Quarterly Report

Federal Funds Rates Based on Seven Simple Monetary Policy Rules

Based on data and forecasts available as of March 3, 2021.

Simple monetary policy rules provide a relationship between the central bank's policy rate and a relatively small number of indicators on real economic activity and inflation, and they can serve as inputs into the decision-making process for policymakers. Here we present the latest federal funds rates based on seven simple monetary policy rules conditional on three different forecasts.

Figure 1 and Table 1 provide a summary of the results across all the simple policy rules and all forecasts using quartiles. We present the median funds rate as well as the 25th and 75th percentiles and the maximum and minimum at each point in time.

Figure 1

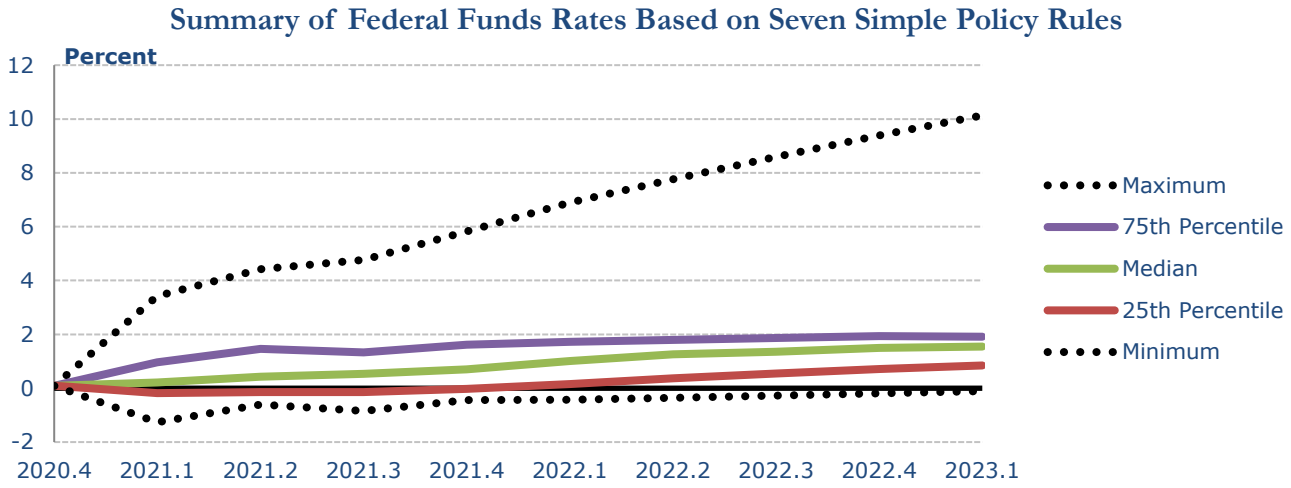


Table 1

Summary of Federal Funds Rates Based on Seven Simple Policy Rules (Percent)

	2020.4	2021.1	2021.2	2021.3	2021.4	2022.1	2022.2	2022.3	2022.4	2023.1
Maximum	0.09	3.43	4.42	4.76	5.82	6.89	7.76	8.59	9.38	10.13
75th Percentile	0.09	0.97	1.47	1.33	1.62	1.72	1.80	1.87	1.94	1.91
Median	0.09	0.22	0.43	0.54	0.70	1.01	1.25	1.35	1.50	1.55
25th Percentile	0.09	-0.18	-0.14	-0.14	-0.02	0.15	0.37	0.54	0.71	0.85
Minimum	0.09	-1.26	-0.61	-0.85	-0.44	-0.42	-0.36	-0.28	-0.19	-0.11

Notes: Dates use YYYY.Q format. Federal funds rates are quarterly averages. Pink denotes data.

Forecast Source: Survey of Professional Forecasters

Figure 2 and Table 2a provide the results from seven simple monetary policy rules conditional on forecasts from the Survey of Professional Forecasters (SPF). The SPF provides forecasts for PCE inflation, core PCE inflation, and the unemployment rate. Because they do not estimate the output gap, we construct a proxy for the output gap using Okun's coefficient and the unemployment gap. The forecast horizon is shorter than that of other forecasts included here, extending 4 quarters into the future, which limits results coming from the rules. Table 2b provides the formulae used to calculate each policy rule based on forecasts from the SPF.

