Chapter Title: Market Operations in Japan: Theory and Practice

Chapter Author: Kunio Okina

2 Market Operations in Japan: Theory and Practice

Kunio Okina

This paper outlines Japan's short-term money markets, the conduct of the daily operations of the Bank of Japan, and the theoretical framework behind such operations.

The modi operandi of monetary policy in recent decades have experienced several regime changes. First, from 1960 to the early 1970s, lending by financial institutions rather than the money stock was considered the most important variable linking operating variables and the ultimate objectives of monetary policy. The second period began in the early 1970s when the immediate impact of the first oil crisis had dissipated, and ended in the mid-1980s. The bank shifted its emphasis from financial institutions' lending to the money stock, especially M_2. It was in July 1978 that the Bank of Japan started publishing forecasts of broad money supply developments. Finally, since the mid-1980s, M_2 + CDs (certificates of deposit) has not declined gradually as it did during the second period, but has continued to grow around 10% per year until very recently. At the same time, the prices of goods and services have remained stable.[1]

1. One possible explanation of this phenomenon is the recent financial deregulation and innovation in Japan. Another plausible explanation lies in the sharp appreciation of the yen since October 1985 and the stock market crash of October 1987, which killed inflationary expectations. Under the sharp appreciation of the yen and rapid growth of the money supply, a combination of stable prices of goods and services (which partly reflected lower prices of tradable goods) and the rapid inflation of land prices (a nontradable factor of production) was observed. See Ito (1991).

The Bank of Japan has never committed itself to a certain rate of growth of monetary aggregates as an intermediate target and often reiterates that it watches a variety of economic indicators such as interest rates, price indices, indicators reflecting corporate liquidity conditions and the general business outlook, and the yen exchange rate. However, the Bank of Japan's monetary policy *always* begins with controlling interest rates in short-term money markets. Thus, in this paper, I will concentrate on the mechanism for controlling the operating targets, that is, short-term interest rates. Neither the relationship between the intermediate (or final) and the operating targets nor how the desired operating targets are chosen by the bank will be discussed.

In order to control short-term interest rates, central banks are supposed to change the level of the monetary base through open-market operations. However, it is difficult to apply this textbook explanation to actual market operations, especially in Japan. The reason for this is as follows. High-powered money consists of banks' reserve deposits in central bank accounts and bank notes. On the one hand, because the lagged reserve system was adopted in Japan, the demand for reserves in a given month is predetermined. On the other hand, the demand for bank notes, including vault cash, is quite insensitive to market interest rates in the short run. Therefore, the aggregate demand curve for high-powered money in any month is virtually vertical. In order to clear the market for high-powered money, the Bank of Japan has no option but to accommodate the demand for required reserves and bank notes.

Put differently, under the current institutional framework, the Bank of Japan is obliged to supply a sufficient amount of high-powered money, at least as a monthly average, so that all banks can meet their reserve requirements; hence, it will not be able to effect textbook-type operations.

Of course, over periods longer than a month, the demand for many components of high-powered money will become more interest elastic. However, this does not imply the possibility of short-term textbook-type operations. Interest rate determination in this kind of market needs an explanation more elaborate than the simple textbook story. The one given in this paper emphasizes the role of signals for equilibrium rates transmitted by the Bank of Japan.

Although the issue of the mechanism of interest rate control may appear to be technical, it has important macroeconomic implications. For example, according to the interest rate control mechanisms discussed in this paper, the level of short-term interest rates does not necessarily depend on the quantity of high-powered money or on monetary aggregates. Thus, the validity of empirical studies that use innovations in the money stock as a proxy for changes in the monetary policy stance in Japan must be called into question.

Section 2.1 is a brief review of recent developments in the short-term

---

In such circumstances, the Bank of Japan has gradually corrected its monetary policy stance, which had remained very expansionary for several years. In May 1989 the discount rate was raised by three-quarters of a percentage point, the first increase since early 1980.

money market and an explanation of the market's characteristics. Section 2.2 examines the supply and demand of high-powered money in the money market, which is the basic consideration behind the Bank of Japan's daily operations. This is followed by a detailed discussion of operating procedures and tools and their limitations. In section 2.3 the relationship between the daily operations of the Bank of Japan and the formation of overnight interest rates is explained, with special attention given to how the bank controls overnight rates through accommodative operations. Section 2.4 deals with the relationship between overnight rates and longer-term interest rates, and assesses the impact of the money market reforms of November 1988. The paper concludes with a brief summary and some caveats.

2.1   Recent Developments in the Short-Term Money Markets

2.1.1   Money Markets in Japan: the Status Quo

Short-term money markets in this paper are defined as those in which assets have a maturity of less than one year and are traded by market participants (rather than through bilateral negotiations), with the call, bill, bond repurchase (gensaki), certificate of deposit (CD), commercial paper (CP), and treasury bills and financial bills (TBs, FBs) markets being considered representative.[2]

As shown in table 2.1, short-term money markets in Japan have grown rapidly in recent years, especially since 1985 (annual rate of growth in 1975–85, 11.8%; after 1985, 29.5%), and posted a total outstanding figure of 80 trillion yen at the end of 1989. This rapid expansion is the combined result of economic growth, the creation of new money markets stimulated by deregulation and globalization, and money market reforms promoted by market participants and the Bank of Japan.

Several new short-term money markets have come into operation since 1985: (1) the uncollateralized call market (July 1985); (2) the TB market (February 1986); and (3) the CP market (November 1987).

The main recent reform measures affecting the money markets have been (1) reduction of the minimum denomination of CDs (a gradual lowering from 500 million yen to 50 million yen); (2) extension of CD maturities (a gradual widening from three to six months originally to a two-week- to two-year interval today); (3) reduction in the minimum transaction amount for TBs and FBs (from 100 million yen to 50 million yen in August 1987, and from 50 million yen to 10 million yen in April 1990); and (4) diversification of TB maturities (from six months only to three months and six months, September 1989).

---

2. Yen-denominated deposits in Japan's offshore market and yen-conversion market could also be included. In addition, though there is no official data with respect to market size, CD and CP gensaki markets may satisfy the definition in this paper.

Table 2.1   **Money Market Assets Outstanding (end of fiscal year, in 100 million yen)**

	1975	1985	1986	1987	1988	1989	Share (%)
Interbank market	71,575	159,097	223,364	268,549	338,369	384,031	46.2
Call	50,271	87,408	131,581	186,414	211,563	287,214	34.5
Collateralized	(50,271)	(78,982)	(112,755)	(158,080)	(140,324)	(161,544)	(19.4)
Uncollaterialized	(—)	(8,426)	(18,827)	(28,335)	(71,239)	(125,670)	(15.1)
Bills	21,304	71,689	91,783	82,135	126,806	96,817	11.6
Open market	73,995	159,722	217,088	273,089	355,647	447,871	53.8
Certificates of deposit	16,708	96,335	112,630	135,235	182,881	211,362	25.4
Commercial paper	—	—	—	26,373	90,530	132,163	15.9
Treasury bills	—	10,236	20,226	20,007	24,014	55,028	6.6
Financial bills	—	10,000	25,000	29,000	10,000	10,000	1.2
Securities gensaki[a]	57,287	43,151	59,232	62,474	48,222	39,318	4.7
Total	145,570	318,819	440,452	541,638	694,016	831,902	100.0

Source: Short-Term Money Market Study Group (1990).

[a]Excluding TB and FB gensaki.

Meanwhile, practices in the short-term money markets have been reviewed extensively, especially since November 1988, by the Bank of Japan and market dealers (see table 2.2).

2.1.2   Characteristics of Short-Term Money Markets in Japan

For historical and institutional reasons, money markets in industrialized countries have their own characteristics. Japan's money markets are marked by the following features.

First, the size of the markets as measured by the ratio of outstanding amounts of the traded instruments to GNP is relatively small, though recent developments have brought the ratio to GNP closer to that of the other large industrialized countries (see table 2.3).[3]

Second, the size of short-term government paper relative to the total outstanding amount of the market is smaller than in the United States (at the end of September 1989, 7% in Japan versus 26% in the United States) and closer to that of the United Kingdom and West Germany. In addition, this ratio shows wide month-to-month fluctuations in Japan. Though the amounts of short-term government debt and CP outstanding have recently been increasing, bank liabilities such as call money, bills, and CDs still dominate Japan's market.[4]

2.2   The Short-term Money Markets and Daily Market Operations

2.2.1   The Surplus or Shortage of High-Powered Money and Market Operations

The short-term money market is where short-term lending and borrowing among various economic agents (business firms, central and local governments, financial institutions, etc.) take place. Like the central banks of other developed countries, the Bank of Japan implements monetary policy through market operations aimed at adjusting the aggregate surplus or shortage of high-powered money ("funds"[5]) in short-term money markets. I will discuss its operating practices from two perspectives: (1) the relationship between the surplus or shortage of high-powered money and market operations; and (2) daily operating procedures.

