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A Case Study in Monetary Control: 1980-82

FOR SEVERAL YEARS PRIOR to October 1979, the Federal Reserve implemented monetary policy decisions of the Federal Open Market Committee (FOMC) by targeting the federal funds rate. Staff of the Open Market Desk bought or sold government securities with the objective of keeping the federal funds rate within a range specified by the FOMC at its latest meeting.

The effects of monetary policy on the economy under a procedure of targeting the federal funds rate depend on the willingness of policymakers to move the funds rate target fast enough and far enough when the pace of economic activity changes. In the 1970s, the tendency of the Fed to limit changes in the federal funds rate as the growth of total spending accelerated produced rapid money growth, resulting in accelerating inflation in the late 1970s.

In response to the accelerating inflation, the Fed in October 1979 adopted a procedure of targeting nonborrowed reserves (NBR). The FOMC stated that it adopted the NBR operating

procedure to promote better short-run control of the monetary aggregates, to better control inflation.¹ Under the NBR operating procedure, the objective of the staff of the Open Market Desk was to keep the average level of NBR between FOMC meetings at levels consistent with the short-run objectives of the FOMC for growth of the monetary aggregates.

The Fed stopped targeting NBR in the fall of 1982; the operating procedure used since then is similar to targeting the federal funds rate.²

The NBR operating procedure generated a great deal of interest and controversy among economists. There is a large literature on the conduct of monetary policy under that procedure and, in recent years, economists have continued to analyze the conduct of monetary policy during the three years ending in the fall of 1982.³ Critics of the NBR procedure contend that it caused a high degree of interest rate volatility, as illustrated in Figure 1. Some critics argue that the Fed actually did not change its operating procedure

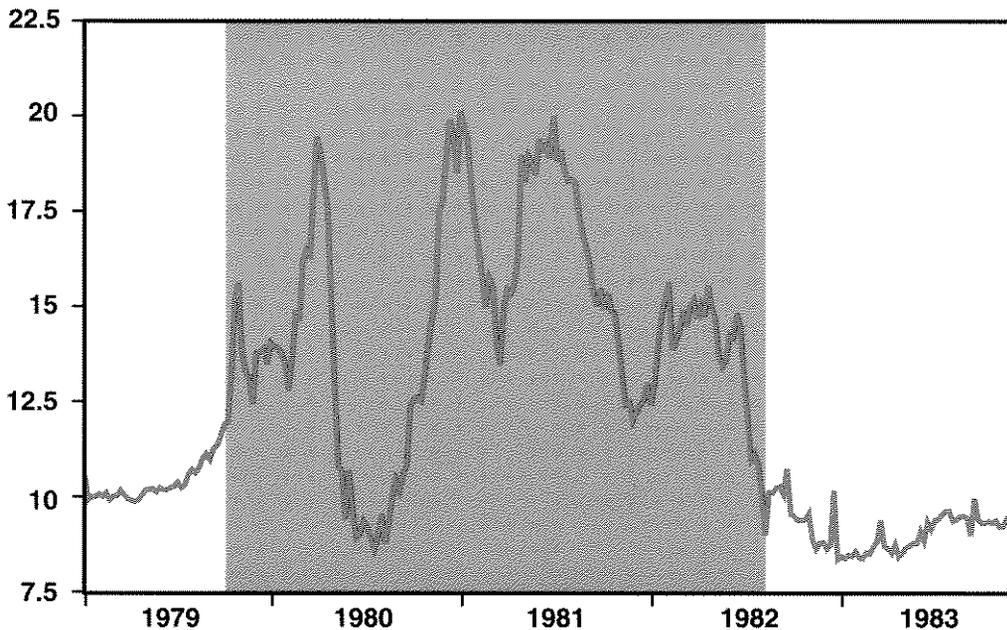
¹ For a description of the decisions by the FOMC at its meeting in October 1979, see Board of Governors (1979, p. 974).

² For a general description of the mechanics of various operating procedures, see Gilbert (1985). Thornton (1988) provides evidence that targeting borrowed reserves has been essentially the same as targeting the federal funds rate.

³ The following are selected references to the literature on the NBR operating procedure: Goodfriend (1983); Hetzel (1982,

1986); Hoehn (1983); Lindsey (1982, 1983); Lindsey and others (1984); McCallum (1985); Poole (1982); and Spindt and Tarhan (1987). For recent additions, see Avery and Kwast (1993), Goodfriend and Small (1993) and Pearce (1993).

Figure 1
Weekly Federal Funds Rate: January 3, 1979, to December 28, 1983
 Percent



Note: Shaded area encompasses the period of nonborrowed reserves targeting (10/3/79 through 9/29/82).

in any fundamental way in October 1979.⁴ Others blame large errors in hitting money targets on improper design of the operating procedure, especially in combination with lagged reserve accounting in effect at the time.⁵

Whatever the flaws in the NBR targeting procedure as a method of monetary control, the Federal Reserve did achieve its objective of sharply reducing the rate of inflation during the period in which it used that procedure (Figure 2). That success in reducing the rate of inflation, however, came at the price of a very sharp recession (Figure 3).

This article extends the literature on NBR targeting in two ways. First, it presents information relevant for interpreting policy actions that was confidential until several years after the end

of the period of NBR targeting: Federal Reserve staff projections of total reserves (TR) over periods between FOMC meetings, and staff estimates of the levels of TR over the same periods that would have been consistent with FOMC objectives for growth of the monetary aggregates (the TR paths).⁶ In addition, this article extends the literature by answering a question not answered by the other studies: Did the pattern of policy actions under the NBR operating procedure reflect a consistent use of the procedure for hitting short-run targets for growth of the monetary aggregates, given the information available to policymakers on staff projections of TR and estimates of the TR paths?

This article may have implications for the choice of operating procedure in the future. If the Federal Reserve chose once again to target a

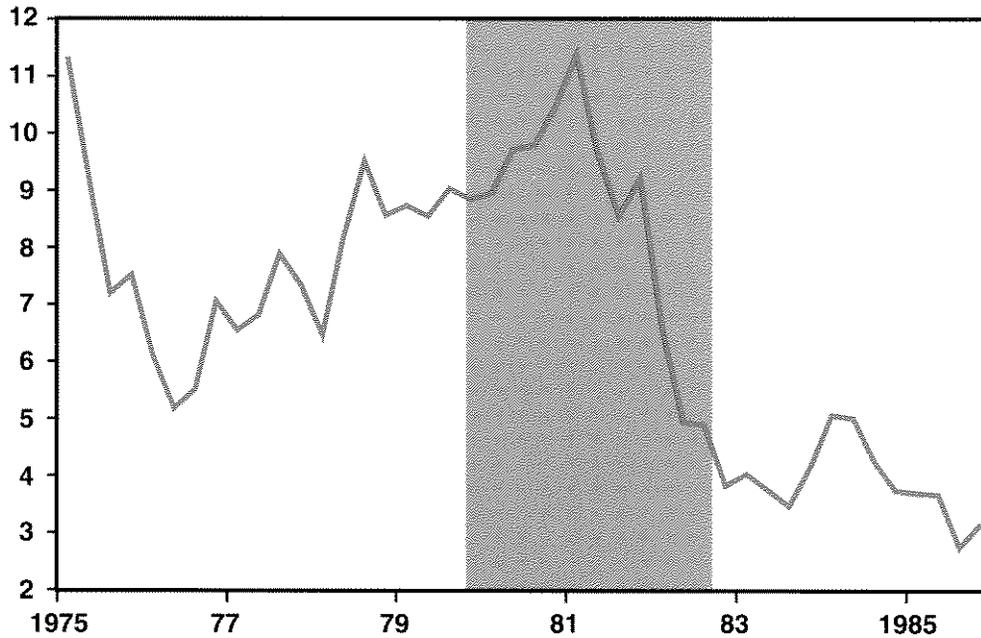
⁴ See Poole (1982).

⁵ See McCallum (1985). Gilbert and Trebing (1982) provide a description of lagged and contemporaneous reserve accounting.