Figure 2

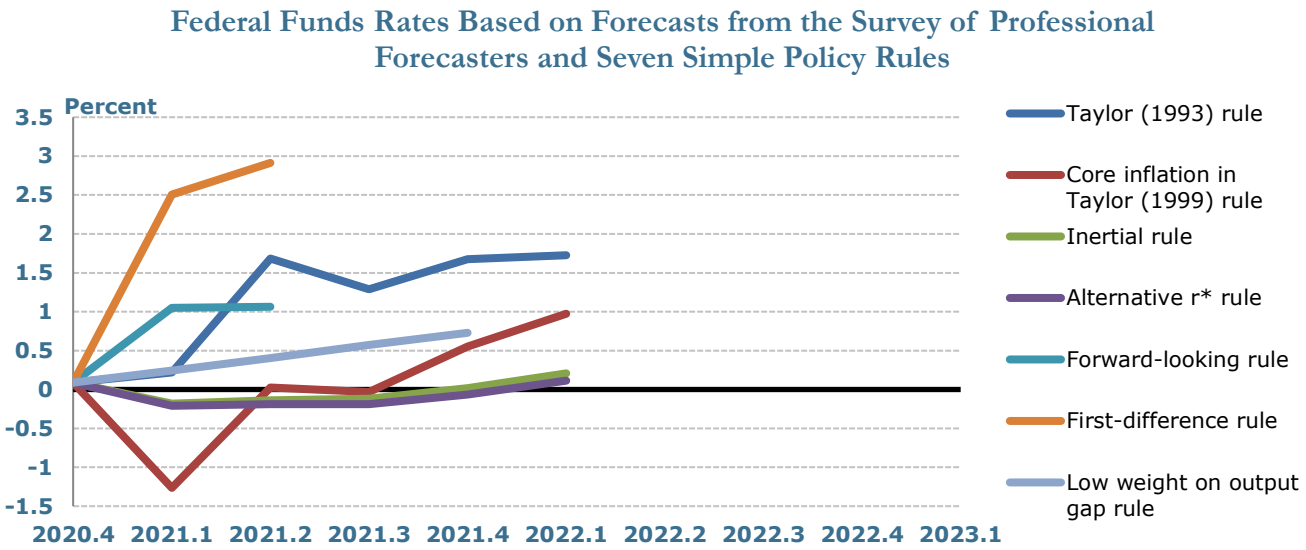


Table 2a

SPF: Federal Funds Rates Based on Seven Simple Policy Rules (Percent)

Date (YYYY.Q format)	2020.4	2021.1	2021.2	2021.3	2021.4	2022.1
Taylor (1993) rule	0.09	0.22	1.68	1.29	1.67	1.73
Core inflation in Taylor (1999) rule	0.09	-1.26	0.03	-0.03	0.55	0.97
Inertial rule	0.09	-0.18	-0.14	-0.12	0.02	0.21
Alternative *r* * rule	0.09	-0.21	-0.19	-0.19	-0.07	0.11
Forward-looking rule	0.09	1.05	1.06			
First-difference rule	0.09	2.51	2.91			
Low weight on output gap rule	0.09	0.24	0.41	0.57	0.73	

Table 2b

SPF: Simple Policy Rule Formulae

1. Taylor (1993) rule	$i_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(1/b)(u_t - u^*_{SPF})$
2. Core inflation in Taylor (1999) rule	$i_t = r^* + \pi^{Core}_t + 0.5(\pi^{Core}_t - \pi^*) + (1/b)(u_t - u^*_{SPF})$
3. Inertial rule	$i_t = \rho i_{t-1} + (1-\rho)[r^* + \pi^{Core}_t + 0.5(\pi^{Core}_t - \pi^*) + (1/b)(u_t - u^*_{SPF})]$
4. Alternative *r rule**	$i_t = \rho i_{t-1} + (1-\rho)[r^*_{alt} + \pi^{Core}_t + 0.5(\pi^{Core}_t - \pi^*) + (1/b)(u_t - u^*_{SPF})]$
5. Forward-looking rule	$i_t = r^* + \pi^F_{t+3} + 0.5(\pi^F_{t+3} - \pi^*) + 0.5(1/b)(u_t - u^*_{SPF})$
6. First-difference rule	$i_t = i_{t-1} + 1.74(\pi^F_{t+3} - \pi^*) - 1.19(u_{t-1} - u_{t-2})$
7. Low weight on output gap rule	$i_t = 0.91 i_{t-1} + (1-0.91)[r^* + \pi^* + 1.58(\pi^{Q,F}_{t+1} - \pi^*) + 0.14(1/b)(u^F_{t+1} - u^*_{SPF})]$