The surplus or shortage of an individual bank arises from various financial transactions such as the settlement of bills and checks, domestic exchange,

3. From the end of 1985 to the end of 1988, this ratio went from 9.1 to 17.4% in Japan, 32.0 to 32.7% in the United States, 32.6 to 25.5% in the United Kingdom, and 17.9 to 18.0% in West Germany. As mentioned earlier, there are no official statistics for either CD or CP gensaki outstanding. If such figures were added to the outstanding amounts, the gap in market size between Japan and other countries would narrow.

4. The ratio of bank liabilities to the total amount outstanding in the market decreased from 80.4% at the end of 1984 to 70.8% at the end of 1989.

5. In Japan the hypothetical change in aggregate reserves held by financial institutions if the Bank of Japan were not to conduct any operations is called "the surplus or shortage of funds."

Table 2.2   **Money Market Reforms since November 1988**

Item	Before Reform	After Reform
1988		
Nov Bill maturities	1–6 months	1 week–6 months
Collateralized call money maturities	Unconditional–3 weeks	Unconditional–6 days
Uncollateralized call money maturities	Overnight–3 weeks	Overnight–6 months
Maturities of bills eligible for BOJ operations	1–3 months	1 week–3 months (mainly 1–3 weeks)
1989		
Jan Unit for call money and bills	1/16%	1/32%
Apr Bill maturities	1 week–6 months	1 week–1 year
Uncollateralized call money maturities	Overnight–6 months	Overnight–1 year
May CP operations	—	Introduced
Aug Disclosure of demand/ supply of funds and market operations	—	Figures for the previous day and revised estimates for the day: 10 A.M.
		Results for the day and estimates for the following day: 4 P.M.
Advanced acceptance of bills used as collateral for bill operations	Not accepted	Commencement of "rollover" of bill operations
Dec Borrowers of collateralized credit extended by BOJ	City banks, long-term credit banks, major regional banks, etc.	Shinkin banks, foreign banks, and some others added
Disclosure of demand/ supply of funds and market operations	Results for the day and estimates for the following day: 4 P.M.	Results for the day and estimates for the following day: 3 P.M.
		Offered operations of the day (recorded services): 10 A.M.
1990		
Jan TB operations	—	Introduced
Feb Limitations on use of uncollateralized call loans by investment funds	Up to 30% of total amount of call loans incorporated in funds	Up to 50% of the aggregate amount of call loans and bills incorporated in funds
Apr Securities eligible as collateral for BOJ advances	Publicly offered municipal bonds	Some non-publicly offered municipal bonds added
Jun Auction schedules of TB operations, rotative bond purchases, and bond repos	From offers to notice of bids 3 hrs., 30 mins.	From offers to notice of bids 2 hrs., 50 mins.

Table 2.2   (continued)

	Item	Before Reform	After Reform
Aug	Disclosure schemes for fund demand/supply and market operations	Disclosure of figures based on increase/ decrease in bank notes	Disclosure of figures based on surpluses/ shortages in the market Commencement of disclosure of difference between current reserve amount and required reserves not satisfied
Nov	Collateralized call rates	Quotation system	Commencement of offer/ bid system

Source: Nakao and Horii (1991).

deposit withdrawals, government expenditures, and so forth. However, if the surpluses or shortages among banks are added up, the aggregate net surplus or shortage of high-powered money simply corresponds to that of the government sector and the demand for cash (bank notes) by the private sector.

Since the interest elasticity of the demand for high-powered money for daily settlements is negligibly small, central bank open-market operations are essential to establish daily market equilibrium and to avoid volatile interest rate movements.

This can be confirmed by checking the budget constraints of market participants. Suppose the financial sector consists of m banks, where the simplified budget constraint of the ith bank ($i = 1, \ldots , m$) is assumed to be

(1) $$R_i = D_i - L_i - C_i + B_i,$$

where R_i = ith bank's deposits with the Bank of Japan; D_i = ith bank's deposits outstanding; L_i = ith bank's loans outstanding; C_i = ith bank's other financial assets, (if negative, other financial liabilities); and B_i = Bank of Japan lending outstanding to the ith bank. By aggregating over all banks, the following budget constraint for the financial sector is attained:

(1′)   (1)′ $\sum_i R_i = \sum_i D_i - \sum_i L_i - \sum_i C_i + \sum_i B_i.$

Next, the simplified budget constraint for the jth agent ($j = 1, \ldots , k$) in the nonfinancial private sector is assumed to be

(2) $$L_j + W_j = D_j + C_j + N_j + V_j,$$

where L_j = jth agent's borrowing outstanding; W_j = jth agent's net wealth; D_j = jth agent's deposits outstanding; C_j = jth agent's financial assets (if negative, financial liabilities); N_j = cash (bank notes) held by the jth agent; and V_j = jth agent's real capital.

Table 2.3   **Money Markets of Some Large Industrialized Countries (end September 1989)**

Country		Share (%)	Country		Share (%)
Japan (trillion ¥)			United States (billion $)		
Call	25	32.3	Federal funds and RPs	178	11.5
Bills	11	14.6	CDs[a]	396	25.5
CDs	20	25.7	CPs	507	32.7
CP	11	14.3	Bank acceptances	64	4.1
TBs	3	4.3	TBs	407	26.2
FBs	2	2.6			
Securities gensaki	5[b]	6.3			
Total	77	100.0	Total	1,551	100.0
Ratio of total to nominal GNP		19.6	Ratio of total to nominal GNP		29.4
West Germany (billion DM)			United Kingdom (million £)		
Call	311	79.2	Call	10,913	6.7
Bills	71	18.1	Interbank deposits	87,406	53.5
TBs	10	2.6	Bills	5,472	3.3
Total	392	100.0	£ demonimated CDs	43,556	26.7
			£ denominated CP	3,126	1.9
Ratio of total to nominal GNP		7.3	TBs	12,891	7.9
			Total	163,364	100.0
			Ratio of total to nominal GNP		32.0

Source: Short-Term Money Market Study Group (1990).
[a]Large-denomination time deposits (over $100,000).
[b]Excluding TB and FB gensaki.

By aggregation, we have

$$(3) \qquad \sum_j L_j + \sum_j W_j = \sum_j D_j + \sum_j C_j + \sum_j N_j + \sum_j V_j.$$

If we ignore, for the sake of simplicity, the government sector, then the balance sheet of the private sector can be described as follows.

After aggregating over the entire private sector, without open-market purchases of securities by the central bank the net supply of financial assets in the private sector is zero; that is,

$$(4) \qquad \sum_i C_i + \sum_j C_j = 0.$$

Similarly,

$$(5) \qquad \sum_i L_i = \sum_j L_j,$$

and

$$(6) \qquad \sum_i D_i = \sum_j D_j.$$

And since net wealth in the economy corresponds to real capital, we have

(7)
$$\sum_j W_j = \sum_j V_j.$$

Putting all these constraints together, we have

(8)
$$\sum_i B_i = \sum_j N_j + \sum_i R_i.$$

This equation simply shows that, in spite of the existence of various markets, the macroeconomic conditions determining the quantity of high-powered money held by the private sector (deposits with the central bank and bank notes) boil down to the budget constraint of the central bank. That is, in order to satisfy the demand for high-powered money, the Bank of Japan's lending $(\sum_i B_i)$ should equal the demand for banknotes $(\sum_j N_j)$ plus aggregate reserves $(\sum_i R_i)$ if no market operations are conducted.

In reality, the government sector affects the budget constraint of the Bank of Japan, and the Bank of Japan not only lends but also purchases financial assets. However, these do not affect the fundamental nature of market equilibrium. In fact, daily open-market operations by the Bank of Japan are based on a straightforward extension of equation (8), which includes the government sector and is expressed with flow variables:

(8')
$$\Delta R = \Delta B + \Delta G - \Delta N,$$

where ΔR = increase in reserves held by financial institutions; ΔB = increase in Bank of Japan credit; ΔG = increase in net expenditures by the government sector; and ΔN = increased bank note issuance.

