

Financial Innovation and Monetary Indicators in Japan

The financial system of Japan has undergone substantial innovation over the past dozen years or so. A once rigid and unchanging structure of interest rates has become more flexible. Markets for bonds and short-term paper open to nonbank investors—almost nonexistent until late in the 1960s—are now active. A number of new financial instruments emerged during the 1970s. Given present trends, further changes can be expected.

Two important developments have motivated innovation. First, much higher inflation rates and greater variation in inflation rates, compared with the 1960s, has made a relatively fixed interest rate structure less workable than it was then. And, second, there has been a need to accommodate important changes in financial flows among the main domestic sectors and the world outside. In the domestic sector, government has become a larger borrower than business while business borrowing has declined and its liquidity has increased. In its external relations, Japan has emerged as a major international creditor and the yen has become more important as an international currency. Some innovations have originated in the private sector to meet new borrower or lender needs. Others have been fostered by the authorities as they faced new problems in domestic and external monetary management. Nearly

all have been subject to some official controls or guidance.

The increasing diversity of financial flows also led the Bank of Japan to abandon bank credit to the private sector as its main monetary indicator and to substitute the broader monetary aggregate, M-2—more recently M-2 plus certificates of deposit (CDs). Since 1978 the Bank has regularly forecast the growth of that aggregate one quarter ahead. But it has felt free to revise its forecasts in the light of unexpected developments. It has not adopted a money growth target, since it believes that the variability and unpredictability of the money-income relationship (*i.e.*, money velocity) have made this approach to policymaking unworkable. In Japan as elsewhere, financial innovation has been an important source of uncertainty and change in money velocity.

The first section of this article describes the institutional setting of the late 1960s and the changes in financial flows and in the economic environment since then that have spurred innovation in financial instruments held by individuals and corporations.¹ The second section deals with the gradual development of the innovations themselves and their effects on personal and corporate financial portfolios. The final section shows how those innovations have complicated the use of monetary aggregates as policy indicators and contributed to Japan's reluctance to establish targets for those aggregates.

This is the second in a series of articles on financial innovation abroad. The first, "Financial Innovation in Canada", appeared in this *Quarterly Review* (Autumn 1980), pages 1-8.

A number of persons have contributed to the development of this article. The writer would especially like to thank M. Akbar Akhtar, Hugh Patrick, Jeffrey Shafer, and John Wenninger.

¹ Innovations in interbank financial markets, also of considerable importance, are not dealt with in this article.

Forces for change

At the end of the 1960s, financial investment patterns in Japan more closely resembled those of continental Europe, where deposit-taking institutions attracted the major portion of personal and business funds, than those of the United States, where securities markets closely rivaled deposit institutions as avenues for investment.² Deposits averaged about two thirds of all business and personal financial holdings of currency, deposits, and securities in Japan in 1965-69, compared with about one third in the United States. While the Japanese stock market was very active, bond trading was negligible (Stock exchanges were closed to most bond trading from 1962 to 1966 for lack of volume) And there was virtually no market for short-term credit instruments open to nonbank investors

As in many other countries, most interest rates were subject to official control. But Japan was exceptional among industrial countries in the rigidity of interest rates on bank deposits, bank loans, and new bond issues. For most of the 1960s, those rates remained unchanged despite numerous changes in the official discount rate up and down within a 5.5 to 7.3 percent range and much wider fluctuations in interbank call money rates.³ From 1961 to 1970, the one-year bank deposit rate remained at 5.5 percent, slightly lower than the 5.8 percent consumer price inflation averaged during that period. In four of those years, real deposit rates (roughly calculated as the difference between the deposit rate and the inflation rate) were in the negative 1.1 to 2.3 percent range. The rigidity of most interest rates was made possible by comprehensive controls over bank credit, bond issues, and foreign exchange transactions as well as the absence of organized trading in outstanding bonds during much of the 1960s.

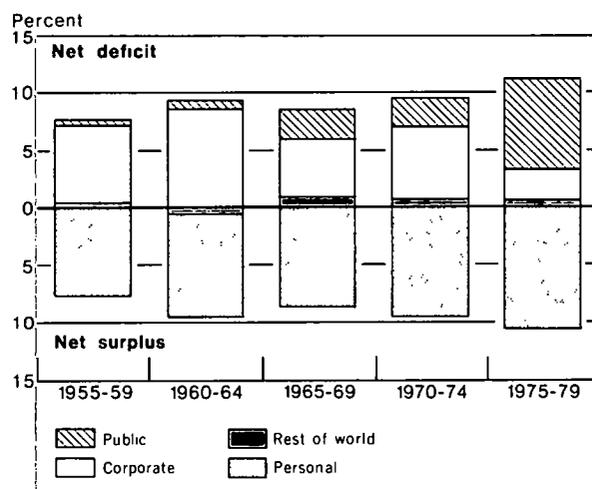
Monetary control was very close during the decade. The primary monetary target was bank credit to the private domestic sector, and an important policy instrument was the imposition of ceilings ("window guid-

² Descriptions of the Japanese financial structure as it existed at the end of the 1960s may be found in Bank of Japan, Economic Research Department, *Money and Banking in Japan*, L. S. Presnell, ed. (New York: St. Martin's Press, 1972); Hugh T. Patrick, "Finance, Capital Markets and Economic Growth in Japan", *Financial Developments and Economic Growth*, Arnold Sametz, ed. (New York University Press, 1972); and *Banking System in Japan* (Japan Federation of Bankers' Association of Japan, third edition, 1970). For a description of financial institutions in the early 1970s, see Henry C. Wallich and Mabel I. Wallich, "Banking and Finance", *Asia's New Giant*, Hugh Patrick, and Henry Rošovský, eds. (Brookings Institution, 1976).