⁶ The weekly reports of the Manager of the Open Market Account, which included the projections and estimates of TR, became public information five years after the dates of the reports. Cook (1989a, 1989b) presents some, but not

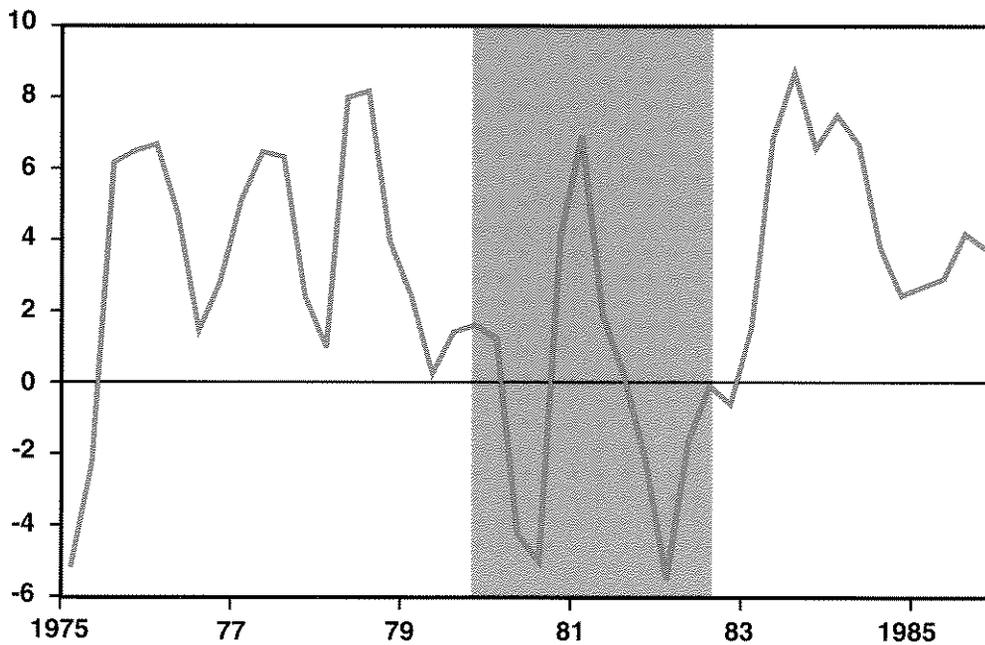
all, of the information on the NBR operating procedure presented in this article. In particular, Cook presents information on the *gap* between projections of TR and the TR path, but he does not present the levels of those projections and estimates. Feinman (1988) made extensive use of the data from the weekly reports of the Manager of the Open Market Account in an unpublished dissertation.

Figure 2
Rate of Growth in the GDP Deflator



Note: Rates of growth in the GDP deflator are two-quarter growth rates; the shaded area encompasses the period of nonborrowed reserves targeting (1979:Q4 through 1982:Q3).

Figure 3
Rate of Real GDP Growth



Note: Rates of real GDP growth are two-quarter growth rates; the shaded area encompasses the period of nonborrowed reserves targeting (1979:Q4 through 1982:Q3).

narrow monetary aggregate, the Federal Reserve might consider a change in operating procedure, perhaps to an NBR operating procedure. Several prominent monetary economists have expressed dissatisfaction with the lack of success of the FOMC in hitting its targets for money growth under NBR targeting.⁷ It is not possible to evaluate NBR targeting as a method of monetary control from the experience of 1979-82, however, without knowing whether policy actions were consistent with use of the procedure for monetary targeting.

TARGETING NONBORROWED RESERVES

This section describes the nature of the NBR operating procedure. Most members of the FOMC at the special meeting on October 6, 1979, agreed that the degree of monetary control under the procedure of targeting the federal funds rate had become unsatisfactory. They decided to adopt instead a procedure that linked the supply of NBR to their objectives for money growth, while permitting larger fluctuations in the federal funds rate than under the previous procedure of federal funds rate targeting.⁸

Changes in the Nature of FOMC Decisions

Under the federal funds rate targeting procedure, the FOMC stated its objectives for growth of each monetary aggregate between meetings as a range of growth rates from a month before the meeting to a month after the meeting. Beginning with its meeting on October 6, 1979, the FOMC began specifying its objectives for growth of the monetary aggregates as specific growth rates over periods between meetings. Under the federal funds rate targeting procedure, in contrast, the FOMC stated its objectives for money growth as ranges of growth rates of the monetary aggregates.

Although the FOMC continued to specify ranges for the federal funds rate under the NBR operating procedure, the ranges were widened substantially. For most periods, the range was 400 basis points, compared with ranges of 50 to 100 basis points under the federal funds rate operating procedure. The role that the wider ranges for the funds rate played in the operating

procedure is unclear. On several occasions, the FOMC widened the range on the federal funds rate when the rate threatened to move outside the range. On other occasions, the federal funds rate was allowed to move outside its range for short periods of time.⁹

At each meeting, the FOMC also made an assumption about the average level of borrowed reserves over the period until the next meeting. The staff used this "borrowings assumption" in deriving the target level for NBR.

Staff Projections of TR and Estimates of the TR Path

After each FOMC meeting, the staff would estimate the average level of TR that would be consistent with the FOMC's objectives for growth of monetary aggregates until the next meeting. This was called the "TR path." The target for the average level of NBR between FOMC meetings, called the "NBR path," was simply the TR path minus the borrowings assumption of the FOMC. The objective of the Open Market Desk was to keep the average level of NBR between FOMC meetings equal to the NBR path.¹⁰

Staff estimates of the TR path were based on FOMC objectives for M1 and M2 and estimates of the following: (1) currency in the hands of the public; (2) average reserve requirements on deposit liabilities in M1 and M2; (3) required reserves on bank liabilities not included in M1 or M2; and (4) excess reserves. The staff generally revised their estimate of the TR path each week, based on new information about the factors that affected the relationship between reserves and the monetary aggregates.

Each time the staff estimated the TR path, they also projected the average level of TR over the same period. Projections of TR were based on estimates of the actual levels of the monetary aggregates between FOMC meetings and the four estimates specified above that were made in estimating the TR path. Each change in the gap between the staff projection of TR and their estimate of the TR path during an intermeeting period, therefore, reflected a change in the staff projections of the monetary aggregates. Appendix 1 illustrates the process of projecting TR and esti-

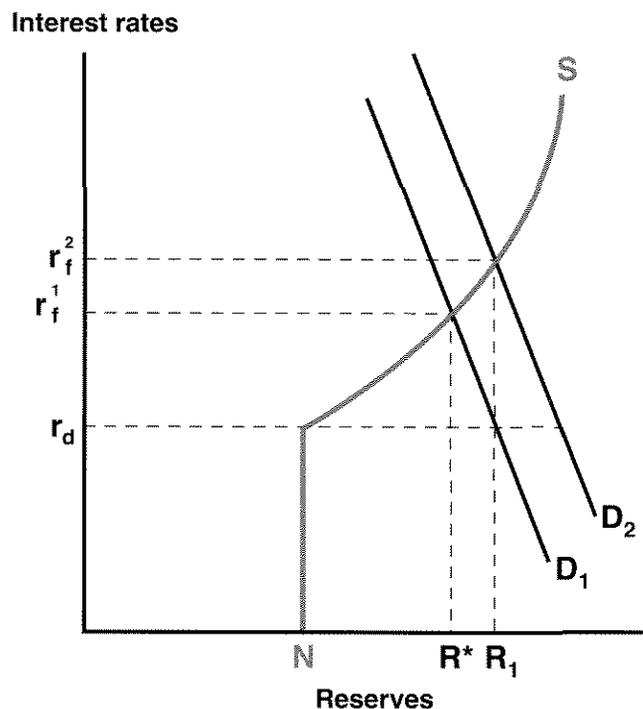
⁷ See Friedman (1984), McCallum (1985), Pierce (1984) and Poole (1982).

⁸ See Board of Governors (1979, p. 974).

⁹ See Gilbert and Trebing (1981) and Thornton (1982, 1983).

¹⁰ The staff of the Open Market Desk converted the NBR path for each intermeeting period into weekly and daily objectives for NBR. See Levin and Meek (1981), Meek (1982) and Stevens (1981).

Figure 4
Supply and Demand for Reserves



imating the TR path for the first intermeeting period in Table 1.¹¹

Since projections of TR and estimates of the TR path reflected information about the same four variables specified above, projections of TR often were revised in the same direction as the estimates of the TR path. In the three weeks ending February 27, 1980, for instance, the projections of TR and the TR path were both reduced, but by different amounts (Table 1). Changes in projections of TR and TR paths over the 37 periods in Table 1 had the same signs in all but eight of the periods. These comparisons indicate that changes in projections of TR over intermeeting periods tended to reflect the same factors that caused the staff to revise its estimates of the TR path: changes in factors that affect the relationship between reserves and the monetary aggregates.