Forecast Source: Congressional Budget Office

Figure 3 and Table 3a provide the results from seven simple monetary policy rules conditional on forecasts from the Congressional Budget Office (CBO). The CBO provides forecasts for PCE inflation, core PCE inflation, the unemployment rate, and the output gap. Table 3b provides the formulae used to calculate each policy rule based on forecasts from the CBO.

Figure 3

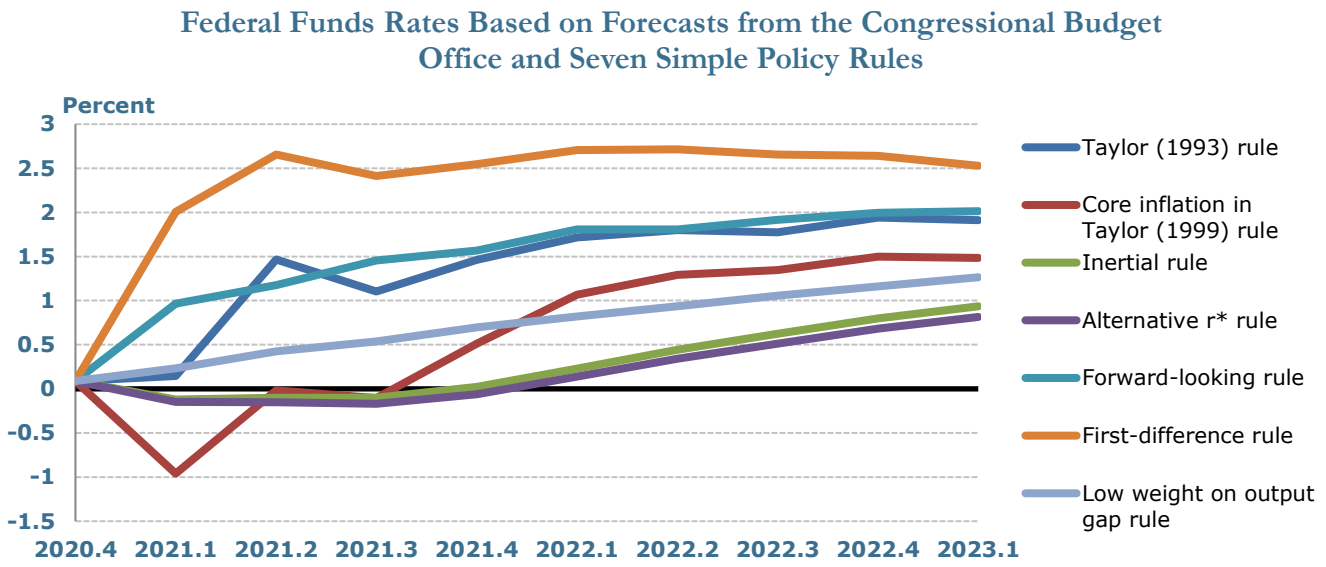


Table 3a

CBO: Federal Funds Rates Based on Seven Simple Policy Rules (Percent)

