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The Quarterly Review is published by the Research and Statistics Function of the Federal Reserve Bank of New York. Among the members of the staff who contributed to this issue are LAWRENCE RADECKI (on an analysis of some possible dangers of short-run monetary control, page 1); EDWARD J. FRYDL (on the Eurodollar conundrum, page 11); MARCOS T. JONES (on mortgage designs, inflation, and real interest rates, page 20).

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Short-run Monetary Control

An Analysis of Some Possible Dangers

While the Federal Reserve has been setting annual targets for several years, there continues to be a question of the time horizon the Federal Reserve should use in attempting to control money. Some analysts contend that the Federal Open Market Committee (FOMC) can and should extend control to the very short run. But there could be costs in so doing: the pursuit of monthly monetary targets could transmit an unacceptable degree of instability to the financial markets and to economic activity. The purpose of this article is to show under what circumstances such considerations are important and then to review some empirical evidence relevant to these matters.

Currently, the Federal Reserve's monetary targets are set on an annual basis, measured from the fourth quarter of one year to the fourth quarter of the next. During the course of the year, the FOMC also sets shorter run monetary objectives consistent with attaining the annual targets. These shorter run targets usually extend over a period of a few months, for example, December to March.

Some analysts argue that tight control over such short periods or even shorter periods is both desirable and feasible. Others are concerned that sharp movements in nonborrowed reserves would be required to achieve such precise control. To hit the monetary targets in the very short run it might become necessary to adjust the level of nonborrowed reserves substantially every period to offset the lagged effects of the Federal Reserve's own policy

actions in previous periods. This is because the total response of the public's money holdings to a change in nonborrowed reserves occurs partly in the same period as the change in nonborrowed reserves and partly in the next and succeeding periods. Consequently, a change in nonborrowed reserves bringing the money stock quickly back to target from, for instance, a level below target may later cause the money stock to rise *above* target, as the lagged effects take hold. It would thus be necessary to make further adjustments to the level of nonborrowed reserves to keep the money stock on target in every period.

Roughly speaking, if the lagged effects of past actions are large, the movements in nonborrowed reserves from period to period required to keep the money stock on target in each period could turn out to be sizable initially and diminish only slowly through time. If the lagged effects are particularly large, the required offsetting movements in subsequent periods could increase through time; such a situation is known as "instrument instability".¹ Explosive oscillations in the movement of the policy instrument would be untenable. Furthermore, even substantial although gradually moderating oscillations in nonborrowed reserves might be judged to be undesirable, not because of the required shifts in open market operations *per se*, but because

¹ See Robert S. Holbrook, "Optimal Economic Policy and the Problem of Instrument Instability", *American Economic Review* (March 1972), pages 57-65.

of the associated effects on financial markets and the general economy.²

In the first section of this article, the timing of the public's adjustment of its money holdings to changes in interest rates is shown to be important in selecting a control horizon for the monetary aggregates that will avoid or minimize such problems. This is true even though interest rates are not controlled by the Federal Reserve under the new operating procedures. In the second section, empirical estimates of the demand for money from previous research are examined. The evidence indicates the possibility that monetary control over periods of less than six months could have destabilizing effects. Some readers may wish to pass over the mathematical treatment of the problem in the first section and proceed directly to the review of earlier empirical research and its implications, beginning on page 4.

Simulations of the monetary sector under monetary targeting

In this section, some simple examples are used to illustrate how strict short-run monetary targeting can precipitate cycles in nonborrowed reserves and interest rates. Initially, it is assumed for simplicity that the level of income is given and is invariant to changes in the money stock and interest rates; therefore, only the monetary sector of the economy is relevant. Later this assumption will be dropped; changes in the money stock and interest rates will then be allowed to affect aggregate demand, which in turn will have feedback on the demand for money. At that time, the model will be expanded to include an equation representing aggregate demand.

To begin, let the monetary sector consist of the demand and supply of money, which are specified as:

$$\begin{aligned} \text{(demand)} \quad M(t) &= a - b_0 r(t) - b_1 r(t-1) + cY(t) \\ \text{(supply)} \quad M(t) &= d + eNBR(t) + f[r(t) - DISC(t)] \end{aligned}$$

where M = the money stock,
 r = the interest rate,
 Y = income,
 NBR = nonborrowed reserves,
 $DISC$ = the discount rate, and
 t represents a specific period of time.

That is, the quantity of money demanded is determined by the current period's income and the current and previous period's interest rate, so that the total response to a change in the interest rate occurs partly in the same period and partly in the following period. The quantity of money supplied is determined by the current period's level of nonborrowed reserves and the spread between the interest rate and the Federal Reserve's discount rate. Banks are assumed to respond completely in the same period to changes in these factors. Hence, no lagged effects are included in the supply-of-money equation.

If the goal of monetary policy is to keep the money stock on target in every period, the level of nonborrowed reserves—the Federal Reserve's main policy instrument—must be changed every period (at least early on) after a change in income or a shift in the demand for money.³ Nonborrowed reserves must be changed enough in the first period to offset the effect of the income or money demand disturbance on money holdings. In the second period and all periods thereafter, nonborrowed reserves must be adjusted to offset the lagged effects of earlier changes in nonborrowed reserves.

The relative magnitude of the current and the one-period lagged interest rate effects on money demand determines whether the oscillations of nonborrowed reserves and the interest rate will be explosive or stable if period-by-period control over the money stock is maintained. It can be shown that the cycles are explosive—the case of instrument instability—if the lagged effect (b_1) is greater than the current effect (b_0). If the current effect is greater than the lagged effect, the cycles eventually die out. Generally the greater the current effect is relative to the lagged effect, the more rapidly the cycles dampen.⁴

Chart 1 shows the simulated behavior of nonborrowed reserves and the interest rate when a targeted value of the money stock is to be maintained despite a permanent 4 percent reduction of income. Three sets of values for the current and lagged interest rate effects were selected to illustrate explosive, slowly damped, and rapidly damped cycles. The qualitative

² Attention was called to these potential problems first by Richard G. Davis, "Implementing Open Market Policy with Monetary Aggregate Objectives", *Monetary Aggregates and Monetary Policy* (Federal Reserve Bank of New York, 1974), pages 7-19, and more recently by Bryon Higgins, "Should the Federal Reserve Fine Tune Monetary Growth?", *Economic Review* (Federal Reserve Bank of Kansas City, January 1982), pages 3-16. Also see John H. Ciccolo, "Is Short-run Monetary Control Feasible?", *Monetary Aggregates and Monetary Policy* (Federal Reserve Bank of New York, 1974), pages 82-91.

³ Recognizing that the Federal Reserve does not have perfect control over either the Federal funds rate or nonborrowed reserves, some economists refer to one or the other as the operating target rather than the policy instrument. The term "policy instrument" then refers to open market operations, the discount rate, and reserve requirements. For example, see Gordon H. Sellon, Jr., and Ronald L. Teigen, "The Choice of Short-run Targets for Monetary Policy: Part One", *Economic Review* (Federal Reserve Bank of Kansas City, April 1981), pages 3-16.

⁴ If the current and lagged effects are exactly equal, constant oscillations occur; however, this special case will not be considered. See William J. Baumol, *Economic Dynamics* (New York: Macmillan, 1970), page 164.

character of the cycles would be the same if the income disturbance is transitory, provided the ratio between the current and lagged effects of the interest rate on money demand is kept constant.

In the example shown in Chart 1, the lagged interest rate effects on money are confined to the previous period, but lagged interest rate effects on the demand for money may in the real world extend for several periods. If so, the resulting cycles will be one of two types: (a) cycles repeating themselves every two periods or (b) cycles taking longer than two periods to repeat themselves. To distinguish between these two cases, it is customary to refer to (a) as oscillations and to (b) as fluctuations or trigonometric oscillations. Whether they are oscillations or fluctuations, the cycles can be either explosive or damped.⁵

Besides lagged interest rate effects on the quantity of money demanded, there may be lagged income effects. Their presence generally does not change the character of the cycles, although it does affect the particular path. For example, suppose a lagged income effect is introduced so that the quantity of money demanded is determined by the current and previous period's level of income, as well as the current and previous period's interest rate. The demand-for-money equation therefore becomes:

$$M(t) = a - b_0 r(t) - b_1 r(t-1) + c_0 Y(t) + c_1 Y(t-1).$$

Let the weights of the interest rate effects be the same as those used to produce the slowly damped cycles shown in Chart 1. In the first four columns of Table 1, a comparison is made between the paths that nonborrowed reserves and the interest rate take when the demand for money does and does not have a lagged income effect; the long-run income elasticity is the same, however. In both cases, slowly damped cycles occur; with the lagged income effect present, the amplitude of the cycles is smaller.

Although the character of the cycles is generally the same whether lagged income effects are present or not, there is an important exception. No cycles whatsoever occur following a change in income if the current and lagged effects from income and the interest rate are exactly parallel, that is:

$$(b_0/c_0) = (b_1/c_1) = (b_2/c_2) = \dots$$

⁵ With a two-period lag, fluctuations will occur rather than oscillations if $(b_1/b_0)^2 < (4b_2/b_0)$. With a two-period lag, the conditions for damped cycles are:

$$(b_2/b_0)^2 < 1 \text{ and } (b_1/b_0)^2 < [1 + (b_2/b_0)]^2$$

These conditions are derived in Baumol, *op. cit.*, page 248.

If income decreases in period 1 when money demand is in equilibrium, nonborrowed reserves will be moved in period 1 to its new equilibrium level if the money stock is to be kept on target, and nonborrowed reserves will be kept at that new equilibrium level in all subsequent periods. The last two columns of Table 1 are an example of this. What happens is that the level of nonborrowed reserves is moved in period 1 to offset exactly the change in the quantity of money demanded due to the change in income. No further adjustments of the policy instrument are necessary to keep the money stock on target, because the lagged interest rate effects precisely cancel the lagged income effects in subsequent periods.

Exactly parallel income and interest rate effects may seem to be a very special case, but this restriction often appears in empirical studies of the demand for money. One way this restriction is imposed is through the "partial adjustment" model, which is frequently assumed, mostly for convenience, as the mechanism determining the lagged income and interest rate effects in the demand for money.⁶ Implicit in the partial adjustment model is the way all factors influencing the long-run demand for money have parallel lagged effects in the short run.

Looser short-run monetary targeting

The simulation results (Chart 1) illustrate how lags in the demand for money can cause troublesome cycles in nonborrowed reserves and interest rates when the money stock is immediately brought back to target following a disturbance. The problem can be averted by relinquishing some control over the money stock in the short run. Suppose that only the current and previous period's interest rate affects the quantity of money demanded; again let the weights of these two effects equal those used to generate the slowly damped cycles in Chart 1. In period 1, let income decrease permanently by 4 percent. If the level of nonborrowed reserves is changed so that the interest rate is moved to its new equilibrium value in period 1 and kept there subsequently, the money stock will be back on target in period 2 and will remain there. Cycles are thus avoided but at the cost of having the money stock below target for one period.

This result can be generalized for more complicated cases. If the quantity of money demanded is affected by the level of the interest rate as far back as n periods ago, the money stock will be back on target in period $n + 1$, provided the interest rate is moved to

⁶ The partial adjustment model is discussed in detail by Stephen M. Goldfeld, "The Demand for Money Revisited", *Brookings Papers on Economic Activity* (1973, 3), pages 576-638.

its new equilibrium value in period 1 and subsequently kept there. The money stock, however, will be off target from period 1 through period n.⁷

Another strategy, that of bringing the money stock back to target gradually, would also mitigate cycles, provided they were damped to start with. In Table 2, a comparison is made between the paths nonborrowed reserves and the interest rate take with the immediate and gradual return of the money stock to target. If the money stock is brought one half of the way back to target in the first period and completely back to target in the second period, the amplitude of the damped cycles is greatly reduced. This strategy fails nevertheless in the case of instrument instability; if immediate return of the money stock to target causes explosive cycles, likewise gradual return to target causes explosive cycles. This occurs because the money stock must eventually be put on target in one period.⁸

Results from empirical research on the demand for money

The simulations presented earlier suggest that the lag structure in the demand for money is critical for the behavior of nonborrowed reserves and the interest rate under monetary targeting. In this section, the results from three econometric studies of the demand-for-money equation are examined to see what types of cycles are implied according to the analysis in the previous section. Although the models are based on the same general theory of money demand, there are differences in the ways they are formulated and

⁷ This was pointed out by Holbrook, *op. cit.*, page 60.

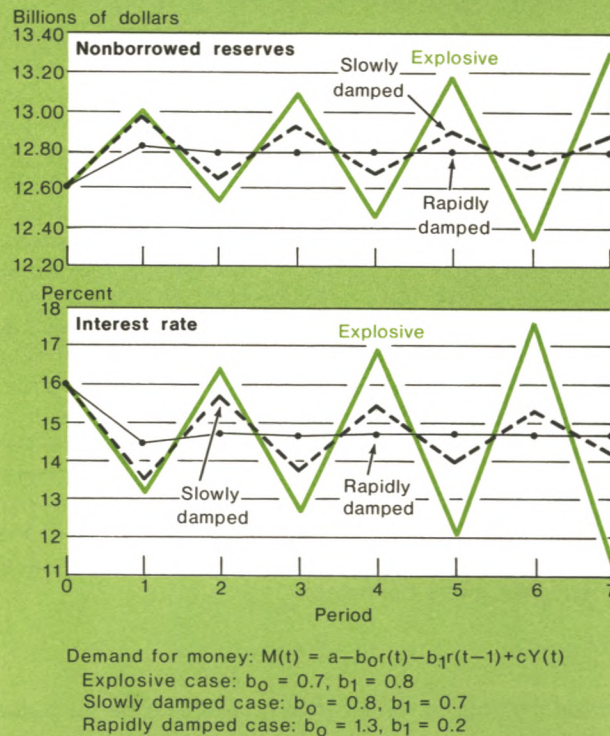
⁸ This can be shown with the example below. The demand for money is: $M(t) = 19 - (0.5)r(t) - (1.0)r(t-1) + (0.5)Y(t)$; this specification leads to instrument instability if period-by-period control is attempted. If the money stock is gradually returned to target after four periods, however, instrument instability still occurs because the money stock must be put back on target in period 4.

Simulated Paths of Nonborrowed Reserves and the Interest Rate

In billions of dollars

Period	Y	M	NBR	r (percent)
0	100	45.0	12.60	16
1	96	43.5	12.75	15
2	96	44.0	12.60	16
3	96	44.5	13.05	13
4	96	45.0	12.30	18
5	96	45.0	13.80	8
6	96	45.0	10.80	28
7	96	45.0	16.80	-12
∞	96	45.0	—	—

Chart 1
Simulated Paths of Nonborrowed Reserves and the Interest Rate
Assuming Period-by-Period Control of Money



then estimated, so that the implications of tight monetary targeting vary considerably.

Goldfeld. Stephen Goldfeld formulated and estimated a model of the demand for money using quarterly data.⁹ He found that the quantity of money demanded in a particular quarter was determined by the level of the commercial paper rate as far back as six quarters previous and by the level of income as far back as eleven quarters previous. The mean lag—the time it takes for one half of the long-run effect resulting from a change in income or interest rates to occur—was calculated to be 9.2 months for the commercial paper rate and 6.8 months for income. The estimates of the regression equation's coefficients imply that adjusting the policy instrument to keep the money stock on target every quarter would precipitate cycles that dampen rather rapidly. For example, starting in equilibrium with the money stock on target and the interest rate

⁹ See Goldfeld, *op. cit.*, pages 604-5.

Table 1

Simulated Paths of Nonborrowed Reserves and the Interest Rate
Assuming Period-by-Period Control of Money

In billions of dollars

Period	No income lag ($c_0 = 0.5, c_1 = 0.0$)		Nonparallel income and interest rate lags ($c_0 = 0.35, c_1 = 0.15$)		Parallel income and interest rate lags ($c_0 = 0.267, c_1 = 0.233$)	
	Non- borrowed reserves	Interest rate (percent)	Non- borrowed reserves	Interest rate (percent)	Non- borrowed reserves	Interest rate (percent)
0	12.60	16.00	12.60	16.00	12.60	16.00
1	12.98	13.50	12.86	14.25	12.80	14.67
2	12.65	15.69	12.75	15.03	12.80	14.67
3	12.93	13.77	12.85	14.35	12.80	14.67
4	12.68	15.45	12.76	14.95	12.80	14.67
5	12.90	13.98	12.84	14.42	12.80	14.67
6	12.71	15.27	12.77	14.88	12.80	14.67
7	12.88	14.14	12.83	14.48	12.80	14.67
∞	12.80	14.67	12.80	14.67	12.80	14.67

Income equals \$100 billion in period 0, \$96 billion in subsequent periods.

Demand for money: $M(t) = a - (0.8)r(t) - (0.7)r(t-1) + c_0Y(t) + c_1Y(t-1)$.Supply of money $M(t) = d + eNBR(t) + f[r(t) - DISC(t)]$.

Table 2

Simulated Paths of Nonborrowed Reserves and the Interest Rate
Immediate Versus Gradual Return of the Money Stock to Target

In billions of dollars

Period	Money stock	Immediate return		Money stock	Gradual return	
		Non- borrowed reserves	Interest rate (percent)		Non- borrowed reserves	Interest rate (percent)
0	45	12.60	16.00	45	12.60	16.00
1	45	12.98	13.50	44	12.79	14.75
2	45	12.65	15.69	45	12.81	14.59
3	45	12.93	13.77	45	12.79	14.73
4	45	12.68	15.45	45	12.81	14.61
5	45	12.90	13.98	45	12.79	14.72
6	45	12.71	15.27	45	12.81	14.62
7	45	12.88	14.14	45	12.80	14.70
∞	45	12.80	14.67	45	12.80	14.67

Income equals \$100 billion in period 0, \$96 billion in subsequent periods.

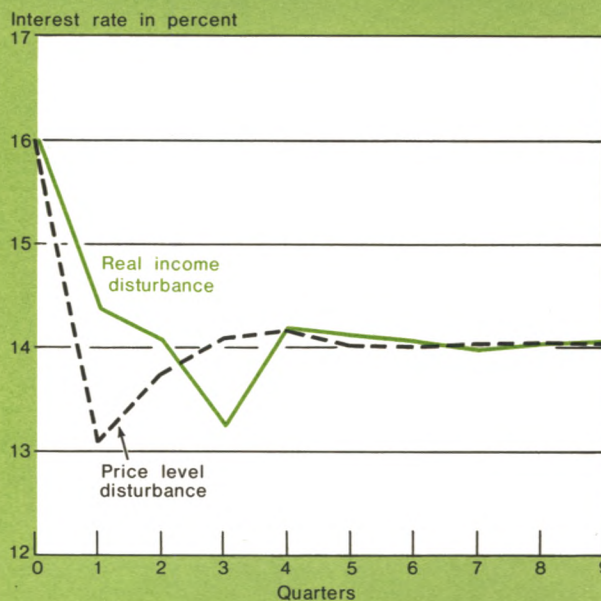
Demand for money: $M(t) = a - (0.8)r(t) - (0.7)r(t-1) + cY(t)$.Supply of money: $M(t) = d + eNBR(t) + f[r(t) - DISC(t)]$.

Target for money stock: \$45 billion.

Chart 2
**Simulated Paths of the Interest Rate under
 Monetary Targeting: Goldfeld Equation**



Chart 3
**Simulated Paths of the Interest Rate under
 Monetary Targeting: MPS Equation**



at 16 percent, suppose the demand for money falls by 1 percent. (A 1 percent deviation of the money stock from its targeted value would seem to characterize some of the problems the FOMC confronts.) Chart 2 shows the values of the interest rate that result quarter by quarter when the target is attained by changing nonborrowed reserves. Two cases are examined: (a) a fall in money demand due to a drop in the price level and (b) a fall due to a decline in real income. (These two cases are different since a change in the price level, unlike a change in real income, has no lagged effects.) Because the interest rate elasticity in the current quarter was estimated to be rather small, a very sharp rise in nonborrowed reserves—and a concurrent fall in the short-term interest rate—is necessary in the first period to offset a price level disturbance.

MPS. A second equation examined is that used in the MPS model of the macroeconomy.¹⁰ This regression equation was also estimated using quarterly data; however, the dependent variable is demand deposits. The lagged effects of short-term interest rates were

estimated to go back three quarters; the mean lag is only 1.8 months, considerably shorter than Goldfeld's estimate. The interest rate elasticity for the current quarter was constrained to -0.05 , which is about 3.5 times as great as Goldfeld's estimate. The lagged effects from income were also estimated to go back three quarters. Since the interest rate's current period effect is large relative to its lagged effects, the estimated coefficients of the MPS equation imply very rapidly damped cycles if the money stock is kept on target every quarter following either a price level or real GNP disturbance. Chart 3 shows the values of the interest rate obtained when the two simulations performed with the Goldfeld equation are repeated with the MPS equation.

Thomson-Pierce. This equation representing money demand was estimated using monthly, instead of quarterly data.¹¹ The lagged effects of the short-term interest rate were estimated to go back nine months and for income four months. In contrast to the two models already investigated, the estimates of this regression

¹⁰ This equation is described in a mimeograph obtained from the Board of Governors of the Federal Reserve System. MPS refers to the MIT-Penn-Social Science Council econometric model.

¹¹ The Thomson-Pierce model is described in Robert S. Pindyck and Steven M. Roberts, "Optimal Policies for Monetary Control", *Annals of Economic and Social Measurement* (January 1974), pages 207-38.

equation's coefficients imply that hitting monetary targets either month by month or quarter by quarter would cause explosive cycles. This result is obtained, in part, because it was estimated that the interest rate from five months previous had the greatest effect on the current month's money demand. The shortest time period over which monetary targeting would be feasible without explosive cycles appears to be six months.

In summary, the estimates of these three models have vastly different implications for monetary targeting: *i.e.*, rapidly damped cycles in nonborrowed reserves and interest rates if monetary targets are hit quarterly in contrast to explosive cycles if monetary targets are hit on anything shorter than a semiannual basis. The wide range in findings is not so surprising, given the wide variation in estimates of the lagged effects that changes in income and interest rates have on the demand for money. To illustrate how diverse the estimates of the lagged effects are, the mean lag has been computed from several studies on the demand for money (or demand deposits). According to these esti-

mates (Table 3), the mean lag in some cases is less than a month, and in other cases more than 2½ years. The mean lag by itself is insufficient to determine the implied behavior of nonborrowed reserves and the interest rate under monetary targeting since the pattern in the relative sizes of the lagged effects is also important. Still, from this wide range of estimates of the lagged effects (as characterized by the mean lag), a wide variation in the implied behavior of the monetary sector under monetary targeting could be expected.

Furthermore, very small changes in the estimates of the lagged effects can significantly influence the behavior of nonborrowed reserves and the interest rate under precise monetary targeting. Consider, for example, an alteration of the Goldfeld equation in which the long-run interest rate elasticity remains unchanged, but the mean lag is lengthened from the existing 6.8 months to 7.3 months. To do this, let the elasticities take on the values shown on page 8; these hypothetical values are all within one standard deviation of Goldfeld's estimates.

Table 3

Estimates of the Mean Lag in the Demand for Money

Name	Lag structure	Mean lag (in months)	
		Income	Market interest rate
Quarterly models:			
Goldfeld	geometric	7.6	7.6
Goldfeld	polynomial	9.2	6.8
MPS*	geometric	10.0	10.0
MPS	polynomial	†	1.6
Hamburger‡	geometric	31.0	31.0
Lieberman§	geometric	0.9	0.9
Monthly models:			
Board of Governors 	polynomial	2.5	1.9
Thomson-Pierce	polynomial	1.3	4.8

* See Jared Enzler, Lewis Johnson, and John Paulus, "Some Problems in Money Demand", *Brookings Papers on Economic Activity* (1976,1), pages 261-80. MPS refers to the MIT-Penn-Social Science Research Council econometric model.

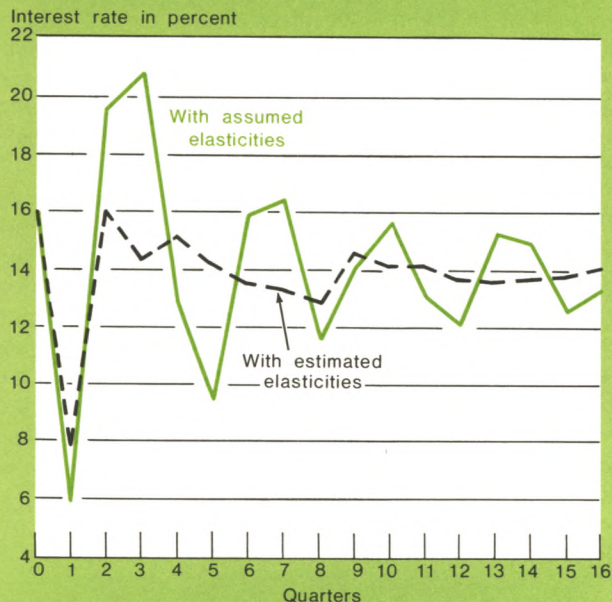
† Cannot be computed.

‡ Michael J. Hamburger, "Behavior of the Money Stock: Is There a Puzzle?", *Journal of Monetary Economics* (July 1977), pages 265-88.

§ Charles Lieberman, "The Transactions Demand for Money and Technological Change", *Review of Economics and Statistics* (August 1977), pages 307-17.

|| See Helen T. Farr, "The Monthly Money Model", mimeograph (Washington, D.C.: Board of Governors of the Federal Reserve System, 1980).

Chart 4
Simulations of the Interest Rate with Goldfeld's Estimates and Assumed Values



Interest rate elasticities

Lag (in quarters)	0	1	2	3	4	5	6
Goldfeld's estimates	0.014	0.014	0.012	0.011	0.009	0.006	0.003
Hypothetical values	0.010	0.012	0.014	0.014	0.010	0.006	0.003

This slight change in the interest rate's lagged effects from what Goldfeld estimated causes the cycles to dampen much more slowly (Chart 4).

In a paper written for the Federal Reserve staff study of the *New Monetary Control Procedures*, Tinsley and Others [1981] make a similar observation. The coefficient estimates of the model they investigate imply that damped, rather than explosive, cycles would result from tight monetary targeting. They note, though, "the margin between stability and instability is extremely small, especially in light of the standard errors of the coefficients".¹²

Thus, the high sensitivity of interest rate behavior to the estimates of lagged effects, combined with the wide variation in the estimates of lagged effects, leads to vastly different implications. Despite all the effort ex-

pendent in empirical research on the demand for money, no firm conclusion can be made concerning the precise cyclical behavior of nonborrowed reserves and short-term interest rates under quarter-by-quarter or month-by-month monetary targeting. According to this analysis, slowly damped cycles are a distinct possibility and explosive cycles cannot be eliminated entirely from the set of potential outcomes.

Simulations of the monetary sector and aggregate demand under monetary targeting

In this section, a simple three equation model of the economy is constructed. The model is used to illustrate how, under fairly believable conditions, feedback on the money market from the production side of the economy can reinforce the lagged interest rate effects on the demand for money, thereby aggravating the cycles in nonborrowed reserves and the interest rate caused by period-by-period monetary control and, at the same time, creating cycles in income itself.

Model simulations

The model consists of three equations: (1) the demand for money, (2) the supply of money, and (3) aggregate demand:

$$\begin{aligned}
 (1) \quad M(t) &= a - b_0 r(t) - b_1 r(t-1) + cY(t) \\
 (2) \quad M(t) &= d + eNBR(t) + f[r(t) - DISC(t)] \\
 (3) \quad Y(t) &= g - h_0 r(t) - h_1 r(t-1)
 \end{aligned}$$

The demand and supply of money are formulated in the same manner as before. Aggregate demand is affected by the current and previous period's interest rate. The relative magnitudes of the current and lagged interest rate effects in the demand for money and aggregate demand, as well as the sensitivity of the demand for money to changes in income, determine the type of oscillations nonborrowed reserves, income, and the interest rate will exhibit if absolute control over the money stock is maintained. Specifically, the cycles will be explosive if $(b_0 + ch_0) < (b_1 + ch_1)$ and damped if $(b_0 + ch_0) > (b_1 + ch_1)$.¹³ Thus, the more the current period's interest rate affects money demand and aggregate spending, the more likely the cycles will be stable; the more the previous period's interest rate affects money demand and aggregate spending, the more likely the cycles will be unstable.

Table 4 reports the simulated behavior of the model

¹² See Appendix C of Peter Tinsley and Others, "Money Market Impacts of Alternative Operating Procedures", *New Monetary Control Procedures*, Federal Reserve staff study, Volume 2 (Washington, D.C.: Board of Governors of the Federal Reserve System, 1981).

¹³ Constant oscillations occur if $(b_0 + ch_0) = (b_1 + ch_1)$; as before, this special case will not be considered. Another special case occurs if $b_0 h_1 = b_1 h_0$; then income exhibits no cycles whatsoever.

Table 4

Simulated Paths of Nonborrowed Reserves, the Interest Rate, and Income
Assuming Period-by-Period Control of Money

In billions of dollars

Period	Explosive ($h_0 = 0.5, h_1 = 4.0$)			Slowly damped ($h_0 = 1.5, h_1 = 3.0$)			Rapidly damped ($h_0 = 4.0, h_1 = 0.5$)		
	Non-borrowed reserves	Interest rate (percent)	Income	Non-borrowed reserves	Interest rate (percent)	Income	Non-borrowed reserves	Interest rate (percent)	Income
0	12.60	16.00	100.00	12.60	16.00	100.00	12.60	16.00	100.00
1	12.79	14.71	97.65	12.75	15.02	97.46	12.69	15.39	98.42
2	12.52	16.54	101.81	12.63	15.83	99.18	12.68	15.48	98.40
3	12.91	13.94	94.86	12.73	15.16	97.76	12.68	15.47	98.40
4	12.36	17.63	103.42	12.64	15.72	98.93	12.68	15.47	98.40
5	13.14	12.39	91.28	12.71	15.26	97.96	12.68	15.47	98.40
6	12.03	19.83	108.51	12.65	15.64	98.77	12.68	15.47	98.40
7	13.61	9.28	84.05	12.70	15.34	98.10	12.68	15.47	98.40
∞	—	—	—	12.68	15.47	98.40	12.68	15.47	98.40

Demand for money: $M(t) = a - (1.3)r(t) - (0.2)r(t-1) + cY(t)$.Supply of money: $M(t) = d + eNBR(t) + f[r(t) - DISC(t)]$.Aggregate demand: $Y(t) = g - h_0r(t) - h_1r(t-1)$.

when the targeted value of the money stock is to be maintained despite shifts in aggregate demand. Three simulations are conducted. The demand-for-money function is the same in each of the three cases; if looked at in isolation, a relatively large current period effect ($b_0 = 1.3, b_1 = 0.2$) would imply rapidly damped cycles. The purpose of these simulations is to reveal how critical are the sizes of the current and previous period's interest rate effects on aggregate demand.

The procedure used to perform the simulation is similar to what was followed in the simulation of the monetary sector alone. Initially the money stock is on target. Then, aggregate demand (rather than income) decreases permanently by 4 percent, and the level of nonborrowed reserves is adjusted period by period to keep the money stock on target. Given a demand-for-money equation, the interest rate effects on aggregate demand determine the type of cycles that occur. Thus, concentrating on the current and lagged interest rate effects in the demand for money by themselves could lead to the wrong conclusion concerning the outcome of period-by-period control of the money stock.

With this model as with the model consisting solely of the monetary sector, explosive or slowly damped cycles can be avoided by relinquishing some control over the money supply and setting the interest rate at its new equilibrium value. Slowly damped cycles

can also be mitigated by bringing the money stock back to target only gradually.¹⁴

The lagged effects on aggregate demand

It is beyond the scope of this article to survey the large volume of empirical work on the lagged effects on aggregate demand, particularly investment spending. It is fair to say, however, that all macroeconomic models of the economy feature lagged interest rate effects on residential construction and business fixed investment. Current rates alone may influence the decision to begin construction of housing units or expansion of plant capacity, but actual expenditures follow with a lag.

Although it seems certain that the lagged effects on investment spending exist, there is no consensus on the pattern of the lagged effects or the number of periods they extend beyond the previous period. There does seem to be a considerable impact on residential housing construction one and two quarters after a change in the level of interest rates. (In terms of the model used in this section, this delayed impact would be reflected by h_1 being equal to or greater than h_0 .)

¹⁴ Many of these same points were illustrated with a similar model by Kevin Hurlley in "How a Tight Monetary Policy Can Destabilize the Economy", *Money Manager* (March 9, 1981), page 3.

Thus, the pattern of lagged interest rate effects on aggregate demand could to some extent intensify cycles caused by tight control of the money supply.

In another paper written for the Federal Reserve staff study of the *New Monetary Control Procedures*, Enzler and Johnson construct a consensus model of the macroeconomy that would give results which are "qualitatively representative of a wide range of models of similar but more elaborate structure (for example, the MPS model)".¹⁵ This model consists of four equations; besides aggregate demand and the demand for money, they include an equation describing FOMC be-

havior and a "Phillips curve" inflation rate equation. They then use this model to perform a series of simulations of the economy's performance. In several simulations, explosive or slowly damped cycles with a period of fourteen quarters are obtained for income; these simulations imply explosive or damped cycles for the interest rate and nonborrowed reserves as well.

Concluding remarks

Some critics of monetary policy assert that the FOMC should control the money stock in the very short run. These critics generally do not confront the possibility that overly close monetary control could destabilize the economy. In fact, empirical research suggests that the adoption of a very short control horizon could inject instability into financial markets and the level of economic activity.

Lawrence Radecki

¹⁵ Jared Enzler and Lewis Johnson, "Cycles under Monetary Targeting", *New Monetary Control Procedures*, Federal Reserve staff study, Volume 1 (Washington, D.C.: Board of Governors of the Federal Reserve System, 1981).

The Eurodollar Conundrum

Transactions in the Eurodollar market can complicate Federal Reserve monetary policy. Most dollars held abroad are not counted in the U.S. target aggregates, but they may substitute for deposits in domestic banks. Unpredictable changes in Eurodollars, then, can reduce the usefulness of currently defined money stocks as targets. The slippage is not too important now, since Eurodollars are relatively small compared with the aggregates. But overseas deposits are growing much faster than domestic money stocks: for example, Eurodollar deposits of U.S. residents not counted in the aggregates increased more than 35 percent in 1981. With this pace of expansion, the Euromarket could in the future become an important snag in monetary control and the problems it poses merit closer attention.

