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What Ends Recessions?

1. Introduction

The Employment Act of 1946 set as the goal of government economic policy the maintenance of reasonably full employment and stable prices. Yet, nearly 50 years later, economists seem strangely unsure about what to tell policymakers to do to end recessions. One source of this uncertainty is confusion about how macroeconomic policies have actually been used to combat recessions. In the midst of the most recent recession, one heard opinions of fiscal policy ranging from the view that no recession has ever ended without fiscal expansion to the view that fiscal stimulus has always come too late. Similarly, for monetary policy there was disagreement about whether looser policy has been a primary engine of recovery from recessions or whether it has been relatively unimportant in these periods.

This paper seeks to fill in this gap in economists' knowledge by analyzing what has ended the eight recessions that have occurred in the United States since 1950. In particular, it analyzes whether monetary and fiscal policies have helped or hindered previous recoveries. By quantifying the role of policy, the paper seeks to identify how much of recoveries is attributable to government action and how much to other factors such as self-correction and fortuitous shocks. By determining which policies were the most effective in ending past recessions, the paper tries to discern the likely efficacy of policy today and in recessions to come.

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Our main finding is that monetary policy has been the source of most postwar recoveries. While limited fiscal actions have occurred around most troughs, these actions have almost always been too small to contribute much to economic recovery. In contrast, monetary policy has typically moved toward expansion shortly after the start of most recessions and appears to have contributed, on average, almost two percentage points to real gross domestic product (GDP) growth in the four quarters following the trough. Even if one accounts for the fact that tight monetary policy before the peak continues to depress the economy for several years, the net effect of monetary policy in ending recessions has been substantial.

We reach this conclusion through a series of steps. Section 2 analyzes the record of policy actions since 1950. It shows that both nominal and real interest rates fell by several percentage points before most troughs. In contrast, the ratio of the high-employment surplus to trend GDP typically fell slightly around troughs, but only rarely moved more than a percentage point.

Section 3 analyzes the sources of these policy changes. It examines the stated motivations of policymakers to see if the changes in interest rates and in the high-employment surplus during recessions and around troughs were taken largely to end the recessions or for other reasons. We find that nearly all of the monetary changes and most of the fiscal changes were genuinely antirecessionary. Interestingly, we find that many of the largest discretionary fiscal actions taken in the postwar era, such as the 1964 tax cut and the Nixon "New Economic Policy," were not antirecessionary measures, but expansionary actions taken when policymakers were dissatisfied with the pace of growth.

Section 4 examines the likely effects of the antirecessionary actions we identify. Using estimates of the effects of policy both from our own regressions and from Data Resources Incorporated's forecasting model, we estimate the contributions of monetary and fiscal policy to recessions and recoveries. Although there is substantial variation in the estimates of policies' impact, the results suggest that monetary policy has been crucial in ending recessions, while fiscal policy has contributed very little.[1]

Section 5 investigates two additional issues raised by our analysis. The first issue is the overall stabilization record of policy. We argue that there is little evidence that discretionary policy has had a large stabilizing influence, and that there are several important episodes in which

1. Perry and Schultze (1993) also investigate the sources of recoveries. They reach conclusions generally similar to ours.

expansionary policy has exacerbated fluctuations. The second issue is the persistence of output movements. We find that the component of fluctuations that is due to shifts in monetary and fiscal policy is highly persistent and accounts for a large part of the persistence of overall output movements.

2. *Policy Actions in Recessions and Recoveries*

2.1 INDICATORS OF POLICY

To analyze whether policy could account for recoveries, it is necessary to examine the behavior of policy during recessions and recoveries. We examine two indicators of monetary policy. The first is simply the quarterly change in the nominal federal funds rate.[2] Throughout much of the postwar period, the federal funds rate has been the primary proximate instrument of monetary policy. And even during periods when it was not, such as the 1950s and 1979–1982, the Federal Reserve placed considerable emphasis on "money market conditions"—that is, changes in nominal interest rates—in setting policy. Cook and Hahn (1989) and Bernanke and Blinder (1992) document that the Federal Reserve can control the federal funds rate in the short run, and Bernanke and Blinder present a variety of evidence that innovations in the funds rate are largely due to changes in monetary policy.

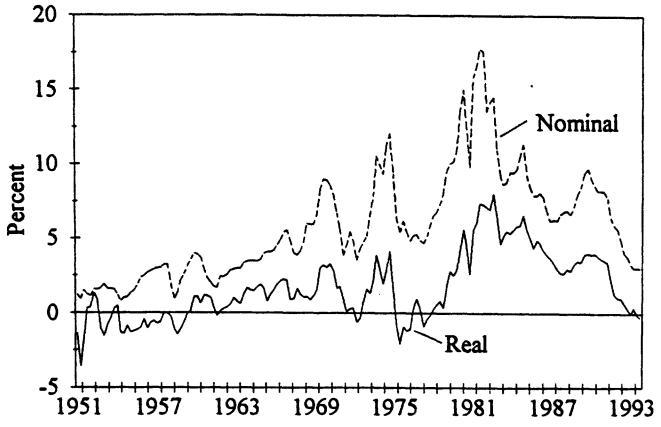
Our second indicator of monetary policy is the estimated change in the real funds rate. Theory predicts that it is the real rather than the nominal rate that is relevant for economic activity. The fact that expansionary monetary policy lowers nominal interest rates strongly suggests that the Federal Reserve influences real rates. But because expected inflation may change systematically over the course of recessions and recoveries, it is important to examine explicitly the behavior of real rates.

Our procedure for estimating the real funds rate follows Mishkin (1981). We first compute the ex post real rate as the difference between the nominal rate and the change in the logarithm of the GDP deflator.[3] We then regress the ex post real rate on a constant, a time trend, the current and the first four lagged values of the nominal rate, and the first

2. Unless otherwise noted, all data are from Citibase (Dec. 1993 update). The federal funds rate data for 1950–1954 are described in Romer and Romer (1993).

3. Because the federal funds rate is a very short-term rate, the relevant inflation rate for computing the real rate for a quarter is inflation within that quarter. Therefore, we compute the ex post real rate for quarter t as $i_t - 4[\ln((P_{t+1} + P_t)/2) - \ln((P_t + P_{t-1})/2)]$, where i is the nominal funds rate and P is the GDP deflator.

Figure 1 NOMINAL AND EX ANTE REAL FEDERAL FUNDS RATES

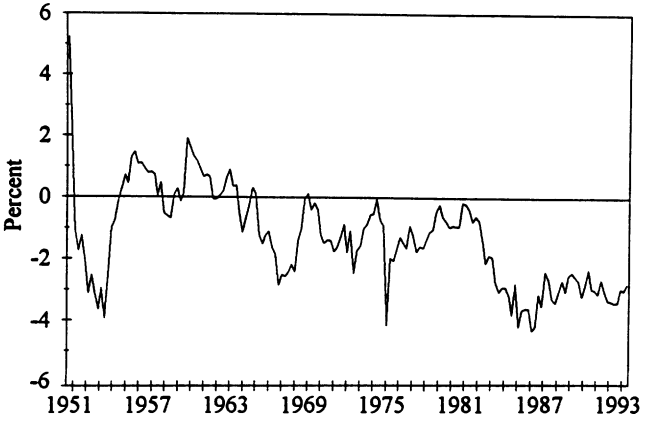


four lags of inflation and real GDP growth.[4] The sample period is 1951:1 to 1993:2. The estimated values of the ex ante real rate are the fitted values of this regression. Figure 1 shows our estimates of the ex ante real federal funds rate along with the nominal rate.

Our measure of discretionary fiscal policy is the change in the ratio of the high-employment surplus to trend or potential GDP.[5] This measure is shown in Figure 2. The rationale for using the high-employment surplus is the standard one that it adjusts for the impact of economic activity on receipts and expenditures. Because of this adjustment, the high-employment surplus can differentiate fiscal actions taken deliberately in response to recessions from those that occur automatically. The high-employment surplus, however, is not a perfect measure of discretionary fiscal changes because some actions may have more or less effect on the economy than their impact on the high-employment surplus would suggest. Therefore, in the analysis of fiscal policy in the next two sections, we discuss temporary tax changes, investment tax credits, and other factors that might cause the change in the high-employment surplus to be a misleading measure of the expansionary stance of fiscal policy.

4. To prevent the period t value of the GDP deflator from entering the first lag of inflation, the lagged values of inflation are computed simply as $4[\ln(P_{t-1}) - \ln(P_{t-2})]$, $4[\ln(P_{t-2}) - \ln(P_{t-3})]$, and so on, rather than in the more complex way used to calculate current inflation described in footnote 3. Using the more complex definition has essentially no effect on the estimated real interest rate series.
5. For the period since 1955, the data are from the Congressional Budget Office. The data for 1950–1954 are described in Carlson (1987).

Figure 2 HIGH-EMPLOYMENT SURPLUS TO TREND GDP



Although it is useful to separate out the automatic changes in the surplus that are caused by economic activity from the discretionary changes, the automatic changes are nevertheless interesting. It is certainly possible, for example, that automatic stabilizers are important to recoveries. For this reason we also examine the change in the ratio of the automatic surplus to trend GDP; we measure the automatic component of the surplus simply as the difference between the actual surplus and the high-employment surplus.[6]

2.2 RESULTS

2.2.1 Monetary Policy Table 1 reports the behavior of the federal funds rate during recessions—specifically, from the times of peaks in real GDP to the quarter after troughs.[7] The top half of Table 1 shows the change in the nominal rate; the bottom half shows the change in the real rate.

Table 1 shows that interest rates fall sharply in recessions. The falls in the nominal funds rate are particularly consistent: 28 of the 33 entries in the top portion of Table 1 are negative. The only significant exception to the pattern of falling nominal rates occurred in 1974, when the Federal Reserve moved to sharply tighter policy even though real

6. For the actual budget surplus, we use the National Income and Product Accounts measure of the federal surplus.
7. Because our focus is on movements in aggregate output, we use the dates of the peaks and troughs in real GDP rather than National Bureau of Economic Research (NBER) peaks and troughs. The two sets of dates are very similar, however.

output was falling. Even during this recession, however, the overall movement in the funds rate was a large decline. The average decline between the peak in output and one quarter after the trough is 3.4 percentage points. For comparison, the standard deviation of movements in the nominal funds rate for the full sample is 1.0 percentage point for one-quarter changes, and 2.3 percentage points for four-quarter changes. Thus, the declines in recessions are large.

The bottom half of Table 1 shows that real interest rates also fell during these recessions. In all eight episodes, the estimated real rate fell

Table 1 THE FEDERAL FUNDS RATE IN RECESSIONS

Date of peak	53:2	57:3	60:1	69:3	73:4	80:1	81:3	90:2
	Change in nominal rate (percentage points)							
Quarter relative to peak								
+1	−0.03	−0.01	−0.24	−0.04	−0.67	−2.36	−3.99	−0.08
+2	−0.03	−1.37	−0.76	−0.37	1.93	−2.85	0.64	−0.42
+3	−0.37	−0.92	−0.64	−0.69	0.84		0.29	−1.32
+4	−0.39		−0.29	−1.18	−2.74		−3.51	−0.56
+5	0.22				−3.04		−1.72	
+6					−0.88			
Cumulative change, peak to quarter after trough	−0.59	−2.30	−1.93	−2.28	−4.58	−5.21	−8.29	−2.38
	Change in real rate (percentage points)							
Quarter relative to peak								
+1	0.46	−0.08	−0.46	−0.15	−1.11	−1.11	−0.15	−0.12
+2	0.61	−0.21	0.56	0.25	0.90	−1.88	−0.21	−0.13
+3	0.20	−0.83	−0.08	−0.45	1.32		1.13	−1.19
+4	−1.84		−0.11	−1.21	−2.66		−1.47	−0.96
+5	−0.03				−2.40		−1.98	
+6					−1.16			
Cumulative change, peak to quarter after trough	−0.60	−1.11	−0.08	−1.56	−5.10	−2.98	−2.68	−2.40

Note: Data for quarters after the first quarter after the trough are not reported.

Table 2 THE FEDERAL FUNDS RATE IN RECOVERIES

Date of trough	54:2	58:1	60:4	70:2	75:1	80:2	82:3	91:1
	Change in nominal rate (percentage points)							
Quarter relative to trough								
+2	0.02	0.38	−0.27	−1.14	0.74	6.02	−0.63	−0.22
+3	0.29	0.84	−0.06	−1.71	−0.75	0.72	0.15	−0.83
+4	0.16	0.40	0.72	0.71	−0.59	1.21	0.66	−0.79
+5	0.43	0.52	0.00	0.91	0.37	−0.20	−0.03	−0.25
Cumulative change, 1 to 5 quarters after trough	0.90	2.14	0.40	−1.23	−0.22	7.74	0.14	−2.09
	Change in real rate (percentage points)							
Quarter relative to trough								
+2	0.56	−0.36	−0.60	0.11	1.18	2.97	0.55	−0.21
+3	−0.48	0.39	−0.62	−0.83	−0.27	0.42	0.35	−0.06
+4	0.12	0.42	0.32	−0.79	0.08	1.37	−0.17	−0.28
+5	0.10	0.57	0.19	0.19	1.29	−0.10	0.22	−0.37
Cumulative change, 1 to 5 quarters after trough	0.30	1.02	−0.71	−1.33	2.27	4.67	0.95	−0.93

between the peak and the quarter after the trough. The declines in the real rate are somewhat smaller and less consistent than the falls in the nominal rate, however. For example, the average decline is just slightly over 2 percentage points.[8]

Once a recovery has begun, there is a moderate tendency for both the nominal and real funds rates to rise. Table 2 shows the changes in the nominal and real federal funds rates in the second through fifth quarters after troughs. About two-thirds of these entries are positive,

8. Section 4.3 shows that the declines in output, prices, and expected inflation during recessions relative to their normal behavior would have caused only modest falls in nominal interest rates, and essentially no change in real rates, if the Federal Reserve had kept the money growth rate fixed in the face of these movements. Thus, even if we adopted measures of monetary policy that did not attribute these parts of changes in interest rates to policy, we would still find that monetary policy was the source of the bulk of the interest rate declines.

with an average rise of both the nominal and the real rate during these periods of about 1 percentage point. And although the relevant numbers are not reported in the tables, the same general tendency toward moderate interest rate increases continues through the second year of recoveries. Table 2 also shows that the 1991 experience is quite unusual. Rather than rising as is typical, both real and nominal rates fell substantially after the trough.

This examination of movements in interest rates suggests that monetary policy could play a critical role in recoveries: There are large, consistent declines in interest rates during recessions. Whether these declines reflect deliberate countercyclical policy, and whether their timing and magnitude are consistent with the view that they are important in recoveries, are questions that we address in the next two sections.

2.2.2 *Fiscal Policy* Table 3 reports the change in the ratio of the high-employment surplus to trend GDP from peaks to five quarters after troughs. These data do not show any pattern of discretionary fiscal policy as consistent or strong as the declines in interest rates in recessions. The average cumulative change in the high-employment surplus to GDP ratio from the peak to one quarter after the trough is -0.7 percentage points. However, there is great variation around this average, with some cumulative changes being large and positive, and others being large and negative. To put the average change in perspective, the standard deviation of movements in the high-employment surplus to GDP ratio for the full sample is 0.6 percentage points for one-quarter changes and 1.1 percentage point for four-quarter changes. Thus, the average fall during recessions is not large relative to typical movements in the high-employment surplus to GDP ratio.

To the extent that there is any systematic pattern in deliberate fiscal policy, it is that policy is generally expansionary around troughs. For example, in every recession except the one immediately after the Korean War, the ratio of the high-employment surplus to GDP fell between two quarters before the trough and the quarter after the trough; 19 of the 24 individual changes for these quarters were negative. The overall shifts over these three quarters were generally about 1% of GDP. Thus, it does appear that fiscal policy becomes slightly expansionary late in recessions.

The record of automatic fiscal policy is decidedly more promising than that of discretionary fiscal policy. Table 4 shows the change in the automatic surplus to GDP ratio around the eight troughs since 1950. As would be expected, the automatic surplus to GDP ratio consistently

declines during recessions. These automatic falls in the surplus are moderately large; the average cumulative decline in the automatic surplus to GDP ratio from the peak to the quarter after the trough is 1.6 percentage points. For comparison, the standard deviation of changes in the automatic surplus to GDP ratio is 0.3 percentage points for one-quarter changes and 0.9 percentage point for four-quarter changes.