Equation (8') is an identity. However, since the interest elasticity of ΔG and ΔN is quite small on a daily basis, these variables can be regarded as exogenous. ΔB is a policy variable determined by the Bank of Japan daily, according to its desired level of ΔR.[6]

Hence, market operations commence from the estimation of the shortage of funds $(\Delta N - \Delta G)$. In Japan, since the surplus or shortage fluctuates quite widely (figure 2.1 shows the weekly fluctuation in the surplus or shortage of funds in Japan and the United States during 1988), the prediction of a surplus or shortage plays an important role in conducting appropriate market operations. A brief explanation of the Bank of Japan's prediction schedule will be given, with the reservation that it is often changed following a change in market practice. The explanation that follows is, in principle, based on the situation as of January 1991.

The monthly surplus or shortage of funds for the following month, taking into account seasonality, business conditions, and information acquired from

---

6. As mentioned later, on the final day of the reserve period the Bank of Japan must extend enough credit to satisfy the aggregate reserve requirement.
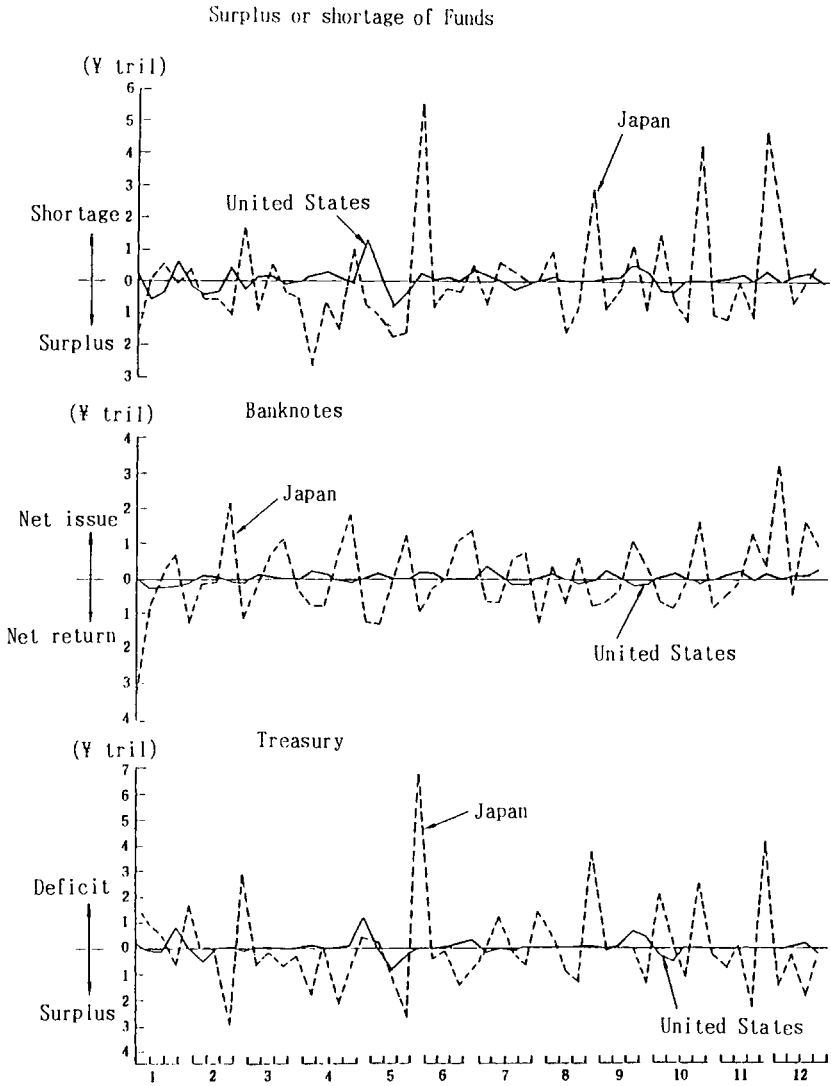
Surplus or shortage of Funds

Fig. 2.1   Fund markets in the United States and Japan (1988, weekly)
Source: Short-Term Money Market Study Group (1990).

market participants and others, is predicted and announced at the end of the current month. These figures may be revised shortly afterward on the basis of new information.

Estimates of daily shortages and surpluses, which are based on the information available at the Bank of Japan's head office, are announced each day around 3 P.M. On the morning of the day concerned, revised estimates are

released with details of the bank's planned operations. In the afternoon the figures for government net expenditures and the net demand for bank notes are revised, and preliminary figures are published around 3 P.M.

2.2.2   Schedule of Daily Market Operations

The next question is when and how the Bank of Japan enters the market. Table 2.4 shows the Bank of Japan's typical market-operation schedule in January 1991. There are two focal points during a business day that are especially important for the Bank of Japan's market operations: (1) the bill clearing settlement at 1 P.M., and (2) the final settlement at 3 P.M.

Before noon, call money transactions, mainly overnight, are usually quite active, as are various bill transactions. In the early morning, the Bank of Japan offers CP and bill operations (for the final settlement of the day) and lending; later, it offers bond, bill, and TB operations for the next business day and after. At 1 P.M., bill clearing settlement, domestic exchange settlement, and call and bill settlements are carried out. Financial institutions having insufficient reserves for such settlements must raise money by the specified times. In Japan there exist intraday call transactions—financial institutions that do not have enough reserves for settlement at 1 P.M., but that expect to receive funds by 3 P.M. (final settlement), for example, utilize second-half intraday call transactions. After 1 P.M., the total surplus or shortage in the market for the final settlement gradually becomes known. The Bank of Japan carries out its final market adjustment to offset part of the surplus or shortage of funds. The primary tool for this final operation is Bank of Japan lending to financial institutions.[7] At 3 P.M., yen-based settlements in categories such as foreign exchange and net government expenditures are effected.

2.2.3   Bank of Japan Market-Operation Instruments and Their Limitations

Presently, the Bank of Japan possesses several tools for market operations: bill purchases, CP purchases, TB purchases, FB sales, bond gensaki, and long-term government bond purchases (see tables 2.5 and 2.6).

These instruments are used for different adjustment purposes. The roles of these respective instruments in the 1980s were roughly as follows:

• Bill operations and lending by the Bank of Japan are mainly used to correct the daily surplus or shortage.[8] On some occasions, CP operations are employed for the same purpose.

---

7. In Japan, Bank of Japan lending is considered a primary market operation tool. Such lending is not carried out passively, according to the demand of private banks; rather, it is almost completely determined by the Bank of Japan.

8. Dotsey (1986) and Ueda (chap. 1 in this volume) emphasize that the Bank of Japan uses discount window lending as a tool of "dynamic" operations. Though the weight of discount window lending is substantial, usually the Bank of Japan does not consider it a tool for dynamic operations. Rather, since Bank of Japan lending involves minimal administrative work, it is considered the most convenient tool for final adjustment.

Table 2.4   **Schedule of Market Operations for January 1991**

Time	Market Transactions	BOJ Operations	BOJ Announcements

Uncollateralized call

Collateralized call   Bill   Euroyen

09:00   Offer of bill operation for final settlement of the day

90

09:30   80   Offer of BOJ lending

100
10:00   (approx.)   Securities purchases and gensaki (settled the fourth business day)   Revised fund surplus/ shortage for the day and actual figure for the prior day

TB purchases (settled the third business day)   Operation plan for the day and actual operations the prior day

Prior-day difference between required reserve and accumulated reserve

11:00   Bill operation (settled the next business day)

12:00

13:00   (Bill clearing and domestic exchange settlement)

14:00   10   20   Offer of BOJ lending for final settlements

15:00   (Final settlement)   Publication of preliminary surplus/ shortage for the day and prediction for the next business day

Preliminary announcement of operations for the day

Table 2.4   (continued)

Time	Market Transactions	BOJ Operations	BOJ Announcements
16:00			
17:00		Offer of FB operations for the next business day	Preliminary announcement of the difference between required reserve and accumulated reserve

Source: Research and Statistics Department, Bank of Japan.

Notes: While CD and CP transactions are effected almost simultaneously with Euroyen transactions, transactions tend to be concentrated in the late afternoon for next-day settlement. Bar graph figures indicate the weight of transactions normally carried out within the given time span ("guesstimation" based on the views of market participants; %).