Date (YYYY.Q format)	2020.4	2021.1	2021.2	2021.3	2021.4	2022.1	2022.2	2022.3	2022.4	2023.1
Taylor (1993) rule	0.09	0.15	1.47	1.10	1.46	1.72	1.80	1.77	1.94	1.91
Core inflation in Taylor (1999) rule	0.09	-0.96	-0.02	-0.11	0.51	1.07	1.29	1.34	1.50	1.48
Inertial rule	0.09	-0.12	-0.10	-0.10	0.02	0.23	0.44	0.62	0.80	0.94
Alternative *r** rule	0.09	-0.15	-0.15	-0.17	-0.06	0.14	0.34	0.51	0.68	0.82
Forward-looking rule	0.09	0.97	1.18	1.46	1.57	1.81	1.81	1.91	2.00	2.01
First-difference rule	0.09	2.01	2.65	2.41	2.55	2.71	2.71	2.66	2.64	2.53
Low weight on output gap rule	0.09	0.23	0.43	0.54	0.70	0.82	0.94	1.06	1.16	1.26

Table 3b

CBO: Simple Policy Rule Formulae

1. Taylor (1993) rule	$i_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(\text{output gap}_t)$
2. Core inflation in Taylor (1999) rule	$i_t = r^* + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (\text{output gap}_t)$
3. Inertial rule	$i_t = \rho i_{t-1} + (1-\rho)[r^* + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (\text{output gap}_t)]$
4. Alternative *r rule**	$i_t = \rho i_{t-1} + (1-\rho)[r^*_{alt} + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (\text{output gap}_t)]$
5. Forward-looking rule	$i_t = r^* + \pi^F_{t+3} + 0.5(\pi^F_{t+3} - \pi^*) + 0.5(\text{output gap}_t)$
6. First-difference rule	$i_t = i_{t-1} + 1.74(\pi^F_{t+3} - \pi^*) - 1.19(u_{t-1} - u_{t-2})$
7. Low weight on output gap rule	$i_t = 0.91 i_{t-1} + (1-0.91)[r^* + \pi^* + 1.58(\pi^{Q,F}_{t+1} - \pi^*) + 0.14(\text{output gap}^F_{t+1})]$

Forecast Source: Federal Reserve Bank of Cleveland Staff Small BVAR

Figure 4 and Table 4a provide the results from seven simple monetary policy rules conditional on forecasts from a small statistical Bayesian vector autoregression model consulted by staff at the Federal Reserve Bank of Cleveland (FRBC BVAR). Because the Cleveland Fed staff consult a variety of forecasting models, the FRBC BVAR model forecast does not necessarily represent the official forecast of Cleveland Fed staff or the president of the Cleveland Fed. The FRBC BVAR provides forecasts for PCE inflation, core PCE inflation, and the unemployment rate. Because it does not provide an estimate of the output gap, we construct a proxy for the output gap using Okun's coefficient and the unemployment gap. Table 4b provides the formulae used to calculate each policy rule based on forecasts from the FRBC BVAR.