This simple examination of the data suggests that automatic fiscal policy is more likely to have affected recoveries than has discretionary policy. Unless the effects of modest changes in deliberate fiscal policy are large, or there are consistently important shifts in fiscal policy that are not reflected in the high-employment surplus, discretionary fiscal policy cannot have played a central role in ending downturns or in

Table 3 THE HIGH-EMPLOYMENT SURPLUS IN RECESSIONS AND RECOVERIES

	Change in ratio of high-employment surplus to trend GDP (percentage points)							
Date of trough	54:2	58:1	60:4	70:2	75:1	80:2	82:3	91:1
Quarter relative to trough								
−4					0.31			
−3	0.70				0.02		−0.39	
−2	−0.99		−0.29	0.24	0.50		0.17	0.54
−1	1.41	−0.71	−0.31	−0.22	−0.69		−0.15	−0.65
0	1.52	0.45	−0.14	−0.80	−0.18	0.06	−0.66	0.00
+1	0.25	−0.99	−0.27	−0.29	−3.23	−0.03	−0.70	−0.15
+2	0.64	−0.10	−0.27	0.12	2.18	0.00	0.26	0.47
+3	0.41	−0.07	0.08	−0.01	−0.09	0.77	−0.05	−0.37
+4	0.43	0.77	−0.08	−0.36	0.38	−0.05	−0.85	−0.31
+5	−0.26	0.20	−0.72	0.16	0.40	−0.16	−0.27	−0.03
Cumulative change, peak to quarter after trough	2.89	−1.25	−1.00	−1.08	−3.28	0.02	−1.74	−0.26
Cumulative change, 1 to 5 quarters after trough	1.21	0.80	−0.99	−0.09	2.88	0.55	−0.92	−0.23

Note: Data for quarters prior to the peak are not reported.

creating strong recoveries. On the other hand, the automatic movements in the surplus during recessions may be large enough and consistent enough to have significantly affected the path of real output following troughs.

Despite this negative conclusion on the overall movement of discretionary fiscal policy during recessions, the finding that discretionary fiscal policy is consistently expansionary around troughs is intriguing. If these expansions are in fact responses to economic conditions, they would suggest that deliberate fiscal policy may play some role in recoveries. More important, they raise the possibility that if such expansions were only undertaken more aggressively, fiscal policy could be a significant countercyclical tool. The key issues are the motives for the shifts in policy, the reasons they are not larger, and the timing of their effects. It is to these issues that we now turn.

Table 4 THE AUTOMATIC SURPLUS IN RECESSIONS AND RECOVERIES

	Change in ratio of automatic surplus to trend GDP (percentage points)							
Date of trough	54:2	58:1	60:4	70:2	75:1	80:2	82:3	91:1
Quarter relative to trough								
−4					−0.46			
−3	−0.32				−0.19		−0.48	
−2	−0.35		−0.29	−0.34	−0.50		−0.50	−0.37
−1	−1.41	−0.59	−0.22	−0.41	−0.44		−0.18	−0.12
0	−0.84	−1.01	−0.51	−0.41	−1.08	−0.90	−0.30	0.85
+1	0.47	−0.15	−0.08	0.01	0.07	−0.32	−0.27	−0.85
+2	−0.11	0.33	0.11	−0.50	0.08	0.30	−0.03	−0.62
+3	0.72	0.50	0.17	0.35	0.12	0.13	0.40	−0.04
+4	0.18	0.26	0.37	−0.18	0.34	−0.17	0.40	−0.06
+5	0.22	0.35	0.21	−0.04	0.00	0.01	0.43	−0.08
Cumulative change, peak to quarter after trough	−2.45	−1.76	−1.09	−1.16	−2.60	−1.22	−1.74	−0.49
Cumulative change, 1 to 5 quarters after trough	1.00	1.44	0.86	−0.37	0.56	0.27	1.21	−0.80

Note: Data for quarters prior to the peak are not reported.

3. *Motivations for Policy Actions*

This section analyzes the nature and motivation of the policy actions behind the movements in interest rates and the high-employment surplus described in the previous section. This analysis is crucially important because our policy indicators could move for reasons other than antirecessionary policy. Interest rates, for example, could decline during recessions if the Federal Reserve were targeting money growth and simply allowed rates to fall as declines in real activity reduced money demand. They could also fall if the Federal Reserve were targeting interest rates but changed them in response to international or financial-market developments rather than in response to recessions. Similarly, the high-employment surplus could fall because of military actions or other spending changes unrelated to the state of the economy. Only by analyzing the motivations of policymakers can we determine whether the movements in interest rates and the high-employment surplus during recessions were the result of deliberate antirecessionary policy.

3.1 MONETARY POLICY

The records of the Federal Reserve provide ample evidence that the falls in interest rates before recoveries are the result of deliberate antirecessionary policy. Boschen and Mills (1992) provide a monthly index of the Federal Reserve's intentions based on the Record of Policy Actions of the Federal Open Market Committee (FOMC). Their index classifies intentions on a scale from -2 to $+2$, with -2 indicating a strong emphasis on inflation reduction and $+2$ indicating a strong emphasis on real growth. Table 5 shows the change in the Boschen–Mills index from the peak in economic activity to five quarters after the trough. (Most of the values are in fractions because we have converted the monthly series to quarterly values to be consistent with our other indicators.)

The most obvious message of Table 5 is that monetary policy typically changes toward an emphasis on real growth very soon after the peak in real GDP. Without exception, the change in the Boschen–Mills index is positive within two quarters of the peak. In many cases the change occurs concurrent with or even slightly before the peak in output. This pattern obviously parallels the finding in Section 2 that interest rates fall soon after the peak in most cases. The behavior of the Boschen–Mills index indicates that the Federal Reserve typically responds to weakness in the economy quite rapidly and that the declines in interest rates are generally the result of deliberate monetary policy.

Table 5 THE BOSCHEN–MILLS INDEX IN RECESSIONS AND RECOVERIES

Date of trough	*Change in the Boschen–Mills index*							
	54:2	58:1	60:4	70:2	75:1	80:2	82:3	91:1
Quarter relative to trough								
−4					0.33			
−3	0.67				−0.67		0.67	
−2	1.33		1.00	0.33	0.00		0.33	na
−1	0.67	1.67	1.33	0.67	1.00		0.00	na
0	0.00	0.67	0.33	0.33	1.67	0.00	0.00	na
+1	0.00	0.67	0.00	0.67	0.33	0.67	1.00	na
+2	−0.33	−1.00	−0.67	0.33	0.00	0.33	0.00	na
+3	−1.67	−1.00	−0.33	0.00	−0.67	0.00	−0.67	na
+4	−0.67	0.00	−0.33	−1.00	−0.33	0.00	−1.33	na
+5	−1.00	−0.33	−0.67	0.00	−0.33	0.00	0.00	na
Cumulative change, peak to quarter after trough	2.67	3.00	2.67	2.00	2.67	0.67	2.00	na
Cumulative change, 1 to 5 quarters after trough	−3.67	−2.33	−2.00	−0.67	−1.33	0.33	−2.00	na

Notes: Data for quarters prior to the peak are not reported. The Boschen–Mills index is not available for the 1991 recession. A positive change in the Boschen–Mills index indicates a move toward expansion; a negative change indicates a move toward contraction.

Table 5 also shows that the emphasis of monetary policy typically changes soon after the trough. In every recession analyzed by Boschen and Mills, monetary policy turned contractionary within two or three quarters of the low point in real output. This again suggests that the rises in interest rates after troughs described in Section 2 are the result of deliberate Federal Reserve policy.[9]

9. It is important to note that although Boschen and Mills find that concern about inflation became the main motivational factor for the Federal Reserve after each trough, inflation itself does not consistently rise in the early stages of the recoveries. To the extent that there is a pattern, the inflation rate (measured as the percentage change in the GDP deflator) generally falls during the first two years of recoveries, though most of this effect is due to the first quarter after the trough.

3.1.1 Episodes The Boschen and Mills index, while very useful, is not perfect for our purposes because it does not consider the Federal Reserve's perceptions of the state of the economy.[10] Therefore, it does not distinguish between times when the Federal Reserve is counteracting a recession and, for example, times when it believes the economy is growing normally but desires even faster growth. For this reason, it is useful to supplement Boschen and Mills's analysis with an independent reading of the Record of Policy Actions of the Federal Open Market Committee and the *Minutes* of the FOMC during recessions.[11]

1953 The Federal Reserve was very quick to perceive the weakening of the economy in 1953. In retrospect, we know that the peak in real GDP occurred in the second quarter of 1953. Yet as early as the June 11, 1953, meeting, one member of the FOMC expressed the opinion that "the economy was cresting" (*Minutes*, 6/11/53, p. 50). Throughout the fall, the economic conditions reviewed by the Board indicated that the economy was relatively stable, but with "indications of reductions in demand in some important sectors" (*Minutes*, 9/8/53, p. 2). By December, however, the FOMC felt that "the decline in economic conditions, though moderate, was unmistakable" (1953, p. 102). The FOMC began to loosen policy in the summer of 1953. The FOMC initially aimed merely to end the previous policy of monetary contraction, but by September 1953 they had adopted a program of "active ease." The motivations for this policy were summed up by one member, who stated, "the System should be trying to build factors which would offset any down-turn in the economy.... [Thus] it would be desirable to pursue a policy of active ease by putting reserves liberally into the market" (*Minutes*, 9/8/53, p. 11). This switch to antirecessionary policy is also indicated by the decision to remove any mention of inflation from the directive, leaving as the primary goal of open market operations "avoiding deflationary tendencies" (*Minutes*, 9/24/53, p. 29).[12]

1957 Monetary policy in 1957 was almost identical to that in 1953. Once again, the Federal Reserve perceived the downturn immediately. While

10. The speed with which the Federal Reserve recognizes recessions has been analyzed by other researchers. See, for example, Hinshaw (1968), Kareken and Solow (1963), and Brunner and Meltzer (1964).
11. The Records of Policy Actions for each year are compiled in the *Annual Reports* of the Board of Governors. Citations to this source are only identified by the year and page number. Citations to the *Minutes* are identified by the title, date, and page number.
12. Technical considerations involving seasonal demand for reserves and Treasury financing operations had some effect on the exact timing of the easing over this period. Specifically, these considerations appear to have led the FOMC to ease slightly more in June and September and slightly less in December.

the peak in real GDP occurred in the third quarter of 1957, the records of the Federal Reserve show that as of the October 1, 1957, meeting, the FOMC noted that "an increasing number of business observers were suggesting... that the prospective movement in activity was a decline" (1957, p. 51). By the November 12 meeting, the FOMC perceived that "there no longer was much doubt that at least a mild downturn in business activity was under way" (1957, p. 56). In response to the decline, on November 12 the FOMC changed its policy directive "to eliminate the previous clause (b) which had called for restraining inflationary pressures and to replace that clause with wording that provided for open market operations with a view... 'to fostering sustainable growth in the economy without inflation by moderating the pressures on bank reserves'" (1957, p. 56). The motivation for this change was summed up by Vice Chairman Hayes, who stated that "relaxing credit restraint... seems desirable in view of the possibility, however remote, that the business adjustment may be more than a mild dip" (*Minutes*, 11/12/57, p. 18). Thus, monetary policy was clearly antirecessionary in this episode.

1960 The changes in monetary policy during the 1960 recession were motivated largely by a belief that economic activity was roughly constant or increasing slightly, not by perceptions that the economy was in a recession. While the peak in real GDP occurred in the first quarter of 1960, as late as July 1960 the FOMC's perception was only that "little upward momentum was evident,... and uncertainty regarding future trends continued to be widespread" (1960, p. 58). The Federal Reserve nevertheless moved to lower interest rates repeatedly over the first nine months of the year in order to increase real growth. For example, in May the FOMC felt that the "lack of exuberance in the business picture... justified moving modestly in the direction of increasing the supply of reserves available to the banking system" (1960, p. 53). It was not until November that the FOMC realized that a recession was under way (1960, pp. 70–71). By that time, however, balance of payments considerations prevented further easing. Thus, the declines in interest rates over this period were largely the result of shifts in policy in response to news about real output, but were not truly antirecessionary.

1969 Real output reached its peak in the fourth quarter of 1969. Over the last several months of 1969, the Federal Reserve gradually revised its forecast of short-run growth downward to the point where its expectation was that growth would be approximately zero over the next several quarters. Concern about the high level of inflation, however, kept the FOMC from shifting to easier policy (see, e.g., 1970,

p. 96). By February 1970 the forecast had been revised to predict negative growth; as a result, the FOMC "concluded that, in light of the latest economic developments and the current business outlook, it was appropriate to move gradually toward somewhat less restraint" (1970, p. 103). The stance of policy actually shifted only slightly over the next several months, however. But beginning in May, the FOMC moved consistently toward easier policy. In May and June, this shift was to some extent a response to "strains" in financial markets. Throughout the second half of the year, however, the easing was a response to the weak state of the economy and a perception that inflation was moderating. In August, for example, the FOMC felt that "expectations of continuing inflation had abated considerably.... It was the consensus of the Committee that monetary policy at present should be sufficiently stimulative to foster moderate growth in real economic activity.... Against this background, the Committee decided that open market operations should be directed at promoting some easing of conditions in credit markets" (1970, p. 149). Thus, the falls in interest rates during the 1969 recession were largely the result of deliberate antirecessionary policies.

1973 Beginning roughly in February 1974, the Federal Reserve expected real output to fall in the first quarter and then to stay essentially unchanged (see, for example, 1974, pp. 137, 144). While this suggests that the Federal Reserve was quick to discern the onset of recession, which we now date as having begun with the peak in the fourth quarter of 1973, it was slow to realize its severity. It was not until the October 14 FOMC meeting that the System acknowledged that there would be an extended decline in real activity (1974, p. 207). As in 1969–1970, concern about inflation prevented the Federal Reserve from loosening significantly during the early part of the recession, and in fact led to considerable tightening in the spring of 1974 (see, e.g., 1974, pp. 107, 161). Beginning in September, however, the FOMC began to move to ease policy significantly. This easing was clearly a response to the recession; for example, the summary of actions by the Board of Governors in September through November states that "the Board felt that the weakening tendencies in the economy should be countered initially through the use of monetary policy instruments other than the discount rate. To this end, System open market operations became increasingly less restrictive as the fall progressed" (1974, pp. 109–110; see also pp. 202–203, 211, 213, 225). These antirecessionary policies continued into the first part of 1975 (see, for example, 1975, pp. 142–143).

1980 At every meeting of the FOMC from July 1979 through the summer of 1980, the Federal Reserve believed that a recession was

either under way or was imminent. Concern about inflation and money growth, however, prevented policymakers from moving to lower interest rates until the spring of 1980. Beginning in April 1980, just after the actual peak in real GDP in the first quarter of 1980, the combination of weak money growth and unfavorable news about real output caused the FOMC to lower the federal funds rate sharply. The FOMC did not want to "exacerbate recessionary tendencies in the economy" and was concerned about "the risk that the contraction would prove to be deeper than was widely expected" (1980, pp. 117, 122).

1981 Real GDP peaked in the third quarter of 1981. As early as November, "the consensus [of the FOMC] was that the downward drift in economic activity apparent when the Committee met in early October had clearly developed into a recession" (1981, p. 136). The major declines in interest rates occurred in the fourth quarter of 1981 and in the third and fourth quarters of 1982. The declines in late 1981, like those in the spring of 1980, were partly a response to weak money growth and partly a direct response to the recession. By July 1982, the FOMC wanted "to provide sufficient monetary growth to encourage recovery in economic activity over the months ahead" (1982, pp. 109–110). FOMC members stressed "the need for flexibility in interpreting the behavior of the monetary aggregates" and felt that money growth "near, or for a time somewhat above, the upper ends of [the target] ranges would be acceptable" (1982, p. 111). Although concern with the growth of monetary aggregates was an important motive in monetary policy over this period, direct concern about real activity and the effects of the recession on the financial system was important as well.

1990 In the most recent recession the Federal Reserve began to worry about a downturn long before it occurred. As early as December 1989, the FOMC viewed "the risks of a shortfall in economic activity as sufficiently high to justify an immediate move to slightly easier reserve conditions" (1989, pp. 135–136). In July 1990, immediately after what we now know was the peak in real GDP, the FOMC expected "sustained but subdued growth in economic activity... for the next several quarters" (1990, p. 120). In response they called for "some easing fairly soon unless incoming indicators indicated appreciably stronger monetary growth and greater inflationary pressures than the members currently expected" (1990, p. 126).

While the Federal Reserve was quick to worry about recession, it was fairly slow to realize that a recession was actually in progress during the fall of 1990. In October the FOMC believed that "the available data do

not point to cumulating weakness and the onset of a recession" (1990, p. 139). They nevertheless felt that "an easing move was warranted in light of indications that there was a significant risk of a much weaker economy" (1990, p. 141). Not until November did a consensus develop that "the most likely outcome was a relatively mild and brief downturn" (1990, p. 148). At this point, the FOMC voted for some slight immediate easing of reserve conditions and indicated that "the growing signs of a softening economy... suggested that the Committee should remain alert... to signals that some further easing was appropriate" (1990, p. 149). Thus it appears that, although the falls in interest rates throughout 1990 were motivated by movements in real output, only those after November 1990 were truly antirecessionary.

3.1.2 Lessons from Postwar Monetary Policy This analysis of the motivations for policy suggests that monetary policy can respond quickly to changes in economic conditions. The Federal Reserve has almost always recognized that a recession was underway very rapidly. Only in 1960 and 1990 was there a lag of more than one quarter between the peak and when the Federal Reserve perceived a downturn. And even in these two instances, the Federal Reserve loosened in response to what it perceived as merely slow growth.