Table 2.5   **Instruments of Monetary Control**

Instrument	Bank of Japan lending[a]	Bill operations (1) Purchase of commercial bills (3) Sale of commercial bills
Commencement	November 1962	June 1972
Intervention rate	Official discount rate	Bill rates determined in the interbank bill market
Objectives	Adjusting short-term fund shortages/surplus	Credit accommodation for short-term fund shortages
Characteristics	BOJ advances to banks are made and called back solely upon the BOJ's initiative; amounts also determined by the BOJ. This makes BOJ lending a very flexible and attractive instrument for controlling the reserve supply in the money market. (From the viewpoint of borrowing banks, they always have to anticipate that BOJ advances might be called back at any time.)	The BOJ purchases bills held by financial institutions through money market dealers[b] (bill terms: 1 week–3 months) Different from BOJ lending, in that sellers (financial institutions) do not have to worry about repurchases. (The BOJ rarely resells bills to others.)
Instrument	Bill operations (1) Purchase of commercial bills	FB operations Sales

(continued)

Table 2.5   (continued)

	(2) Sale of commercial bills	
Commencement	August 1971	May 1981
Intervention rate	Bill rates or call rates determined in the interbank bill market	Bill rates
Objectives	Absorption of short-term fund surpluses	Absorption of short-term fund surpluses
Characteristics	The BOJ issues bills, payee being the BOJ itself, and sells them to money market dealers. (1) To the call market (term: several days; rates: call rates [in this case dealers do not resell]). (2) To the bill market (term: 1–3 months; rates: bill rates [in this case dealers resell bills to financial institutions]).	The BOJ sells financing bills (short-term government bills) to money market dealers with repurchase agreements. Dealers resell to financial institutions or securities firms; which in turn distribute them to various banking and nonbanking institutions. This instrument enables the BOJ to intervene in the open market directly. Since the BOJ is able to manage only sales operations, however, FB operations are not sufficient as a monetary control measure.
Instrument	Outright purchase of bonds	Purchase of bonds with repurchase agreement
Commencement	November 1962	December 1987
Intervention rate	Rate determined by auction	Rate determined by auction
Objectives	Supply of currency necessary for economic growth	Credit accommodation for short-term fund shortages
Characteristics	The BOJ buys government bonds from financial institutions and securities companies. The current operating method (in which a purchase offer of a relatively small size is made to a limited number of institutions chosen by the BOJ on a rotation basis) was introduced in June	The BOJ buys securities (in practice, long-term government bonds) from financial institutions and securities companies with repurchase agreements.

Table 2.5   (continued)

	1984 in order to mitigate the impact on the bond market	
Instrument	CP operations Purchases	TB operations Purchases
Commencement	May 1989	January 1990
Intervention rate	CP repo rates, or call rates	Rate determined by auction
Objectives	Control of overnight interest rates	Credit accommodation for short-term fund shortages
Characteristics	The BOJ purchases CP (with due date within 3 months from operation date via money market dealers) with repurchase agreements.	The BOJ purchases securities (in practice, TBs or short-term government bills) from financial institutions or securities firms with resale agreements.

Source: Nakao and Horii (1991).

[a]In addition to the types of loans listed here, a limited amount of lending is available upon request (the lending takes the form of discounting eligible commercial bills and import settlement bills).
[b]The BOJ usually purchases bills issued by financial institutions and those backed by other commercial bills as collateral.

- Seasonal factors (such as monthly or quarterly surpluses or shortages) are mainly corrected by FB and securities gensaki operations.
- Long-term government bond purchases are employed to accommodate the demand for money originating from economic growth.

It should be emphasized again that the role of each operational tool is not fixed. Rather, it changes in accordance with changes in the financial environment and changes in market practice.[9]

The Bank of Japan has various tools for intervening in the money markets. There is criticism that the bank should concentrate instead on operations in a core market. In Japan, however, there is neither a core market nor a core operating tool such as the repurchase market in the United States.

The primary prerequisites for an operating tool to become a core tool are

1. The respective market should have sufficient depth.

2. Operational instruments should be homogeneous.

3. The administrative work involved in the operation should be minimal and same-day settlement ensured.

9. In fact, as shown in table 2.2, CP and TB operations were introduced in the late 1980s.

Table 2.6　　　　**BOJ Credit and Bank Reserves (100 million yen)**

	1987	1988	1989	1989 September	October	November	December	1990 January
Surplus or shortage of funds	−6,710	−12,889	−57,284	−25,762	−17,232	49,716	−92,233	26,285
Bank notes	−23,019	−31,315	−51,017	−398	698	−6,083	−71,919	61,032
Treasury funds	2,965	6,087	3,992	−23,193	−16,450	55,590	−19,797	−33,987
Bank of Japan credit								
Lending	442	19,071	−15,288	3,088	6,054	−20,750	28,507	−14,218
Commercial bills purchased	993	3,007	41,000	22,000	1,000	3,000	10,000	−3,000
CP purchased	—	—	—	−3,000	—	3,000	−3,000	3,000
Sales of TBs	—	—	—	—	—	—	—	4,035
Sales of FBs	−2	−996	9,947	72	14,882	−44,807	49,767	−9,972
Short-term sales of securities	1,783	416	3,051	−1,556	—	3,065	2,185	−3,281
Sales of securities	7,380	4,215	17,154	—	1,255	3,633	1,022	2,212
Total	10,596	25,713	55,864	20,604	23,191	−52,859	88,481	−21,224
Reserves	3,886	12,824	−1,420	−5,158	5,959	−3,143	−3,752	5,061

	1990							
	February	March	April	May	June	July	August	September
Surplus or shortage of funds	16,460	7,611	45,278	43,034	−48,705	−21,566	12,095	−5,895
Bank notes	−4,432	−17,696	−11,112	34,681	−25,029	9,441	7,460	−2,609
Treasury funds	20,342	28,739	55,627	8,317	−24,669	−33,594	2,308	−4,913
Bank of Japan credit								
Lending	5,920	−7,742	−7,946	−9,613	6,339	1,309	−19,891	20,762
Commercial bills purchased	−6,000	−14,000	−21,000	6,000	21,000	−6,000	−17,000	−5,000
CP purchased	−3,000	—	—	—	3,000	2,000	−5,000	—
Sales of TBs	−1,064	−1,873	5,536	−697	−1,257	4,015	−924	2,264
Sales of FBs	−14,805	14,813	−21,732	−40,919	22,007	23,795	11,958	9,900
Short-term sales of securities	1,935	−2,361	−1,543	1,493	159	—	−15	—
Sales of securities	1,886	1,340	1,663	1,737	1,723	2,045	1,967	2,046
Total	−15,128	−9,823	−45,022	−41,999	52,971	27,164	−28,905	29,972
Reserves	1,332	−2,212	256	1,035	4,266	5,598	−16,810	24,077

Source: Bank of Japan (1990).

Note: A minus sign indicates the following in each row: row 1 = shortage of funds; row 2 = increase of notes in circulation; row 3 = net receipts of the Treasury; row 4 = net repayment to the Bank of Japan; rows 5–7 and 9 = net resales by the Bank of Japan; rows 8 and 10 = net sales by the Bank of Japan; row 11 = decrease of credit; and row 12 = decline in reserves.

4. The assets to be acquired should have creditworthiness and liquidity appropriate for being assets of the central bank.[10]

In light of these four conditions, short-term government bills are potentially the most suitable tools for money market operations. At present, however, there are some difficulties in using government bills as core instruments. In Japan, two types of short-term government bills are issued: TBs and FBs. The amount of TBs outstanding was about 4 trillion yen as of the end of December 1989, accounting for only 5.0% of the money market. For the TB market to become a core area of operations, expansion of its volume is essential. However, in light of the structural change in the money flow, for example, the decline in the total issuance of government bonds, it seems to be difficult to increase TB issuances rapidly.[11]

In order for the short-term government bill market to become the primary area of operation, it is necessary to maintain sufficient market size at all times. Since the issuance volume of TBs cannot grow very rapidly, a second option would be to expand the FB market. FBs are bills issued by the government to meet its temporary shortage of funds. FBs outstanding at the end of December 1989 totaled 28 trillion yen, more than five times the outstanding stock of TBs. At present, however, FBs are issued through fixed-rate public subscription, where the Bank of Japan underwrites the remaining FBs. In practice, the Bank of Japan must underwrite the bulk of the FBs issued: this means that the Bank of Japan cannot purchase FBs before selling them to the private sector.