This article looks at the complications the Eurodollar market creates for monetary policy and examines some solutions. The best approaches from a U.S. viewpoint involve international agreements that are hard to achieve. U.S. authorities could take some steps on their own that would reduce the monetary control problem, but these would be less effective or would have disruptive side effects. The options surveyed here do not, by and large, imply changing the central feature of monetary policy: the use of a monetary aggregate as an intermediate target. Current practices in the Eurodollar market, however, do pose a conundrum that is part of a broader problem—the emerging conflicts among policies on monetary control, financial

deregulation and innovation, and the lender-of-last-resort role.¹

The Eurodollar market and monetary control

The availability of Eurodollar deposits provides a way for investors to place funds outside the domestic banking system without limiting its capacity to generate deposits. In this regard, the Euromarket acts like other alternatives to domestic bank deposits, such as repurchase agreements, money market funds, or even commercial paper. These nonbank instruments are avenues for the growth of credit that are not directly constrained by the supply of reserves to U.S. banks. Although Eurodollar deposits are bank liabilities, they produce effects similar to the nonbank instruments because they are generally free from reserve requirements.

Federal Reserve policy seeks to control the growth rates of target monetary aggregates, but most Eurodollars are not counted in these aggregates.² Therefore, growth of Eurobank operations can expand global dollar credit for a given reserves base and convention-

¹ On aspects of this issue, see Betsy Buttrill White, "Monetary Policy Without Regulation Q", this *Quarterly Review* (Winter 1981-82), pages 4-8.

² Overnight Eurodollar deposits held by U.S. nonbank residents at Caribbean branches of U.S. banks are a component of M-2. Term Eurodollars held by U.S. nonbank residents are part of L, a broad liquidity measure. Eurodollars held by foreigners are not included in any aggregate.

ally defined money supply. Insofar as Eurodollars substitute for usual money balances and sustain more spending in the United States, the measured monetary aggregates will show increased velocities. But the extent of the substitution cannot be easily gauged and that is the crux of the monetary control problem: changes in Eurodollar deposits that cause unanticipated velocity swings for the monetary aggregates make the latter less reliable as intermediate policy targets.

The chief determinant of investor preference for Eurodollars is their risk-adjusted interest rate differential against domestic deposits. Eurobanks operate on a narrower margin between their cost of funds and their return on loans than do domestic banks—and hence can offer depositors higher yields—because they are free from certain costs. Specifically, Eurobanks are free from reserve requirements and are not prohibited from offering very short-dated time deposits.

The Eurodollar sector is linked to the domestic banking market through arbitrage: banks will fund at the lower cost, thereby tending to equate the costs of funds in both sectors. Under “normal” market conditions, domestic rates adjusted for reserve requirements (and other relevant costs, such as deposit insurance) will just about equal Eurorates.³ As a corollary of such arbitrage, depositors get most of the benefit of the lower operating margin in the form of higher Euro-market rates. This yield advantage for Eurodollars widens in basis points when the level of dollar interest rates rises.

Such behavior meshes with the incentives banks face. If U.S. banks have to hold more noninterest-bearing reserves than they desire, they have a strong motive to encourage shifts of funds to reserve-free Eurodeposits. In a competitive market, then, banks will price Eurodeposits as attractively as they can. This is why most of the gain is passed on to depositors as a higher yield on Eurodollars.⁴

Offsetting the yield gain is a higher risk that depositors assign to Eurodollars. Three principal elements make up this risk: (1) Eurodollar deposits are not insured; (2) they are booked at banking offices that do

not have direct access to the Federal Reserve discount window, and (3) they are outside the legal jurisdiction of the United States. The element of country risk in the last feature can cut two ways. While many depositors will view the United States as a relatively low country risk, others may prefer to hold dollars outside the reach of American law. These risk features are a chief reason why domestic banking system deposits are held in the face of a yield disadvantage.⁵

In a market without constraints on flows of funds, investors would be expected to shift deposits into the Euromarket until the risk-adjusted yields in the two sectors are equated. Then there would be no clear reason for one sector to grow more rapidly than the other. Nevertheless, the removal of U.S. capital controls in 1974 did not get rid of the gap in growth rates between the overseas and domestic dollar banking sectors. Since then, the Eurodollar market has consistently grown much faster than the domestic aggregates (table). This rapid growth has raised concerns that the Eurodollar market may act to limit the effectiveness of U.S. monetary policy in the control of inflation.

Growth of the market

Increased demands for Euromarket credit, particularly by sovereign borrowers for balance-of-payments financing, are frequently cited as the driving force behind the expansion of the market. What complicates monetary policy, however, is the growth of the deposit side of the market. Credit extensions in the Euromarket can be funded up to a point without new deposits by interbank borrowings from domestic banking systems—for example, the overseas branch of a U.S. bank may make a Eurodollar loan and fund it with borrowings from its head office. Although this process—a kind of “pure” intermediation—can have important implications for the distribution of bank lending, it does not automatically produce growth on the deposit side of the Euromarket.

What factors, then, account for the relatively high rate of Eurodollar deposit growth since 1974? There is no simple satisfactory explanation, but at least three ideas that focus on important economic trends of the post-1974 period merit some attention.⁶ The first of

³ The complete arbitrage conditions are more complicated, but they show that in an efficiently arbitrated market the differential between Eurorates and domestic rates adjusted for reserves will be small. A more elaborate analysis of arbitrage conditions appears in R.B. Johnston, “Some Aspects of the Determination of Euro-currency Interest Rates”, *Bank of England Quarterly Bulletin* (March 1979).

⁴ Federal Reserve pronouncements, the so-called Martin-Burns letters, seek to dissuade U.S. banks from soliciting Eurodollar deposits from domestic residents through their overseas branches. Such cautions probably have limited the marketing efforts of some banks. Nevertheless, recent growth of resident Eurodollar deposits has been strong both at foreign banks and at overseas branches of U.S. banks.

⁵ Of course, demand and small time deposits are not available in the Euromarket. And even an unconstrained risk-neutral large depositor may hold a domestic certificate of deposit because of its superior liquidity, compared with a Eurodollar time deposit or a Eurodollar certificate of deposit.

⁶ The lengthy and disputatious literature about the size of the Eurodollar multiplier does not shed much light on the problem of why the market grows so fast. If the multiplier is a stable parameter, the growth of the market must still be explained by whatever determines the initial deposit inflows. If the multiplier is not stable, as appears to be the case, it is best to drop that framework altogether.

Growth Rates of Eurodollar Deposits and U.S. Monetary Aggregates

Percentage change over period, at annual rates

Market sector	1974	1975	1976	1977	1978	1979	1980 (Jan.-Sept.)	1981
Eurodollar deposits*								
Gross	28.9	38.0	24.3	19.6	24.6	27.4	27.4	20.2
Net	†	21.8	30.9	17.1	24.6	29.1	23.5	22.6
Nonbank	33.2	7.4	23.6	17.5	39.0	35.7	27.3	26.8
U.S. monetary aggregates‡								
M-1	4.4	4.8	6.6	8.0	8.2	7.1	6.5	2.2
M-2	5.6	12.7	14.1	10.9	8.3	8.2	9.0	9.2
M-3	8.5	9.6	12.0	12.4	11.4	9.3	10.3	10.8
L	9.3	10.2	11.3	12.7	12.6	11.1	10.1	10.7

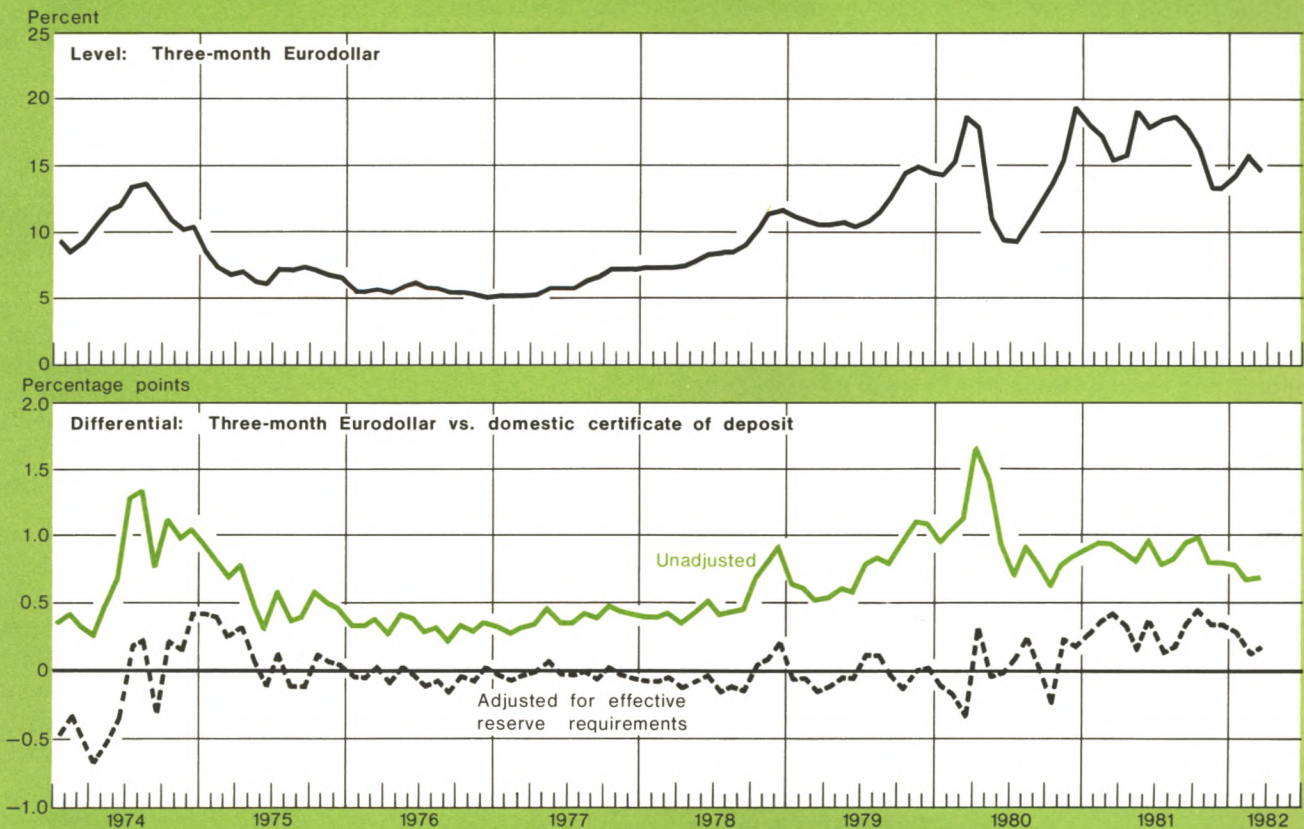
* Percentage changes in the outstanding end-of-period levels.

† Not available.

‡ Percentage changes in the monthly average levels for the last month of the period.

Chart 1

Eurodollar Interest Rates



these explanations, and the most important, hinges on factors that have changed the risk-adjusted rate differential between domestic deposits and Eurodeposits; the other two look to shifts in international payments patterns that altered the worldwide distribution of financial wealth.

Changes in the risk-adjusted rate differential. The risk-adjusted interest rate differential between Eurodollar deposits and domestic bank deposits is the most important element affecting depositor decisions. Two developments have made this differential move in favor of Eurodollar deposits in recent years. The first has been the trend increase in the level of dollar interest rates. This resulted in an increased basis points advantage for Eurodollar deposits (Chart 1). If the perceived risk differential in favor of domestic deposits was unchanged in terms of basis points, an incentive emerged to shift funds into the Euromarket.

On top of this, however, the perceived riskiness of Eurodeposits has almost certainly declined over time. In part, the very success of the market brought this about. Since 1974 no crisis of confidence on a par with the Herstatt affair has occurred. Following the Herstatt episode, bank managements upgraded their internal controls and authorities in many countries improved their monitoring of banking activities and tightened their prudential supervision. Despite repeated warnings from many quarters about the incapacity of the market to handle the volume of recycling related to higher oil prices, no specific incident can be pointed to as a failure of an institution to function. As a result, the Euromarket was seen as more robust and less of a risk to depositors.

Enhancing this perception were widely held views about the extent of agreement among major central banks on lender-of-last-resort roles and supervisory responsibilities. In September 1974, following the Franklin National and Herstatt troubles, the central bank governors of the major countries meeting at the Bank for International Settlements (BIS) in Basel stated they were satisfied that means exist to provide liquidity assistance to the Euromarket should the need arise.

Later, in the autumn of 1975, the Committee on Banking Regulations and Supervisory Practices presented to the BIS governors a set of guidelines on the division of supervisory obligations among national authorities, widely known as the Concordat.⁷ These guidelines were more detailed than the Basel declara-

tion on lender-of-last-resort activity. They placed the primary burden for supervising the liquidity positions of Eurobanks with the host authorities. The duty of supervising the solvency position of subsidiaries and joint ventures was also placed chiefly, but not exclusively, with the host authorities, while that for branches was held to belong clearly to the home authority of the parent banks.

The Concordat covers just supervisory duties; the Basel declaration is the only public notice of any international agreement on emergency assistance. Nevertheless, together they had a reassuring effect on market views about the extent of central bank cooperation regarding support for the Euromarket. This, in turn, contributed to the continuing erosion of perceived risks in the Euromarket, prompting more deposits and faster growth.

U.S. balance-of-payments deficits. A view that has achieved some standing is that deficits in the U.S. balance of payments have fed the growth of the Euromarket since 1974. The line of argument here is often hard to follow. In some versions, the U.S. deficit on the official reserves transactions basis, roughly the total of current account and private capital transactions, has been cited as a cause of Euromarket expansion. U.S. payments deficits and Eurodollar growth may be observed together, but a logical case for a causal link is absent. A simple example shows why. A Eurobank may make a dollar loan to a foreigner and fund it by borrowings made in or by deposits that have been induced to shift from the United States. If the loan substitutes for borrowing the foreigner would have done anyway in his domestic market, what shows up is a net private capital outflow in the U.S. accounts and expansion in the Euromarket.⁸ But the former cannot be said to cause the latter. Indeed, the Euromarket may play a purely intermediary role, as in a case where the foreigner could have borrowed the dollars directly within the United States. Eurodollar transactions and U.S. capital flows are both set by a complex interaction of borrower and lender preferences worldwide.

A variant of the argument looks to deficits on the U.S. current account instead of the overall balance of payments. The factors that determine the current account picture—international competitiveness and relative business cycles, for example—are independent of

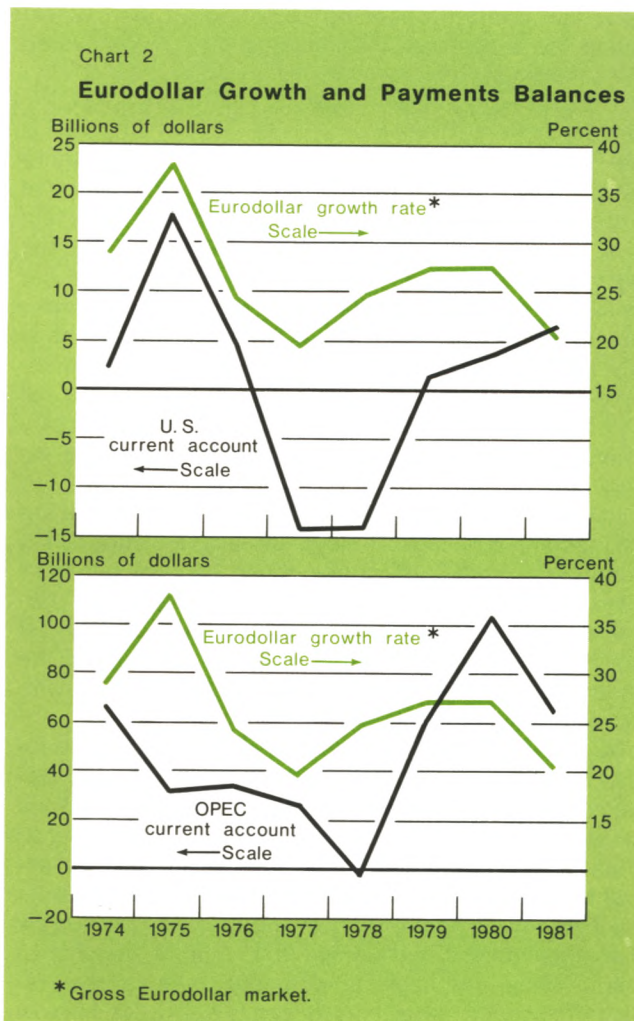
⁸ This example assumes that the central bank of the foreign country intervenes in the exchange market to acquire the dollars as reserves. Under a purely floating exchange rate, of course, no deficit on the official reserves transactions account would appear, since there would be an offsetting current account or private capital inflow to the United States.

⁷ See Peter Cooke, "Developments in Cooperation Among Banking Supervisory Authorities", presented at a Conference on the Internationalization of Capital Markets, International Faculty for Corporate and Capital Market Law, New York City, March 19-21, 1981.

Euromarket transactions. U.S. current account deficits shift financial wealth from U.S. residents to the rest of the world. Since changes in financial wealth affect the demand for all assets, including Eurodollars, current account deficits can shift up the demand for Eurodollars, but only if foreigners always have a greater preference for Eurodollar deposits, at the margin, than U.S. residents. But there is no theoretical reason to assume this kind of systematic tilt in asset preferences. Some factors, such as convenience, will work in favor of foreigners holding dollar deposits in overseas banks, while others, such as the Euromarket's lack of direct access to the Federal Reserve discount window, will cut the other way. Whether a shift of wealth arising from U.S. current account deficits was a force behind high Eurodollar growth is an empirical question that can be answered correctly only by a detailed model of worldwide portfolio behavior. A rough look at the numbers, however, shows that the effect, if it exists, is too subtle to be assigned much importance. In fact, the United States had a tiny cumulative current account surplus over the period 1974-80. Furthermore, annual swings in the deficit appear to be correlated with a broad measure of Eurodollar growth in just the opposite direction (Chart 2).

Oil-exporter surpluses. The most striking international wealth transfer of the period was the growth of oil-exporting-country current account surpluses. Here again the pattern of current accounts would have affected Euromarket growth only if oil-exporting countries had a stronger preference for Eurodollars than did oil-importing countries. This presumption, however, is not unreasonable. Many commentators have depicted the financial behavior of the oil exporters as very cautious, at least in the initial years of large surplus, and marked by a desire for investments with a high degree of liquidity. Such preferences would favor the Eurodollar banking sector, which offers time deposits of very short maturities not available from U.S. banks. Thus, a shift of wealth to a group of countries with a relatively high liquidity preference could have plausibly fueled Eurodollar growth. Member states of the Organization of Petroleum Exporting Countries (OPEC) had a total cumulative current account surplus between 1974 and 1980 of nearly \$325 billion. But, as with the U.S. current account, yearly changes in the OPEC surplus do not appear to match up closely with variations in the Eurodollar growth rate (Chart 2).

In summary, different factors have at various times contributed to relatively high Eurodollar growth. Certainly, a major factor behind sustained high growth of the market in recent years has been the rise in the



risk-adjusted yield advantage for overseas deposits relative to domestic deposits. This reflects the combined effects of trend increases in the level of dollar interest rates and trend reductions of the perceived riskiness of Euromarket deposits. But the ballooning of the OPEC surplus may have played a particularly important role in 1974-75, a time when dollar interest rates were declining and perceptions of risk in the Euromarket were aggravated.

What can be done?

If the high rate of Eurodollar deposit growth poses a problem for a policy of monetary aggregates targeting, what steps can be taken to address the problem? The range of policy options covers three broad classes: (1) do nothing; (2) take account of Eurodollars in the monetary targeting process; (3) put the Euro-

dollar and domestic banking sectors on a more equal footing by measures that change the risk-adjusted rate differential.

Do nothing

The prescription that policymakers can safely ignore the Eurodollar market rests on the view that the size of the problem it poses is small and is likely to remain so in the near future. As a percentage of M-3—the aggregate that includes large domestic bank time deposits, the principal alternative to Eurodollars—overseas dollar deposits held by U.S. residents amount to only about 3 percent (Chart 3). And, as domestic reserve requirements on nonpersonal time deposits fall to 3 percent under the provisions of the Monetary Control Act, Eurodollars will have much less of an edge in the future.

The counterpoint to that view is that Eurodollars are fast becoming a big problem. In fact, focusing on a broader Eurodollar measure—those held by all nonbanks worldwide—reveals that overseas dollar deposits exceed 10 percent of M-3 (although most observers think that such a measure overstates the amount of Eurodollars that should be compared with domestic aggregates).

The Euromarket is becoming a more active and significant alternative to domestic banking deposits. Between December 1980 and December 1981, term Eurodollar deposits held by domestic nonbank residents other than money market funds grew at an annual rate of over 35 percent to \$66.2 billion. Should these trends continue, the Eurodollar market will grow to a significant size relative to M-3 in a number of years. While reduction of domestic reserve requirements on nonpersonal time deposits will work to slow this process, it will not remove all incentives for Euromarket growth. A 3 percent reserve requirement can still result in a significant yield differential at current levels of interest rates. Additionally, a large part of Eurodollar deposits is for very short-dated maturities (less than fourteen days) not allowable for domestic deposits. These short-term Eurodollars may continue to substitute to some extent for domestic transactions accounts. There are, therefore, reasons not to neglect Eurodollars in setting monetary policy.

Take account of Eurodollars

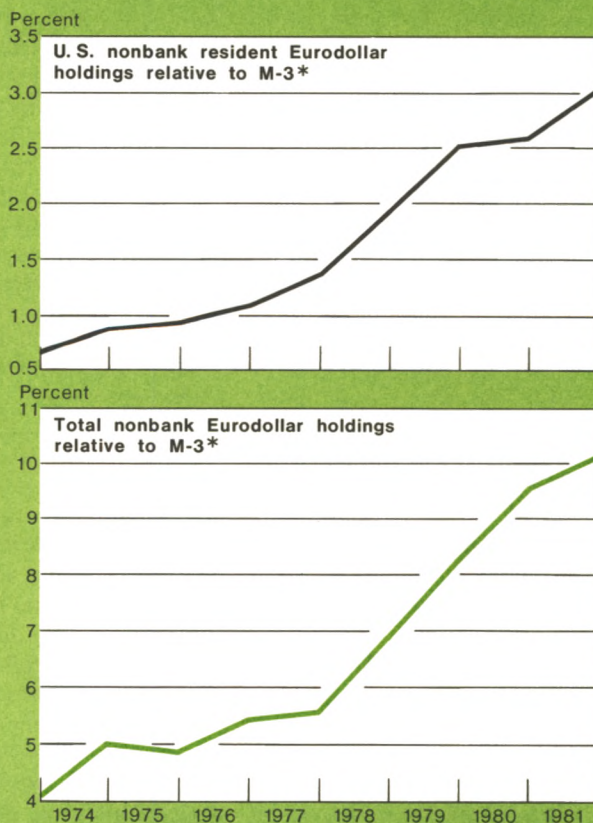
The second policy option is to take account of Eurodollar developments in some way. This can be done formally or informally. To account formally for changes in Eurodollars in setting policy means revising the target monetary aggregates to include some classes of overseas deposits. The problem with this approach is a basic one: economic analysis at present cannot

answer very well what shares of Eurodollar holdings by domestic residents or by foreigners should be counted or to which aggregates they should be added.

Using a simple criterion to construct a monetary aggregate can be misleading. The location of deposits, for example, is frequently irrelevant to the purposes the deposits serve. U.S. residents may hold dollars overseas that are closely connected with their domestic business operations. While a residence-of-depositor rule may appear more satisfying, it also has some drawbacks. For example, some of the Eurodollars held by foreigners may support their transactions within the United States. Furthermore, these simple rules do not address the question of how many Euro-

Chart 3

Eurodollars and U.S. Monetary Aggregates



*Eurodollar measure excludes domestic nonbank holdings of overnight Eurodollars and Eurodollars held by money market mutual funds; these items are counted directly or indirectly in M-3.

dollars should be put in an M-1 aggregate, how many in M-2, and so forth.

Statistical evidence in this area is limited, but one study has been done using a familiar methodology in research on the empirical definition of money.⁹ It compared the out-of-sample forecasting properties of standard money demand equations and reduced form income-money relations fitted to different definitions of money, including and excluding various categories of Eurodollar deposits. The findings are mildly consistent with the inclusion in the narrow monetary aggregate of some part of Eurodollars—specifically, overnight deposits booked anywhere in the world held by U.S. residents. The methodology itself, however, does not determine what proportion of Eurodollars should be added to the monetary aggregates. The study makes the interesting point that, once some account has been taken of U.S. resident Eurodollar holdings, the inclusion of Eurodollars held by foreigners does not improve the statistical or forecasting properties of the money demand equation. On the question of which categories of and how many Eurodollars should be put in the broader (M-3) aggregate, the results are inconclusive.

An informal way of taking account of Eurodollars is to study their behavior and make changes when needed, for example, by altering the speed of adjustment to monetary target paths or even by changing the target ranges themselves. One can argue that the scope for this kind of adjustment currently exists, but it is applied only rarely and in an uneven way. An informal approach is really useful only if it includes a more systematic procedure to analyze Eurodollar developments when constructing monetary policy options.

Both the formal and informal approaches share a serious drawback: most data are not available on a timely basis. In fact, this was a major reason why only selected Eurodollar items were put in the new aggregates. For the most complete information series—the BIS Eurocurrency statistics—the lag ranges from three to six months. This lack of timely data has naturally led to considering options that would tend to put the Eurodollar and domestic banking sectors on a more equal footing. Such approaches would seek to change the relative cost structure of the two sectors in a way that would reduce or eliminate the incentive to shift funds into the Euromarket.

Put the sectors on an equal footing

Measures that seek to put the sectors on an equal footing are especially useful from the perspective of

U.S. monetary control goals. If investors do not have much reason to hold deposits in one sector rather than the other, the two should grow at similar rates. Therefore, the elements left out of the aggregates will tend to grow at the same rate as those which are included and the problem of how many Eurodollars to count in a “true” money measure is lessened.¹⁰

Putting the sectors on an equal footing involves changing the factors behind the risk-adjusted yield differential. This can be done in two ways: (a) closing the gap between the margins on which banks in the two sectors operate and thereby making the rates on deposits converge or (b) affecting the perceived relative risk of the two sectors.

The first way includes the larger number of options. Some actions can even up the two sectors by adjusting costs in the domestic market, and U.S. authorities can take these steps unilaterally.

Eliminate or further reduce domestic reserve requirements. This step goes to the heart of the matter, since getting rid of reserve requirements on non-personal time deposits at domestic banks would ease some of the monetary control problems posed by the Euromarket. Some problems would remain, however, as a large share of Eurodeposits is very short dated and this would still be a potential substitute for domestic transactions accounts.

Pay interest on the required reserves of domestic banks. Instead of eliminating reserve requirements, the cost disadvantage they impose on domestic banks could be reduced through interest payments on required reserves. The closer such payments are to market rates, the smaller will be the yield difference between Eurodollars and domestic deposits. However, this option is at present excluded under the conditions of the Monetary Control Act.

Other policy steps are possible that would even up the two sectors by changing cost structures in the Euromarket.

Impose reserve requirements on Euromarket deposits. In principle, this could be done unilaterally: the Federal Reserve could impose reserve requirements on Eurodeposits at overseas branches of U.S. banks. Such a move would be largely ineffective since deposits would be shifted to other Eurobanks. Non-

⁹ Laurie Goodman, “Eurodollars and the U.S. Money Supply”, Federal Reserve Bank of New York Research Paper No. 8001 (January 1980).

¹⁰ That problem is eliminated only if Eurodollars as a whole substitute for M-3 as a whole. If Eurodollars substitute only for the domestic large time deposit component of M-3 and if that component is growing more rapidly than other parts of M-3, the weight given to the fast-growing component in the broad aggregate will depend on how many Eurodollars are included.

dollar Eurobanks may not be willing to take over the entire dollar book of U.S. branches immediately. But in the longer run the U.S. banking system's loss of market share would be enormous and little effect would occur on the total market.

The alternative to unilateral actions is to negotiate an agreement among the major international banking countries (the Group of Ten and Switzerland) to impose reserve requirements on the Eurodeposits of their banking systems worldwide. This was proposed by the United States at the BIS in 1980 but was not adopted. A major problem impeding agreement was the imbalance that such an agreement would create between the domestic and Euromarket operations of foreign banking systems. Putting reserve requirements on Eurodollar deposits only would not be sufficient. These could be avoided by booking, say, a reserve-free Euromark deposit while at the same time selling the marks forward against dollars, thereby creating the equivalent of a reserve-free Eurodollar deposit. These redenomination incentives can be stopped only by putting reserve requirements on Eurodeposits in all currencies. To do this, however, would create complications for foreign countries that do not use reserve requirements on their domestic banks but would wind up with them on the Eurodeposits of their home currency. The impasse stems from differences among countries in the techniques used for monetary control and domestic financial regulation. Breaking the impasse would seem to require a closer harmonization of national banking systems.

Impose capital-assets ratios. That dilemma led to suggestions that perhaps an agreement on Euromarket regulation could be reached by focusing on capital-assets ratios. This approach is also full of pitfalls. A basic one is that capital-assets ratios serve principally as a prudential yardstick for supervision purposes, not as a monetary policy tool. They can limit the growth of banking system balance sheets, but they are not a very flexible instrument for monetary policy when compared with open market operations that affect reserves availability.

And there are other problems. Definitions of acceptable bank capital vary across countries, and the capital-assets ratios on which different national banking systems operate span a wide range. Unlike the United States, many foreign banking systems have a large public-sector element, which raises a question of whether infusions of new capital would be made on an equivalent commercial basis in all countries. Finally, under a system where capital is the effective constraint on balance-sheet growth, banks might face an incentive to add to earnings by taking on riskier loans, since

institutions that show higher earnings growth might be able to issue new equity at higher price-earnings ratios.

Impose a mixed regulation system. These difficulties bring up the question of whether agreement could be reached on a mixed system of regulations where some countries place reserve requirements on the Euro-operations of their banking systems and others impose capital-assets ratios. Can such a system be designed that would limit the growth of the Euromarket but not distort Euromarket shares among different banking systems simply because different types of regulations are used? One theoretical study answers yes.¹¹ At any time there are levels of reserve requirements and of capital-assets ratios that do not distort market shares. However, the relative value of those ratios must be changed continually in response to changes in the cost of capital to avoid a distortion of market shares. Such a system would be complicated to design and run, perhaps too complicated to be practical. If interest payments on required reserves were allowable, variations in that rate of interest could be used as a tool to keep an equitable cost structure in the face of varying capital costs. Of course, such a mechanism runs up against the familiar objections to paying interest on reserves.

Even an international agreement, of whatever design, is subject to the criticism that nonagreeing banking systems would be at an advantage and would take over business. However, if an agreement were broadly enough based to cover the major international banking countries and if lender-of-last-resort assistance were not available to nonagreeing banking systems (as would surely be the case), the capability of those banks to take over any significant part of the market could be limited. Highly capitalized banks operating outside the agreeing countries would be the biggest loophole.

Increase the perceived risk of the Euromarket. A final approach would be to increase the perceived relative riskiness of the Euromarket, making Eurodollar deposits less attractive for any given yield differential. In practice, this would involve limiting the guarantee of lender-of-last-resort assistance to the Euromarket in a way that would have a convincing effect on market views of risk. Obviously, such a step is drastic. Limiting lender-of-last-resort support for the Euromarket

¹¹ Stephen E. Usher, "A Mixed Policy Approach to Euromarket Regulation", Federal Reserve Bank of New York Research Paper No. 8002 (February 1980).

would have a large one-time effect on perceptions and would shrink the size of the market. It would not, however, clearly improve the monetary control problem stemming from shifts of funds between the overseas and domestic sectors.

Conclusion

All the options considered have drawbacks as well as points in their favor. What, then, is the most sensible line to follow? No single approach will provide an entirely satisfactory solution; it is best to try to make small progress on many fronts. From the U.S. perspective, an international agreement on Eurocurrency reserve requirements remains an attractive approach to a solution of the monetary control problem. But, to be practical, such an agreement would have to be structured more carefully with differences among national banking systems in mind. It would be useful to study further the prospects for an international agreement on a mixed system of regulations to see if a relatively simple arrangement could be worked out that would be roughly equitable. A reason, though not the only one, for the failure to agree on Euromarket reserve requirements was that the proposal was

geared principally to U.S. concerns. Trying to design an agreement that would have short-run monetary control benefits for the United States while addressing the interests and concerns of other countries would be helpful. It would build on the basically sympathetic view that some foreign authorities have of an international agreement on Euromarket regulation.

Other avenues are open. Reserve requirements on domestic nonpersonal time deposits could be phased out when appropriate. Taking systematic account of Euromarket developments could play a greater role when deciding whether to aim high or low in the monetary aggregates target ranges. Clearly, work should continue on trying to determine the extent to which Eurodollars substitute for domestic instruments counted in the aggregates. Finally, the somewhat trying multilateral efforts to obtain better and more timely data should go on. While this item may be the least controversial, it is not the least important, since the inadequacies of current data prevent specific answers to many of the important empirical questions about the role that Eurodollars play and limit the extent to which changes in the Euromarket can be factored into short-run policy decisions.

Edward J. Frydl

Mortgage Designs, Inflation, and Real Interest Rates

The economic trends of the last decade have diminished the usefulness of the fixed-rate mortgage. High interest rates, substantial inflation, and the variability of both have created problems for borrowers and lenders. Prospective mortgage borrowers face payment obligations that have been raised dramatically by the rise in mortgage rates. Lenders, on the other hand, have experienced large reductions of net worth as the rise in interest rates has reduced the market value of their portfolios of long-term fixed-rate loans. Both sides of the mortgage market could benefit from the use of a different mortgage design.¹ Each of the alternatives to the fixed-rate mortgage has its advantages and disadvantages. This article reviews the economics of the fixed-rate mortgage and alternative designs, focusing on how each one deals with the problems of housing finance in the present environment.

On the lending side of the market, the major response to the developments of the last several years has been the adoption of mortgage designs that permit rate adjustments. Such loans protect lenders from the risk of unanticipated changes in interest rates. But borrowers may face the same difficulties with adjustable mortgages that they have had with fixed-rate loans. By itself, the rate-adjustment feature does not

reduce a mortgage borrower's payment burden. Indeed, the adjustable mortgage presents borrowers with the additional problem of an unknown series of future payments.

There are two ways in which the mortgage contract can be altered to protect lenders from interest rate risk while at the same time presenting borrowers with initial payment requirements smaller than those of the long-term fixed-rate loan. One is the use of inflation-linked contracts, or indexed loans. In contrast to adjustable mortgages, on which rates are periodically raised or lowered to reflect changes in (nominal) market yields, indexed loans have their outstanding balances raised or lowered to reflect movements in some measure of prices. The interest rate on an indexed mortgage would not contain an inflation premium. Thus, in an inflationary environment, an indexed loan would impose a substantially smaller payment burden on mortgage debtors in the early years of a loan agreement. An alternative approach would be to reduce required mortgage payments of adjustable loans during the early years of the loan by adopting more flexible schedules for the repayment of loan principal. In some cases, the two schemes are approximately equivalent. Both designs² achieve the twin goals of smoothing the borrower's real payment burden and allowing lenders to adjust mortgage returns in response to changes in economic conditions: indexed mortgages respond to inflation, while adjust-

¹ New mortgage designs are not the only method of coping with the problems of the fixed-rate mortgage. Mortgage investors might resort to hedging in the futures market, for example, to reduce the interest rate risk associated with a portfolio of long-term fixed-rate assets. Alternatively, mortgage investors might benefit from the establishment of an insurance facility in which they could buy protection from these risks. Either of these devices could be used to support continued lending in fixed-rate loans, provided there were institutions or individuals (other than the lender) willing to accept the risks.