Graphical Representation of NBR Targeting

Implementation of monetary policy under this operating procedure is illustrated in Figure 4, using the concepts of supply and demand for reserves and equilibrium in the market for reserves described in Appendix 2.¹² Levels of TR and NBR on the horizontal axis refer to average levels for the weeks between FOMC meetings. On the vertical axis, r_d is the level of the discount rate and r_f is the level of the federal funds rate. The TR path is illustrated as R^* . The NBR path is N , based on a borrowings assumption of R^* minus N . The objective of the Open Market Desk was to keep the average level of NBR over intermeeting periods close to the NBR path.

TR would be at the path level R^* if the demand

¹¹ Although the Federal Reserve began using the NBR operating procedure in October 1979, the reports of the Manager of the Open Market Account did not include projections of TR and TR paths on a consistent basis until February 1980. Cook (1989b) discusses some of the difficulties in deriving consistent information from the weekly Reports of Open Market Operations on the conduct of monetary policy in the first few weeks under the NBR operating procedure.

¹² Lindsey (1982, 1983) describes how the procedure of targeting NBR worked in practice by examining the timing of money growth relative to FOMC objectives, borrowed reserves, the federal funds rate and the discount rate. Meek (1982) describes in detail the operations of the Open Market Desk under NBR targeting.

Figure 5
Tightening of Monetary Policy

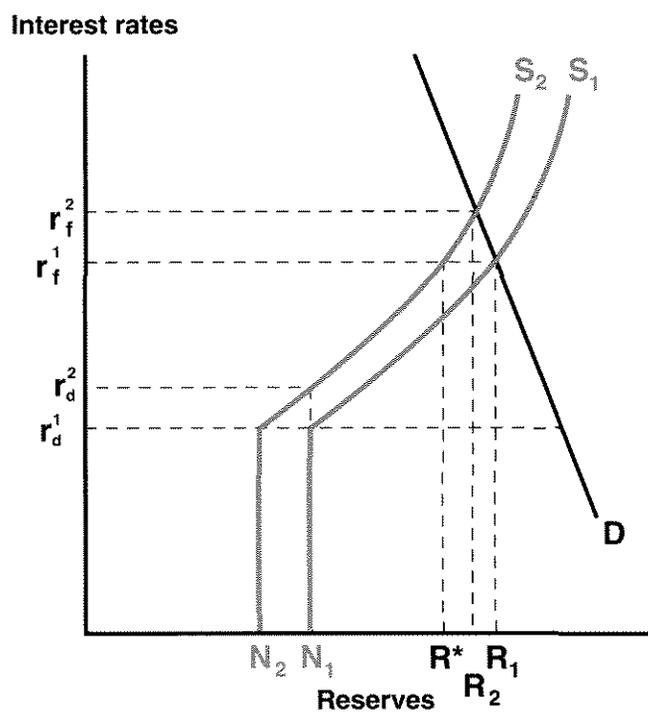
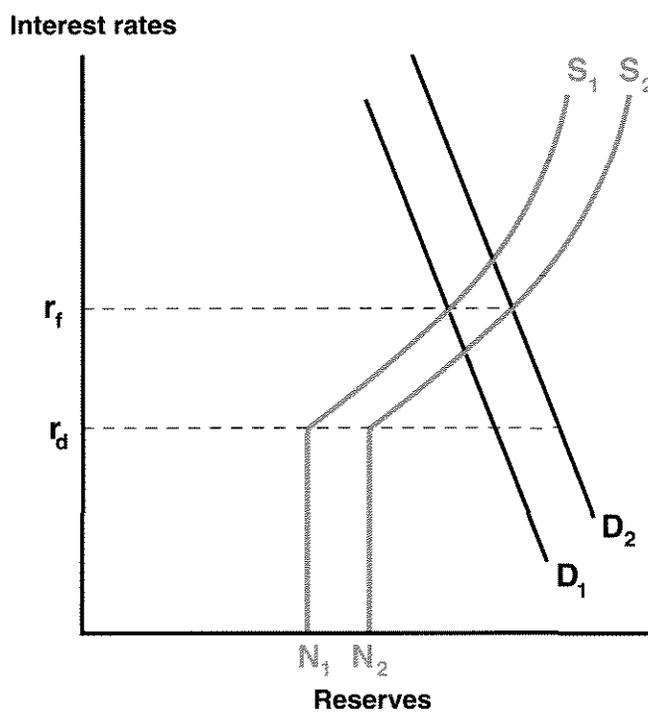


Figure 6
Federal Funds Rate Targeting



curve for reserves was D_1 . From that initial position, consider the effects of an increase in the demand for reserves, illustrated by a shift in the demand curve to D_2 , which reflected an increase in the demand for money.¹³ TR would rise to R_1 , which is above the TR path. Since the staff of the Open Market Desk would keep NBR at the level N , the rise in TR to R_1 would involve an increase in borrowed reserves. The federal funds rate would rise from r_f^1 to r_f^2 , inducing the higher level of borrowings. Without any additional policy actions, the money stock would tend to exceed the FOMC's objectives because TR would be above the path level.

During some intermeeting periods, the Federal Reserve took no policy actions in response to changes in the demand for reserves. In the case illustrated in Figure 4, FOMC members considered the rise in the federal funds rate from r_f^1 to r_f^2 an adequate response to the shift in demand for reserves, even if growth of the monetary aggregates exceeded objectives established at the last FOMC meeting.

Experience eventually convinced some Federal Reserve officials that rapid policy responses were necessary to close the gap between actual money growth and FOMC objectives once money growth started to deviate substantially from FOMC objectives.¹⁴ During some periods between FOMC meetings, the Federal Reserve adjusted the level of the NBR path or the discount rate to reduce the deviations of the money stock from desired levels. The Federal Reserve took such policy actions when the deviations appeared to reflect more than transitory movements in the money demand schedule, perhaps due to changes in aggregate spending.¹⁵

In the situation illustrated in Figure 5, the staff projects TR to be R_1 , which is above the TR path (R^*). The policy action illustrated in Figure 5 is a reduction in the NBR path from N_1 to N_2 , which involves an increase in the borrowings assumption from R^* minus N_1 to R^* minus N_2 . Due to the inelastic demand for reserves over intermeeting periods, the average level of TR would decline to R_2 , still above the TR path, but

the reduction in NBR would produce a sharp increase in the federal funds rate. The Fed could have the same effect on the funds rate and TR by keeping NBR at N_1 and raising the discount rate to r_d^2 . In taking policy actions that reduced but did not eliminate the gap between projections of TR and path levels, Fed officials emphasized the assumption that sharp increases in interest rates would, over time, reduce the quantity of money demanded. This article does not model the assumed feedback mechanism based on money demand as a function of lagged interest rates.¹⁶

One of the issues policymakers confronted in determining whether to adjust the NBR path or the discount rate when TR was projected to deviate from path levels involved their confidence in the projections of TR and estimates of the TR path. Studies conducted during the period of NBR targeting indicated large errors in these projections and estimates.¹⁷ These errors would tend to be smaller later in intermeeting periods, when actual observations were available for part of the periods. Observations in Table 1 are consistent with the view that the projections and estimates of TR were subject to large errors, and that the errors affected the timing of policy actions. Table 1 indicates that often there were large revisions to the projections of TR and to TR paths over intermeeting periods. Also, on those occasions when policymakers took actions between FOMC meetings, they generally acted at least two weeks after an FOMC meeting, when they might assume that the projections and estimates were more accurate.

Graphical Representation of Targeting the Federal Funds Rate

One way to highlight the nature of NBR targeting is to contrast the open market operations for a given situation under NBR targeting and under the procedure of targeting the federal funds rate. Suppose the demand for reserves increases, reflecting an increase in the demand for money. Under the NBR targeting procedure, the staff of the Open Market Desk would continue to target the same average level of NBR over the intermediate period (as in Figure 4). If the policymakers

¹³ If the shift in demand for reserves resulted from an increase in average reserve requirements on deposit liabilities or excess reserves, the TR path would shift to the right. The rise in the demand for reserves would not affect the federal funds rate.

¹⁴ See Axilrod (1981, pp. A23 - A24).

¹⁵ See Lindsey (1983, p. 5).