In most instances the Federal Reserve responded to the weakening economy by increasing reserves immediately. This suggests that the declines in interest rates during recessions documented in Section 2 were at least partly the result of antirecessionary monetary policy. In those instances where policymakers did not cut interest rates in response to the weakening of the economy, it was typically because some other factor, such as inflation or balance of payments difficulties, was thought to necessitate tight policy.

The fact that the Boschen and Mills index of Federal Reserve intentions shows a move toward inflation control soon after the start of most recoveries is also important. It suggests that most periods of high inflation are not the result of antirecessionary monetary policy carried too far. Rather, they are more likely the result of expansionary policies taken for reasons unrelated to recessions or of insufficient shifts toward combating inflation once recoveries have begun. Thus, policy mistakes are not an inherent feature of antirecessionary monetary policy.

3.2 FISCAL POLICY

Our primary source for the history of fiscal policy is the *Economic Report of the President*, published biennially from 1948 to 1952 and then annually from 1953 through the present. The *Economic Reports* contain

detailed descriptions and justifications of the President's fiscal policy recommendations. They also summarize the fiscal policies actually implemented in the preceding year. If the policies implemented differ from those previously recommended by the administration, some discussion or critique of Congress's motives is usually given. As a result, the *Economic Reports* provide unique insight into both the motivation for policy and the lags in taking fiscal actions.[13]

3.2.1 Episodes

1953 The end of the Korean War caused a substantial decline in government spending in 1953. When a recession began in the second quarter of 1953, the Eisenhower administration did not take any noticeable steps to increase spending. It did, however, move to reduce taxes shortly before the trough of the recession in the second quarter of 1954. In January 1954 an extensive tax cut went into effect that reduced taxes during the first six months of 1954 by $1.1 billion, or about 0.6% of GDP over this period (1955, p. 19). This tax cut eliminated two wartime tax increases: the excess profits tax passed in 1950, and the personal and corporate income tax increases put into place in 1951.

Whether this fiscal action was truly antirecessionary is ambiguous because the original legislation called for the excess profits tax to expire on June 30, 1953, and the personal income tax increase to be rescinded on December 31, 1953. Three pieces of evidence, however, suggest that it was largely discretionary. First, the excess profits tax was extended for six months early in 1953 at the urging of President Eisenhower, who felt that a tax cut in mid-1953 would be inflationary. Second, the 1953 *Economic Report* includes among its 1954 budget deficit projections, the situation that would occur "if the post-Korea tax increases are not allowed to run off as provided by present law" (1953, p. 71). This suggests that the Truman administration thought an extension of the wartime taxes was a likely outcome. Finally, the Eisenhower *Economic Report* of 1954 treats the tax decrease as an important antirecessionary act. It states:

> The Secretary of the Treasury therefore announced in the plainest possible language that the Administration, besides relinquishing the excess-profits tax, would not seek to postpone the reduction of the personal income tax, averaging approximately 10 percent, scheduled for January 1, 1954. This unequivocal promise of tax relief to both families and business firms bolstered confidence at a time when trade and employment were slipping slightly. In coming months

13. Unless otherwise noted, all citations in this section refer to the *Economic Reports*.

these well-timed tax reductions are likely to give substantial support to consumer and investment markets. (1954, p. 52)

Even if the tax reduction was discretionary, it is obvious that this is an unusual case. The president rarely has a tax cut passed and waiting prior to the onset of recession. Thus, there was more flexibility in fiscal policy in 1953 than at almost any other time.[14]

1957 The 1957 recession began in the third quarter of 1957. The only significant fiscal change that occurred soon after the onset of the recession was an acceleration of defense spending. The Eisenhower administration accelerated the placement of defense contracts, and in January 1958 requested supplemental appropriations of $1.3 billion from Congress as an advance on 1959 spending. Although the administration stressed that national security was the main motivation for these actions, it was quick to point out the economic benefits. For example, the 1958 *Economic Report* states, "At the turn of the year, the economy was beginning to feel the effects of an acceleration of the placement of defense contract awards, prompted by the need to move forward quickly with programs essential to the strengthening of the Nation's defenses" (1958, p. 8). The frequent references to the economic benefits of this spending suggests that at least some of the motivation was antirecessionary.

The 1959 *Economic Report* indicates that similar types of spending acceleration were undertaken around the trough in the first quarter of 1958. In March and April 1958, spending on federal programs for building airports, hospitals, and other public buildings was moved forward. In April 1958, legislation was passed to increase spending on the interstate highway program (1959, pp. 41–42). Both of these measures were consistent with the Eisenhower philosophy that "the major emphasis of Federal countercyclical policy should be placed on measures that will result in prompt action.... Though a useful contribution can be made by the acceleration of public works projects that are already under way or are ready to be started, little reliance can be placed on large undertakings which... can be put into operation only after an extended interval of planning" (1959, p. 2). In addition to these measures, Congress passed, at the administration's request, a temporary extension of unemployment benefits in June 1958 (1959, p. 40). Several

14. Despite the reduction in taxes, the high-employment surplus to GDP ratio actually rose slightly in 1954 because of an even greater reduction in spending. However, since the decline in expenditures reflected both external shocks and long-term national security planning, it seems reasonable to view fiscal policy as quite expansionary in 1954 relative to likely alternatives.

minor spending bills passed in July 1958 were also taken at least partly in response to the state of the economy (Bartlett, 1993).

1960 Real GDP peaked in the first quarter of 1960. The 1961 *Economic Report* indicates that no significant antirecessionary fiscal actions were taken before the trough in the fourth quarter of 1960. Numerous actions, however, were taken in the quarter just after the turning point in GDP. The first Kennedy administration *Economic Report* in January 1962 reports that "immediately upon taking office, the new Administration moved vigorously to use the fiscal powers of the Federal Government to help bring about economic recovery" (1962, p. 82). Among the measures proposed and quickly passed were an acceleration of federal procurement and tax refunds, changes in transfer programs that added $2 billion to transfer payments over fiscal years 1961 and 1962 combined, and the Temporary Extended Unemployment Compensation Act, which extended coverage.[15] Despite this flurry of activity, the total amount spent under these programs was quite small.

An investment tax credit equal to 7% of gross investment in depreciable machinery and equipment was also proposed early in the Kennedy administration and was passed in October 1962. Interestingly, this action is discussed in the chapter of the *Economic Report* on policies to encourage economic growth, not in the chapter on economic recovery. The 1962 *Report* states that "if faster economic growth is desired, revision of the tax structure is called for, to permit a higher rate of investment once full use of resources is achieved" (1962, p. 132). While the *Report* points out that increased investment will stimulate aggregate demand, this does not seem to be the primary motivation behind the program. Thus, this often noted Kennedy fiscal stimulus appears to have been primarily motivated not by the 1960 recession, but rather by supply-side issues related to long-term growth.

The motivation for the even more famous 1964 tax cut appears to be a mixture of concern about sluggish growth and concern about incentives. It is clear from the 1963 *Economic Report*, which contains the first discussion of this proposed tax reduction, that the act was not some grossly delayed response to the 1960 recession. The *Report* states that "we approach the issue of tax revision, not in an atmosphere of haste and panic brought on by recession or depression, but in a period of

15. Two other measures, the Area Redevelopment Act enacted in May 1961 and the Public Works Acceleration Act enacted in September 1962, were designed to aid areas with particularly high and persistent unemployment. Whether these programs should be viewed as antirecessionary acts or general antipoverty measures is unclear. However, neither program was very large.

comparative calm" (1963, p. xiii). The *Report* goes on to argue that "Only when we have removed the heavy drag our fiscal system now exerts on personal and business purchasing power and on the financial incentives for greater risk-taking and personal effort can we expect to restore the high levels of employment and high rate of growth that we took for granted in the first decade after the war" (1963, p. xv). While supply-side effects are certainly emphasized, there is sufficient discussion of underutilized capacity and unemployment in the 1963 and 1964 *Economic Reports* that it seems clear that the aggregate demand effects of the tax cut were also a major factor in the proposal, and in the ultimate passage of the act in February 1964.

1969 Real output peaked in the third quarter of 1969. The 1970 *Economic Report* makes it clear that inflation was such an overriding concern that the administration resisted efforts by Congress to increase spending or reduce taxes. It states, "the best hope of curbing inflation and restricting the rise in unemployment... rests with a policy of firm and persistent restraint on the expansion in the demand for goods, services, and labor" (1970, p. 22). The one obviously antirecessionary measure that was proposed (and ultimately passed in August 1970, shortly after the trough in output) was the Employment Security Amendments, which provided additional unemployment benefits once the insured unemployment rate exceeded $4\frac{1}{2}\%$ for three consecutive months.

In 1971 the administration sought to run a balanced full-employment budget. The 1971 *Economic Report* indicates that the administration "strongly resisted program expansion which would substantially raise commitments for expenditures beyond 1970" (1971, p. 26) and took no fiscal measures aimed at stemming the recession. There were some increases in transfer payments because of a change in social security benefits and an increase in revenue-sharing to the states, but neither of these measures appears to have been related to the state of the economy. Therefore, any fall in the high-employment surplus in 1970 and 1971 was motivated by considerations other than the recession.[16]

16. One ambiguity in the 1970 fiscal record concerns the 10% income tax surcharge implemented in 1968. This surcharge, which was set to expire on June 30, 1969, was extended in August at the urging of the President to cover the last six months of 1969. In December Congress approved a reduction of the surcharge to 5% and an extension to June 30, 1970. Given this record of extensions, the failure to extend the surcharge in mid-1970 could be viewed as an antirecessionary policy. However, the 1970 *Economic Report* does not speak of the expiration in this way. It states that "the tight expenditure control recommended for the budget for fiscal 1971... is intended to prevent" excessive stimulus caused by the expiration of the tax surcharge (1970, p. 59).

In August 1971, more than a year after the trough in the second quarter of 1970, the Nixon administration proposed the "New Economic Policy." This proposal called for an end to gold convertibility, a 10% surcharge on imports, a wage and price freeze, and a substantial fiscal expansion. Among the fiscal changes that were passed by Congress in 1971 were an increase in the personal income tax exemption, the removal of some excise taxes, a 7% job development credit, and the reinstatement of the investment tax credit. According to Carlson (1981), the Revenue Act of 1971 reduced annual tax revenues by $8 billion, or 0.7% of GDP. The 1972 *Economic Report* makes clear that the administration was well aware that the economy was already recovering before the New Economic Policy was proposed. It states, "[The administration] believed that a more rapid expansion of the economy than was generally forecast was desirable and feasible" (1972, p. 21). Thus, the fall in the high-employment surplus in 1972 was motivated not by an attempt to end a recession, but by a desire for more rapid growth.

1973 Real GDP peaked in the fourth quarter of 1973. The immediate response of the administration was to do nothing. According to the 1974 *Economic Report*, "the budget proposed by the President... would inject no fiscal stimulus to push the economy above its average rate of expansion" (1974, p. 29).[17] By January 1975, shortly before the trough in real GDP, the administration perceived that the economy was in a severe recession and proposed a one-year tax cut of $16 billion. The *Economic Report* for this year refers to it as an "antirecession tax cut" (1975, p. 7), and it is clear that there was no motivation other than the recession. The Tax Reduction Act of 1975 was passed by Congress in March 1975. The largest component of this act was a rebate of approximately 10% of 1974 personal income taxes, which was paid in May and September 1975. The act also lowered individual income taxes for 1975 by increasing the standard deduction and by granting a $30 credit to each taxpayer. The act also reduced corporate liabilities by a substantial amount, mainly through an increase in the investment tax credit from 7% to 10%.

There were minor spending changes in 1975 as well. The 1975 *Economic Report* states that "in response to the sharp rise in unemployment in the second half of 1974, two new laws that affect the unemployment insurance program were enacted in December 1974" (1975, p. 120). The Emergency Unemployment Compensation Act extended unemployment insurance by 13 weeks, and the Emergency Jobs and Unemployment Assistance Act gave unemployment benefits to some

17. The 1975 *Economic Report* states that fiscal policy in 1974 was more contractionary than anticipated because of the revenue-increasing effects of inflation (1975, p. 60).

uncovered workers and provided for a small public service employment program. These programs were entirely motivated by the recession. The only major change in spending that was not unambiguously antirecessionary was a 7% increase in social security benefits passed in April 1974. Taken as a whole, antirecessionary fiscal policy actions were very large in 1975 and explain most of the fall in the high-employment surplus in this year.

The Revenue Adjustment Act of 1975 extended most of the personal and corporate tax cuts included in the Tax Reduction Act of 1975 through the first six months of 1976. The 1977 *Economic Report* states that "the objective of fiscal policy in 1976 was to maintain the degree of stimulus provided during 1975 in order to keep the economy on a course of moderate, sustained expansion" (1977, p. 69). The Tax Reform Act of 1976 extended many of the 1975 tax changes through 1977. The Ford administration argued in favor of a permanent extension, and even called for larger tax cuts, on the grounds that the changes would stimulate investment and long-term growth (1977, pp. 4–5). Thus, it appears that by mid-1976 the motivation for policy had shifted from antirecessionary considerations to a desire to stimulate long-run economic progress.

According to the first Carter administration *Economic Report* in January 1978, the administration "proposed a series of measures intended to raise the rate of growth of real output in 1977 and 1978 to a pace that would lead to significant reductions in the unemployment rate" (1978, p. 50). Among the actions taken were the Tax Reduction and Simplification Act of 1977, which led to net tax reductions of roughly $5 billion and $10 billion in 1977 and 1978, respectively, largely through increases in the personal standard deduction and an employment tax credit. A variety of public works, public service employment, and training programs were funded by the Economic Stimulus Appropriations Act in the spring of 1977 and were aimed at stimulating the economy. These spending increases amounted to roughly $1 billion in 1977 and $7 billion in 1978. The motivation for all of these programs was clearly to increase growth from an already moderate level. For example, the President's section of the 1978 *Economic Report* states, "I have begun from the premise that our economy is basically healthy" and "the American economy is completing three years of recovery from the severe recession of 1974–75" (1978, p. 3).

1980 The 1980 recession began in the first quarter of 1980 and ended in the second. The Carter administration, apparently chastened by increases in inflation during its first years in office, took no expansionary fiscal actions in response to the downturn. The 1981 *Economic Report*

states, "twice in the last decade the tendency for government to stimulate the economy somewhat too freely during the recovery from recession probably played a role in retarding the decline of inflation or renewing its acceleration. That is why I was so insistent that a tax cut designed for quick economic stimulus not be enacted last year" (1981, p. 8). In fact, inflation was seen as such an overriding problem that Carter proposed tightening fiscal policy in January 1980, when the *Economic Report* noted "that a mild recession is widely forecast" (1980, p. 9). The administration believed that "this austere budget policy, accompanied by supportive policies of monetary restraint, is a necessary condition for controlling inflation" (1980, p. 6).[18]

1981 Following a brief recovery in late 1980 and early 1981, the economy slipped into another recession in the third quarter of 1981. This recession lasted until the third quarter of 1982. Fiscal policy changes in the first year of the Reagan administration were enormous. The Economic Recovery Tax Act of 1981 reduced both personal and business taxes substantially. In addition to the tax reductions, federal spending rose substantially, mainly because of increases in real national defense purchases (as measured by the National Income and Product Accounts) of 6% in 1981 and 7% in 1982.

Despite its name, the Economic Recovery Tax Act of 1981 appears not to have been motivated by the recession. The 1982 *Economic Report* states that "the major elements of the Administration's economic policy are designed to increase long-term growth and to reduce inflation. Uniformly favorable near-term effects were not expected" (1982, p. 24). It specifically identifies the Economic Recovery Tax Act as one of those long-term policies, and the short-term stimulatory effects are never mentioned (1982, p. 44). Even the 1984 *Economic Report* only mentions the aggregate demand effects of the tax cut in the context of discussing why the deficit is not an immediate danger to the economy (1984, p. 39).

There is similarly little emphasis on the short-term stimulatory effects of the increase in defense expenditures. The 1982 *Economic Report* makes it clear that national security was the main motive behind the spending program when it states that "any economic effects, however,

18. The 1981 *Economic Report* emphasizes that the fall in the high-employment surplus in 1980 was not deliberate. Rather, it was due to the "delayed effect on individual tax refunds and final settlements from the Revenue Act of 1978" and "to large increases in interest outlays caused by record high interest rates" (1981, pp. 156–157).

must be assessed in the context of the overriding need for maintaining the level of defense spending necessary for national security" (1982, p. 85). Furthermore, the main short-term effects that were contemplated were bottlenecks and price increases in industries that supply defense goods (1982, p. 86). Thus, it appears that fiscal changes in 1981–1982 were almost entirely motivated by factors other than the recession.

1990 The most recent recession began in the second quarter of 1990 and ended in the first quarter of 1991. Fiscal policy was essentially unchanged during the recession. One explanation for this absence of discretionary fiscal policy is that the Omnibus Budget Reconciliation Act had been passed in November 1990. Given its stress on "credible and systematic" policies (1991, p. 4), the Bush administration did not want to change fiscal policy so soon after the budget agreement.[19] The only significant fiscal action proposed in 1991 was a cut in the tax rate on long-term capital gains, and this measure was defeated in Congress.

