

# ELIMINATING RUNAWAY INFLATION: LESSONS FROM THE GERMAN HYPERINFLATION

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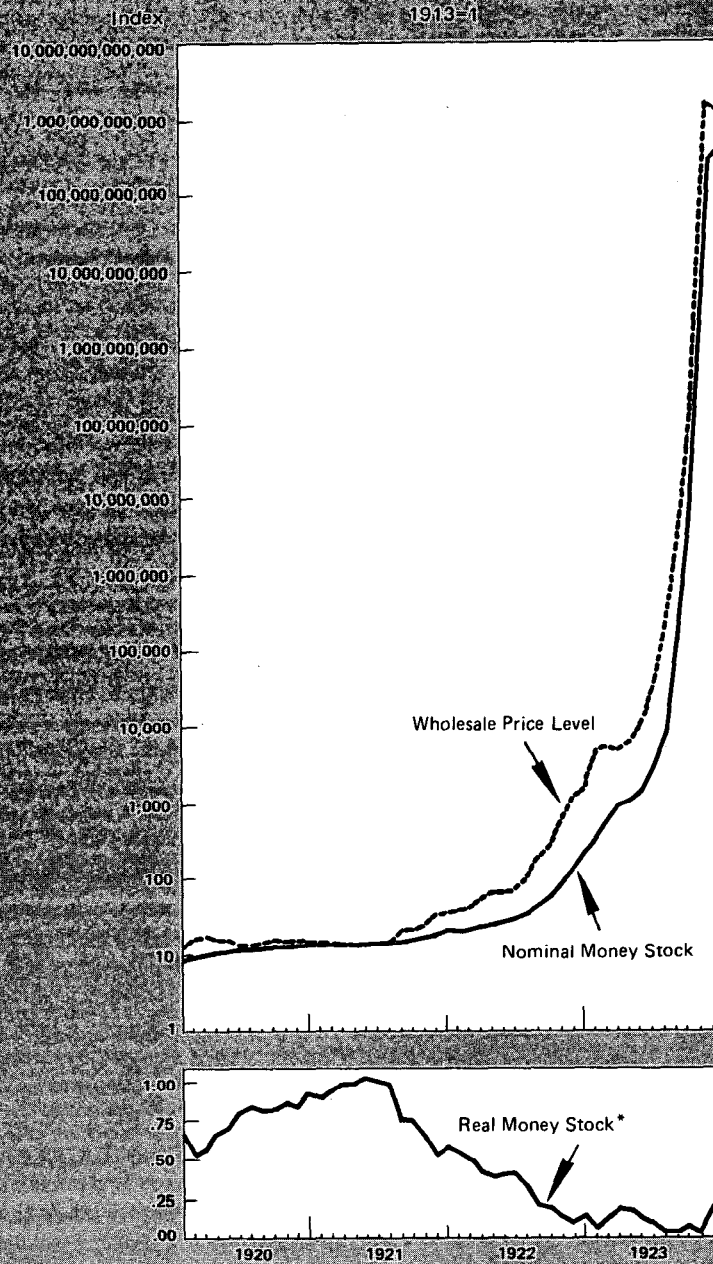
The German hyperinflation of 1923 is a classic example of what can happen when the monetary authorities let themselves be guided by false and misleading theories. In this case the fallacious theories included (1) an external shock or balance of payments theory of inflation and exchange rate depreciation, (2) a reverse causation theory of the link between money and prices, (3) the notion that the real money stock rather than the nominal money stock is the appropriate indicator of monetary ease or tightness, (4) the real bills doctrine according to which the money supply should accommodate itself to the needs of trade, and (5) the idea that the central bank can stabilize nominal market interest rates simply by pegging its discount rate at some arbitrary level.

**Misleading Theories** The authorities adhered to these theories to a ludicrous degree. For example, at the height of the inflation when a postage stamp and a newspaper cost 90 billion marks and 200 billion marks respectively, and when the money supply was expanding at a rate of 1300 percent per month and 30 paper mills were working overtime just to keep the Reichsbank supplied with paper for its banknotes, the authorities were actually insisting that money growth had nothing to do with inflation. On the contrary, they blamed inflation on external nonmonetary factors and declared that money growth was the consequence not the cause of inflation. Like modern government officials who attribute our present inflation to the machinations of the OPEC cartel, they located the source of inflation in the postwar punitive actions of the Allies. More specifically, they traced a chain of causation running from reparations burdens to balance of payments deficits to exchange rate depreciation to rising import prices and thence to general price inflation to rising money demand and finally to the money stock itself. That is, they argued that external shocks operating through the balance of payments caused the inflation, that the resulting rise in prices created a need for more money on the part of business and government to carry on the same level of real transactions, and that it was the duty of the Reichsbank to accommodate this need, a duty

which it could accomplish without affecting prices. Far from seeing currency expansion as the source of inflation, they argued that it was the solution to the acute shortage of money caused by skyrocketing prices. In this connection they advanced the peculiar theory that monetary excess could not possibly be the source of German inflation since the real or price-deflated value of the German money stock was smaller than it had been before the inflation started. They failed to realize that excessive nominal money growth itself was responsible for the shrinkage in the real money stock. They did not see that inflationary monetary growth, by generating expectations of future inflation (expectations that constitute the anticipated depreciation cost of holding money) had greatly reduced the demand for money and had stimulated a corresponding rise in velocity. This inflation-induced rise in velocity had caused prices to rise faster than the nominal money stock thus producing the observed shrinkage in the real money stock (see chart on following page). This sequence of events, however, was beyond their comprehension. Hence even though the nominal money stock was several trillion times larger than at the beginning of the inflation, they argued that it was still not large enough because prices had actually risen faster than the money stock. They thought that they could prevent further shrinkage of the real money stock by increasing the nominal money stock. In so doing they succumbed to the fallacy that the policymakers can systematically control real economic variables (e.g., the real money stock) by controlling nominal economic variables (e.g., the nominal money stock).

**Real Bills Doctrine** Another fallacious theory to which they adhered was the real bills or needs of trade doctrine, which says that money can never be excessive as long as it is issued against bank loans made to finance real transactions in goods and services. What they overlooked was that the demand for loans also depends on the level of prices at which those real transactions are effected. They forget that rising prices would require an ever-growing volume of loans just to finance the same level of real transactions. Under the real bills criterion these loans

## BEHAVIOR OF NOMINAL AND REAL MONEY STOCKS IN THE GERMAN HYPERINFLATION



During the German hyperinflation the nominal money stock exploded while the real money stock, reflecting an inflation-induced flight from cash and a corresponding rise in the circulation velocity of money, declined sharply. The real money stock fell because inflationary nominal monetary growth, by generating expectations of future inflation and thereby raising the anticipated depreciation cost of holding money, reduced the demand for real cash balances and stimulated a corresponding rise in velocity. This expectations-induced rise in velocity caused prices to rise faster than the nominal money stock thus producing the observed fall in the real or price-deflated money stock. Efforts to arrest this fall via faster nominal money growth only served to prolong it. Not until late 1923 when anti-inflationary monetary reform seemed imminent did the real money stock revive.

\*Index of the German Money Stock (1913=1) divided by the Index of Wholesale Prices (1913=1).

Source: Frank D. Graham, *Exchange, Prices, and Production in Hyperinflation: Germany, 1920-1923* (Princeton: Princeton University Press, 1930), pp. 105-106.

would be granted and the money stock would therefore expand. In this manner price inflation would generate the very monetary expansion necessary to sustain it and the real bills criterion would not limit the quantity of money in existence. In short, they failed to understand that the real bills criterion cannot distinguish between the price and output components of economic activity and therefore constitutes no bar to the inflationary overissue of money.

**Inflationary Discount Rate Policy** They also made the mistake of pegging the discount rate at a level of 90 percent, which they regarded as constituting an appropriate degree of monetary tightness at a time when the market rate of interest on bank loans was more than 7300 percent per year. This huge interest differential of course made it extremely profitable for banks to rediscount bills with the Reichsbank and then to loan out the proceeds, thereby producing additional inflationary expansions of the money supply and further upward pressure on interest rates. If the monetary authorities recognized this, however, they said nothing about it.

**Monetary Reform Measures** But I do not intend to dwell on the hyperinflation per se. Rather I wish to discuss the very successful monetary reform that ended it in a prompt and relatively painless manner—an accomplishment that seems beyond our powers today. Regarding the monetary reform the facts are as follows. On November 15, 1923 the government announced that it intended to get inflation under control. Acting quickly, it did four things.

- First, it transferred responsibility for monetary control from the Reichsbank to Dr. Hjalmar H. Schacht, the newly appointed Commissioner for the National Currency.
- Second, it issued a new currency called the Rentenmark to circulate with the old currency. The Rentenmark was declared to be equal in value to one prewar gold mark or one trillion depreciated paper marks.
- Third, it established a fixed upper limit on the amount of Rentenmarks that could be issued. According to Costantino Bresciani-Turroni, perhaps the leading authority on the hyperinflation episode, this limitation was crucial to the success of the monetary reform.<sup>1</sup>

<sup>1</sup> Costantino Bresciani-Turroni, *The Economics of Inflation* (New York: Augustus Kelley, 1968), pp. 347-348, 402.

- Fourth, it directed the Reichsbank to stop the discounting of Treasury bills, which meant in effect that the Reichsbank would issue no more paper money for the government.

**The Miracle of the Rentenmark** The reform was an instant success. The new currency was in great demand and circulated at its declared gold value. Within weeks the rate of inflation, which had been raging at an annual rate of 300,000 percent, dropped to virtually zero. And this was accomplished at a cost of only 10 percent lost potential output in 1924, the year following the monetary reform.<sup>2</sup>

To get an idea of the magnitude of this accomplishment were it to be attempted today, we can use the late Arthur Okun's rule of thumb calculation (which he derived from evaluating simulations from six econometric models) that the cost in terms of lost output per each 1 percentage point reduction in the rate of inflation is 10 percent of a year's GNP. According to Okun's 10 percent rule, it should have required a 50 percent GNP gap sustained for 600 centuries to eliminate Germany's 300,000 percent inflation rate.<sup>3</sup> In fact, however, the German inflation was virtually eliminated by early 1924 at the cost of only a 10 percent GNP gap.

How did they do it? How did the German authorities manage to eliminate an inflation that was infinitely worse than ours today and yet do it so quickly and painlessly? What recipe for success did they have that our authorities lack today? Most observers correctly note that the key to stopping the inflation was the eradication of inflationary expectations and the restoration of confidence in the German currency. But they offer only the vaguest of explanations as to why that confidence was so easily restored, attributing it either to a yearning of the German national spirit for monetary order and stability or to a naive belief on the part of the public that the new Rentenmark was worth one prewar gold mark simply because it was declared to be worth that much on the face of the note.

**The Credibility Hypothesis** There is, however, a more plausible explanation that stresses the credibility associated with the government's policy declarations. According to that explanation, when the

<sup>2</sup> Frank D. Graham, *Exchange, Prices, and Production in Hyperinflation: Germany, 1920-1923* (Princeton: Princeton University Press, 1930), p. 319.

<sup>3</sup> The computation is Roy Webb's. See his article, "Depression or Price Controls: A Fictitious Dilemma For Anti-Inflation Policy," Federal Reserve Bank of Richmond, *Economic Review* 66 (May/June 1980), p. 4.

German officials announced in November 1923 their intention to halt inflation, the public was fully convinced and accordingly swiftly revised downward its expectations of future inflation. People believed the government not only because it had placed the responsibility for stabilization in new hands but also because prior to the monetary reform it had taken decisive steps to reduce the budgetary deficits that were an immediate cause of inflationary money growth.<sup>4</sup> Consisting of drastic cuts in expenditures (particularly welfare relief to striking workers) and the levying of taxes in real (i.e., gold) rather than nominal terms, these measures were widely regarded as an essential prerequisite to monetary stabilization and a clear indication of the government's intention to end inflation. People also believed the government because it had not tried to mislead the public during the preceding hyperinflation. True, the officials had misunderstood the cause of the hyperinflation. But they at least had not lied to the public about the policy rule they were following at the time. On the contrary, throughout the inflationary episode the authorities candidly acknowledged that their main policy objective was to accommodate inflation with sufficient monetary growth to overcome inflation-induced shortages of money and to stabilize the real value of the money stock. In this connection Reichsbank president Rudolf Havenstein even boasted of the installation of new high-speed currency printing presses that would enable money growth to keep up with skyrocketing prices.