¹⁶ For references to this feedback mechanism from changes in interest rates to changes in the quantity of money demanded, see Axilrod (1981, p. A23) and Lindsey (1983).

¹⁷ See Levin and Meek (1981) and Pierce (1981).

wished to limit the deviation of money growth from FOMC objectives, they would reduce the target level of NBR (as in Figure 5). Under the federal funds rate targeting procedure, in contrast, the Fed would respond to an increase in the demand for reserves by increasing the level of NBR enough to keep the federal funds rate unchanged, as illustrated in Figure 6. This contrast provides a standard for judging whether Fed actions in the three years ending in the fall of 1982 were consistent with use of the NBR operating procedure for targeting the monetary aggregates.

INTERPRETING FEDERAL RESERVE ACTIONS

The framework of supply and demand for reserves is used to interpret monetary policy actions under the NBR operating procedure, as recorded in Table 1.¹⁸

Policy Actions in Selected Intermeeting Periods

This section illustrates use of the NBR operating procedure for implementing monetary policy during the first two intermeeting periods covered in Table 1. These periods illustrate very different patterns in use of the procedure. During the first period, after the FOMC meeting on February 4-5, 1980, the Fed reduced the NBR path and raised the discount rate when projections of TR began to rise relative to the TR path. This period illustrates aggressive use of the procedure for monetary targeting. During the second period, after the FOMC meeting on March 18, estimates of TR declined sharply relative to the TR path, but the Fed made no adjustments in the NBR path or discount rate in response.

The period from the FOMC meeting on February 4-5, 1980, until the next FOMC meeting was divided into two periods of three weeks each for purposes of projecting the average level of TR and estimating the TR path.¹⁹ As of February 7, the staff projected an average level of TR for the

three weeks ending February 27 that was only \$38 million below the initial estimate of the TR path. By February 15, however, the projections and estimates of TR had changed substantially, with TR projected to be \$313 million above the path level. As of February 15, the Fed reduced the target for NBR by \$67 million relative to the new estimate of the TR path. The reduction in the NBR path was a restrictive policy action. The staff of the Open Market Desk responded to a reduction in the NBR path by adjusting its plans for open market operations to hit a lower average of NBR over the intermeeting period. The Fed also raised the discount rate from 12 percent to 13 percent, effective February 16, another restrictive policy action.

Even though the Fed took these restrictive policy actions over the three weeks ending February 27, the average level of TR was \$272 million above the final estimate of the TR path. These observations raise an issue about how to interpret monetary policy actions under the NBR operating procedure. One view of the conduct of monetary policy during the three weeks ending February 27 would be that policy actions were inconsistent with hitting FOMC targets for monetary aggregates because TR was above the TR path. Interpretation of these actions, however, must account for the way that the Fed operated under lagged reserve requirements, which were in effect during the period of NBR targeting. Required reserves for each week were determined by deposit liabilities two weeks earlier. The Fed operated under the constraint of supplying each week enough reserves to meet required reserves, either through open market operations or through the discount window. For the three weeks ending February 27, required reserves were based on deposits over the three weeks ending February 13. By the time the Fed took policy actions on February 15, therefore, required reserves for the three weeks ending February 27 were predetermined.

This article evaluates whether policy actions

¹⁸ Information on the conduct of monetary policy in Cook (1989a, 1989b) is similar to that in columns six through nine of Table 1. One difference involves the dating of the difference between projections of TR and the TR path (column six) and policy actions (columns seven and eight). The dates in Table 1 are those in the weekly Report of Open Market Operations from the Federal Reserve Bank of New York. Cook dates the gap between the projections of TR and the TR path and dates policy actions as of weeks ending on Wednesdays, thus reflecting the changes that occurred during each seven-day period. For this reason, the dates in Table 1 and in Cook (1989a, 1989b) do not match.

¹⁹ When periods between FOMC meetings were longer than five weeks, the staff divided the intermeeting periods into two subperiods for purposes of setting TR paths and projecting the average levels of TR. The staff divided these intermeeting periods into subperiods to avoid setting weekly objectives for NBR just after an FOMC meeting based on estimates of variables for six or seven weeks into the future. The staff considered their estimates that far into the future to be so unreliable that revisions in their estimates over intermeeting periods could generate unnecessary noise in weekly objectives for NBR.

Table 1

Policy Actions Under the Nonborrowed Reserves Operating Procedure (amounts in millions of dollars)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates	Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path	Discount rate	Change in the federal funds rate, in basis points		
								1980		
February 4-5	3 weeks ending February 27	February 7	\$ 43,182	\$ 43,220	\$ - 38	As of 2/15: \$ -67	Through 2/15: 12% As of 2/16: 13	February 13	84	
		15	43,083	42,770	313			20	123	
		22	43,311	42,770	541			27	-25	
	27	43,042	42,770	272						
Change		-140	-450							
March 18	3 weeks ending March 19	February 29	42,915	42,289	626	As of 2/29: \$ -300 ¹	As of 3/14: imposed 3% surcharge	March 5	155	
		March 7	42,933	42,289	644			12	28	
		14	43,013	42,289	724			19	-21	
	19	43,005	42,289	716						
Change		90	0							
April 22	5 weeks ending April 23	March 21	44,597	44,571	26	No change	No change	March 26	154	
		28	44,633	44,571	62			April 2	161	
		April 4	44,458	44,771	-313			9	-35	
		14	44,476	44,771	-295			16	-69	
		18	44,339	44,771	-432			23	-79	
		23	44,336	44,771	-435					
Change		-261	200							
May 20	4 weeks ending May 21	April 25	44,543	45,131	-588	As of 5/2: \$ 100	As of 5/7: eliminated 3% surcharge	April 30	-244	
		May 2	44,379	45,181	-802			May 7	-216	
		9	44,410	45,231	-821			14	-211	
		16	44,377	45,231	-854			21	-14	
		21	44,352	45,231	-879					
Change		-191	100							
July 9	4 weeks ending June 18	May 23	43,821	43,821	0	As of 5/28: 12% As of 6/13: 11%	As of 5/28: 12% As of 6/13: 11%	May 28	-125	
		30	43,714	43,714	0			June 4	128	
		June 6	43,548	43,554	-6			11	-106	
		13	43,592	43,592	0			18	-69	
	Change		43,535	43,592	-57					
	3 weeks ending July 9	June 20	43,299	43,299	0	No change	No change	June 25	9	
		27	43,354	43,354	0			July 2	33	
		July 7	43,377	43,377	0			9	-15	
9		43,509	43,377	132						
Change		210	78							
July 9	5 weeks ending August 13	July 11	41,602	41,602	0	As of 7/28: 10%	As of 7/28: 10%	July 16	-28	
		23	41,558	41,558	0			23	-30	
		28	41,538	41,505	33			30	30	
		August 1	41,512	41,455	57			August 6	62	
		8	41,639	41,480	159			13	-75	
		13	41,645	41,480	165					
		Change		43	-122					

Table 1(continued)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates	Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path	Discount rate	Change in the federal funds rate, in basis points	
								1980	
August 12	5 weeks ending September 17	August 15	\$ 39,944	\$ 39,816	\$ 128	As of 9/5: \$ -150	No change	August 20	50
		19	40,239	40,111	128			27	68
		22	40,393	40,111	282			3	44
		29	40,623	40,261	362			10	-25
		September 5	40,596	40,311	285			17	42
		12	40,691	40,311	380				
		17	40,686	40,311	375				
	Change		742	495					
Sept. 16	5 weeks ending October 22	September 19	41,581	41,199	382	As of 10/3: \$ -200	As of 9/26: 11%	Sept. 24	21
		26	41,694	41,199	495			1	153
		October 3	41,522	41,199	323			8	21
		10	41,741	41,299	442			15	5
		17	41,737	41,299	438			22	9
		22	41,697	41,299	398				
	Change		116	100					
Oct. 21	4 weeks ending November 19	October 24	42,004	41,795	209	As of 11/7: \$ -100 As of 11/14: \$ -50	As of 11/17: basic rate 12%, 2% sur-charge	October 29	62
		31	41,996	41,795	201			5	82
		November 7	41,639	41,420	219			12	66
		14	41,745	41,445	300			19	57
		19	41,753	41,445	308				
	Change		-251	-350					
Nov. 18	5 weeks ending December 24	November 21	39,988	39,691	297	As of 12/1: \$ -170	As of 12/5: basic rate 13%, 3% sur-charge	Nov. 26	221
		25	40,224	39,821	403			3	29
		December 1	40,382	40,041	341			10	110
		5	40,392	40,131	261			17	101
		12	40,381	40,171	210			24	-39
		23	40,395	40,171	224				
		24	40,514	40,171	343				
	Change		526	480					
December 18-19	4 weeks ending January 14	December 23	40,948	40,948	0		No change	Dec. 31	-99
		29	40,991	41,048	-57			7	161
		January 5	40,971	41,148	-177			14	-42
		9	41,168	41,338	-170			21	-29
	Change	14	41,199	41,338	-139			28	-123
			251	390				4	-93
	3 weeks ending February 4	January 16	41,740	42,041	-301		No change		
		23	41,509	41,841	-332				
		30	41,427	41,841	-414				
		February 2	41,520	41,934	-414				
		4	41,371	41,934	-563				
	Change		-369	-107					

