result, these equilibrium real rate measures are not intended to capture the full long-run equilibrium of the economy.³ The measures also abstract from the short-term effects of purely “transitory” economic shocks, meaning shocks having dynamics that dissipate within a few years. Such transitory shocks may well lead the FOMC to set the intended federal funds rate at a level other than its equilibrium level for some time.

1. The real federal funds rate is defined here to be the nominal federal funds rate less the percentage change in core PCE prices over the previous four quarters.

2. The “current rate” shown in the chart is the rate after the May FOMC meeting. Some minor corrections have been made to the various real funds rate series, but the effect on the chart of these adjustments is quite small.

3. Simulations of the FRB/US model suggest that long-run equilibrium real rates typically correspond to a horizon of several decades.

Chart 3
Actual Real Federal Funds Rate and
Range of Estimated Equilibrium Real Rates



Note: The shaded range represents the maximum and the minimum values each quarter of the five estimates of the equilibrium real federal funds rate described in the text. Real federal funds rates are calculated using four-quarter lagged core PCE inflation. The values of the real federal funds rate in the second quarter of 2001 include the staff projection of core PCE inflation for that quarter.

1, both of these measures of the equilibrium real funds rate have declined substantially of late.

The Statistical-Filter-Based Measures⁵

The statistical-filter-based measures of the equilibrium real federal funds rate are estimated by Thomas Laubach and John Williams based on a two-equation model. The first equation—essentially a traditional IS curve—links the output gap to past values of the output gap, past deviations of the real federal funds rate from its (unobserved) equilibrium value, and an error term. Thus, even if the funds rate is at its equilibrium value, output will differ from its trend value as a result of the error term as well as the short-run dynamics caused by past differences between output and its trend value. The second equation indicates that the equilibrium real federal funds rate is a random walk—i.e., changes in the equilibrium real rate are unforecastable. The parameters of this model are estimated jointly with one-sided filter estimates of the equilibrium real interest rate in each period—that is, estimates based only on data from previous periods—using a Kalman filter. These one-sided estimates are then improved upon by using the full data sample in a two-sided statistical filter (the “Kalman smoother”).

As in the case of the quarterly model, two series of equilibrium real rates were calculated using this method. The first series is based on data only through 2001Q3—using the staff projections of the output gap and the real federal funds rate for 2001Q2 and 2001Q3—to derive estimates of the equilibrium real rate through 2001Q2. (The use of the third quarter data is necessary given the lags in the assumed relationship between the output gap and the real federal funds rate). The second series is based on the actual output and real federal funds rate data augmented by the staff projection through 2002Q4. As shown in the attached table, the inclusion of the staff projection in the dataset causes a significant reduction in the estimate of the current equilibrium real federal funds rate.

5. This method is described in Thomas Laubach and John Williams “Estimates of a Time-varying Equilibrium Real Federal Funds Rate,” memorandum to the Board of Governors, December 14, 2000.

*The Indexed-Treasury-Based Measure*⁶

This measure of the equilibrium real rate, developed by Antulio Bomfim, starts from the observation that—if term, liquidity, and convexity premiums are roughly offsetting—the forward real interest rate implied by ten- and thirty-year Treasury inflation-indexed securities should correspond to market participants' expectations of average real short-term Treasury yields ten to thirty years from now. Under the assumption that any transitory shocks will have run their course over the coming ten years, this forward rate should provide an estimate of the medium-term equilibrium value of real short-term Treasury yields.

In order to obtain an estimate of the equilibrium real federal funds rate, one must adjust the equilibrium Treasury yield for the effects of taxes and risk premiums. To do so, the forward rate is boosted to offset an assumed marginal state and local tax rate of 11 percent as well as the average risk premium between (tax-adjusted) Treasury bill yields and the federal funds rate over the 1962 to 2000 period. As can be seen in the table, the resulting estimate of the equilibrium real federal funds rate is the highest of the five in recent quarters.

6. This method is described in Antulio Bomfim, "What Do Simple Averages and Yields on Treasury Inflation-Indexed Securities Tell Us About Equilibrium Real Interest Rates," memorandum to Governor Gramlich, May 11, 2001. Note that the real federal funds rates reported in that memorandum are on an annualized basis. Additional information is provided in Antulio Bomfim, "Deriving Equilibrium Real Interest Rate Measures from Yields on Treasury Inflation-Indexed Securities," memorandum to Mr. Kohn, June 5, 2001.

Table 1
Estimates of the Equilibrium Real Federal Funds Rate

Method	1998	1999	2000	2001Q1	2001Q2
FRB/US (employing a one-sided moving average, using projected data through 2001Q2)	3.8	4.1	4.2	3.7	3.5
FRB/US (employing a centered moving average, using projected data through 2002Q4)	4.5	4.6	4.4	3.8	3.7
Statistical Filter (using projected data through 2001Q3)	3.8	3.7	3.5	3.3	3.3
Statistical Filter (using projected data through 2002Q4)	3.6	3.5	3.1	2.8	2.7
Indexed Treasury Securities	3.9	4.2	4.2	3.9	4.0

Note: The estimates of the real equilibrium federal funds rate were calculated using the annualized return on federal funds less the lagged four-quarter core PCE inflation rate calculated as a log-difference of the price index. However, for ease of comparison with the more familiar federal funds rates on a quoted basis (which are not annualized) and the inflation rates reported in the staff projection, the values in this table and in the bluebook chart have been converted to a quoted basis with inflation calculated as a simple percentage change.