According to the 1993 *Economic Report*, "when the need for a fiscal policy that would provide immediate stimulus became increasingly clear in late 1991," the Bush administration proposed several small fiscal changes (1993, p. 51). Among the measures taken were executive actions to reduce personal income tax withholding and to accelerate the spending of previously appropriated Federal funds. Legislation to reduce the capital gains tax, to provide for a temporary investment tax allowance, to enhance depreciation for certain companies, and to provide for a temporary tax credit for first-time homebuyers was also proposed. None of these programs were very large, however, and none were passed by Congress.

3.2.2 Lessons from Postwar Fiscal Policy This analysis of the motivations of policy suggests some important facts about postwar fiscal policy. First, there is abundant evidence that limited fiscal stimulus can be undertaken rapidly.[20] Either slightly before or concurrent with most troughs, there were small increases in government spending that were motivated almost entirely by the state of the economy. This suggests

19. The 1993 *Economic Report* states that "the Budget Enforcement Act of 1990, the ongoing defense downsizing, and a political stalemate between the Administration and the Congress played important roles in keeping fiscal policy from being more stimulative" (1993, pp. 55–56).

20. Bartlett (1993) reaches a more pessimistic conclusion about the speed with which even small fiscal actions can be taken. This difference is attributable mainly to the fact that Bartlett concentrates on public works programs, rather than on all spending and tax programs undertaken to end recessions.

that the small falls in the high-employment surplus to GDP ratio around troughs documented in Section 2 were mainly the result of antirecessionary policy.

The nature of these rapid spending changes, however, provides insight into why the changes were almost always quite small. The spending increases have typically been limited to actions that can be taken without congressional approval, such as the acceleration of planned spending or tax refunds, or to actions for which congressional approval is easy to obtain, such as the extension or expansion of unemployment insurance benefits. Since the number of such actions is inherently limited by the structure of the U.S. government, it would be unrealistic to infer from the modest increases in spending around postwar troughs that equally rapid but more aggressive fiscal responses were possible.

The postwar record on major legislated antirecessionary actions is complicated. There are no examples of major spending changes undertaken in response to recessions. There are, however, two times when taxes were cut in response to recessions: 1953 and 1975. (Taxes were also cut during the 1981 recession, but there is no evidence that this cut was motivated by the cyclical condition of the economy.) But both tax cuts were unusual in ways that may limit their relevance to other recessions. In 1953, the tax cut had already been passed before the recession began; all Eisenhower had to do was not ask that it be delayed. In 1975, the recession was particularly long; it had already been going on for over a year before any policy action was taken. A more positive interpretation of the 1975 experience, however, is that in response to a particularly severe recession, effective measures can eventually be taken. Consistent with this positive interpretation is the fact that the lag between when the tax cut was officially proposed and when the first rebate actually appeared was only five months.

Perhaps the most important lesson to be learned from this analysis is that most large fiscal actions have been taken in response to slow recoveries rather than to actual recessions. The 1964 tax cut, Nixon's "New Economic Policy," and Carter's tax cut and spending increases were all passed to increase growth in a sluggish but basically healthy economy. This fact is significant because the potential for policy mistakes, for overheating the economy and generating inflation, is much higher for such policies than for those passed in the depth of recession.

Finally, the record of the specific actions taken in response to recessions suggests that focusing on the high-employment surplus is likely to lead, if anything, to overestimates of the extent of antirecessionary

fiscal stimulus. Most of the actions took the form of temporary tax cuts, temporary changes in transfers, and changes in the timing of disbursements, all of which may have much smaller effects than long-lasting changes in purchases or taxes.

4. *The Contribution of Macroeconomic Policies to Recoveries*

As Sichel (1992) and Beaudry and Koop (1993) document, recessions are typically followed by periods of very rapid growth. For the eight recessions since 1950, real growth in the four quarters after the trough has averaged 4.6%, and has exceeded the average annual postwar growth rate of 2.75% in every recovery except the current one.[21] In this section we attempt to measure the contribution of policy to this spurt of rapid growth following troughs. In particular, we ask whether in the absence of policy actions, output growth after troughs would have continued to be negative, been equal to its average postwar value, or been even higher than it actually was.

To measure the role of policy, it is clearly not enough to just establish how monetary and fiscal policy changed during recessions and recoveries; we also need estimates of the magnitude and timing of the policies' effects. Therefore, in this section we construct such estimates and analyze their implications. We do not attempt to shed new light on the underlying question of whether monetary and fiscal policy have real effects. For this exercise we take it as given that policy affects output, and seek to provide plausible estimates of the size of those effects.

4.1 ESTIMATING THE EFFECTS OF POLICY

4.1.1 Baseline Policies Any description of how policies have affected the course of the economy must compare the economy's actual behavior with how it would have behaved if policies had followed some baseline paths. Thus, the analysis requires specifying baseline policies. We take as our baselines a constant real federal funds rate and a constant ratio of the high-employment surplus to trend GDP. Thus, we are attempting to estimate the contributions of changes in the real funds rate and in the ratio of the high-employment surplus to trend GDP to the path of real output.

21. We calculate average growth over the period 1953:2 to 1993:2, which is the sample period used in our subsequent calculations. Throughout, percentage changes are computed as changes in logarithms.

These baseline policies are approximately feasible. Unpredictable movements in expected inflation, and in receipts and expenditures for a given level of activity, make it impossible for policymakers to keep the real funds rate and the high-employment surplus to trend GDP ratio exactly constant. On a quarterly basis, however, these shocks are likely to be small. This would not be true of some other potential baselines; quarterly shocks to the money supply and to the unadjusted deficit, for example, appear to be large.

Over the longer term, there is no reason that fiscal policy cannot keep the high-employments surplus to trend GDP ratio roughly constant. Monetary policy, on the other hand, cannot keep the real interest rate above or below its long-term equilibrium level indefinitely without causing unbounded deflation or inflation. But movements in the sustainable level of the real interest rate are likely to be gradual. Thus, attributing movements in the real interest rate that are in fact due to changes in its sustainable level to changes in monetary policy will not have a large effect on the analysis of the sources of short-run output movements.[22]

4.1.2 Approaches to Estimating the Effects of Policy We estimate the effects of monetary and fiscal policy in three ways. The first two approaches are based on simple regressions, and the third is based on a large macroeconomic model.

Our first regression is an ordinary least squares (OLS) regression of real GDP growth on eight lags of the change in our estimate of the real federal funds rate and on the current and eight lags of the change in the high-employment surplus to GDP ratio. We also include a constant, a dummy variable for the post-1973 period (to account for the productivity growth slowdown), and eight lags of the dependent variable.[23]

The OLS estimates are likely to provide conservative estimates of the effects of changes in the real interest rate. Most importantly, if the Federal Reserve changes the real funds rate on the basis of information about future output movements beyond that contained in the right-hand

22. This would not be true if we took a constant nominal funds rate as our baseline. Attempting to peg the nominal rate at an unsustainable level would lead to accelerating changes in inflation, the real rate, and output. Thus, the effect of changes in the nominal rate is explosive. As a result, attributing shifts in the nominal rate that are in fact due to changes in its sustainable level to changes in monetary policy would have very large effects on the analysis of the sources of output movements.

23. We exclude the current value of the change in the real funds rate on the grounds that the real rate is likely to respond to output movements within the quarter. Since this appears less likely with the high-employment surplus to GDP ratio, we include the contemporaneous value of that variable. Treating the two policy variables symmetrically has little effect on the results, however.

side variables of the regression, the changes in the real rate will be positively correlated with the error term. As a result, the OLS estimates will be biased upward (that is, toward zero). Since, as Section 3 describes, monetary policy responds very rapidly to economic developments, this effect is likely be to present to some extent. Similarly, any additional information that consumers have about future output movements will cause the real rate to rise before increases in output, again biasing the OLS estimates of the effects of changes in the real rate toward zero.

Contemporaneous interaction between changes in the real rate and output growth has more complex effects on the OLS estimates. Since simple examples suggest that such interaction is likely also to bias the estimates toward zero, and since the reaction of output to the real interest rate within the quarter is likely to be small in any event, this effect is unlikely to reverse the effects of the other biases.[24]

Thus, the OLS estimates seem much more likely to understate than overstate the effects of changes in the real funds rate. Since there are important sources of variation in real interest rates, such as concern about inflation and political considerations, that are not likely to be substantially correlated with sources of output movements not included in the regression, the bias may not be serious. And for fiscal policy, where major policy shifts appear to require at least several quarters to implement, and where there are many important sources of variation in policy other than economic conditions, significant correlation with the error term appears unlikely. Thus, for fiscal policy the bias from using OLS is likely to be small.

Because of the potential bias of the OLS estimates, our second set of estimates of policies' effects are derived from instrumental variables (IV) estimation of the regression just described, with the changes in the real rate treated as endogenous. As instruments, we employ the Romer and Romer (1989, 1994) and Boschen and Mills (1992) indexes of Federal Reserve policy. We use 16 lags both of the Romer–Romer index and of the change in the Boschen–Mills index.

The Romer–Romer index is a simple dummy variable equal to one on dates of apparent shifts by the Federal Reserve to policies designed to

24. Suppose the true model is $\Delta y_t = a_0 \Delta r_t + a_1 \Delta r_{t-1} + b \Delta y_{t-1} + \epsilon_t^y$, $\Delta r_t = \alpha_0 \Delta y_t + \alpha_1 \Delta y_{t-1} + \beta \Delta r_{t-1} + \epsilon_t^r$, where the ϵ's are independent white-noise shocks, a_0 and a_1 are negative, α_0 is positive, b is positive (reflecting the positive serial correlation of output growth), and β is negative (reflecting the negative serial correlation of changes in the real interest rate). For this case, one can show that the true effect of a change in Δr on output growth in the subsequent period is larger (in absolute value) than what one would obtain from an OLS regression of Δy_t on Δr_{t-1} and Δy_{t-1}.

reduce inflation from its current level. Because these policy shifts to combat inflation appear to be largely the result of changes in tastes, and not responses to additional information about future output movements, the index should be essentially uncorrelated with the error term of the regression. Thus, the Romer and Romer dates should allow the IV regression to estimate the output effects of interest rate changes. The Boschen–Mills index described in the previous section is a less-than-ideal instrument because Boschen and Mills do not distinguish Federal Reserve actions that are independent of the economy from those that are responses to the predicted behavior of the economy. However, if one believes that most changes in stated Federal Reserve intentions represent independent policy shifts, then this index is a useful instrument for isolating the effects of policy-generated changes in interest rates.

Both the OLS and IV regressions are estimated over the period 1957:2 to 1988:4; the sample period is dictated by the availability of the Boschen–Mills index. To drive policy multipliers from these regressions, we use the coefficient estimates to calculate the dynamic multipliers for a one-percentage-point fall in the real federal funds rate and a one-percentage-point fall in the high-employment surplus to GDP ratio.

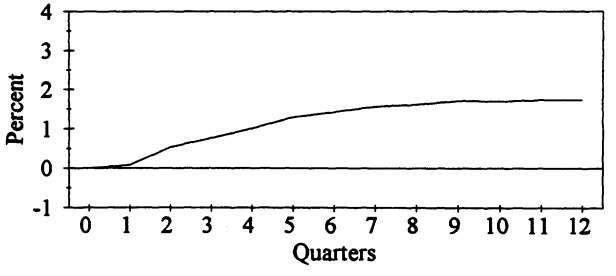
Our third set of estimates of policies' effects are from the Data Resources Incorporated (DRI) model of the U.S. economy. Using a large macroeconomic model has the advantage that it incorporates a great deal of information and judgment. It has the disadvantages, however, that it is much less transparent than the regressions and that its implications may reflect the model builders' priors rather than characteristics of the data. For monetary policy, the experiment we consider in the model is a permanent one-percentage-point change in the real federal funds rate with the parameters governing fiscal policy held fixed. For fiscal policy, we consider a permanent change in personal income taxes of 1% of GDP with the real funds rate held fixed.[25]

4.1.3 Results Figure 3 shows the multipliers for monetary policy implied by the two regressions and by the DRI model. The OLS regression implies that a permanent one-percentage-point fall in the real funds rate raises real GDP by 1.7%. Most of this effect comes between the second and fifth quarters after the increase. As one would expect, the IV regression implies a somewhat larger impact. The overall effect is now a

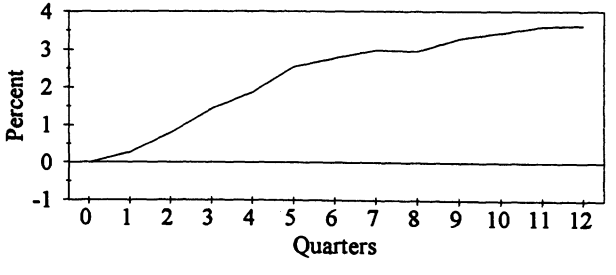
25. For fiscal policy, we also investigated averaging the multipliers for a change in taxes with those for a change in government purchases. This resulted in a considerably larger effect in the quarter of the policy change and had little effect thereafter. Because most major postwar antirecessionary fiscal actions have taken the form of changes in taxes and transfers, we focus on the multipliers for a change in taxes.

Figure 3 MULTIPLIERS FOR MONETARY POLICY

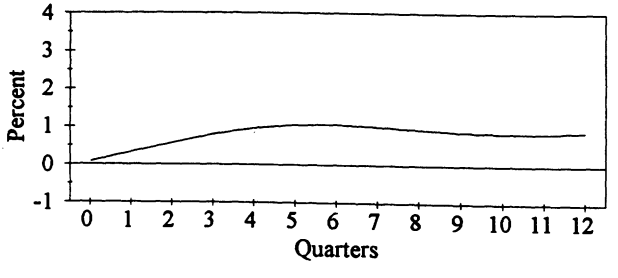
a. OLS Regression



b. IV Regression



c. DRI Model



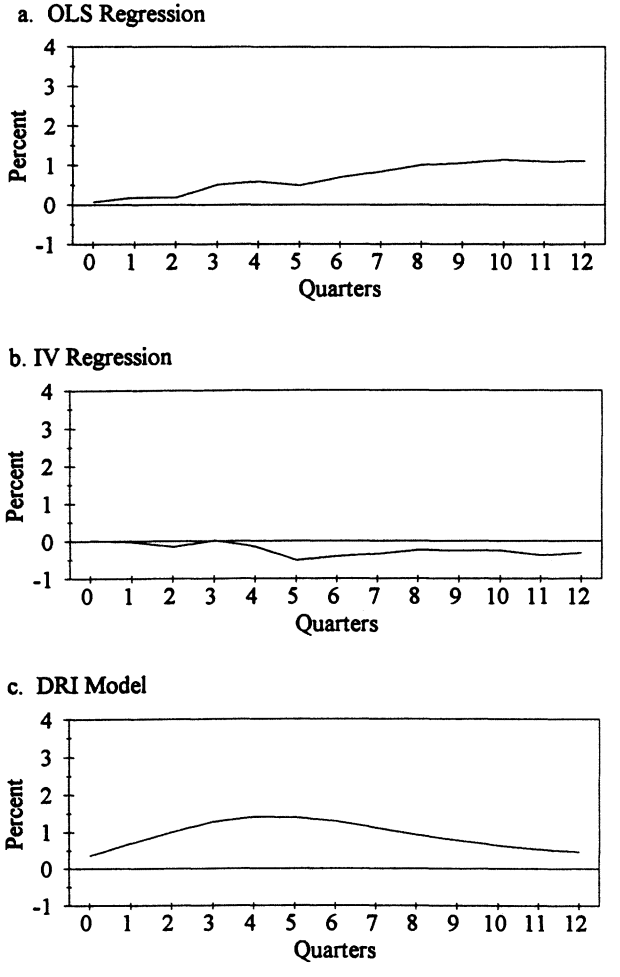
rise in real GDP of 3.6%; the timing is similar to that with OLS.[26] The DRI model implies a rise in real GDP of 1.1%, with most of the effect

26. We also estimated the IV multipliers using as instruments only the Romer–Romer index and the exogenous right-hand-side variables. The results are very similar to those shown in Figure 3. The implied multiplier for a one-percentage-point rise in the real federal funds rate reaches a maximum impact on real GDP of 4.3% after 12 quarters; the timing is the same as that for the OLS and basic IV regressions. Because the Romer–Romer index is a dummy equal to one on only a small number of dates, the point estimates for the limited IV regression are substantially less precise than those from the standard version.

coming between one and four quarters after the change.

Figure 4 shows the estimated multipliers for fiscal policy. The OLS regression implies that a permanent fall of one percentage point in the ratio of the high-employment surplus to trend GDP raises output by 1.1%. The effect occurs gradually over about 10 quarters. The IV estimates imply that the effects of lowering the surplus to GDP ratio are small and irregular. Taken literally, the estimates imply that fiscal policy has essentially no effects. However, because the standard errors are

Figure 4 MULTIPLIERS FOR FISCAL POLICY



large, the IV regression does not provide strong evidence against conventional views of the effects of fiscal policy. For example, the two standard error confidence interval for the sum of the coefficients on the surplus to GDP ratio is (−1.59, 1.70); for comparison, the OLS estimate is −0.74. We therefore, do not place great emphasis on the point estimates of the effects of fiscal policy from the IV regression. Finally, the DRI model implies that the effect of a fall of one percentage point in the surplus to GDP ratio on real GDP peaks after four quarters at 1.4% and then gradually declines.