² These and other mortgage designs are discussed at length in *New Mortgage Designs for Stable Housing in an Inflationary Environment*, a collection of papers edited by Franco Modigliani and Donald Lessard (Federal Reserve Bank of Boston Conference Series No. 14).

able mortgages reflect changes in nominal interest rates.

When variations in nominal interest rates are due largely to variations in (actual and expected) inflation, the two main alternatives to the standard mortgage design serve the purpose of reducing or eliminating inflation-induced risks and distortions. But, recently, higher and more volatile real interest rates have become important factors in the mortgage market. Each of these mortgage designs leaves one or both sides of the market exposed to the risk of variations in the real rate of interest. Moreover, when real interest rates remain at high levels, neither of the alternatives to the long-term fixed-rate loan can reduce the costs of homeownership.

Shortcomings of the fixed-rate mortgage

The standard lending instrument in the housing finance industry has been the long-term fixed-rate mortgage.³ It is characterized by equal periodic payments. Part of each payment is interest on the loan, calculated by applying the contract rate of the loan to the unpaid balance. The remainder of each payment constitutes repayment of principal, or amortization of the loan. The term of the loan—the length of the amortization period—can be set at any number of years, but original maturities of twenty, twenty-five, and thirty years are commonly used.

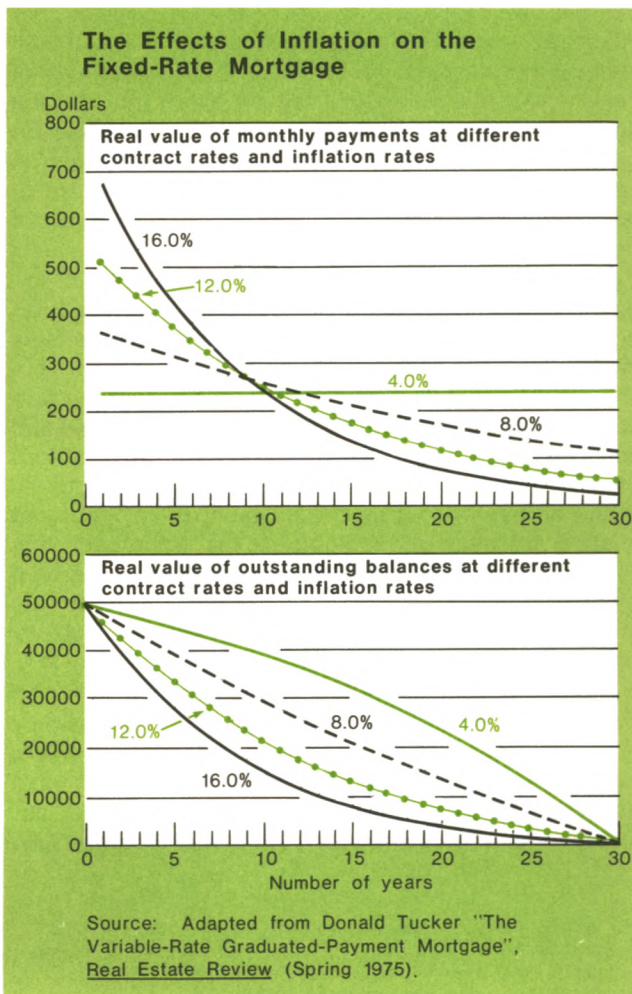
Monthly payments on a mortgage loan are determined by the size of the loan, the contract rate, and the length of the amortization period. Other things remaining equal, the monthly payment required to amortize a mortgage loan is higher with a higher contract rate, a shorter amortization period, or a larger loan amount. Although all the monthly payments on a fixed-rate loan are for the same (nominal) dollar amount, their allocation between principal and interest varies considerably over the life of the loan. Early payments are devoted almost entirely to the payment of interest. But, as the relatively small repayments of principal accumulate and the loan balance declines, the proportion of the fixed payment that needs to be allocated to interest declines, and amortization proceeds more rapidly. Interest payments are tax deductible. Thus, the increase in the proportion of each payment that is allocated to repayment of loan principal raises the aftertax cost of the mortgage.

³ In June 1981, for example, Federally insured savings and loan associations held \$430 billion in mortgage loans on one- to four-family residential properties, of which less than \$35 billion was subject to rate adjustment. If recent trends continue, however, the fixed-rate loan may be the exception, not the rule. Roughly one third of new conventional mortgage commitments made in the last half of 1981 were for adjustable loans.

The effects of inflation

In the absence of inflation, the level payments required to repay a standard mortgage loan would impose a constant real payment burden on the borrower. This burden is illustrated by the solid horizontal line in the upper panel of the chart. With a stable price level, the 4 percent contract rate on the loan for which these payments are made produces a real return of 4 percent. The amount of the loan is \$50,000. The monthly payments are \$238.71.

But, when inflation and interest rates rise in tandem, the real cost of loan repayment is redistributed, with a higher real cost in the early years of the loan being offset by a reduced real cost in later years. When lenders expect inflation to continue throughout the life of a fixed-rate loan, they must raise the rate at which such loans are offered by the expected rate of inflation. The inflation premium, as this rate increase



is called, compensates lenders for the decline in purchasing power of their nominally fixed debt claims.

The effects of the inflation premium on mortgage borrowers are substantial, as can be seen by comparing the real values of mortgage payments for several loans that produce the same real return to the investor. The loans, all for \$50,000, differ only in the size of the inflation premium contained in their nominal rates. They all produce a 4 percent real return. An 8 percent loan (associated with expectations of 4 percent inflation) requires monthly payments of \$366.88, while the payments for the 12 percent loan (with expectations of 8 percent inflation) and the 16 percent loan (at 12 percent inflation) are \$514.31 and \$672.38, respectively.

While these payment obligations are fixed in nominal terms for the life of the mortgage, the cumulative effect of inflation reduces their real values as time progresses. The real value of the payments on the 8 percent loan, for example, declines by 4 percent per year, while that of the payments for the 16 percent loan declines by 12 percent per year. In general, higher inflationary expectations produce a higher initial real and nominal payment requirement. The real values of these payments, however, decline more rapidly the higher the rate of inflation. The effect of inflation on the real value of the remaining mortgage balance is similar. As shown in the lower panel of the chart, inflation increases the rate at which the real value of the mortgage debt is reduced.

Some analysts⁴ have described these features of the fixed-rate mortgage in an inflationary environment as the mislabeling of principal and interest components of the level monthly payment. In the case of the 12 percent loan, for example, the real value of the outstanding loan balance at the beginning of the second year is 8 percent less than it would have been without inflation. But this reduction of the value of the lender's asset has been offset by the payment of an 8 percent inflation premium in addition to the 4 percent real return on the original balance. Since the 8 percent inflation premium is a deductible interest expense, the fixed-rate mortgage borrower receives a tax subsidy for what is essentially the repayment of principal.

The large payments produced by high nominal rates give rise to the "affordability problem"—the inability of many households to qualify for mortgage loans. Using customary underwriting standards, the annual income required for approval of a mortgage loan application rises proportionately with the monthly pay-

ment. As shown in the chart, an increase in the expected rate of inflation from zero to 8 percent, assuming a 4 percent real return is to be obtained, raises the income threshold by 115 percent. (This is the percentage increase in the required monthly payment associated with a move from a 4 percent loan to a 12 percent loan.) As payment requirements have increased faster than household incomes, there has been a decline in the proportion of households able to qualify for mortgage loans.⁵ In recent years, however, the relaxation of loan approval standards has mitigated the impact of rising mortgage rates. Thus, the rule of thumb that mortgage and other housing costs should be less than 25 percent of household income has given way to current limits that approach 40 percent at some lending institutions.

Interest rate risks

The fixed-rate mortgage contract also suffers from its inability to protect lenders from interest rate risks. Until recently, this sort of risk was associated with the occurrence of higher than expected inflation rates. But the rate of inflation has declined fairly steadily since early 1980, while nominal interest rates have remained high. This more recent experience has awakened borrowers and lenders alike to the existence of real interest rate risks.

The difficulties caused by unanticipated inflation are easily explained. In the examples discussed so far, it has been assumed that inflation turns out to be what had been expected when the mortgage rate was set. But the actual rate of inflation experienced during the life of the mortgage loan may be different from the inflation premium included in the nominal mortgage rate. When inflation exceeds this premium, borrowers benefit from a faster than anticipated reduction of the real value of payments on the mortgage loan. And, when the actual rate of inflation falls short of the inflation premium, borrowers are faced with a slower than expected reduction of the real value of mortgage payments. Lenders face the opposite results, benefiting when actual inflation is less than the inflation premium and losing when actual inflation exceeds expectations.

The fixed-rate mortgage also leaves borrowers and lenders exposed to the risk of variations in the real rate of interest. This risk may arise in conjunction with—or apart from—the failure of actual inflation to match expectations. Assume, for example, that a mortgage loan was made at a 15 percent contract rate

⁴ See, for example, Milton Friedman, "How to Save the Housing Industry", *Newsweek* (May 26, 1980), page 80. An earlier, more formal treatment is in D. Tucker, "The Variable-Rate Graduated-Payment Mortgage", *Real Estate Review* (Spring 1975).

⁵ It should be noted, however, that an increase in the real rate of interest, with the inflation premium unchanged, would have the same effect, reducing the proportion of qualifying households.

when both borrower and lender expected inflation of 10 percent per year for the entire term of the loan. They implicitly agreed to a real interest rate of 5 percent. Even if their inflationary expectations are correct—that is, if prices rise by 10 percent per year—the prevailing nominal (and hence real) rate of interest might rise (benefiting the borrower) or fall (providing the lender with a windfall). Alternatively, with the nominal level of interest rates constant, there could be an increase or decrease in the rate of inflation expected to prevail in the economy, reducing or increasing the real cost of the long-term mortgage loan.

The long-term fixed-rate mortgage offers protection from neither real nor inflation-based interest rate risks. Thus, for very different reasons, mortgage borrowers and lenders face strong incentives to find alternatives to the standard mortgage contract. Borrowers' primary concern is to minimize the cash flows required to repay mortgage debt, particularly in the early years of the loan. Lenders, on the other hand, are concerned mainly with the nominal yield flexibility of the mortgage instrument. For both groups, the long-term fixed-rate mortgage is largely incapable of coping with interest rate risks, whether they are due to changes in inflationary expectations or to changes in the real rate of interest.⁶

Alternative mortgage designs

The mortgage designs that have been used or proposed as replacements for the fixed-rate loan are variants or combinations of two basic alternatives—adjustable and indexed loans. An adjustable mortgage is a loan agreement under which the contract rate, monthly payments, and remaining maturity of the loan all may be changed in response to the movement of a predetermined interest rate. These changes in the mortgage loan are made at the end of each adjustment period. (In practice, adjustment periods have been as short as six months or as long as five years.) The adjustable mortgage can thus be viewed as a series of short-term loan agreements based on a single longer amortization period or as a single long-term loan with provisions for rate adjustments. Several adjustable mortgage designs have been introduced in recent years (Box 1).

As a response to inflation-induced interest rate variations, the indexed mortgage seems to be fundamentally different from the fixed-rate loan and its adjustable variants. The contract rate on an indexed loan

⁶ The single exception is the borrower's ability to refinance mortgage debt at lower nominal rates. Refinancing is sensible when the present value of the reduction in mortgage payments exceeds the transactions costs of the new mortgage loan.

contains no inflation premium and is, therefore, lower than the nominal interest rate in an inflationary period. This rate is not subject to periodic adjustment. Instead, the outstanding balance of an indexed loan is periodically raised or lowered in line with movements in some measure of housing prices or the general level of prices. If the series used to adjust an indexed loan is an accurate measure of inflation, and these adjustments are made frequently enough, the real value of mortgage payments will be constant throughout the life of the loan.⁷ While the basic features of an indexed mortgage loan are fairly simple, the selection of an appropriate price index might pose a problem. Among the candidates for use in adjusting the remaining balance on indexed loans are such general measures of price changes as the consumer price index or the gross national product price deflator, nationwide measures of housing prices, similar measures aggregated on a regional or local basis, and individual house prices.

There are a number of factors that might impede the widespread introduction of the indexed mortgage contract. Chief among these is the unwillingness of financial institutions to hold indexed assets that are not hedged by indexed liabilities.⁸ It is a useful reference device, however, because it eliminates the distortions that characterize a fixed-rate mortgage in an inflationary environment.

Suppose, for example, that lenders desire a real return of 4 percent and expect inflation to proceed at a 12 percent rate over a thirty-year period. Under these conditions, long-term fixed-rate loans and adjustable loans would be offered at a 16 percent rate and indexed loans would be offered at 4 percent. In the first year of a thirty-year loan for \$50,000, payments on the standard loan and the adjustable loan would be \$672.38, while those on an indexed loan would be \$238.71—roughly 35 percent of the payments on the competing fixed-rate loan. The payments on the fixed-rate loan would remain at \$672.38 throughout the life of the loan. But, if the price index rose by 12 percent in the first year of the indexed loan, its balance would be raised (from \$49,119.45 to \$55,013.79) at the end of the first year. The monthly payments on the indexed

⁷ In practice, these adjustments might be made at annual intervals, creating the possibility of significant deviations from a constant real payment burden.

⁸ In *New Mortgage Designs for Stable Housing in an Inflationary Environment*, several authors advocated the issuance of indexed deposits at commercial banks and thrift institutions. More recently, Michael Lovell has proposed indexed annuities, which would be the appropriate liability hedge for a different group of mortgage investors. See "Unraveling the Real-Payments Twist", *Brookings Papers on Economic Activity* (1981:1).

Box 1: Adjustable Mortgage Instruments

In the last three years, Federal and state regulators of mortgage lending institutions have authorized a variety of adjustable mortgages. The successive designs have allowed lenders increasing discretion in selecting the features of adjustable loans. They also have relaxed or removed the limits on interest rate changes that can be made on adjustable loans.

Table 1 summarizes the features of five different mortgage designs authorized by the Federal Home Loan Bank (FHLB) Board, the agency that regulates Federally chartered savings and loan associations. The first four columns describe different kinds of adjustable mortgages. The last column describes a hybrid design, the shared-appreciation loan.

The first design listed in the table, the California variable-rate mortgage, allowed Federally chartered thrift institutions in that state to issue loans with features identical to those being offered by state-chartered lenders in the state. Under these regulations, the contract rate on an outstanding loan could be changed at six-month intervals in response to changes in the average cost of the funds in the eleventh FHLB district. Limits on the rate adjustments were imposed to protect

mortgage borrowers from sudden large increases in required mortgage payments. The maximum allowable rate increase was set at 50 basis points per year, and a limit of 250 basis points was imposed for the cumulative total of rate increases. To assure the continued availability of long-term fixed-rate loans, lending institutions were barred from issuing more than 50 percent of their mortgage loans in the variable-rate instruments.

In the California mortgage design and other early mortgage plans, limits on rate adjustments were viewed as an important consumer protection device. A borrower that signed a variable-rate contract with an initial interest rate of 8 percent, for example, was certain that the rate on the loan could never exceed 10.5 percent. The limits on rate increases, however, could have the effect of converting a variable-rate loan to a fixed-rate loan after the maximum interest rate increases have been applied. Not surprisingly, subsequent designs have included higher limits on interest rate adjustments, expanding the range of interest rate risk that could be assigned to mortgage borrowers.

The California and nationwide variable-rate mortgages each called for rate adjustments tied to move-

Table 1: **New Mortgage Instruments Authorized by the Federal Home Loan Bank Board**

Instrument	California variable-rate mortgage (VRM)	Nationwide variable-rate mortgage (VRM)	Renegotiable-rate mortgage (RRM)	Adjustable-rate mortgage	Shared-appreciation mortgage
Index	Average cost of funds, San Francisco FHLB district	Average cost of funds, all FSLIC insured savings and loan associations	FHLB average contract rate on existing homes	Any index that is "readily verifiable"	Net appreciation is based upon net sales price appraisal
Adjustment period	6 months	12 months	3, 4, or 5 years	Any period up to 5 years	10 years or less
Maximum adjustments:					
Individual	50 basis points per year	50 basis points per year	50 basis points per year	No limitations	40 percent of net appreciated value
Life of loan	250 basis points	250 basis points	500 basis points	No limitations	
Effective date	January 1979	July 1979	April 1980	April 1981	September 1980
Other features or comments	Minimum adjustment of 10 basis points 50 percent portfolio limitation Authorized for Federally chartered thrift institutions in California	Maturity extension up to one third of original maturity 50 percent portfolio limitation	No maturity extensions	Replaced FHLB regulations for VRMs and RRMs Negative amortization without limit 30-year loan term may be extended to 40 years	Guaranteed (and mandatory) refinancing of remaining balance and contingent interest at end of appreciation period

FSLIC = Federal Savings and Loan Insurance Corporation.

Box 1: Adjustable Mortgage Instruments (continued)

Table 2: Adjustable Mortgages in the Secondary Market

Plan	Interest rate index*	Interest rate adjustment period	Payment adjustment period	Maximum interest rate adjustment (percent)	Maximum payment adjustment (percent)
Federal National Mortgage Association					
1†	6 months	6 months	6 months	—	7½
2†	6 months	6 months	3 years	—	—
3†	1 year	1 year	1 year	—	7½
4†	3 years	2½ years	2½ years	—	18¾
5	3 years	2½ years	2½ years	5	—
6	5 years	5 years	5 years	—	—
7	FHLB‡	1 year	1 year	—	—
8	FHLB‡	1 year	1 year	2	—
Federal Home Loan Mortgage Corporation					
1	FHLB‡	1 year	1 year	—	—
2	FHLB‡	1 year	1 year	2	—

* Treasury yields for Federal National Mortgage Association plans 1 through 6; Federal Home Loan Bank Board conventional mortgage rate for others.

† Negative amortization permissible, so long as the loan balance does not exceed 125 percent of the original loan amount.

‡ FHLB average contract rate on existing homes.

ments in the average cost of funds at savings and loan associations. In subsequent regulations, the FHLB authorized the use of a current mortgage rate as an index, reflecting the concerns of many lenders that yields on outstanding mortgages should be kept in line with those of newly originated loans.

In principle, the adjustable-rate mortgage authorized by the FHLB Board satisfies both concerns that seemed important to lenders. It imposes no limits on the size of contract rate adjustments, satisfying lenders' concerns with yield flexibility. In addition, the regulations for adjustable-rate mortgages do not specify a particular index for contract rate adjustment. The rules allow lenders to choose virtually any interest rate series as the basis for mortgage rate adjustments.

The regulations for adjustable-rate mortgages may provide substantial benefits for mortgage borrowers as well. They permit, but do not require, the use of negative amortization. This provision allows lenders to reduce the increases in monthly payments associated with any given contract rate increase. Similarly, the regulations permit lenders to extend the remaining maturity of a loan, thus providing another means of reducing required increases in monthly payments.

In the short run, the use of adjustable mortgages promises to benefit consumers by increasing the willingness of lenders to provide mortgage loans. In-

deed, a secondary market for adjustable-rate loans has already materialized. In July 1981 both the Federal National Mortgage Association (FNMA, or Fannie Mae) and the Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac) announced plans to purchase adjustable-rate mortgage loans in the secondary market. Fannie Mae will accept eight different loan designs, while Freddie Mac will buy only two. Table 2 summarizes the main features of the acceptable loan designs. Both agencies announced that nonconforming loans will be considered for purchase on a case-by-case basis.

FNMA will buy loans that have adjustment periods ranging from six months to five years. Many of the FNMA plans include limits on interest rate changes and monthly payment increases. Four of the eight plans allow for negative amortization. In none of these cases, however, will the loan balance be allowed to exceed 125 percent of the original loan amount.

The designs that are acceptable to Freddie Mac are identical to two of the Fannie Mae options. Both use the FHLB mortgage-rate index and have annual adjustment periods. Unlike most of the other plans that FNMA will accept, both of the plans approved for FHLMC purchase prohibit negative amortization.

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loan would also rise by 12 percent, to \$267.36. This larger nominal amount, however, would have only the same purchasing power as the original payment of \$238.71.

If in subsequent years the price index continued to rise at a 12 percent annual rate, the outstanding balance and monthly payments on the indexed loan would continue to be raised by 12 percent each year. This pattern of price increases would produce large nominal payment requirements—\$7,151.73 per month in the thirtieth year, for example. Presumably, however, a borrower's nominal income would also have risen in line with the price level, allowing these large nominal payments to be handled as easily as the initial payments of \$238.71.⁹

With an annual adjustment period for the adjustable mortgage loan, payments in the second and subsequent years would depend on the change in the interest rate to which the loan was tied. Thus, changes in market conditions—whether due to a change in the inflation premium or in the underlying real rate of interest—would be transmitted through the mortgage contract.

The treatment of inflation and risk

The differences in payment schedules reflect different arrangements for the sharing of interest rate risk. At one extreme, the fixed-rate loan saddles mortgage lenders with the entire risk of variations in nominal rates. Because of the asymmetry established by the borrower's option to refinance, changes in nominal interest rates can work only to the disadvantage of lenders. Moreover, since the fixed-rate loan can assign only nominal interest rate risks, it exposes both borrowers and lenders to the risk of offsetting changes in the real rate of interest and the inflation premium.

At the other extreme of risk-sharing arrangements, adjustable mortgages assign all the risk of variations in nominal rates to borrowers. Like fixed-rate loans, they entangle the risks of real and inflation-based variations in interest rates. Thus, adjustable loans guarantee lenders that their mortgage yields will always reflect the prevailing level of real interest rates as well as the current inflation premium.

In contrast to fixed-rate loans, indexed mortgage contracts disentangle the real and inflationary components of nominal interest rate risk. They assign all the risk of inflationary developments to the borrower, while forcing lenders to bear the risk of variations in the real rate of interest. In an environment of rapid and variable inflation, perfectly indexed contracts are

economically equivalent to fixed-rate loans in a world of stable prices.

The three designs thus have very different implications for risk sharing. But all of them accommodate inflation. The indexed mortgage, however, has two distinct advantages over the fixed-rate and adjustable designs. First, since it allows the inflation adjustment to be based on the price changes experienced during the life of the contract, it does not require borrowers and lenders to commit to a specific inflation forecast. In addition, since its payment schedule is based only on the real component of the prevailing level of interest rates, it avoids the inflation-induced distortions—and the associated affordability problem—of the fixed-rate loan.

Adjustable mortgages suffer from some of the basic shortcomings of the standard fixed-rate loan. During any particular adjustment period, the payments on an adjustable loan are identical to those of a long-term fixed-rate loan with the same contract rate, outstanding balance, and remaining maturity. Since the contract rate on an adjustable loan is a nominal rate, the payments required for its amortization are subject to the same inflation-induced bias. In fact, if there is no change in the interest rate to which an adjustable mortgage is tied, the associated payments would be identical (in nominal terms) to that of a fixed-rate loan. Moreover, if the real and inflationary components of this constant rate on the adjustable mortgage do not vary over time, the *real* value of the series of payments would also be identical to that of a fixed-rate loan made at that rate. Under these circumstances, adjustable mortgages would not alleviate the inflation-induced distortion of the mortgage borrower's payment burden.

From the lender's point of view, the attractiveness of adjustable loans may be deceptive. While such loans offer lenders protection from the risk of variations in interest rates, they may raise the default risk of mortgage assets. This default risk is the analogue of the affordability problem: just as prospective mortgage borrowers can be disqualified by rising payment requirements, holders of adjustable mortgage loans facing substantially increased payment requirements might be forced into delinquency and default.

An approximation of the indexed loan

The adjustable mortgage contract can be respecified in a manner that redistributes the allocation of interest rate risks and avoids the possibly severe initial payment requirements of the fixed-rate design. Federal regulations for adjustable-rate mortgages include two provisions that would allow lenders to reduce or to eliminate the increase in monthly payments associated with an increase in the contract rate of the loan. One

⁹ This is too generous a presumption for those households whose incomes fail to keep pace with inflation.

of these provisions permits negative amortization.¹⁰ For intervals as long as five years, mortgage lenders may set the monthly payment on a loan below the amount required to pay interest on the outstanding balance. The difference between these amounts is accumulated as an increase in the loan's outstanding balance—hence the term negative amortization.

When negative amortization is used, the size of required payments is independent of the rate of interest that is applied to the outstanding loan balance. As a result, lenders may be able to increase the proportion of prospective mortgage borrowers that qualify for mortgage loans by maintaining low payment requirements. Under these arrangements, the loan balance would be increased by the difference between actual payments and those required by strict application of the mortgage contract rate.

In an inflationary environment, the results could be qualitatively similar to the use of an indexed mortgage. The real interest rate that would apply to an indexed loan would be significantly below the nominal rate on a competing fixed-rate loan, producing much lower monthly payments. Similarly, the monthly payments on an adjustable loan would be reduced substantially by the negative amortization feature. The outstanding balance of an indexed loan would be raised periodically to reflect increases in the chosen measure of inflation. In a similar fashion, the outstanding balance of an adjustable loan with negative amortization would be raised periodically to reflect the difference between actual and required payments. But, when the pretax cash flows involved in the two loan designs are similar, the deductibility of interest payments—including deferred interest when it is paid—

would make the adjustable loan less costly on an aftertax basis (Box 2).

The outlook

The economic characteristics of indexed mortgage loans and adjustable loans with negative amortization can be similar. The difference in the mechanisms they employ to reduce the risks and distortions of inflation are more apparent than real. In comparison to the standard fixed-rate loan, however, both of these designs reduce the cash receipts of mortgage lenders in the early years of a mortgage loan. In view of the sizable losses they have incurred in recent years, it may be unreasonable to expect mortgage lenders quickly to exploit the negative amortization feature to the extent required to replicate the indexed contract.

The preceding analysis, however, underscores the point that the more fundamental problem in the mortgage market may be the persistence of high real rates of interest. In markets of all kinds, high real rates of interest discourage leveraged purchases of long-lived assets by raising financing costs (e.g., the cost of borrowed money) and opportunity costs (e.g., the purchasing power of foregone interest earnings). New mortgage designs may remove the inflation-induced distortions that have disrupted the mortgage market. But, if high real rates of interest persist, they will continue to encumber the housing market.

Beyond the immediate future, there is a more sanguine prospect for the allocation of interest rate risks. With sufficient flexibility in the construction of payment schedules—that is, with negative amortization—adjustable mortgages permit the separation of real and inflation-induced interest rate risks. The direction of recent changes in the design of mortgage contracts suggests a reasonable allocation of these risks, with borrowers absorbing the risk of variable inflation, while lenders—in their basic role as financial intermediaries—absorb the risk of variations in real interest rates.

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¹⁰ The other provision allows the remaining maturity of an outstanding loan to be extended, so long as the entire term of the loan does not exceed forty years. After the first year of a thirty-year adjustable-rate mortgage, for example, the remaining maturity can be increased from twenty-nine to thirty-nine years.

Box 2: Cash Flows and Tax Consequences

For the sake of simplicity, the analysis in the text of the article ignores the tax treatment of mortgage debt. The deductibility of interest payments reduces the borrower's cost of debt repayment in all the mortgage designs. In the cases of adjustable and indexed loans, these arrangements mean that the tax authorities absorb some of the impact of increases in interest rates or the price level. Indeed, the sensitivity of household aftertax costs to changes in interest rates or the price level is a declining function of the marginal tax rate. Lenders face an additional complication. When taxes are paid on interest earnings accrued (rather than interest earnings received), negative amortization schemes confront lenders with taxable incomes that exceed their interest receipts. Thus, accrual-basis lenders have a strong incentive to avoid the use of loan designs that involve negative amortization.

Consider a twenty-year mortgage loan for \$50,000. The four panels of Table 3 illustrate the cash flows and aftertax costs associated with each of four agreements that might be used to effect the transaction.¹ At the time any one of these contracts is written, the prevailing fixed-rate mortgage rate is 15 percent and includes a 9 percent inflation premium. The variations in interest rates that are assumed to follow are all due to changes in inflationary expectations. The real before-tax interest rate remains at 6 percent.

Two measures of the aftertax cost of the loan appear in Columns 5 and 6. They apply to borrowers with marginal tax rates of 50 and 20 percent, respectively. Each is calculated as the sum of interest payments (net of tax benefits) and amortization. Since loan repayment is actually a form of saving, these figures overstate the economic cost of the loan payments.

Fixed-rate mortgage

In the simplest case, equal annual payments of \$7,988.07 (Column 1) amortize the loan over its twenty-year term. In the first year, \$7,500 of the payment is allocated to interest ($0.15 \times \$50,000$, Column 2), leaving only \$488.07 for the repayment of principal. By the

twentieth year, however, only \$1,041.92 of the payment is allocated to interest.

Adjustable mortgage

In its unconstrained form, the adjustable mortgage is equivalent to a series of one-year loans made at the values of the reference rate listed in Column 7. In the example provided, the reference rate rises to 21 percent in the third year of the loan, making the required payment one-third more than the first annual payment. Aside from the irregularity of the series of annual payments and relatively minor changes in the amortization pattern, the adjustable mortgage shown here maintains all the cash flow and tax features of the fixed-rate loan.

Adjustable mortgage with negative amortization

Any number of schemes can be devised to achieve negative amortization. One such method establishes two mortgage rates—a payment rate used to calculate periodic payments and a debit rate used to compute interest due on the loan. Whenever the payment rate is less than the debit rate, negative amortization occurs. The figures in panel C arise from such a dual-rate scheme. The payment rate is set at a constant 6 percent, while the debit rate is the hypothetical reference rate.

The tax consequences of the negative amortization scheme are somewhat different from those of the first two designs. Loan payments are allocated first to current interest (*i.e.*, interest accrued during the period), then to deferred interest, and finally to principal. As a result, for each year in which the loan balance remains above the original \$50,000, the entire loan payment is tax deductible.

Indexed mortgage

The series of payments and the amortization pattern of the indexed loan are very much like those for the adjustable mortgage with negative amortization. But differences in the composition of loan balance changes (recall the mislabeling of principal and interest, page 22) have a dramatic effect on the aftertax cost comparisons. While most of the payments on the adjustable loan with negative amortization are fully deductible, only a portion of each payment on the indexed loan qualifies as an interest expense. Thus, in the mortgage market, the tax code's treatment of indexation constitutes an important barrier to the introduction of indexed contracts.

¹ For illustrative purposes, all the figures in the table are based on a schedule of annual payments made at the end of each year. Complete tables and a mathematical summary of the calculations are available from the author on request.

Box 2: Cash Flows and Tax Consequences (continued)

Table 3: Cash Flows and Aftertax Costs in Four Mortgage Designs

Nominal dollar amounts; loan amount is \$50,000 and loan term is 20 years

Year	Payment	Interest	Amortization	End-of-year balance	Aftertax cost 50%	Aftertax cost 20%	Hypothetical reference rate (R) or inflation rate (I)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Fixed-rate mortgage							
1	7,988.07	7,500.00	488.07	49,511.93	4,238.07	6,488.07	
2	7,988.07	7,426.79	561.28	48,950.64	4,274.68	6,502.72	
3	7,988.07	7,342.60	645.48	48,305.16	4,316.78	6,519.55	
19	7,988.07	1,947.94	6,040.13	6,946.15	7,014.10	7,598.49	
20	7,988.07	1,041.92	6,946.15	0.00	7,467.11	7,779.69	
B. Adjustable mortgage							
1	7,988.07	7,500.00	488.07	49,511.93	4,238.07	6,488.07	R*
2	9,765.62	9,407.27	358.35	49,153.58	5,061.98	7,884.16	0.15
3	10,667.33	10,322.25	345.08	48,808.50	5,506.20	8,602.88	0.19
8	6,364.92	4,521.23	1,843.69	43,368.58	4,104.30	5,460.67	0.21
9	5,754.79	3,469.49	2,285.31	41,083.27	4,020.05	5,060.90	0.18
10	6,325.31	4,108.33	2,216.98	38,866.29	4,271.15	5,503.64	0.13
19	7,170.62	1,350.78	5,819.83	6,460.02	6,495.23	6,900.46	0.10
20	7,106.02	646.00	6,460.02	0.00	6,783.02	6,976.82	0.08
C. Adjustable mortgage with negative amortization							
1	4,359.23	7,500.00	(3,140.77)	53,140.77	2,179.61	3,487.38	R*
2	4,762.52	10,096.75	(5,334.22)	58,475.00	2,381.26	3,810.02	0.15
3	5,400.55	12,279.75	(6,879.20)	65,354.20	2,700.27	4,320.44	0.19
8	9,340.25	8,268.63	1,071.62	81,614.65	4,670.13	7,472.20	0.21
9	9,734.75	6,529.17	3,205.58	78,409.07	4,867.38	7,787.80	0.10
10	9,941.72	7,840.91	2,100.81	76,308.26	4,970.86	7,953.38	0.08
19	21,589.16	4,353.96	17,235.21	22,346.21	19,412.19	20,718.37	0.10
20	24,580.83	2,234.62	22,346.21	0.00	23,463.52	24,133.91	0.11
D. Indexed mortgage†							
1	4,359.23	3,000.00	1,359.23	53,018.44	2,859.23	3,759.23	‡
2	4,751.56	3,181.11	1,570.45	58,136.23	3,161.01	4,115.34	0.09
3	5,369.26	3,488.17	1,881.09	64,693.41	3,625.17	4,671.63	0.13
8	9,105.33	4,836.40	4,268.93	79,391.19	6,687.13	8,138.05	0.15
9	9,469.54	4,763.47	4,706.07	76,178.82	7,087.81	8,516.85	0.04
10	9,658.94	4,570.73	5,088.21	73,934.23	7,373.57	8,744.79	0.02
19	18,747.69	2,062.31	16,685.38	18,570.83	17,716.54	18,335.23	0.04
20	19,685.08	1,114.25	18,570.83	0.00	19,127.95	19,462.23	0.05

* The values of the reference rate in years 1 through 20 are 0.15, 0.19, 0.21, 0.21, 0.18, 0.13, 0.13, 0.10, 0.08, 0.10, 0.12, 0.14, 0.16, 0.17, 0.15, 0.14, 0.13, 0.12, 0.11, and 0.10.

† End-of-year balances for the indexed loan include an adjustment for inflation. This adjustment is not shown in the table.