Figure 4

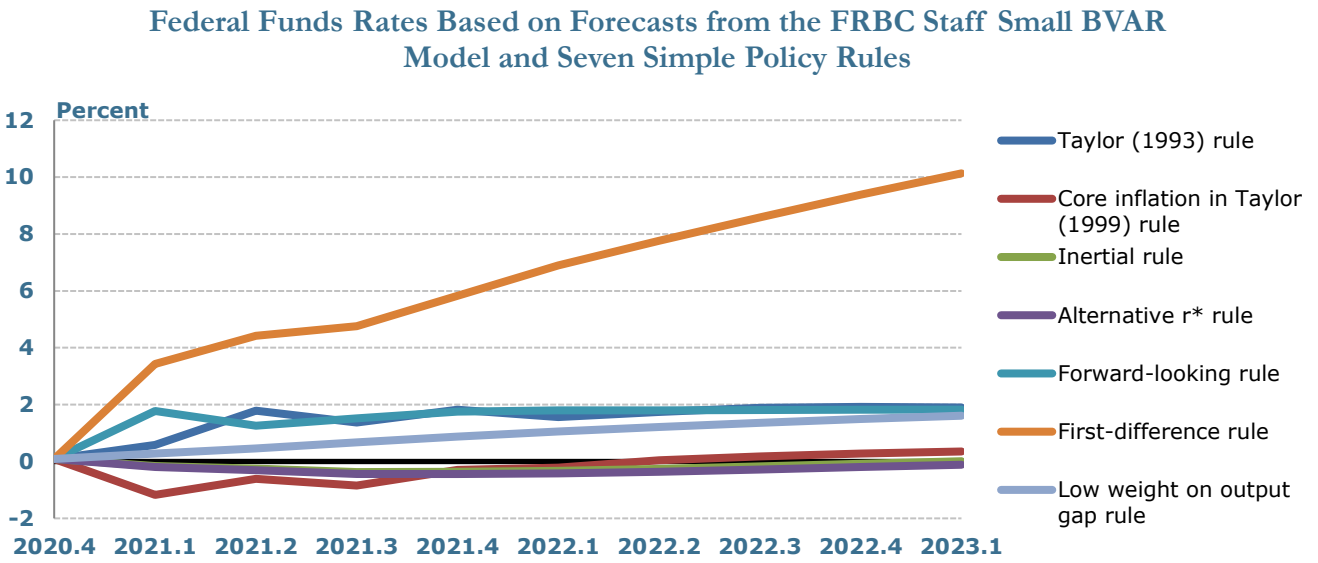


Table 4a

FRBC BVAR: Federal Funds Rates Based on Seven Simple Policy Rules (Percent)

Date (YYYY.Q format)	2020.4	2021.1	2021.2	2021.3	2021.4	2022.1	2022.2	2022.3	2022.4	2023.1
Taylor (1993) rule	0.09	0.58	1.79	1.37	1.82	1.56	1.74	1.89	1.92	1.90
Core inflation in Taylor (1999) rule	0.09	-1.17	-0.61	-0.85	-0.30	-0.22	0.04	0.17	0.28	0.35
Inertial rule	0.09	-0.16	-0.25	-0.37	-0.36	-0.33	-0.26	-0.17	-0.08	0.01
Alternative *r** rule	0.09	-0.19	-0.30	-0.44	-0.44	-0.42	-0.36	-0.28	-0.19	-0.11
Forward-looking rule	0.09	1.77	1.25	1.52	1.75	1.80	1.79	1.81	1.82	1.82
First-difference rule	0.09	3.43	4.42	4.76	5.82	6.89	7.76	8.59	9.38	10.13
Low weight on output gap rule	0.09	0.28	0.46	0.67	0.88	1.06	1.22	1.36	1.49	1.61

Table 4b

FRBC BVAR: Simple Policy Rule Formulae

1. Taylor (1993) rule	$i_t = r^* + \pi_t + 0.5(\pi_t - \pi^*) + 0.5(1/b)(u_t - u^*_{SEP})$
2. Core inflation in Taylor (1999) rule	$i_t = r^* + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (1/b)(u_t - u^*_{SEP})$
3. Inertial rule	$i_t = \rho i_{t-1} + (1-\rho)[r^* + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (1/b)(u_t - u^*_{SEP})]$
4. Alternative *r rule**	$i_t = \rho i_{t-1} + (1-\rho)[r^*_{alt} + \pi_t^{Core} + 0.5(\pi_t^{Core} - \pi^*) + (1/b)(u_t - u^*_{SEP})]$
5. Forward-looking rule	$i_t = r^* + \pi^F_{t+3} + 0.5(\pi^F_{t+3} - \pi^*) + 0.5(1/b)(u_t - u^*_{SEP})$
6. First-difference rule	$i_t = i_{t-1} + 1.74(\pi^F_{t+3} - \pi^*) - 1.19(u_{t-1} - u_{t-2})$
7. Low weight on output gap rule	$i_t = 0.91 i_{t-1} + (1-0.91)[r^* + \pi^* + 1.58(\pi^{Q,F}_{t+1} - \pi^*) + 0.14(1/b)(u^F_{t+1} - u^*_{SEP})]$

Federal Funds Rates by Simple Policy Rule

Figures 5 through 11 provide the same results, re-grouped by policy rule. This grouping reveals the variation in results for one policy rule across the three forecasts.