³ While banks managed to adjust effective loan rates somewhat by altering compensating deposit requirements, and sometimes paid above-ceiling deposit rates, interest rate controls were by and large effective. See Hugh T. Patrick, "Japan's Interest Rates and the 'Grey' Financial Market", *Pacific Affairs* (Fall and Winter, 1965-66).

Chart 1

Financial Deficits and Surpluses of Major Economic Sectors in Japan in Relation to Gross National Product



Source: Bank of Japan, Flow of Funds

ance") on that credit aggregate for each bank. The effectiveness of credit ceilings was strengthened by discount rate changes, discount quotas, changes in reserve requirements, and securities transactions with banks—all undertaken to influence the availability and cost of liquid assets to the banking system.⁴

Until well into the 1960s, the main beneficiaries of the low and inflexible interest rate structure were the corporations, which regularly absorbed net flows amounting to 7 to 9 percent of gross national product (GNP). Until late in the decade, public-sector borrowing was very modest since the central government held to a balanced budget policy. All borrowing was financed by large personal saving plus a small amount of carefully controlled borrowing from abroad (Chart 1).

But, from the late 1960s onward, the pattern of financial flows underwent a significant transformation, reflecting the changing role of the external, government, and business sectors in Japan's economy. Those trends created a need for new financial instruments

⁴ An excellent description of monetary control techniques in the 1960s is contained in *Monetary Policy in Japan* (Organization for Economic Cooperation and Development, Monetary Studies Series, December 1972). An account of changing official policies on interest rate flexibility in the 1960s and 1970s is given in *Steps Toward Flexible Interest Rates in Japan* (Bank of Japan, Economic Research Department, Special Paper No. 72, December 1977).

and more flexible interest rates, thus setting in motion a process of financial innovation.

In the external sector, sustained current account surpluses appeared in the latter half of the 1960s for the first time in the postwar period, rising from about 0.8 percent of GNP in the late 1960s to well over 2 percent in 1971 and 1972. The two oil price increases of the 1970s plunged the Japanese accounts into temporary deficits, but the 1974 drop was followed by a strong return to surplus, and recovery from the 1979 deficit is now in full swing. Japan's new international creditor position and the severe year-to-year swings in the external balance led the government to adopt a compensatory capital flow policy—alternately encouraging inflows and outflows of Japanese and foreign capital—as a means of limiting changes in reserves and fluctuations in the external value of the yen. Capital flow policy was partly implemented by relaxing and tightening a battery of exchange controls. But it also required the availability of financial instruments to accommodate foreign borrowing and lending and greater flexibility in Japanese interest rates to provide incentives to the desired capital flows

In the domestic area, the central government's abandonment of a balanced budget policy in 1965 was followed by a rise in public-sector borrowing to an average of about 2½ percent of GNP in the second half of the 1960s and the first half of the 1970s. Much of the borrowing financed needed infrastructure such as roads, rail, and port facilities. Increasingly, however, fiscal policy took on a contracyclical role, providing a stimulus to supplement the effects of rising exports in the recovery phase of the cycle. With the oil price hikes of 1973-74 and subsequent world recession, the need for stimulus increased, both for domestic reasons and in response to international pressures for the United States, Germany, and Japan to lead world recovery. As a result, the public-sector deficit rose to nearly 8 percent of GNP in the latter half of the decade. The need to finance the rising government deficit underlined the desirability of an active market in government securities, a closer relationship between new issue rates and market yields on outstanding bonds, and a wider variety of debt maturities than existed in the 1960s.

The slower growth prospects of the 1970s also contributed to a downward trend in corporate investment and borrowing (the latter falling to less than 3 percent of GNP in the late 1970s) and an upward trend in corporate saving and liquidity. The corporations' holdings of liquid assets and their lessened dependence on borrowing from banks reduced the effectiveness of window guidance as the key monetary control instrument. Faced with this new problem, the authorities

concluded that more use should be made of interest rates as a means of influencing business investment decisions.

While important shifts in intersectoral financial flows generated pressures for a more flexible interest rate structure, the acceleration of inflation and its increasing variability during the 1970s served to reinforce those pressures. From 1961 through 1970 the average yearly rate of consumer price inflation was 5.8 percent and its variability around that average, as measured by the coefficient of variation,⁵ was 23 percent. But from 1971 through 1980, the average inflation rate was 9.1 percent and the coefficient of variation was 67 percent. Thus, the burden imposed on lenders implicit in a low and inflexible interest rate structure was far greater in the 1970s than it had been in the 1960s and the pressure to innovate that much greater.

The need for more flexible interest rates was recognized early, in a 1967 report by the Ministry of Finance Committee on Financial System Research. The committee did not propose eliminating official controls over interest rates. However, it did advocate loosening controls over new bond issue rates and over loan and deposit rates to allow greater responsiveness to market forces. These specific recommendations were implemented within the next few years, thus breathing new life into old instruments. More broadly, the report reflected the change in official attitudes toward interest rate flexibility, thereby setting the stage for further innovations.

Innovations and changes in financial portfolios

Innovations in financial instruments

Innovations in financial instruments developed gradually but fairly continuously during the 1970s. In most areas the government exercised strict control over the pace of change. Innovations took three major forms.

- Deposits at banks and post offices and bond issues with newly flexible interest rates.
- New forms of consumer banking.
- New financial instruments free of interest rate controls but usually subject to stringent volume controls.