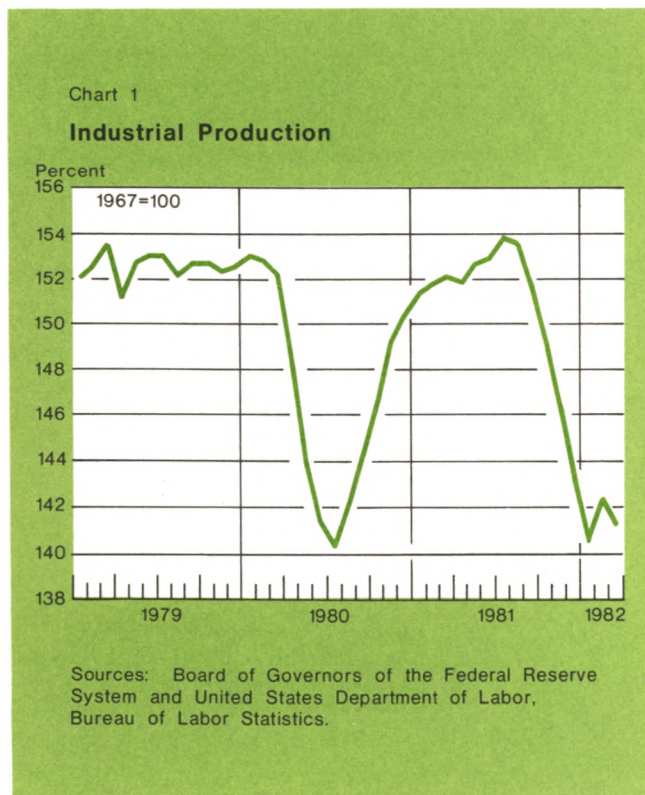
‡ The inflation rate is assumed to be the difference between the reference rate and 0.06.

Current economic developments

Business activity declined further in the first quarter, and inflationary pressures continued to subside. Interest rates, which had backed up near the end of the year, continued to rise in January and did not change significantly through the balance of the quarter. Looking ahead, two main factors are widely cited to support a view that a turnaround in economic activity will begin by the second half of the year. First, inventory liquidation appears to be winding down. Also, disposable incomes will receive a large boost in July from a 7.4 percent increase in social security payments and a 10 percent reduction of income taxes. Nevertheless, many believe that whether the economy can sustain a recovery for an extended period of time may depend in large measure on the future course of interest rates. Despite the improvement in the inflation outlook and the weakness in the economy, concerns continued that rates would remain high, in part because of the Federal budget outlook.

Inventories and the first-quarter decline in GNP

In each of the recessions in the postwar period, inventory liquidation has been the primary factor in the decline of gross national product (GNP) in at least one of the quarters during the recession. Completion of the liquidation has generally occurred near the turning point in economic activity. According to preliminary estimates, real GNP declined in the first quarter at an annual rate of about 4 percent. Industrial production plunged in January, as severe weather conditions interfered with production schedules, and fell back again in March (Chart 1). This decline in production



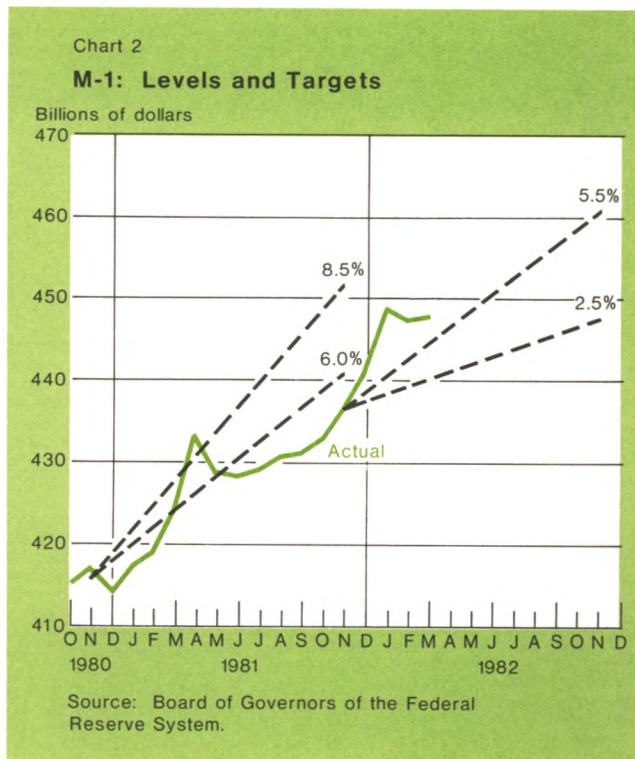
facilitated a large runoff of inventories. According to preliminary estimates by the Department of Commerce, a drop in business inventories of \$17.5 billion, by itself, more than accounts for the estimated decline in real GNP in the first quarter.

If the inventory adjustment is nearly over, it will remove a large negative factor from the measured change in GNP and may set the stage for a recovery in the second half of the year. Evidence is mounting that the auto inventory adjustment is about over. Stocks changed little in March. However, retail sales (excluding autos) were weak throughout the quarter, declining by approximately 4 percent in real terms. This casts some doubt on whether the inventory correction in the nonauto sectors has been completed as of yet, although the rate of decline should be more moderate in any event. In fact, even if the reduction of stocks were to continue but at a slower rate, it would represent a positive contribution to GNP growth.

The persistence of high interest rates: January money growth and budget deficit projections

The prospects for a strong and sustained recovery that will last more than a few quarters depends on a number of factors, ranging from energy prices to business and consumer response to the recent tax cut. One of the most important factors is the future course of interest rates. Despite weakness in the economy and a decline in the inflation rate, nominal interest rates increased early in the quarter and remained high throughout. An important backdrop to the run-up in short-term rates early in the quarter was a surge in the growth of the money stock in December and January. In these two months, M-1 grew at an annual rate of about 16½ percent and, by the end of January, was well above the upper bound of the target range (Chart 2). In February and March, M-1 declined slightly on balance. This helped alleviate some of the fears of a further rise in rates, although as the quarter ended the markets began to focus on the prospects of a surge in money growth in April.

Another sustaining factor for high interest rates, especially in the intermediate- and long-term maturity areas, has been market concern over the Federal budget outlook. The President's February budget proposal, as anticipated, forecast a \$100 billion deficit for 1982. However, for 1983 and 1984, the enactment of deficit-reduction measures of \$56 billion and \$84 billion would, according to the budget proposal, reduce the deficits to only about \$90 billion and \$80 billion, respectively. Subsequent analysis by the Congressional Budget Office (CBO) and others suggested that, on the basis of technical inaccuracies alone, even these deficit figures might be understated by \$25 billion for 1983 and \$35



billion to \$45 billion for 1984, and less optimistic economic assumptions would raise the number even further.¹ It has now become clear that, without additional spending cuts and tax increases like those contained in the President's budget or those proposed by others, the markets could be faced with financing a 1983 deficit in excess of \$180 billion and a 1984 deficit of at least \$220 billion.

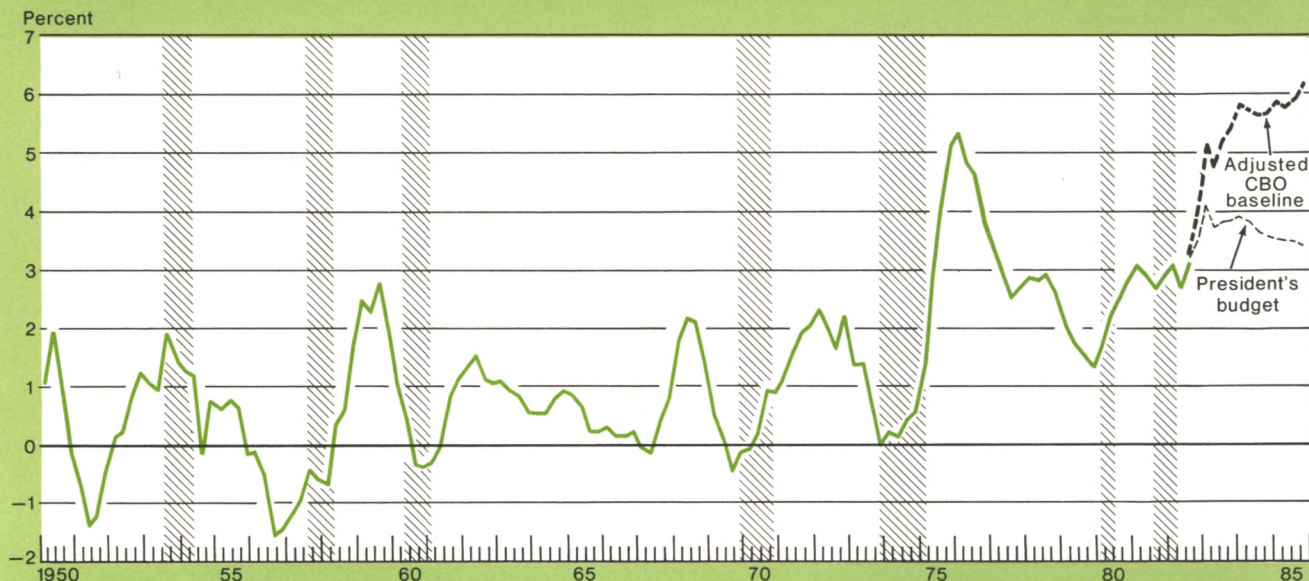
Assuming an end to the recession by the second half of this year, an increase in the deficit in fiscal 1983 during the first year of recovery would not be without precedent. In five of six recessions in the post-war period, the deficit as a percentage of GNP peaked after the end of the recession (Chart 3):

- Some tax payments, such as corporate and individual income tax *final* payments, are lagged and, in contrast to withheld taxes, show their greatest response to a recession in the year following the resumption of economic growth.

¹ See "An Analysis of the President's Budgetary Proposals for Fiscal Year 1983", Congressional Budget Office (February 1982) and statement of James R. Capra before the Senate Committee on the Budget (March 5, 1982).

Chart 3

The Government Deficit as a Percentage of GNP



Shaded areas represent periods of recession, as defined by the National Bureau of Economic Research.

Source: Congressional Budget Office, An Analysis of the President's Budgetary Proposals for Fiscal Year 1983.

- Also fiscal stimulus, in the form of tax cuts or discretionary spending increases has usually been put into place just before or slightly after the resumption of real growth and continues to affect the budget figures for some time afterward. This factor appears to be part of the fiscal outlook for 1983. For example, the July cut in individual income taxes will result in an increase in fiscal stimulus, more than offsetting the net spending cuts enacted to date.

In the past, the deficit as a percentage of GNP generally continued to rise until real GNP reached its pre-recession peak. What is different this time is that well into what is supposed to be a recovery period (1984 and 1985) the deficit could continue to rise both in absolute terms and as a percentage of GNP (as shown by the adjusted CBO baseline in Chart 3).² At best, the deficit would rise in absolute terms and de-

² The CBO baseline is a budget projection that shows what the budget would look like with no changes in the laws and policies in effect at the end of calendar year 1981. For the purposes of analysis, an adjustment has been made to the baseline to make it reflect the real growth of defense in the Administration's budget proposal.

cline only slightly as a percentage of GNP (as shown by the President's budget). It is this pattern that has been cited by market participants as an important factor sustaining the high level of interest rates. An inability of the Congress and the Administration to enact changes that would significantly cut the size of the 1983 deficit is not necessarily viewed as an important problem for 1983 *per se* as it is a signal that the figures for 1984 and 1985 in Chart 3 may become a reality.

The Government deficit and interest rates

The prospects of large budget deficits in the future may be affecting both the real and inflation components of nominal interest rates. Measured against either the current inflation rate or a short-run forecast of the inflation rate, real interest rates have been at a postwar high—between 6 and 8 percent when measured on a basis unadjusted for taxes. High budget deficits, combined with a Federal Reserve policy of not accommodating such deficits, are generally considered to affect not only short-term rates but more importantly also the longer maturities. The reason for this is that, despite a potential rise in personal and business saving rates as a result of the tax cut, the quantum jump in the deficit

over the next few years would, on balance, result in a smaller share of savings being available for private borrowers. However, assuming the economy sustains some kind of recovery (in part because of stimulative fiscal policies), private credit demands are expected to increase. A confrontation between rising private credit demands and a reduced availability of savings for private investment would mean continued high real interest rates in the future. The credibility of the Federal Reserve's commitment to its money growth targets is critical to this line of reasoning. Expectations are said to be keeping real rates in the longer maturities high right now, precisely because the market believes the Federal Reserve will not cushion the effects of the future deficits on funds availability by absorbing significant amounts of Government debt. A reinforcing effect is that the expected high real rates also may add to risk premiums because of the fear of the financial failure of corporations that are forced to borrow at high rates both now and in the future.

The deficit also might be affecting that part of current nominal interest rates related to inflation expectations. Although current inflation rates are low, the inflation component of interest rates is actually comprised of market participants' expectations about future inflation. Some analysts suggest that the market foresees higher inflation because large deficits could generate irresistible pressure on the Federal Reserve to accelerate money growth with an accompanying increase in inflation and inflationary expectations. A competing explanation is that market participants believe that large deficits during an economic recovery

are inherently inflationary, irrespective of what the Federal Reserve is doing.

Although projections of future deficits may be an important reason for the current high level of rates, there are limits to how fast or by how much interest rates would decline if projections of future budget deficits were reduced. First, the fiscal outlook is not the only factor holding up interest rates. For example, for long-term rates, it is possible that, even in the absence of the deficit problem, there would be considerable market skepticism about the likelihood of a longer term slowing of inflation, given the record of progressively higher upward ratchets of inflation after temporary improvements over the past fifteen years and the accompanying deterioration of the long-term bond market. This may limit somewhat the size of the reductions of long- and intermediate-term rates that would result from enactment of a deficit-reduction program. In addition, Federal outlays have been consistently underestimated and Congressional and Administration budget targets have been far from the mark over the past few years.³ Consequently, it may take some time and possibly even some actual experience with lower Treasury borrowing to counteract market skepticism about the ultimate effects of an agreed-upon set of deficit-reduction targets.

³ In testimony before the House Budget Committee on March 16, 1982, Henry Kaufman, citing previous overruns of budget resolution targets, suggested that it would take more than enactment of Congressional budget resolution targets to convince the financial markets that the outlook for the deficit had been improved substantially.

James R. Capra

Monetary Policy and Open Market Operations in 1981

The Federal Reserve System pursued a policy of monetary restraint in 1981 as part of a sustained effort to break the inflationary momentum that had built up over the years. Economic activity was expanding rapidly as the year began, but the economy then leveled off in the second and third quarters before declining in the closing months. Meantime there were encouraging reductions in the measured rates of price increase and significant progress in blunting inflationary expectations. Signs of slower labor cost increases offered hope of further gains on the price front in 1982.

The Federal Open Market Committee's (FOMC) policy of restraint involved a slowing in the pace of expansion planned for its money and credit objectives. For M-1B, adjusted for shifts into negotiable order of withdrawal (NOW) accounts, the FOMC sought growth of 3½ to 6 percent from the fourth quarter of 1980 to the fourth quarter of 1981, ½ percentage point below

the range set for M-1B for 1980.¹ Since M-1B had come out above the upper bound in 1980, the new range implied a greater deceleration than the ½ percentage point change in the range. For M-2, M-3, and bank credit, the growth ranges were 6 to 9 percent, 6½ to 9½ percent, and 6 to 9 percent, respectively, unchanged from those set for 1980.² As with M-1B, the ranges for M-2 and M-3 implied a deceleration from actual 1980 growth rates since both measures had exceeded their ranges that year. Furthermore, the growing importance of money market mutual funds (MMMFs) was expected to add to the growth of the broader measures, which meant that similar growth rates would have more restrictive implications than previously.

Adapted from a report submitted to the Federal Open Market Committee by Peter D. Sternlight, Senior Vice President of the Bank and Manager for Domestic Operations of the System Open Market Account. Fred J. Levin, Manager, Securities Department, and Ann-Marie Meulendyke, Research Officer and Senior Economist, Open Market Operations Function, were primarily responsible for preparation of this report, with the guidance of Paul Meek, Monetary Adviser. Connie Raffaele, Robert Van Wicklen, and Catherine S. Ziehm, members of the Securities Analysis Division staff, participated extensively in preparing and checking information contained in the report.

¹ The shift adjustment for M-1B was an estimate of the extent to which NOW account deposit growth in excess of the previous trend came from sources other than demand deposits and, hence, represented an increase in M-1B that would not have occurred in the absence of legalization of nationwide NOW accounts. The estimates were made from survey data. The adjustments assumed 77.5 percent of NOW accounts came from demand deposits in January and 72.5 percent in the remaining months of 1981. It was estimated that the remainder of the transferred funds came from M-2 components, so that no shift adjustment was needed for that measure.

² The FOMC also established a range of 3 to 5½ percent for M-1A (shift adjusted) at its February meeting. However, by midyear, the bulk of the initial transfers of funds into NOW accounts appeared to have taken place, and the measure was given no further emphasis in policy deliberations. For the year, it expanded 1½ percent.

Chart 1

Targeted and Actual Growth of M-1B
Adjusted for NOW account shifts

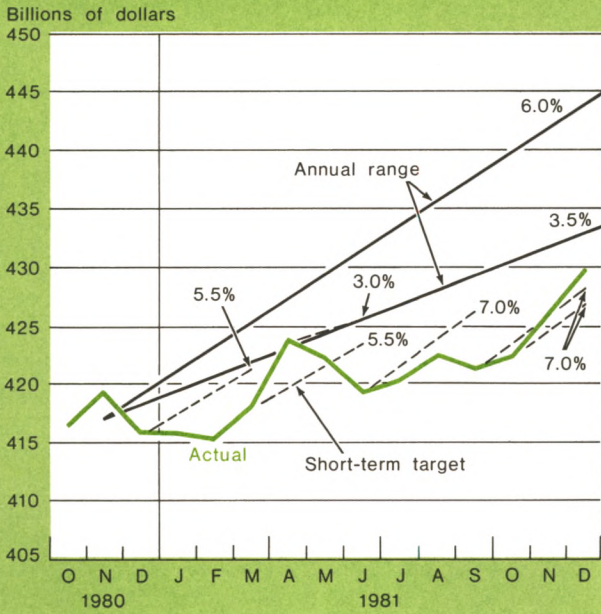


Chart 2

Targeted and Actual Growth of M-2

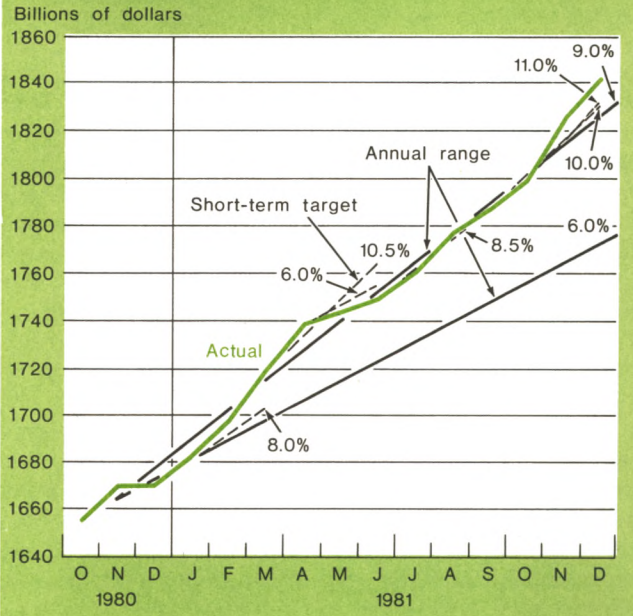


Chart 3

Targeted and Actual Growth of M-3

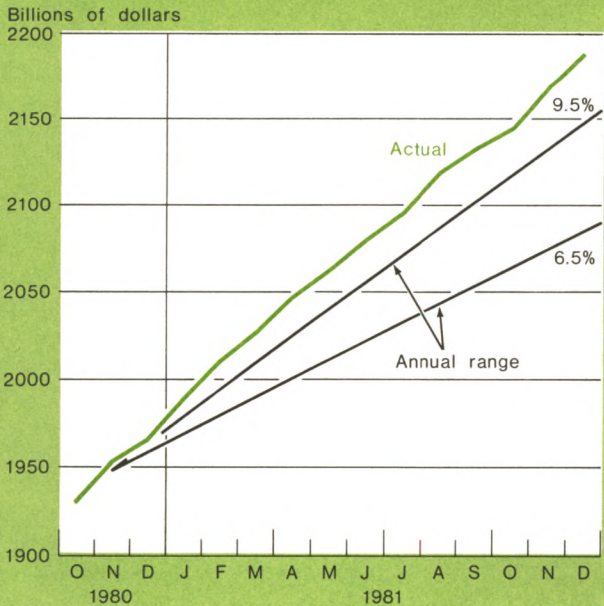
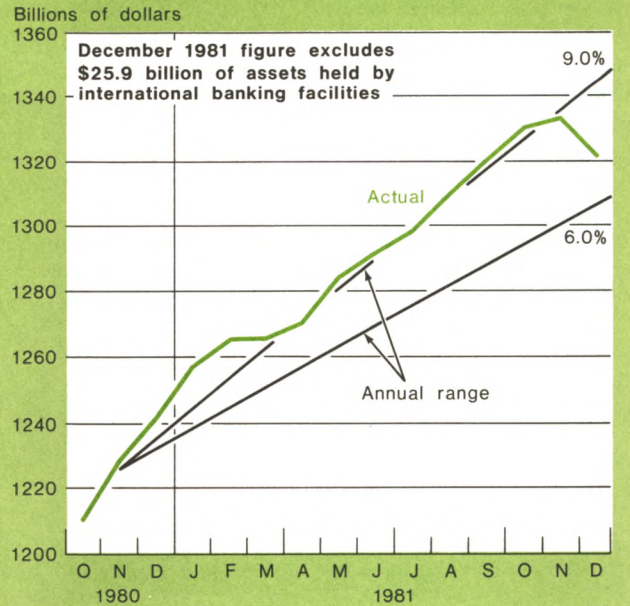


Chart 4

Bank Credit: Levels and Associated Range



It turned out that the various monetary aggregates in 1981 diverged more than had been expected. The narrow measures were weak, compared both with their performance of other recent years and with the FOMC's objectives. The broader measures meantime grew about as much as in 1980, or even more, and they tended to be high relative to the objectives. M-2 hugged the upper bound of the Committee's four-quarter range and slightly exceeded it for the year. M-3 was above the upper boundary of its four-quarter range throughout the year. Bank credit generally fluctuated around the upper bound of its associated range, ending slightly within the range. Charts 1 to 4 illustrate the behavior of the various measures relative to their ranges.³

Faced with such different signals from the various monetary measures, the Committee gave weight to both M-1B (shift adjusted) and M-2. Operationally, this meant that it was often willing to accept some of the shortfall in M-1B when M-2 was around the upper bound of its range. The 7½ percentage point spread between their growth rates was unprecedented for a period of cyclically high interest rates. Chiefly responsible appeared to be the public's alacrity in economizing on low-return deposits in favor of those offering market-related interest rates. All the components of M-1B are subject to some type of interest rate ceiling, while many elements in M-2 and M-3 provide market-related rates. These latter components grew very rapidly during the year, continuing a trend of recent years. In some cases, they drew funds that might otherwise have been invested directly in market instruments. In its midyear review of the long-run targets, the Committee recognized these developments, indicating that it would accept M-1B around the bottom of its range and M-2 around the top of its range for the year. By the year-end, the divergence was even greater than anticipated at midyear, with M-1B ending below its range and M-2 slightly above its range.

The FOMC continued to pursue the reserve-oriented approach to controlling money growth begun in October 1979. A review of the procedure completed

early in the year concluded that quicker changes in the path for nonborrowed reserves and the discount rate were probably desirable to speed up the response to large deviations of total reserves and money from path. This approach was followed in April when money expanded rapidly. The Federal Reserve lowered the nonborrowed reserve path and raised the discount rate and the surcharge. During much of the rest of the year, the FOMC gave weight to the strength of M-2 as well as to the weakness in M-1B. In the face of such divergent signals, path adjustments of the above-noted kind were avoided. It was not until early November, in the context of a visibly slowing economy and continued apparent weakness in M-1B, that a second adjustment was made to the nonborrowed reserve path specifically to speed a return of total reserves to path. Around this time, the surcharge on the discount rate was also reduced and then eliminated and the discount rate lowered.

The maintenance of a restrictive monetary policy in the face of embedded inflationary expectations meant that interest rates tended to be high during much of the year. Rates were also volatile. At times, market participants concentrated on factors tending to boost rates, including estimates of large and prolonged Federal deficits and substantial growth of broad money aggregates. At other times, participants were heartened by the slow growth of the narrow monetary measures, the weakening in economic activity, and signs of slowing inflation. Interest rate volatility itself probably also contributed to somewhat higher rates than might otherwise have prevailed, as lenders and dealers sought additional protection against the greater risks.

The capital markets continued to function reasonably well during the year despite adverse conditions. A large volume of Government, corporate, and municipal debt issues was sold. For much of the year, short-term rates were higher than long-term rates, as is typical in periods of monetary restraint. Potential long-term investors were reluctant to extend the maturities of their portfolios unless substantial rate declines appeared to be a near-term prospect. Rallies tended to be short-lived.

In these circumstances, many corporate borrowers chose to sell intermediate- rather than long-term issues, as the risks seemed less and the buyers more receptive. Deep discount securities offering low, or even zero, coupons also came into vogue as investors sought to lock up high yields for the life of the issue. By the year-end, with the economy having weakened, short-term rates had come down below long-term rates and were somewhat below those of a year earlier. Long-term rates were well above the levels where

³ The figures in this report are based on the seasonal and benchmark data that applied during 1981 and the definition of M-2 in effect at the time. In February 1982, M-2 was redefined to include retail repurchase agreements (RPs) and to exclude institutional MMMFs. Benchmark and seasonal revisions were also made. Net revisions to the growth rates of the various monetary aggregates were very small. The new data show that, for the four quarters of 1981, M-1B (shift adjusted) grew 2.3 percent. M-1B not shift adjusted—now referred to as M-1—grew 5 percent over the four quarters of 1981, compared with 4.9 percent on the unrevised basis. M-2 expanded 9.5 percent, and M-3 grew 11.4 percent after revision. Changes in the quarterly patterns also were small. Table 1 displays growth rates before and after the revisions.

they had started the year, although generally below the September-October peaks. Long-term municipal rates, though, reached record levels late in the year.

The Economy and Financial Market Developments

The economy

The pace of economic activity slackened as 1981 progressed. At the start of the year, the economy was expanding rapidly, extending the recovery begun in the second half of 1980. Real gross national product (GNP) in the first quarter grew strongly at an 8.6 percent seasonally adjusted annual rate. The middle two quarters were essentially flat—a slight decline in the second quarter and a slight rise in the third. The economy weakened notably in the final quarter, with real GNP falling at a 4.5 percent rate. For much of the year, many observers felt that the economy was surprisingly resilient, given the extent of monetary restraint and the depressed levels of the automobile and housing sectors. Still, the drop, when it occurred, was steeper than many had expected, particularly as it came soon after the enactment of large tax cuts. The unemployment rate was virtually steady through midsummer but then climbed in the final months.

The inflation rate, as measured by the various indexes, slowed irregularly over the year. The greatest improvement was in wholesale prices. The producer price index rose at a 12 percent annual rate through April and at a 4.5 percent average over the balance of the year. For the year the increase was 7.1 percent, compared with 11.9 percent during 1980. The rise in consumer prices also slowed between the first and second quarters but speeded up again in the third quarter before moderating to a 5.2 percent annual rate in the fourth quarter. For the year the consumer price index rose 8.9 percent, compared with 12.4 percent in 1980. Some of the slowing in both wholesale and consumer price advances reflected developments in the volatile energy and agricultural sectors, but there also was deceleration in other components. The implicit GNP price deflator, which is less volatile, rose 8.9 percent from the fourth quarter of 1980 to the fourth quarter of 1981, modestly below the 9.9 percent increase a year previous.

The financial markets

Interest rates during the year were volatile and frequently higher than seemed consistent with a weakening pattern of economic activity and some slowing of inflation (Chart 5). After peaking in May, short-term rates fluctuated in a high range and then began to fall in September. They declined sharply in the fourth quarter, reflecting the weak economy, slowing infla-

Chart 5
Selected Interest Rates

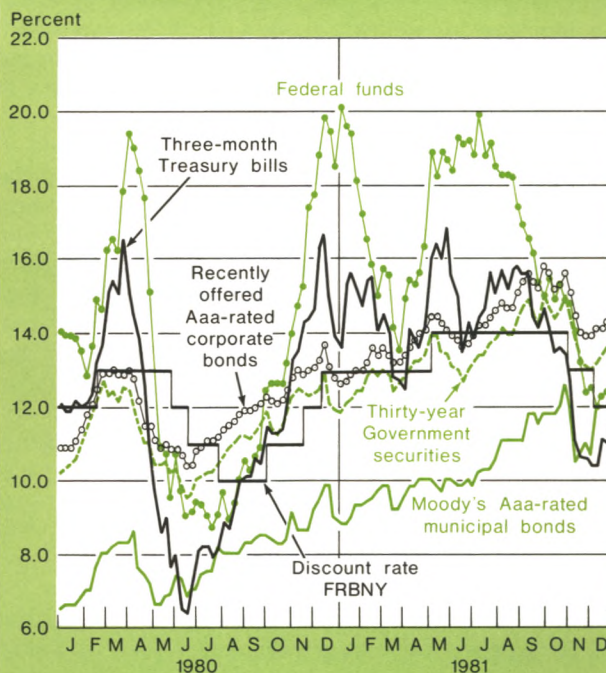
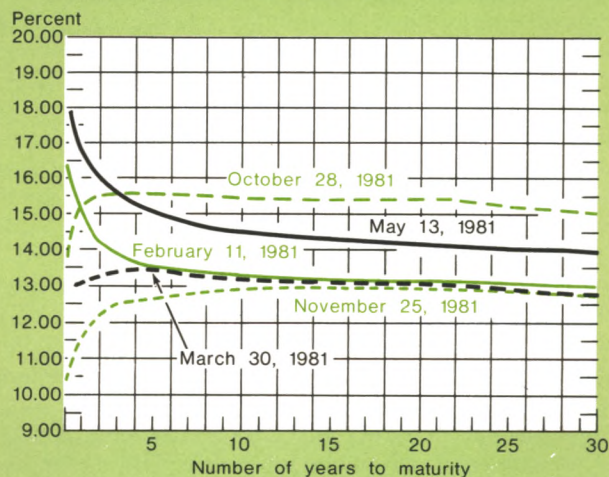


Chart 6
Yield Curves for Selected U.S. Government Securities



tion, and the Federal Reserve's provision of reserves in the effort to meet money growth objectives. Long-term rates, on the other hand, peaked somewhat later and remained above the late-1980 levels at the year-end. Long-term rates were held up by concerns about ongoing Treasury deficits, as well as uncertainty about whether there would be more permanent gains in the battle against inflation than after earlier episodes of restraint during the last decade and a half.

During the year, investor expectations responded to changing evidence concerning monetary growth, the state of the economy, the size of prospective Federal deficits, and the outlook for inflation. During the first quarter, slow growth of M-1B led to a marked decline in short-term interest rates, as the Reserve System supplied nonborrowed reserves while the demand for total reserves fell. Long-term rates changed little as the economy remained strong, so that the yield curve on Treasury issues, which had been steeply inverse through mid-February, became virtually flat by the end of March (Chart 6). In early April, short-term rates began to rise sharply, first as market participants discovered that the FOMC had not lowered the Federal funds rate range even though funds had traded below the lower end of its range for a couple of weeks. More importantly, the pickup in M-1B growth in late March and April against the background of a strong economy was troubling, while the System's rapid response to the overshoot generated strong upward pressure on the Federal funds rate. There was also growing concern that large budget deficits would result from the President's economic program, and the steeply inverted yield curve that developed by mid-May stood significantly above that of six weeks earlier (Chart 6).

Rates in all sectors stayed high through the summer. Long-term rates rose more than short-term rates, as concerns about Treasury deficits and prospective supplies of corporate debt weighed heavily. By August, money market conditions began to ease in response to the persistent weakness in M-1B. With long-term rates still holding up, or rising, the yield curve developed a humpbacked shape. Continued declines in short rates relative to long rates and the mildly accommodative monetary policy stance produced, by the end of October, a positively sloped yield curve for the nearby years. A major rally was touched off at that time by cumulating evidence of economic weakness. This lowered the yield curve and steepened its slope. The rally came to a halt in late November, with short-term rates at their lows for the year and long-term rates well below their September-October highs. Rates backed up again through the year-end. A sense of caution returned as budget deficits and strengthening money growth came into focus.

Debt issuance

With a substantial deficit to be financed and a large volume of maturing issues to be rolled over, the Treasury was a major borrower during the year. Marketable debt held outside the Federal Reserve and Government accounts rose a net \$88.4 billion in 1981, similar to the \$90 billion increase the year before. (A net pay down of \$10.3 billion of publicly held nonmarketable issues, including \$2.4 billion denominated in foreign currencies, contributed to the cash need.) The Treasury raised a net of \$23.2 billion from the public through bills and \$65.2 billion through coupon issues. In addition, it replaced \$68 billion of maturing coupon issues and continued rolling over the \$172 billion of publicly held bills that was outstanding at the end of 1980.

The Treasury maintained its regular cycles of Treasury bill and coupon sales during the year. In view of the large cash needs, it added a quarterly seven-year note cycle beginning with an auction on December 30, 1980. It also substituted a twenty-year bond for a fifteen-year bond at the start of 1981. Some consideration was given to the possibility of eliminating the offering of long-term bonds, on the grounds that the Treasury should not make a commitment to pay high interest rates for an extended period when the Administration was resolved to end inflation. However, given the huge financing needs and the desirability of maintaining a balanced debt structure, the Treasury decided to continue to sell bonds on a regular basis. With this ongoing commitment to debt extension, the average maturity of the outstanding debt was lengthened over the year by two months to fifty months.

The market for issues of Federally sponsored agencies was subject to considerable strain during the year. During the summer, investors became wary of the issues of the Federal National Mortgage Association (FNMA) and to a lesser degree the Federal Home Loan Banks (FHLBs). The prevailing high interest rates caused the costs of FNMA and the thrift institutions that rely on FHLBs to rise well above the yields on their mortgage portfolios. Market participants became concerned by June about their sustained viability, and interest rate spreads between the debt of these agencies and the Treasury widened significantly. The spreads increased through August, especially for FNMA issues, for which the spreads widened to well over a full percentage point compared with a more normal $\frac{1}{4}$ to $\frac{1}{2}$ percentage point. Later in the year, as short-term yields declined, spreads fell back toward more usual levels.

Net new cash raised by various Federal agencies during the year amounted to \$33.3 billion, compared with the \$24.9 billion raised the year before. (These

figures do not include Government National Mortgage Association pass-through certificates.) Most borrowing was by FNMA, FHLBs, and the farm credit agencies, with FHLBs accounting for the stepped-up issuance in 1981. Debt was issued in maturities ranging from six months to ten years.

Corporate bond issuance was again heavy in 1981, with a total of \$37 billion of public offerings, although this was below the record level of almost \$42 billion in 1980. Many corporations faced weakening liquidity positions and were eager to extend the maturities of their outstanding debt. However, they tended to wait for declines in bond yields to rush their offerings to market. A large portion of the year's debt issuance took place during rallies in the spring and toward the year-end.