Because the authorities had instituted budget reforms compatible with monetary stability and because they had not lied to the public about the policy rule in effect during the preceding hyperinflation, there was ample reason for the public to believe the authorities' announced intention to change the policy rule and halt inflationary money growth. Consequently, inflationary expectations were swiftly revised to zero when the halt was announced, thereby allowing the speedy removal of inflation without large increases in lost output. Evidently, policy credibility was essential to the reversal of inflationary expectations and the resulting rapid termination of inflation.

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<sup>4</sup> On this point see Ragnar Nurkse's comments in *The Course and Control of Inflation* (Geneva: League of Nations, 1946), pp. 22-23, 68-73. Nurkse stresses the contribution made by the fiscal reforms to the success of the stabilization of the mark. In particular, he notes that, since budget deficits were largely financed by inflationary money growth, decisive steps to reduce those deficits and bring the budget under control improved the prospects for monetary stabilization and thereby lowered inflationary expectations.

**Lessons of the Monetary Reform** There are at least three lessons to be learned from the monetary reform that ended the German hyperinflation. First, the task of subduing inflation is easier

- if the policymakers have established a record of credibility,
- if they accurately convey their intentions to the public, and
- if they convince the public of their resolve to stop inflation.

Unfortunately, these ingredients have been sadly lacking in many countries in recent years where anti-inflation rhetoric has been accompanied by steady and persistent increases in the basic trend rate of inflation.

**Credible Policy Strategies** A second lesson to be learned from the German stabilization episode is that a credible anti-inflation policy must focus on a single objective, namely the elimination of inflation.<sup>5</sup> A shifting-targets policy that focuses now on inflation, now on unemployment, now on interest rates or the foreign exchange value of the dollar or still some other objective will be largely ineffective in fighting inflation. The public, having observed the past tendency of the authorities to shift from one policy objective to another, will expect monetary restraint to be abandoned upon the first signs of economic slack as monetary policy shifts from fighting inflation to fighting unemployment. Knowing that monetary restraint will be temporary, wage and price setters will have no incentive to accept lower rates of wage and price increases when such restraint occurs. As a result, the inflation rate will respond but little to the short-lived efforts to reduce it.

The preceding should not be taken to imply that inflation is inherently resistant to all policy strategies. On the contrary, were the government to drop its shifting-targets policy strategy for one devoted solely to eliminating inflation, the inflation rate might subside rapidly once the public was convinced that a true anti-inflation policy was in force. Confronted with a new policy environment, economic agents would have an incentive to alter their wage- and price-setting behavior in a manner consistent with rapid adjustment to lower rates of inflation.

The third lesson is that we should be wary of pessimistic conclusions that inflation can only be removed

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<sup>5</sup> What follows draws heavily from Webb, *op. cit.*, p. 5.

at the cost of a protracted and painful recession. Those conclusions often are derived from econometric models estimated for the period when the government's shifting-targets policy was in effect. These models usually assume that economic agents will not change their wage- and price-setting strategies when the policy environment changes. This assumption is questionable. For as mentioned above, if the focus of monetary policy were to change from a shifting-targets strategy to one of permanently eliminating inflation, the context in which wage and price decisions are made would be drastically altered. Responding to the new policy environment, people would adjust their expectational and price-setting behavior accordingly. Consequently, inflation would be less intractable and costly to subdue than in the past and the inflation rate could be brought down more swiftly and painlessly than indicated by the econometric models. The trick of course would be in convincing the public that the policy environment had indeed changed. But this could be done if the policymakers were to announce anti-inflation targets and then demonstrate that they were meeting those targets. Given a successful track record of meeting stated anti-inflation targets, policy credibility would be restored thus making it easier to get inflation under control.

**Conclusion** The preceding has enumerated three lessons taught by the stabilization episode that ended the German hyperinflation. Whether modern policymakers will ever consistently apply these lessons remains to be seen. Certainly the post-World War II policy record in many countries is hardly encouraging

on this score, indicating as it does a tendency for the lessons to be more often forgotten than remembered. Over the past year, however, there are signs that the authorities both at home and abroad may have started to apply the lessons and that they may have abandoned their old shifting-targets policy of responding to the most pressing short-run concerns for a new longer run policy of eliminating inflation. The current recession, bringing pressures on the policymakers to shift from fighting inflation to fighting unemployment, should reveal whether this is in fact the case. So should the ensuing recovery when the central bank undoubtedly will be called upon to accelerate money growth to keep interest rates from rising. If the authorities can resist these pressures and stick to their longer term policy of eliminating inflation they will have shown that they have indeed learned the lessons of the German hyperinflation.

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# NEGOTIABLE CERTIFICATES OF DEPOSIT

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Negotiable certificates of deposit (negotiable CDs) are the most important source of purchased funds to U. S. banks that are practitioners of liabilities management. Moreover, they have become one of the major types of liquid assets in the portfolios of many investors. Recent financial market developments, including increased competition among financial institutions, high and sometimes volatile patterns of interest rates, and regulatory changes have all led to significant changes in the money markets generally, and in the market for negotiable CDs in particular. This article describes the market for negotiable CDs, placing particular emphasis on developments that have occurred over the past decade or so.

**Types of Issuers** It is possible to distinguish between four general classes of negotiable CDs based on the type of issuer, because the characteristics of these four types of CDs, including rates paid, risk, and depth of market, can vary considerably. The most important, and the oldest of the four groups, consists of negotiable CDs, called domestic CDs, issued by U. S. banks domestically. Dollar denominated negotiable CDs issued by banks abroad are called Eurodollar CDs or Euro CDs,<sup>1</sup> while negotiable CDs issued by the U. S. branches of foreign banks are known as Yankee CDs. Finally, some nonbank depository institutions, particularly savings and loan associations, have begun to issue negotiable CDs. These are referred to as thrift CDs.

**Domestic CDs** Negotiable CDs issued by U. S. banks domestically are large denomination (greater than \$100,000) time deposit liabilities evidenced by a written instrument or certificate. The certificate specifies the amount of the deposit, the maturity date, the rate of interest, and the terms under which interest is calculated. While banks are free to offer market determined interest rates on time deposits in amounts above \$100,000, negotiable CDs included, the mini-

imum denomination acceptable for secondary market trading in domestic CDs is \$1 million. The term to maturity on newly issued domestic CDs is the outcome of negotiation between a bank and its customers, the individual instrument usually tailored to fit the liquidity requirements of the purchaser. Regulations limit the minimum maturity on deposits of U. S. banks to 30 days.<sup>2</sup> Newly issued domestic CDs typically have maturities that run from 30 days to 12 months. The average maturity of outstanding negotiable CDs is about three months.

Interest rates on newly issued negotiable CDs, called primary market rates, are determined by market forces and sometimes are directly negotiated between the issuer and the depositor. Domestic CD rates are quoted on an interest-bearing basis; rates on most other money market instruments, such as Treasury bills, bankers acceptances, and commercial paper are calculated on a discount basis. Interest is computed for the actual number of days to maturity on a 360-day year basis and can be either fixed for the term of the instrument or variable. Interest on fixed-rate negotiable CDs with original terms to maturity of up to one year is normally paid at maturity; on longer-dated instruments, interest is normally paid semiannually. If variable, the rate usually changes every month or three months and is tied to the secondary market rate on domestic CDs having maturities equal to the variable term of the contract.

Domestic CDs may be issued in either registered or bearer form. The great majority of negotiable CDs, however, are bearer instruments. In fact, most banks automatically classify bearer CDs as negotiable instruments and classify registered CDs along with large time deposits open account as nonnegotiable instruments.

Domestic CDs are paid for in immediately available funds on the day of purchase. They are redeemed for immediately available funds on the maturity date. Many investors in domestic CDs prefer to purchase and settle in New York. For this reason, regional banks that are active in the CD market issue

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<sup>1</sup> Some dollar denominated CDs are issued in foreign locations other than Europe. For example, banks in Hong Kong have issued Asian CDs, while the branches of at least two U. S. banks have issued Nassau CDs. Markets for these instruments are just developing, however.

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<sup>2</sup> The Federal Reserve Board has recently proposed, however, that the minimum maturity of time deposits be reduced to 14 days.

and redeem their CDs sold to national customers through a New York correspondent bank acting as a clearing agent.

*Early History*<sup>3</sup> As corporations became more adept at cash management during the 1950's, they were able to economize on their holdings of demand deposits. Since few banks offered corporations interest-bearing deposits as alternatives to checking balances, businesses turned to other investment sources, particularly commercial paper, Treasury bills, and repurchase agreements with securities dealers. Consequently, there was a sharp decline in the importance of corporate deposits on the banking system's balance sheet. Large money center banks especially felt this loss of funds since they relied on corporate demand deposits to a greater extent than other, smaller banks. This situation prompted First National City Bank of New York to introduce negotiable CDs, which were offered first to the bank's foreign customers in August 1960. Investor response to this move was only modest, however, due in part to the lack of a secondary market for the certificates. In February 1961 First National City Bank began to offer negotiable CDs not only to foreign investors, but to domestic investors as well. A simultaneous development crucial to the success of the new instrument was the announcement by the Discount Corporation of New York, a large Government securities dealer, that it would make a secondary market for the negotiable CDs of money center banks.

The new negotiable CD was specifically designed to attract corporate deposits, and to serve as a source of funds flexible enough to accommodate changes in short-term loan demand. Other major New York banks quickly followed the lead of First National City Bank in offering negotiable CDs, and most of the leading U. S. Government securities dealers quickly became active in the secondary market. Within two months, negotiable CDs outstanding at New York City banks reached \$400 million, and by September 1961 the figure rose to almost \$1,100 million.

It should be noted that commercial banks, primarily the large regional banks located outside New York, had years of experience issuing interest-bearing certificates of deposit and large time deposits open account prior to 1961. Time deposits open account had been offered to the foreign depositors of banks since the 1930's. Also, banks would sometimes pay

interest on "link certificates" arranged by their loan customers to fulfill compensating balance requirements. Finally, a number of regional banks outside New York and Chicago routinely issued negotiable CDs at the request of their corporate customers. Although legally negotiable, these CDs issued by large regional banks lacked an organized secondary market, a factor that limited their use as true money market instruments. Large regional banks that had been active issuers of negotiable CDs promptly established themselves as competitors with the New York money center banks in 1961.

*The Importance of Regulation* Unlike most other participants in the domestic money market, commercial banks are heavily regulated. Government regulation has had an important influence on the development of the market for negotiable CDs since its inception. Two Federal Reserve regulations in particular have had an influence on the negotiable CD market, namely Regulation Q, which governs interest paid on deposits by member banks, and Regulation D, which prescribes reserve requirements that must be held against deposits.

Until May 1973, Regulation Q specified an interest ceiling that could not be exceeded on newly issued negotiable CDs of at least some maturities. At times, these ceilings were binding, i.e., they limited banks to paying rates below open market rates. In the early period of the development of the market for negotiable CDs, for example, there was a 1 percent ceiling rate on time deposits of less than three months' maturity. Since market interest rates on competing instruments were greater than 1 percent, this ceiling effectively prohibited banks from issuing short-dated CDs. Then in late 1961, the rate on 3-month Treasury bills edged upward and exceeded the 2½ percent Regulation Q ceiling rate in effect for 3- to 6-month CDs. Within the first year in which they were offered, therefore, banks were forced into a noncompetitive position vis-à-vis the money market alternatives to negotiable CDs in the maturity range out to six months.