Bond issues and bank and postal deposits with flexible interest rates developed early. From 1968, interest rates on new issues of government and industrial

⁵ Denoting the average four-quarter inflation rate as P , the number of quarters as N , and the difference between the inflation rate in any given quarter and the average inflation rate as d , the coefficient of variation is $(\sum d^2/N)^{0.5}/P$

bonds and on bank debentures⁶ were adjusted at intervals in response to changes in the official discount rate. In 1970, Bank of Japan guidelines for interest rates on bank deposits were substituted for the maximum interest rates previously set by the Ministry of Finance. While the new guidelines were initially as unresponsive to market rates as the old ceilings, they acquired new flexibility beginning in 1972. Since then, interest rates on new bond issues and bank deposits have moved up and down with each change in the official discount rate, but often with a lag and by lesser amounts. Rates on deposits at post offices are aligned with bank deposit rates, although postal deposits offer slightly more favorable interest-compounding features.⁷

During the high-inflation years, 1973-75, when consumer price inflation rose as high as 25 percent and averaged 16 percent, real interest rates on one-year bank deposits averaged a negative 8.5 percent. From 1976 through 1980, more moderate inflation rates and more flexible deposit rates reduced the average negative real interest rate on these deposits to about 0.6 percent. This was not very different from the real deposit rates of the 1960s.

A second group of innovations—new developments in consumer finance and related economizing in the use of low-interest demand deposits—was partly initiated by foreigners. While the foreigners' traditional commercial banking activities were severely restricted by official regulations, companies specializing in consumer credit, credit cards, factoring, and leasing were able to enter those unregulated fields. Beginning in the 1960s, they formed joint ventures with their Japanese counterparts, the Japanese contributing ready access to yen financing and foreigners (mostly Americans) contributing their extensive experience.⁸

In 1972, the Japanese banks adapted what they had learned to their regular commercial banking, introducing the "sogo account" for personal use. The sogo account customer maintains a time deposit and an

"ordinary" deposit paying a lower rate of interest than the time deposit.⁹ Payments for purchases made by credit card or prearranged automatic payments (e.g., utility charges) are automatically debited to the customer's ordinary account. Overdrafts in this account are permitted up to 90 percent of the amount in the customer's time deposit, which serves as collateral for the overdraft. The interest charge is only ¼ percentage point higher than the rate received on time deposits. Statistics on sogo accounts are not available, but the Federation of Bankers' Associations states that these accounts are now widely used.¹⁰ The development of sogo accounts tends to blur the distinction between demand deposits and savings deposits in personal money holdings, since they permit time deposits bearing relatively high interest rates to be used to finance current spending at the very modest cost of ¼ percent. Somewhat similar features may be observed in recent innovations by United States banks, for example, ATS accounts (savings accounts subject to automatic transfer) and "loophole" CDs.

A third form of innovation—new financial instruments bearing market rates of interest—was allowed to develop gradually throughout the period. The first new instrument to appear was the bond repurchase agreement (gensaki). Trading in public-sector and industrial bonds and in bank debentures had become more active in the late 1960s, helped by the reopening of the stock exchanges to those securities and by the introduction of some flexibility into new issue rates. The need of securities houses to finance their growing bond portfolios and the desire of corporations to maximize the return on their growing liquid balances were joined, as securities houses sold bonds to corporations under repurchase agreements ranging from a few days to one year. Later, a second type of gensaki transaction developed, with the securities houses acting as brokers for transactions between financial institutions and nonfinancial business firms. However, securities companies have remained the largest gensaki borrowers and business firms the largest lenders.¹¹

The market gathered momentum in the early 1970s

⁶ The power to issue debentures is mainly confined to the long-term credit banks which, in view of the long-term maturities on most of their loans, are permitted to issue debentures up to twenty times capital and surplus. The Bank of Tokyo, a specialized foreign exchange bank with few domestic branches, is permitted to issue debentures up to five times capital.

⁷ The proceeds of postal deposits are turned over to the Trust Fund Bureau of the Ministry of Finance, which invests them largely in government securities and loans to the central government, local governments, and government-related organizations.

⁸ Those developments are described briefly in T. F. M. Adams and Iwao Hoshii, *A Financial History of the New Japan* (Tokyo and Palo Alto: Kodansha International Ltd., 1972).

⁹ "Ordinary" accounts resemble passbook savings accounts in the United States. However, since personal checking accounts are rare and ordinary accounts are drawn on for payments purposes, they are classified as demand deposits in Japan.

¹⁰ *Banking System in Japan* (Federation of Bankers' Associations of Japan, 1979).

¹¹ For a description of the gensaki market, see Mark Borsuk, "How the Gensaki Market Works", *EuroMoney* (May 1978), and "Japan's Bond Repurchase (Gensaki) Market", *Mitsubishi Trust Report* (July 1979).

but continued free of any official control over either interest rates or volume until 1974 (a year in which *gensaki* yields touched 17.3 percent, some 12 percentage points higher than three-month bank deposit rates, the largest discrepancy ever registered). During that year, the Ministry of Finance introduced several rules for self-regulation. The rules were followed in 1976 by official Ministry guidelines covering the varieties of bonds that might be traded, the maturities of the repurchase agreements, and the institutions allowed to participate in the market. In 1978 the Ministry also imposed limits for each participating securities house (on its position as broker and its position for its own account), and the Bank of Japan set limits on each participating bank's position. Those restrictions have been eased gradually since then, while interest rates have remained free of all but occasional informal restraint

Other early innovations in financial instruments resulted from capital flow policies geared to offsetting large swings in the current account balance of payments. Aside from opening doors to Japanese residents' investments in foreign financial markets, capital flow policies also led to the development of two new financial instruments in Japanese markets: "samurai" bonds and foreign currency deposits at banks in Japan.

The samurai bond—a yen bond issued by a foreign borrower in Japan—was first permitted in 1970. Access to the market is carefully regulated, with an eye to balance-of-payments requirements and domestic bond market conditions, and is confined mainly to official borrowers. The bonds have served to increase the volume and variety of assets available to the Japanese investor, although many have been purchased by foreigners. In 1978, samurai bonds also made a minor contribution to interest rate flexibility when several issues were priced closer to the market for outstanding securities than new domestic issues were at that time.