Table 1(continued)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates	Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path	Discount rate	Change in the federal funds rate, in basis points			
								1981			
1981											
February 2-3	4 weeks ending March 4	February	6	\$ 39,627	\$ 39,796	\$ -169	As of 2/25: \$ -166	No change	February	11	-68
			17	39,671	39,998	-327			18	-70	
		25	39,622	39,973	-351	25			-85		
		27	39,489	39,973	-484	March			4	77	
	Change	March	4	39,583	39,973	-390		No change	March	11	-20
				-44	177					18	-140
4 weeks ending April 1	March	6	39,819	40,300	-481	No change	March	11	-20		
		13	39,663	40,135	-472			18	-140		
	20	39,661	40,010	-349	April		25	-65			
	27	39,608	40,010	-402			1	145			
Change	April	1	39,714	40,010	-296	No change	April	1	145		
			-105	-290							
March 31	4 weeks ending April 29	April	3	40,006	40,006	0	As of 5/1: \$ -250 ^c As of 5/8: \$ -234	No change	April	8	50
			10	40,132	40,165	-33				15	-10
		20	40,229	40,132	97	22			22		
		24	40,122	40,132	-10	29			73		
	Change	April	29	40,027	40,132	-105		As of 5/5: basic rate 14%; 4% surcharge	May	6	263
				21	126					13	-70
3 weeks ending May 20	May	1	40,959	40,407	552	As of 5/5: basic rate 14%; 4% surcharge	May	6	263		
		8	40,736	40,362	374			13	-70		
	15	40,683	40,294	389	20			68			
	20	40,679	40,294	385							
Change	May		280	-113							
May 18	4 weeks ending June 17	May	22	40,011	40,011	0	No change	No change	May	27	-18
			29	40,104	40,098	6				June	3
		June	5	40,141	40,204	-63			10	93	
			12	40,078	40,138	-60			17	-23	
	Change	June	17	40,069	40,138	-69		No change	June	24	10
				58	127					July	1
3 weeks ending July 8	June	19	40,464	40,643	-179	No change	June	24	10		
		30	40,674	40,808	-134			July	1	-36	
	July	6	40,743	40,907	-164			8	109		
		8	40,879	40,907	-28						
Change	July		415	264							

Table 1(continued)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates		Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path	Discount rate	Change in the federal funds rate, in basis points						
									1981						
July 6-7	3 weeks ending July 29	July	10	\$ 41,359	\$ 41,359	\$ 0		No change	July	15	-117				
			17	41,136	41,104	32				22	29				
			24	41,126	41,134	-8				29	-51				
	29	41,273	41,134	139											
Change			-86	-225											
3 weeks ending August 19	July	Aug.	31	40,627	40,782	-155		No change	Aug.	5	-29				
			6	40,815	40,954	-139				12	4				
			14	40,824	40,982	-158				19	-10				
	19	40,830	40,982	-152											
Change			203	200											
August 18	4 weeks ending September 16	Aug.	21	40,510	40,668	-158		No change	Aug.	26	-78				
			28	40,483	40,683	-200				2	-52				
		Sept.	4	40,515	40,833	-318				9	-39				
			15	40,535	40,833	-298				16	-41				
	Change			79	165										
	3 weeks ending October 7	Sept.	Oct.	18	40,715	41,162				-447	As of 9/22: 3% surcharge	Sept.	23	-76	
25				40,721	41,140	-419	30	-33							
Change				106	64										
Change	Oct.	7	40,847	41,226	-379	Oct.	7	46							
			40,821	41,226	-405										
October 5-6	3 weeks ending October 28	Oct.	9	40,997	40,997	0		As of 10/12: 2% surcharge	Oct.	14			-53		
			20	40,812	40,883	-71				21	39				
			23	40,799	40,868	-69				28	-45				
	Change			-246											
	3 weeks ending November 18	Oct.	Nov.	30	40,673	40,817				-144	As of 11/6: \$56	As of 11/2: basic rate 13% As of 11/17: surcharge eliminated	Nov.	4	-8
				6	40,661	40,855				-194				11	-78
13		40,600	40,754	-154	18	-84									
Change			-11	-46											
Change	Nov.	18	40,617	40,771	-154	Nov.	18	-84							
			40,662	40,771	-109										
November 17	5 weeks ending December 23	Nov.	20	41,209	41,209	0		As of 12/4: 12%	Nov.	25	-75				
			30	41,277	41,252	25				2	6				
			Dec.	4	41,305	41,252				53	9	-44			
				14	41,620	41,525				95	16	22			
			18	41,488	41,389	99				23	17				
			23	41,488	41,389	99									
			Change			324				180					
	Change			144											

Table 1(continued)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates	Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path		Discount rate	Change in the federal funds rate, in basis points					
						1982	1982							
December 21-22, 1981	6 weeks ending February 3	Dec.	28	\$ 42,684	\$ 42,684	\$ 0	As of 1/15: \$ -187	No change	Dec.	30	11			
			Jan.	4	42,779	42,573				206	6	44		
		8		42,860	42,536	324			13	-56				
		15	43,020	42,534	486	20			54					
		22	42,976	42,459	517	27			102					
		29	42,965	42,351	614	Feb.			3	79				
		3	43,013	42,351	662									
		Change		329	-333									
		February 1-2	4 weeks ending March 3	Feb.	5	41,270			41,270	0	No change	Feb.	10	42
					16	41,214			41,309	-95			17	42
19	41,077			41,158	-81	March	3	21						
26	41,065			41,181	-116									
3	41,141			41,181	-40									
Change			-129	-89										
4 weeks ending March 31	March		5	39,102	39,376	-274	March	10	28					
			12	39,094	39,239	-145		17	54					
	19		38,988	39,159	-171	24		-41						
	26		39,002	39,159	-157	31		51						
	31	39,035	39,159	-124										
Change		-67	-217											
March 29-30	4 weeks ending April 28	April	2	39,536	39,536	0	No change	April	7	16				
			9	39,537	39,449	88			14	-47				
		16	39,582	39,414	168	21			33					
		23	39,498	39,334	164	28			-29					
		28	39,474	39,334	140									
	Change		-62	-202										
	3 weeks ending May 19	April	30	39,679	39,702	-23		May	5	81				
			7	39,658	39,702	-44			12	-56				
		14	39,786	39,821	-35	19			-30					
		19	39,810	39,821	-11									
Change			131	119										
May 18	6 weeks ending June 30	May	21	39,401	39,401	0	No change	May	26	-97				
			28	39,409	39,385	24			2	-27				
		June	4	39,368	39,355	13		9	17					
			11	39,478	39,428	50		16	64					
		18	39,487	39,373	114	23		-7						
		28	39,472	39,373	99	30		64						
		30	39,507	39,373	134									
		Change		106	-28									

Table 1(continued)