In July 1963 the Regulation Q ceiling for CDs maturing in three months or longer was raised to a competitive 4 percent. The artificially low rate ceiling on CDs of less than three months' maturity was raised in November 1964, so that banks were finally able to compete with other money market instruments. In subsequent periods, however, Regulation Q ceilings again became binding, with important consequences for the negotiable CD market. These episodes will be examined later when growth in domestic CDs is discussed.

<sup>3</sup> This discussion of the early history of domestic CDs relies heavily on the work of Brewer [2] and Fieldhouse [4].

Both Regulations D and Q require that time deposits have a minimum maturity of thirty days. This effectively restricts the minimum maturity of newly issued negotiable CDs to one month. Moreover, Regulation Q prohibits commercial banks from purchasing their own outstanding negotiable CDs, an action that would be interpreted under the regulation as payment of a deposit before maturity. Some investors have horizons much shorter than 30 days and might prefer to avoid having to routinely enter the secondary market to raise cash by selling negotiable CDs. Consequently, banks have had an incentive to develop alternative instruments to negotiable CDs to meet these investors' demands. The 30-day minimum maturity requirement on negotiable CDs is likely an important factor explaining the rapid growth in bank repurchase agreements, which are considered nondeposit liabilities and are therefore not subject to the 30-day minimum maturity requirement on interest-bearing deposits.

Member banks of the Federal Reserve System, a group that accounts for the largest share of negotiable CDs outstanding, have always been required to hold noninterest-bearing reserves against deposits as prescribed by Regulation D. Beginning September 1, 1980, all depository institutions having either transactions accounts or nonpersonal time deposits (which include virtually all negotiable CDs) will be required to hold reserves as specified in Regulation D. Reserve requirements increase the cost of funds to depository institutions since a portion of total assets must be set aside in noninterest-earning reserve accounts. Reserve requirements against negotiable CDs have varied over the years and have at times been graduated by both the maturity of the deposit and the amount of total balances held. The Federal Reserve varies reserve requirements primarily as an aid in achieving the objectives of monetary and credit policy. In the case of CDs, however, Regulation D has also been used to achieve a bank regulatory goal, namely the lengthening of the maturity structure of the commercial banking system's liabilities. Thus, the size of reserve requirements on CDs has at times been inversely related to maturity.

*Growth in Domestic CDs* There is, unfortunately, no precise measure of the total amount of domestic negotiable CDs outstanding. This is primarily because not all reporting banks classify their large time deposits consistently. The best measure of the volume of domestic CDs outstanding is the series comprising the CDs of all large banks that report to the Federal Reserve on a weekly basis (the large weekly reporting banks). Negotiable CDs outstand-

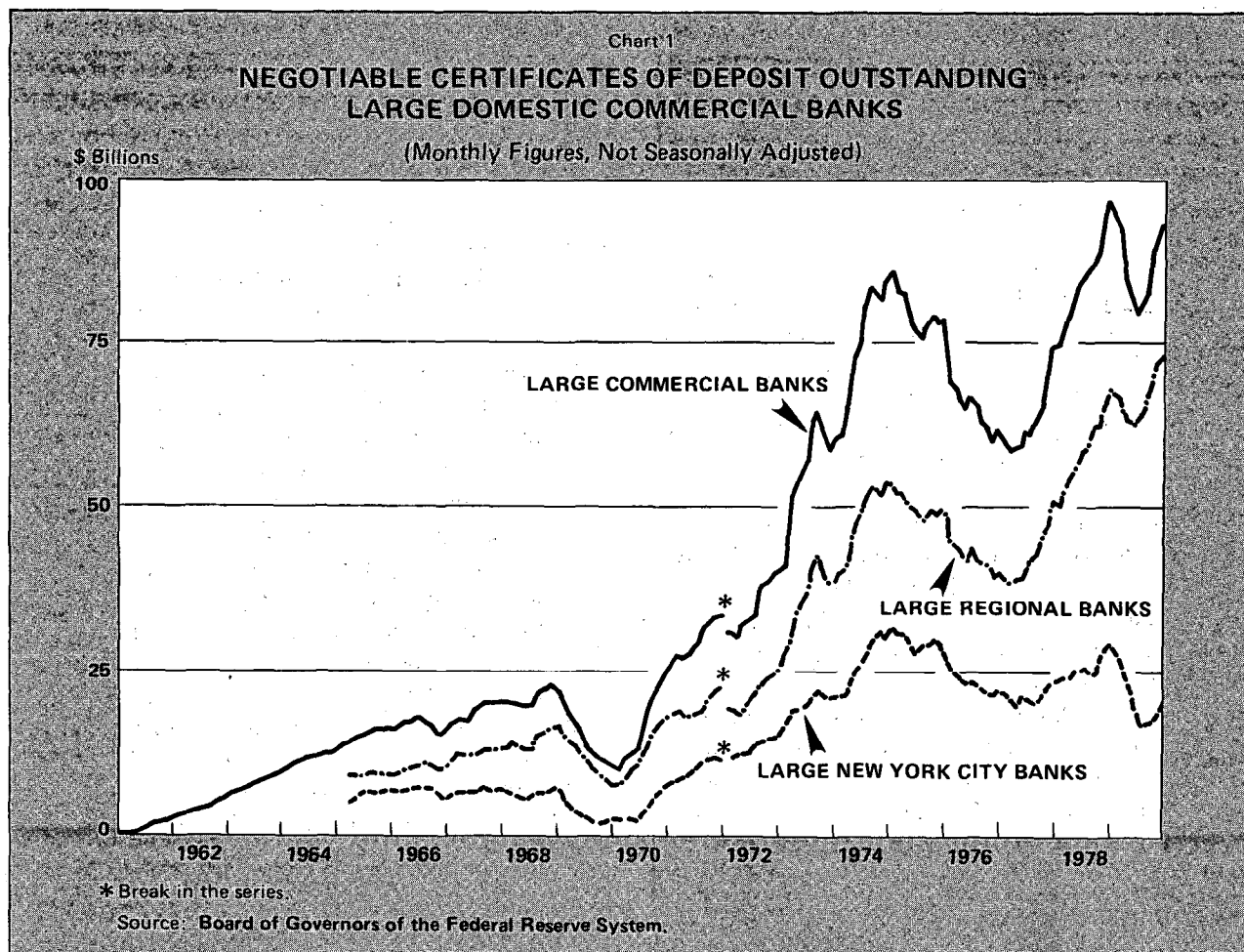
ing of all large weekly reporting banks are shown on Chart 1. Negotiable CDs of the large New York City banks and large regional banks are shown separately on the same chart.

It is clear from Chart 1 that domestic CDs have grown rapidly but unevenly, especially after 1968. The chart also shows that there is a close but imperfect relationship between changes in the volume of outstanding negotiable CDs for large regional banks and for the large New York banks. The rate of growth in negotiable CDs issued by New York banks generally lags the rate of growth experienced by the regional banks during periods when outstandings are increasing rapidly. During the 1975-77 runoff in negotiable CDs, the percentage decline was less for the New York banks than for the regional banks; the shallower trough for the New York banks suggests that these institutions are more reliant on such deposits as a primary source of funds. Comparing the trends for the two series suggests that large regional banks have been expanding their negotiable CD positions faster than the New York money center institutions, a situation explained by the spread of liabilities management practices outside the money centers and by the generally faster rate of increase in business lending at regional banks during the last decade. The share of total negotiable CDs attributable to the New York banks has trended downward since 1975, falling from nearly 60 percent to less than one-third by late 1979.

Within the first decade of its existence, the market for negotiable CDs suffered two major setbacks from an otherwise rapid growth trend. These episodes, which occurred in 1966 and 1969-70, both were a result of binding Regulation Q ceilings. The Regulation Q ceiling on negotiable CDs of all maturities was raised to 5½ percent in December 1965, following the pattern set by short-term open market rates. When market rates moved above this level in early 1966, however, the Federal Reserve took no further action to keep banks competitive in the money markets; this was a departure from previous practice and reflected the System's desire to slow growth in bank loans. Consequently, new issues of domestic CDs declined and outstandings dropped by about \$3 billion or 16 percent in the last quarter of 1966. Secondary market activity also slumped during this period. When short-term rates dropped sharply in early 1967, however, new issue and secondary market activity quickly recovered.

This interest rate decline was short-lived, however, and by late 1967 open market rates again began to push up against the Regulation Q ceiling. The ceiling





rate on 6-month to 1-year CDs was raised by one percentage point to 6½ percent in 1968, but by later in the year even longer term negotiable CDs lost competitiveness with other money market instruments. A wide gap opened between Regulation Q ceiling rates and open market rates in 1969, and this gap was not eliminated when the ceilings were raised on CDs of all maturities in January 1970. Outstanding negotiable CDs declined by over \$13 billion, or more than half of the total amount outstanding, between December 1968 and February 1970. The decline would have been even greater had it not been for a special exemption that allowed banks to sell CDs to foreign official institutions (i.e., governments and central banks) without regard to the regulatory ceiling. During the runoff, banks issued about \$2 billion in negotiable CDs to such investors. The secondary market in negotiable CDs almost completely disappeared during this period as dealers eliminated their positions and trading declined to almost zero. This, of course, greatly reduced the liquidity of the remaining negotiable CDs outstanding.

In June 1970, the collapse of the Penn Central Transportation Company gave rise to fears of a general liquidity crisis, as businesses found themselves unable to issue commercial paper. One very important action taken in response to this crisis was removal of the Regulation Q ceiling on short-term CDs, i.e., those with maturities from 30 to 89 days. Bank new issue rates on 1- to 3-month CDs quickly rose to competitive levels and the volume of outstanding CDs resumed rapid growth. The ceiling on longer term negotiable CDs was removed three years later in May 1973. Since the early 1970's, therefore, the market for domestic CDs has been conducted in an atmosphere free of constraints on interest rates.

Strong demand for bank credit, particularly for business loans, led to a boom in the issuance of domestic CDs between 1972 and 1974. During this period the Federal Reserve attempted to dampen credit expansion by raising reserve requirements on, and thus increasing the cost of, negotiable CDs. In June 1973, for example, a 3 percent supplemental reserve requirement was added to the existing 5 per-

cent requirement, and applied to increases in CDs above the amount outstanding on May 16, 1973 (a 20 percent supplemental requirement on Eurodollar borrowings had been in effect since January 1971). Simultaneous changes were made to lower reserve requirements on Eurodollars in an attempt to equalize the reserve costs for these two sources of funds. In September 1973 the supplemental reserve requirement on CDs was raised to 6 percent while reserve requirements on Eurodollars remained unchanged. The CD requirement was lowered back to 3 percent in December, however. This temporary inequality of reserve requirements between domestic CDs and Eurodollars explains the temporary decline in CD volume appearing in Chart 1 for the second half of 1973.

A recession-induced decline in business loan demand of unprecedented proportions occurred at large banks between 1975 and 1977. Domestic CDs followed this decline, falling by over \$28 billion in the approximately two year period from January 1975 to April 1977. Rapid growth resumed in mid-1977 and continued through 1978, after which a six-month decline totaling over \$16 billion occurred. This decline was prompted by a surge in the growth of small time deposits, spurred by large increases in Money Market Certificates, combined with softening in the demand for total bank credit. Accelerating credit demand by businesses, however, led to renewed growth in domestic CDs after mid-1979.

*Money Center versus Regional* About one-third of domestic CDs are issued by a handful of large money center banks in New York City, while the remainder are issued by about two hundred large regional banks located around the U. S. Although both the money center and regional institutions sell their newly issued instruments primarily to large national and multinational investors, the former group of banks is much more heavily involved in this market. Banks issuing negotiable CDs usually post a list of base rates, with spreads expressed in increments of five basis points, for the various maturities they are writing. These rates are adjusted upward or downward depending on the particular bank's need for funds and on market conditions. Regional banks located in cities that serve as headquarters for major corporations are often able to book a large portion of their CDs directly through the main office, without having to work through a New York correspondent. The regional issuers that are most active in the CD market, however, keep a supply of blank but signed certificates in New York so that investors not located in their area and wishing

to purchase their CDs can do so conveniently. Regional banks that issue large amounts of domestic CDs but that depend heavily on purchases by investors located outside their geographic area typically employ a sales force to actively market their certificates.