Japanese residents were first permitted to make foreign currency deposits at Japanese banks in 1972, as authorities sought means of relieving upward pressure on the yen. These deposits were exempted from interest rate controls in 1974. But, when the yen came under substantial downward pressure in 1974, a ceiling on resident foreign currency deposits was imposed, causing them to level off until 1976, when this form of exchange control was partially liberalized. Until recently, however, such deposits acquired by conversion of yen into foreign currency (rather than by deposit of foreign currency proceeds of exports or other external transactions) were limited to ¥3 million equivalent (about \$15,000). With the coming into force of a more liberal foreign exchange law late in 1980, this restriction was removed. As funds moved strongly into foreign

currency deposits, the Bank of Japan monitored developments closely. It also raised reserve requirements on those deposits, bringing them closer to but not level with reserve requirements on yen deposits.

Late in the decade, other yen instruments issued by domestic borrowers appeared. Shorter term government bonds were introduced in 1977 and 1978. Until then, the government had confined its debt issues to seven- and ten-year maturities—aside from very low-yield Treasury bills sold mainly to the Bank of Japan and other official holders. Rather than selling bonds at auction as in the United States, the government allocated them to banks and other financial institutions at interest rates that were often lower than yields on outstanding issues.¹² The rising size of government borrowing requirements and rising interest rates increased the banks' resistance to this practice, since it threatened their earnings and created large capital losses. In partial response, the government offered a somewhat shorter maturing five-year bond in 1977. In 1978 it went further, offering two- and three-year bonds at auction rather than by allocation. Thus far, however, short-term bond issues have been small and auctions infrequent. At the end of 1980, bonds with original maturities of two to four years amounted to about 7 percent of all government bonds outstanding.

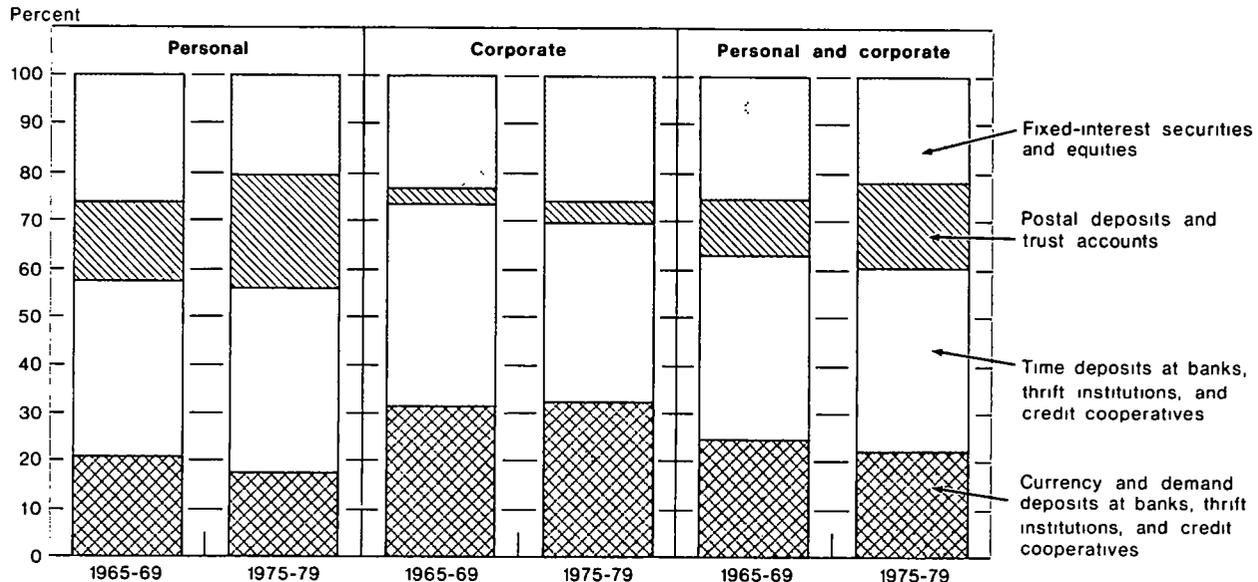
Despite the authorities' preference for longer term bond issues, the maturity of outstanding government debt is likely to decline over the next few years as the large volume of bonds issued in the latter half of the 1970s approaches maturity. Thus, the volume of short-term securities available to business and personal investors will be greatly increased. Indeed, by the mid-1980s, as much as one fifth of all government bonds outstanding could be within two years of maturity.

Large-denomination bank CDs were permitted only recently, in May 1979, after a long campaign on the part of the banks. In authorizing their issuance, the Bank of Japan specified that maturities be limited to the three- to six-month maturity range and that CDs be negotiable only with the permission of the original issuers. The Bank of Japan also strictly controlled volume, originally setting ceilings at 25 percent of each bank's capital. Since then, issue limits have been adjusted upward several times as the more active banks approached their upper limits. By April 1980, the ceiling

¹² Following an agreement made in the 1960s, an underwriting group of banks and securities companies is committed to absorb each new issue of government bonds. The share that each bank must take is set by the authorities. Banks are not permitted to resell new issues for some specified period of time. This holding period has gradually been reduced, however, and is currently only 100 days.

Chart 2

Distribution of Selected Personal and Corporate Financial Assets in Japan



The monetary aggregates defined

M-1 = Currency and demand deposits at banks and thrift institutions

M-2 = M-1 plus time deposits at banks and thrift institutions

M-3 = M-2 plus postal deposits, trust accounts, and deposits at cooperatives

Source Bank of Japan, Flow of Funds

was 50 percent of each bank's capital. In recent months, a repurchase market in CDs, which in effect allows shorter maturity transactions in CDs, has started to develop. CD interest rates are allowed to move freely, and thus arbitrage keeps gensaki (repurchase agreement) rates, CD rates, and rates in the interbank call money market fairly closely aligned¹³

The latest market instrument to appear—the government bond mutual fund introduced in 1980—is keyed to the needs of the personal sector. Fund shares are issued by the securities houses, which in turn invest mainly in short-term and other government bonds and in call money. These funds might ultimately become as popular as money market funds in the United States. But, for the present, their volume is small and carefully controlled by the Ministry of Finance.