Given interest rate volatility and the high degree of uncertainty about the future, investors tended to favor intermediate-term issues increasingly in 1981. Indeed, according to an estimate by Salomon Brothers, about half of the nonconvertible debt issuance by domestic corporations in 1981 was in intermediate-term issues, compared with only about one quarter in the late 1970s. Another major change was the active issuance of debt with coupons well below current rates, offered at an initial discount. Some investors found these issues attractive because they offer certain advantages should interest rates fall. They are less likely to be called early and a part of the return is, in effect, already invested at the high rates prevailing when the bonds were issued. Issuers found their costs lower on such offerings and also gained a tax advantage since the accrued interest obligations can be treated as an expense before the actual payment must be made.

Sales of tax-exempt bonds amounted to \$46 billion in 1981, about 70 percent of which were revenue issues. In 1980, total borrowing had been \$47 billion, with 65 percent consisting of revenue bonds. (These figures do not include borrowings with maturities of one year or less.) During the latter part of the year, the yields on tax-exempt issues had to rise to new highs to attract investors, in part because the changes in the tax laws reduced the importance of tax-free income for the traditional purchasers of these issues. Also, there was a year-end surge in offerings by state housing authorities to fund relatively low-rate mortgages. The tax-exempt sector shared in the early stages of the November rally but reversed course before the taxable sector, with rates in some cases ending at their highs for the year.

Monetary and Credit Aggregates and Monetary Policy

Behavior of the aggregates

Growth rates of the narrow and broad aggregates diverged to an unusual extent in 1981. The narrow measures generally were weaker than intended, while the broader aggregates expanded at a more rapid pace than was sought by the FOMC. In responding to developments over the year, efforts were made to interpret this divergence, with weight being given to both M-1B (shift adjusted) and M-2.

M-1B (shift adjusted) grew just 2.1 percent between the fourth quarter of 1980 and the fourth quarter of 1981. (Figures do not allow for the benchmark and seasonal revisions made in February 1982. The revised figures are given in Table 1.) This was well below the Committee's target range of 3½ to 6 percent. Except when growth accelerated in April, M-1B (shift adjusted) was below the range through the year (Chart 1). The perceived extent of the weakness depends somewhat on the choice of dates. Measured from December 1980 to December 1981, it grew 3.3 percent, and inclusion of January 1982 would bring M-1B within an extension of the 1981 "growth cone". Measures of volatility of M-1B also depend on one's vantage point, although the volatility was less than in 1980. While quarterly average growth rates in 1981 showed alternating strength and weakness, growth rates computed from the last month of the previous quarter to the last month of the new quarter were reasonably steady for the first three quarters, then more rapid in the final quarter (Table 1). In any event, there seems little reason to believe that short-run variations in money growth rates—say from one quarter to the next—are significant for the performance of the economy so long as they do not cumulate in one direction or the other for a long period.

M-1B itself showed considerably more growth than the shift-adjusted measure in the early part of the year, as individuals opened NOW accounts with funds transferred from savings and other accounts as well as from demand accounts. Initially it was expected that there would be about a 2 to 3 percentage point difference in the growth rates over the year as a whole. By December 1981, the shift adjustment cumulated to \$12.4 billion, which meant a 3 percentage point difference in the growth rates. Much of the shift took place early in the year, causing the adjustment factor to reach \$9.8 billion by April. The differences then moderated though they widened somewhat in the final two months. Demand deposits also dropped dramatically in January and were decidedly weaker than other transactions accounts through April. Thereafter the differences generally were modest.

M-2 generally was close to or slightly above the upper bound of its 6 to 9 percent range during 1981 and increased 9.5 percent over the four quarters (Chart 2), about the same rate as the year before. It accelerated rapidly in the three months ended in April, at a 13.5 percent pace, moving above its target range by March. A sharp deceleration in May and June brought it back within its range. M-2 then fluctuated around the upper bound of its range for some months before a two-month spurt at the close of the year once again took it slightly above its range.

The non-M-1B components of M-2, as a group, expanded rapidly on average although their accelerations and decelerations showed a similar pattern to M-1B. The individual nontransactions components showed a wide range of growth rates. MMMF shares grew extremely rapidly through most of the year, increasing from \$75.8 billion in December 1980 to \$184.5 billion in December 1981. Six-month money market certificates (MMCs) also expanded rapidly through August but declined thereafter, posting a net increase of 9 percent. The 2½-year small savers certificates grew fairly rapidly early in the year, slowed when the

rate cap kept yields well out of line during the spring and early summer, then accelerated dramatically when the interest rate cap was removed at the start of August. Overall they increased about 88 percent. On the other hand, overnight RPs (issued by commercial banks) and Eurodollars (issued by Caribbean branches of member banks), which served as short-term investment media for excess corporate cash, changed little over the year. Savings deposits and traditional types of small time deposits subject to below-market interest rate ceilings declined over the year.

M-3 expanded 11.2 percent from the fourth quarter of 1980 through the fourth quarter of 1981 (Chart 3), well above the upper bound of the 6½ to 9½ percent target range. It moved above that range in January and stayed above throughout the year, even though there was a modest deceleration after April. Large time deposits expanded at a 21 percent average rate over the four quarters. Sharp variations in the rates of change of large time deposits appeared to be related to the behavior of bank credit (Chart 4). When that measure decelerated from January to April, large time deposits decelerated as well. When bank credit

Table 1

Monetary Aggregates in 1981

Seasonally adjusted annual rates

Period	M-1B* Unrevised	M-1B* Revised	M-2 Unrevised	M-2 Revised	M-3 Unrevised	M-3 Revised
Growth from previous quarter:						
Quarter 1	-0.9	-0.9	8.2	7.5	12.4	11.2
Quarter 2	5.2	5.8	10.6	12.0	10.6	12.2
Quarter 3	-0.4	-0.4	7.2	8.3	10.3	11.2
Quarter 4	4.6	4.7	10.6	8.8	9.8	9.2
Growth from three months earlier:						
March	2.1	2.2	11.7	10.8	12.6	12.4
June	1.1	1.9	7.2	9.3	10.3	11.5
September	1.9	1.8	8.6	8.6	10.5	10.8
December	8.3	7.6	12.2	10.0	10.0	9.3
Growth from December 1980 to December 1981	3.3	3.4	10.3	10.0	11.3	11.4
Growth from four quarters earlier:						
1981-Quarter 4	2.1	2.3	9.5	9.5	11.2	11.4
1980-Quarter 4	7.3	7.3	9.6	9.2	10.2	10.0
1979-Quarter 4	7.5	7.4	8.8	8.4	9.8	9.8
1978-Quarter 4	8.2	8.2	8.3	8.2	11.2	11.3
1977-Quarter 4	8.2	8.2	11.5	11.5	12.6	12.5
1976-Quarter 4	6.2	6.2	13.7	13.6	11.4	11.3

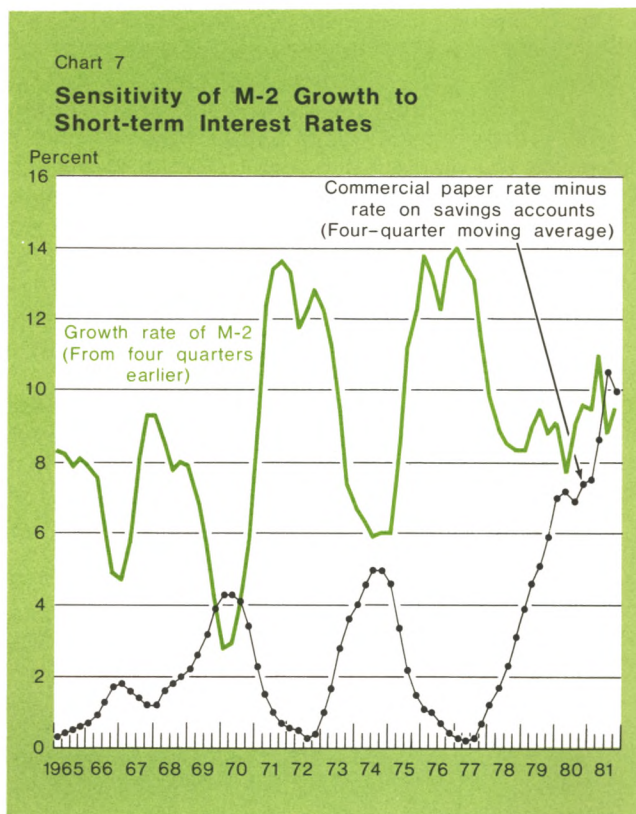
* Data for 1981 are adjusted for the estimated impact of shifts into NOW accounts.

growth picked up again between May and October, large time deposits resumed a relatively rapid pace of growth. When bank credit growth slackened in November, large time deposits declined.

The divergence in the average rates of expansion of the narrow and broad aggregates in 1981 was unprecedented for a period of cyclically high interest rates. The growth of M-1B, adjusted, slowed markedly for the year as a whole, as businesses and consumers economized on transactions balances with a low rate of return. M-2 growth, however, continued at a rapid clip, reflecting the growth of the components that offered market-related interest rates.⁴ Through 1978, in contrast, M-2 had typically slowed more than M-1 during periods of rising rates because interest rate ceilings caused a shift to market instruments whenever market rates were above the ceilings (Chart 7). In those days, M-2 also accelerated earlier and more sharply when interest rates fell below the ceilings.

Sensitivity of M-2 to interest rate moves began to change during 1978. As the economy entered an extended period during which interest rate ceilings were binding, the incentives to find substitutes strengthened, and regulatory changes permitted the market-related components to develop. The importance of instruments that paid market rates grew dramatically. By the final quarter of 1981, about 45 percent of M-2 consisted of instruments that could pay market rates, compared with 2 percent at the start of 1978. Some of these funds came out of the M-2 components subject to ceilings, leaving total M-2 unchanged. But, in other cases, funds were attracted that were previously invested, or would have been invested, directly in market instruments rather than being intermediated through banks, thrift institutions, and MMMFs.

Some of the shift into market-rate-based instruments in M-2 reflected a transitional adjustment in response to the existence of new options. This probably raised the average growth rate for M-2 relative to M-1B by more than would be expected to occur during future interest rate cycles. The transition still appears to be in progress. The changes in M-2 composition suggest that M-2 growth will no longer be so severely constrained by rising interest rates as that of M-1. Indeed, it seems possible that M-2 market-related components could attract funds from longer term



instruments whenever short-term rates rise above long-term rates. Conversely, funds might move out of M-2 when the yield curve shifts to a positive slope. At the same time, savings and other low-interest components of M-2 could behave in an opposite fashion, and the net result on M-2 as a whole is uncertain. In 1981, the conflicting forces served to maintain growth that was well above the rates recorded in earlier periods of high interest rates but well below the peak growth rates associated with reintermediation in times of declining rates.

Implementation

During 1981 the FOMC continued to follow the supply-oriented procedures adopted in October 1979. As before, the Committee provided, on occasion, for speeding up the adjustment process through path or discount rate changes when the demand for total reserves departed significantly from path. Given the frequent divergence between M-1B and M-2, the Committee gave somewhat greater explicit attention to M-2 than in the previous year. (In the remaining sections, all reference will be to the shift-adjusted version of M-1B which formed the basis of policy during 1981.)

⁴ "Market-related rates" means either completely unrestricted rates, such as on overnight RPs and Eurodollars and on MMMF shares, or rates that are tied to a market rate such as six-month MMCs.

MMCs were first permitted in June 1978. The 2½-year small savers certificates were introduced at the start of 1980. From March 1980 until August 1981, however, they were subject to a rate cap which often was below market rates. All savers certificates paying a market-related tax-exempt rate were introduced in October 1981.

The Committee reaffirmed its support for making adjustments to the nonborrowed reserve path on occasions when total reserves and money were far above or below their objectives. Targeting nonborrowed reserves means that intended discount window borrowing will adjust automatically to satisfy the difference between total reserve demand and nonborrowed reserve supply. Studies of the first year's experience with the new procedures suggested that, to speed the response when a large discrepancy developed, adjustments should probably be made to the nonborrowed reserve path. This in fact had been done on six occasions during 1980.

In practice, however, supplemental adjustments were made only during two reserve periods in 1981, as most episodes of reserve divergence from path involved shortfalls of M-1B that coincided with overshoots of M-2. In a mechanical sense, the reserve paths by themselves give much more weight to M-1B than to M-2. This arises because most of the deposits in M-1B are subject to relatively high reserve requirement ratios, while those in M-2 are subject either to low reserve requirements or to none at all. When total reserves and M-1B were well below path but M-2 was strong, the path was not lowered. This had the effect of giving more weight to M-2 than would have occurred automatically. Downward path adjustments were made in April when both measures were above path, and an upward adjustment was made in early November when M-1B was far below path and M-2 had slowed.

Although explicit changes in the nonborrowed reserve path aimed at speeding the return of total reserves to their track were limited in number, there were frequent path adjustments of a more technical nature. For the most part, they were made to both the total and nonborrowed reserve paths to incorporate new information about reserve multipliers. In addition, there were instances where borrowing had been quite different from anticipated levels early in the intermeeting period, and path adjustments were made to avert abrupt changes in conditions of reserve availability deemed inconsistent with the thrust of policy.

The FOMC continued to set broad bands around the Federal funds trading range. These bands served to trigger consultation when funds traded persistently outside these ranges. This occurred during the early part of the year and led to Committee discussions. In the latter part of February, M-1B had weakened sufficiently so that total reserves were well below path and the funds rate was pushing below the 15 percent lower bound. In a telephone consultation, the Committee indicated willingness to see funds trade below the range (although it was also inclined to tolerate some shortfall in reserves, given the strength in the broader

aggregates). No formal change was made in the funds rate range. During April, money growth was exceptionally strong, and the Federal funds rate was allowed to trade above the range during the latter part of the April-May intermeeting period. A Committee telephone consultation confirmed that and other responses to the bulge in money. No further conflicts arose between the reserve objectives and the Federal funds rate bands over the balance of the year.

Estimating the impact on reserves of so-called operating factors continued to be a challenge. In 1981, the average absolute projection miss was about \$600 million from the first day of the statement week. (The standard deviation was \$735 million.) Even by the final day of the week the average absolute error was \$120 million (and the standard deviation was \$165 million). Large errors are most likely to occur in winter, when weather has a greater impact on check clearing. Weeks containing partial holidays are often troublesome as adjustments between open and closed banks need to be worked out.

Revisions to reserve estimates from the start of the week were smaller on average in 1981 than in the previous year when the absolute average had been around \$750 million. The gain came primarily as a result of the reduction of both the mean and variance of float. The reorganization of the interdistrict check transportation system in September 1980 played a key role in these changes.

With considerable uncertainty and variability remaining in the behavior of the operating factors, the Trading Desk continued to employ RPs and matched sale-purchase agreements to affect reserves on a temporary basis. Helped by the lower variance in float, the volume of temporary transactions arranged in the market did decrease to \$269 billion in 1981, compared with \$370 billion the year before.⁵ The decline might have been greater had it not been for the need to offset the reserve absorption from the transfer of funds to the Federal Reserve in early July associated with the special Iranian accounts. Since it was not known when the funds would be paid out, it was not practical to use outright securities purchases as an offset. The funds finally were transferred in mid-August, returning the reserves to the banking system.

Outright transactions during the year amounted to \$25.9 billion. Of these, \$11.4 billion was arranged in the market, \$12.6 billion with foreign accounts, and the remainder consisted of redemptions of maturing issues. The net increase in the portfolio was \$8.5 billion to a

⁵ These figures include customer-related RPs as well as RPs and matched sale-purchase agreements on behalf of the Reserve System.

level of \$139.8 billion at the year-end. As usual, most of the increase supported the rise in currency outstanding. Nonborrowed reserves increased modestly, while foreign currency holdings declined somewhat.

Conducting Open Market Operations

January through March

A pattern that was to characterize much of the year emerged near its start, as the narrow aggregates fell below the Committee's path while M-2 was in line with its path or somewhat above. As the demand for reserves weakened along with the narrow money measures, the nonborrowed reserve-targeting procedure led to declines in borrowing and a fairly steep drop in short-term interest rates. The strength in M-2 had little offsetting impact on reserve demands, since much of it was concentrated in MMMF shares with zero reserve requirements.

About midway through the quarter, after the Federal funds rates had declined to about 15 percent from the 19 to 20 percent range prevailing in December, the Committee decided to accept some shortfall in the growth of the narrow aggregates in view of the strength in the broad aggregates. The nonborrowed reserve path was lowered temporarily relative to the total reserve path to maintain borrowing pressure on banks and thus reduce the likelihood that short-term rates would drop precipitously. Subsequently, the narrow aggregates showed additional weakness for a time, and the funds rate eased a bit further before firming at the period's close.

At the December 1980 meeting, the Committee had specified growth objectives for the December-March period at annual rates consistent with the midpoints of the tentative annual ranges for growth for all of 1981 adopted the previous July. These ranges centered on 4¼ percent for M-1A, 4¾ percent for M-1B, and 7 percent for M-2, after allowing for the impact of the introduction of nationwide NOW accounts on December 31 (Table 2). In light of the rapid advance in the aggregates since the summer of 1980, the Committee was willing to accept some shortfall from these rates if that developed in the context of reduced pressures in the money market. The Committee had agreed upon an initial level for adjustment and seasonal borrowing of \$1.5 billion to be used to construct the nonborrowed reserve path. The Federal funds rate range had been placed at 15 to 20 percent, with the end points serving as potential triggers for a Committee consultation if funds were to trade persistently outside the range.

Operations early in the year were complicated by the difficulties in measuring the impact of NOW ac-

counts on money growth, the effects of seasonal pressures in the money market, and the transfer of funds related to the settlement of the hostage crisis with Iran. Following the December FOMC meeting, the staff had built reserve paths for the intermeeting period, using its December projections for the monetary aggregates at the time and the growth rates for January consistent with the Committee's three-month objectives. The aggregates in December turned out well below path, with the narrow aggregates actually declining sharply and M-2 showing only modest growth. January estimates were erratic from week to week and thus highly uncertain. The staff had to gauge the proportion of funds that were flowing into the newly authorized NOW accounts from demand deposits versus other interest-bearing assets in order to compute the adjusted measures for M-1A and M-1B. These flows proved much stronger than had been envisioned, so that even slight revisions to the estimated proportions from one week to the next had large impacts on their estimated growth. Overall, incoming data suggested some pickup in money growth in January, but the levels remained below those built into the path.

With the narrow aggregates weak and the Desk supplying nonborrowed reserves in line with the path, the implied weekly borrowing levels consistent with the path gradually moved downward in December and averaged about \$1.1 billion in January. Actual discount window borrowing, however, did not begin to recede until after the turn of the year. Even then, it fluctuated widely from week to week and remained generally above expectations (Chart 8). The average weekly effective rate on Federal funds reached a record of 20.06 percent in the week of January 7, and trading remained in the 19 to 20 percent area over the next two weeks. Late in December and early in January, banks' demands for excess reserves were persistently higher than allowed for in the path so that nonborrowed reserves tended to be scarce. Heavy dealer financing demands and the lingering effects of corporate and bank year-end positioning activity tended to keep the funds rate from declining appreciably until late in the month.

Meanwhile, in the week of January 21, the Desk faced special problems relating to the transfers of Iranian funds. As the week began, negotiations between the United States and Iran to resolve the hostage situation were proceeding actively. It was clear that resolution would entail the unfreezing of Iranian assets held at commercial banks and the New York Reserve Bank, but the timing of the transfer and its effect on bank reserve availability were in question. On Friday of that week (and again on Monday), the Desk provided reserves by arranging customer RPs in

Table 2

Specifications from Directives of the Federal Open Market Committee and Related Information

Date of meeting	Specified short-term annualized rates of growth for period mentioned (percent)		Range for Federal funds rate (percent)	Associated initial assumption for borrowed reserves (millions of dollars)	Basic discount rate and surcharge on day of meeting and subsequent changes (percent)	Notes
	M-1B*	M-2				
12/19/80.....	December to March 4¾	7	15-20	1,500	13 + 3 surcharge	The short-run specifications also included an objective of 4¾ percent growth for M-1A (adjusted for NOW account shifts). The Committee indicated some shortfall in growth would be acceptable if that developed in the context of reduced pressures in the money market.
2/3/81.....	December to March 5-6	8	15-20	1,300	13 + 3 surcharge	The short-run specifications also included an objective of 5 to 6 percent for growth of M-1A (adjusted for NOW account shifts). In a telephone conference on February 24, the FOMC modified the directive to accept some shortfall in growth of M-1A and M-1B from the rates specified at the February meeting.
3/31/81.....	5½ (or somewhat less)	March to June 10½	13-18	1,150	13 + 3 surcharge 14 + 4 surcharge on 5/5	For simplification, the Committee decided to focus on M-1B as the measure of transactions balances and to omit any reference to M-1A in its statement of monetary objectives for the short run. In a telephone conference on May 6, the FOMC agreed that the reserve paths should continue to be set on the basis of the short-run money growth objectives set at the March meeting, recognizing that the Federal funds rate might continue to exceed the upper end of the range indicated for consultation at that meeting.
5/18/81.....	3 (or lower)	April to June 6	16-22	2,100	14 + 4 surcharge	

Table 2 (continued)

Specifications from Directives of the Federal Open Market Committee and Related Information

Date of meeting	Specified short-term annualized rates of growth for period mentioned (percent)		Range for Federal funds rate (percent)	Associated initial assumption for borrowed reserves (millions of dollars)	Basic discount rate and surcharge on day of meeting and subsequent changes (percent)	Notes
	M-1B*	M-2				
7/7/81.....	June to September 7	see notes	15-21	1,500	14 + 4 surcharge	The 7 percent objective for M-1B growth was set provided that growth of M-2 remained around the upper limit of, or moved within, its range for the year.
8/18/81.....	June to September 7	see notes	15-21	1,400	14 + 4 surcharge 14 + 3 surcharge on 9/22	The short-run specifications for M-1B was again made provisional on M-2 growth remaining around the upper limit of, or moving within, its range for the year.
10/6/81.....	September to December 7	10 (or slightly higher)	12-17	850	14 + 3 surcharge 14 + 2 surcharge on 10/13 13 + 2 surcharge on 11/2 13 on 11/17	In setting the objective for growth of M-2, the Committee recognized that its behavior would be affected by recent regulatory and legislative changes, particularly the public's response to the availability of the all savers certificate.
11/18/81.....	October to December 7	11	11-15	400	13 12 on 12/4	
12/22/81.....	November to March 4-5 (M-1)	9-10	10-14	300	12	The transactions measure of money was redesignated as M-1 with the same coverage as M-1B. The target no longer reflected the shift adjustment for conversion of outstanding interest-bearing assets into NOW accounts.

* Abstracting from the effects of deposit shifts connected with the introduction of NOW accounts on a nationwide basis on December 31, 1980.

the market when the funds rate was firm, even though estimates suggested a surplus of nonborrowed reserve supplies relative to the objective for the week. (These estimates assumed that all funds transferred from banks to Iran would flow back to the banking system the same day, which was not certain.) Later on Friday, after receiving instructions to sell Iran's \$1.1 billion of Treasury bill holdings, the Desk purchased these for the System Account. The proceeds, along with the \$1.4 billion of Iran's balances held at the New York Reserve Bank, were invested by arranging matched sale-purchase transactions with the System Account. The reserve effects of these two operations were offsetting.

The funds transfers were supposed to take place over the weekend, but it was not until the wee hours of Tuesday that commercial banks were instructed to transfer \$5.5 billion to the New York Reserve Bank for payment to Iran. The funds were placed at the Bank of England and returned to the banking system late that day. The result left a large surplus of reserves, augmented by the discount window borrowing of one bank involved in the transfer (which the Desk treated as nonborrowed reserves for path-setting purposes). After the transfer on Tuesday, the funds rate

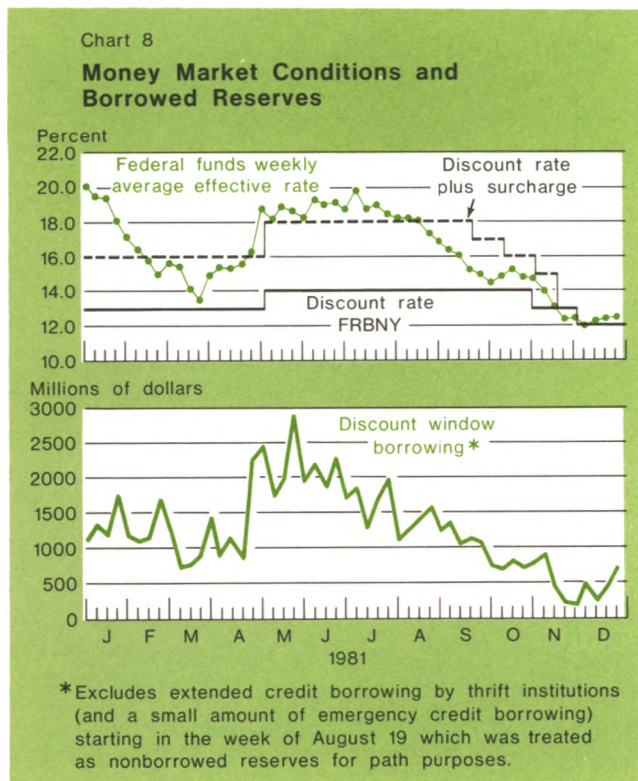
plummeted, dropping to 10 percent. The Desk absorbed the glut of reserves on Wednesday by arranging nearly \$7 billion of matched sale-purchase transactions in the market.

The week encompassing the Iranian funds transfers was the start of the second reserve subperiod (three weeks ended February 4) following the December meeting. In the last two weeks of that subperiod, the Desk encountered a problem involving discount window borrowing that has occurred from time to time since the beginning of the reserve-targeting approach in October 1979. Borrowing through Tuesday of the January 28 statement week was averaging about \$1.8 billion, well above the \$1.2 billion level expected to be associated with the nonborrowed reserve objective for that week. If the Desk acted to achieve the objective, banks were likely to end up holding about \$600 million more excess reserves than their estimated demand. The glut of reserves would then result in a sharp easing in money market conditions on the settlement day, perhaps disrupting the markets and giving a misleading impression about System policy intentions. Faced with this situation, the Desk deliberately sought to undershoot the nonborrowed reserve objective that week by about \$500 million, somewhat less than the overshoot in borrowing.

Given the shortfall in nonborrowed reserves in the January 28 week, a relatively large increase would have been needed in the February 4 statement week to achieve the average path level for the three-week period as a whole. In turn, this would have implied a sharp drop in expected borrowing for that week, down to about \$250 million. To avoid an abrupt easing in financial market pressures likely to be generated by such a reduced borrowing level, and given the proximity of a major Treasury financing, it was decided to lower the nonborrowed reserve path by \$280 million relative to the total reserve path. This left projected borrowing for the week at \$1.1 billion, about the same as in the previous week. Nonborrowed reserves for the three-week subperiod ended February 4 were virtually equal to the revised path, according to final figures. Reflecting the weakness in the narrow aggregates, total reserves averaged \$390 million below path, with most of the shortfall in required reserves.

At the February 3 meeting, the Committee sought a near-term pickup in money growth to make up for the shortfalls in the narrow aggregates that had occurred in December and January. Accordingly, it adjusted upward the December-to-March growth objectives for both M-1A and M-1B to 5 to 6 percent and raised the M-2 objective to 8 percent. The Federal funds rate range continued at 15 to 20 percent.

During the first subperiod that followed the Febru-



ary meeting (four weeks ended March 4), incoming data for February suggested that the narrow aggregates were growing well below path. M-2 growth, on the other hand, appeared to be picking up strongly that month and was projected to be on or above path. Reflecting the weakness in the narrow aggregates, implied discount window borrowing associated with achieving the nonborrowed reserve path gradually moved lower. Actual borrowing also trended down, though it fluctuated widely from week to week, and the Federal funds rate eased substantially. By the February 25 statement week, estimates before the weekend suggested that achievement of the average nonborrowed reserve path for the subperiod implied borrowing of \$770 million over the remaining two weeks. Meanwhile, the funds rate dipped below 15 percent on Friday and continued to edge lower after the weekend. It became evident that pursuit of the nonborrowed reserve path was inconsistent with funds trading remaining within the Committee's specified range.

At a special telephone conference on Tuesday, February 24, the Committee discussed the strength of M-2 and M-3 and the easing in money market conditions, as well as the uncertainties over the behavior of the narrow aggregates. It decided to accept some shortfall in growth of the narrow aggregates, implying a reduction of the nonborrowed reserve path. While the funds rate range was not formally changed, it was recognized that pursuit of the nonborrowed reserve path might lead to further declines in the funds rate, depending on subsequent growth of the aggregates. In the final week of the first subperiod, the Desk chose not to offset an undershoot in nonborrowed reserves and an overshoot in borrowing in the previous week. Nonborrowed reserves for the subperiod thus came out \$70 million below the downward revised path. Total reserves were \$220 million below path.

At the start of the second reserve subperiod, growth of the monetary aggregates did indeed appear to be weaker. Accordingly, it was decided not to continue with the downward adjustment of the nonborrowed reserve path in the second subperiod that had been applied in the first subperiod. Estimated borrowing consistent with achieving the nonborrowed reserve path in the second subperiod (four weeks ended April 1) dropped to \$800 million. Subsequently, the narrow aggregates began to show renewed strength. As the second subperiod progressed, weekly borrowing levels consistent with the path gradually moved upward, climbing back to around \$1.1 billion by the final week. The funds rate continued to edge lower for a while, briefly touching as low as 13 percent in mid-March, but returned to the 15 percent area by the end of the month.

Nonborrowed reserves for the second subperiod were very close to path, while total reserves averaged \$320 million below path.

April through June

The Federal Reserve responded quickly and forcefully to a surge in money growth in April. The Desk's pursuit of the nonborrowed reserve path in line with the Committee's aggregates objectives automatically forced banks to step up their discount window borrowing, putting upward pressure on short-term rates. To apply further restraint, the nonborrowed reserve path was lowered substantially in early May, forcing even higher borrowing, and the Board of Governors approved increases in both the basic discount rate and the surcharge on frequent borrowing by large banks. Following these actions, growth of the monetary aggregates began to slow. At first, the Committee was willing to tolerate the slowdown to make up for the overrun in April. Later, as the money stock weakness continued through June, reserve pressures on banks were gradually relaxed.

The Committee's targets for second-quarter growth of the monetary aggregates, set at the March 31 meeting, were formulated to take into account the disparate trends in the money stock measures and their relationship to the Committee's annual ranges. The objective for growth of M-1B of 5½ percent or somewhat less was set with recognition that a portion of the first-quarter shortfall apparently reflected the rapid expansion of MMMF shares which were being used, to some extent, as transactions balances. The objective for M-2 growth of about 10½ percent gave weight to the staff's projection that the expansion of MMMF shares would remain strong in the second quarter. At this meeting, the Committee stopped specifying short-run objectives for M-1A; after adjustment for the effects of flows into NOW accounts, growth of the two narrow measures would be similar.

Initial estimates of monetary aggregates growth following the March meeting were in line with path rates for April, set equal to the Committee's objectives. As the intermeeting period progressed, however, estimates for April M-1B growth were repeatedly revised upward to rates well above path. In turn, estimated discount window borrowing consistent with achieving the nonborrowed reserve path rose sharply from the initial \$1,150 million level. By the final week of the first reserve subperiod (four weeks ended April 29), implied weekly borrowing needed to achieve the nonborrowed reserve path had climbed to \$1.7 billion. Nonborrowed reserves for the first subperiod were close to path. Reflecting the strength in the aggregates, total reserves averaged \$160 million above

path, with required reserves \$310 million above path.

At the start of the second reserve subperiod (three weeks ended May 20) the demand for total reserves was projected to be about \$550 million above path. Given this large gap, it was decided, in consultation with the Chairman, to reduce the nonborrowed reserve path relative to the total reserve path by \$250 million. Average borrowing associated with the nonborrowed reserve path over the second subperiod rose to nearly \$2 billion. The following Monday, on May 4, the Board approved Reserve Bank requests to raise the basic discount rate from 13 to 14 percent and to lift the surcharge on frequent borrowing by large banks from 3 to 4 percentage points.

Although the gap between projected reserve demands and the total reserve path narrowed a bit in the following week, it was still quite wide. Consequently, the nonborrowed reserve path was reduced by an additional \$120 million and by a further \$114 million to offset an overshoot in borrowing in the April 29 week. (Discount window borrowing on the settlement day of that week was a record \$8.6 billion, as the Desk had difficulty in hitting the weekly nonborrowed reserve objective because of sizable revisions to reserve projections and a shortage of collateral in the market.) These adjustments followed a Committee telephone consultation on May 6, at which it instructed the Desk to continue aiming for reserve paths consistent with the money stock objective set at the March meeting, recognizing that Federal funds in the days remaining before the May meeting were likely to trade in ranges that exceeded somewhat the 13 to 18 percent consultation band. Nonborrowed reserves for the second subperiod averaged close to the downward revised path, while total reserves came out \$450 million above path.

As banks were forced to borrow increasing amounts at the discount window beginning in early April, the Federal funds rate began to climb. At first, the rise was delayed a bit as banks seemed content to hold unusually low excess reserves or to run deficiencies. Funds traded in the 15 to 15½ percent range over the first three weeks of April and then shot up to 20 percent in the wake of the extreme reserve stringency in the April 29 week. Thereafter, the funds rate seemed to be settling down in the 17 to 18 percent area, but the announcement of the discount rate actions on May 4 pushed the rate up almost immediately to around 19 percent where it remained in the days preceding the May Committee meeting.

When the Committee met on May 18, the members agreed about the importance of maintaining a posture of restraint to reduce growth of the monetary aggregates rather quickly. The economy had expanded well

above expectations in the first quarter, and the velocity of the narrow money stock had grown at an unusually rapid rate. Indications of continuing strength in the economy, coupled with a possible turnaround in the velocity of money, posed the risk of excessive growth of the aggregates as the year unfolded. Although the major price indexes were rising at somewhat reduced rates, there was little indication of a reduction of the underlying inflation rate or an abatement in inflationary expectations. Accordingly, and also in light of the rapid money growth in April, the Committee sought a substantial deceleration in growth for the April-June period to rates of 3 and 6 percent for M-1B and M-2, respectively. Moreover, given the overshoot in April, the Committee indicated that it was willing to accept some shortfall of M-1B growth from the two-month rate specified. An initial borrowing assumption of \$2.1 billion was established, and the funds rate range was lifted to 16 to 22 percent.

A few days after the May meeting, staff projections of the aggregates for May were considerably weaker than those available at the time of the meeting. Projections suggested essentially no growth for M-1B for the month and only modest growth of M-2. Given the Committee's preference for such a slowdown, following the April bulge, the reserve paths were constructed using the staff's revised forecasts for May and the implied growth rates for June consistent with the Committee's two-month objectives. Hence, at the start of the first reserve subperiod (four weeks ended June 17), achievement of the nonborrowed reserve path was expected to imply the same \$2.1 billion of discount window borrowing that the Committee had accepted as the initial assumption.