Although almost all banks on occasion sell their newly issued certificates to securities dealers, most prefer to sell directly to investors. The advantages of selling directly to retail include paying a lower rate on the new issues, since the dealer intermediary is eliminated, and having more information over where certificates are ending up. Banks would prefer that their CDs be held as investments and not sold before maturity, since secondary market sales could compete with attempts to market new offerings in the future. Although dealers sometimes hold CDs for investment purposes, most of their purchases are passed through to retail investors in the secondary or resale market. Regional banks that are attempting to build a name in the domestic CD market, or that are trying to reestablish a name after a period of inactivity, generally must operate through dealers. In these cases, the dealers accept marketing responsibility for the newly issued certificates. When particularly large offerings come to market most banks, even the money center institutions, rely on dealers to help distribute the issue. A new offering of several hundred million dollars, for example, may be difficult to place directly even for a bank with a large base of regular customers.

Over the years, investors have developed preferences for the CDs of certain issuers, or groups of issuers, that are reflected in the rate structure on CDs. The rate required on the CD of a top name bank may be 5 to 25 basis points lower than that required on the CD of a lesser known institution. Historically, the rate spread on domestic CDs of the top and lesser name issuers has fluctuated with the level of interest rates, the spread widening in high interest rate periods. Prior to 1974, investors distinguished roughly between two groups of issuing banks in the domestic CD market, prime and nonprime. The prime banks included the large and well-known major money-center institutions, while the nonprime category included the smaller, lesser known regional banks. In 1974, as concerns about the liquidity of the banking system were aroused by problems at Franklin National Bank and Herstatt Bank of West Germany, investor tiering of domestic CDs by issuer became more flexible and complicated. Size remained important, but investors' perceptions of financial strength began to be formed more spe-

cifically, so that the top tier of preferred banks dropped in number and tended to vary over time. Nonetheless, investors still place the greatest emphasis in assessing risk on bank size, so that New York City banks continue to dominate the top tier. The more conventional factors used to assess risk, for example, capital ratios, asset growth rates, and earnings variability, remain of secondary importance in determining which banks are classified in the top tier. An implication of this is that portfolio managers have the opportunity to improve yield, without taking a commensurate increase in risk, by investing in the domestic CDs of regional banks that meet the traditional tests of financial soundness but that do not fall within the top tier.<sup>4</sup>

**Eurodollar CDs** Like a domestic CD, a Eurodollar CD is a dollar denominated instrument evidencing a time deposit placed with a bank at an agreed upon rate of interest for a specific period of time. Unlike a domestic CD, however, a Euro CD is issued abroad, either by the foreign branch of a U. S. bank or by a foreign bank. The market for Euro CDs is centered in London and is therefore frequently called the London dollar CD market.

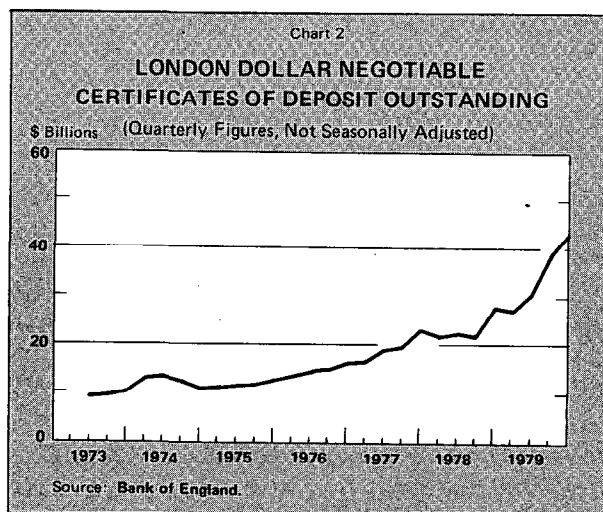
This market originated in 1966 with a Eurodollar CD issue by the London branch of Citibank. The incentive to U. S. banks to start issuing CDs abroad was provided by regulations restricting their ability to raise funds in the domestic money market, especially Regulation Q. Since it is free of interest rate regulation, the Eurodollar market provides banks the opportunity to raise funds for domestic lending even when their ability to issue domestic CDs is restricted. The Euro CD market has grown rapidly since 1966. As shown on Chart 2, Euro CD outstandings at London banks totaled over \$43 billion at year-end 1979. The foreign branches of U. S. banks dominate the London dollar CD market, accounting for about 60 percent of all CDs issued by banks located in London. Japanese banks rank second in importance, their share of the market having increased from 9 percent in 1976 to 17 percent in 1979.

Euro CD maturities run from 30 days out to 5 years, but shorter terms ranging from one month to one year are most common. By and large, the customer base is the same as that for domestic CDs, i.e., most Euro CDs are placed with the same large cor-

porations that are active purchasers of domestic CDs in the U. S. In fact, some of the largest CD dealers in the U. S. are represented in London, where they make an active market in Euro CDs. These dealers, and many large investors as well, view their investment activity as essentially one worldwide position and manage their Euro CD and domestic CD portfolios in an integrated fashion.

Inasmuch as there is a five-hour time zone difference between London and New York, perfect synchronization of delivery and payment on Euro CDs is very difficult. Therefore, settlement for Euro CDs is normally two working days forward, which is the value date, and payment is made in clearing house funds. Dollar settlement is made in New York, even though the certificates themselves are issued and held in safekeeping in London. The First National Bank of Chicago has set up a Euro CD clearing center in London to smooth payment and delivery on these instruments. The clearing center, which is open to banks, dealers, and investors, operates on the clearinghouse concept, where debits and credits are cancelled by computer and only net settlement is made.

**Yankee CDs** Yankee CDs are negotiable CDs issued and payable in dollars to bearer in the U. S. (more specifically, in New York) by the branch offices of major foreign banks. They are sometimes referred to as foreign-domestic CDs. The foreign issuers of Yankee CDs are well-known international banks headquartered primarily in Western Europe, England, and Japan. Investors in Yankee CDs look to the creditworthiness of the parent organization in assessing their risk, since the obligation of a branch of a foreign bank is in actuality an obligation of the



<sup>4</sup> This conclusion is reached by Crane [3]. It should be pointed out, however, that investors may be willing to accept somewhat lower yields on the CDs of money center banks if these instruments have greater marketability than CDs issued by regional banks.

parent bank. The Yankee CD market is primarily a shorter term market; most newly issued instruments have maturities of three months or less.

Foreign banks have operated branches in the U. S. for many years, most being located in New York City. These banks were initially established to provide credit services to their parent banks' multinational business customers. Their number increased greatly during the 1970's, and the U. S. branches became more aggressive competitors for the loan business of U. S. corporations. Their major sources of funds have included borrowings from foreign parent organizations, purchases in the Federal funds market, and more recently the issuance of large time deposits to U. S. investors. At year-end 1979 the time deposits of U. S. branches of foreign banks due to private investors and public bodies totaled about \$25 billion. It is estimated that about \$20 billion of this amount was in the form of negotiable CDs. Some individual foreign branches have Yankee CDs outstanding well in excess of \$1 billion.

The U. S. branches of foreign banks at first placed most of their Yankee CDs directly with their established loan customers, who through experience were familiar with the reputations of the issuers. Since their names were not well known outside this small group, the U. S. branches of foreign banks were forced to rely on dealers to market their CDs as reliance on this source of funds grew. The largest part of their offerings have until recently been placed through dealers, several of which are now active market makers for Yankee CDs. Foreign bank names have become much better known and acceptable in the U. S., however, so that today it is much more commonplace for foreign branches to sell their negotiable CDs directly at retail. Secondary market trading in Yankee CDs has increased greatly in just the last several years so that the liquidity of such instruments now rivals that of better rated domestic CDs.

An important institutional feature of foreign banking operations in the U. S. is that, until recently, foreign branches have been state-licensed and not subject to Federal Reserve regulations. Thus, until recently Yankee CDs have not been subject to reserve requirements under Regulation D. This exemption from regulation probably helped establish the market for Yankee CDs, because the U. S. branches of foreign banks could pay higher rates on their certificates than could domestic banks but still not incur higher costs than their U. S. banking competitors as a result of savings on reserve requirements. *The International Banking Act of 1978* provides that large foreign banks doing business in

the U. S. should be subject to the same Federal Reserve regulations as domestic banks. The U. S. branches of large foreign banks become subject to Regulations D and Q as of September 4, 1980.

Yankee CDs, along with certain other managed liabilities of the U. S. branches of foreign banks, became subject to reserve requirements for the first time in October 1979. This change subjected certain managed liabilities above a base amount to an 8 percent reserve requirement, which was subsequently increased to 10 percent in March 1980, and then reduced to 5 percent in May 1980. The imposition of marginal reserve requirements on the managed liabilities of the U. S. branches of foreign banks may have had the effect of slowing the growth of Yankee CDs. This is because the market is still young, with new issuing banks entering regularly. These new banks entering the Yankee CD market typically market their negotiable CDs aggressively in an attempt to build volume and goodwill quickly. Starting from a low or zero reserve exempt base, however, the newly entering banks bear a reserve cost on all of their negotiable CDs, not just a fractional amount like established issuers. This higher cost has likely discouraged new entries into the Yankee CD market.

**Thrift Institution CDs** Thrift institutions, particularly savings and loan associations (SLAs), have become active competitors for large time deposits not subject to Regulation Q ceilings. Most of their large domestic time deposits are practically if not legally nonnegotiable, i.e., there is very little secondary market activity in thrift CDs. The large denomination CDs of FSLIC insured SLAs totaled nearly \$30 billion at year-end 1979.

Recent changes in Federal Home Loan Bank Board regulations grant Federally insured savings and loans considerably broadened authority to market Euro CDs. At least one large California SLA has placed a \$10 million package of unsecured CDs in the Eurodollar market. The success of such placements depends on the size and financial strength of the issuing thrift. Other thrifts have taken steps to place Euro CDs that are backed by mortgage loan collateral. Part of this process involves obtaining a credit rating from Standard & Poor's Corporation, which is now making such ratings. So far, these mortgage-backed offerings have been for longer terms, i.e., five years.

**Nonnegotiable CDs** Nonnegotiable CDs are an important part of total large time deposits issued by commercial banks. In fact, nonnegotiable CDs of U. S. banks have grown faster than domestic negotiable CDs in recent years and now are more impor-

tant than domestic negotiable CDs as a source of funds. It is important to understand what nonnegotiable CDs are, because many investors active in the market for negotiable CDs are willing to substitute between the two types of instruments.

Nonnegotiable CDs are not considered money market instruments because they lack the liquidity of negotiable certificates. Some nonnegotiable instruments, such as time deposits open account, are legally nonnegotiable. Others, such as registered CDs, are technically negotiable but are in practice nonnegotiable because of the administrative difficulty involved in changing ownership. Some banks have ceased issuing certificates and have instead instituted book-entry accounting procedures for registered CDs. This practice seems to confirm that liquidity is a secondary consideration to investors purchasing such instruments.

Among the largest investors in nonnegotiable CDs are public bodies, e.g., state and municipal governments. Often, state law requires that public bodies invest their funds locally, that all investments be registered in the name of the governmental unit, and that investments be secured. A large share of banks' total large time deposits are secured CDs issued in registered form to state and local governments. As might be expected, regional banks are more heavily dependent upon such funds than are the money center banks.