FOMC meeting	Period for setting total reserves path	Dates of projections and estimates	Projected total reserves	Total reserves path	Difference	Changes in the NBR path between FOMC meetings to limit the size of deviations of TR from path	Discount rate	Change in the federal funds rate, in basis points			
								1982			
1982											
June 30- July 1	4 weeks ending July 28	July	2	\$ 39,978	\$ 39,978	\$ 0	As of 7/16: \$ 85	As of 7/20: 11.50%	July	7	-34
			9	39,994	40,078	-84			14	-129	
			16	40,017	40,114	-97			21	-104	
			23	40,002	40,085	-83			28	-112	
			28	39,976	40,085	-109					
	Change		-2	107							
	4 weeks ending Aug. 25	July Aug.	30	40,203	40,411	-208	As of 7/30: \$100	As of 8/2: 11% As of 8/16: 10.50%	Aug.	4	13
			6	40,156	40,411	-255				11	-25
			13	40,139	40,391	-252				18	-79
			20	40,112	40,343	-231				25	-107
25			40,111	40,343	-232						
Change		-92	-68								
Aug. 24	3 weeks ending Sept. 15	Aug. Sept.	27	39,510	39,510	0	As of 9/24: \$ 248	As of 8/27: 10%	Sept.	1	111
			3	39,609	39,573	36				8	-1
			10	39,767	39,663	104				15	13
			15	39,812	39,663	149					
			Change		302	153					
	3 weeks ending Oct. 6	Sept. Oct.	17	40,227	39,933	294	As of 10/12: 9.50%	As of 9/24: \$ 248	Sept. Oct.	22	4
			24	40,279	39,784	495				29	-19
			1	40,348	39,784	564				6	65
			6	40,386	39,784	602					
			Change		159	-149					
Oct. 5	3 weeks ending Oct. 27	Oct.	8	40,454	40,454	0			Oct.	13	-117
			15	40,579	40,598	-19				20	-7
			22	40,583	40,587	-4				27	-9
			27	40,578	40,587	-9					
			Change		124	133					

¹ The three weeks ending March 19, 1980, is the second subperiod between FOMC meetings on February 4-5 and March 18. The NBR path was reduced by \$300 million relative to the TR path at the beginning of this subperiod to limit the size of the deviation of TR from path.

² The three weeks ending May 20 is the second subperiod between FOMC meetings on March 31 and May 18. The NBR path was reduced by \$250 million relative to the TR path at the beginning of this second subperiod to limit the size of the deviation of TR from path.

were consistent with use of the NBR procedure for monetary control by examining the direction and magnitude of policy actions in relation to the gaps between the projections of TR and estimates of the TR path at the time of the policy actions. From this perspective, policy actions during the three weeks ending February 27, 1980, were consistent with use of the NBR operating procedure for monetary control.²⁰

As of February 29, the staff projected that TR would be \$626 million above path level in the second intermeeting period (the three weeks ending March 19). That day, the Fed reduced its target for NBR by \$300 million relative to the TR path to limit the size of this deviation of TR from the path. As a result of that reduction in the NBR path, banks were forced to obtain more of the reserves from the discount window to meet their required reserves. The federal funds rate rose by 155 basis points in the week of this policy action.

Projections later in the period indicated that the gap between TR and the path level was continuing to grow. On March 14, the Fed imposed a surcharge of 3 percent on discount window borrowings by banks with deposits of \$500 million or more that borrowed frequently, as part of President Carter's program of credit controls and monetary restraint.²¹ During this first intermeeting period examined in Table 1, the Fed took four policy actions that were appropriate for monetary control with TR projected to exceed the path level: two reductions in the NBR path and two increases in the discount rate.

The FOMC met again on March 18, four days after President Carter announced a program of credit controls and monetary restraint. In support of the President's program, the FOMC tightened

monetary policy by increasing the borrowings assumption substantially (Table 4). With given objectives for growth of the monetary aggregates, a larger borrowings assumption implies a lower NBR path and, therefore, a more restrictive monetary policy.

As of the beginning of the period after the March FOMC meeting (that is, the five weeks ending April 23, 1980), TR was projected to be approximately equal to the TR path. Later in that period, the projection of TR was reduced and the TR path increased, producing a widening gap between projected TR and the path level. The Fed, however, took no policy actions to limit the size of that gap. The actual level of TR ended up \$435 million below the final estimate of the TR path.

General Patterns in Policy Actions

Examination of policy actions in Table 1 for the entire period from February 1980 through October 1982 indicates several patterns:²²

Variable Pattern in the Use of Policy Tools —

For given staff projections and estimates of TR, policy actions were highly variable. As noted for periods examined above, widening gaps between projections of TR and path levels induced prompt and substantial adjustments of policy tools in some periods but not in other periods. To identify relevant periods when the Fed did not take policy actions, it is necessary to specify a criterion for identifying relatively large deviations of TR from the TR path. This paper uses \$200 million or more as the size of a large deviation, based on the following reasoning. Over the period of NBR targeting, TR was approximately \$40 billion. A gap of \$200 million is one-half of 1 percent of

²⁰ The last observation for TR over each intermeeting period reflects the information available to Fed staff as of the end of the period. For instance, the last estimate of TR for the three weeks ending February 27, 1980, was the staff estimate as of February 27. The data for TR over intermeeting periods reflect the information available to policymakers at the time, not subsequent revisions to TR.

²¹ For more details on the discount rate surcharge, see Board of Governors (1980, pp. 315-18). For a description of the credit control program, see Gilbert and Trebing (1981).

²² This article does not include among the policy actions some adjustments to the supply of NBR which might properly be classified as policy actions. Levin and Meek (1981) mention that on some occasions the staff of the Open Market Desk based open market operations on movements in the federal funds rate, rather than their numbers on factors affecting NBR. As they describe those actions, the objective was to use the federal funds rate as an indicator of errors in their numbers on factors affecting NBR. They do not indicate that these open market operations based on movements in the

federal funds rate interfered with hitting targets for NBR over intermeeting periods.

Other adjustments to the supply of NBR raise more questions about adjustments to the supply of NBR that should be labeled as policy actions. At times, the staff adjusted the supply of NBR to prevent large movements in borrowings and in the federal funds rate just prior to FOMC meetings. Weekly Reports on Open Market Operations mention that at times the staff did not make the full adjustments to the TR path that were indicated by their information on factors affecting the relationship between reserves and the monetary aggregates, and the reports refer to occasions when the staff deliberately allowed NBR to deviate from its path level, to avoid forcing large changes in borrowed reserves just before FOMC meetings. Table 1 limits its list of policy actions to those identified clearly as policy actions in the Report on Open Market Operations.

\$40 billion. An error of approximately one-half of 1 percent in hitting a target for an aggregate over a month, compounded over a year, would be an error of 6 percent, which could be interpreted as a substantial error. TR deviated from the TR path by at least \$200 million, and the Fed took no policy actions in response, in each of the periods after the FOMC meetings on March 18, 1980, and December 18-19, 1980.

Directions of Policy Actions Were Appropriate for Monetary Control — Prior to the fall of 1982, the *direction* of each policy action between FOMC meetings was appropriate for monetary control. When TR was projected to be above the path level, policy actions included reductions in the target for NBR relative to the TR path or increases in the discount rate. The Fed took the opposite types of policy actions when TR was projected to be below the path level.²³

The only exception to this pattern occurred on February 25, 1981. The Fed reduced the NBR path by \$166 million when the staff projected TR to be \$351 million below the TR path. At that time, the growth of M2 and M3 exceeded FOMC objectives, whereas M1 was growing more slowly than the target set by the FOMC at its meeting on February 2-3, 1981. TR was below the TR path because required reserves predominately reflected the required reserves on deposits in M1. In February 1981, the FOMC decided to put more weight on its objectives for M2 and M3 than on M1. Therefore, the FOMC decided to reduce the supply of NBR to limit the growth of M2 and M3. This reduction in the NBR path on February 25, 1981, was consistent with use of the NBR procedure for monetary targeting, even though TR was projected to be below the path at the time of the policy action.

The change in the NBR target on September 24, 1982, in contrast, illustrates a policy action that was inconsistent with use of the NBR operating procedure for monetary control. It is generally

recognized that by the fall of 1982, the Fed had abandoned use of the NBR operating procedure in favor of smoothing short-term interest rates.²⁴ For operational purposes, however, the staff continued to calculate the numbers that had been important for conducting policy under the NBR procedure. After the FOMC meeting on August 24, 1982, projections of TR were increased gradually relative to estimates of the TR path, and by September 24, the gap had reached \$495 million. A policy action appropriate for monetary targeting would have been a reduction in NBR. Instead, the Fed *increased* the target for NBR, to limit the rise in short-term interest rates in response to the rise in demand for reserves. This action, the kind of policy action illustrated in Figure 6, provides one way to date the end of the NBR operating procedure.