During the first week of the subperiod, borrowing bulged to \$2.9 billion, as banks borrowed heavily over the three-day Memorial Day weekend—perhaps because many thought that another increase in the discount rate might be imminent. Under these circumstances, the Desk deliberately sought a level of nonborrowed reserves for the week that was well below the objective. To have achieved the weekly objective, given the high borrowing, would have meant an overabundance of total and excess reserves and a sharp easing in money market conditions at the end of the week—a result that seemed inconsistent with the thrust of policy.

In the weeks that followed, estimates of M-1B for May were repeatedly revised downward, although projected M-2 growth remained close to, or only somewhat below, path. As M-1B weakened, both the total and nonborrowed reserve paths were adjusted lower each week, for a total downward adjustment of \$180 million, in keeping with the Committee's willing-

ness to accept some shortfall from the aggregates growth targets specified at the May meeting. (The nonborrowed reserve path was lowered an additional \$206 million in the second week to offset the impact of the unusually high borrowing over the Memorial Day weekend.) The effect of these adjustments was to keep implied weekly borrowing levels consistent with hitting the nonborrowed reserve paths from falling sharply below the \$2.1 billion level. Reflecting these adjustments, both nonborrowed and total reserves averaged close to path.

By mid-June, estimates showed that M-1B had declined in May at a 5 percent annual rate, and little or no growth was projected for June. (Projected M-2 growth for the two-month interval, on the other hand, was only a touch below path.) Given the extent of the M-1B growth shortfall from the Committee's two-month objective, it was decided that no further downward adjustments to the reserve paths were warranted. The paths for the second subperiod (three weeks ended July 8) were redrawn on the basis of 3½ percent growth of M-1B from March to June, the staff's projection of growth at the time.

During the second subperiod, incoming data for M-1B in June indicated even further weakness than earlier. This time, however, the reserve paths were not reduced to accommodate the shortfall. As a result, the demand for total reserves fell increasingly below path. In turn, achievement of the nonborrowed reserve path implied lower and lower borrowing levels. By the final week of the subperiod, the weekly borrowing level consistent with hitting the nonborrowed reserve path had dropped to \$1.4 billion. Total reserves for the subperiod averaged \$100 million below path. Nonborrowed reserves were also about \$100 million below path according to final figures, although preliminary numbers indicated that they were fairly close to path.

With the Desk supplying nonborrowed reserves more generously over the second subperiod, this should have led to some easing in the Federal funds rate over late June and early July. Instead, funds continued to trade around 19 percent, the same level that had prevailed since the beginning of May. One factor that apparently accounted for the firm money market over the period was that banks had been forced to borrow heavily over an extended time. Hence, even though borrowing pressures eased starting in late June, there was greater reluctance to resort to the window. Still another factor was that banks became increasingly disappointed when the funds rate failed to ease beginning in early June as many had expected, given the weakness in M-1B. In the week of June 17, in particular, banks made only light use of the dis-

count window through Tuesday and thus accumulated large reserve deficiencies, expecting funds to break on the settlement day. Instead, funds shot up to as high as 30 percent at the close on Wednesday as banks were forced to borrow \$6.4 billion to meet reserve requirements. The caution engendered by this experience tended to keep the funds rate firm well into July.

Interest rates varied over a wide range in the second quarter, as the markets were buffeted by the rapid changes in the money stock, shifting views on the economic and Federal budget outlook, and uncertainty over System policy intentions. Yields rose sharply through early May, reaching near-peak levels in the short-term markets and setting new records in many longer term sectors. (The records were eclipsed in the third quarter.) The markets were disturbed at the outset when the February FOMC policy record, released on April 4, was interpreted to mean that the System had not deliberately sought the trading in Federal funds below the 15 percent that had emerged in mid-March. Rapid money stock growth in April and the firming trend in the funds market put strong upward pressure on rates, as did the discount rate actions taken on May 4. While some participants were encouraged by Congressional actions to restrain Federal spending, many worried about the interest rate implications of a large tax cut and resulting high Federal budget deficits.

Around mid-May sentiment began to change. The markets rallied strongly over the next month, and yields retraced a large portion of their earlier increases. A series of statistics suggested that the economy was not so robust as previously thought and that inflationary pressures were waning. Reports indicated that the Administration might be willing to compromise on its tax-cut proposals. At the same time, the weakness in M-1B in May and early June convinced many participants that the money market would soon begin to ease. By mid-June, however, participants had grown impatient with the continued firmness in the funds market. Many began to appreciate that policy was also being significantly affected by the strength in M-2. As the quarter ended, yields were on the rise again.

July through September

The third quarter was marked by continued divergent trends in the narrow and broad monetary aggregates. Except for a brief time early in the quarter, growth of M-1B fell increasingly below the Committee's objectives; M-2 growth, on the other hand, was roughly in line with its corresponding objectives. As the Desk pursued the nonborrowed reserve path, the reserve

approach automatically generated less borrowing pressures on banks, and the Federal funds market eased substantially by the quarter's end. Given the sustained strength in M-2, however, no steps were taken to reinforce this process either by raising the nonborrowed reserve path or by cutting the basic discount rate.

At the July meeting, the Committee affirmed its intention to seek growth of M-1B for the year near the lower bound of its specified range, recognizing that growth of the broader aggregates might be high in their annual ranges. M-1B had so far been growing well short of this pace, advancing at an annual rate of 2¼ percent through the second quarter. The 7 percent objective chosen at this meeting for expansion of M-1B from June to September, if continued in the fourth quarter, would bring growth up to the lower bound of the annual range by the year-end. At the same time, though, it was made conditional on M-2 remaining around the upper end of, or moving within, its growth range for the year.

The initial borrowing level for the intermeeting period was established at \$1.5 billion. Early in the first reserve subperiod (three weeks ended July 29), incoming data suggested that growth of both aggregates in July was exceeding path rates—set a bit higher for M-1B than the Committee's three-month objective because of the expected impact of an early mailing of social security checks that month. Later in the first subperiod, and continuing through the second reserve subperiod (three weeks ended August 19), estimated M-1B growth for July was repeatedly revised downward to rates well below path. Consequently, after edging higher at first, implied weekly discount window borrowing consistent with the nonborrowed reserve path gradually moved downward in the second subperiod to the \$1.4 billion level or below. Actual borrowing also fell, although it varied sharply from week to week. The Federal funds rate declined gradually from the 19 percent level at the time of the July meeting to around 18 percent by mid-August. Nonborrowed reserves were \$90 million and \$40 million below path in the first and second subperiods, respectively. Total reserves were \$80 million above path in the first subperiod, reflecting an overshoot in excess reserves, but \$200 million below path in the second subperiod.

Starting in the August 19 statement week, the Desk began to include thrift institution borrowing at the discount window under the extended credit program as nonborrowed reserves for path purposes, since such borrowing does not imply the same reserve pressures in the money market as adjustment borrowing. The amount of extended credit borrowing each week was treated as a market factor that supplied nonborrowed

reserves. (The same procedure was followed with respect to special borrowing by one particularly large regional bank in 1980.) In this way, as the Desk aimed to achieve the nonborrowed reserve path, the reserves supplied through the extended credit program did not lead to an overabundance of total reserves.⁶

System open market operations between the July and August meetings were substantial. The Desk purchased for the System Account over \$3 billion of Treasury bills (\$1.4 billion in the market and the rest from foreign accounts) and nearly \$1 billion of Treasury coupon securities in the market. These outright transactions were needed to counter the effect of seasonal factors that were draining reserves. In addition, the Desk arranged an unusual volume of temporary transactions stemming from the second phase of the settlement with Iran. As part of that settlement, \$2 billion of funds was transferred from commercial banks to the New York Reserve Bank on July 10. Because of the uncertainty over when the funds would flow back to the banking system—as it turned out, not until August 17—they were placed in the foreign temporary investment pool. To offset the effects on reserve availability, the Desk engaged in repeated rounds of System RPs in the market or passed through to the market portions of the enlarged foreign investment orders.

When the Committee met in August, it retained the 7 percent target for M-1B growth over the June-to-September interval, subject to the same provision that M-2 remain around the upper bound of, or move within, its range for the year. Since the expansion of M-1B had fallen well short of path in July, achievement of the three-month objective meant that a substantial pickup in growth was needed for the August-September period. Data available at the time of the meeting showed rapid increases in the first couple of weeks of August, and the paths were constructed to reflect the strength that was projected and also desired for the month in view of the earlier shortfall.

A few days after the meeting, however, estimates of M-1B growth for August were revised downward sharply. Although estimates were subsequently boosted as the period progressed, growth remained well below path. Incoming data for September suggested that M-1B was remaining weak in that month as well. In contrast, M-2 growth for the two months was generally estimated to be close to, or only slightly below, path. Moreover, flows of funds into retail RPs

⁶ The volume of extended credit borrowing was fairly modest over the year. In late October, it reached a weekly average peak of \$464 million (largely accounted for by the borrowing of one institution) and thereafter dropped back to the \$125 million area.

at thrift institutions (not captured in the M-2 series) were artificially depressing its growth. After making allowance for this distortion, M-2 appeared to be expanding at rates somewhat above path.

Reflecting the shortfall in M-1B growth from the Committee's objectives, total reserves in the first reserve subperiod (four weeks ended September 16) averaged \$160 million below path. (Nonborrowed reserves were \$70 million below path.) At the start of the second subperiod (three weeks ended October 7), the gap between the total reserve path and the projected demand for total reserves swelled to around \$370 million. Ordinarily, such a large gap would call for an upward adjustment of the nonborrowed reserve path relative to the total reserve path to speed money growth back to path. However, given the behavior of M-2, no adjustment seemed warranted. Even so, implied weekly borrowing consistent with the nonborrowed reserve path dropped from the initial level of \$1.4 billion specified by the Committee to below \$900 million by the end of the second reserve period. Total reserves for the second subperiod averaged \$370 million below path, while nonborrowed reserves were \$60 million above path. With borrowing pressures on banks easing, the Federal funds rate fell sharply, down from about 18 percent in mid-August to around 15 percent in mid-September. On September 21, the Board approved Reserve Bank recommendations for a reduction of the discount rate surcharge on frequent borrowing by large banks from 4 to 3 percentage points. By this time, though, very little borrowing was actually subject to the surcharge, and thus the action had no observable effect on the funds rate. Indeed, if anything, market participants seemed disappointed that no cut was made in the basic discount rate.

Despite the sharp drop in the Federal funds rate over the third quarter, other short-term rates edged higher in July and August before turning down in September. Although most rates finished the quarter lower on balance, the declines were much less than registered in the funds market. Indeed, rates on Treasury bills beyond the shortest maturities ended the period somewhat higher, reflecting continued heavy Treasury issuance.

Meanwhile, yields on intermediate- and long-term securities were on a generally upward trend over the quarter in extremely volatile markets. New record-high yield levels were established in all the key sectors. The mood was one of deep pessimism, dominated by concern over the prospect of continued large Treasury deficits in the wake of the Federal tax cuts. Although participants responded favorably to the economic statistics showing a weakening economy and moderating

inflation, this nourished only sporadic rallies. Investors remained largely on the sidelines, preferring to channel their funds to short-term instruments. Corporate borrowers avoided the capital markets in favor of bank loans and commercial paper. Trading activity was largely confined to dealers and trading accounts, who were hesitant to take sizable positions, and the markets were thin. Daily price movements of 2 to 3 points (25 to 40 basis points in long-term yields) were not uncommon. In the Treasury's August refunding, all three issues set new record yields in their maturity categories, with the auction average on the reopened thirty-year bond at 14.06 percent. At its peak in late September, the yield on Treasury long-term bonds in the secondary market touched as high as 15.29 percent.

October to the year-end

Growth of the monetary aggregates picked up substantially in the fourth quarter, but the strength was not apparent until the final month. Earlier in the period, estimates suggested that the narrow money stock measure was continuing to come in below path. Consequently, borrowing pressures on banks eased and money market rates fell considerably, spurred on by cuts in the basic discount rate. The sharp rebound in money growth that followed, however, went well beyond the Committee's objectives. The strength in the aggregates was unusual, as interest rates were still historically high and the economy was in the midst of recession with no recovery in sight. Nevertheless, the reserve approach automatically began to apply increasing pressures in the money market—pressures that were intensified as money growth accelerated further early in the new year.

When the Committee met in October to consider its fourth-quarter objectives, it weighed the risks of inadequate versus excessive money growth against the background of continued divergent trends in the aggregates. M-1B had advanced little in the third quarter, and its expansion for the year thus far was well below the lower bound of the Committee's annual range. Growth of the broader aggregates, on the other hand, had remained close to, or somewhat above, the upper bounds of their respective ranges. The Committee agreed upon annual growth objectives for the September-to-December period of 7 percent for M-1B and 10 percent or slightly higher for M-2. It was noted that the behavior of M-2 would depend, in part, on the public's response to the availability of all savers certificates starting October 1.

The staff built the reserve paths for the intermeeting period on the basis of essentially straight-line money growth for the individual months of the quarter, but with some allowance for a one-time jump in M-2 in

October to reflect anticipated shifts of funds from retail RPs into the new all savers certificates. Over the first reserve subperiod (three weeks ended October 28), the monetary aggregates projections for October were fairly close to path. (Total reserves for the first subperiod ended up \$60 million below path, while nonborrowed reserves were \$50 million above path.) Hence, expected discount window borrowing implied by the nonborrowed reserve path remained around the \$850 million initial level agreed to by the Committee.

Starting in the second subperiod (three weeks ended November 18), however, estimates of the aggregates began to fall below path. M-1B was especially weak, but M-2 growth was also somewhat below path for October, as there was less switching of funds into the all savers certificates than had been anticipated. As money growth weakened, borrowing consistent with achieving the nonborrowed reserve path moved lower. To encourage a bit quicker response in money growth back to path, while also avoiding a precipitous easing in money market conditions, the nonborrowed reserve path was raised modestly—by about \$50 million—in the November 11 statement week. Expected borrowing associated with the nonborrowed reserve objective that week was about \$500 million. However, actual borrowing was well above this level, which would have meant only modest borrowing in the final week of the subperiod if the nonborrowed reserve path were to be achieved. To avoid an abrupt reduction of reserve pressures only a few days in advance of the November FOMC meeting, it was decided to aim for reserve supplies a little below the nonborrowed reserve path, consistent with borrowing of \$400 million in the final week. Nonborrowed reserves in the second subperiod averaged slightly below path, according to preliminary data, but \$60 million above path after subsequent revision. Total reserves were \$30 million below path, with required reserves \$140 million below path.

Meanwhile, on October 30, the Board announced a reduction of the basic discount rate from 14 to 13 percent. Earlier, on October 9, the discount rate surcharge on frequent borrowing by large banks had been lowered from 3 to 2 percentage points; on November 16, it was removed altogether. The reduction of the basic discount rate and the lessening of borrowing pressures on banks was reflected in a considerable easing in the money market. The Federal funds rate dropped from about 15½ percent at the time of the October FOMC meeting to around 13 percent by the third week in November.

The securities markets rallied dramatically beginning in late October. Investors responded enthusiastically to mounting evidence of a slowdown in the

economy and further moderation in inflation. Reports of continued weakness in the narrow money stock measure also buoyed sentiment, as did the cut in the basic discount rate and the general easing of money market conditions. Over the course of a month, rates on three- and six-month Treasury bills dropped about 3 percentage points to their lowest levels in over a year. Strong investor demand was evident in the Treasury's November refunding, with the thirty-year bond auctioned at an average yield of 14.10 percent. In the latter part of November, the yield on Treasury long-term bonds in the secondary market got as low as 12¾ percent. In the improving climate, corporate borrowers rushed offerings to market that had been deferred earlier. The volume of gross corporate issues in November swelled to over \$7 billion, nearly twice the average monthly volume recorded over the first ten months of the year.

By the time the Committee met in November, it was clear that the downward drift in the economy observed earlier had developed into a recession. The Committee continued to agree on the desirability of seeing more rapid growth of M-1B over the remaining months of the year, taking account of the strength in the broader aggregates. In this light, they chose growth objectives for the October-to-December period of 7 percent for M-1B and 11 percent for M-2. Given the shortfall of M-1B in October, it was understood that more rapid growth, consistent with the fourth-quarter objectives set at the October meeting, would be acceptable if the demand for transactions balances proved to be strong. It was also understood that a modest shortfall of M-1B growth from path would not be unacceptable, particularly if the broader aggregates continued to expand rapidly.

On December 4, the Board announced a further 1 percentage point reduction of the basic discount rate to 12 percent. In the meantime, the monetary aggregates were showing mixed trends early in the intermeeting period, with estimated M-1B growth for November slightly below path and M-2 growth slightly above. As the period progressed, however, estimates for M-1B in November were revised sharply upward. (A further large upward revision to M-1B in November was made late in December, reflecting new deposit information from a sample of quarterly reporting banks.) Preliminary data for the first couple of weeks in December suggested that the strength was continuing that month. Projected total reserve demand for the reserve period (five weeks ended December 23) thus rose above the total reserve path and average borrowing consistent with achieving the nonborrowed reserve path moved up to about \$500 million from the \$400 million initial level chosen by the Committee.

At the same time, actual borrowing in the first two weeks of the reserve period fell well below expectations, which would have implied sharply higher borrowing in the remaining weeks if the original nonborrowed reserve path were to be achieved. It was decided, however, to accommodate the borrowing shortfalls in the first two weeks and to set the objectives for nonborrowed reserves for the remaining weeks in line with the estimated average borrowing for the period. This approach recognized the Committee's willingness to tolerate somewhat above-path growth of M-1B over the November-December interval to make up for the October shortfall. Nonborrowed reserves for the period averaged \$90 million above path, while total reserves were \$210 million above path.

Many banks apparently misjudged the Federal Reserve's policy stance in late November and early December, believing that the System's objectives for nonborrowed reserves implied only frictional levels of borrowing. Hence, they were reluctant to pay higher rates for Federal funds than the prevailing discount rate or to borrow from the discount window. Funds thus traded around 12½ percent in late November and very early December when the basic discount rate was 13 percent. After the announcement of a reduction of the discount rate to 12 percent on December 4, funds traded for a while around 11¾ percent. Discount window borrowing was extremely light early in the statement weeks of November 25 and December 2. While this should have resulted in sharply higher borrowing on the settlement day of those weeks, this did not happen, largely because of reserve projection errors. Even in the week of December 9, when borrowing did bulge on Wednesday after remaining low earlier in the week, participants tended to shrug this off as an aberration. By mid-December, however, the funds rate began to move higher as expectations changed, in

part owing to the reported strength in the monetary aggregates.

Over the remainder of the year and into early 1982, the monetary aggregates continued to grow very rapidly. M-1 bulged in the first week of January and, as the month unfolded, little of the strength washed out. Growth rates for the aggregates were thus well above the Committee's objectives for November to March set at the December meeting of 4 to 5 percent for M-1 and 9 to 10 percent for M-2. (M-1 has the same coverage as M-1B, but the target was set for the measure without adjustment for the impact of NOW account shifts.) As the aggregates strengthened, projections of the demand for reserves began to rise well above the total reserve path, forcing banks to borrow increasing amounts at the discount window and putting upward pressure on the funds rate.

The rally in the securities market faded soon after the November FOMC meeting. Interest rates across the maturity spectrum backed up sharply in December and continued to rise through January. While long-term yields in the Government and corporate sectors remained somewhat below their peak levels of late September, yields in the municipal sector set new record highs in early January before receding late in the month as the technical situation in that market improved. The rapid growth of the monetary aggregates and the firming trend in the money market in December and January were the principal factors responsible for the turnaround in yields, while the prospects for continuing large Federal deficits remained a major concern. At the same time, though, market participants took encouragement from statistics showing weakness in the economy and moderation in inflation. The rise in yields was thus tempered by the view that money growth would not remain strong with signs pointing to continuing recession.

Treasury and Federal Reserve Foreign Exchange Operations

There were two key turning points for the dollar in the exchange market during the August-through-January period under review. In early August, the year-long advance of the dollar against major foreign currencies came to an end. Then, after a four-month decline, dollar rates started to firm at the beginning of December, a trend which continued through the remainder of the period.

Several factors supported the long advance of the dollar through early August. U.S. inflation had begun to moderate even as the economy withstood recessionary tendencies longer than most forecasters had expected. The Reagan administration's leadership in translating its economic policy into action was greeted positively in the exchange markets, particularly as the program gained support in the Congress. At the same time, the U.S. current account continued to post a surplus. Meanwhile, the demand for credit in the United States remained strong and, with the Federal Reserve continuing to restrain monetary expansion, interest rates stayed high. Thus, although differentials favoring the dollar were well below their peaks of late 1980, they were widening again during the summer, attracting interest-sensitive funds into dollar-denominated assets once again.

Most other industrial countries, by contrast, continued to show disappointingly slow progress in pulling out of the difficulties associated with the prolonged ad-

justment to the 1979-80 oil price increases. In many countries there was public debate over the appropriate course of fiscal and monetary policy in the face of unacceptably high inflation and mounting unemployment. In this context, foreign governments expressed open concern over the high level of U.S. interest rates and the inflationary consequences of the depreciation of their currencies against the dollar. Furthermore, political developments in Eastern Europe and the Middle East clouded the outlook for many countries abroad, leaving traders and investors with the view that the United States was a relatively attractive outlet for investment.

As the dollar continued its advance in early August, however, sentiment became more cautious. Market participants were aware that major European central banks had stepped up their dollar sales and, in view of the rapid run-up of the dollar in late July-early August, began to expect a correction. Consequently, once the upward momentum broke, dollar rates fell back sharply in mid-August and then declined irregularly through late November.

The August turnaround in the exchange markets coincided with a shift in focus in the U.S. financial community from the immediate issues surrounding the passage of the Administration's program to its implications for the fiscal deficit and U.S. capital markets. As market attention turned to estimates of the fiscal gap, skepticism deepened that the Administration's program could proceed without having the government's burgeoning financing needs exert renewed strains on the credit markets. In this environment, there was growing

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concern over the potential for conflict between fiscal and monetary policy, leading market participants to question whether the Federal Reserve might back away from its anti-inflation stance.

At the same time, the economy began to show signs of weakening. U.S. short-term interest rates were therefore easing, even though the Federal Reserve continued its policy of restraining monetary expansion. Reflecting the slow growth of the narrowly defined money supply, the Federal funds rate dropped about 600 basis points over the four months to end-November. The Federal Reserve progressively eliminated its 4 percent surcharge on large banks that frequently borrowed at the discount window, and by early December it reduced its basic discount rate 2 percentage points to 12 percent. Already by November evidence was mounting that the U.S. economy was in a sharp recession, leading to expectations that private-sector credit demands would decline substantially. These expectations contributed to a rally in the bond market which brought long-term rates down more than 200 basis points by the end of the month.

The four-month decline of short-term interest rates in the United States was reflected in a narrowing of interest differentials favorable to the dollar *vis-à-vis* most other currencies. At least initially, monetary authorities

abroad felt they had little room to respond to the lower U.S. interest rates by easing their own money market rates. They were concerned about entrenched inflationary pressures at home, and in some countries, notably France, Switzerland, and the United Kingdom, the central banks acted to raise interest rates. In addition, some countries felt constrained by the pressures against their currencies within the European Monetary System (EMS).

Beginning in October, however, as U.S. interest rates continued to decline, monetary authorities in some countries began to allow an easing of their own short-term interest rates. Their economies were making little headway in recovering from recession, and unemployment was rising rapidly. Government deficits were already large relative to historical standards and in many cases were placing strains on the domestic financial markets. Consequently, the authorities in several countries felt there was only limited scope for further fiscal stimulus. The current account deficits of a number of countries were beginning to decline so that the authorities felt they no longer needed such high interest rates to attract capital from abroad. There were widespread forecasts of a U.S. move from current account surplus to deficit in 1982; Japan's current account had already swung from a deep deficit into surplus;

Table 1
Federal Reserve Reciprocal Currency Arrangements

In millions of dollars

Institution	Amount of facility January 1, 1981	Decrease effective May 23, 1981	Amount of facility January 31, 1982
Austrian National Bank	250		250
National Bank of Belgium	1,000		1,000
Bank of Canada	2,000		2,000
National Bank of Denmark	250		250
Bank of England	3,000		3,000
Bank of France	2,000		2,000
German Federal Bank	6,000		6,000
Bank of Italy	3,000		3,000
Bank of Japan	5,000		5,000
Bank of Mexico	700		700
Netherlands Bank	500		500
Bank of Norway	250		250
Bank of Sweden	500	200	300
Swiss National Bank	4,000		4,000
Bank for International Settlements:			
Swiss francs-dollars	600		600
Other authorized European currencies-dollars	1,250		1,250
Total	30,300	200	30,100

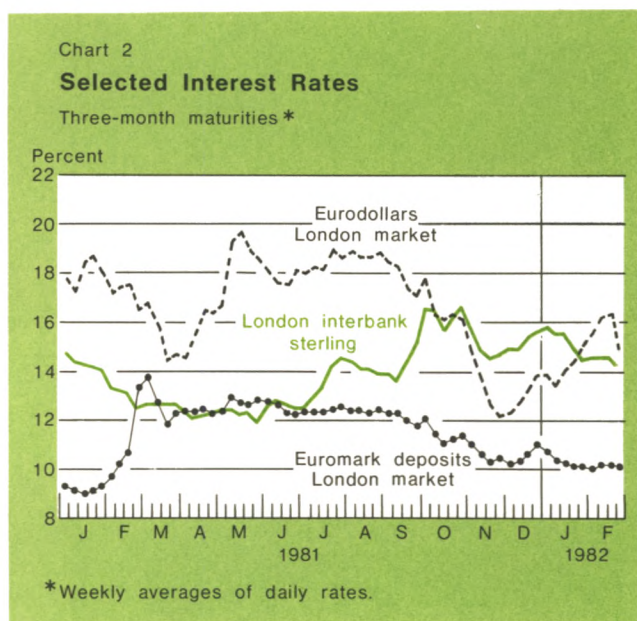
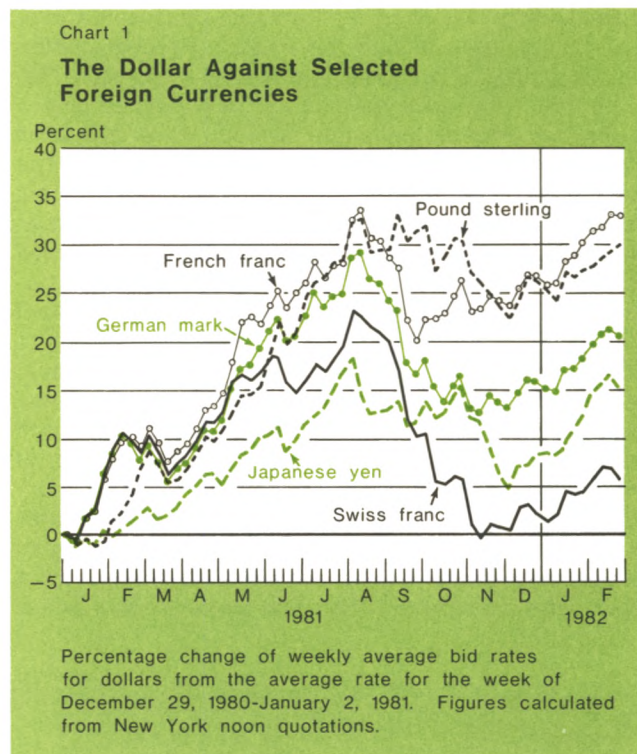
and a German export surge had led officials and private forecasters alike to predict an elimination of that country's current account deficit in 1982. Moreover, strains in the EMS were relieved by a multilateral realignment of parities on October 5. As a result, foreign monetary authorities felt they had greater scope for easing their domestic interest rates. Even so, with the drop in short-term U.S. rates accelerating, particularly in November, interest differentials favoring the dollar continued to narrow.

Meanwhile, other factors lent support to the dollar. Orders to buy dollars emerged repeatedly whenever the dollar moved substantially lower, as commercial interest in a number of centers sought to take advantage of what they considered favorable rates for current payments or investments. From time to time there were also substantial purchases of dollars by the monetary authorities in Organization of Petroleum Exporting Countries (OPEC) and other countries outside the Group of Ten. In addition, there was a continuing inflow of funds into dollars from Japan, where residents were taking advantage of a recent relaxation of exchange controls or were for other reasons seeking to diversify their portfolios internationally. Furthermore, the November rally in the U.S. bond market reportedly attracted capital from abroad, as investors sought to lock in high yields and position themselves for capital appreciation. Moreover, the increasingly fragile situation in the Middle East and Poland depressed sentiment toward those countries seen as more vulnerable than the United States to heightened geopolitical tensions. The recession in the U.S. economy led forecasters to expect less deterioration in this country's current account than previously. Even so, by end-November the dollar dropped from end-July levels by 6¼ percent against sterling, about 11 percent against the Japanese yen and the German mark, and as much as 18 percent against the Swiss franc.

Early in December the dollar turned around once more and began an advance that carried through end-January. This second turning point was triggered by a reappraisal of the view that a continuing drop in economic activity in the United States would lead to further substantial declines in U.S. interest rates and, therefore, to further movements adverse to the dollar in interest rate differentials.

That reappraisal was based on a number of developments. In the United States, the Federal Reserve was perceived as moving cautiously to reduce its discount rate and to supply bank liquidity. Although output was falling and unemployment was climbing, credit demands were not fading. In fact, commercial financing needs were heavy, with corporate issues flooding the bond market in December and commercial demand for

bank credit remaining strong. Also, estimates of the Federal deficit for current and future fiscal years had undergone repeated and large upward revisions, and



the prospective borrowing requirement for the first quarter of 1982 was seen as likely to be greater than previously had been estimated. Moreover, the release of figures showing no letup in a series of large weekly increases in the monetary aggregates began to generate expectations of a substantial tightening of money market conditions. Under these circumstances, U.S. money market rates rose in December and even more rapidly in January.

Abroad, by contrast, persistent weakness of domestic economies had led to near-record levels of unemployment, and in some countries official financial policies were coming under domestic criticism. As pressures for measures to boost employment intensified, expectations strengthened that some countries in Europe might ease their restrictive monetary postures even if U.S. interest rates did not decline further. In fact, during January, the central banks of many major industrialized countries either reduced their official lending rates or facilitated some easing of local money market rates.

As interest rate differentials once more moved strongly in favor of the dollar, they began to attract funds into dollar-denominated assets. The dollar was bid up across the board during the final two months of the period. By end-January it was about 6 percent higher against the European currencies and 8 percent higher against the yen from the levels of end-November. As a result, the dollar closed the six-month period down on balance about 1 percent against sterling, 4 percent against the yen, 5½ percent against the German mark, and 13 percent against the Swiss franc. The trade-weighted value of the dollar in terms of ten major currencies declined 3½ percent during the period.

During the six-month period, there were occasions when the market experienced unusually sudden and sharp exchange rate movements during a single day. Some of these episodes were associated with major political events, such as the assassination of Egypt's President Anwar Sadat on October 6 and the imposition of martial law in Poland over the December 12-13 weekend. Other episodes were less dramatic and were not associated with such identifiable events. The U.S. authorities were prepared to intervene on some occasions had the market disturbances persisted or cumulated during the U.S. trading session; as it turned out, the Federal Reserve undertook no intervention operations on behalf of the U.S. authorities. The Trading Desk continued its long-standing practice of cooperating with other central banks by intervening as their agent from time to time in the New York market.

On September 1 and December 15 the U.S. Treasury paid off the two maturing tranches equivalent to

\$1,611.4 million of its German mark-denominated securities. After those redemptions, the Treasury had outstanding \$4,080.8 million equivalent of the foreign currency notes, public series, which had been issued with the cooperation of the German and Swiss authorities in connection with the dollar-support program of November 1978. Of the notes outstanding as of January 31, 1982, a total of \$3,622.3 million is denominated in German marks and \$458.5 million is denominated in Swiss francs. The maturity dates for the remaining securities range between May 12, 1982 and July 26, 1983.

In the seven months through January 1982, the Federal Reserve had gains of \$0.1 million on its foreign currency transactions. The Exchange Stabilization Fund (ESF) gained \$15.2 million in connection with sales of foreign currencies to the Treasury general account to finance interest and principal payments on foreign currency-denominated securities. The Treasury's general account gained \$42.5 million net. This gain reflected \$94.8 million of profits on the redemption at maturity of Swiss franc- and German mark-denominated securities, partly offset by \$52.3 million of losses as a result of annual renewals at current market rates of the agreement to warehouse with the Federal Reserve Swiss franc and German mark proceeds of Treasury securities. As of January 31, 1982, valuation losses on outstanding balances were \$374.8 million for the Federal Reserve and \$1,102.1 million for the ESF. The Treasury's general account had valuation gains of \$826.4 million related to outstanding issues of securities denominated in foreign currencies.

German mark

In early August the German mark was subject to divergent tendencies—weak against the dollar but strong against European currencies.

With respect to the dollar, market sentiment toward the mark remained bearish. Domestically, the German economy was relatively weak, unemployment was rising, and inflation was high by historical standards. Moreover, the government deficit remained large, capital markets continued under strain, and fiscal policy was under heated discussion publicly and within Germany's coalition government. Internationally, Germany had experienced substantial deterioration in its terms of trade because of the increase in oil prices and the depreciation of the mark. The current account was in heavy deficit, and there were wide interest rate differentials favoring investment in the United States. On top of these economic considerations, the mark was seen in the exchanges as more exposed than the dollar to international political tensions. This vulnerability reflected Germany's strategic position, its ties to Eastern Europe, and its greater reliance on the Middle

Table 2

Drawings and Repayments by Foreign Central Banks and the Bank for International Settlements under Reciprocal Currency Arrangements

In millions of dollars; drawings (+) or repayments (-)

Bank drawing on Federal Reserve System	Outstanding January 1, 1981	1981 I	1981 II	1981 III	1981 IV	1982 January	Outstanding January 31, 1982
Bank of Sweden	-0-	+200.0	-200.0	-0-	-0-	-0-	-0-

Data are on a value-date basis.

Table 3

United States Treasury Securities, Foreign Currency Denominated

In millions of dollars equivalent; issues (+) or redemptions (-)

Issues	Amount of commitments January 1, 1981	1981 I	1981 II	1981 III	1981 IV	1982 January	Amount of commitments January 31, 1982
Public series:							
Germany	5,233.6	-0-	-0-	- 680.3	-931.1	-0-	3,622.3
Switzerland	1,203.0	-0-	-0-	- 744.5	-0-	-0-	458.5
Total	6,436.6	-0-	-0-	-1,424.8	-931.1	-0-	4,080.8

Data are on a value-date basis.

Because of rounding, figures may not add to totals.