4.2 IMPLICATIONS FOR THE SOURCE OF RECOVERIES

Table 6 summarizes the implications of these estimated multipliers for the sources of output growth in the four quarters after troughs. Specifically, for each of the three sets of multipliers, Table 6 reports the implied average contributions during these periods of macroeconomic policies and other factors. The policy contributions are divided both according to whether they reflect monetary or fiscal policy and according to whether they reflect actions before the peaks in real output or after. In addition, the contributions of fiscal policy are divided into the effects of automatic and discretionary policy. The reason for separating the effects of prepeak and postpeak policies is that the multipliers suggest that the lags in the effects of monetary policy are sufficiently long that the shifts to tighter monetary policy before peaks continue to depress growth even after troughs. Thus, what we need to understand is not simply why output growth is above normal in recoveries, but why it is above normal despite the previous monetary tightenings.

Table 6 ESTIMATES OF THE CONTRIBUTIONS OF MONETARY AND FISCAL POLICIES TO GROWTH IN THE FIRST YEAR OF RECOVERIES

	Contribution to growth (percentage points)						
	Prepeak policies			*Postpeak policies*			*Residual*
Source of multipliers	Monetary	Discretionary fiscal	Automatic fiscal	Monetary	Discretionary fiscal	Automatic fiscal	
OLS	−0.92	−0.18	−0.01	1.59	0.25	0.63	0.45
IV	−2.05	0.00	−0.03	3.00	0.02	−0.41	1.30
DRI	−0.14	0.27	0.14	1.48	0.50	0.85	−1.30

Notes: The residual shows the component of the difference between mean growth in the year after troughs and average annual growth that is not accounted for by prepeak and postpeak policies. The difference between mean growth after troughs and average annual growth is 1.82 percentage points; the rows may not add to this value due to rounding.

All three sets of estimates imply that the reductions in real interest rates after peaks are crucial to recoveries. The OLS multipliers imply that these reductions have added an average of 1.6 percentage points to real growth during the first year of recoveries, the IV multipliers imply that they have added 3.0 percentage points, and the DRI multipliers imply that they have added 1.5 percentage points. Thus, the estimates imply that the declines in real interest rates in recessions are large enough, and their effects occur quickly enough, that they play a critical role in the rapid growth during recoveries. Since average output growth in the year following troughs is 4.6%, the OLS estimates imply that without these declines, growth in the year after troughs would average only 3.0%; the IV estimates imply that it would average just 1.6%; and the DRI estimates imply it would average only 3.1%.[27]

The OLS and DRI estimates imply that discretionary fiscal expansions after peaks contribute moderately to growth (not surprisingly, the IV estimates imply that the effect is negligible). In both cases, however, the majority of the estimated effect comes from the recovery from the 1973–1975 recession. In addition, because the changes in discretionary fiscal policy in recessions have consisted disproportionately of temporary changes in taxes and transfers, the multipliers are likely to overstate their effects. Thus, discretionary fiscal policy has played at most a small role in recoveries.

Our estimates imply that automatic changes in fiscal policy are more important. As described in Section 2, there are consistent and substantial changes in the automatic component of the surplus during recessions. As a result, the OLS estimates suggest that the automatic movements in fiscal policy after peaks add an average of 0.6 percentage points to growth in the first year of recoveries, and the DRI model suggests that they add 0.9 percentage points.

27. Our calculations assume that the changes in the real funds rate resulting from the Federal Reserve's consistent responses to recessions have the same real effects as other movements in the real funds rate. This appears to be a reasonable approximation, for two reasons. First, since the Federal Reserve adjusts the real funds rate rapidly to economic developments, both the recession-related and the remaining part of movements in the real funds rate have a large unanticipated component to them. Second, for the real interest rate (in contrast to the money supply), there is no clear reason for unanticipated and anticipated changes to have very different effects. As described in Section 2, the fact that systematic Federal Reserve policy affects the nominal funds rate, together with the fact that the direction of the effect is that expansionary policy lowers the nominal rate, strongly suggests that the systematic component of policy affects the real rate as well. It is possible, of course, that a larger movement in the money supply is needed to bring about a given change in the real funds rate when the movement is the result of systematic policy; but this is not relevant to our calculations.

Together, these results imply that policies undertaken during recessions are crucial to strong recoveries. All three sets of estimates suggest that without these policies, growth during the first year of recoveries would be anemic. The OLS estimates imply that it would have averaged 2.1%, the IV estimates imply 2.0%, and the DRI estimates imply 1.4%. Our results suggest that the main source of the weak growth that would occur without the postpeak changes in policy is the monetary tightening that usually occurs before peaks. The first column of Table 6 suggests that prepeak monetary policy reduces growth in the year after troughs by roughly 1 percentage points.

Nonpolicy factors appear to have little effect on growth in the year following troughs. The final column of Table 6 shows the amount of above-average growth not accounted for by prepeak or postpeak policies. While this residual varies somewhat depending on the multipliers used, it is typically small, implying that growth would have been approximately average during the first year of recoveries in the absence of policy changes. Thus, nothing in our analysis suggests that output would continue to drop indefinitely without governmental intervention. Similarly, nothing suggests that the economy possesses strong self-correction mechanisms that would cause it to quickly make up the output losses that occur during recessions.

Considering slightly longer horizons strengthens the case that monetary policy is critical to recoveries. For example, output growth (at an annual rate) in the fifth and sixth quarters of recoveries averages only 0.1 percentage points above normal; but the OLS multipliers imply that postpeak monetary policies contribute 1.4 percentage points to annual growth in these quarters, the IV multipliers imply that they contribute 3.1 percentage points, and the DRI multipliers imply that they contribute 0.2 percentage points.[28]

28. We also investigated the implications of using multipliers from the MPS model maintained by the Federal Reserve Board. The MPS model implies very gradual, but very persistent, effects of monetary policy on real output. This response occurs mainly because the nominal long-term rate is assumed to adjust gradually to the nominal short-term rate. This gradual adjustment causes the real long-term rate to fall essentially linearly in response to a permanent change in the real funds rate. As a result, the change in the funds rate has very little effect on output in the first year and a nearly permanent effect on output *growth* thereafter. Therefore, the model suggests a very different view of the source of recoveries than any of the estimates considered in the text. The MPS multipliers, like the OLS and DRI ones, imply that fiscal policy contributes moderately. But the extreme lags in the effects of monetary policy in the model mean that the monetary expansions undertaken during recessions have only a modest effect on growth during the first year of recoveries. As a result, the model implies that nonpolicy factors are the critical source of recoveries.

4.3 IMPLICATIONS OF AN ALTERNATIVE BASELINE

The preceding analysis takes a constant real federal funds rate as the baseline monetary policy and, therefore, describes output movements resulting from changes in the real funds rate as being due to monetary policy. But there are other possible baselines. In a conventional textbook model where the Federal Reserve is targeting the growth rate of the money supply, nominal interest rates would decline in a recession because of the fall in income and because of the increase in the real money supply resulting from the fall in inflation. The effect on real interest rates would be mitigated, however, by the decline in expected inflation.

The magnitude of these effects depends on the interest and income elasticities of money demand. Following the standard approach in the money demand literature, assume that money demand takes the form

$$\ln m_t = a + b \ln y_t - c \ln i_t + - d\pi_t + \lambda \ln m_{t-1}, \tag{1}$$

where m_t is real money balances, y_t is real income, i_t is the nominal interest rate, and π_t is quarterly inflation. Equation (1) implies that a decline in y with m held fixed reduces $\ln i$ by $(b/c)\Delta \ln y$ and, therefore, reduces i by approximately $(b/c)[\Delta \ln y]i$. Similarly, it implies that a fall in the price level with the nominal money stock held fixed reduces i by approximately $(1/c)(1 - d)[\Delta \ln p]i$ in the initial period and $[(1 - \lambda)/c][\Delta \ln p]i$ in subsequent periods. Goldfeld and Sichel (1990), Judd and Scadding (1982), and others suggest that reasonable values of the parameters in Equation (1) are $b = 0.12$, $c = 0.05$, $d = 0.7$, and $\lambda = 0.8$. These values imply long-run income and interest elasticities of 0.60 and -0.25, respectively.

To estimate the effect of the recession on interest rates when money growth is held fixed, we need measures of the falls in output, prices, and expected inflation due to the recession. We compute the fall in output between the peak and the quarter following the trough due to the recession (the $\Delta \ln y$ term in the expression above) simply as the sum of the shortfalls of quarterly output growth from its average value of 2.75%/4, or 0.69%. These values of the change in y, together with the estimates of b and c and the actual values of the nominal interest rate, imply that if the Federal Reserve did not adjust the path of the money stock, the falls in real income would reduce the nominal interest rate by an average of 0.9 percentage points over the period from the peak to one quarter after the trough.

To find the effect of the recession on the price level, we compare the actual path of the price level with what would have occurred if

inflation had simply held steady at the value of expected inflation implied by our estimated real federal funds rate as of the peak quarter. These estimates imply that the increases in the real money supply coming from the declines in inflation reduce the nominal interest rate by an average of 0.6 percentage points. Thus, the textbook self-correction mechanism of downward pressure on prices increasing real money balances and, therefore, lowering interest rates accounts for only a small part of the interest rate declines during recessions.[29]

Finally, the estimates of expected inflation implied by our real funds rate series suggest that expected inflation declines by an average of 1.4 percentage points between the peak and the quarter after the trough. The fact that the direct effects of the declines in expected inflation more than offset the effects of the increases in the real money stock resulting from the falls in inflation is consistent with the evidence of De Long and Summers (1986) that price flexibility is on net destabilizing in the U.S. economy.

Combining these three figures, our results suggest that if the Federal Reserve were holding money growth fixed, the behavior of income, prices, and expected inflation would lead to only moderate falls in the nominal interest rate between the peak and the quarter after the trough and have essentially no effect on the real interest rate. Thus, choosing a baseline for monetary policy that takes account of these effects would not affect our conclusion that monetary policy is the primary engine of recovery from recessions.[30]

5. *Stabilization and Persistence*

Our analysis of the contribution of macroeconomic policy to output growth can be used to address two other issues. First, we can examine the overall role of macroeconomic policy in economic stabilization. Even if policy has contributed to recoveries, it is useful to consider its

29. An alternative way of computing the effect of the recession on the price level would be to combine the figures for the decline in output with standard estimates of the Phillips curve (for example, Gordon, 1990). Doing this yields a slightly larger implied reduction in nominal interest rates.

30. By describing any changes in the real interest rate that are not due to changes in income, prices, and expected inflation as changes in monetary policy, the baseline policy implicit here is money targeting that accommodates any shifts in the money demand function. A natural alternative choice of the baseline would be pure money targeting. We do not pursue this possibility for two reasons. First, there have been large shifts in money demand, most of which were largely accommodated by the Federal Reserve. Second, the results are likely to be sensitive to the specification of what it means for the Federal Reserve to continue with "normal" money growth during recessions.

effects in other periods. Second, we can investigate the extent to which the persistence of overall output movements derives from the persistence of policy changes and their effects.

5.1 THE OVERALL RECORD OF STABILIZATION POLICY

Our estimates of the contributions of policy to output growth can be used to construct estimates of what the path of real output would have been if policy had held the real interest rate and the high-employment surplus to GDP ratio constant. Figure 5 shows the implied paths of real

Figure 5 OVERALL EFFECTS OF ACTIVE POLICY

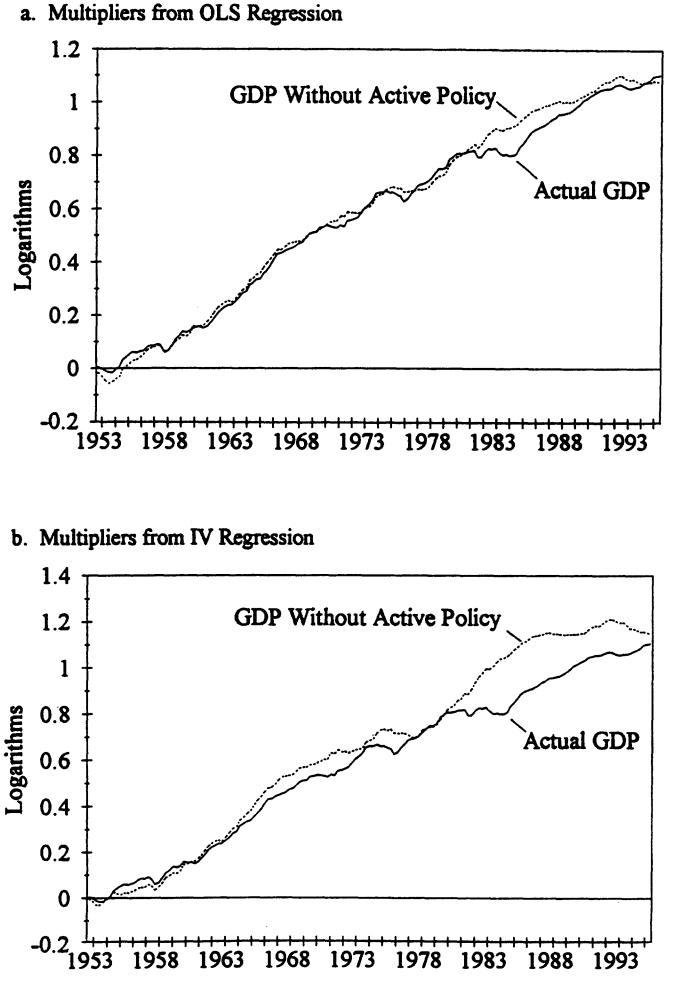
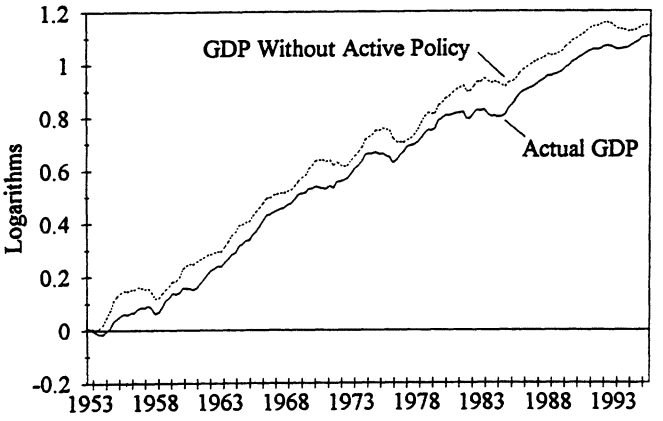


Figure 5 (continued)

c. Multipliers from DRI Model



output under policies of a constant high-employment surplus to GDP ratio and a constant real funds rate, together with its actual path, for the three sets of multipliers. Since, as described earlier, monetary policy cannot in fact hold the real rate constant indefinitely, no great significance should be attached to the longer-term movements in the difference between the implied and actual paths. But the shorter-term swings can be interpreted as largely representing the effects of policy.

The OLS multipliers suggest that departures from the baseline policies have generally made recessions more severe, and recoveries more rapid, than they otherwise would have been. The estimates imply, for example, that the 1960 and 1969 recessions would not have occurred at all under the baseline policies, and that the output declines in the 1973 and 1981 recessions would have been half as large as they actually were. These estimates suggest that the one major success of active policy occurred in the last few years: Since growth has been weak despite a falling real funds rate, the estimates imply that there would have been a protracted and severe recession under the baseline policies.

The IV multipliers suggest a generally similar picture. They imply, however, that in addition to preventing a major downturn over the past few years, active policy prevented extended periods of approximately zero growth in the mid-1950s, mid-1970s, and mid-1980s. Finally, the DRI multipliers imply that the 1953 and 1960 recessions would not have occurred under the baseline policies, that the 1969 and 1973 recessions would have occurred later and been slightly more severe,

and again that the 1990 recession would have been much longer and larger.

This overall record of stabilization policy suggests that policy, especially monetary policy, helped to both start and stop postwar recessions. Since both inflation control and output growth are generally considered valid goals of macroeconomic policy, it would be hard to find consensus that either of these uses of policy was inappropriate. Given that throughout most of our sample period inflation was at levels that (both at the time and in retrospect) were viewed as excessive, it is arguable that low output growth was likely to be needed at some time to reduce inflation. The only issues concern the timing and speed of disinflation. Similarly, when output growth is low and inflation is low or falling, most economists would probably agree that expansionary policy is appropriate. Thus, the tightening and loosening of policy around recessions and recoveries are hard to question.