Size of the Policy Actions — Table 2 lists the changes in the NBR path between FOMC meetings that the Fed classified as policy actions. These changes in the NBR path generally were about half or less of the gap between TR projected by the staff and the TR path at the time of the policy actions. These observations indicate that even at those times when the Fed adjusted the NBR path as a policy action, the Fed was willing to tolerate large deviations of TR from the path over intermeeting periods. The emphasis in the policy was bringing the levels of the monetary aggregates closer to FOMC objectives over time. The policy did not call for actions to force immediate shifts of the levels of the aggregates back to the levels specified in FOMC directives.

Policy Actions Did Not Cause All of the Sharp Fluctuations in Interest Rates — The federal funds rate was more variable during the period of NBR targeting than in surrounding periods (Figure 1). These large fluctuations generated a lot of complaints from market participants and from economists critical of the procedure. In evaluating NBR targeting as a method of implementing monetary policy, it would be useful to

²³ Some changes in the gap between the NBR path and the TR path were labeled "technical adjustments" to the supply of NBR, not policy actions. The purpose of these technical adjustments was to offset the effects on interest rates of changes in the relationship between borrowings and the spread between the federal funds rate and the discount rate for TR. At times, the staff concluded that there were persistent changes in the quantity of reserves borrowed by banks for given spreads between the federal funds rate and the discount rate. In terms of Figures 1 and 4, there appeared to be shifts in the slope of the supply curve of reserves. At those times, the staff adjusted the supply of NBR to offset possible effects on interest rates of such changes in the

behavior of banks. Table 1 does not include these adjustments to the supply of NBR because the purpose of this article is to examine patterns of policy actions under the NBR operating procedure. Reports by the Manager of the Open Market Account distinguish between technical adjustments and changes in the supply of NBR labeled policy actions.

²⁴ See Thornton (1983, 1988).

Table 2
Size of Changes in the Nonborrowed Reserves Path

Date	Change in the NBR path (millions of dollars)	Change in the NBR path as a percentage of the most current staff projection of the gap between TR and the TR path
1980		
2/15	\$ -67	21.4%
2/29	-300	47.9
5/2	+100	12.5
9/5	-150	52.6
10/3	-200	61.9
11/7	-100	45.7
11/14	-50	16.7
12/1	-170	49.9
1981		
2/25	\$ -166	N/A ¹
5/1	-250	45.3%
5/8	-234	62.6
11/6	+56	28.9
1982		
1/15	\$ -187	38.5%
7/16	+85	87.6
7/30	+100	48.1

¹ The NBR path reduced at a time when TR were projected to be below the TR path.

know whether the relatively large fluctuations in interest rates under NBR targeting reflected frequent, aggressive policy actions to hit short-run money targets. Perhaps fluctuations in the federal funds rate under a NBR targeting procedure would be substantially smaller than the experience of 1980-82 if the Fed used the procedure less aggressively in attempting to hit short-run money targets. In contrast, many of the relatively large weekly changes in the federal funds rate may have

occurred simply because the Fed placed less weight on limiting interest rate fluctuations under the NBR operating procedure than other operating procedures.

It is possible to determine whether the relatively large weekly fluctuations in the federal funds rate reflected the effects of policy actions by examining their timing and the timing of policy actions.²⁵ Table 3 examines the pattern of policy actions during the weeks in which the federal funds rate changed by 100 basis points or more. Changes in weekly average levels of the federal funds rate of 100 basis points or more were relatively common during the three years ending in September 1982. For example, Table 3 list 29 weekly occurrences. During the three years ending in September 1979, in contrast, there were no weeks when the federal funds rate changed by as much as 100 basis points. During the three years ending in September 1985, the three years following the period of NBR targeting, the federal funds rate changed by 100 basis points or more in only five weeks.

Seven of the relatively large changes in the federal funds rate in Table 3 occurred in the weeks just after FOMC meetings. For instance, the federal funds rate rose 154 basis points in the week ending March 26, 1980, the first week after the FOMC meeting on March 18. The decisions of the FOMC at its meeting on March 18, 1980, can be characterized as a tightening of monetary policy. Table 4 illustrates the shift in monetary policy at the FOMC meeting on March 18 in terms of an increase in the borrowings assumption relative to the level set at the prior meeting: from a level of \$1.25 billion set at the meeting on February 4-5 to a level of \$2.75 billion set on March 18. The rise in the federal funds rate in the week ending March 26 is consistent with a tightening of monetary policy at the FOMC meeting on March 18.

The federal funds rate fell by 244 basis points in the week ending April 30, 1980, which was the first week after the FOMC meeting on April 22. At its meeting on April 22, the FOMC decided to reverse the tightening of monetary policy at its prior meeting. Table 4 illustrates the easing of monetary policy at the meeting of April 22 with

²⁵ Cook (1989a, 1989b) conducted a similar analysis of the timing of policy actions and changes in the federal funds rate during the period of NBR targeting. Cook investigated the degree to which changes in the federal funds rate over periods between FOMC meetings could be explained in terms of policy actions. Cook concluded that roughly two-thirds of

the changes in the federal funds rate were due to judgmental actions of the Federal Reserve. This article, in contrast, examines the timing of relatively large weekly changes in the federal funds rate and policy actions.

Table 3

**Association Between Weekly Changes in the Federal Funds Rate
of 100 Basis Points or More and Policy Actions**

Week ending	Change in the federal funds rate from the prior week, in basis points	Change in the NBR target	Change in the discount rate or surcharge	First week after an FOMC meeting
X indicates occurrence in the week				
1980				
2/20	+123	X	X	
3/5	+155	X		
3/26	+154			X
4/2	+161			
4/30	-244			X
5/7	-216	X	X	
5/14	-211			
5/28	-125		X	X
6/4	+128			
6/11	-106			
10/1	+153		X	
11/26	+221			X
12/10	+110		X	
12/17	+101			
1981				
1/7	+161			
1/28	-123			
3/18	-140			
4/1	+145			
5/6	+263	X	X	
7/8	+109			
7/15	-117			X
1982				
1/27	+102			
2/24	-175			
7/14	-129			
7/21	-104	X	X	
7/28	-112			
8/25	-107			
9/1	+111		X	X
10/13	-117		X	X

Table 4
Initial Assumptions for Borrowed Reserves Set by the FOMC, 1980-82

Date of FOMC meeting	Initial assumption for borrowed reserves (millions of dollars)
1980	
January 8-9	\$ 1,000
February 4-5	1,250
March 18	2,750
April 22	1,375
May 20	100
July 9	75
August 12	75
September 16	750
October 21	1,300
November 18	1,500
December 18-19	1,500
1981	
February 2-3	\$ 1,300
March 31	1,150
May 18	2,100
July 6-7	1,500
August 18	1,400
October 5-6	850
November 17	400
December 21-22	900
1982	
February 1-2	\$ 1,500
March 29-30	1,150
May 18	800
June 30-July 1	800
August 24	350
October 5	300
November 16	250
December 20-21	200

the decline in the initial borrowings assumption to \$1.375 billion.

Comparison of Tables 3 and 4 illustrates this consistent pattern: On those occasions when the federal funds rate changed by over 100 basis points in the first week after an FOMC meeting, increases in the federal funds rate coincided with increases in the initial borrowings assump-

tions at the FOMC meetings, and relatively large decreases in the federal funds rates were associated with reductions in the initial borrowings assumptions. This pattern prevailed until the fall of 1982, when the Fed had largely abandoned use of NBR targeting. Thus, some of the relatively large changes in the federal funds rate reflected policy actions initiated at the time of FOMC meetings.

Of the 29 weeks in Table 3 in which the federal funds rate changed by 100 basis points or more, 15 were *not* the first week after an FOMC meeting or weeks of changes in the NBR path or the discount rate. Many of the relatively large weekly changes in the federal funds rate, therefore, reflected the relatively low weight the Fed attached to limiting fluctuations in the federal funds rate under the NBR operating procedure. Also, the economy was very volatile during the period of NBR targeting. Influences other than the conduct of monetary policy may have contributed substantially to the variability of interest rates over this period.

CONCLUSIONS

The conduct of monetary policy in the United States from October 1979 through the fall of 1982 has important implications for the design of procedures for targeting monetary aggregates today. This is the only period in which daily open market operations were tied directly to objectives of the FOMC for growth of the monetary aggregates. It is our closest approximation to short-run monetary control in the United States. Some critics of the conduct of monetary policy in this period have concluded that errors in hitting the money targets of the FOMC reflected problems inherent in the design of the procedure.

