BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

DIVISION OF MONETARY AFFAIRS

Date: January 30, 1995

To: Donald Kohn

From: David Small

Subject: Rule-Based Policy Recommendations

Policy recommendations from five simple rules for the setting of the federal funds rate are presented in the table on page 3. The rules are identified in the table by their targets--either nominal income growth or twin targets of the output gap and the deviation of inflation from target. (Results from Taylor's rule are shown in the first line.) The results in this table are drawn from the more detailed tables on the following pages.[1]

Each rule's recommended quarterly-average level of the federal funds rate in 1995:1 is given in the first column. The current level of the intended federal funds rate is given in the second column. The third column shows differences between the current and recommended levels, which can be interpreted as the rules' recommendations for the size of an immediate change in the intended funds rate. The fourth column shows the rule-based

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1. Table 1 presents variants of the Taylor rule, which sets the *level* of the nominal federal funds rate based on an assumed 2 percent real interest rate, the current inflation rate, and corrections for the deviations of output from potential and of inflation from its targeted value.

Table 2 presents rules that determine a *change* in the federal funds rate as a function of deviations of the growth of nominal income from target.

Table 3 presents the results from a nominal income targeting rule developed by the Federal Reserve Bank of San Francisco. It follows closely the rule of Table 2 except that it allows for the targeted growth of nominal income to change over time--such as in table 3 where the target falls over time to reduce long-term inflation.

projection for the 1995:Q1 funds rate that was made during the December Bluebook cycle. Comparison with column 1 indicates how much tightening the rules call for based on the new data available since the December meeting.

Also attached is a chart that shows a simulation of the Taylor rule. This is essentially a static simulation because there are no lagged dependent variables in the model.

Targets of Various Rules	Federal Funds Rate			
	Rule's Solution: 1995:Q1	Actual/ Greenbook	Diff. (1 - 2)	Dec. 1994 recomm. for 1995:Q1[1]
	(1)	(2)	(3)	(4)
Level of real GDP and inflation in GDP deflator (*Table 1, Line 9*)[2]	5.10	5.5	-.40	5.18
Level of real GDP and inflation in GDP deflator (*Table 1, Line 11*)[3]	5.21	5.5	-.29	5.31
Level of real GDP and inflation in CPI (ex. F&E) (*Table 1, Line 12*)	5.77	5.5	.27	6.12
Quarterly growth rate of nominal GDP (*Table 2, Line 5*)	5.33	5.5	-.17	4.84
Quarterly growth rate of nominal GDP (*Table FRB-SF, Line 5*)	5.59	5.5	.09	5.23
Memo:				
Staff Projection	5.50[4]	5.5	0	6.10[5]

1. This column shows the rules' recommendations, produced in December 1994 and based on data then available, for the federal funds rate in 1995:Q1.
2. Taylor's rule, which has equal response coefficients on real GDP and inflation.
3. With estimated response coefficients that are estimated from the mid-1980s through 1993 and that are larger than in Taylor's rule.
4. Current staff projection for the federal funds rate in 1995:Q1.

Table 1

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Rule-Based Policy: Targeting the Level of Real GDP and the Four-Quarter Inflation Rate

Rule: $\hat{\imath}_t = \bar{\imath}_t + \alpha\,(y_t - y_t^*) + \beta\,(\Delta^4 p_t - \Delta^4 p_t^*)$

Item	1994 1	1994 2	1994 3	1994 4	1995 1	1995 2	1995 3	1995 4	1996 1	1996 2	1996 3	1996 4
1. Real GDP gap [1] $(y_t - y_t^*)$	-.83	-.42	-.02	.61	.81	.71	.55	.39	.30	.33	.39	.45
2. GDP implicit price deflator [2] $(\Delta^4 ipd_t)$	1.71	2.02	2.27	2.36	2.46	2.33	2.38	2.52	2.40	2.40	2.44	2.50
3. IPDGAP $(\Delta^4 ipd_t - 2.0)$	-.29	.02	.27	.36	.46	.33	.38	.52	.40	.40	.44	.50
4. CPI, ex. food and energy [2] $(\Delta^4 cpi_t)$	2.88	2.83	2.92	2.76	2.90	2.88	2.94	3.15	3.13	3.18	3.23	3.30
5. CPIGAP $(\Delta^4 cpi_t - 2.0)$	.88	.83	.92	.76	.90	.88	.94	1.15	1.13	1.18	1.23	1.30
Definition of $\bar{\imath}_t$ and the Federal Funds Rate [3]												
6. Greenbook Assumption					5.49	5.50	5.50	5.50	5.50	5.50	5.50	5.50
7. Rule baseline $(\bar{\imath}_t = \Delta^4 ipd_t + 2.0)$	3.71	4.02	4.27	4.36	4.46	4.33	4.38	4.52	4.40	4.40	4.44	4.50
8. Rule baseline $(\bar{\imath}_t = \Delta^4 cpi_t + 2.0)$	4.88	4.83	4.92	4.76	4.90	4.88	4.94	5.15	5.13	5.18	5.23	5.30
9. Rule $(\alpha = .50, \beta = .50, IPDGAP)$ [4]	3.15	3.82	4.40	4.84	5.10	4.85	4.84	4.98	4.75	4.76	4.86	4.97
10. Rule $(\alpha = .50, \beta = .50, CPIGAP)$	4.90	5.03	5.37	5.45	5.75	5.68	5.69	5.92	5.85	5.94	6.05	6.17
11. Rule $(\alpha = .60, \beta = .57, IPDGAP)$ [5]	3.05	3.78	4.41	4.93	5.21	4.94	4.92	5.05	4.81	4.82	4.93	5.05
12. Rule $(\alpha = .83, \beta = .22, CPIGAP)$ [5]	4.38	4.66	5.10	5.44	5.77	5.67	5.60	5.72	5.63	5.72	5.83	5.95