In contrast, expansionary policy taken in face of a strong economy and of inflation that is high or rising might be generally viewed as mistaken. By this standard, three times stand out as periods when policy was overly expansionary: 1967–1968, 1972, and 1986–1987. Growth was above normal in all three periods. Unemployment was also low to moderate in each case: 3.6% in 1967–1968, 5.5% in 1972, and 6.5% in 1986–1987. Yet both the OLS and IV multipliers imply that policy was adding considerably to real growth in all three periods. Averaged over these five years, the OLS multipliers imply that monetary policy contributed 1.2 percentage points to real growth, and discretionary fiscal policy contributed 0.5 percentage points. The same numbers for the IV multipliers are 2.4 percentage points for monetary policy and 0.2 percentage points for discretionary fiscal policy. The DRI multipliers also imply that monetary policy contributed substantially to growth in these years, with an average contribution of 0.6% per year. These multipliers imply, however, that discretionary fiscal policy had an offsetting effect of -0.7 percentage points, so that the overall contribution of policy was essentially zero.[31]

The nature of the expansionary policies differed across the episodes. The 1967–1968 and 1986–1987 episodes involved moderately stimula-

31. As Figure 4 shows, the DRI model implies that a decrease in the surplus to GDP ratio has a negative effect on growth beginning in the fifth quarter after the decrease. These delayed contractionary effects are the main source of the model's implication that fiscal policy reduced growth in 1967–1968, 1972, and 1986–1987. When these effects are omitted, the DRI multipliers imply that discretionary fiscal policy contributed just -0.1 percentage points to average growth in these years. The delayed contractionary effects of fiscal policy are also the main source of the estimated moderate contribution of prepeak automatic and discretionary fiscal policy to output growth in recoveries reported in Table 6.

tive policies at relatively late stages in expansions. The stimulus in the 1967–1968 period stemmed from reductions in the high-employment surplus in 1965 and 1966 and from an absence of consistent changes in the nominal federal funds rate in the face of rising inflation over the period 1965–1967. The stimulus in 1986 and 1987 was the result of a general downward trend in both the high-employment surplus and the nominal federal funds rate, together with slight upward movements in inflation. The 1972 episode, on the other hand, resulted from extremely expansionary monetary policy in the wake of the mild 1969 recession. In the three quarters after the recession ended in the second quarter of 1970, the nominal federal funds rate fell from 7.88% to 3.86%. It fluctuated irregularly over the next year, reaching a low of 3.54% in the first quarter of 1972. Since inflation was, if anything, rising over this period, the result was that monetary policy was extremely stimulative. Despite the differences in the nature of policy across these episodes, they are united by the fact that expansionary policies stimulated an already strong economy and, thus, set up the inflation that ultimately induced later tightenings.

5.2 THE PERSISTENCE OF OUTPUT FLUCTUATIONS

A large recent literature examines the persistence of output movements. The general conclusion of this research is that quarterly changes in real GDP are highly persistent. The usual presumption in interpreting these findings, either implicit or explicit, is that output movements driven by shifts in aggregate demand will not be very persistent (see, for example, Nelson and Plosser, 1982, and Blanchard and Quah, 1989). As a result, the conclusion that has been drawn from these studies is that supply-side disturbances must be a crucial source of fluctuations.

Our examination of postwar monetary and fiscal policies and their contributions to output movements suggests that the presumption underlying this conclusion should be reexamined. There are extended periods when macroeconomic policy—particularly monetary policy—is either generally expansionary or generally contractionary. And our estimates of policies' effects imply that the impact of any given policy movement on the economy is quite protracted. Thus, monetary and fiscal policies' contributions to output movements may be highly persistent.

To examine this issue formally, we perform a bivariate experiment analogous to the univariate one performed by Campbell and Mankiw (1987a). Campbell and Mankiw estimate some simple processes for overall output growth, and then use these processes to address the question of how forecasts of the path of output should be revised in response to an output innovation. Analogously, we decompose output

growth into the estimated contributions of discretionary policy and of other factors and then ask how one should revise the forecasted path of output in response to innovations in each of these two components.

Specifically, we estimate a bivariate vector autoregression (VAR) using these two variables with four lags and then find the effects of shocks to each of the variables. The sum of a shock's effects on policy-related and nonpolicy-related growth represents its effect on the path of output growth. Cumulating these growth effects then gives its effect on the path of the log of total output.

The results suggest that output innovations stemming from macroeconomic policies have considerably more persistent effects than innovations coming from other sources. Consider, for example, the results when the OLS multipliers are used to estimate the component of output growth that is due to monetary policy and discretionary fiscal policy and, thus, to decompose output growth into policy and nonpolicy components. The VAR implies that the overall output effect of a 1% shock to the nonpolicy component of output peaks at 1.3% two quarters after the shock and then gradually declines. The effect returns to 1% after six quarters and is 0.7% after 12. This relatively low persistence occurs because the policy component of output growth responds negatively to the nonpolicy component: Policymakers respond to positive output innovations by tightening. The overall effect of 0.7% after 12 quarters, for example, reflects a contribution of +1.5% from the nonpolicy component and an offsetting contribution of −0.8% from the policy component.

The results imply that independent changes in the policy component of output growth, in contrast, have extremely persistent effects. A 1% innovation raises overall output by 2.3% after 4 quarters and 2.4% after 12. This strong persistence arises both because the policy component of growth is highly serially correlated and because the nonpolicy component is essentially unresponsive to the policy component. The strong serial correlation of the policy component, in turn, stems from the facts that the estimated effects of real interest rate changes are quite protracted and that the real interest rate reverts to its mean only slowly.[32]

32. It is of course possible that the output effects of a shock to the policy component of output are eventually reversed. Indeed, our procedure for estimating the effects of policy imply that if shocks to the real interest rate and the surplus-to-GDP ratio are eventually completely undone, the long-run effect of a shock to the policy component of output is zero. As is well known, however, data from moderate time spans can shed little light on the effects of innovations at long horizons, and conventional estimates of the persistence of fluctuations (such as Campbell and Mankiw's) reflect effects at moderate rather than long horizons (see, for example, Christiano and Eichenbaum, 1990). For that reason, we focus on the effects of innovations over several years and make no attempt to estimate their effects at very long horizons.

Using the IV and DRI multipliers to decompose output growth into the policy and nonpolicy components produces generally similar results. The IV multipliers imply that a 1% innovation to growth stemming from sources other than policy raises the level of output after 12 quarters by 0.8%, while a 1% innovation to the policy component raises output after 12 quarters by 1.9%. With the DRI multipliers, the figures are 1.2% and 2.4%. Thus, these alternative sets of multipliers continue to imply that the policy-induced output movements are considerably more persistent than other output movements.

Taken together, the results using all three sets of multipliers suggest that the source of the high degree of persistence of aggregate output fluctuations may be quite mundane. Rather than reflecting fundamental characteristics of fluctuations, it may simply reflect the fact that shifts in macroeconomic policy and their effects on the economy are often quite protracted.[33]

6. *Conclusions*

Our central conclusion is that monetary policy alone is a sufficiently powerful and flexible tool to end recessions. In nearly every postwar recession, policymakers have been quick to discern the onset of recession and have responded to the downturn with rapid and significant reductions in nominal and real interest rates. Plausible estimates of the size and speed of the effects of these interest rate cuts suggest that they were crucial to the subsequent recoveries.

Discretionary fiscal policy, in contrast, does not appear to have had an important role in generating recoveries. Fiscal responses to economic downturns have generally not occurred until real activity was approximately at its trough. In addition, these responses have generally been limited to moderate actions that could be undertaken without congressional approval or for which congressional approval was easy to obtain. As a result, our estimates suggest that fiscal actions have contributed only moderately to recoveries. Policymakers have succeeded in making large adjustments in fiscal policy in response to recessions only in unusual circumstances. Thus, the historical record contradicts the view that fiscal policy is essential to ending recessions or ensuring strong recoveries.

While monetary policy has been crucial to postwar recoveries, our results suggest that the overall record of discretionary monetary and

33. Our results are consistent with the findings of Campbell and Mankiw (1987b) that the component of output movements that is correlated with movements in the unemployment rate is at least as persistent as general output fluctuations. West (1988) shows that a largely conventional model can imply that fluctuations driven by aggregate demand movements are relatively persistent.

fiscal policy is less impressive. One apparent error that has been made on several occasions is for policymakers to become overly concerned about the possibility of weak growth during expansions or excessively optimistic concerning the prospects for expansion without triggering inflation and, therefore, to adopt excessively expansionary policies. The common pattern during recoveries is for there to be modest increases in interest rates and little change in the high-employment surplus. However, in periods where policymakers have been concerned about low growth, they have often undertaken major fiscal expansions or have kept nominal interest rates constant or declining in the face of rising inflation. On several occasions, such expansionary policies appear to have contributed substantially to above normal growth.

Finally, our analysis of the effects of policy may help to explain the persistence of movements in aggregate output. We find that the large degree of persistence of movements in real GDP appears to result to a considerable extent from extremely high persistence of the contribution of policy changes. Thus, policy is not only the source of postwar recoveries, but also the source of the puzzling serial correlation in aggregate output.

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Comment

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1. Introduction

This paper advances a startling and intriguing proposition: Active, systematic monetary policy ended postwar recessions. It is the latest in a series of provocative papers in which Christina and David Romer have revived some of the methods and views of Friedman, and Friedman and Schwartz.

In evaluating this work, I am naturally drawn to Friedman's critics. In particular, Tobin's (1970) "Post Hoc Ergo Propter Hoc" and Kareken and Solow's (1963) "Lags in Monetary Policy" outlined the issues that, formalized by Sims (1972) and others, today define the standard methodology for evaluating monetary policy. They complained about *causal* inferences from Friedman's historical analysis and regressions. They demonstrated the central *identification* problems. In particular, Tobin showed how models with no structural or *policy-invariant* effects of money on output are consistent with Friedman's evidence. They complained that Friedman refused to write down any *models* or tell us what the identifying restrictions *are*.

These issues are at least 30 years old. Like the prisoners who have told jokes so often they refer to them by number, I should be able to say "Identification," "Exogeneity," and "Invariance" to provoke knowing laughter. But after so many years, perhaps we remember the numbers but forget the jokes.

2. Identifying "Policy Actions"

Much of this paper presents a history of "policy actions" in recessions. This work has many precedents. Among others, Kareken and Solow discussed the "inside lag" of monetary policy at length. Like Romer and Romer, Kareken and Solow found that the Fed typically perceives the onset of a recession quickly. They also found that the Fed often delays a response out of fear of still high inflation.

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Romer and Romer's history basically collects statements by Federal Reserve officials about the state of the economy, and what policies the officials thought appropriate. For example, here is what Romer and Romer say about *annus horribilis* 1980:

> At every meeting of the FOMC from July 1979 through the Summer of 1980, the Federal Reserve believed that a recession was either under way or was imminent. Concern about inflation and money growth, however, prevented policymakers from moving to lower interest rates until the spring of 1980. Beginning in April 1980, just after the actual peak in real GDP in the first quarter of 1980, the combination of weak money growth and unfavorable news about real output caused the FOMC to lower the federal funds rate sharply. The FOMC did not want to "exacerbate recessionary tendencies and the economy" and was concerned about "the risk that the contraction would prove to be deeper than widely expected."

The historian in me wants to question this history, e.g., by asking how a collection of quotes culled from the FOMC minutes document statements like "the combination of weak money growth and unfavorable news about real output *caused* the FOMC to lower the federal funds rate sharply" or how this history is consistent with the last Romer and Romer (1989) *Macro Annual* paper and with the conventional wisdom that the Fed *caused* rather than reacted to events in 1979–1980.

Instead, let's take the history at face value and ask, what can we learn from it? Well, I learned that Fed officials are about as well informed about the economy as the average number-watching economist and that they seem to advocate countercyclical policy. This is useful evidence. As we will see later, whether, how fast, and based on what information the Fed reacts to output and inflation is very important for understanding the time series. VARs yield fragile estimates of the Fed's reaction function, so corroborating historical evidence is helpful.

But what does this history tell us about the *ends of recession*? It documents the Fed's attempts at *systematic* policy, actions that the Fed takes *predictably* as a function of output and inflation. It's not clear that systematic policy has any real effect at all. If it does, it's not clear why we need to look for policy *actions*. My old undergraduate ISLM textbook trumpets "automatic stabilizers" as the great success of postwar policy, precisely because they *don't* require conscious recognition or action by policymakers. Monetary, nominal GNP, or interest rate targeting rules are often advocated to work in the same way. Finally, *predictable* actions are precisely those actions whose correlations with other events have dubious causal interpretations. As Sims (1992) asks, does the cock's crow cause the sunrise? For this reason, historical and

econometric analyses search for innovations or unpredictable movements.

Thus, "policy" could have "ended recessions" with no "policy actions," and "policy actions" could have occurred without helping to "end recessions." The pure history of policy actions can tell us that the *Fed* reacted to *output* and inflation, but doesn't tell us if *output* reacted to the *Fed*. Hence, it does not teach us much about what caused the ends of recessions.

3. *Measuring the Contribution of Policy*

Since the history is inconclusive, the heart of this paper is a set of *calculations* of how much postpeak declines in real rates increased subsequent output. The crucial ingredient of these calculations are *econometric estimates* of dynamic "policy multipliers."

3.1 OLS ESTIMATES

Romer and Romer first run OLS regressions of output growth on the real federal funds rate,

$$\Delta y_t = \sum_{j=1}^{8} \beta_{yfj} ff_{t-j} + \sum_{j=1}^{8} \beta_{yyj} \Delta y_{t-j} + \epsilon_t, \tag{1}$$

and on the high-employment budget surplus. They use this equation to simulate output under different paths for the federal funds rate.

This kind of policy analysis also has a long history. Most notably, Anderson and Jordan (1968) ran similar regressions and calculated output paths under alternative policies. They obtained similar multipliers and reached similar monetarist conclusions. Their paper even has "Monetary and Fiscal *Actions*" in the title. This is known as the "St. Louis Fed" approach, in their memory. (See the discussion in Sargent's 1979 textbook, p. 287.) Anderson and Jordan used monetary aggregates rather than an estimate of the real fed funds rate,[1] and omitted lagged output, but these differences are irrelevant for what I have to say.

1. One can say both good and bad things about this choice. Here's a small sample. Good: The real federal funds rate can only change in response to a monetary tightening if money has some nonneutral effect. In the end of a hyperinflation, the real interest rate, properly measured, would not change, so no change in monetary policy would be registered. Bad: Of course we are now running one endogenous variable on another. The real funds rate is a complicated and imperfectly measured construct; it is undoubtedly determined by a complex lag of monetary policy and real events; and, thus, it is dubiously under the Fed's control. See Romer and Romer's plot 1: It is sometimes measured at *minus* 4%, which seems unlikely.

Kareken and Solow (1963) already criticized this method:

> Imagine an economy buffeted by all kinds of cyclical forces,... Suppose by heroic... variation in the money supply... the Federal Reserve manages deftly to counter all disturbing impulses and to stabilize the level of economic activity absolutely. Then, an observer... would see peaks and troughs in monetary change accompanied by a steady level of aggregate activity. He would presumably conclude that monetary policy has no effects at all, which would be precisely the opposite of the truth.

We tend to make this kind of point quantitatively today, by constructing models and seeing what aspects of those models are recovered by our empirical procedures.

3.1.1 Contemporaneous Shock Identification Suppose output is affected by the monetary policy variable m (a monetary aggregate, the real or nominal federal funds rate, or other indicator of policy) and other serially correlated disturbances, so

$$y_t = \sum_{j=0}^{\infty} a_{ymj} m_{t-j} + \sum_{j=1}^{\infty} a_{yyj} y_{t-j} + \epsilon_t. \tag{2}$$

Suppose the Fed reacts to output, as the Kareken and Solow's and Romer and Romer's historical evidence suggests,

$$m_t = \sum_{j=1}^{\infty} a_{mmj} m_{t-j} + \sum_{j=0}^{\infty} a_{myj} y_{t-j} + \delta_t. \tag{3}$$

Now we can solve Equation (3) for output, yielding

$$y_t = \frac{1}{a_{my0}} m_t - \sum_{j=1}^{\infty} \frac{a_{mmj}}{a_{my0}} m_{t-j} - \sum_{j=1}^{\infty} \frac{a_{myj}}{a_{my0}} y_{t-j} - \frac{1}{a_{my0}} \delta_t. \tag{4}$$

Note that Equations (2) and (4) have exactly the same list of right-hand variables! Will OLS recover Equation (2), the effect of money on output, or Equation (4), the Fed feedback rule? Well, OLS sets the residual orthogonal to the right-hand variables. But since contemporaneous m appears in the y equation and vice versa, *neither* ϵ nor δ is orthogonal to the right-hand variables.

This is a classic simultaneous equations system. To recover estimates of the structural parameters, we need an *identifying assumption*. Romer and Romer's assumption is that contemporaneous m does not affect y,

$a_{ym0} = 0$. Given this additional assumption, OLS *does* recover the structural Equation (1). But consider what happens if their identifying assumption is wrong. What if m *can* affect y within the quarter? Then, OLS recovers *mongrels*, combinations of the structural output effects and the Fed feedback rule. For example, if $\sigma_\delta^2 = 0$, then OLS estimates recover the feedback rule and have nothing to do with the effects of m on y!