This article presents information on the conduct of monetary policy in this period of nonborrowed reserves (NBR) targeting not available in other published studies. This information includes Fed staff projections of the actual levels of total reserves (TR) over periods between FOMC meetings and staff estimates of the average levels of TR between meetings that would have been consistent with FOMC objectives for money growth (the TR paths). Using this information, we can examine the timing and size of policy actions in relation to the information available to Fed policymakers at the time.

Examination of policy actions during the period of NBR targeting yields the following

observations. First, the pattern of policy actions does not reflect consistent use of the procedure over time for monetary targeting. During some intermeeting periods in which the staff projected that TR would deviate substantially from the TR path, the Fed took no policy actions, whereas in other periods the Fed took aggressive actions consistent with monetary targeting. Second, when the Fed did take policy actions, they were in the *directions* appropriate for monetary control, given the staff projections and estimates available at the time. This observation contradicts assertions that there was no change in the operating procedure in October 1979. Third, the *magnitude* of policy actions often was small in relation to the gap between the projection of TR and the path. These three observations have implications for interpreting the three years ending in the fall of 1982 as an experiment in monetary targeting. The commitment of policymakers to hitting short-run money targets varied over those three years. Any conclusions derived from data for those three years concerning NBR targeting as a method of monetary control should account for variation over time in the commitment of policymakers to take actions appropriate for monetary control.

The fourth observation concerns the degree of interest rate variability under a procedure of NBR targeting. While several of the relatively large weekly changes in the federal funds rate coincided with the timing of policy actions, the Fed took no policy actions at the time of some relatively large fluctuations in the federal funds rate. Interest rate fluctuations during the period of NBR targeting reflect use of an operating procedure which left the federal funds rate largely unconstrained within wide bands. It is difficult to extrapolate from this experience to the degree of weekly interest rate variability that would exist under use of an NBR procedure now. This experience, however, is consistent with the view that targeting NBR for purposes of short-run monetary control would tend to increase weekly interest rate variability.

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Appendix 1

Illustration of Staff Projections and Estimates of Total Reserves

This appendix describes the steps involved in staff estimates of the TR path and projections of TR for the intermeeting period after the FOMC meeting on February 4-5, 1980. The staff divided the intermeeting period into two subperiods of three weeks each, ending on February 27 and March 18. They made such divisions when the periods between meetings were longer than five weeks to avoid using projections of variables several weeks into the future in determining the supply of NBR early in an intermeeting period.

To aid in clarifying the timing of relationships between deposits and reserves, Table A1 presents a calendar of January and February 1980. At its meeting on February 4-5, the FOMC specified its short-run objectives as growth of M1-B at a 5 percent rate and M2 at a 6.5 percent rate over the first quarter of 1980. To estimate the TR path for the three weeks ending February 27, the staff would do the following calculations:

1. Project the weekly levels of M1 and M2 growing at the desired rates from mid-December through the three weeks ending February 13. Deposits over the three weeks ending February 13 determine required reserves over the three weeks ending February 27. These weekly levels are projected from the seasonally adjusted data for December and then converted into nonseasonally adjusted levels using the seasonal factors for those weeks.
2. Estimate currency in the hands of the public, not seasonally adjusted, for the three weeks ending February 13.
3. Subtract the estimate of currency in the hands of the public from the projection of M1 to derive the level of checkable deposits, not seasonally adjusted, if M1 grew at the rate desired by the FOMC.
4. Multiply the average level of checkable deposits as derived in step 3 by an estimate of the average reserve requirement on checkable deposits.
5. Subtract the estimate of average currency holdings as described in step 2 and checkable deposits as described in step 3 from the projection of M2, as described in step 1.

Table A1
Calendar of January and February 1980

January						
S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		
February						
S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	

Multiply by an estimate of the average reserve requirement on deposits in M2 but not in M1.

6. Sum estimates of required reserves as described in steps 4 and 5 and an estimate of required reserves on deposits not in M2 to derive an estimate of what required reserves would be in the three weeks ending February 27 if M1 and M2 grew at the rates specified by the FOMC at its meeting on February 4-5. Add an estimate of the average level of excess reserves for the three weeks ending February 27 to get an estimate of the TR path over the three weeks ending February 27.

The steps involved in projecting TR are similar to the steps in estimating the TR path:

1. Estimate liabilities subject to reserve requirements for the three weeks ending February 13, not seasonally adjusted. The Federal Reserve

staff generally had data on reservable liabilities eight days after the end of a reserve maintenance week. By February 7, the date of the first projection, the staff would have had information on reservable liabilities for the week ending January 30. They would have to estimate liabilities for the weeks ending February 6 and 13.

2. Estimate average reserve requirements on various categories of liabilities.
3. Sum the projections for required reserves for the three weeks ending February 27, based on calculations described in steps 1 and 2, and add an estimate of average excess reserves.

Appendix 2

A Tool for Describing the Conduct of Monetary Policy: Supply and Demand for Reserves

This paper describes the conduct of monetary policy under the NBR operating procedure using diagrams of the supply and demand for bank reserves.¹ This appendix describes the determinants of the supply and demand curves, and the following section uses this analytical tool to describe the mechanics of the NBR operating procedure.

Reserves available to meet reserve requirements include currency that banks hold in their vaults and their reserve balances at Federal Reserve Banks. The Federal Reserve supplies reserves. Banks demand reserves to facilitate their customers' transactions and to meet reserve requirements imposed by the Federal Reserve, which are based on the amount and composition of their liabilities.

Banks earn no interest on reserves. This article identifies the opportunity cost to banks of holding reserves as the federal funds rate, which is the interest rate that banks charge each other for lending reserves.² A bank changes its reserves by borrowing or lending at the federal funds rate.

Demand for reserves by banks is drawn as a function of the federal funds rate in Figures 4-6. Reserve requirements on deposits included in the money stock create a close relationship

between the demand for money by the public and the demand for reserves by banks. Demand for reserves, therefore, depends on reserve requirements and the demand for money.

Demand for money is assumed to be a function of total spending in the economy and interest rates. Various influences can cause shifts in the demand curve for reserves. A change in total spending in the economy, which influences the demand for money, would cause the demand curve for reserves to shift. Shifts in the demand for reserves could reflect other influences: changes in the random component of money demand; the average reserve requirement on deposit liabilities included in the money stock; reserve requirements on other liabilities; or the demand for excess reserves.

Elasticity of the demand for reserves depends on the relevant time period over which average reserves are measured. The demand curves for reserves in Figures 4-6 are steeply sloped because it is for a period between FOMC meetings. Over these periods, there is little time for a change in interest rates to change the quantity of money demanded, feeding back to a change in the quantity of reserves demanded.

Factors that influence the supply of reserves can be analyzed by considering separately the

¹ For convenience of exposition, the term "bank" refers to all depository institutions.

² Federal funds brokers facilitate the operation of the federal funds market. These brokers receive orders from depository institutions located throughout the nation to lend or borrow reserves, and the brokers match lenders and borrowers at mutually agreeable interest rates. Most of the transactions through the federal funds market involve borrowing and

lending reserves for one day. The transfers of reserves to borrowers are made the same day through wire transfer systems, including the Fed Wire of the Federal Reserve System.

determinants of borrowed reserves and NBR. The Federal Reserve determines the amount of NBR directly through the open market operations. Banks decide the amount of reserves they borrow from the Federal Reserve, but their decisions are shaped by lending terms set by the Federal Reserve, including the discount rate and limits on the size and frequency of borrowings by individual banks. Banks try to avoid exceeding these borrowing limits to ensure that they maintain access to credit from the Fed to cover their short-term liquidity requirements. If a bank borrows now, it will be subjected to greater administrative pressure to limit its borrowings in the future, when the attractiveness of borrowing from the discount window might be greater.

The supply curve for reserves in Figure 4 is drawn as a vertical line from the level of NBR (labeled N) up to the level on the vertical axis at which the federal funds rate equals the discount rate (r_d). If the discount rate is above the federal funds rate, the amount of reserves borrowed from Federal Reserve Banks tends to be relatively low and insensitive to small changes in the federal funds rate. The supply curve of reserves is upward sloping in the range with the federal funds rate above the discount rate. Given the terms for lending set by the Federal Reserve, it takes an increase in the spread between the federal funds rate and the discount rate to induce banks to increase their borrowings from the discount window.³

³ Goodfriend (1983) derives the relationship between borrowings and the rate spread from a theoretical framework that is based on profit-maximizing bank behavior.