Table 4

Net Profits (+) and Losses (-) on United States Treasury and Federal Reserve Current Foreign Exchange Operations

In millions of dollars

Period	Federal Reserve	United States Treasury	
		Exchange Stabilization Fund	General account
First quarter 1981	+ 6.2	- 0.7	-144.3
Second quarter 1981	- 1.4	- 3.8	-0-
Third quarter 1981	+ 0.1	-0-	+ 85.9
Fourth quarter 1981	-0-	-0-	- 39.2
January 1982	-0-	+ 15.2	- 4.2
Valuation profits and losses on outstanding assets and liabilities as of January 31, 1982	-374.8	-1,102.1	+826.4

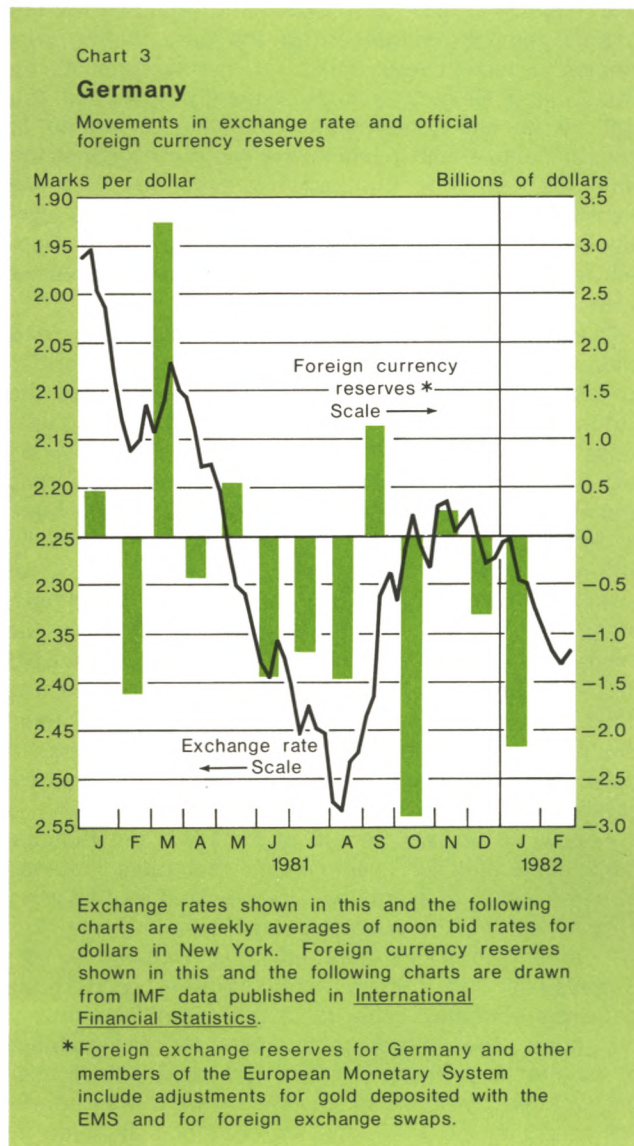
Data are on a value-date basis.

East for energy resources and export markets. In consequence, the mark was subject to capital outflows, all the more as market sentiment toward the dollar became increasingly bullish. On August 10 the rate plunged to a five-year low of DM 2.5773, a decline of some 45 percent since mid-1980.

Against other EMS currencies, however, the mark remained strong. It benefited from the market's view that the authorities in Germany were still placing priority on correcting the external imbalance and on financing the current account deficit in the interim by inflows of private and official capital. The federal government continued the practice, unusual for Germany, of placing Deutsche mark-denominated debt instruments directly with foreign official institutions. Following the move in February 1981 to introduce a special Lombard facility, German interest rates increased so that adverse interest rate differentials *vis-à-vis* other EMS currencies were either narrowed or eliminated. The Bundesbank had announced its intention that because of the inflation problem it would aim at the lower part of the 4 to 7 percent target range for the growth of central bank money. Thus, with the market apprehensive about prospects for other EMS currencies, the mark had moved toward the top of the EMS, at times hitting its upper intervention limit.

As a result of these crosscurrents in the exchanges, the Bundesbank had frequently bought French and Belgian francs to ease pressures within the EMS while selling dollars, at times heavily, to support the mark against the dollar. Through end-July, Germany's foreign currency reserves had increased to stand at \$43.4 billion. During August, however, as the Bundesbank stepped up its dollar sales to support the mark, German foreign currency reserves fell by \$1.5 billion.

Once the mark came close to its lows, market participants became wary of a shift in market direction and professionals moved quickly to cover their short positions. The mark bounced back sharply and, as the dollar fell lower in the exchanges, market sentiment toward the German currency became more favorable. In part, the turnaround reflected developments in the United States, where the initial euphoria surrounding the adoption of the U.S. Administration's economic program gave way to skepticism that the program would achieve all its goals. At the same time in Germany, trade and current account figures for July were released, pointing to a dramatic improvement in export sales and providing the first concrete evidence that the earlier surge in export orders was finally showing through. Official commentary about this improvement gave rise to expectations that Germany's current account deficit would continue to narrow in subsequent



months—a time when most forecasters were expecting the U.S. current account to deteriorate. Furthermore, the government finalized a 1982 budget proposal according to which nominal expenditure growth would be slowed to 4 percent and the net financing requirement of the federal government would be cut to DM 27 billion or 1.6 percent of gross national product (GNP), down from a revised estimate for 1981 of DM 34.3 billion or 2.2 percent of GNP. As the dollar eased, therefore, the German mark moved up to trade around DM 2.3195 by end-September.

Meanwhile, the strengthening of the mark added to strains within the EMS. The markets became vulner-

able, especially prior to weekends, to repeated rumors of an imminent realignment of the participating currencies. Speculative bidding for marks against the French and Belgian francs frequently stretched the EMS to its limits, generating sizable intervention in several centers and pushing the mark up against the dollar as well. The Bundesbank responded to these pressures by purchasing both dollars and EMS currencies in the exchanges so that, by the end of September, German foreign exchange reserves increased by \$1.1 billion.

Over the weekend of October 3 and 4, the EMS finance ministers announced a realignment of parities to take effect October 5. The mark, as well as the Dutch guilder, was revalued by 5½ percent against those currencies whose parities remained unchanged and in effect by 8½ percent against the French franc and the Italian lira. Immediately thereafter, the mark traded in the lower portion of the new band, reflecting reflows of speculative investments as well as a reversal of commercial leads and lags. Accordingly, other central banks began purchasing marks in the exchanges so as to cover the liabilities within the EMS that had built up over preceding months. Against the dollar, however, the realignment was seen as freeing the mark to strengthen further, and in subsequent days the mark moved up to DM 2.1815, 15½ percent above its August low.

Following the realignment of the EMS, the Bundesbank confirmed the easing of interest rates that had already begun in Germany's money and capital markets by cutting the special Lombard facility rate from 12 percent to 11 percent effective October 9. The Bundesbank felt able to take action to support the domestic economy because of the overall strength of the mark, the improving outlook for the balance of payments, and the achievement of a compromise on fiscal policy. Even so, the Bundesbank was careful not to signal more forceful action, since at home inflation continued to accelerate to an annual rate of 7 percent year on year and in the United States interest rates remained high so that interest rate differentials adverse to the mark remained large. Later the same day the Federal Reserve lowered its surcharge on discount window borrowing by large banks from 3 percent to 2 percent, the second 1 percentage point cut in this rate in three weeks. Thus, the Bundesbank's action did not contribute to any further widening of interest rate differentials versus dollar assets.

After mid-October a number of developments within Germany weighed on the mark. Unemployment was increasing as declining corporate profits forced many firms to move aggressively to economize on labor. As a result, market participants came to expect that the

Bundesbank would take advantage of whatever opportunity developed to allow German interest rates to follow U.S. rates down. In addition, the earlier optimism over a quick and sustained improvement in Germany's balance of payments faded, as first August and then September monthly trade figures disappointed market expectations. Late in October the government revised its budget estimates for 1982 to take account of climbing unemployment and lower than expected revenues, thereby eliminating virtually all the planned drop in the borrowing requirement. Although this new budget gap was later covered, largely by an expected increase in Bundesbank profits available to be transferred to the government, the episode underscored the differences that still existed within the government coalition on major issues of economic policy. Also, political tensions abroad adversely affected sentiment toward the mark. The assassination of Egyptian President Anwar Sadat pointed out the potential for instability in the Middle East and Germany's reliance on that region for oil supplies. Repeated reports of military maneuvers around Poland were also an unsettling reminder of Germany's vulnerability to potential Soviet interference in Eastern Europe.

Under these circumstances, the mark did not strengthen even though interest differentials adverse to the mark were narrowing sharply. Also, the Bundesbank moved cautiously to provide some short-term liquidity to the banking system through swaps and repurchase agreements and did not change official interest rates again until December 4, when it cut its special Lombard rate ½ percentage point to 10.5 percent. By contrast, in the two months to early December, the Federal Reserve had twice lowered its discount rate by 1 percentage point to 12 percent and also eliminated the remaining 2 percentage point surcharge on frequent borrowers. Short-term interest rates in the United States had fallen sufficiently to cut in half—from about 5 percentage points to 2½ percentage points—the short-term differentials *vis-à-vis* the mark.

During the six weeks to end-November, the mark occasionally came into demand, especially at times when U.S. interest rates were declining. But the mark did not keep pace with currencies outside the EMS that were continuing to strengthen against the dollar. Instead, movements of the rate above the DM 2.20 level regularly prompted commercial and investor selling of marks against dollars. On occasion, the mark came sharply on offer, especially in the wake of political developments in Eastern Europe or the Middle East. At these times, the Bundesbank intervened promptly and forcefully to sell dollars while EMS central banks were also buying marks. These operations contributed to better market balance.

In December and January the mark was adversely affected by developments abroad. On December 14, martial law was declared in Poland, triggering a brief scramble for dollars against marks and sending the rate as low as DM 2.3650 for a few hours. Prompt intervention by the Bundesbank and other central banks, together with commercial activity and professional profit taking, quickly restored balance to the market, and the rate almost fully recovered in just a matter of hours. Yet the Polish situation remained a matter of market concern. In the United States, interest rates stopped declining, disappointing market expectations that the deepening U.S. recession would continue to ease credit demands. Indeed, U.S. money market rates moved strongly higher, casting doubt that the strengthening of Germany's external position would show through in the mark exchange rate.

This development focused attention anew on the dilemma facing the German authorities. With the level of unemployment heading to a record two million persons, political pressures mounted, not only from labor unions but also within parties in the governing coalition, for more action to deal with the deteriorating unemployment situation. But the government was concerned about actions that either would increase taxes and thereby hamper a recovery or would increase government borrowing and thereby add to inflation. There were also pressures to ease monetary conditions. But the Bundesbank remained concerned that a renewed easing in interest rates would exacerbate the decline in the mark which would exert a further upward push on costs and prices.

In the event, the government presented to Parliament a compromise program, approved shortly after the close of the period, that was designed to stimulate jobs through investment subsidies, lending programs for small companies, and modest direct government spending on energy-saving projects—financed mainly by a 1 percentage point increase in the value-added tax in 1983. Meanwhile, new figures showed that an export surge late in the year had boosted Germany's trade account and helped pull its current account deficit for 1981 as a whole down to DM 17.5 billion, significantly lower than had been forecast. The improving external position gave the Bundesbank scope to lower its special Lombard rate a further ½ percentage point to 10 percent on January 21 and ensure a similarly modest easing in money market rates.

At the end of January the mark was trading at DM 2.3420, down about 6¼ percent from the late-November levels while up about 9 percent from its lows of early August. The Bundesbank was at times active in the markets during December and January, selling dollars in support of the mark, while other

central banks within the EMS continued to acquire marks. Reflecting Bundesbank dollar sales during the two months, German foreign currency reserves fell \$3.0 billion to close the period at \$37.5 billion, down \$5.9 billion for the period as a whole.

Swiss franc

In mid-1981, Switzerland was faced with a resurgence of inflationary pressures. Part of the inflationary impulse stemmed from the buoyancy of the domestic economy—in contrast to the stagnation in other European countries—led by strong consumption and construction activity. Shortages developed in the housing market, and domestic house prices and rents exhibited sharp increases, contributing to a strong rise in consumer prices. In addition, the decline of the Swiss franc in the exchanges substantially boosted the cost of imports, particularly by raising the domestic price of oil and other dollar-denominated raw materials.

Though Swiss interest rates had risen progressively, they were still well below those in other industrial countries. At midyear, interest differentials adverse to the franc were about 9-10 percentage points *vis-à-vis* the dollar and more than 3 percentage points *vis-à-vis* the German mark. Consequently, foreign official and corporate borrowers continued to place heavy demands on the Swiss franc money and capital markets. The Swiss authorities did not seek to restrain these outflows. They hoped to avoid the development of sizable external markets in Swiss franc-denominated assets, particularly for longer maturities, and in any event the current account had moved into surplus, estimated to be \$2.0-2.5 billion for 1981. Nonetheless, the pressure of outflows of capital pushed the Swiss franc down in the exchanges. At end-July the franc was trading at SF 2.15 against the dollar and SF 0.87 against the German mark. Along with other major currencies, it declined further against the rising dollar to a four-year low of SF 2.2095 on August 10, a decline of some 39 percent since its peak of 1980. On July 31, Switzerland's foreign exchange reserves stood at \$9.9 billion.

The Swiss authorities continued to pursue a policy of monetary restraint to combat inflationary pressures. Increasingly, however, the authorities had reason to question whether policy was as restrictive as developments in the monetary aggregates would suggest or, in view of the inflationary situation, whether policy was as tight as circumstances warranted. For some time the monetary base was below the 4 percent annual growth target for 1981. However, as in many other countries, continuing financial innovations in Switzerland, coupled with unusually high interest rates by historical standards, had altered the behavior of banks and the public, making the monetary base as well as the broader

monetary aggregates less reliable than in the past as a guide to policy. Questions about the adequacy of monetary restraint were highlighted by the release of consumer price numbers for August, showing inflation rising 11.3 percent at an annual rate in the most recent quarter and 7.4 percent year on year.

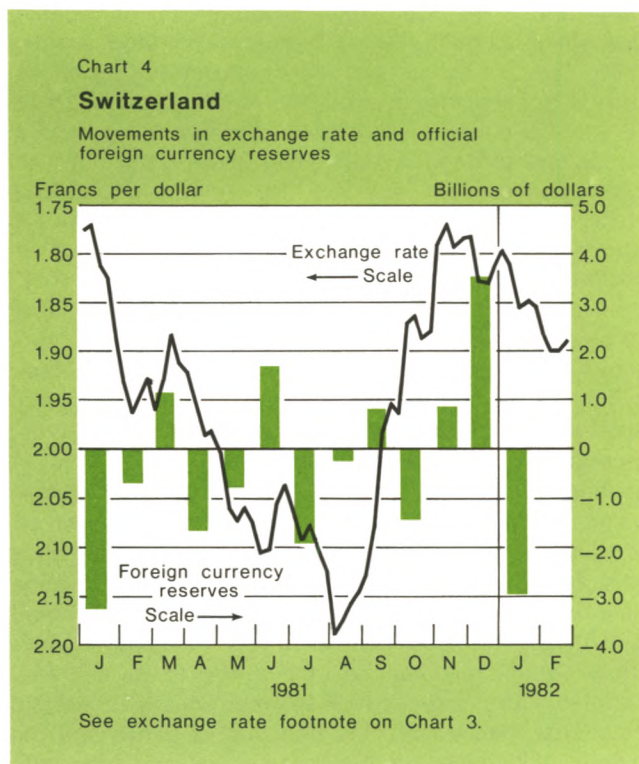
Early in September the authorities began taking aggressive action to tighten monetary policy and thereby underscore the primacy of the anti-inflation struggle. Effective September 2 the Swiss National Bank boosted its discount rate to 6 percent from 5 percent and its Lombard rate to 7.5 percent from 6.5 percent, the fourth rise in 1981 in those official lending rates. The authorities also made the refinancing of credit through foreign exchange swaps with the central bank more expensive. Following these actions, Swiss franc interest rates shot up temporarily before settling down around 11 percent.

The rise in Swiss interest rates during September and October, which occurred at a time when interest rates in other centers were easing, meant that differentials adverse to the franc either narrowed dramatically, as in the case of the dollar, or were reversed, as in the case of the German mark. Nonresidents therefore found incentives to begin repaying their Swiss franc-denominated debt, while in-

vestors sought out higher yielding franc investments, and these actions helped propel the franc sharply higher in the exchanges. As the franc strengthened, the view developed in the market that the Swiss authorities might allow the franc to appreciate beyond SF 0.80 against the mark—a level considered an upper bound in the market since September 1978 when the Swiss National Bank had intervened forcefully at that rate. In addition, many European countries were regarded as more vulnerable than Switzerland to political tensions in Eastern Europe and the Middle East, and this concern over the prospects for other currencies continued to benefit the Swiss franc. In these circumstances, the franc became exceptionally well bid. By mid-November the rate advanced 18 percent from early-September levels to a high of SF 1.7475 against the dollar and some 10 percent to SF 0.7935 against the German mark.

The strong appreciation of the franc, while welcome as a contribution in the fight against inflation, was nevertheless a matter of concern to the authorities. Of special worry was the rapid rise against the German mark, the currency of Switzerland's main foreign trade partner and major competitor in third markets, since it threatened to put Swiss exporting and tourist industries in a difficult position. Still, the authorities made clear in public statements that large-scale intervention similar to that undertaken in 1978 would be inappropriate. Sizable sales of Swiss francs would lead to an expansion in Switzerland's money supply, and large purchases of dollars would push the dollar higher in the exchanges—both developments that would exacerbate inflationary pressures.

In the event, by November the economy showed clear signs of flattening out and some private forecasters began to express fears that economic activity would weaken to the point where unemployment might rise. In addition, the need to avoid liquidity strains from developing with the approach of the year-end argued for some relaxation in monetary restraint. Accordingly, the Swiss National Bank progressively reduced the rate charged to domestic banks for Swiss franc swap credit against dollars and provided somewhat more liquidity than it absorbed via maturing swaps. On December 4 the authorities reduced the Lombard rate from 7.5 percent to 7.0 percent—an action taken in coordination with interest rate reductions in other industrial countries and designed to bring the Lombard rate more closely in line with prevailing Swiss money market rates. But at the same time the Swiss National Bank was anxious to avoid the impression of a fundamental shift in policy course and consequently left the discount rate unchanged at 6 percent. In the exchange market the franc lost its



upward momentum as domestic and Euro-Swiss money market rates eased downward. Against the dollar the franc slipped back to trade around SF 1.80 by end-December. Against the mark, however, the franc remained well bid around SF 0.7985, principally in response to market concerns over the foreign and domestic implications for Germany of the declaration of martial law in Poland.

By January the need for such a tight monetary policy in Switzerland appeared to have passed, particularly with the release of inflation figures showing a marked deceleration in consumer prices to around 6 percent. The 3 percent monetary growth target announced by the authorities for 1982 was generally viewed as consistent with the policy of fighting inflation, while also providing sufficient liquidity so as not to exacerbate the developing weakness of the economy. Even so, the Swiss authorities were thought to be under less pressure than others in Europe to ease credit conditions, given Switzerland's low unemployment rate and the still relatively favorable performance of the economy. In fact, the Swiss National Bank did not lower its official lending rates following the reduction by the Bundesbank on January 21 of its special Lombard rate. In these circumstances the franc, though fluctuating widely at times, remained firm against the German mark. But *vis-à-vis* the dollar, the franc continued to ease as money and capital market rates in the United States firmed substantially and were generally expected to remain high despite the weakness of the U.S. economy.

By the end of January the franc was trading at SF 1.8680 against the dollar and at SF 0.7976 against the German mark. At these levels the franc was up 15½ percent against the dollar since its August low. Over the six months under review the franc gained 13½ percent against the dollar and 8 percent against the German mark. Between end-July and end-January, Switzerland's foreign exchange reserves rose \$600 million to \$10.5 billion in response to foreign currency swap operations, the net purchase of dollars in intervention operations, and interest earnings on outstanding reserves.

Japanese yen

By mid-1981 the Japanese economy had made impressive adjustments to the second round of oil price increases of 1979-80. Changes in production processes in many of Japan's largest enterprises had substantially reduced Japan's dependence on oil imports. These developments, together with a continuing impact of the 1979-80 depreciation of the yen, had led to a sharp improvement in Japan's current account, which swung from deep deficit to moderate surplus in

just one and a half years. The rate of inflation at the wholesale level, which at one point in 1980 had reached 24 percent, had slowed to just about 1 percent. Meanwhile, restrictive monetary and fiscal policies had helped limit the extent to which rising material prices were passed on in the economy so that inflation at the consumer level, which had never exceeded 9 percent, was around 5 percent per annum.

The process of adjustment had been uneven, however, and domestic demand remained weak. Important sectors of the economy remained severely depressed. Moreover, consumer expenditures were slow to recover from the deflationary impact of rising energy prices, despite the moderation of inflation. The sluggishness of domestic demand cast doubt that a firm basis for sustained recovery had been established, and domestic pressures on the authorities intensified to adopt reflationary measures. Moreover, it heightened anxieties that the weakness of demand at home, in combination with the legacy of the yen's earlier depreciation, would provoke another surge of exports and exacerbate protectionist reactions in Japan's major markets overseas.

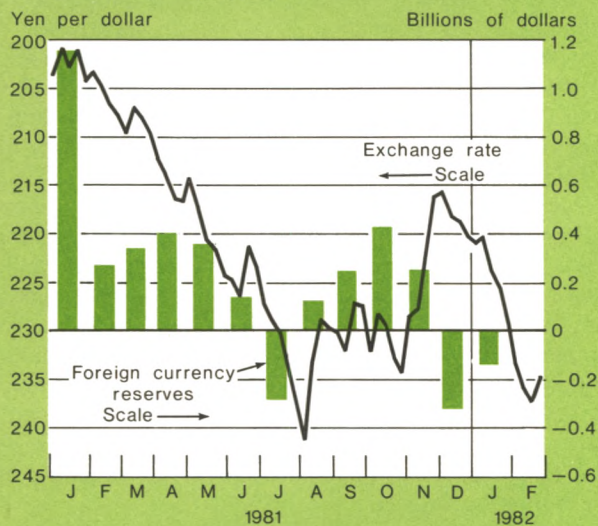
As a result, the authorities had already begun to provide stimulus to the economy. The government had announced measures to aid small companies and to speed up expenditures for public works. But the scope for further expansionary fiscal policies was limited by virtue of the fact that the levels of the government's overall deficit and borrowing requirement continued to be considered excessive by many Japanese and were already exerting pressures in the local capital markets. Thus, the larger source of stimulus came from an easing of monetary policy. During the spring, the Bank of Japan lowered its discount rate, eased banks' reserve requirements, and substantially relaxed "window guidance" ceilings on the growth of bank lending.

In the exchange markets, the yen had benefited from Japan's improving economic performance to recover from its 1980 lows against most European currencies. Relative to the German mark, it had risen nearly 40 percent to trade at 97 yen to the mark by early August. Against the dollar, however, a tentative recovery late in 1980 had given way to a renewed and protracted decline. With interest rates in Japan lower than in any other industrialized country, Japanese residents had taken advantage of newly liberalized foreign exchange controls to make long-term investments abroad. Then during midsummer, when a long-awaited decline in U.S. interest rates failed to materialize, market participants lost hope that the large interest differentials adverse to the yen would soon narrow so as to permit Japan's improving competitiveness to

Chart 5

Japan

Movements in exchange rate and official foreign currency reserves



See exchange rate footnote on Chart 3.

show through in the yen-dollar exchange rate. Thus, as Japanese importers sought to limit their losses during the August vacation period, they accelerated their yen sales to hedge remaining future dollar needs. In addition, foreign corporations continued short-term yen borrowings to meet financing needs in other currencies. As the selling of yen gathered force, it pushed the spot rate down to ¥ 246.10 by the first business day in August—a level only about 6 percent above its 1980 low.

At this point, many market participants felt that the yen's decline had been overdone in view of Japan's steadily improving current account position. With banks generally in an oversold position, the market was ripe for a reversal of sentiment toward the yen when the dollar began its general decline during August. Reports that some Middle Eastern investors had been attracted in size by the rally in Japan's securities markets and purchases on the International Monetary Market helped spur the turnaround in demand for the currency in early August. The yen's rise initially outpaced that of other currencies against the dollar, bringing the exchange rate to ¥ 228.20 against the dollar and to a high of ¥ 91.64 against the German mark on August 18.

A sense of caution soon overcame the yen market,

however. Participants recalled the disappointment earlier in the year when the yen's appreciation had not gone as far as expected. They worried about the possibility that new protectionist barriers might be erected in markets where Japan's exports were penetrating rapidly. Moreover, pressures built up over the summer and autumn for the government to introduce further monetary and fiscal stimulus to the still flagging domestic economy. In this atmosphere, the yen's rise seemed to stall after mid-August at around the ¥ 230 level against the dollar even as the European currencies continued rising.

In September, the monetary authorities announced that window guidance ceilings on commercial banks' lending would be further increased for the fourth quarter, even though monetary growth, running close to 10 percent at an annual rate, was just within the Bank of Japan's projections. Further, the government announced on October 2 a four-point program of fiscal and other measures intended to stimulate domestic demand and imports while assisting Japanese industries and regions that were experiencing particularly severe structural difficulties. The Ministry of Finance also set wider limits on Japanese banks' foreign lending for the half year beginning in October, in keeping with the projected financing needs accompanying the growing surplus on the current account and reflecting the continuing policy of allowing the country's banks to maintain their overall share of lending in the Euro-markets.

Long-term capital outflows from Japan remained large even though interest differentials favoring dollar investments narrowed during the late summer and autumn. Using their new freedom under the 1980 Foreign Exchange Law, Japanese institutional investors continued programs begun earlier in the year to diversify internationally. Also, some Japanese firms with large import requirements had experienced significant losses earlier in the year on their uncovered future dollar commitments and were now adopting more conservative policies regarding the hedging of forward obligations in foreign currency. In the case of firms in some structurally depressed industries, such as oil refining, the need to protect weak financial positions by hedging more of their future import requirements was encouraged as part of the government's efforts to support long-term adjustment. Under these influences, the yen-dollar rate wavered around the ¥ 230 level through September and October. Against the German mark, whose continuing rise against the dollar was partly influenced by the pressures building for realignment within the EMS, the yen declined steadily to reach a low point of nearly ¥ 105 per mark on October 30.

During November the yen became well bid again, as U.S. interest rates declined further and hopes became widespread that this trend would continue. Market participants felt that, despite renewed arguments being heard in Japan for a further easing of monetary policy, Japan's already low interest rates offered less scope for the monetary authorities in Japan as compared with those in Europe to match U.S. interest rate reductions. Therefore, further drops in U.S. rates were expected to be reflected in a significant narrowing of the differentials adverse to yen investments. Foreign transactions in Japan's securities markets, including purchases of bonds under short-term repurchase arrangements, reversed direction in November to become sizable net purchases. Market participants were also impressed by trade figures released for September and October that showed a further strong improvement in the current account surplus, even though the October figures on export letters of credit already gave some warning that the growth of exports might be slowing in subsequent months. Under these positive influences, the yen rose some 8 percent against the dollar during November, reaching its high for the six-month period of ¥ 213.40 on November 30 while recovering to ¥ 96.80 against the German mark.

Toward the end of the year there still was no clear evidence of recovery in the domestic economy and predictions of a very large current account surplus in 1982 became widely accepted. Statistics on consumer and wholesale prices continued to show the lowest rate of inflation among industrial countries. Information released about the real economy indicated that growth of the third quarter had been heavily concentrated in the foreign sector. Public-sector spending and domestic consumption were virtually flat, while private investment actually declined slightly for the third quarter in a row. Investment by small- and medium-sized firms showed an especially large drop, continuing the trend which had been a concern to policymakers for sometime. After the third quarter, monthly trade statistics revealed that even export growth had slowed at least temporarily in November under the influence of government-imposed restraints as well as sluggish demand in major export markets. While welcome from the point of view of mitigating trade frictions, this development lent further emphasis to the need for recovery in the domestic economy.

The new budget, announced in December for the fiscal year beginning in April 1982, retained the relatively restrictive stance that had been adopted for fiscal year 1981 in keeping with the long-range objective of containing and eventually reducing the size of the government's deficit and borrowing requirement. In these circumstances and with the yen exhibiting more

strength than it had in the earlier part of the year, the monetary authorities took further action to help spur the faltering recovery. On December 11, the Bank of Japan reduced its discount rate for lending to commercial banks by $\frac{3}{4}$ percentage point to $5\frac{1}{2}$ percent following similar actions in the United States and other industrial countries. This step was supplemented later in the month by the announcement that overall credit ceilings limiting loans extended by Japan's leading commercial banks, already progressively eased in previous quarters, would be lifted entirely for the calendar quarter beginning in January 1982.

In announcing the cut in the official lending rate, the authorities made it clear that they had confined the reduction to less than 1 percentage point so as not to interfere with the recent rising tendency of the yen and that they were prepared to counter any short-term effect on the yen-dollar rate by intervening in the exchange markets. Nonetheless, when the U.S. and Euro-dollar interest rates began to rise during December, the relative unattractiveness of yields on yen-denominated assets showed through in the exchanges once again and the yen began moving down. When the upward movement of U.S. interest rates continued into January, rather than reversing with the new year as many had hoped, the depreciation of the yen continued. Potential yen holders became increasingly impressed with the discrepancy between the pressures building for sustained high interest rates in the United States, as new statistics were released showing higher than expected growth of the U.S. monetary aggregates, and the situation of Japan's monetary authorities, who faced a continuing need to ease credit policy to stimulate the flagging domestic economy. Hope that wide interest differentials might soon be reversed thus faded in the first weeks of the new year. Pressure against the yen intensified, bringing the exchange rate against the dollar to ¥ 230.00 by the close of January, down 8 percent from the November 30 high but up $6\frac{1}{2}$ percent above the low of August 1981. The yen's cross rate in terms of the German mark had changed even less on balance, to ¥ 98.21 by end-January as compared with ¥ 97.00 six months earlier.

The Bank of Japan continued its policy of intervening in the exchange markets to smooth erratic fluctuations in the exchange rate, intervening to support the yen at various times when the rate moved down rapidly. Such dollar sales contributed to net declines recorded in Japan's foreign exchange reserves for December and January. For the six months as a whole, however, Japan's foreign exchange reserves rose \$600 million to \$24.6 billion by end-January, mainly reflecting interest earnings on Japan's outstanding holdings.

Sterling

In mid-1981, deep-seated concerns over the prospects for the economy of the United Kingdom continued to weigh on market sentiment toward the pound. While the worst of the 2½-year-old recession appeared over, evidence of an economic upturn had not yet materialized and, with United Kingdom interest rates lower than earlier in the year, there was concern that the government might be easing its stringent financial policies prematurely. It appeared likely that the United Kingdom share in world export markets was falling—inasmuch as persistently high rates of inflation and the earlier appreciation of the exchange rate had severely eroded the competitiveness of British industry. The trade and current accounts remained in surplus. However, softening world oil prices prompted worries that the substantial benefits Britain's oil self-sufficiency had provided to the balance of payments might diminish. Moreover, in other major industrial countries interest rates had increased, particularly over the summer. But in the United Kingdom the pressures of high and rising unemployment were seen in the exchange market as limiting the rationale, as well as the scope, for the authorities to raise domestic interest rates, and interest differentials in fact moved adversely to sterling-denominated assets. By end-July the pound had dropped 24 percent from the highs registered in January of last year to \$1.84 against the dollar. It also declined 10½ percent to DM 4.55 against the German mark and 10 percent in effective terms to 92.5 on a trade-weighted basis. The Bank of England, acting to smooth fluctuations in the exchange rate, had maintained its policy of intervening modestly on both sides of the market. Nonetheless, mainly due to the repayment of outstanding loans, Britain's foreign exchange reserves had declined to \$13.6 billion by end-July.

The pronounced drop of the dollar in August was reflected in only a temporary rebound of sterling in the exchanges. Indeed, bearish sentiment toward the pound deepened in September and October so that, while other European currencies were advancing against the dollar, the pound declined in the exchanges. In part, renewed downward pressure on sterling stemmed from fears that the monetary authorities had relaxed the restrictive stance of monetary policy before inflationary expectations had been firmly laid to rest, thereby threatening the progress already under way in bringing inflation under control. In the view of many, the growth of the targeted aggregate sterling M-3 substantially above its 6-10 percent annual range could not be fully explained by temporary distortions, such as the delay of tax payments caused by a civil servants' strike or by technical factors, such

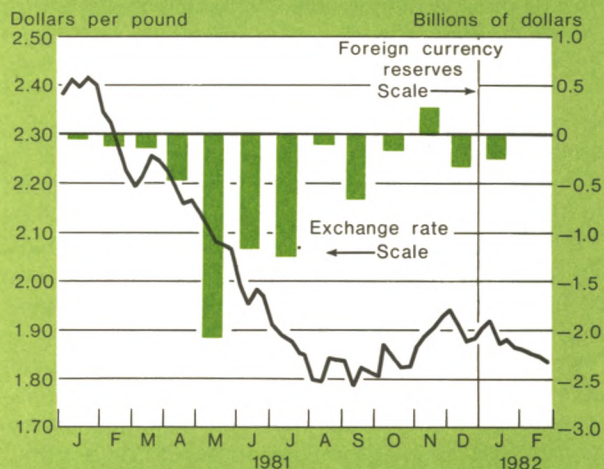
as a shift in housing finance from the building societies to the banks. After allowing for these considerations, the "underlying" rate of sterling M-3 growth remained high. The banking data released for August were particularly discouraging in this respect, reflecting a rapid expansion of bank lending to finance personal consumption and to satisfy growing needs of the corporate sector.

The downward pressure on sterling also resulted from nervousness ahead of the publication of trade figures for September and October—the first full figures since February 1981 when the civil service pay dispute interrupted the compilation of data. In the interval, expectations for a reduction of the trade surplus had developed. Weakened competitiveness was thought likely to restrict the volume of exports, while import volume was expected to rebound as the previous sharp rundown of domestic stocks abated and was gradually reversed. The decline of sterling during 1981 was also presumed to have weakened the terms of trade. In the event, the actual trade figures confirmed a fall in the trade surplus from the exceptional level of the winter of 1980-81, though gaps in the data posed greater than usual problems of interpretation. Looking ahead, crude oil price reductions, which had taken place on a selective basis following the breakdown of OPEC price discussions in late summer,

Chart 6

United Kingdom

Movements in exchange rate and official foreign currency reserves



See exchange rate footnote on Chart 3.

added to the unfavorable outlook for Britain's balance-of-payments trends.