Innovation-related changes in the composition of financial portfolios (Chart 2).

The innovations described in the preceding section have led to important changes in personal and corporate financial portfolios during the 1970s. For individuals, the more flexible interest rates offered on deposits, trust accounts, and new issues of bank debentures, as well as more active trading in debentures, apparently encouraged a massive shift in the composition of their portfolios with more going to those assets and less to equities. Dividend payments are very low in Japan, and most of the return on capital is reflected in the price of equities. However, stock prices have been volatile, creating risks that discouraged small holders. Thus, the newly flexible interest rates on deposits, trust accounts, and debentures seem to have proved appealing. Most of the deposit gain was in term deposits at post offices, with only a modest share going to bank deposits. This was apparently because post offices were more easily accessible than banks for small depositors and offered slightly more favorable interest-compounding features

¹³ Remaining restrictions in each of those markets has allowed un-arbitrated gaps between the three rates to appear from time to time. For a discussion, see *General Features of Recent Interest Rate Changes* (Bank of Japan, Economic Research Department, Special Paper No. 91, December 1980)

However, banks did attract added personal investment in trust accounts (in effect long-term deposits) and debentures (issued mainly by specialized long-term credit banks).

In a separate development, the introduction of sogo accounts led to a decline in the importance of both currency and demand deposits relative to time deposits in personal financial assets. This was because sogo accounts permit individuals to use relatively high-interest deposits as a means of payment.

In corporate portfolios, the importance of equities increased somewhat. At the same time, the development of the repurchase agreement and the growing supply of bonds eligible for repurchase agreement attracted a growing share of their liquid balances. Both developments served to reduce the importance of corporations' time deposits at banks.

The portfolio adjustments just described have in turn affected the relative importance of the main monetary aggregates in total financial assets. Chart 2 compares the importance of these aggregates in personal

and corporate portfolios in the second half of the 1970s with the situation a decade earlier. The importance of M-1—currency and demand deposits—was reduced by the tendency of individuals to economize in their holdings of those two assets and to increase their time deposits once sogo accounts became available. The importance of M-2—M-1 plus time deposits at banks—also declined slightly, largely in response to the growing corporate preference for fixed-interest securities whose liquidity was greatly enhanced by the introduction of repurchase agreements. And, finally, the importance of M-3—M-2 plus postal deposits, trust accounts, and deposits at cooperatives—increased as a result of adjustments in personal financial portfolios out of equities and into postal deposits and trust accounts.¹⁴

More detailed information on Japan's monetary aggregates and a comparison with those in the United States is given in the box.

¹⁴ The differing treatment of deposits at credit cooperatives in flow-of-funds statistics (used in Chart 2) as compared with statistics for the monetary aggregates does not materially affect the analysis.

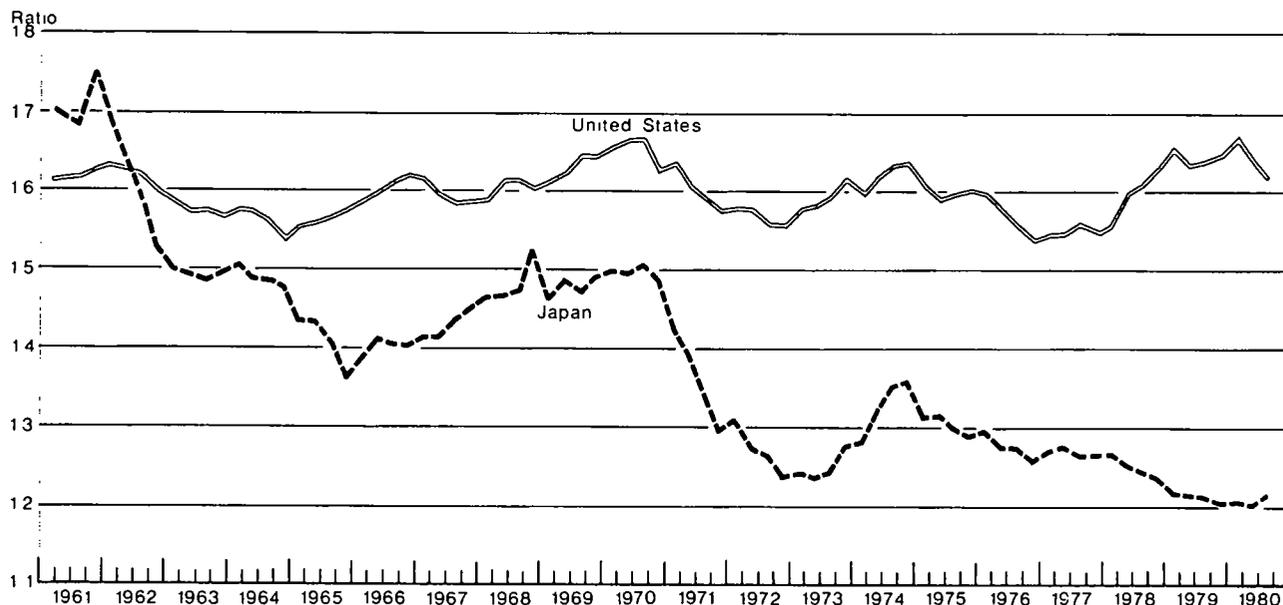
Definitions of Monetary Aggregates* in Japan and the United States

Japan	United States
M-1 . . . Currency, checkable demand deposits, and noncheckable interest-bearing demand deposits (used for payments purposes) at banks and thrift institutions.	M-1A . . . Currency and checkable demand deposits at commercial banks.
M-1' . . . M-1 plus corporations' domestic and foreign currency time deposits at banks and thrift institutions.	M-1B . . . M-1A plus ATS (automatic transfer service) and NOW (negotiable order of withdrawal) accounts at banks and thrift institutions, credit union share draft accounts, and demand deposits at mutual savings banks.
M-2 . . . M-1' plus other domestic and foreign currency time deposits at banks and thrift institutions.	M-2 . . . M-1B plus savings and small-denomination time deposits at all depository institutions, overnight repurchase agreements at commercial banks, overnight Eurodollars held by United States residents at Caribbean branches of member banks, and money market mutual fund shares.
M-2 + CDs at banks and thrift institutions.	
M-3 . . . M-2 plus deposits with postal system, deposits with credit cooperatives, and trust accounts—in effect long-term deposits—at banks.	M-3 . . . M-2 plus large-denomination time deposits at all depository institutions and term repurchase agreements at commercial banks and savings and loan associations.
	L . . . M-3 plus other liquid assets such as term Eurodollars held by United States residents, bankers' acceptances, commercial paper, Treasury bills, other liquid Treasury securities, and United States savings bonds.