It is not just public bodies that invest in nonnegotiable certificates, however. Some corporate investors are willing to sacrifice the liquidity provided by an instrument that can be traded in the secondary market for a small increase in yield. Also, some banks have gentleman's agreements with customers who take their registered or book-entry CDs which provide that, in the event cash is needed on an emergency basis, the bank will exchange the registered CD for a bearer CD. In addition to nonfinancial corporations, some money market funds have invested in nonnegotiable CDs.

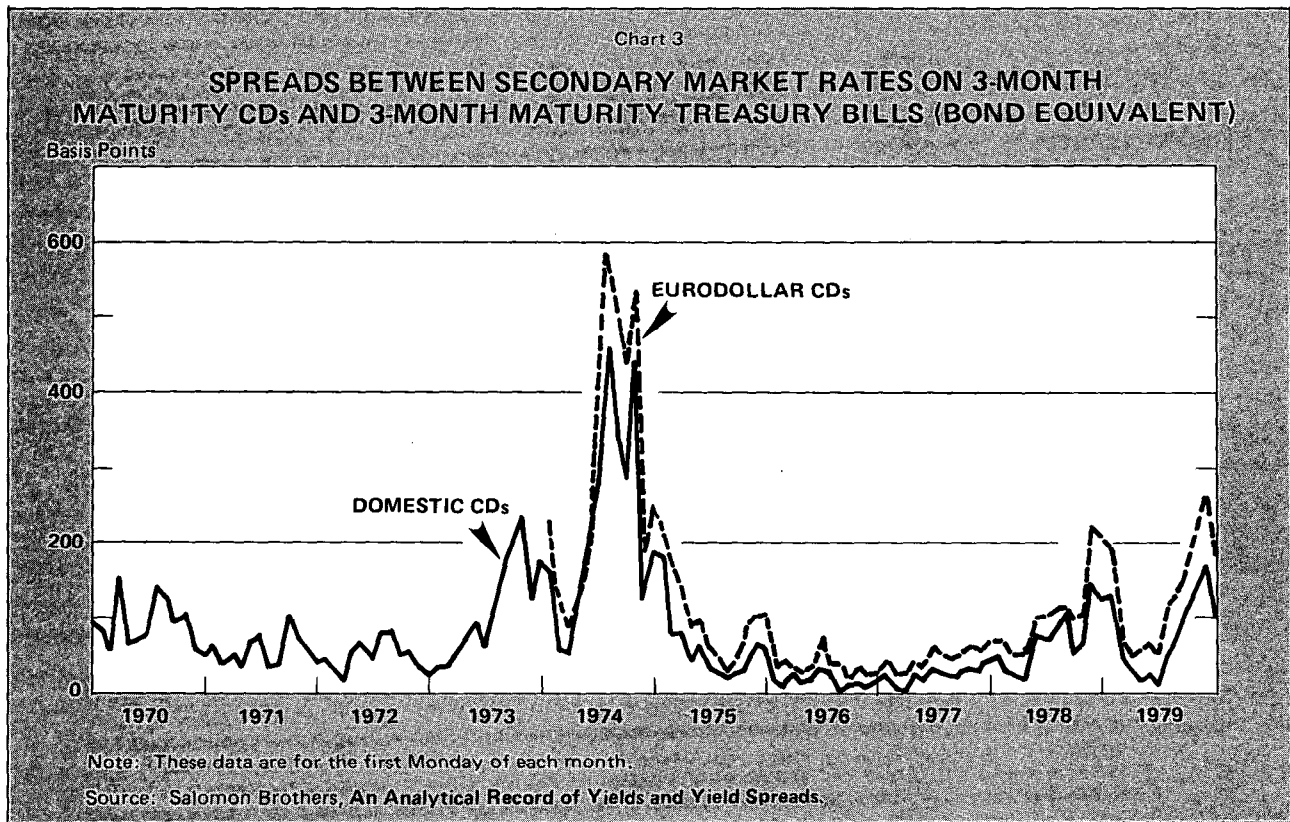
**Risk and Return** Negotiable CDs subject investors to two major types of risk, credit risk and marketability risk. Credit risk is the risk of default on the part of the bank issuing the CD. This is relevant even for U. S. banks which are insured by the FDIC, since domestic CDs are issued in large denominations and deposit insurance only covers up to \$100,000 of a depositor's funds. Marketability risk reflects the fact that a ready buyer for a CD might not be available when the owner is ready to sell. Although the secondary market in CDs is well developed, it does not possess the depth of the U. S. Government se-

curities market. These risks are reflected in the yields on negotiable CDs. It should be noted, however, that yields on money market instruments may vary for reasons other than differences in risk, e.g., due to changes in their relative supplies.

Chart 3 plots the spread between the secondary market yields on two types of 3-month CDs, domestic and Euro, and the secondary market rate on 3-month Treasury bills. The spread is positive and tends to widen in periods of high interest rates. For example, the domestic CD-Treasury bill spread was generally below 100 basis points for the periods 1971-72 and 1976-78, but widened greatly in 1973-74. The spread peaked at 458 basis points in August 1974. The chart shows that rates on Euro CDs are almost always above those on domestic CDs, typically by about 20-30 basis points, and that the Euro-domestic CD rate spread tends to widen in periods of high interest rates. The higher rate on Euro CDs in part reflects the credit risk premium required by investors in these instruments; this premium tends to increase in periods of stress in the financial markets. There is no reserve requirement against such deposits, and therefore the total cost to the issuing institution is not necessarily greater than the total cost to a domestic bank issuing a CD. In fact, the reserve adjusted costs of domestic and Euro CDs tend to be very close in times of financial market normalcy [6].

There is no published rate series for Yankee CDs. Dealers indicate, however, that Yankee CD rates move very closely, within plus or minus 10 basis points, of Euro CD rates. These two types of CDs are good substitutes and their rates should be expected to move close together except due to technical factors, such as relative supply. On average, though, Yankee CD rates average somewhat lower than Euro CD rates. There are two reasons for this. First, Yankee CDs, unlike Euro CDs are subject to U. S. laws and regulations and therefore do not bear sovereign or foreign country risk. Second, it is easier and less costly for dealers to engage in Yankee CD transactions than in Euro CD transactions. Yankee CDs are purchased in the U. S. and positions are financed with RPs or Federal funds, while Euro CDs are purchased abroad and entail international money transfers.

*Quality Ratings* One major rating firm, Moody's Investors Service, Inc., has begun to rate the CDs of banks. So far, only a small number of regional U. S. banks have received ratings and a handful of applications are in process. Foreign banks issuing Yankee CDs, however, have more actively sought formal ratings than have U. S. banks. This is understand-



able, since they are still attempting to establish their names with U. S. investors. The rating process used by Moody's for CDs is virtually identical to that used for rating commercial paper. It is not the particular issue that is rated but rather the issuing organization itself. The CD ratings, like those for commercial paper, are designated P-1, P-2, and P-3. Because of the closeness of the rating processes, one should never expect to see a divergence between a bank's CD rating and its commercial paper rating. It is possible, however, for a bank's CD rating to differ somewhat from the commercial paper rating of its parent holding company.

Standard & Poor's Corporation has begun rating the CDs of SLAs. Like Moody's, S&P has experience rating commercial paper issued by SLAs, but has so far applied bond rating methods to thrift CDs because of their longer terms. If asked to rate short-term thrift CDs, S&P will likely apply a variant of its commercial paper rating system.

**Rates and Maturities** During the first decade of their existence, negotiable CDs were written exclusively under fixed interest coupon contracts. Certificates were written specifying a particular rate of interest that would be paid for a given term to maturity. This pricing arrangement suited investors

quite well, at least during the relatively stable interest rate environment of the 1960's. Those seeking a compromise between return and liquidity could invest in short-dated negotiable CDs, while those seeking extra yield could extend the maturity of their investments out to six months or perhaps even longer. So long as the upward sloping yield curve remained the norm, banks and investors had a reasonable basis for trading off higher yield against longer term.

In the latter part of the 1960's interest rate conditions changed dramatically. Interest rate fluctuations increased, and the general level of rates began to trend upward. Under such circumstances, investors can be expected to shift their preferences to shorter term instruments, and this happened in the CD market; by 1974 the average maturity of outstanding domestic CDs fell dramatically to about two months from the three-and-one-half-month length more common in the 1960's. In September 1974 the Federal Reserve provided banks an incentive to lengthen their negotiable CD maturities by restructuring reserve requirements in such a way as to raise the reserve cost of shorter term certificates. This incentive was reinforced in December 1974 when reserve requirements were set at 6 percent for negotiable CDs with an original maturity of less than six months and at 3 percent for negotiable CDs with an original ma-

turity of six months or more. In October 1975 the reserve requirement was further lowered to 1 percent for CDs with original maturities of four years or more, and finally in January 1976 the requirement was lowered to 2½ percent on certificates with original maturities of from six months to four years. In keeping with this pattern, the marginal reserve program introduced in October 1979 exempts CDs with original maturities of one year and greater. In addition to these changes in reserve requirements, domestic banks had an incentive to increase CD maturities as a result of the deteriorating liquidity positions of their balance sheets. By the mid-1970's, therefore, the time was ripe for a fundamental change in the terms under which negotiable CDs had traditionally been offered.

*Fixed-Rate Rollover CDs* Early in 1977 a large New York bank, Morgan Guaranty Trust Company, introduced to its customers on a selective basis fixed-rate rollover CDs, or "roly poly" CDs, in minimum amounts of \$5 million. These instruments had full terms to maturity of from two to five years, but consisted of a series of 6-month maturity instruments. Investors would sign a contract to leave a deposit with the bank for, say, four years, but instead of receiving a CD maturing in four years would receive a 6-month CD. The contract obligated the investor to renew, or roll over, the 6-month instrument eight consecutive times at the rate negotiated at the inception of the contract. Although the bank hoped to qualify for the four year CD reserve requirement with these deposits, a ruling by the Federal Reserve made the rollover CDs reservable at the higher 6-month maturity reserve requirement.

These instruments bore rates somewhat above the rate on Treasury notes of equal maturity, but below the rate offered on a straight two to five year CD. The feeling was that an investor would earn the long-term rate but get enhanced liquidity since a single 6-month issue in the series could be sold in the secondary market. This fixed-rate type of instrument proved more attractive to the issuing banks than to the investing public during a period of rising interest rates. Consequently, a sizable market in fixed-rate rollover CDs never developed.

*Variable Rate CDs* Variable rate or variable coupon CDs (VRCDs or VCCDs) have the rollover feature described above but also entail periodic re-settings of the coupon rate and periodic payment of interest. Interest on each component or "leg" of a VRCD is calculated according to the same rules as on conventional CDs. The dated date is the original dated date for the first leg, and for subsequent legs

it is the date of the interest payment on the preceding leg. VRCDs were first offered in the Euro CD market, where floating rate instruments were an accepted method of doing business long before they were in the U. S. The VRCD was initially introduced in the domestic and Yankee CD markets by those large banks having Euro CD experience, but the new method of writing certificates was quickly adopted by the major regional banks as well. VRCDs were introduced domestically in 1975, grew in popularity in the latter 1970's, and have now become a major innovation in the market for negotiable CDs.

VRCDs range in full maturity from six months to four years, the most common full maturities being six months and one year. The rollover period for these instruments varies. For example, from 1975 to 1977, three- and six-month rollovers were common. The higher short-term interest rates of 1979 and 1980, however, have resulted in the three-month and one-month rollovers becoming standard. Investor preferences for full maturity and rollover frequency are directly related to expected interest rate patterns, periods of stable or declining rates leading to preferences for longer full maturities and longer rolls, and periods of rising rates and upward sloping yield curves leading to preferences for shorter maturities and shorter rolls. The four VRCD issues having the greatest popularity at present are (1) six-month (full maturity)/three-month (roll), (2) six-month/one-month, (3) one-year/three-month, and (4) one-year/one-month.