Thus, due to the absence of a primary tool of operation, the Bank of Japan is at present heavily dependent on lending.[12] Introducing a public auction system for the issuance of FBs would change this situation.

2.3   The Relationship between Market Operations and the Control of the Overnight Interest Rate: A Theoretical Interpretation

2.3.1   The Reserve Requirement System and Market Operations

Ueda's paper in this volume criticizes the explanations (including the one in this paper) of interest rate determination that are given by the staff of the Bank of Japan for all sharing the problem of relying too much on the special

10. These four conditions were mentioned by the Short-Term Money Market Study Group (1990).

11. There are two other problems: (1) TBs are settled on the third business day; and (2) profit gained from the redemption of TBs, as well as other discounted securities, is subject to an 18% withholding tax at the time of issuance. This is rarely observed in other countries and may be a reason that TBs have not become important yen-denominated assets for nonresidents.

12. Constraints with respect to other tools of operations are (1) CP and bills are issued by various private companies. Therefore, their creditworthiness is not homogeneous, and additional administrative work is necessary, making them not appropriate as primary tools of operation; and (2) long-term government gensaki are subject to a securities transaction tax and are settled on the fourth business day.

features of the current reserve accounting system. Indeed, the explanation given below relies heavily on the institutional framework of the present reserve system, though I do not think it is an analytical problem. In fact, if institutional features are not taken into account, misleading conclusions will result.

Thus, in order to understand the techniques of the Bank of Japan's monetary policy, some knowledge of the reserve requirement system in Japan is indispensable. The system requires financial institutions to keep deposits with the central bank in certain proportions to their deposits and other liabilities. This system was introduced in 1957, under the Law concerning the Reserve Deposit Requirement System, and in 1959 reserve ratios were established for each category of financial institution.[13] When the system was introduced in Japan, it was considered to be an instrument that directly affected the liquidity position of private banks by changing their reserve requirement ratios. Today, however, the Bank of Japan rarely employs this tool to affect monetary conditions in the economy, April 1981 being the last occasion. Still, the reserve requirement system supplies a basic framework for market operations by the Bank of Japan.

2.3.2   Interest Rate Control under a Lagged Reserve System

The Profit-maximizing Behavior of Private Banks under a Lagged Reserve System

Ordinarily, the reserve requirement system requires commercial institutions to maintain deposits in certain proportions to their deposits and other liabilities in non-interest-bearing accounts at the central bank. In Japan, private banks' required reserves are calculated as the product of the reserve ratio and average deposits outstanding in a calendar month, with the reserve "maintenance period" beginning on the sixteenth day of that month and ending on the fifteenth day of the following month. Therefore, the Japanese reserve requirement system is a mixture of a "lagged reserve system" and a "contemporaneous reserve system." But to understand its role in controlling short-term interest rates, it could essentially be viewed as a lagged reserve system. This system is more suitable for controlling short-term interest rates than for controlling reserves.[14]

To see this, let us consider the mechanism of interest rate determination under a lagged reserve system. For the sake of simplicity, we assume that the maturity of all financial assets is overnight (i.e., the only interest rate in the economy is the overnight rate) and ignore the existence of the government sector as well as the demand for bank notes from the nonfinancial private

13. For details on the introduction of the reserve requirement system in Japan, see the Bank of Japan (1985).

14. This does not imply that a lagged reserve system is essential to interest rate control. This is self-evident when we recall that there was no reserve requirement in Japan before 1959.

sector. In reality, both the government's financial balance and bank note demand are interest rate inelastic in the short run. In order to maintain the smooth functioning of the money markets, the Bank of Japan partially accommodates them on a daily basis and completely accommodates them over the "maintenance period." Therefore, neglecting them poses no problem in discussing the nature of the lagged reserve system.

Let us consider the profit-maximizing behavior of private banks before the last day of the reserve maintenance period. The optimum strategy for the banks would be to borrow from the market and accumulate reserves when the interest rate is low, and to become a lender when the interest rate is high. Thus, on each business day, banks compare the interest rate for the day and the expected interest rate for the remainder of the maintenance period. Through this kind of intertemporal arbitrage, the daily interest rate converges to the expected interest rate for the rest of the reserve maintenance period.

If the daily reserve demand (except on the final day) in a reserve maintenance period is perfectly substitutable, such arbitrage works completely. In other words, the interest rate elasticity of daily reserve demand is infinite at the level of cumulative required reserves. Therefore, the actual quantity of daily reserves supplied by the central bank is not important as such for controlling the daily equilibrium interest rate. Rather, the market's expectation of future interest rates is the dominant factor in the determination of the current interest rate. In this setup, once the central bank's ability to control market interest rates is established, the expectations of market participants are formulated around the inferred target range of the central bank. Thus, signals about the target range of interest rates emanating from the central bank are what actually determine market rates.

The "Anchor" Rate and the Reserve Market on the Final Day of the Maintenance Period

The theoretical essence behind the credibility of the central bank is that it is the lender (and borrower) of last resort, which is easily understood by looking at the reserve market on the final day of a reserve maintenance period.

On the final day, the demand for reserves will become highly interest inelastic because financial institutions are obliged to satisfy the reserve requirement. In Japan, if a bank fails to meet the reserve requirement, the shortfall is subject to a penalty interest rate 3.75 percentage points per annum above the discount rate. Moreover, since a failure to satisfy the reserve requirement is quite exceptional and is viewed as disgraceful, banks consider the nonpecuniary cost to be more serious. Thus, on the final day, these financial institutions try to raise funds to satisfy the reserve requirement at any cost. Therefore, if there is an aggregate shortage in the market, interest rates will skyrocket without reaching market equilibrium unless the central bank intervenes in the market as the lender of last resort.

On the other hand, if there is an aggregate surplus on the final day, banks

will try to lend excess reserves, and the interest rates will drop to zero unless the central bank absorbs funds as the borrower of last resort.

Hence, with a net surplus or shortage on the final day of the maintenance period, the net supply or demand curve for aggregate private banks' reserves becomes vertical, and therefore the market interest rate will be determined by the rate at which the central bank supplies or absorbs reserves from the market.

As mentioned above, however, the central bank has an obligation to supply reserves to private banks so that they can meet reserve requirements. Therefore, if it cannot choose interest rates (e.g., if lending at a fixed discount rate were the only way to supply credit), the interest rate control mechanism mentioned above would not work. But usually central banks have many options through which to control interest rates on their credit, the most standard one being open-market operations with prices determined by the central bank. The Bank of Japan usually utilizes lending for the final adjustment; the expected effective rate of this instrument is also controllable, if necessary.

For example, lending by the Bank of Japan is calculated according to the "both ends–counted method" (a historically typical lending practice in Japan) in which a loan of a week is counted as an eight-day loan, that is, the actual length of the loan plus one day. If private banks try to exploit a profit opportunity by using the discount window on the final day, the Bank of Japan can thus penalize them by asking them to return the funds immediately after the final day of the maintenance period. This would raise the effective cost of borrowing from the Bank of Japan to a level significantly above that indicated by the official discount rate. Even if this penalty is only rarely utilized, its mere existence is'sufficient to provide the Bank of Japan credibility in the eyes of market participants.[15]

Under the implicit assumption that market participants recognize the strong influence of the central bank on interest rates on the final day, the interest rates on other days converge to the expected (central bank's final day target). In this setup, private banks try to maximize profits daily, continually bearing in mind the expected rate on the final day (the "anchor"), and such behavior is the key to formulating the daily rate. This game is repeated every month. The art of central banking here is to transmit information about the anchor to market participants in an effective way.

---

15. Ueda's paper (chap. 1 in this volume) emphasizes the role of heavy reliance on discount lending for interest rate control under the current framework. He argues that expectations of the cancellation of discount window lending are important. Since the official discount rate is usually lower than market interest rates and since banks rely heavily on discount window lending, this could work as an effective punitive deterrent. Theoretically speaking, the structure of this explanation is quite similar to the "both ends–counted" story given in this paper. However, anecdotal evidence suggests that, when the final day of the maintenance period comes just before a weekend, it becomes more difficult for the Bank of Japan to control interest rates because the penalty from using the "both ends–counted" rule becomes unfeasible. Therefore, heavy reliance on discount window lending in itself is not a necessary condition for controlling interest rates.