* Holdings of residents and nonresidents (except central governments, official monetary institutions, and banks)

Chart 3

Income Velocity of M-2* in the United States and Japan



*Gross national product/M-2

Innovation and the usefulness of the monetary aggregates as indicators and targets

The changes in financial flows of the 1970s that motivated innovation in financial instruments also led to a change in monetary policy indicators. In the 1960s, when private corporations were the predominant borrowers, bank credit to the private sector had proved a useful indicator of the thrust and effectiveness of monetary policy. But in the 1970s, as public-sector borrowing came to overshadow private borrowing and as external transactions gained in importance, some broader policy indicator was clearly needed. While total bank credit might have served the purpose, most industrial countries at the time were adopting monetary rather than credit aggregates as indicators and targets. This may have influenced the Japanese decision to adopt M-2 as its main policy indicator.

An important reason for the choice of M-2—rather than the narrower and more homogeneous M-1 or the broader and more comprehensive M-3—as the main indicator was that M-2 came closest to being the balance-sheet counterpart of bank credit to both the private and government sectors and of the position of the monetary authorities and the banks relative to the

outside world¹⁵ (In line with this reasoning, M-2 plus CDs replaced M-2 as the primary indicator when banks were first permitted to issue CDs.) The authorities' choice of the monetary aggregate that corresponds most closely to bank credit may well have been related to their ability to influence bank credit through credit ceilings, allocation of new government securities issues to banks, and through regulation of the banks' net foreign position.

Since 1978, the Bank of Japan has published at the beginning of each quarter its forecast for the growth rate of the indicator aggregate in that quarter, expressed as a percentage change over the same quarter a year earlier (The indicator forecast was M-2 through the second quarter of 1979 and M-2 plus CDs thereafter.) The forecasts have been given in round numbers with qualifiers such as "about" or "a little less than". Their purpose has been to call public attention to

¹⁵ *Role of the Money Supply in the Japanese Economy* (Bank of Japan, Economic Research Department, Special Paper No. 60, October 1975), *Rising Trend Line of the Marshallian k* (Bank of Japan, Economic Research Department, Special Paper No. 74, February 1978). The Bank of Japan's views cited throughout this section are drawn in good part from these two papers.

monetary developments and to give some indication of the general thrust of monetary policy. Thus far, the objective has been a gradual deceleration of money growth to reduce inflation without inhibiting real GNP growth. Through the second quarter of 1980, successive forecasts spelled out a gradual decline in money growth from 12 percent to 10 percent. And, after a small unwelcome overshoot late in 1978, actual money growth followed rather closely the forecast pattern. But, for the third quarter of 1980, when M-2 plus CDs was forecast to be about 10 percent higher than four quarters earlier, implying a seasonally adjusted annual rate of growth for that quarter alone of a little over 10 percent, actual money growth dropped precipitately. In fact, the indicator rose to a level only 8.4 percent higher than four quarters earlier and growth in the single quarter being forecast dropped to 4.9 percent.

Partly in an effort to halt further overrapid deceleration in the growth of money, the official discount rate was reduced three times—in August and November 1980 and March 1981 for a total of 2.75 percentage points—to 6.25 percent. At the same time, forecasts were progressively adjusted downward, to 8 percent for the four quarters ended in the fourth quarter of 1980 and 7 percent for the period ended in the first quarter of this year, to take account of trends clearly in evidence.

Despite their introduction of quarterly forecasts, the authorities have avoided any suggestion of monetary targets, especially the targets for four quarters ahead common in other industrial countries. The Bank has given two related reasons for the way it uses monetary aggregates. First, it is unsure of its ability to control money growth closely enough to make targeting successful. And, second, it doubts its ability to forecast accurately the relationship between money growth and ultimate objectives, such as real GNP growth and inflation. Its own studies have suggested that the transmission mechanism running from changes in money to changes in ultimate policy targets, such as output and prices, is highly variable over time because it is subject to numerous independent influences—notably government expenditures, foreign demand, exchange rates, and autonomous expenditures for plant, equipment, and inventory. Further, its studies of the demand for M-2 have also shown considerable variability in the relationship between income and the demand for money balances.¹⁶ The variability of both the transmission mechanism and the money demand relationships is reflected in Chart 3, which plots the income velocity of money, GNP/M-2 and compares it

with the income velocity of the somewhat broader based M-2 in the United States.¹⁷

Much of the variability and uncertainty regarding the relationship between income and demand for money is related to financial innovation. In the 1970s, the increased availability of financial instruments bearing market rates of interest—which sometimes varied widely from rates available on bank deposits—made money demand much more sensitive to market interest rates than in the 1960s. This interest sensitivity of money demand in the 1970s is illustrated by the equations given in the appendix. Further, the fact that innovations are continuing to occur means that the money demand relationships that developed in the 1970s cannot be counted on as a guide to the 1980s.