[1] Percent, seasonally adjusted.
[2] Four-quarter percent change, seasonally adjusted.
[3] Annual rate of return in percent on a quoted basis.
[4] Taylor's Rule.
[5] Coefficients estimated from mid-1980s through 1993.

Table 2

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Rule-Based Policy: Targeting the Quarterly Growth of Nominal GDP

Rule: $\hat{i}_t = i_{t-1} + \lambda \left(\Delta n_{t-1} - \Delta n^*_{t-1} \right)$

Item	1994 1	1994 2	1994 3	1994 4	1995 1	1995 2	1995 3	1995 4	1996 1	1996 2	1996 3	1996 4
1. Nominal GDP [1] (Δn_t)	6.10	7.20	6.23	6.78	6.39	4.51	4.07	4.05	4.68	5.03	5.20	5.18
2. Gap ($\Delta n_t - 4.3$)	1.80	2.90	1.93	2.48	2.09	.21	-.23	-.25	.38	.73	.90	.88
Federal funds rate [2]												
3. Greenbook Assumption					5.49	5.50	5.50	5.50	5.50	5.50	5.50	5.50
4. Intended and rule ($\lambda = .2$) [3]					5.63	6.05	6.09	6.05	5.99	6.07	6.22	6.40
5. Intended and rule ($\lambda = .08$) [3]					5.33	5.50	5.52	5.50	5.48	5.51	5.57	5.64
Change in federal funds rate [2]												
6. Greenbook Assumption	.18	.77	.55	.63	.36	.01	.00	.00	.00	.00	.00	.00
7. Rule ($\lambda = .2$) [3]	.68	.36	.58	.39	.50	.42	.04	-.05	-.05	.08	.15	.18
8. Rule ($\lambda = .08$) [3]	.27	.14	.23	.15	.20	.17	.02	-.02	-.02	.03	.06	.07

[1] Quarterly percent change at a compound annual rate, seasonally adjusted.

[2] Annual rate of return in percent on a quoted basis.

[3] Based on single-equation dynamic simulations of the policy rule in which i_{t-1} equals the lagged value of $\hat{i}_t$.

Table FRB-SF

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Rule-Based Policy: Targeting the Quarterly Growth of Nominal GDP

Rule: $\hat{\imath}_t = i_{t-1} + \lambda \left(\Delta n_{t-1} - \Delta n^*_{t-1} \right)$

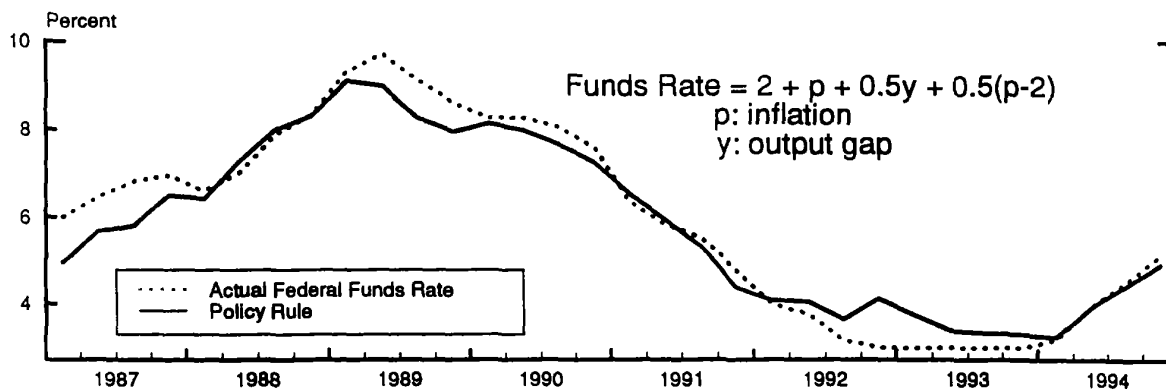|	Item	1994 1	1994 2	1994 3	1994 4	1995 1	1995 2	1995 3	1995 4	1996 1	1996 2	1996 3	1996 4
1.	Nominal GDP [1] (Δn_t)	6.10	7.20	6.23	6.78	6.39	4.51	4.07	4.05	4.68	5.03	5.20	5.18
2.	Target (Δn^*_t)	4.88	4.76	4.63	4.51	4.38	4.26	4.13	4.01	3.88	3.76	3.63	3.51
3.	Gap ($\Delta n_t - \Delta n^*_t$)	1.22	2.44	1.60	2.27	2.01	.25	-.06	.04	.80	1.27	1.57	1.67
	Federal funds rate [2]												
4.	Greenbook Assumption					5.49	5.50	5.50	5.50	5.50	5.50	5.50	5.50
5.	Intended and rule ($\lambda = .2$) [3]					5.59	5.99	6.04	6.03	6.04	6.20	6.45	6.77
	Change in federal funds rate [2]												
6.	Greenbook Assumption	.18	.77	.55	.63	.36	.01	.00	.00	.00	.00	.00	.00
7.	Rule ($\lambda = .2$) [3]	.54	.24	.49	.32	.45	.40	.05	-.01	.01	.16	.25	.31