Of course, since the maintenance period in Japan is one month, and since the daily market rate depends on expected targets, the overnight rate is not perfectly controllable. For example, given a situation in which the yen is rapidly depreciating, market participants may be confident that the Bank of Japan will raise the official discount rate and try to raise short-term interest rates within the current maintenance period. This expectation would actually raise interest rates, even if the Bank of Japan tried to transmit the signal that it wanted to keep rates at current levels, for example, by supplying reserves. In the present world with abundant information, the problem is whether the signals transmitted by the central bank can acquire credibility among market participants.[16]

2.3.3   Interest Rate Control under Alternative Reserve Systems

Length of the Maintenance Period and the Role of Defensive Operations

The importance of accurate "defensive operations" (operations aimed to offset changes in aggregate reserves) differs just as reserve systems differ. One example of a system in which defensive operations are essential is the case of Italy before 14 October 1990. Reserve requirements were maintained each day of the maintenance period until 14 October 1990; every day was a kind of "final day" of the maintenance period. As a result, interest rates were quite sensitive to the market operations of the Bank of Italy.

When the Bank of Italy supplied excess reserves, for example, overnight rates dropped to near 0%. Because of these problems, on 15 October 1990 the Bank of Italy shifted its reserve requirement system to a monthly average requirement. When there is no reserve requirement system, or when a required reserve ratio is quite low and is not a binding constraint on banks, as it was in Japan before 1959, the situation is similar to that in Italy because the demand for the high-powered money required for daily settlements cannot be interest elastic. Thus, it is not surprising that the nonregulated call rate in Japan before 1959 was volatile.[17]

If precise defensive operations are not essential in controlling interest rates under the current lagged reserve framework, the question arises why the Bank of Japan makes every effort to estimate the shortage or surplus of funds every day, as explained earlier.

My tentative interpretation of this phenomenon is that the so-called reserve progress ratio is used in Japan as a means of signaling the anchor rate to market participants.[18] The reserve progress ratio is the ratio of reserve deposits accumulated from the first day of a maintenance period to the total cumulative reserve deposits required for that period. Suzuki, Kuroda, and Shirakawa

16. The problem of consistency among the signals transmitted by the central bank will be discussed again in section 2.5.1.
17. See Ueda's paper (chap. 1 in this volume).
18. For further discussion of this interpretation, see Okina (1987).

(1988) argue that the ratio increases by 3.3% a day in a standard path along which required reserve deposits are equally maintained every day during a given maintenance period. A faster pace would emit a signal of easier, and a slower pace tighter, money market control. In order to avoid transmitting confusing signals, accurate estimation of the shortage or surplus of funds each day would be important.

Interest Rate Control under a Contemporaneous Reserve System

So far, I have assumed a pure lagged reserve system. In reality, however, the Japanese reserve requirement system is a mixture of a lagged reserve system and a contemporaneous reserve system. Do I have to modify my arguments about interest rate control if this fact is taken into account? To answer this question, consider the function of the contemporaneous reserve system.[19]

Under a lagged reserve system, the required reserve for a given maintenance period is a predetermined variable. On the other hand, under a contemporaneous reserve system, it has been argued that, since private banks can change their deposits by changing lending levels, they can control the level of required reserves. Therefore, the central bank need not transmit signals regarding the target interest rate to market participants. This is why a contemporaneous reserve system is advocated when total reserve targeting is attempted.

Even in the United States, however, where a contemporaneous reserve system has been adopted, reserve demand on the final day of the maintenance period is highly interest rate inelastic, and the federal funds rate often shows volatile movement on that day.

Of course, the reserve requirement system in the United States is not purely contemporaneous.[20] But even if we adopt a purely contemporaneous reserve system, it would not be easy for the central bank to avoid affecting interest rates directly, for as the maintenance period comes closer to its end, it becomes more difficult for private banks to adjust required reserves. Actually, at the very last moment such adjustment should be practically impossible, and the demand for reserves is bound to become highly interest rate inelastic. Therefore, unless the central bank is willing to accept severe interest rate vol-

19. One practical problem of a contemporaneous reserve system is the difficulty in calculating required reserves. Partly due to this, a contemporaneous system was avoided in Japan. In 1957, the Report of the Committee for Financial System Research argued that it was appropriate to have some lag between the maintenance period and the period of calculation for cash and deposits, for the convenience of data collection. As a result, the fifteen-day lag of the current system was decided upon.

20. Since February 1984, U.S. depository institutions have been required, on average, to maintain given reserves for over fourteen days. Since the average reserve requirement against transaction deposits is computed by using the average over the fourteen days ending two days before the end of the maintenance period, and since the relative weight of transaction deposits in the reserve requirement calculation is high (reserve requirements against other liabilities are lagged by nearly four weeks, compared with those against transaction deposits), the system is usually considered to be essentially contemporaneous.

atility, it has no option but to accommodate the demand for reserves, and in that process it will have to reveal its anchor.[21]

One might argue that private banks could quickly adjust their deposits, by repurchasing CDs, for example. In Japan, however, the share of CDs in all deposits of private banks is only a few percent, and the required reserve ratio for CDs is only 1.75%. Therefore, in order to offset a reserve shortage, the required amount of CD repurchases would be approximately fifty-seven times the initial reserve shortage. Moreover, there is no incentive for a bank with a shortage of reserves to repurchase the CDs: such action would reduce the level of required reserves for the concerned bank and for the banking system as a whole; for the individual bank, however, the outflow of reserves caused by the repurchase will be much larger than the reduction in required reserves. Thus, CD repurchases may not be a practical solution.

In sum, even under a contemporaneous reserve requirement system, the central bank may still have to act as a lender (and borrower) of last resort. If so, market participants are very likely to attach great importance to the level of interest rates that they consider the central bank to be targeting, and the techniques of central banking used to guide market rates will be very similar to those used under a lagged reserve system. In Japan, although the reserve system is a mixture of "two weeks lagged" and "two weeks contemporaneous," the art of central banking is intrinsically closer to a pure lagged reserve system.

Effects of Carry-over Options

Since reserve carry-over is not permitted in Japan and the Bank of Japan would accommodate any potential shortages during a given maintenance period, private banks have no incentive to hold excess reserves. Thus, sometimes it is argued that the absence of carry-over is an important feature of the reserve system in Japan.[22] However, the carry-over in the reserve system is not necessarily essential. The existence of carry-over options in the Japanese reserve requirement system, such as those in the United States, would have a negligible impact. In the United States, banks are allowed to carry forward any deficiency in reserves up to two percentage points of the reserve requirement, but this deficiency must be made up by holding additional reserves in the next maintenance period. Under the current system in the United States, this option is used only for technical adjustments made by the bank, and the impact of the federal funds rate on the carry-over amount is quite limited.

---

21. The Fed seems to be relatively less interested in defensive operations. In fact, it effects market operations only once a day, around 11:30 A.M. Therefore, if it misestimated the surplus or shortage of funds, it would affect the market rate. However, in the United States, volatile movements in the federal funds rate are mostly observed on the final day of each maintenance period. The implication of this fact is that the importance of defensive operations differs between a usual day and the final day.

22. See Ueda's paper (chap. 1 in this volume).

Indeed, in spite of the existence of this carry-over allowance, the federal funds rate in the United States shows considerable volatility on the final day of the maintenance period.

In addition, if the two-percentage-point limit on the carry-over option were to be lifted, it would simply mean that the length of the maintenance period would be doubled, becoming two months rather than one. All of this indicates that carry-over is not necessarily as important as has sometimes been argued.

2.3.4   The Equilibrium Overnight Rate in a General Equilibrium Model

In this paper I concentrate on the determination of the overnight rate within a given one-month maintenance period. If I tried to discuss the transmission mechanism of monetary policy from operating targets to intermediate and final targets, I would need to construct a dynamic general equilibrium model and accumulate empirical knowledge of the parameters involved. However, the discussion in this paper is not necessarily imperfect just because my analysis is based on a partial equilibrium setup. In what follows, I will briefly expand on this point.[23]

Consider a dynamic general equilibrium model that includes markets such as the high-powered money market, the deposit market, the bank lending market, and the securities market. It might be desirable to include the real sector as well, but I omit that sector for the sake of simplicity. The time unit t represents one reserve requirement maintenance period (one month for Japan). In this model, interest rates such as lending and deposit rates should be determined simultaneously. Equilibrium in the high-powered money market, ignoring the government sector, is given by

$$(8'') \qquad \sum_i R_{it} + \sum_j N_{jt} = B_t,$$

where R_{it} = reserves of the ith bank at the tth maintenance period; N_{jt} = demand for bank notes of the jth nonfinancial agent at t; and B_t = credit supplied by the central bank at t. Under a lagged reserve system,

$$(9) \qquad \sum_i R_{it} = \sum_i \gamma D_{it-1} \ (= R_t^*),$$

where D_{it-1} = deposits outstanding of the ith at $(t - 1)$; γ = reserve requirement ratio; and R_t^* = aggregate required reserve at t.