Figure 5

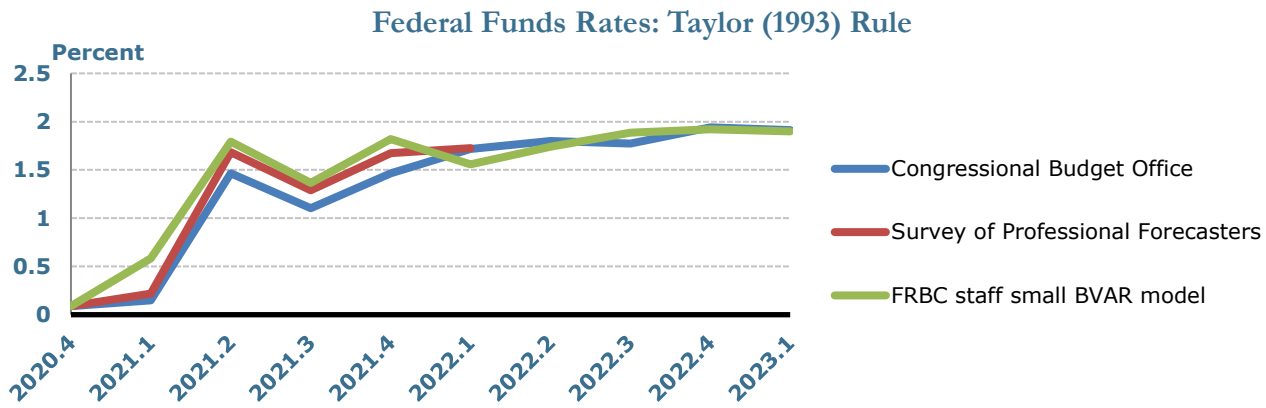


Figure 6

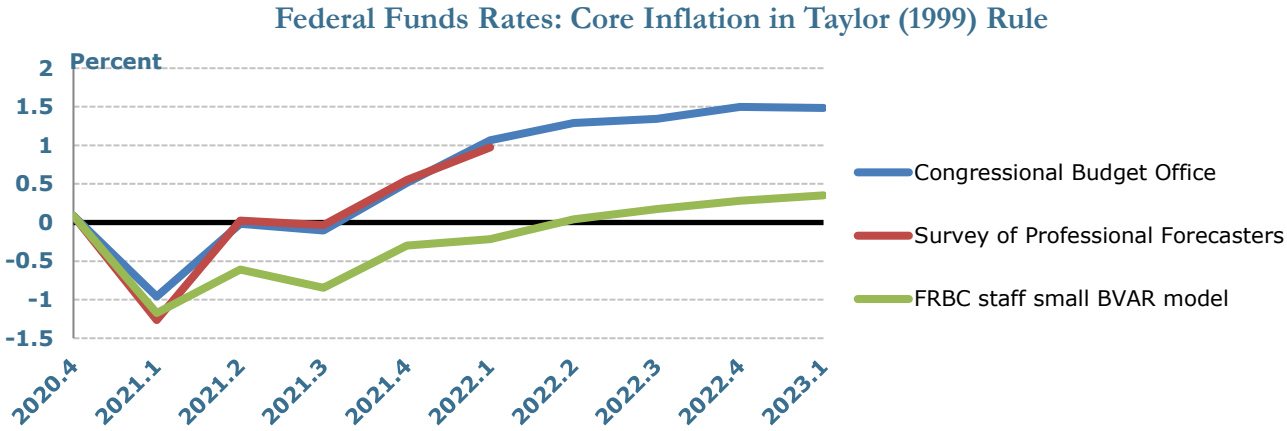


Figure 7

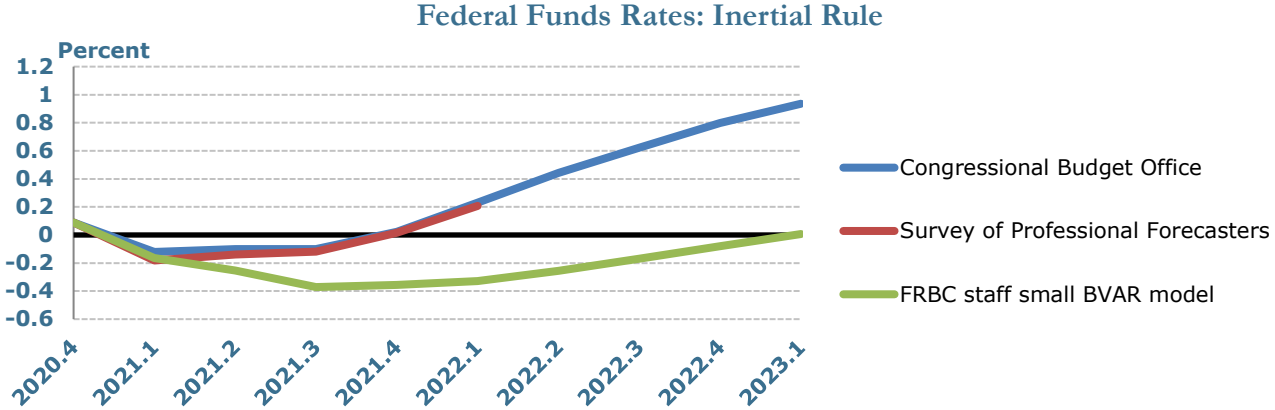


Figure 8

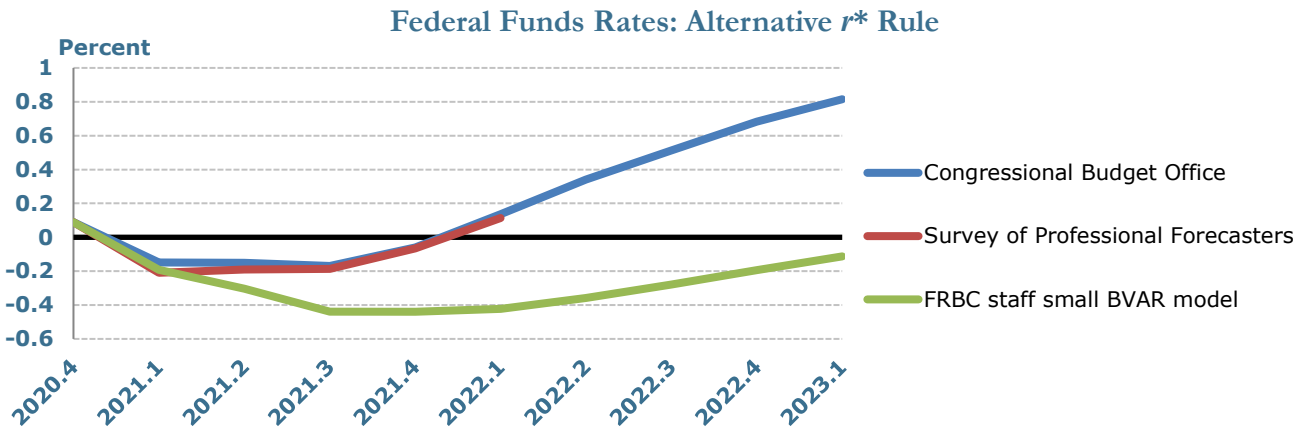