Coupon rates set on each new leg of VRCDs are based on the preceding day's secondary market CD rates reported daily by the Federal Reserve Bank of New York. These are averages of offered rates quoted by major dealers. Collection of interest payments, and of principal at final maturity, is made by presenting the VRCD to the issuing bank or the issuing bank's agent. When presented for collection of interest, the certificate is stamped with the amount of the previous period's interest and the new coupon rate. Payment of interest and principal is made in immediately available funds. VRCDs normally carry an interest premium over the rate one would expect to receive on a conventional CD. This premium, which compensates investors for the credit risk entailed by tying funds up for longer periods, increases with the maturity of the VRCD. The premium has usually been about 15 basis points for six-month full maturities, 20 basis points for one-year full maturities, and 25 basis points for eighteen-month full maturities. As in the case of conventional CDs, VRCDs issued by the top tier banks carry somewhat

lower rates than those issued by the lesser name institutions.

The typical size of a VRCD issue ranges from \$50-\$200 million for large banks and \$25-\$100 million for smaller banks, but issues as large as \$400 million are not uncommon. The largest portion of VRCD issues is underwritten by dealers, who usually charge the issuing bank a small commission for underwriting and distribution services. Dealers have been willing to take larger positions in VRCDs than in longer term conventional CDs since there is less market risk involved and because retail demand has proved quite strong. So far, retail demand has been so strong that dealers have placed a major portion of newly issued VRCDs on an order basis.

Investors treat VRCDs as a conventional CD once the coupon has been set for the last time and the certificate is on its last leg. Since VRCDs carry an interest premium over the rate paid on a conventional CD, a VRCD on its last leg offers the potential for trading profits.

Estimates by market participants place the total amount of VRCDs outstanding in early 1980 at \$12 billion, about double the amount outstanding only six months earlier. Most of these are domestic CDs. Thus, in the short time since they have become popular, VRCDs have grown to equal over 10 percent of the total volume of domestic CDs outstanding. To date, money market funds have been the most active investors in VRCDs.

**Dealers** There are currently about 25 dealers in CDs, all of which are active in the domestic CDs of top tier banks and some of which specialize in regional names or Yankee CDs. The center of the dealer market is New York City, but the larger dealers have branches in major U. S. cities and in London. Two main functions of the CD dealers are to distribute CDs at retail, either after first taking new issues into their own positions or by acting as brokers, and to support a secondary market in negotiable CDs. In accomplishing the latter, dealers must stand ready to make a market, i.e., buy and sell CDs. Bid and offering prices are constantly maintained and the typical spread is between 5 and 10 basis points, but narrower spreads on good names with short remaining terms to maturity are common.

The normal round-lot trade in negotiable CDs between dealers and retail customers is \$1 million, but increases to \$5 million for interdealer trades. There is, of course, a great deal of variety among the CDs being traded at any given time with respect to issuer, maturity, and other contractual terms. Consequently, dealers post bid and asked prices for certificates

issued by a particular tier bank, with maturity identified as early or late in a particular month. For example, the bid and ask price for a top trading name might be for "early December" or "late January."

Financing of dealer CD positions is largely done using RPs. Since CD collateral is more risky than U. S. Government security collateral, RPs against CDs are usually slightly more expensive than RPs against, say, Treasury bills. For the same reason, it is more difficult to get term RP financing for CDs. Normal practice in the RP market is to finance the face value of a money market instrument. Since CDs bear interest, dealers must finance any accrued interest on CDs held in position from some source other than RP, e.g., from capital.

Growth in dealer activity has paralleled growth in the market for negotiable CDs. As the market expanded in the 1960's daily average dealer transactions were in the \$50-\$60 million range, and the daily average dealer positions ranged from \$200-\$300 million. As mentioned, the secondary market nearly dried up in 1969, daily average dealer transactions falling to only \$9 million and daily average positions falling to only \$27 million during that year. Dealer activity burgeoned in the 1970's, when trading opportunities increased due to the more aggressive marketing of negotiable CDs by regional banks and with the development of the Yankee CD. By 1975, for example, daily average dealer positions increased about five-fold to \$1.4 billion and transactions increased sixteen times to \$800 million. By 1979, positions further expanded to \$2.7 billion and transactions to \$1.7 billion.

**Summary** The market for negotiable CDs issued domestically by U. S. banks grew rapidly but, due to the effects of interest rate regulation, unevenly during the 1960's. Regulation Q restrictions on rates that could be paid on domestic CDs led to the introduction of the Euro CD in 1966. After interest rate ceilings on domestic CDs were removed in the early 1970's the market grew dramatically. Regional banks became particularly active issuers during this period, and the U. S. branches of foreign banks began issuing Yankee CDs. Most recently, savings and loan associations have also begun issuing CDs. Investors can now choose among a number of issuers in selecting CDs, i.e., domestic, Euro, Yankee, and thrift.

Not only have the types of issuers multiplied, but the character of CD contracts has changed as well. The conventional fixed-rate CD, which is primarily a short-term instrument, has been modified to extend



the term and float the rate. The resulting instrument, the variable rate CD, has quickly gained popularity among investors. The terms under which VRCDs are offered, however, change constantly in response to investor preferences.

The rate of change in the market for negotiable CDs has been particularly rapid in recent years. This change is the outcome of competitive forces working to redesign a financial market to better suit the needs of its major participants.

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# CURRENT ISSUES IN MONETARY CONTROL\*

*Statement by*

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*Before the Subcommittee on Domestic Monetary Policy*

*of the*

*Committee on Banking, Finance and Urban Affairs*

*U. S. House of Representatives*

*March 25, 1980*

I am very pleased to be here this morning to discuss issues of monetary control and of the Federal Reserve's new definitions of the monetary aggregates. These are not the big, sexy issues of monetary policy regarding our overall monetary management for purposes of reducing inflation and maintaining a fully-employed economy. However, without proper attention to monetary control these big issues will never be resolved satisfactorily. I am, therefore, delighted that this Committee, which has taken the lead in investigating these mundane issues, is taking them up again in the current set of hearings.

I will begin by outlining briefly the importance of monetary control issues, both for the long run and for the short run. I will then discuss in some detail monetary control problems and the steps the Federal Reserve and the Congress should take to improve the accuracy of control. Finally, I shall discuss issues of measurement of monetary magnitudes.

**Importance of Monetary Control** Control of the money stock over the long run is a necessary and sufficient condition to control the rate of inflation. If we print too much money, then its value will fall, if not immediately then surely eventually. That the price level is a direct function of the quantity of money is one of the oldest propositions in economics. Indeed, in these days of faulty business cycle forecasts I would remind you that the quantity theory proposition is also one of the more reliable propositions in economics. In short, if we do not control the money stock we will not be successful in controlling inflation.

The proposition that the price level is a function of the level of the money stock, or that the rate of inflation is a function of the rate of growth of the money stock, is correct as a long-run matter. However, it is clearly the case that the rate of inflation

on a quarter-by-quarter and year-by-year basis is very loosely related to variations in money growth rates quarter-by-quarter or year-by-year. If money growth averages three percent per year for a decade, it matters relatively little whether that three percent average arises from an absolutely rock steady three percent growth per year or as an average of fluctuating money growth—say, zero percent in even years and six percent in odd years. This observation has frequently been used by the Federal Reserve and by many economists to justify a lack of concern over short-run money growth.

Indeed, in some business cycle theories variations in short-run money growth can, in principle, provide an important element of stabilizing policy. When the economy is weak money growth should be higher and when the economy is booming money growth should be lower. But I should emphasize the importance of the qualifying phrase "in principle". For countercyclical monetary policy to be successful it is obviously necessary that the variations in money growth be well-timed with respect to the needs of the economy. Although there is a lively debate among business cycle theorists over whether fluctuations in money growth can in principle be stabilizing, after the experience of the last fifteen years no one can believe that fluctuations in money growth have been stabilizing in fact. Moreover, the experience of the last fifteen years is not an aberration. Careful examination of the record from the earliest days of the Federal Reserve System suggests that there has never been a period in which monetary policy has been systematically stabilizing.

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\* Paper presented at a seminar at the Federal Reserve Bank of Richmond, March 26, 1980. The views expressed herein are those of the author and not necessarily those of the Federal Reserve Bank of Richmond or of the Board of Governors of the Federal Reserve System.

From long experience with attempts at countercyclical monetary policy in the United States and in other countries it is clear that, given the current state of knowledge, the potential gains are small and the risks are great of attempting deliberate countercyclical fluctuations in money growth. By a failure to control the money stock more carefully over the short run the Federal Reserve has lost control over the money stock over the longer run. Instead of fluctuating money growth averaging three percent over a decade, we have seen the six percent years followed by additional six percent and even eight and ten percent years. It has been all too easy to put off monetary discipline to the future—to say that this year is an especially inconvenient time to reverse last year's money surge. Time and again we have put off our money stock diet until tomorrow; we have taken too many one last drinks attempting to satisfy our apparently insatiable thirst to print more money.

It is self-evident that if we are to have stable and low money growth in the long run we must find a way either of preventing short-run money growth fluctuations from occurring in the first place or of insuring that they will in fact be offset by fluctuations in the opposite direction in succeeding periods. We have simply failed at this latter course; we should now eliminate the short-run fluctuations and do so by paying much more careful attention to close money stock control on a month-by-month basis.

There is a special advantage to tight short-run control of the money stock today. If today's inheritance were one of fifteen years of stable long-run money growth and experience with prompt Federal Reserve action to reverse unwanted changes in money growth, then money surges today would be met with a ho-hum shrug. But that is not our inheritance in 1980. With good reason, surges in the money stock today generate fears that the Federal Reserve is losing control or caving in. I personally believe that the Federal Reserve is currently doing a fine job and is very much on the right track. But my optimism is tempered with realism. In addition, I can well understand the extreme skepticism with which current Federal Reserve policy is treated in the market-place. The Federal Reserve's inner commitment is not enough; it must earn the confidence of the markets by solid and sustained performance.

I have discussed the issue of monetary control with respect to the Federal Reserve's responsibilities but let me hasten to add that the Federal Reserve needs consistent and sustained support from the Administration and the Congress. More often than not, the Administration and the Congress have

badgered the Fed to do the wrong thing instead of badgering the Fed to stop doing the wrong thing.

One of my favorite examples of harmful pressure on the Fed occurred in October 1977. As reported in the *Wall Street Journal* the next day, on October 20, 1977 the White House posted a "Notice to the Press" that criticized Federal Reserve policy. The thrust of that notice was that the Fed's efforts to restrict money growth were forcing up interest rates which would damage the economy. Near the end of the *Wall Street Journal* report is the following paragraph:

After cautioning about the dangers of further tightening, the statement declared: "Rapid growth of the money supply is a matter of concern when it occurs in the context of very rapid economic expansion, high employment and a worsening outlook for inflation. Those are not the circumstances we face presently." The word "not" was underlined.

The entire article from which the above paragraph is extracted makes for very sobering reading indeed after the inflationary experience of the last two years.

**Technical Problems in Monetary Control** Let me now turn to technical issues of monetary control. Initially, let us assume that we want to control one of the currently defined monetary aggregates, either M-1 or M-2.

The basic structure of the monetary control problem is institutionally rather complicated but intellectually rather simple. Federal Reserve open market operations—the purchase and sale of government securities by the Fed—control the monetary base, which is defined as the sum of currency in circulation and bank reserves. When the Federal Reserve buys government securities, it pays for them by writing a check on itself, which directly increases the reserves of the banking system. Conversely, when the Federal Reserve sells government securities it receives checks in payment and clears those checks by subtracting them from bank reserve balances on deposit at Federal Reserve Banks. With exceptions to be discussed below, through Federal Reserve open market operations the monetary base can be controlled to the penny.

This basic fact is extremely important. The Federal Reserve is under no obligations of any contractual or technical kind to engage in open market operations. If the Fed stops buying government securities, then the monetary base will stop growing. It may or may not be wise for the Federal Reserve to stop the growth of the monetary base in its tracks. But let there be no misunderstanding; although the Federal Reserve and many economists frequently say

that the Fed "has no choice" concerning increases in the monetary base, those views refer to policy and not to any technical impediments whatsoever.