Equation (9) implies that the reserve demand at t is predetermined. The demand for bank notes is both insensitive to interest rates and volatile, as shown in figure 2.1. Thus, if we denote the aggregate demand for bank notes at t as N_t^*,

$$(10) \qquad N_t^* = \sum_j N_{jt},$$

23. Iwamura (1992) deals with a similar problem by using a standard general equilibrium model. Ueda (1984) has pursued a related argument.

then N_t^* is almost exogenous. As a result, the central bank must accommodate reserve requirements and the demand for bank notes at time t. Namely,

$$(11) \qquad\qquad\qquad B_t = R_t^* + N_t,$$

which means that the credit supplied by the central bank is determined by the predetermined reserve requirement and the exogenous demand for bank notes. Note that these variables are not affected by any variables determined by other sectors in the model. Since the demand for reserves is predetermined and the supply of reserves is accommodative, the equilibrium interest rate in the money market is seemingly indeterminate. However, the central bank can choose the level of interest rates, as explained earlier. In sum, since R_t^* and N_t are predetermined or exogenous and are not simultaneously determined in the whole general equilibrium model, the Bank of Japan can guide interest rates even if it completely accommodates the demand for high-powered money.[24]

2.4   Determination of Longer-Term Market Rates and Money Market Reform in Japan

2.4.1   Longer-Term Interest Rates and Overnight Rates

So far, I have assumed that money market transactions are only effected overnight. In reality, however, there are also other maturities of money market transactions. For example, the maturities of transactions in commercial bills run from one week to one year.[25]

The standard theory of the term structure suggests that longer-term interest rates are equal to the expected average of overnight rates in the period concerned plus a risk premium, which is determined by the market and which reflects such factors as the preferred maturity of market participants, the degree of risk aversion, and the expected volatility of overnight rates.[26]

If the money market is efficient, it should not be possible for the Bank of Japan to effect successfully a "twist operation" within a given maintenance period. Suppose the Bank of Japan carries out at the same time an overnight CP operation and a one-week bill operation seven days before the final day of the maintenance period. Through the latter operation, it may try to transmit a signal regarding the average future level of overnight rates during the maintenance period. Market participants will compare this rate with the overnight rate, however, and if the signals conveyed by the overnight CP operation are

24. Thus, in constructing a general equilibrium model, we need a reaction function that explains how the Bank of Japan determines its target level for short-term interest rates. Regarding the reaction function of the Bank of Japan, see Bryant (1991).

25. In this section, we are mainly concerned with interest rates in short-term money markets. However, interest rates on assets with maturities of longer than one year are not excluded from the argument, because some empirical analysis suggests that information regarding longer-maturity interest rates is more abundant than that for shorter-term rates.

26. One example of a recent empirical study of the term structure in Japan is Campbell and Hamao's paper (chap. 4 in this volume).

inconsistent with those of the bill operation, market participants would be puzzled. If market participants believed that the intention of the Bank of Japan was to realize a different overnight rate on the final day of the maintenance period, arbitrage would simply offset the effect of the CP operation.

Let us consider the case in which there occurs a "twist operation" that goes beyond a particular maintenance period. Since the demand for reserves in each of the two periods concerned are not directly linked, it should in principle be possible to have longer-maturity operations reveal the expected future anchor without affecting the expected anchor in the current maintenance period. This kind of operation by the central bank may sometimes become meaningful. But even in this case, market participants would be puzzled, unless the signal included in each type of operation is established as a market practice.

If the possibility of a "twist operation" is limited, the central bank must select one maturity from the whole term structure as its operating target. The criteria in selecting an operating target are (1) ease of control by the central bank; (2) the market information sacrificed by using that particular instrument as a target; and (3) its relationship with intermediate and final targets. If the emphasis is placed on the first two criteria, it is natural to select the overnight rate as an operating target. In this case, the overnight rate would directly reflect the policy stance of the central bank. Longer-term interest rates, in turn, would reflect the expected overnight rate formulated by market participants based on their expectations of business conditions and monetary policy in the future, and would thus provide the central bank with important information about market sentiments.

The framework of interest rate determination would be formulated by the following feedback rule: overnight rates affect longer-term rates via the expectations of market participants and, observing these rates, the Bank of Japan readjusts overnight rate targets.

Suppose the Bank of Japan keeps the overnight rate at an inappropriately low level. Theoretically, it could maintain this situation in any maintenance period. However, doing so would create inflationary expectations and the anticipation of a future increase in overnight rates (i.e., changes in the future policy stance), and interest rates for longer maturities would rise.[27] This rise would reflect pressure for a policy change stemming from market participants. Thus, although longer-term rates naturally have a stronger influence on the real economy than do overnight rates, it may not be a good strategy for the central bank to choose a longer-term rate as the operating target unless it contains no useful information and only noise.[28]

27. Nakao and Horii (1991) argue that market rates in Japan are noisy and not a credible indicator of future inflation. On the other hand, Kato (1991) uses a method similar to that of Mishkin (1989) and reports that spreads between short- and long-term interest rates in Japan can perhaps suggest the course of future inflation.

28. Although longer-term interest rates may contain valuable information that could be used in formulating monetary policy, a problem in attaching too much importance to them is the possible

Of course, from the central bank's viewpoint, the market may not always react appropriately. Market participants sometimes overreact to variables such as the exchange rate, stock prices, interest rates abroad, and speeches by government officials at home and abroad, and they sometimes misperceive the true intentions of the central bank.

In order to avoid such misunderstanding, the Bank of Japan manifests its policy intentions not only in various market operations but also in many other ways. Examples are the governor's speeches and his press conferences every other week, and official comments on statistics compiled by the bank (wholesale prices, the money supply, the Short-Term Economic Survey of Enterprises, or TANKAN). The publication of the *Quarterly Review* (since 1987 in both English and Japanese) is also used as a means of explaining the current monetary policy stance.[29]

When the central bank transmits various signals, it is important that market participants identify the one that is the most fundamental. In Japan, the official discount rate is considered to be the most basic signal. Therefore, flexible and timely changes in the official discount rate are highly desirable.

2.4.2   An Interpretation of Money Market Reforms in 1988

Until November 1988, the maturity of the bill operations frequently used by the Bank of Japan was two to three months. Under this situation, interest rate differentials between bill rates and the Euroyen or CD rates widened in the summer of 1988, when the expansion of the economy was evident and market participants expected a future increase in short-term interest rates. Thus, the bulk of money market transactions shifted to outside the bill market.

Against this background, practices in the interbank market were jointly reviewed in November 1988 by the Bank of Japan as well as market participants. One of the major items that came under review was the extension of the transaction period for bills (from a range of one to six months to a range of one week to six months; see table 2.2). With this proposal, the Bank of Japan made clear its intention to shorten the maturity of market operations, while leaving the formation of long-term rates to market arbitrage, so as to reflect the expectations of market participants. As a result of the adoption of these reforms, the interest rate differentials between bill rates and Euroyen or CD rates disappeared and transaction volume in the bill market was restored, as shown in figure 2.2. One interpretation of this reform is that it was an attempt to use long-term interest rates as an indicator of the state of the economy.

---

indeterminacy of the operating target and the resultant instability. Similarly, Dornbusch (1986) argues that there exists the possibility of instability due to exchange-rate-oriented endogenous monetary policy.