As broad-based selling pushed the pound precipitously lower, the rate dropped in September to \$1.7695 against the dollar and to DM 4.10 against the mark. In effective terms it traded as low as 86, representing a trade-weighted drop in sterling to the lowest levels since March 1979. At this point British policymakers faced a choice. On the one hand, the depreciation of the exchange rate improved competitiveness and brightened the outlook for a recovery of depressed profit margins and of investment activity. But, on the other hand, the fall in the exchange rate following the decline that had already taken place earlier in 1981 threatened anti-inflationary goals at a time when wage and price inflation was showing improvement. Inflation had already fallen to around 10 percent, close to rates prevailing among Britain's major trading partners. Moreover, a sharp drop in average wage settlements had occurred which, coupled with productivity gains, had stabilized unit labor costs for the first time in a decade. A failure by the authorities to respond forcefully to the rapid buildup of selling pressures might risk accelerating sterling's fall given the development of a severely adverse market psychology. Furthermore, domestic monetary developments, particularly the expansion of bank lending, suggested that policy action was appropriate to avoid a further buildup of domestic liquidity. Thus, on balance, both external and internal considerations pointed to the desirability of increasing United Kingdom money market rates.

Accordingly, in mid-September the authorities raised short-term interest rates sharply, under new monetary control arrangements that came into effect the previous month, first through the discount window and then by their operations in the bill market. In addition, the authorities began operating more actively in the exchange market as a seller of dollars. Meanwhile, interest rates moved lower in the United States and, as a result, British interest rates stood above comparable U.S. interest rates for the first time since November 1980. Then, immediately following the realignment within the EMS, interest rates softened in a number of continental European countries as well so that interest differentials moved generally more favorably for sterling. These developments prompted widespread demand for sterling, which gathered momentum in November when the rally in the U.S. bond market carried over to the gilt-edged market and attracted foreign investors seeking to benefit from capital gains in addition to exchange rate returns. By late November the pound had recovered 11 percent from its lows to trade around \$1.98 against the dollar and 91.9 on an effective basis.

During December, domestic debate over the state of the economy intensified against the background of increased labor unrest. On December 2, Chancellor Howe announced a £5 billion increase in projected public spending for the 1982-83 fiscal year (April-March), mainly for the local authorities and for spending on employment and training programs. But these measures were generally seen as no more than a passive adjustment by the government to rising unemployment and continued low levels of economic activity since they did not imply a significant shift in the already restrictive stance of fiscal policy. Most private forecasters remained relatively pessimistic concerning the strength of any recovery given the lackluster prospects for government expenditure, consumer spending, and exports. The rebuilding of inventories was thought to compensate only partly for the weakness in other areas of economic activity. In these circumstances, exchange market participants remained concerned that the government would have to relax its restrictive policies after all and the pound again came under selling pressure, with the rate slipping back 6 percent from its late-November highs to \$1.8690 by mid-December before steadying around the year-end.

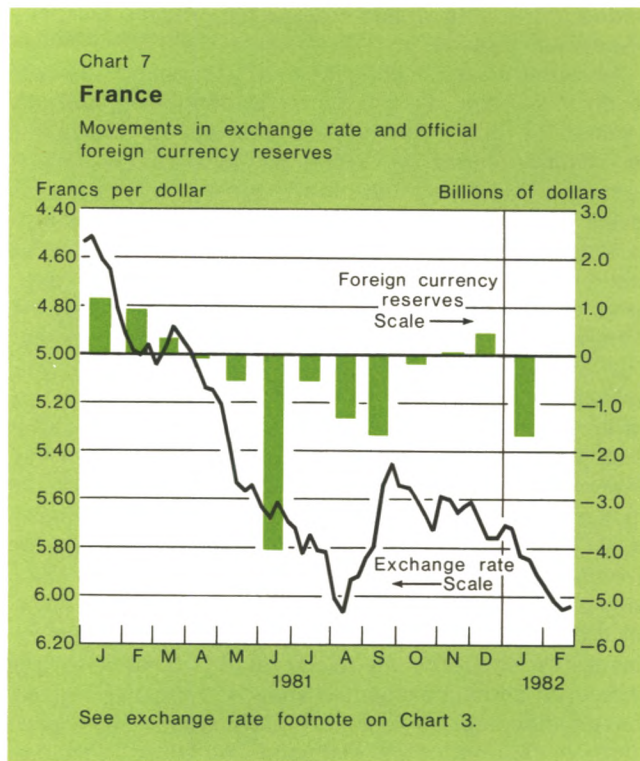
Sentiment toward sterling turned more optimistic during January. The labor situation improved, particularly following the unexpected decision of the miners not to strike and instead to accept the management pay offer—a development which seemed to validate the perseverance of the government in its overall strategy. The miners' decision brightened the outlook for inflation to abate, and in the exchange market this boosted sentiment for sterling. Domestically, this prospect gave a lift to the capital markets and generated hopes that conditions in the money markets would ease. In fact, a softening in short-term interest rates materialized and was not resisted by the authorities. Even so, the decline in short-term United Kingdom interest rates was less than reductions on the Continent where the monetary authorities were taking advantage of some improvement in their external positions to allow interest rates to decline and thus support their economies. As a result, interest rate differentials favoring sterling investments over those denominated in Continental currencies widened. At the same time, trade figures released for December were better than expected and the pound also benefited from oil company demand. As a result, sterling held generally firm against the rising dollar and advanced strongly against the Continental currencies. By end-January the pound was trading at \$1.8670 for a net rise of 1½ percent against the dollar since end-July. On an effective basis, sterling stood at 91.8 for a ¾ percent decline over the six-month period under review.

Between end-July 1981 and end-January 1982 the foreign exchange reserves of the United Kingdom declined by \$1.0 billion to \$12.6 billion. The authorities' intervention operations in the exchange market had a small impact on reserves as compared with other influences, such as the repayments and accruals of external public-sector borrowings and the revaluation losses of gold and dollar swaps against European currency units (ECUs) done with the European Fund for Monetary Cooperation (FECOM).

French franc

During late summer 1981, major elements of the economic strategy adopted by France's new government were under exchange market scrutiny. The government had moved aggressively to reduce burgeoning unemployment through monetary and fiscal measures to stimulate consumption and investment, and it was pledged to a program to redistribute income and to nationalize major banks and industrial groups. In other European countries the case for a shift toward policy stimulus was under intense political debate, but most governments opted for continued monetary and fiscal restraint. Consequently, pessimism deepened in the exchange markets over the outlook for the French franc, since the divergence in policies was expected to produce a deterioration in inflation and the current account deficit in France while improvements were anticipated in some other European countries. The franc fell in these circumstances more rapidly than other European currencies against the rising dollar. From FF 5.8775 at end-July it plummeted to a record low of FF 6.1870 on August 10, while also dropping to the floor of the EMS. Moreover, in subsequent weeks as the dollar declined in the exchanges, the franc had difficulty keeping pace with the advance of the German mark and other EMS currencies against the U.S. currency.

The French government sought to contain the selling pressures on the franc during August and September so as not to jeopardize its domestic program. The Bank of France intervened heavily in the exchange markets, selling mainly dollars as well as European currencies, to keep the franc within the mandatory 2¼ percent trading limit against the German mark and occasionally also against other currencies which traded at the top of the joint float. The government also tightened exchange controls to limit further the scope for leading and lagging of commercial payments by temporarily suspending the facility for importers to purchase foreign currency forward. Previously, one-month forward cover had been permitted except for importers of raw materials who were allowed up to three months to purchase forward exchange ahead of de-



livery. In addition, the Bank of France raised on September 21 its money market intervention rates by 1 percentage point—to 19½ percent for seven-day maturities—thereby reversing the previously easier tendency in domestic interest rates. However, the authorities did not wish to undercut the basic policy aim of reducing the high interest rate burden on French industry, and thus the government requested that the increase in banks' costs be financed out of profits and not by raising base lending rates.

Otherwise, with respect to domestic policy, the government continued to address the problems of an economy showing only limited signs of recovery from more than sixteen-eighteen months of recession. Late in September the government presented its 1982 budget proposals, aimed foremost at increasing employment by supporting economic activity. The budget provided for the creation of 70,000 new public-sector jobs, increased spending on private and public investment, raised aid and financial incentives to industry, and hiked outlays on education and various social welfare programs. On the revenue side the imposition of new taxes, higher tax rates, and steps to reduce tax evasion fell short of the nearly 27 percent increase in expenditures, leaving the government with a projected fiscal deficit of FF 95 billion, roughly equivalent

to 3 percent of GNP, compared with about FF 70 billion in 1981 or about 2.4 percent of GNP. The government also approved a bill nationalizing five industrial groups and a large segment of the private banking sector, with the takeover shifting approximately 750,000 workers from private industry to the government sector.

In the exchange market, participants continued to be concerned about the direction of economic policy. They feared an adverse impact on already depressed business spending plans of the government's efforts to nationalize and restructure industry. They were troubled by the prospect of a sharp rise in the fiscal deficit, which seemed likely if an economic recovery did not materialize. They worried that an expansion in the deficit in a short period could compromise the government's growth target for the monetary aggregates and, thereby, risk substantially increasing inflationary pressures. These concerns prompted large flows of funds to move out of France amid growing speculation that the franc would be devalued within the EMS. The outflows of funds were reflected in a \$3 billion decline in French foreign exchange reserves from \$22.6 billion at end-July to \$19.6 billion by end-September.

On October 5 the central EMS parity of the French franc, along with the Italian lira, was adjusted downward 3 percent against the Danish krone, Irish pound, and the Belgian franc—whose central rates remained unchanged—and in effect by 8½ percent against the German mark and the Netherlands guilder, currencies whose central rates were moved upward within the joint float. Immediately after the EMS realignment, the franc traded at the top of the new band amid a reflow of funds that took the form of a reversal of commercial leads and lags and also represented a reflux of speculative and investment capital. As a result, the franc rose in tandem with the mark against the dollar to trade around FF 5.56 by mid-October.

In the weeks that followed, French government officials stated that henceforth the government would give the same priority to fighting inflation as to unemployment to ensure maximum positive effects from the currency realignment. The authorities acted on several fronts to blunt the inflationary impact of the devaluation of the franc. The government imposed temporary price controls or freezes on a wide range of services and food items, where prices had shown marked acceleration, and introduced an 8 percent guideline on annual increases for industrial products. Regarding wages, the government began discussions with the country's main unions to alter cost-of-living provisions in future wage negotiations so as to stabilize real earnings. In addition, the government froze FF 15 billion in budgeted 1982 expenditures, while

also raising employer and worker contributions to the social security fund. These various measures helped improve the atmosphere in the domestic bond market, and the government, for sometime previously unable to issue new bonds, began to borrow successfully on a large scale. The government's access to the bond market in financing its deficit made it possible for monetary growth to decelerate and enhanced prospects for the monetary aggregates to stay within the 1982 range.

With the realignment in place and with policies in France appearing to move toward greater balance between the goals of combating unemployment and curbing inflation, the franc remained firm within the EMS. The impact of stimulative policies on France's inflation and trade performance remained a source of concern. However, these issues became somewhat less acute, as other countries moved cautiously to provide stimulus to their flagging economies through an easing in monetary conditions and as they came under growing pressure to adopt programs of fiscal stimulus. With the divergence in policies somewhat less pronounced, some forecasters began to look for a smaller deterioration than previously expected in the 1982 French current account.

Moreover, nominal French interest rates remained relatively high—commanding a 6-7 percentage point premium over German interest rates—even though the authorities had renewed their efforts to reduce French money market rates in the aftermath of the EMS realignment. French firms sought foreign currency loans to finance domestic expenditures, while foreign official and private investors maintained and even increased their holdings of franc-denominated assets. In these circumstances, the French authorities were able to ease the ban on forward purchases of foreign currencies, allowing importers of selected basic commodities to purchase foreign exchange up to three months ahead of delivery. Otherwise, exchange controls remained intact, limiting the scope for resident outflows. Moreover, France continued to be seen in the exchanges as less vulnerable than other Continental countries to political disruptions in the Middle East and in Eastern Europe, a perception that helped bolster the franc particularly following the declaration of martial law in Poland in December.

For all these reasons, the franc remained firm at the top of the joint float even as EMS currencies as a group weakened against the dollar during December and January. By end-January the franc was trading at FF 5.96 against the dollar, a net decline of about 1¼ percent over the six-month period under review but a rise of more than 3½ percent from its August lows. The relative strength of the franc enabled the Bank of France

to acquire sufficient marks in the market to reimburse in advance the main part of its very short-term obligations to FECOM stemming from earlier exchange market intervention in 1981. The outstanding amount was fully repaid by early January in ECUs, foreign currency, and special drawing rights. By end-January, France's foreign exchange reserves stood at \$18.3 billion. At this level, France's foreign exchange reserves were \$4.3 billion lower over the six-month period under review, in part reflecting these repayments as well as the revaluation losses of gold and dollar swaps against ECUs done with FECOM.

Italian lira

At the beginning of August the Italian lira had fallen against the strongly rising dollar to stand at LIT 1,227.50. However, it was trading comfortably near the top of the EMS, holding its position firmly in relation to other European currencies following its earlier downward adjustment within the joint float. The Bank of Italy had recently taken advantage of the lira's position within the EMS to rebuild foreign currency reserves to a level of \$16.5 billion.

The relatively firm performance of the lira at that time reflected sizable tourist inflows which offset the adverse impact of Italy's deteriorating terms of trade following the sharp increase in dollar prices for energy and other products as well as a weakening of demand in Italy's principal export markets. In addition, a tight control on liquidity and credit at home helped shield the lira from high interest rates abroad. The Bank of Italy, as part of its continuing struggle against inflation, had tightened monetary policy progressively by widening the scope of its ceilings on bank lending, raising reserve requirements, and hiking its discount rate to 19 percent. In addition, the monetary authorities were changing their procedures for issuing Treasury bills so that the Bank of Italy could vary its purchases of bills according to its assessment of domestic liquidity needs rather than buy all unsold Treasury bills at auction. Moreover, a deposit scheme had been imposed in May for a four-month period on purchases of foreign exchange for imports. This scheme, which required the placement with the Bank of Italy for ninety days of a noninterest-bearing lira deposit equal to 30 percent of the exchange transaction, had the effect of increasing the cost of payments in foreign currency as well as cutting into credit available for domestic purposes.

Nevertheless, there were continuing problems. Inflation was still running at a rate of 18 percent, considerably higher than most of Italy's trading partners. The public-sector debt had continued to exceed expectations despite persistent attempts at expenditure control. A collapse in the stock market had seriously

threatened the authorities' long-standing efforts to rebuild the financial structure of Italy's industrial sector. Evidence then available indicated that the domestic economy was weak, with industrial production still declining. The terms of trade were falling, as the U.S. dollar continued to climb in the exchanges and the traditional surplus on service income was contracting because of growing international debt service.

To deal with these problems, a new coalition government led by Republican Giovanni Spadolini announced that it would not rely on any further sharp contraction of economic activity to curb inflation. Instead, it would seek to contain inflationary pressures through a series of negotiations with business, labor, and various political interests aimed foremost at adjusting Italy's wage indexation system, the *scafa mobile*. For the first time, two of the three major labor unions indicated a willingness to negotiate limited adjustments to the system. Furthermore, proposals were put forth for "receding targets" and "norms" for prices, wages, and public utility rates. At the same time, the government decided to extend the four-month-old import deposit scheme until end-February 1982. In an agreement with the European Community, however, it announced a phased reduction of the proportion of foreign exchange purchases held in noninterest-bearing deposits and increased somewhat the products exempted from the deposit requirement.

During August-September, the lira remained firm within the joint float even as seasonal tourist inflows tapered off. Italy's trade balance was beginning to improve, as export volumes picked up in response to the earlier devaluation and as softness in the domestic economy held import volumes down. Although the weakness of the EMS bloc had pushed the lira to a new record low of LIT 1,268.50 against the dollar on August 10, the Bank of Italy was able to purchase sizable amounts of dollars to rebuild its reserve position through early September. These purchases were reflected in the \$1.0 billion increase in foreign currency reserves over the two months.

Late in September the lira dropped from the middle to the bottom of the joint float. Rumors began to circulate in the market that an EMS realignment would be broad enough to include the lira, whereas previously only a limited adjustment focusing on other currencies was thought likely. New estimates, putting the public-sector borrowing requirement as large as 12.5 percent of gross domestic product, also generated concern that the escalating deficit would undermine the efforts to curb inflation. As Italian importers moved to accelerate foreign currency purchases, sizable intervention by the Bank of Italy was required to steady the rate.

On October 5 the lira was, in fact, devalued along with the French franc by 3 percent against the currencies whose official parities remained unchanged and, in effect, by 8½ percent against the German mark and Dutch guilder. In public statements after the realignment, the Italian government stressed that it had not taken the initiative for the change and that the effect of the revaluation of the mark versus the lira, while insufficient to reestablish the competitive position of Italian exports to West Germany, would make German exports to Italy more expensive and thereby add to Italian inflation in the short run.

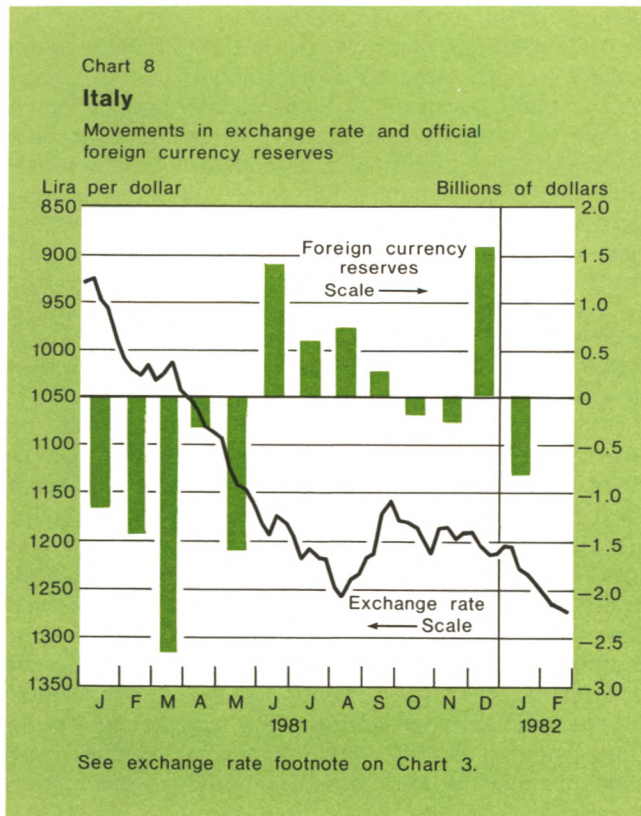
After the EMS realignment and through end-November the lira, although generally trading around the middle of the EMS band, firmed against the dollar. Italian interest rates remained high while those in other centers were generally declining so that favorable interest rate differentials for the lira widened against most currencies. Concern remained, however, that the new government would not win quick agreement from unions and business on approaches to reduce price and wage pressures. Similarly, in November a record rise in the *scala mobile* underscored the risk that the gains in international competitiveness resulting from

the two devaluations would be quickly eroded by inflation. Thus, at times the lira came on offer and the Bank of Italy promptly intervened to resist declines in the rate, as reflected in the two-month drop of \$469 million in foreign currency reserves.

Beginning in late December and continuing through the end of January, the lira firmed to trade at or near the top of the EMS, even though it fell back in relation to the U.S. dollar along with other currencies in the joint float. The Italian trade and current accounts had made considerable and sustained improvement. Export and import volumes, as well as service income, were responding favorably to the depreciation of the lira, declining real incomes in Italy, and inventory liquidation. Moreover, long-term capital continued to flow into Italy, mainly in the form of Eurodollar borrowings, as credit availability at home remained tight. To reinforce the slow down in inflation under way, the Bank of Italy extended in late December the 1981 ceilings on growth of bank lending until the end of 1982. These ceilings were extremely restrictive in that they required a reduction in lending in real terms. Nevertheless, the lira came on offer on occasion, for example, when a bunching of foreign currency purchases entered the market following reductions in the proportion of transactions covered by the import deposit scheme. But intervention by the Bank of Italy helped the lira remain near the top of the EMS. By end-January the lira was trading at LIT 1,250.00 against the dollar, up 1½ percent from its August lows. However, over the six-month period under review, the lira declined 1¾ percent against the dollar and 7¼ percent against the mark, in part reflecting the results of the October EMS realignment. Meanwhile, Italy's foreign exchange reserves advanced \$1.3 billion over the period to stand at \$17.8 billion at end-January.

European Monetary System

The persistence of serious recession and high inflation provoked major policy debates in most countries in the EMS over the summer of 1981. Complaints intensified that high U.S. interest rates were exacerbating the already difficult process of adjustment by forcing a choice between accepting the inflationary consequences of depreciation of their currencies against the rising dollar or by raising interest rates in defense of home currencies and accepting a loss in economic output. Domestically, pressures built up for a relaxation in monetary policy, for fiscal expansion—through some combination of increased expenditures and tax cuts—or otherwise for a change in policy emphasis. In some countries, such as Germany, the commitment to restrictive policies already in place remained firm. In other nations, including Belgium and the Netherlands,



the debate made it difficult for newly elected legislatures to reach agreement on a ruling government or on a common program. In France there was an explicit shift in strategy, under new leadership elected in the spring, in favor of reducing unemployment through domestic stimulus and specific job-creating measures.

In the exchange markets, expectations intensified during the summer and early autumn that divergent policies and economic trends among participating EMS countries—particularly Germany and France—would force a realignment of the joint float. These expectations gained strength, particularly after the turnaround of the dollar in August, since market participants felt that tensions within the joint float would more readily show through once there was greater scope for the mark to rise in the exchanges. In the event, large speculative flows emerged, imposing major strains on the joint float arrangement. To contain the selling pressures, the monetary authorities in many countries raised domestic interest rates. Moreover, EMS central banks intervened heavily during August and September to keep their currencies within agreed limits. In contrast to the spring, the intervention largely took the form of sales of dollars rather than EMS currencies. Then, on October 5 the EMS currencies were realigned with the German mark and Dutch guilder each revalued 5½ percent and the French franc and the Italian lira each devalued 3 percent in relation to the Belgian franc, Danish krone, and the Irish pound whose bilateral central rates against each other remained unchanged.

The new exchange rate structure and the lessening of strains within the EMS provided more countries than previously with the scope to begin lowering interest rates and thereby provide some monetary stimulus to their economies. France and Denmark permitted money market rates to ease, while Germany and the Netherlands lowered official lending rates in the October-December period. However, the reduction of European interest rates lagged behind the decline of rates in the United States and partly for this reason EMS currencies advanced against the dollar by as much as 11 to 16 percent from their August lows. In December when U.S. interest rates moved higher, the currencies of the EMS started to decline against the rising dollar in the exchanges. Although there were rather wide exchange rate fluctuations against the dollar, the configuration of currencies within the EMS remained comparatively stable.

The French franc, which moved to the top of the band immediately after the realignment, was soon joined by the Dutch guilder in the upper part of the EMS. The guilder was supported by a current account surplus and improving inflation prospects in the Netherlands.

From a deficit in 1980, the current account moved to a surplus of about NG 7 billion last year, with further improvement expected this year. The turnaround in the current account reflected delayed increases in the price of natural gas exports and the effect on imports of weak domestic investment and consumer demand. In addition, direct incomes policies pursued by the authorities in 1980 and 1981 improved competitiveness, with labor costs per unit of output lagging behind those of most other countries. Also contributing to the guilder's strength in the EMS was the formation of a government in the autumn after many false starts since the general elections in May. The government was pledged to a program of reducing the fiscal deficit as a proportion of GNP, while also directing part of the country's substantial gas revenues to specific employment-creating projects.

Even though Denmark in contrast to the Netherlands was running a current account deficit, the Danish krone also traded firmly in the upper portion of the joint float. Gains in export market shares and the depressed level of imports supported the krone by narrowing Denmark's current account deficit over the course of 1981. The central bank also made sizable foreign currency payments on behalf of the government from official reserves, thereby helping maintain balance in the exchange market.

Trading around the middle of the EMS band was the Italian lira, bolstered by a contraction in Italy's current account deficit and a tight monetary policy which induced long-term capital to flow in from abroad. Meanwhile, the Irish pound tended to fluctuate somewhat below the middle of the joint float even as Irish domestic interest rates rose significantly. Although conversions of private- and public-sector foreign borrowings helped underpin the pound, the inflows of capital had difficulty keeping pace with the widening of the current account deficit, as a recovery in stock building and fixed investment from earlier depressed levels began to draw in imports.

The German mark, after having initially moved to the floor of the EMS following the October realignment, remained near the bottom of the joint float through end-1981. Accordingly, EMS central banks were able to purchase marks in the exchanges to cover liabilities incurred earlier in the year to FECOM. Together with the mark at the bottom of the EMS was the Belgian franc, pushed lower by concerns over Belgium's large and protracted budget and current account deficits. After elections in November, expectations built up that a downward adjustment of the franc within the EMS would occur. As selling pressures intensified in late November-early December, the Belgian National Bank supported the franc at the

floor of the 2¼ percent band through increasingly heavy sales of foreign currency. The authorities also raised the discount rate and the Lombard rate each by 2 percentage points to 15 percent and 17 percent, respectively, effective December 11 and enforced other measures making it prohibitively expensive for non-residents to speculate against the franc. Then, over the December 13-14 weekend, a new government was formed, pledged to restrain wage increases under the wage indexation system and to curtail the budget deficit. With the new government providing grounds for a more effective approach than previously to reducing government expenditures and lowering the costs of industry, market sentiment toward the Belgian franc improved.

After the new year, as the currency bloc declined against the dollar, the configuration of currencies within the EMS shifted somewhat, but without imposing new strains on the joint-float mechanism itself. As before, the Dutch guilder and the French franc remained strong within the joint float, and the authorities in both countries were able to lower interest rates in line with reductions in Germany. The Italian lira also traded at the top of the band as the authorities kept interest rates high. The Danish krone slipped lower in the middle of the band in response to projections of a widening in Denmark's current account deficit in 1982, and the authorities, unable to take advantage of the tendency for major European interest rates to come down, tightened money market conditions instead.

The German mark moved higher in the joint float even as the Bundesbank, acting to stimulate domestic demand, lowered on January 21 the special Lombard rate for the third time in six months. As the mark moved higher and as debate within Ireland over economic policy intensified, the Irish pound came under modest pressure and moved into the lower half of the EMS band. For its part, the Belgian franc traded steadily at the bottom of the EMS and the authorities cut the discount rate effective January 7 by 1 percentage point to 14 percent and the Lombard rate by 2 percentage points to 15 percent. The authorities did not, however, further reduce lending rates when the Bundesbank acted on January 21 to cut its official lending rate. By the end of January the EMS currencies had relinquished much of the gains recorded against the dollar in the autumn months to end the six-month period about 1½ percent to 10¼ percent higher against the U.S. currency from their August lows.

Canadian dollar

The Canadian dollar was heavily on offer in mid-1981, dropping on August 4 to a fifty-year low of Can.\$1.2445 (U.S.\$0.8035). The decline reflected market concerns

over the balance-of-payments implications of Canadian energy policy, constitutional issues, and persistent inflation.

The main focus of exchange market attention was Canadian energy policy announced in autumn 1980, especially the establishment of incentives for exploration and development of domestic energy which favor Canadian ownership, and an ensuing dispute between the federal government and Alberta over energy pricing and taxation. By mid-1981, the "Canadianization" policy had stimulated sales of foreign-owned energy companies and outflows of capital. Moreover, the policy was seen as threatening the inflows of investment capital needed to offset the traditional current account deficit and to provide capital required to develop Canadian energy reserves and other economic resources. Also, to press their position in the dispute with the federal government, the provincial authorities in Alberta have cut oil production temporarily within the province, increasing Canada's short-term dependence on imported crude oil.

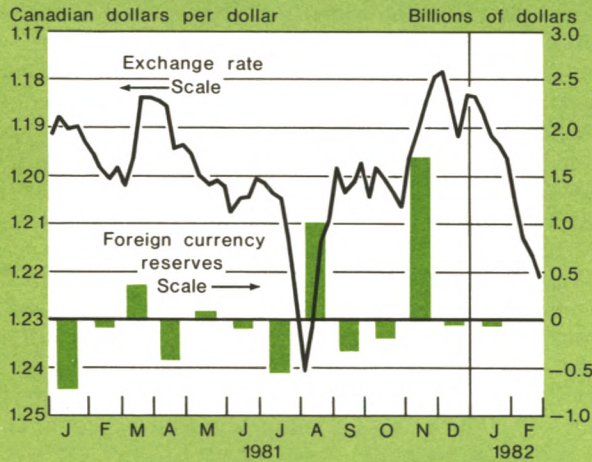
Other factors beyond the energy problems weighed on market sentiment in early August. Strong upward pressure on Canadian prices and wage costs had continued through the first half of 1981 in contrast to the United States where improvement on the inflation front had begun to appear. The move to "patriate" the Canadian constitution by the federal government led to legal challenges by provincial governments at a time when relations were already strained by the energy issues. Earlier in the summer, the traditional interest rate differentials in favor of the Canadian currency nearly disappeared at times when short-term U.S. rates climbed sharply.

Against this background, the Canadian dollar had become increasingly vulnerable, dropping sharply at the end of July and the first week of August. The authorities took several actions in response. The Bank of Canada intervened heavily to support the rate and, by end-July, Canadian foreign currency reserves had declined to \$748 million. It also drew \$700 million in July and \$500 million in August under the \$3.5 billion standby facility with domestic chartered banks to replenish reserves. At the end of August total borrowings under the facility stood at \$1.5 billion. Beginning in late July, the Bank of Canada aggressively pushed up interest rates. In roughly three weeks, short-term rates jumped by about 3 percentage points, restoring substantial interest rate differentials in favor of Canadian assets by early August. In addition, the Canadian Ministry of Finance asked commercial banks to reduce their lending to corporations for purposes of financing buyouts involving foreign currency conversions.

In the wake of these actions, the Canadian dollar re-

Chart 9
Canada

Movements in exchange rate and official foreign currency reserves

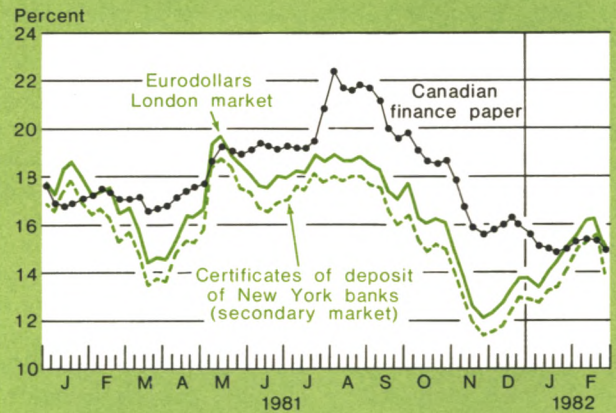


See exchange rate footnote on Chart 3.

Chart 10

Interest Rates in the United States, Canada, and the Eurodollar Market

Three-month maturities*



* Weekly averages of daily rates.

bounded in the exchanges. Also during August, expectations developed that a compromise would soon be reached between the federal and provincial governments on the troublesome issues of pricing, taxation, and revenue sharing in the energy field. On September 1, an agreement was in fact announced which provided for the rapid move of domestic oil prices toward world market levels, helping alleviate exchange market concern that the government's policy would limit future energy development. With agreement now reached, chances increased that several major oil exploration projects that had been suspended in earlier months would be resumed. Also, Alberta moved to restore oil production cutbacks, easing Canadian needs for imported crude. A compromise on revenue sharing was also achieved, providing for increases in federal revenues. Under these circumstances, and with the U.S. dollar generally in decline, the Canadian dollar recovered substantially after mid-August to Can. \$1.1929 by September 3. The Bank of Canada was a net purchaser of U.S. dollars during August-September and repaid \$700 million of the \$1.5 billion in credits drawn during the summer.

The Canadian dollar then steadied to trade in a fairly narrow range, easing back slightly on balance through the remainder of September and October. The Bank of Canada, stressing its view that reduction of inflation was crucial to a return to healthy economic growth and external balance, resisted declines in Ca-

nadian interest rates as large as those then developing in the United States. Nevertheless, a sudden increase in unemployment in September and other signs of developing economic slack led to questions in the market as to how much longer the authorities could maintain their policies of restraint even though there was no evidence of a slowing of inflation. Moreover, the Canadian trade surplus had weakened through the summer, pushing the current account more deeply into deficit. The Bank of Canada was a net purchaser of U.S. dollars during these two months. It paid down \$200 million in borrowings from domestic banks, and by the end of October foreign currency reserves stood at \$1,270 million.

During November, the Canadian dollar climbed about 2 percent as the U.S. dollar declined against most major currencies and as several factors shifted in favor of the Canadian dollar. The Bank of Canada responded to the continued decline in U.S. interest rates by limiting the fall in Canadian interest rates. As a result, interest rate differentials favorable to the Canadian dollar widened, spurring borrowings abroad especially by public authorities. As the exchange rate rose, borrowers moved to accelerate conversions of foreign currency. The government also introduced a generally restrictive 1982 federal budget to Parliament. The exchange market was impressed that monetary and fiscal policy in Canada continued to be directed toward control of entrenched inflationary pres-

tures. At about the same time, new oil and gas finds in the Beaufort Sea seemed to improve the chances of achieving the Canadian goal of energy self-sufficiency by 1990. Also, Prime Minister Trudeau announced in early November a compromise agreement, with all provinces except Quebec approving "patriation" of the Canadian constitution.

By November 30, the Canadian dollar had reached Can.\$1.1761 (U.S.\$0.8503), its highest level in over a year. With the Canadian dollar strengthening sharply, the Bank of Canada bought U.S. dollars in the exchange markets. During November, the government finalized a \$300 million medium-term loan from the Saudi Arabian Monetary Agency. In total, Canadian foreign currency reserves rose \$1.75 billion during the month and stood at \$3.0 billion at the month end. In November and December the Bank of Canada repaid the final amounts borrowed to finance intervention during the summer.

In December and January, with U.S. interest rates rising, concern developed that Canadian interest rates would not increase sufficiently to maintain interest rate differentials. Successive monthly figures on unemployment confirmed the weakness of the Canadian econ-

omy and triggered a debate over fiscal and monetary policy. The restrictive tone of the 1982 budget had generated substantial domestic criticism, and many analysts were predicting that the Canadian economy had by then entered its worst recession of the postwar period. Yet inflation had not decelerated and wage settlements continued above 12 percent at a time when the United States was showing progress in both of these areas. In the event, Canadian interest rates drifted slightly lower, and favorable differentials, which at their peak had been over 5 percentage points, nearly evaporated by the end of January. Capital inflows tapered off and the Canadian dollar dropped back to Can.\$1.1988.

Thus, by the end of January, the Canadian dollar was trading about 2 percent below its end-November highs but still nearly 3 percent above its lows reached just after the opening of the period. The Bank of Canada was a net seller of U.S. dollars, so that Canadian foreign currency reserves declined in January to stand at \$2.9 billion. Even so, over the six-month period, Canadian foreign currency reserves increased \$2.2 billion and all drawings on the standby facility with domestic chartered banks were repaid.

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