While Federal Reserve control of its open market operations, and therefore of the monetary base, is the single most important element in monetary control, it is nevertheless true that the relationship of the money stock to the monetary base is not perfectly predictable. There are a number of reasons why this relationship is somewhat loose, and I will outline the major considerations below.

First, the monetary base has two components—member bank reserves on deposit at Federal Reserve Banks and currency in the hands of the public. Currency is one of the components of the money stock. Reserves, however, are not a direct component of the money stock but rather support the deposits that are a component of the money stock. The importance of the currency/deposit ratio will be discussed later; at this point let us consider why the relationship of deposits to reserves is not perfectly stable and predictable.

Commercial banks that are member banks are required to hold reserves in specified percentages of various classifications of deposits. These required reserve ratios differ substantially from one bank to another. As of this writing, required reserves against demand deposits of more than \$400 million are 16.5 percent, while the requirement for deposits of less than \$2 million is only 7.5 percent. If a depositor writes a \$100 check on an account in a very large bank and that check is deposited in a very small bank, then in the first instance there is no change in deposits for the two banks together; the large bank's deposits decline and the small bank's deposits increase by the same amount. However, the large bank had been holding 16.5 percent required reserves, or \$16.50, against that \$100 deposit whereas the small bank must hold only 7.5 percent, or \$7.50, against that deposit. Thus, even though there is no change initially in total deposits, the transfer of deposits releases reserves of \$9.00 and leaves the banking system with surplus reserves which may be used to support deposit expansion.

Differential reserve requirements on different size banks destabilize the average reserve requirement for the banking system as a whole. As deposits are shifted from one bank to another a given total of reserves in the banking system can support a larger or smaller total of deposits. The needed reform is simple and obvious. All banks (and other financial institutions) should be subject to the same flat reserve requirement on their deposits independent of

bank size. The current bill on Federal Reserve membership and reserve requirements will move far in this direction although, because of a lower requirement on the first \$25 million of transactions type deposits, not quite all the way to absolutely uniform requirements.†

Another reason for the instability in the reserve/deposit ratio in the aggregate is that reserve requirements are assessed against many bank liabilities that

† Editor's note: The reference here is to the Depository Institutions Deregulation and Monetary Control Act of 1980 which was passed on March 31 and which establishes, effective September 1, reserve requirements of 3 percent on the first \$25 million of transactions deposits and 12 percent on amounts in excess of that figure.

Table I

## RESERVE REQUIREMENTS: FEDERAL RESERVE BULLETIN, JANUARY 1965

### RESERVE REQUIREMENTS OF MEMBER BANKS

(Per cent of deposits)

Effective date <sup>1</sup>	Net demand deposits <sup>2</sup>			Time deposits	
	Central reserve city banks <sup>3</sup>	Reserve city banks	Country banks	Central reserve and reserve city banks	Country banks
In effect Dec. 31, 1948..	26	22	16	7½	7½
1949—May 1, 5.....	24	21	15	7	7
June 30, July 1.....	23½	20	14	6	6
Aug. 1, 11.....	23½	19½	13	5	
Aug. 16, 18.....	23	19	12		5
Aug. 25.....	22½	18½			
Sept. 1.....	22	18			
1951—Jan. 11, 16.....	23	19	13	6	6
Jan. 25, Feb. 1.....	24	20	14		
1953—July 1, 9.....	22	19	13		
1954—June 16, 24.....	21			5	5
July 29, Aug. 1.....	20	18	12		
1958—Feb. 27, Mar. 1.....	19½	17½	11½		
Mar. 20, Apr. 1.....	19	17	11		
Apr. 17.....	18½				
Apr. 24.....	18	16½			
1960—Sept. 1.....	17½		12		
Nov. 24.....					
Dec. 1.....	16½				
1962—Oct. 25, Nov. 1.....				4	4
In effect Jan. 1, 1965.....		16½	12	4	4
Present legal requirement:					
Minimum.....	10	7	3	3	3
Maximum.....	22	14	6	6	6

<sup>1</sup> When two dates are shown, first-of-month or midmonth dates record changes at country banks, and other dates (usually Thurs.) record changes at central reserve or reserve city banks.

<sup>2</sup> Demand deposits subject to reserve requirements are gross demand deposits minus cash items in process of collection and demand balances due from domestic banks.

<sup>3</sup> Authority of the Board of Governors to classify or reclassify cities as central reserve cities was terminated effective July 28, 1962.

NOTE.—All required reserves were held on deposit with F.R. Banks, June 21, 1917 until late 1959. Since then, member banks have also been allowed to count vault cash as reserves, as follows: Country banks—in excess of 4 and 2½ per cent of net demand deposits effective Dec. 1, 1959 and Aug. 25, 1960, respectively. Central reserve city and reserve city banks—in excess of 2 and 1 per cent effective Dec. 3, 1959, and Sept. 1, 1960, respectively. Effective Nov. 24, 1960, all vault cash.

do not appear in the definitions of the money stock. For example, when bank liabilities in the form of certain managed liabilities increase, banks must hold additional reserves to satisfy their reserve requirement against those liabilities. With less reserves available to support demand deposits, assuming the total supply of reserves is unchanged, growth in managed liabilities will force a reduction in total deposits.

In recent years the Federal Reserve has continually moved in the direction of more complicated reserve requirements and so the problem of instability in the reserve/deposit ratio has been exacerbated. Table I and Table II show the reserve requirement schedules

reported in the *Federal Reserve Bulletins* for January 1965 and January 1980. Table I is small and reports all reserve requirement changes between December 31, 1948 and January 1, 1965. Table II is large, has extensive fine print in footnotes, and can only report reserve requirements in effect on one date, December 31, 1979, and the date when those requirements took effect.

Comparing the two reserve requirement tables it is clear that reserve requirements have been used for all sorts of purposes other than money control. Indeed, it is fair to say that monetary control issues have rarely even been considered when the Federal Reserve has changed the reserve requirement structure.

Table II

## RESERVE REQUIREMENTS: FEDERAL RESERVE BULLETIN, JANUARY 1980

### 1.15 MEMBER BANK RESERVE REQUIREMENTS<sup>1</sup>

Percent of deposits

Type of deposit, and deposit interval in millions of dollars	Requirements in effect December 31, 1979		Previous requirements	
	Percent	Effective date	Percent	Effective date
<i>Net demand<sup>2</sup></i>				
0-2.....	7	12/30/76	7½	2/13/75
2-10.....	9½	12/30/76	10	2/13/75
10-100.....	11¾	12/30/76	12	2/13/75
100-400.....	12¾	12/30/76	13	2/13/75
Over 400.....	16¼	12/30/76	16½	2/13/73
<i>Time and savings<sup>2,3,4</sup></i>				
<i>Savings.....</i>	3	3/16/67	3½	3/2/67
<i>Time<sup>5</sup></i>				
0-5, by maturity				
30-179 days.....	3	3/16/67	3½	3/2/67
180 days to 4 years.....	2½	1/8/76	3	3/16/67
4 years or more.....	1	10/30/75	3	3/16/67
Over 5, by maturity				
30-179 days.....	6	12/12/74	5	10/1/70
180 days to 4 years.....	2½	1/8/76	3	12/12/74
4 years or more.....	1	10/30/75	3	12/12/74
	Legal limits			
	Minimum		Maximum	
<i>Net demand</i>				
Reserve city banks.....	10		22	
Other banks.....	7		14	
Time.....	3		10	
Borrowings from foreign banks.....	0		22	

1. For changes in reserve requirements beginning 1963, see Board's *Annual Statistical Digest, 1971-1975* and for prior changes, see Board's *Annual Report* for 1976, table 13.

2. (a) Requirement schedules are graduated, and each deposit interval applies to that part of the deposits of each bank. Demand deposits subject to reserve requirements are gross demand deposits minus cash items in process of collection and demand balances due from domestic banks.

(b) The Federal Reserve Act specifies different ranges of requirements for reserve city banks and for other banks. Reserve cities are designated under a criterion adopted effective Nov. 9, 1972, by which a bank having net demand deposits of more than \$400 million is considered to have the character of business of a reserve city bank. The presence of the head office of such a bank constitutes designation of that place as a reserve city. Cities in which there are Federal Reserve Banks or branches are also reserve cities. Any banks having net demand deposits of \$400 million or less are considered to have the character of business of banks outside of reserve cities and are permitted to maintain reserves at ratios set for banks not in reserve cities. For details, see the Board's Regulation D.

(c) Effective Aug. 24, 1978, the Regulation M reserve requirements on net branches due from domestic banks to their foreign branches and on deposits that foreign branches lend to U.S. residents were reduced to zero from 4 percent and 1 percent, respectively. The Regulation D reserve requirement on borrowings from unrelated banks abroad was also reduced to zero from 4 percent.

(d) Effective with the reserve computation period (beginning Nov. 16, 1978, domestic deposits of Edge corporations are subject to the same reserve requirements as deposits of member banks.

3. Negotiable order of withdrawal (NOW) accounts and time deposits such as Christmas and vacation club accounts are subject to the same requirements as savings deposits.

4. The average reserve requirement on savings and other time deposits must be at least 3 percent, the minimum specified by law.

5. Effective Nov. 2, 1978, a supplementary reserve requirement of 2 percent was imposed on large time deposits of \$100,000 or more, obligations of affiliates, and ineligible acceptances.

Effective with the reserve maintenance period beginning Oct. 25, 1979, a marginal reserve requirement of 8 percent was added to managed liabilities in excess of a base amount. Managed liabilities are defined as large time deposits, Eurodollar borrowings, repurchase agreements against U.S. government and federal agency securities, federal funds borrowings from nonmember institutions, and certain other obligations. In general, the base for the marginal reserve requirement is \$100 million or the average amount of the managed liabilities held by a member bank, Edge corporation, or family of U.S. branches and agencies of a foreign bank for the two statement weeks ending Sept. 26, 1979.

NOTE. Required reserves must be held in the form of deposits with Federal Reserve Banks or vault cash.

A typical recent example is the addition on March 14 of reserve requirements on increases in consumer revolving credit and money market mutual fund shares. If the Congress wants to discourage growth in these items, then it should do so by an explicit tax rather than by a hidden tax in the form of a reserve requirement that will make monetary control, and therefore inflation control, more difficult. It is precisely because the Federal Reserve and the Administration have been willing to use devices of this type that our reserve requirements system is a mess. There ought to be a law against it.

A relatively minor, but unnecessary, factor of the same type is the existence of reserve requirements against U. S. Treasury deposits in commercial banks ("tax and loan" accounts), which are not included in any of the various M's. As these Treasury deposits rise and fall, total required reserves rise and fall, changing the ratio of total reserves to deposits that are included in the various M's. Reserve requirements against Treasury deposits in commercial banks should be eliminated.

Another factor that has reduced the stability of the ratio of reserves to deposits is the system of lagged reserve accounting introduced in 1968. Tight monetary control requires that there be a predictable relation between the reserves the Federal Reserve creates or destroys and the deposits banks create or destroy. Under our present system of lagged reserve accounting, reserve requirements for a given statement week are based on banks' deposits two weeks earlier. Looked at the other way around, bank deposit creation in a given week will not change a bank's required reserves at all in that week but only with a lag of two weeks.

Because there is a zero reserve requirement contemporaneously, this relation between reserve creation one week and deposit creation that same week is more variable than used to be the case. Moreover, bank deposit creation in one week may lead the Federal Reserve to simply ratify the deposit creation by supplying the required reserves two weeks later. After all, no matter how stingy the Federal Reserve is in supplying reserves this week there is absolutely nothing the banks can do this week about the level of their deposits two weeks ago. Since the banks can not do anything about their deposits of two weeks ago, there is a natural tendency for the Federal Reserve to avoid putting banks through a wringer that can not today change what happened in the past, and so to simply underwrite banks' deposit creation with minimum fuss.