Romer and Romer treat these as minor issues and note the results are similar if contemporaneous m is included. But the issue is *central* in deciding what OLS has recovered in either case. If both m and y can affect each other within the quarter, regressions with and without current m will both be mongrels. And if the estimated multipliers look a lot like one's priors about the effects of m on y, they also look a lot like my priors about the negative of the Fed feedback rule!

Romer and Romer have in fact estimated the first row of a bivariate vector autoregression, assuming a recursive orthogonalization of the contemporaneous error covariance matrix with output first. This identification issue bedevils the VAR literature, and so much thought has gone into it. Most VARs using monetary aggregates make the opposite assumption—they presume that the Fed cannot see and act quickly enough to make m respond to y within the quarter rather than the other way around. Romer and Romer are primed to contribute constructively to this debate; their historical analysis can tell us a lot about whether the identification stories used in the VAR literature hold water. They should do so.

3.1.2 Omitted Variables Suppose now that other variables z_t are helpful in forecasting output and that the Fed watches them as well. To make matters simple, ignore contemporaneous correlation:

$$y_t = \sum_{j=1}^{\infty} a_{ymj} m_{t-j} + \sum_{j=1}^{\infty} a_{yyj} y_{t-j} + \sum_{j=1}^{\infty} a_{yzj} z_{t-j} + \eta_t \tag{5}$$

$$m_t = \sum_{j=1}^{\infty} a_{mmj} m_{t-j} + \sum_{j=1}^{\infty} a_{myj} y_{t-j} + \sum_{j=1}^{\infty} a_{mzj} z_{t-j} + v_t. \tag{6}$$

What does this system predict for the projection of y on lagged y and m, Equation (1)? The error term is $\epsilon_t = \sum_{j=1}^{\infty} a_{yzj} z_{t-j} + \eta_t$. By virtue of Equation (6), lags of m are correlated with this error term, so Equation (1) yields inconsistent estimates of the structural effects a_{ym} and a_{yy} in Equation (5).

Romer and Romer acknowledge but belittle the possibility of "downward bias" in the estimate of a_{ym}. However, the problem is really *identification*. The estimated lag polynomials in a regression of y on m are *mongrels*, combinations of all the lag polynomials in the system. One can obtain Romer and Romer's regressions from systems in which money has *no* effect on output; modern versions of Tobin's "Post Hoc Ergo Propter Hoc" example will deliver this result. Thus, this "bias" can be upward or downward or both (at different lags).

Are omitted variables quantitatively important? The question is simply whether one can improve output forecasts by using variables beyond lags of output growth and federal funds changes, and whether the Fed watches more than these variables in setting monetary policy. Again, the VAR literature has faced this problem. Many other variables *do* significantly help to predict output growth and the path of monetary policy variables. "Level" variables, including the consumption/output ratio, the term spread, and the default spread are prime examples (see Cochrane, 1994b). And analysis of the Fed's operating procedures and history, by Romer and Romer and others, convinces one that the Fed obsessively watches an enormous number of economic variables when setting policy. Thus, this is not an in-principle argument: A few easy regressions, the lessons of a large and well-known literature, and Romer and Romer's own historical analysis are convincing that left-out variables are a serious problem in Equation (1).

Finally, channels for mongrel coefficients beyond Fed feedback may be even more important. For example, lower output leads to lower money demand and, hence, lower interest rates. The standard real business cycle model predicts a dynamic relation between low output and low (real) interest rates in response to a low technology shock.

3.2 INSTRUMENTAL VARIABLES ESTIMATES AND ROMER-ROMER DATES

To mitigate the previous problems with Equation (1), Romer and Romer estimate it using the Romer–Romer (1989) dates and the Boschen–Mills index as instruments. The results are quite similar to the OLS results.

But the Boschen–Mills index is just another measure of the stance of monetary policy, so there is no reason it should be less correlated with the error term than the federal funds rate.

The Romer–Romer index is "a dummy variable equal to one on dates of apparent shifts by the Federal Reserve to policies designed to reduce inflation...." But it is hard to believe that the Fed ignores output in making such a decision. Romer and Romer's reading of the FOMC minutes is pretty persuasive to the contrary!

This is an important issue, and I wish Romer and Romer were clearer about what their dates mean. As I read it, they believe that the Fed follows feedback rules, which I can simplify for the purposes of this discussion to something like

$$m_t = a_i(L)y_t + b_i(L)\pi_t, \cdot\ i = \text{"growth" or "inflation."}$$

Sometimes, the Fed is more concerned with fighting recessions or maintaining output growth. This is more than just a time in which inflation is low, so that the contribution of the $b(L)\pi_t$ term is low; this is a regime in which $b_i(L)$ itself is small or zero, so that even high inflation would not spur the Fed into action. At other times, the Fed is more concerned with reducing inflation. Again, this is more than just a time in which output is high so that an $a(L)y_t$ term is small; it is a regime in which the $a_i(L)$ coefficients are small or zero. A Romer–Romer *date*, then, is a time in which the Fed *switched* from the large $a_i(L)$ to the large $b_i(L)$ regime.

Here is the fundamental problem. To use these dates as instruments, it does not matter whether the new *regime* places no emphasis on output—whether $a_i(L) = 0$ in the new regime—it matters whether the *change* in regime is made without regard to the current state of output, anticipated future output, or other variables correlated with output. *This* is what I find hard to believe. No disinflation event came in the depth of a depression! It is the crucial piece of evidence and it is not addressed by Romer and Romer's historical analysis.

3.3 IDENTIFICATION OF POLICY-INVARIANTS AND AN APPEAL FOR THEORY

Even if the regression is impeccably specified, a fundamental *identification* ambiguity remains and requires us to spell out our monetary *model* or compare data from different *regimes*.

Kareken and Solow knew of the problem: "...One cannot deduce conclusions about the effects of monetary policy or about their timing without making some hypothesis, explicit or implicit, about what the course of events would have been had the monetary authorities acted differently." Tobin showed us how a model in which money is totally passive can account for Friedman's reduced-form evidence. Sargent (1976) formalized the point more recently.

Here is a simple example. Suppose the structural relation between a monetary policy variable m_t and output y_t is given by

$$y_t = a_{yu}(L)(m_t - E_{t-1}m_t) + a_{ym}(L)m_t + a_{y\epsilon}(L)\epsilon_t,$$

and the feedback rule is given by

$$m_t = a_{my}(L)y_t + a_{m\delta}(L)\delta_t.$$

(To keep the algebra simple and to emphasize that orthogonalization is not the issue, suppose that $a_{my}(0) = 0$, $a_{y\epsilon}(0) = a_{m\delta}(0) = 1$.)

This model nests two interesting special cases: (1) If $a_{ym}(L) = 0$, then only unanticipated money affects output. The path of output is *completely* unaffected by the Fed's policy rule, $a_{my}(L)$ and $a_{m\delta}(L)$; alternative postpeak paths for the funds rate have *no* effects on output; and the *moving-average* representation (impulse-response function) is policy-invariant. (2) If $a_{yu}(L) = 0$, then there is no distinction between anticipated and unanticipated money; different feedback rules *can* stabilize or destabilize output; and the *autoregressive* representation is policy-invariant.

Unfortunately, the Appendix proves the following proposition: $a_{yu}(L)$ *and* $a_{ym}(L)$ *are not separately identified.*

No regression can distinguish whether the true "policy multiplier" is that estimated by Romer and Romer or *zero*. We *must*, impose some theory or "identifying restriction" to get an answer.

Romer and Romer implicitly assume that there is *no* distinction between anticipated and unanticipated money: $a_{yu}(L) = 0$. In this case (and with the orthogonalization assumption, and the absence of other variables) the regression of y on lagged m and y does yield the structural effects of money, $a_{ym}(L)$ (see the Appendix).

Is this assumption sensible? Many economists do seem to believe that anticipated or systematic policy can have real effects. However, some monetary policies have no effects: the ends of hyperinflations, currency revaluations, and policies in countries with high and variable inflation. Thus, we need a view of money that explains why monetary policy *does* have effects in some circumstances and *does not* in others. Most monetary models that can explain both sets of observations give no role to systematic policy (beyond inflation-tax effects). And there are few clean experiments to help us, aside from reforms and hyperinflations. The year 1979 is often trumpeted as an announced deflation, but consumers had been subjected to many announcements; only if everyone *believed* the announcement does it count. One needs to document the state of people's expectations, not the muddy, contradictory, and wolf-crying statements of Fed officials. For these reasons, I venture that few of us would go so far as to assume that there is *no* distinction between anticipated and unanticipated monetary policy.

I don't want to rehash the old arguments over anticipated versus unanticipated monetary policy. Perhaps Romer and Romer *do* want to assume there is no distinction. The point is that the assumption identifying what is policy-invariant is *crucial*, so it needs to be explicit and linked to a monetary *theory* that can explain the wide variety of correlations between real and monetary variables that we observe. Do Romer and Romer want everyone who does not immediately buy their identifying assumption to dismiss their paper? Then they must *argue* for it.

Even in reading history, the example shows how we need to carry along some other variable, be it the way agents form expectations, the average duration of nominal contracts, or the costs of printing new menus, that differentiates the United States in 1979 from Germany in 1921 or Brazil in 1994. And we need a monetary *theory* (or even a *view* or a *story*) to tell us what that state variable is.

3.4 DO THE MULTIPLIERS MAKE SENSE?

Finally, look at the multipliers in the Romer's Figure 3. Can these be the structural effects of monetary policy?

The responses are *permanent* and *delayed*. No story for the effect of money on output that I know of produces such responses. If monetary policy does indeed have the plotted effects, we have *absolutely no idea* how it can do so!

The responses are *big*. A one percent decline in real interest rates causes up to a 3% rise in output. If one thinks like a Keynesian for a minute, monetary policy is alleged to affect output through its effect on investment. Since investment is about 10% of output, these estimates require a 30% rise in investment for each percentage point decline in interest rates! Even the 4–5% rise in investment required if one takes an expansive view, including housing and durables, is much larger than the investment literature suggests.

The VAR literature has a lot of experience with the federal funds–output system estimated by Romer and Romer. (Cochrane [1994b] presents a summary.) Two variable VARs yield large, permanent, and delayed impulse responses, much like Romer and Romer's multipliers. Fed funds shocks account for 50% and more of output variance. However, they also yield a "price puzzle"—prices *rise* following a tightening. This has been ascribed to the fact that the Fed also tightens when it gets news of future inflation. When more variables are added to the VAR, in particular commodity prices to control for the Fed's information about future inflation, the price puzzle disappears, but much

smaller and more *transitory* effects of a federal funds shock emerge. Federal funds shocks then account for 10% or less of output variation.

Finally, I don't think Romer and Romer take the multipliers that seriously. Why stop at constant rates versus the historical postpeak path? Why not set the real rate at minus 4% and *permanently* raise output by 20%? The real funds rate plot, the presumption that it is under the Fed's control, and the multipliers say this is possible! Well, obviously, there are constraints on what the Fed can do; perhaps such expansionary policy might eventually lose its effect on output and raise prices; perhaps the real interest rate really isn't under the Fed's control, i.e., maybe we don't really believe the multipliers.

In fact, Romer and Romer *tell* us not to take many aspects of their calculations seriously, such as the fact that the level of output is always higher under the constant interest rate rule. Well why not? If the method gives a bad estimate of the two-year response, why does it give a good estimate of the one-year response? I don't think you can have it both ways. Either this *is* or it *is not* the menu of options available to the Fed.

4. *Do Recessions Need "Ending?"*

The very title of this paper presupposes that "recessions" need "ending." Most of macroeconomics presumes that the economy reverts following a shock all by itself. For this reason, we usually focus on the shocks that *start* recessions and their propagation mechanisms, but almost never, until now, on policies and shocks that *end* recessions. In order to believe that policy actions "ended recessions," we need solid evidence that postwar recessions ended more quickly than a maintained economic model predicts. This requires an explicit statement of what the model is, and a little data analysis.

In the early 1960s, many macroeconomists thought about the world through a static ISLM model, in which "insufficient aggregate demand" could, in fact, persist indefinitely without policy action.[2] However, by the time Romer, Romer, and I were undergraduates, standard textbooks (Dornbush and Fischer) had taken the natural rate part of Friedman's 1968 address to heart, and added ad hoc dynamics by which the economy would revert to full employment.

Standard stochastic growth models in use today derive their dynamics endogenously and so make quantitative predictions about the speed with which the economy reverts following a shock. The standard model

2. The dynamics of Samuelson's multiplier-accelerator notwithstanding.

with a typical calibration[3] predicts a half-life of 9.1 quarters following a shock. This prediction is tied to parameters of the model, labor's share and depreciation in particular. If one allows for a higher than usual depreciation of 20% per year, the standard model predicts a 5.8 quarter half-life. One can, of course, advocate other models or parameterizations; one *has to* in order to think that recessions need "ending." But at least one standard model predicts that recessions end themselves, so I am not foolish in this presumption.

The *data* are also consistent with the view that recessions end themselves. The simplest example is just based on a nondurable and services consumption/private output ratio autoregression,

$$\ln \frac{C_t}{Y_t} = -0.04 + \underset{(0.036)}{0.872} \ln \frac{C_{t-1}}{Y_{t-1}} + \epsilon_t.$$

The half-life implied by the AR(1) coefficient is 5.07 quarters. More complex evidence from the VAR and forecasting literature yields similar results: Movements in output that are not matched by movements in consumption are expected to die off quickly (e.g., see Cochrane, 1994a).

Figure 1 graphs consumption and output through four recessions. The same message is apparent: Consumers *expected* the recessions to end promptly, which is why consumption is barely affected by the declines in output.

In the face of Figure 1, the only hope for the Romer–Romer story is that consumers expect recessions to end swiftly because they correctly anticipate that the Fed will step in and end them. However, to believe this, one must again believe that completely anticipated, systematic policy can have real effects: One must explain how consumers anticipate the monetary injection and its output effects, but how consumers and producers do not anticipate, expect, demand, or set higher prices.

Finally, this graph and the associated VAR evidence also shows that the "persistence" of recessions that Romer and Romer seek to explain

3. The model is

$$\max E \sum \beta^t \left(\ln(C_t) + \frac{(1 - N_t)^{1-\gamma}}{1 - \gamma} \right) s.t.$$

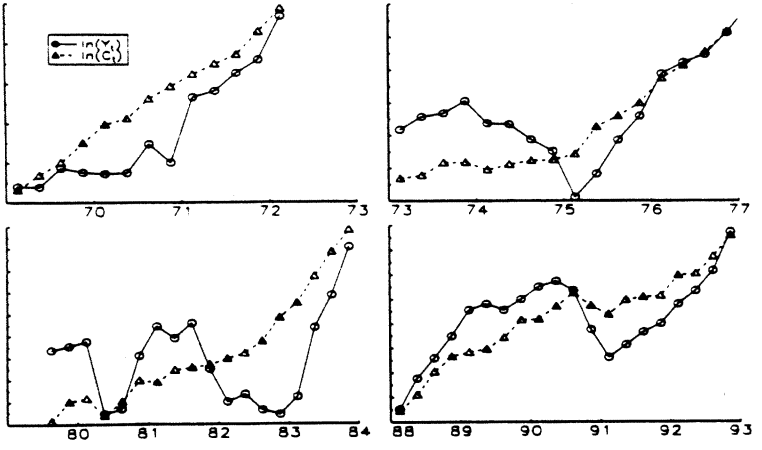
$$Y_t = (A_t N_t)^{\alpha} K_t^{1-\alpha} = C_t + I_t$$

$$K_{t+1} = (1 - \delta) K_t + I_t.$$

I calibrate to a steady-state return on capital of 6% per year, growth 2% per year, $\alpha = 2/3$, $\delta = 10\%$ per year, $\frac{2}{3}$ of a day steady-state leisure, and $\gamma = 1$.

Figure 1 LOG OUTPUT AND LOG CONSUMPTION IN FOUR RECESSIONS.

Output = GDP − government purchases. Consumption = nondurables + services. Log consumption is shifted up by mean ln(*Y*) − ln(*C*).



by persistent policy isn't there. It couldn't be. If it was, recessions wouldn't have "ended"! Also, Christina Romer's earlier work convinced me that business cycles ended just as fast in the United States before the Fed was there to step on the gas at the trough, and business cycles end just as fast in other countries with less lead-footed Feds than ours.

5. *Conclusions*

Here are some of the fundamental questions of macroeconomics:

- Can changes in the quantity of money or a swap of debt for lump-sum taxes affect output? If so, *how* and in *what circumstances*?
- Can *systematic* policy offset other shocks? If so, why are open-market operations different from currency reforms or the ends of hyperinflations?
- *Have* attempts at countercyclical policy in the postwar United States stabilized output? Or have ham-handed attempts at discretionary policy actually destabilized output?

To address these questions, the last 30 years have seen an outpouring of empirical work on the effects of monetary policy. In response to Tobin and Solow's concerns, a standard methodology has emerged.