Some of the problems that would have faced the authorities in 1979 and 1980, had they wished to set money growth targets for the twelve-month period immediately ahead, may serve to illustrate the difficulties. First, the introduction of CDs in May 1979 and the adoption of M-2 plus CDs as the primary monetary indicator changed the character of the indicator, presenting the authorities with a variable to be forecast for which there was no track record. The prediction of CDs themselves was eased somewhat by the fairly tight limits on the amount that could be issued. But it was difficult to predict whether the funds invested in CDs would come out of bank deposits and thus out of existing M-2 or out of other assets held in Japan or abroad. The analysis of actual developments in 1979 and 1980, given in the appendix, suggests that CD purchases were financed in good part by drawing down bank deposits already included in M-2. But this could not have been forecast with any degree of certainty in early 1979.

A second problem associated with targeting in 1979 and 1980 would have been how to allow for the effect on the interest sensitivity of money demand of the

¹⁷ The velocity-of-money ratio relates to a single period of time and reflects the effects of two processes, both of which may entail lags (1) the transmission mechanism running from money to income and (2) the adjustment of money holdings to the level desired at any given income. This ratio is often used in investigations of factors other than income that influence the demand for money. In its money demand studies, Japan has used the reciprocal of velocity (M/GNP , known as the Marshallian k). Unless GNP is also introduced as an independent variable in the regression, the use of GNP/M or M/GNP in such investigations requires the assumption that the income elasticity of demand for money is unitary.

The widely differing trends in the Japanese and United States velocities are related to differences in savings rates. In the second half of the 1970s, personal saving averaged over 20 percent of personal disposable income in Japan but only about 6 percent in the United States. It will be remembered that in Japan the ratio of M-2 (plus CDs) to financial assets has declined even though its importance relative to GNP has increased.

¹⁶ The Bank of Japan's studies of the transmission mechanism and the demand for money revealed even more variability and uncertainty on both counts for M-1, at least since the mid-1960s.

growing supply of market instruments that competed with money. The Bank of Japan's own money demand studies had found that during most of the 1970s money demand was primarily responsive to long-term market interest rates, such as those on bonds and bank debentures. However, the simulation experiments given in the appendix indicate that reliance on past sensitivity to long-term interest rates would have resulted in seriously overpredicting actual money demand as it developed in 1979 and 1980. Historic responses to short-term interest rates, though somewhat weaker in the past, would have provided a far better, though imperfect, basis for forecasting. Indeed, in commenting on the shortfall in the growth of M-2 plus CDs relative to the official quarterly forecast for the third quarter of 1980, the Bank of Japan attributed the discrepancy to the strong attraction of high-interest market instruments. Many such instruments have relatively short maturities.

Since the pace of innovation has quickened in the past year or so, similar forecasting problems can be expected in the future. This would, in turn, complicate monetary targeting should such a policy be adopted.

Conclusions

Financial innovation in Japan has come in response to the changing needs of a maturing economy and its increasing role in international capital markets and to higher and increasingly variable inflation rates since 1970. The authorities themselves have encouraged interest rate flexibility and the development of new financial instruments to influence business investments and international capital flows indirectly through interest rates, as direct controls (credit ceilings and exchange controls) have become less workable. But they have also applied restrictions effectively limiting the pace of financial change.

The main forms of innovation have been the introduction of flexibility into interest rates on bank and postal deposits and on new issue rates for bonds, the advent of *sogo* accounts incorporating bank overdraft facilities that blurred the line between personal demand and time deposits, and the successive introduction of new short-term instruments bearing market rates of interest.

The effects of innovations on the monetary indicator, M-2 plus CDs, and on the authorities' ability to predict its response to policy actions and other de-

velopments have varied greatly. Some innovations have had only minor effects on the demand for M-2 plus CDs, although they have altered the composition of assets included in that aggregate and also those outside it. (One example is the increasing importance of time deposits relative to demand deposits and currency—all within M-2 plus CDs—in response to consumer finance developments.) But the gradual development of nondeposit instruments bearing market interest rates has clearly increased the interest sensitivity of money demand to market interest rates, especially short-term rates, during the past few years.

The interest sensitivity of money demand could well change again in the 1980s. The inevitable growth of the supply of near-maturity government securities and the possible relaxation of limits on the growth of repurchase agreements and government bond funds would tend to make money demand more negatively sensitive to short-term interest rate changes. But continued freedom to make foreign currency deposits in Japanese banks and further development of bank CDs would work in the opposite direction since both instruments are included in the indicator aggregate. And some as yet unforeseen innovations and developments could tip the balance either way.

The problems just cited are very similar to those experienced in a number of other industrial countries, including the United States. In Japan, they have contributed to official reluctance to become committed to yearly targets for any monetary aggregate. In a recent article¹⁸ reviewing Japan's monetary policy in the 1970s, Haruo Mayekawa, Governor of the Bank of Japan, affirmed the Bank's commitment to controlling the money supply as one means of achieving price stability. But he also stated that: "The Bank has not yet started to set a specific numerical target for monetary growth, partly because empirical studies so far carried out have not found a demand for money function stable enough to justify normative monetary targetry, and partly also because experience with the control over the money supply has not yet demonstrated the sufficiently high degree of precision required for the adoption of such a strategy."

¹⁸ Haruo Mayekawa, "Monetary Policy in Japan: A Review of its Conduct during the Past Ten Years", *Kredit und Kapital* (Fourth Quarter 1979)

Dorothy B. Christelow

Appendix: Estimating and Predicting the Demand for Money in Japan, an Illustrative Exercise

The new interest sensitivity of money demand that developed during the 1970s is illustrated in the money demand equations, based on quarterly observations for 1970-78 given in the table on page 53. The variable to be determined is the demand for real money. One equation uses a long-term market rate as a measure of the opportunity cost of holding money, an own-deposit rate, and real income. The other substitutes a short-term market rate for the long-term rate. The real money variable to be determined, lagged one quarter, also enters the right-hand side of the equation, signifying the lagged adjustment response of money holders to the other independent variables.¹

Analysts attempting to forecast the growth of M-2 on the basis of historical money demand relationships face at least three problems. These are: (1) the difficulty of accurately forecasting income, interest rates, and any other variable thought to affect the demand for money, (2) the estimating errors implicit in any money demand equation even when underlying relationships are stable, and (3) the possibility that the money demand relationship itself may be changing in response to innovations.