[1] Quarterly percent change at a compound annual rate, seasonally adjusted.
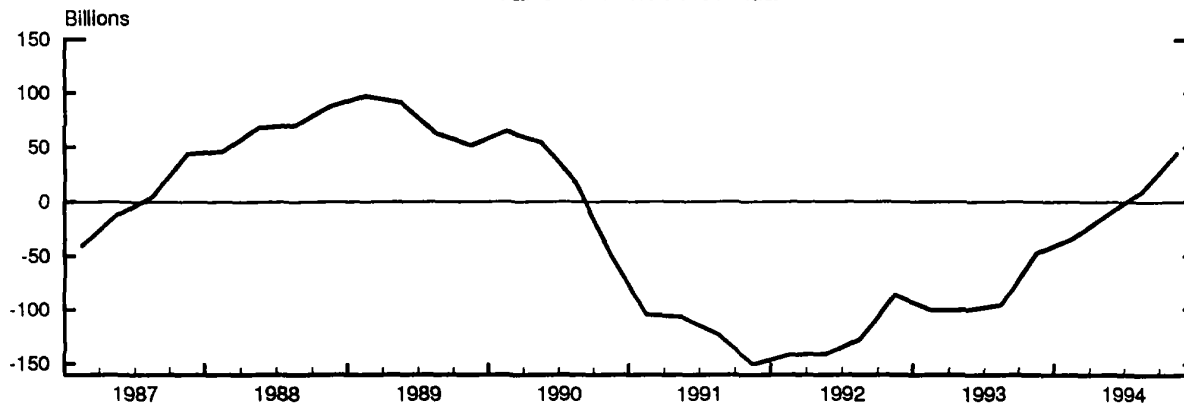[2] Annual rate of return in percent on a quoted basis.
[3] Based on single-equation dynamic simulations of the policy rule in which i_{t-1} equals the lagged value of $\hat{\imath}_t$.
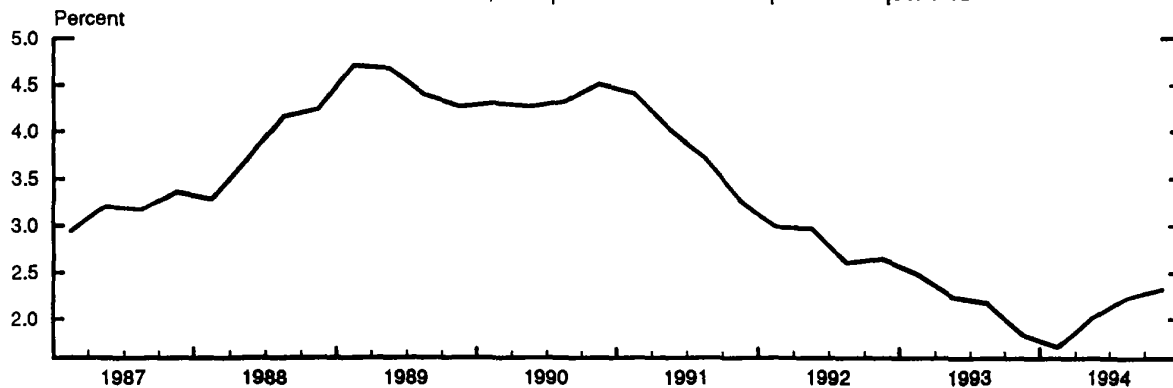
Taylor Rule

Federal Funds Rate*

Percent

Funds Rate = 2 + p + 0.5y + 0.5(p-2)
p: inflation
y: output gap

········· Actual Federal Funds Rate
———— Policy Rule

Output Gap (y)
Real GDP minus Potential

Billions

Inflation Rate (p)
From GDP Deflator, compounded over four previous quarters

Percent

* The federal funds rate is set in the Taylor rule to be equal to an estimate of the equilibrium real funds rate (2%) plus current inflation (p) plus 1/2 times the excess of actual output over its potential (0.5 y) plus 1/2 times the excess of actual inflation over a target rate of 2% (0.5(p-2)).