One adds other variables to the output equation; one adds other equations to control for Fed reaction, effects of output on interest rates and so forth. One can find exogenous stochastic processes in the error terms, and plot responses. This is a VAR, of course. A small taste of this literature, selected because the references happen to be on my hard disk, includes Bernanke and Blinder (1988), Christiano and Eichenbaum (1991), Cochrane (1994b), Gordon and Leeper (1993), King and Watson (1992), Sims (1992), and Strongin (1992). This literature is making some progress: Many different identification schemes are converging on similar answers, which are, as I mentioned, quite different from Romer and Romer's multipliers.

The last 30 years have also seen an outpouring of theoretical work on monetary economics, including the development of rational-expectations, cash-in-advance, overlapping generations, and sticky-price and limited-participation theories of money and its potential nonneutralities. Public finance has produced a similarly enormous body of work evaluating the potential for a fiscal nonneutrality. This material is the heart of macroeconomic training in every Ph.D. program and standard textbooks.

Finally, a generation of monetary economists following Friedman, including Kareken and Solow, Poole, McCallum, Meltzer, and many others, has explored the lags of monetary policy, how the Fed makes decisions, and what variables are under its control.

Romer and Romer completely ignore all of this literature. There is not a mumble of an apology in the direction of Tobin and Solow's methodological concerns, much less their formal statements by Sims and others. Despite its fundamental importance for identification, there is not a hint of a reference to monetary theory, even David Romer's thesis or the collection of papers in his book with Greg Mankiw (1991). The empirical findings of the huge VAR literature go unmentioned (with one lonely exception). The paper reads as if Romer and Romer are the first to ever examine recognition, decision, and action lags at the Federal Reserve. The underlying economics, like the empirical methods, is straight from the 1960s: The paper does not ask whether the economy returns to a natural rate without policy intervention; the 1970s challenge that systematic policy might have no real effects is not even dismissed, to say nothing of the 1980s challenge from stochastic growth models that not even the beginnings of recessions need policy shocks.

The omission is so glaring it must be intentional. Here is my—quite sympathetic—interpretation. The last 30 years of macroeconomics are difficult, and the period hasn't provided firm answers to the earlier questions. VARs address Tobin and Solow's criticisms, but lots of prob-

lems remain. One has to identify shocks from the residuals, consider the potential effects of omitted variables, and worry about whether the AR representation, MA representation, or some combination is policy-invariant. Identification isn't easy. The empirical results are sensitive to specification; the standard errors are big, and one ends up with the impression that the data really don't say much about the effects of monetary policy—which may in fact be true. Theoretical models seem equally sensitive to assumptions and do not connect easily with empirical work.

We've been at this over *30 years*, and look how little progress we have made toward answering such simple questions! Can understanding monetary policy really be so difficult? Why don't we just throw all the formal methodology overboard and go read the history of obvious episodes and *see what happened*? If, like me, you have struggled with even the smallest VAR, this approach is enormously attractive.

Perhaps this is Romer and Romer's motivation. But if so, I think that Romer and Romer are falling into the same trap that ensnared the rest of us. Perhaps they started with a desire to just look at the facts. But then they wanted to make *quantitative* statements. How *much* would output have changed if the Fed followed a different policy? To do so, they reinvented the St. Louis Fed approach—an econometric technique. Despite the desire to "do something simple" (David Romer, during the discussion), they in fact evaluated policy from the autoregressive representation of an output—fed funds VAR. Now they face Tobin and Solow's classic causal and identification problems, which cannot be addressed by quotes from FOMC meetings.

Adam and Eve in the garden of Friedman, they have taken one bite of the forbidden econometric fruit. But the serpent (me) is still there, whispering "go ahead, just add a few more variables;" "you can fix that, just put in a Fed reaction function;" "Why don't you write down a few structural models and verify what your regressions are picking up?" I don't see how they can resist taking bite after bite, until they are cast out of the garden, explicitly running VARs, and working hard for identification with the rest of us.

I don't mean to disparage history. Perhaps we can read history with Solow and Tobin's criticisms in mind and try to address them with historical analysis. Historical analysis should be able to help us figure out *how* monetary policy has nonneutral effects. History contains many different *regimes*; by finding relations between money and output that are invariant across these regimes, we can help identify which relations are invariant to different *policies*. For example, Sargent's (1986) analysis of the ends of hyperinflations brings home the potential neutrality of

some large monetary events, the government's intertemporal budget constraint, and the fact that inflation is often and in many places a *fiscal* phenomenon, in a way that mountains of formal papers do not. Finally, and most importantly, Romer and Romer's analysis of FOMC minutes may be very helpful in sorting out how the *Fed* reacts to the *economy*.

But a successful reading of history can't *ignore* Tobin and Solow's concerns, and a fundamentally econometric paper like this one can do so even less. VAR methods did not evolve as recreational mathematics. They evolved as the best response a generation of talented economists could come up with to genuine and serious concerns, expressed 30 years ago by Tobin and Solow, with the Friedman and Schwartz methodology that Romer and Romer are attempting to revive. I hope that Romer and Romer can find a way to address these concerns with careful historical analysis rather than reinventing the VAR wheel. But if economic history simply ignores the history of economics, it is doomed to repeat it.

Appendix: Identifying Policy-Invariants

The structural system is

$$y_t = a_{yu}(L)\delta_t + a_{ym}(L)m_t + a_{y\epsilon}(L)\epsilon_t$$

$$m_t = a_{my}(L)y_t + a_{m\delta}(L)\delta_t.$$

In addition to the assumptions mentioned in the text, I assume that all the structural lag polynomials are invertible.

Deleting the (L) to simplify notation, the moving average representation is

$$\begin{bmatrix} y_t \\ m_t \end{bmatrix} = \begin{bmatrix} \dfrac{a_{y\epsilon}}{1 - a_{my}a_{ym}} & \dfrac{a_{yu} + a_{ym}a_{m\delta}}{1 - a_{my}a_{ym}} \\ \dfrac{a_{my}a_{y\epsilon}}{1 - a_{my}a_{ym}} & \dfrac{a_{yu}a_{my} + a_{m\delta}}{1 - a_{my}a_{ym}} \end{bmatrix} \begin{bmatrix} \epsilon_t \\ \delta_t \end{bmatrix},$$

which we can compare to that of an unrestricted VAR,

$$\begin{bmatrix} y_t \\ m_t \end{bmatrix} = \begin{bmatrix} \theta_{y\epsilon} & \theta_{y\delta}VV \\ \theta_{m\epsilon} & \theta_{m\delta}W4W \end{bmatrix} \begin{bmatrix} \epsilon_t \\ \delta_t \end{bmatrix}.$$

If $a_{ym} = 0$, then

$$a_{yu} = \theta_{y\delta}.$$

If only unanticipated money matters the impulse response-function recovers the structural response of output to money innovations. This is the usual assumption.

The autoregressive representation is

$$\begin{bmatrix} \frac{1}{a_{y\epsilon}}\left(1 + \frac{a_{yu}a_{my}}{a_{m\delta}}\right) & -\frac{1}{a_{y\epsilon}}\left(a_{ym} + \frac{a_{yu}}{a_{m\delta}}\right) \\ -\frac{a_{my}}{a_{m\delta}} & \frac{1}{a_{m\delta}} \end{bmatrix} \begin{bmatrix} y_t \\ m_t \end{bmatrix} = \begin{bmatrix} \epsilon_t \\ \delta_t \end{bmatrix}$$

Compare the autoregressive representation to an arbitrary VAR

$$\begin{bmatrix} \beta_{yy} & \beta_{ym} \\ \beta_{my} & \beta_{mm} \end{bmatrix} \begin{bmatrix} y_t \\ m_t \end{bmatrix} = \begin{bmatrix} \epsilon_t \\ \delta_t \end{bmatrix}.$$

The second row identifies the money reaction function parameters a_{my} and $a_{m\delta}$. The first row implies

$$\frac{1}{a_{y\epsilon}}\left(1 + a_{yu}\frac{a_{my}}{a_{m\delta}}\right) = \beta_{yy}; \quad -\frac{1}{a_{y\epsilon}}\left(a_{ym} + a_{yu}\frac{1}{a_{m\delta}}\right) = \beta_{ym}.$$

We can eliminate $a_{y\epsilon}$ by dividing the two equations, but then we have one equation in the two unknowns a_{ym}, and a_{yu}. This proves the proposition in the text. a_{ym} and a_{yu} are not separately identified.

If $a_{yu} = 0$, there is *no* distinction between anticpated and unanticipated money, and Romer and Romer's multiplier recovers the structural effects of m on y,

$$a_{ym} = -\beta_{yy}^{-1}\beta_{ym}.$$

Under this identification assumption, the *autoregressive* representation is policy invariant.

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Comment

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This paper is broad in scope and well written. The discussion of the episodes is a good, quick review of the events, and it is excellent

material to assign to students. The paper considers two broad questions: (1) How do policymakers behave? (2) How do policy actions affect the economy? The main theme of my remarks is that Romer and Romer (RR) could do more with these questions than they have done so far.

Regarding the first question, there is a large literature, which RR do not cite, on estimating monetary-policy reaction functions. Sometimes the money supply is taken as the variable to be explained, and sometimes a short-term interest rate is. This work in effect considers the behavior of the monetary authorities over all phases of the business cycle, not just during recessions, as RR focus on. I see no reason to restrict the analysis to recessions. It is just as interesting and important to consider how the authorities behave during booms and normal times. For example, the U.S. economy is currently in more or less a normal time, and a key current question is whether the Fed will begin to tighten now in anticipation of a possible overheating of the economy in the future. RR throw away a lot of useful information by focusing only on recessions, and they limit their analysis by using only tables instead of an econometric approach. At a minimum, they should relate their work to the reaction-function literature.

The previous criticism does not pertain to the examination of fiscal-policy actions, where there is very little work trying to estimate fiscal-policy reaction functions. As the RR discussion documents, fiscal-policy actions do not appear to be systematic enough to allow reaction functions to be estimated.

The question of how policy actions affect the economy is examined in two ways in this paper. One is to compute multipliers from the DRI model. This is a standard approach used by macroeconometric model builders. The other way is to compute multipliers from a regression of real GDP growth on a constant, a dummy variable for the post-1973 period, eight lags of the real GDP growth, eight lags of the change in the real federal funds rate, and the current value and eight lags of the change in the high-employment surplus to GDP ratio. This equation is estimated both by OLS and by IV, where the instruments for IV are indices of Federal Reserve policy. I do not find this second way very interesting. What theory would lead this equation to be a good approximation to the true reduced form equation for real GDP growth? The equation is much too simple to be compatible with theories behind structural macroeconometric models, where the implied reduced form equations are much larger (and generally not feasible to estimate directly). The equation also does not appear to be comparable with theories used in real business cycle models and with theories that are

part of the new Keynesian economics. The equation is too ad hoc to allow any confidence to be placed on the results of using it.

RR use the estimated multipliers to examine the recovery from recessions, but again there is no particular reason to focus just on recessions. For example, one can use a macroeconometric model to compute multipliers for any period. If the model is nonlinear, the multipliers will differ at least somewhat from period to period, but it is straightforward to compute multipliers for any desired period and to run various counterfactual experiments.

To conclude, the two main questions addressed in this paper are obviously of considerable importance, and, while the paper is quite good at describing individual episodes, it has not carried the analysis very far. It has failed to appreciate the amount of work that has already been done in this area, especially in the macroeconometrics literature. Attention should be given to the literature on estimating monetary-policy reaction functions, and more attention should be given to the macroeconometric tools and models that are available to analyze these questions.

Discussion

In response to Cochrane, Christina Romer agreed that identification was the central issue. They had explicitly gone to the Fed records with this in mind, looking carefully at what the Fed said it was doing and what it knew about the state of the economy. She added that while there may be reasons why their regression was not well identified, it was much more plausible that the multipliers are biased downward if the Fed is responding to anticipations of future income, as Karaken and Solow argue. Regarding Cochrane's point that the magnitude of the estimated effects of the federal funds rate on output implied an implausibly large investment multiplier, Romer noted that there were many other channels by which interest rates affect output, e.g., housing, consumer durables, and inventories.

Christina Romer also stressed that an important objective of the paper was to document what the policies actually have been and to uncover the motivations behind those policies. She noted that this was not a trivial question, given the lack of consensus on policy recommendations, particularly in the last recession.

Olivier Blanchard questioned the Romers' instrumental variable strategy. If the problem is that the funds rate depends on information the

Fed has about future output, then using the Romer–Romer or Boschen–Mills dummies as instruments will not solve the simultaneity bias, because they are also likely to depend on what the Fed expects to happen to output.

Several people questioned using the federal funds rate as a measure of shifts in monetary policy. Larry Meyer thought that interest rates are generally not appropriate measures of monetary policy given the instability of money demand over the last 20 years. Greg Mankiw proposed an alternative story in which movements in the funds rate reflect information revealed by the Fed regarding the natural rate and, therefore, future inflation, rather than the Fed simply changing its mind. He noted that this would explain why short rates and long rates often seem to move in the same direction, as they did in February when the Fed raised the funds rate .25%, and the 30-year bond rate went up by .75%.

Christopher Sims agreed with Mankiw and cited some evidence from the VAR literature in support. He noted that when innovations to interest rates are identified as policy innovations, they appear to provide more information about future inflation rather than output. Interest rate innovations from reduced form VARs typically cause output to fall but inflation to rise. But when the interest rate innovations are decomposed and only the component that does not respond to information about future inflation is used, the response of output is generally weaker. Sims remarked that this would be consistent with a story in which the Fed raises interest rates when it perceives inflationary pressures induced by negative supply shocks. In the Romers' reduced-form analysis, the subsequent fall in output, therefore, would be incorrectly credited to monetary policy.

Martin Eichenbaum also questioned the use of the funds rate as a measure of policy. He noted that when a measure of inflationary pressure such as commodity prices is excluded from a VAR system, the 1973 oil shock appears as a large "policy contraction" if innovations in the fed funds rate are interpreted as the policy innovations. However, when commodity prices are included in the system, the innovations tend to be much smaller, once again suggesting that movements in the funds rate are likely to depend on inflationary shocks.

Responding to these comments, David Romer said that the issue was largely semantic. The question addressed in the paper is what would have happened if the federal funds rate had remained constant through the cycle. Thus, monetary policy in the paper is defined as the effects of these movements in the funds rate. Without such a baseline, what is meant by "monetary policy" is ambiguous. Romer added that this view

of monetary policy corresponds with what the Fed says it is doing during recessions—relieving pressures on reserves in financial markets.

In response to Sims and Eichenbaum, David Romer doubted that supply shocks have sufficiently large output effects to bias the multipliers upward. A negative supply shock would increase prices, which would raise interest rates, holding constant the money supply. These interest rate changes would then have the usual impact on output through aggregate demand. The direct effect on output coming from shifts in the productive capacity of the economy is likely to be much smaller, according to Romer. Thus, to the extent that the important effects come through interest rates, shocks to supply variables like commodity prices are not a problem for the analysis in the paper.

Michael Woodford observed that looking at the Fed record should allow one to distinguish times when the Fed is less worried about inflation because they think a recession is underway and likely to continue from times when they are less worried about inflation because of some favorable supply side development that will increase money demand. Christina Romer answered that they had looked for such a distinction, and that there was little evidence that the Fed responds on the basis of supply shocks. The records indicate that the Fed decides to stimulate when it observes that the economy is in a recession.

Following up on her response, Sims noted that the original Romer and Romer study was based on looking for discussion of inflationary pressure. Supply shocks would have an impact on Fed decisions to the extent that they were reflected in these discussions of inflationary pressure. However, he doubted that the Fed records would distinguish between the particular sources of inflationary pressure, so that looking at the Fed records would not be useful in getting around the potential identification problem. Christina Romer disagreed with this interpretation of their previous work. She pointed out that they had only identified changes in taste toward inflation, not simply times when the Fed had reduced inflation just because the economy was overheating.

Robert Gordon raised the issue of sample instability. He noted that if the postwar period is split in thirds, not only does the effect of the funds rate on output decline from the first to the third part of the sample, but the lags also lengthen considerably. This would accord with the view that the transmission channel of monetary policy has changed. With the end of disintermediation and the movement toward a floating exchange rate era, more of the adjustment comes through the slower foreign trade sector rather than the housing sector.

There were also a few comments regarding fiscal policy. Meyer cautioned that reduced forms were inadequate for measuring the effects of fiscal policy. He cited simulations Modigliani had run with the

MPS model demonstrating the bias on fiscal policy multipliers from omitted variables in reduced form systems. Gordon cautioned against holding interest rates constant when estimating the effects of fiscal policy. The fiscal multipliers will depend on whether monetary policy accommodates fiscal policy or not. For example, the 1964 tax cut was accompanied by monetary stimulus, and, therefore, the estimated fiscal multipliers were large. On the other hand, the tax surcharge in 1968 was not followed by a large contraction, because it was accompanied by expansionary monetary policy. Eric Leeper also warned against looking at fiscal policy independently of monetary policy. He noted that a permanent shock to the real interest rate with no corresponding change in fiscal policy would end up violating the intertemporal budget constraint.