The solution to the lagged reserve accounting prob-

lem is simple; the Federal Reserve should move promptly to a contemporaneous reserve accounting system. It should admit that moving from contemporaneous accounting to lagged accounting in 1968 was a mistake.

Let me now look quickly at the currency issue. When individuals cash checks at banks, they withdraw currency from banks and in the first instance there is simple exchange of deposits for currency with no change in the total of currency in circulation plus deposits. However, since currency in the vaults of the banks—vault cash—is one of the components of bank reserve balances used for meeting legal reserve requirements, banks will find that they have a reserve shortage when currency flows out of banks into general hand-to-hand circulation. Unless the currency drain is offset by Federal Reserve open market operations, banks will be forced to contract deposits further. A currency drain out of the banking system tends to depress the money stock; a currency flow into the banking system tends to expand the money stock.

The Federal Reserve attempts to avoid this instability by open market operations offsetting currency flows. However, the required amount of open market operations is always subject to uncertainty because flows into and out of vault cash can occur without the Federal Reserve discovering the fact until the data are reported with a lag of about a week. That lag is not very important in practice; however, the problem can be eliminated completely by a simple change in Federal Reserve regulations. The reserve regulations should be altered so that vault cash in the banks would not count as one of the components of bank reserves but rather would be treated as a deduction from gross demand deposits in calculating net demand deposits subject to reserve requirements. This treatment would be the same as the one that presently applies for bank cash items in the process of collection—checks held by banks that are drawn on other banks and are in the process of being collected.

The discussion so far has assumed that the Federal Reserve can control the size of the monetary base—the sum of bank reserves and currency in circulation—to the penny if it chooses to do so. In fact, that assumption is not quite correct.

To begin with, it must be emphasized that although the Federal Reserve has always had the technical means to control the monetary base extremely accurately, until last October 6 it has never chosen to do so. Especially in recent years the Fed has chosen instead to peg the Federal funds rate—the interest

rate banks charge when they lend reserve balances to each other. Whenever the Federal funds rate tended to rise above the Fed's target the Fed would supply reserves to check the increase; whenever the funds rate tended to fall below the Fed's target the Fed would absorb reserves to check the fall.

The pegging of the Federal funds rate was ended in substantial degree last October. The Federal Reserve widened the range of Federal funds rate fluctuations that it would tolerate without intervening in the market. However, the Fed has not adopted the policy of permitting the funds rate to fluctuate with market forces without any intervention whatsoever. I would be more confident that the October 6 reforms were permanent if the Federal Reserve would abandon its intervention policy altogether and control its open market operations without reference to the Federal funds rate.

There are two technical impediments to precise Federal Reserve control of the monetary base. The first arises from so called "operating factors". The most important of these is Federal Reserve float. In the process of clearing checks, the Federal Reserve on the average adds reserves to banks' reserve accounts before the checks are cleared and subtracted from other banks' reserve accounts, thus injecting extra reserves into the banking system. There would be no problem if float were constant, but in fact float fluctuates in a rather random and unpredictable fashion. For example, whenever a major winter snow storm disrupts operations at O'Hare Airport checks are cleared more slowly and float balloons. Perhaps the Federal Reserve could predict fluctuations in float more accurately if it were to add several meteorologists to its staff; on the other hand, perhaps not. The only practical way for the Fed to reduce the fluctuations and the average size of float is to invest additional resources in computers and personnel to speed check clearing.

Another volatile operating factor involves changes in U. S. Treasury deposits at Federal Reserve Banks. When checks are drawn on these accounts funds are transferred to member bank reserve accounts, increasing bank reserves and the monetary base. Conversely, when tax receipts and the proceeds from sales of U. S. Government securities are deposited in U. S. Treasury accounts at Federal Reserve Banks, member bank reserve accounts decline. The Federal Reserve and U. S. Treasury have worked together for many years to forecast changes in Treasury deposits at Federal Reserve Banks, so that open market operations can offset these changes. To my knowledge there are no further steps available to reduce

the disturbances to the monetary base caused by Treasury operations.

The second important technical impediment to precise Federal Reserve control over the monetary base is the operation of the Fed discount window. Member banks can borrow at their own initiative from the Federal Reserve, and these borrowings create additional reserves. Member bank borrowing through the discount window fluctuates a great deal and these fluctuations are largely unpredictable. Banks can create deposits first and then borrow the reserves necessary to meet the reserve requirements against those deposits later. Or banks can let deposits run off and use the reserves released from reserve requirements to pay off borrowings at the discount window rather than to make new loans that will bring deposits back to their original level.

To some extent, the Federal Reserve can control the amount of borrowing through administrative means. However, the only really reliable method of controlling bank borrowing is to insure that the banks do not have an incentive to do so. The discount window should be closed, except for borrowing in a genuine liquidity crisis or other emergency applying to one or more banks. The vast bulk of borrowing through the discount window has always been for an entirely different purpose—that of short-run reserve adjustment by member banks. The window works rather like the overdraft loan feature of my checking account, except that much of the time the discount rate is below market rates of interest and so banks are *subsidized* when they borrow at the discount window to avoid their reserve balances falling below required levels. It is easy for me and easy for a bank to avoid an overdraft; all we need do is keep a margin of extra funds in our accounts and monitor the accounts carefully to keep track of our balances.

Banks do not want to hold excess balances earning zero interest; neither do I. But that is no reason for an agency of the Federal Government to lend to me at a subsidy rate so that I can avoid an overdraft while keeping my excess balances near zero. For some time I have recommended a different mechanism. Banks should be permitted to carry over a reserve deficiency to the next statement week, but with the penalty that in the next week extra reserves must be held equal to 110 percent of the deficiency. Thus, if a bank has a deficiency, it would in effect borrow from its next week's reserves rather than from the discount window, and so no additional reserves would flow into the banking system to raise the monetary base. Similarly, to be symmetrical and ease banks' reserve management problems, the Fed

should permit a 90 percent carryover of excess reserves.

Even on emergency borrowings the discount rate should be kept continuously above market rates of interest so that banks have an incentive to borrow in the market place rather than to find an excuse to have an emergency so they can borrow from the Federal Reserve at a subsidy rate. If a bank needing funds borrows in the market place, then it must borrow reserves from some other bank and such borrowing does not change the total amount of reserves in existence.

The Federal Reserve should not rely on discretionary changes in the discount rate to keep it above market rates of interest, but rather should tie the discount rate to market rates of interest in an automatic fashion. My recommendation is that the discount rate charged in a particular week should always be a percentage point above the average three-month Treasury bill rate in the prior week.

The reform of tying the discount rate to market rates of interest, however, is always subject to the problem of untying. I would like to see the Congress write a discount rate formula into the Federal Reserve Act subject to change only in emergency circumstances. The Congress has not provided the Federal Reserve with unlimited authority to change reserve requirements and it should not provide unlimited authority for discount rate changes either.

One final element of the monetary control process needs to be examined—the matter of data availability. The relation between the monetary base and the money stock can be made substantially more stable and predictable, but it will never be precisely predictable. For this reason, it is of great importance that the Federal Reserve have accurate and timely data on the assets that are included in the various definitions of the nation's money stock. The Federal Reserve should be granted broad authority by the Congress to collect the monetary data it needs. One of the biggest gaps in the past was timely data on deposits in nonmember banks. That situation has improved substantially in recent years but there are other gaps in the data base. If the Congress is concerned about inflation then it must be concerned about the amount of money in circulation. And if it is concerned about the amount of money in circulation, then it must provide the Federal Reserve with the power to collect the data necessary to measure that magnitude.

The above list of recommended reforms in the Federal Reserve's monetary control mechanism may fairly be described as a laundry list. The fact of the

matter is that improved monetary control is a matter of a large number of individually small reforms. I have worked on this topic for some period of time, beginning with a paper in 1972<sup>1</sup> that provided an extensive analysis, including empirical estimates, of self-inflicted regulatory impediments to accurate money stock control. The Federal Reserve Board and staff have never been very interested in the subject, and have never conducted a comprehensive study of the issues involved. The individual topics have been treated, if at all, on a piece meal basis and reform has generally been rejected on the grounds that the individual matter is too small to be worth doing in the light of other compelling considerations. This attitude of unconcern reflects, I believe, a general attitude of unconcern over the Federal Reserve's most basic and most important function—that of controlling the quantity of money. In recent years the Fed has greatly improved its data and the conceptual basis of its monetary measures; it ought to put at least as much effort into reforming its own reserve regulations and monetary control procedures.

**Money Stock Measurement** The Federal Reserve has recently announced new definitions of its monetary aggregates. I believe that it has done an excellent job in this matter. There were many difficult issues involved and many judgment calls had to be made.

Part of the Fed's problem in the redefinition project was a data problem. A number of newly invented assets and changed market practices had to be investigated with a view as to whether these new assets should or should not be included in the new concepts of money. In a number of cases the data available were substantially weaker than desirable for the purpose of making these decisions. In some cases assets that on a conceptual basis ought to be included in a redefined money stock could not be included because of the absence of data. For example, there is a strong case for including travelers checks outstanding in one of the monetary aggregates, but historical data on the amounts outstanding do not exist and there seems little likelihood of obtaining authority to collect such data.

My only quarrel with the Fed's new money stock definition is that the M-1A concept makes no sense. The M-1A measure is essentially the old M-1—that is, M-1 without any corrections for the new types of checking accounts that created the need for

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<sup>1</sup> William Poole and Charles Lieberman, "Improving Monetary Control," in Arthur M. Okun and George L. Perry, eds., *Brookings Papers on Economic Activity*, 1972:2, 293-335.



redefinition of M-1 in the first place. I recommend that the Fed drop the M-1A concept and that the House and Senate Banking Committees ask the Fed not to present money growth targets for M-1A.

The major redefinition issue is not the job the Fed did—except for the M-1A concept it did an excellent job—but the likelihood that the new definitions will soon be obsolete. At today's interest rates the prohibition of interest on demand deposits and Regulation Q interest ceilings are producing very extensive efforts at avoidance and serious distortions in our monetary data. For example, the M-1B measure includes NOW accounts, an obviously necessary revision in the definition of M-1. However, some years ago there was considerable ambiguity as to whether NOW accounts were really substituting for demand deposits, or whether the check withdrawal feature was simply a cheaper and more convenient way of withdrawing funds from a savings account. The problem was a direct result of the prohibition of interest on demand deposits; were it not for that prohibition, NOW accounts would never have been invented. Similarly, money market mutual fund shares have been added into the new M-2. Here again, there is substantial ambiguity about the proper treatment of money market fund shares. The problem would never have existed were it not for Regulation Q ceilings on time deposits. The entire money market mutual fund industry would not exist without that one regulation.

The market will continue to invent and innovate to get around existing regulations of the types I have mentioned above. These forces are not to be regretted; they reflect the very same profit-seeking and innovative behavior that is responsible for computers, jet aircraft, and the entire range of technological advance that has produced our high standard of living. But financial innovations motivated by regulatory avoidance will pose continuing difficulties for interpretation of monetary data. Reform of monetary control might make possible much more accurate control of, say, M-1B as currently defined but we will always be in danger of controlling a magnitude that has become increasingly out-moded because of financial market innovations.

To appreciate what interest rate controls have done it is worth noting that the menu of financial assets available in 1965 was very similar to that available in 1920, or in 1880 for that matter. Technical change per se has had relatively little effect on the basic structure of the financial system. The costs of clearing checks have been reduced, and the speed of clearing increased, but today a check still looks and works about the way it did 100 years ago. But since 1965 we have seen NOW accounts, POW accounts, ATS accounts, money market mutual funds, loophole certificates, and so forth. Interest ceilings are inefficient and distorting in their own right but one of their biggest costs is the monetary confusion they have caused and will continue to cause. The ceilings should be ended promptly and that is a matter for the Congress and not for the Federal Reserve.