Figure 9

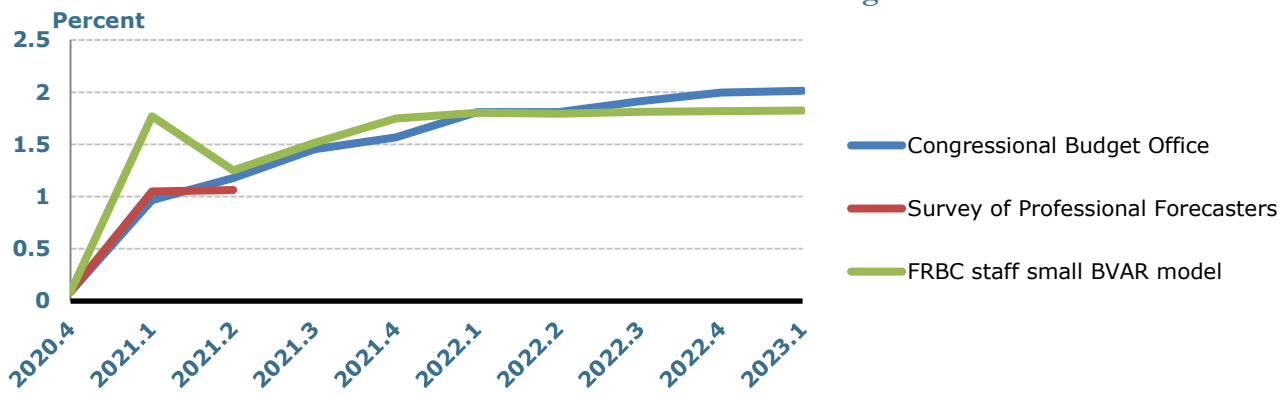


Figure 10

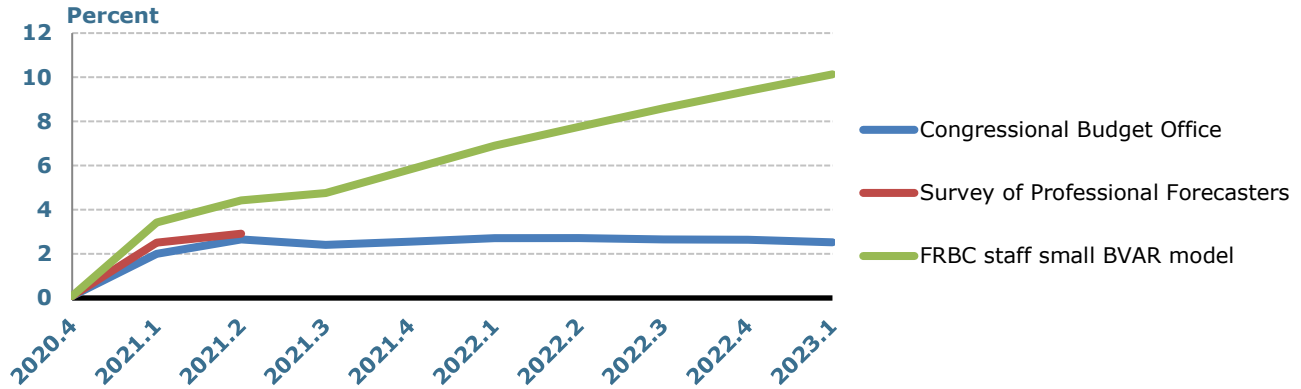
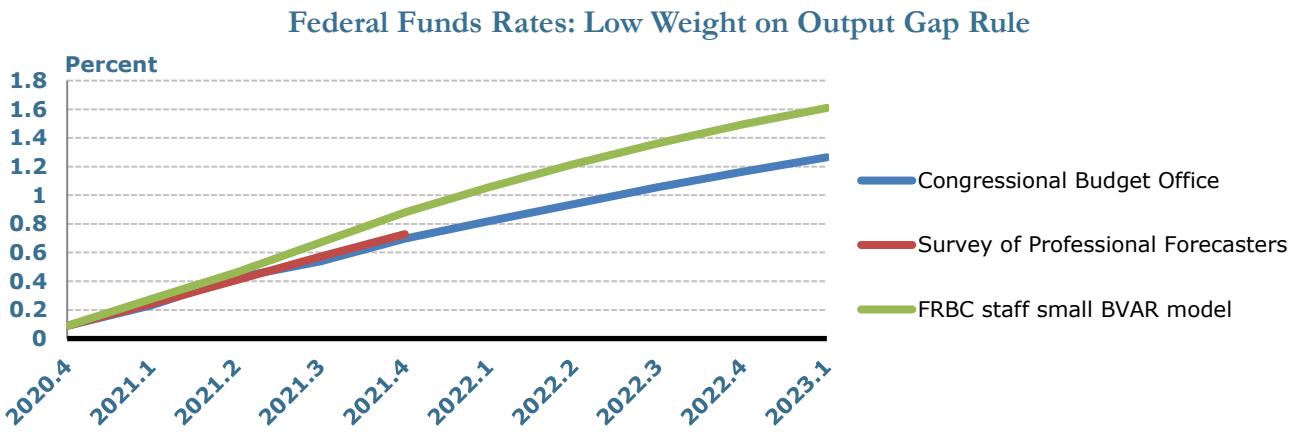


Figure 11


Federal Funds Rates: Low Weight on Output Gap Rule
Percent
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2020.4
2021.1
2021.2
2021.3
2021.4
2022.1
2022.2
2022.3
2022.4
2023.1
Congressional Budget Office
Survey of Professional Forecasters
FRBC staff small BVAR model