29. Since 1989, data on money market transactions including reserves and on the volume of operations by each instrument are published daily and monthly (see table 2.5). Also see Nakao and Horii (1991).
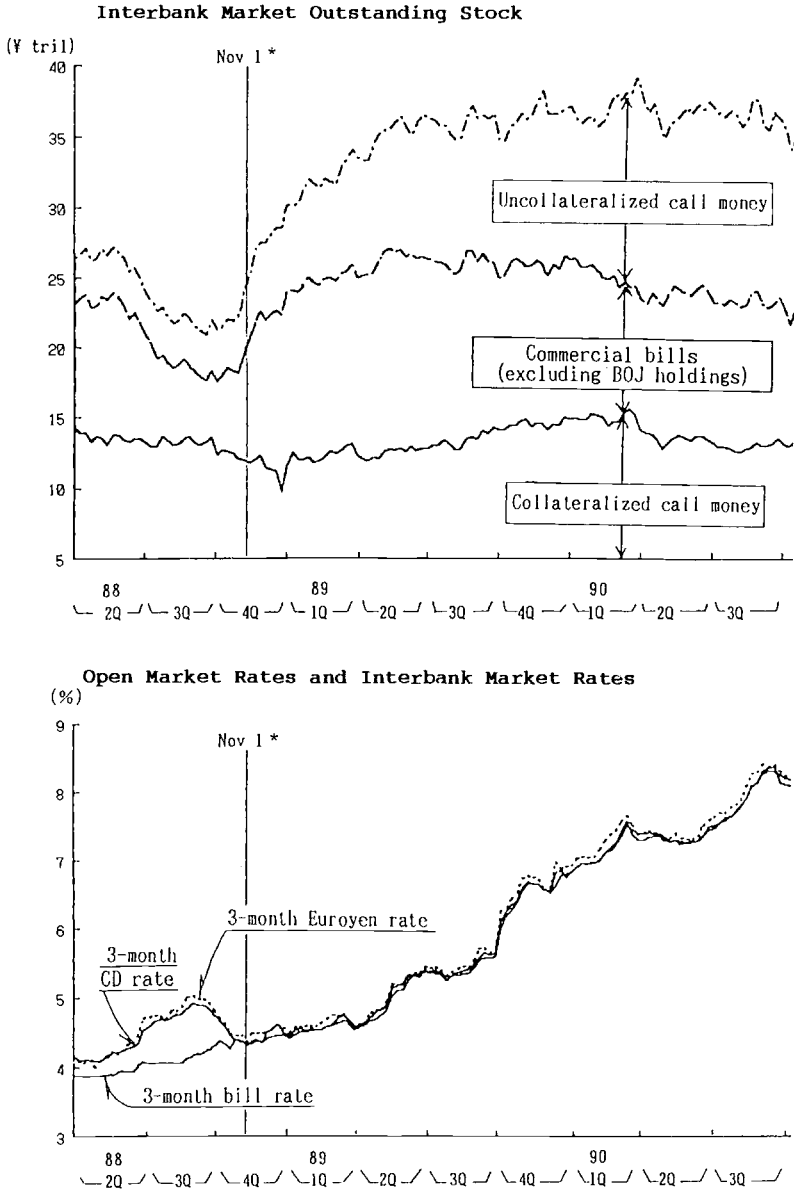
Interbank Market Outstanding Stock

Open Market Rates and Interbank Market Rates

Fig. 2.2   Results of the money market reform
* = Effective date of reform.
Source: Short-Term Money Market Study Group (1990).

Reform of the short-term money market has progressed since November 1988. For example, overnight CP operations and one-month TB operations were introduced. Since financial liberalization and globalization is still under way, market reform must proceed in order to maintain the efficacy of monetary policy.

2.5   Concluding Remarks

In this paper I have discussed (1) the structure of the short-term money market in Japan, (2) the daily market operations of the Bank of Japan in this market, and (3) a possible theoretical interpretation of the role of such operations in formulating market interest rates.

The main points of the third issue are

1. In principle, the Bank of Japan can control overnight rates by transmitting signals regarding the "anchor" rate (the overnight rate on the final day of the reserve maintenance period) to market participants.

2. Since the span of the reserve maintenance period in Japan is one month, however, market rates are formulated around the anchor rate expected by market participants, which does not necessarily reflect the exact intention of the Bank of Japan.

3. Since the most crucial element in determining the overnight rate is the expectation of the anchor, the supply of daily reserves itself is not necessarily important, except on the final day of the maintenance period.

4. If the overnight rate is selected as the operating target, long-term interest rates can be used by the central bank as valuable economic indicators.

Of course, these conclusions are not without some reservations. First, regarding the controllability of interest rates, I have argued that, in principle, the Bank of Japan can control the overnight rate. But if the bank tries to maintain an inappropriate rate (e.g., an inflationary rate), the market may not believe the signal, or the central bank may lose credibility in the market. In other words, the central bank cannot control interest rates as if the rate of interest were a perfectly exogenous variable.

Usually, central banks do not directly indicate the level of the target rate. This fact may partly be due to a concern over political pressure. In addition, some theorists have suggested that the central bank cannot transmit signals that are too precise, because otherwise it would have an incentive to pursue a "time-inconsistent" policy.[30]

I believe that there is another reason why central banks are hesitant to quote the target rate directly. They tend to consider the process of pursuing monetary policy to be a dialogue between themselves and the market, and thus believe that interest rates should have an element of being endogenous. If this philosophy is extended too far, the system may become indeterminate; on the other

---

30. See Stein (1989), for example.

hand, if controllability of interest rates is overemphasized, the actuality of market operations is lost.

Second, the influence of international capital flows has been ignored in this paper. One justification for this is that the topic of this paper is mainly the determination of overnight rates. Since exchange rate risk is large compared with the daily speculative return in the money market, it might not be unrealistic to regard Japan's money market as being effectively isolated from international capital flows.

However, this would not apply to a fixed exchange rate regime. Since interest rates are firmly linked by arbitrage, interest rate controllability by the central bank is restricted. By the same token, a perceived strong commitment to a target exchange rate restricts interest rate controllability.

Also, the development of the Euromarket can be exploited to avoid domestic regulation, including reserve requirements. The latter problem is also important from the viewpoint of monitoring by the monetary authorities and financial system stability.

References

Bank of Japan. 1985. *Nihon Ginko Hyakunenshi* (Centennial history of the Bank of Japan). Vol. 5. Tokyo: Bank of Japan.
————. 1990. Financial Markets September 1990. Tokyo: Bank of Japan, October.
Bryant, R. C. 1991. Model Representations of Japanese Monetary Policy. *Bank of Japan Monetary and Economic Studies* 9, no. 2:11–61.
Dornbusch, R. 1986. *Dollars, Debt, and Deficit*. Cambridge, MA: MIT Press.
Dotsey, M. 1986. Japanese Monetary Policy: A Comparative Analysis. *Bank of Japan Monetary and Economic Studies* 4, no. 2.
Ito, T. 1991. Monetary Policy in the Age of Financial Innovations: The Case of Japan 1985–1990. Paper presented at the NBER conference on Japanese Monetary Policy, April.
Iwamura, M. 1992. The Determination of Monetary Aggregates and Interest Rates. *Bank of Japan Monetary and Economic Studies* 10, no. 1:65–93.
Kato, K. 1991. The Information Content of Financial and Economic Variables: Empirical Tests of Information Variables in Japan. *Bank of Japan Monetary and Economic Studies* 9, no. 1:61–86.
Mishkin, F. 1989. A Multi-country Study of the Information in the Term Structure about Future Inflation. NBER Working Paper No. 3125. Cambridge, MA: National Bureau of Economic Research, September.
Nakao, M., and A. Horii. 1991. The Process of Decision-making and Implementation of Monetary Policy in Japan. Special Paper No. 198. Bank of Japan, March.
Okina, K. 1987. Tankikinyushizyo Kinri to Kinyu Chosetsu (Short-term interest rates and monetary control in Japan). Discussion Paper No. 157. Institute of Economic Research, Hitotsubashi University, March.
Short-Term Money Market Study Group. 1990. *Wagakuni Tanki Kinyu Shijono Genjo to Kadai* (Japan's short-term money market and its issues). Tokyo: Kinyu Zaisei Jijo Kenkyukai.

Stein, J. 1989. Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements. *American Economic Review* 79 (March): 32–42.

Suzuki, Y., A. Kuroda, and H. Shirakawa. 1988. Monetary Control Mechanism in Japan. *Bank of Japan Monetary and Economic Studies* 6, no. 2:1–27.

Ueda, K. 1984. Kashidashi Shijo to Kinyu Seisaku. (Lending market and monetary policy) *Osaka Daigaku Keizaigaku* 34, nos. 2, 3:160–79.