"Predictions" of money demand in 1979 and 1980 derived from two money demand equations, also given in the table, serve to illustrate some of these problems. Since the predictions make use of actual income and interest rates in 1979 and 1980, a device not available to those forecasting the future, most of the first problem is eliminated. However, the predictions also make use of the lagged value of the dependent variable, a forecast generated by the equation and thus subject to forecasting error. With respect to the second problem, the standard errors of estimate of the two equations (given in the final column at the top section of the table) proved to be 1.6 and 1.8 percentage points.

Various facets of the third problem—whether or not the money demand relationship is being altered by innovation—can be illustrated by considering the prediction errors of the two equations (lower section of the table). First, with the adoption as primary monetary indicator of M-2 plus CDs, a variable for which no previous experience existed, it was necessary to predict whether the funds invested in the CDs would come out of bank deposits and thus out of existing M-2 or out of other assets held in Japan or abroad. If the first alternative were entirely correct, one could use a 1970-78 M-2 demand equation to forecast demand for M-2 plus CDs. But, if the second assumption were en-

tirely correct, one might use the 1970-78 equation to forecast M-2 alone, then add some reasonable fraction of the maximum volume of CDs permitted to arrive at a forecast of M-2 plus CDs.² Since equations I and II gave a better prediction of M-2 plus CDs than they did for M-2 alone, it is likely that investment in CDs was, in fact, financed by drawing down other bank deposits included in M-2. Other assets such as repurchase agreements, being subject to official volume controls, apparently remained in short supply relative to the demand for them, and thus were little affected by the appearance of a new financial instrument.

A second aspect of the innovation-related forecasting problem is the choice of the correct interest rate for denoting the yield on alternative assets. In choosing between an equation featuring a long-term market interest rate and one featuring a short-term rate, the authorities might well have chosen the first. In the equations given here, the significance of the coefficients of all variables (as measured by their t-statistics) was somewhat higher and the standard error of the equation was somewhat lower, using a long-term interest rate as a measure of opportunity cost.

In fact, the second equation, featuring a short-term market interest rate, yielded a far better prediction of money demand in 1979 and 1980. Based on equation II, four of the seven quarterly prediction errors were smaller than the standard error of estimate as compared with only one prediction for equation I.³

The greater predictive success of the equation incorporating a short-term market interest rate probably reflects the growing availability of more liquid instruments to Japanese corporations. As far as domestic short-term securities are concerned, those held by persons and corporations amounted to only a negligible percentage of M-2 in the early 1970s but to around 3 percent by early 1980. Japan's flow-of-funds statistics, the source of information on residents' holdings of domestic securities, contains no information on their holdings of the obligations of foreigners, either the samurai bonds held in Japan or foreign-currency-denominated assets held abroad. By 1980, those holdings might well have amounted to 1 to 2 percent of M-2 plus CDs.

¹ For more elaborate and detailed money demand studies, see Bank of Japan, Economic Research Department, Special Paper No. 60 (October 1975) and Special Paper No. 74 (February 1978).

² Since some banks moved more aggressively into CD issues than others, CDs outstanding were unlikely to be at the maxima permissible for all banks.

³ An equation for 1970-78 using both interest rates, long term and short term, was also tried. The short-term rate proved insignificant and the prediction errors nearly as large as for the equation using long-term rates alone. This reinforces the impression that the relative importance of long-term and short-term alternative assets was different in 1979 and 1980 than earlier in the 1970s.

Appendix (continued)

The Demand for Real Money (M), 1970-78*

Equation	Constant	YR	RL	RS	RD	M ₋₁	R ²	SEE
Short-term coefficients								
I	-2.38 † (-2.90)	0.47 † (4.15)	-0.22 † (-5.41)		0.04 (1.00)	0.60 † (7.82)	0.98	0.016
II	-2.25 (-1.96)	0.44 † (2.92)		-0.10 † (-3.15)	0.02 (0.32)	0.60 † (5.66)	0.97	0.018
Long-term elasticities								
I		1.19	-0.55		0.11			
II		1.10		-0.26	0.05			

Prediction Errors for 1979 and 1980‡

Percentage deviation of actual from predicted value

Year and quarter	Using equation I to predict:		Using equation II to predict:	
	M-2	M-2+CDs	M-2	M-2+CDs
1979 First quarter	-1.6	-1.7	-1.5	-1.6
Second quarter	-0.6	-0.8	0.4	0.2
Third quarter	3.0	2.5	2.1	1.5
Fourth quarter	4.3	3.6	2.8	2.1
1980 First quarter	9.2	8.5	5.7	4.9
Second quarter	11.7	10.6	4.2	3.2
Third quarter	13.1	12.1	2.4	1.3

Key to variables (all are in natural logarithms)

M = Real M-2 (M-2/wholesale price index)

YR = Real GNP (gross national product)

RL = Market yield on Nippon Telephone and Telegraph bonds (quarterly average of end-of-month data)

RS = Call money rate (considered as a proxy for yield on repurchase agreements, for which data are not available prior to 1977), average of daily rates

RD = Six-month deposit rates, quarterly average of end-period rates

M₋₁ = Dependent variable lagged one quarter

Figures in parentheses are t-values

* The equations are corrected for first order autocorrelation using the Cochrane-Orcutt method. The Durbin-Watson statistic, although a biased indicator of remaining autocorrelation in an equation with a lagged dependent variable when the Cochrane-Orcutt correction is used, was 2.13 for equation I and 2.00 for equation II.

† Denotes significance at the 99 percent level

‡ Predictions use the dynamic method whereby M₋₁ is generated by the forecasting equation