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Recent Developments in Japan's Bond and Money Markets

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Summary

This paper traces the evolution and recent liberalization of Japan's once highly regulated financial system, and analyzes the quantitative effect of developments since 1981. Until the early 1970s, the Japanese financial system was characterized by the virtual absence of a government bond market or other well-developed open markets in which bonds and short-term securities could be traded. Moreover, interest rates were rigidly regulated and the regulated rates were sheltered from external influences by exchange restrictions. This system began to change gradually in the 1960s with the development of the country into a major industrial economy. However, it was not until the mid-1970s that the fundamental change began to take place. As a structural shift took place in the flow of funds among the corporate, public, and external sectors in the aftermath of the first oil shock, there emerged signs of an erosion in the traditional financial system: the improvement in the financial position of the corporate sector threatened large outflows of funds from the regulated market; the deterioration in the financial position of the government necessitated continuous large issues of bonds; and the emerging large current account surpluses prompted the further easing of restrictions on capital flows. The financial market liberalization since the late 1970s was a response of policymakers to these developments. As a result, the bond and money markets in Japan expanded rapidly and transactions costs fell; and different components of the once-segmented financial market in Japan as well as the Euro-yen market have been fully integrated. Moreover, it is likely that the process of financial market liberalization will continue until the transition to a fully deregulated system is completed.

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## I. Introduction

Japan's financial market has recently undergone a radical transformation from a highly regulated to a more competitive system. While this process of financial liberalization in Japan has stimulated a number of studies, the focus of these studies has been almost exclusively on the institutional aspect of that process, namely, how the structural changes in the economy since the 1970s generated pressure for institutional changes. 1/ In contrast, this paper will discuss not only the economic forces underlying the institutional changes but also their effect on the workings of the yen-denominated bond and money markets in Japan. 2/ However, it will not discuss the equity market, the bank loan market, or retail banking, where important developments have also taken place in recent years.

The paper is organized as follows. Section II outlines the bond market in the context of the traditional financial system in the 1950s; Section III, developments in the bond and money markets in the 1960s; and Section IV, the liberalization of the bond and money markets from the mid-1970s through 1985. Section V analyzes the effect of financial liberalization on the bond market during 1981-85; and Section VI, its effect on the money market. Section VII discusses the effect of the financial liberalization on the integration of the bond and money markets; and Section VIII, on the integration of the domestic and Euro-yen markets. Section IX discusses further developments in 1986 and the outlook for the bond and money markets. Section X presents a summary of major findings. Finally, Appendix I presents an explanation of the statistics used, and Appendix II gives a chronological summary of major developments in the bond and money markets.

## II. The Bond Market in the 1950s

The traditional financial system in Japan during the first fifteen years of the postwar era was characterized by the absence of a well-developed open market in which secondary bonds and short-term financial instruments could be freely traded. The interbank call market, through which reserve positions of commercial banks could be adjusted, was the

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1/ Horne (1985) and Feldman (1986) are by far the most comprehensive studies. Bronte (1982) and Emery (1984) describe the institutional details of the Japanese financial system.

2/ In this paper, the money market is defined to include the call, bill-discount, certificate of deposit (CD), Gensaki, treasury bills (TB), and bankers' acceptance (BA) markets, in which yen-denominated instruments with original maturities of less than one year are traded. Since instruments with remaining maturities of less than one year are also traded in the bond market, the distinction between the bond market and the money market is somewhat artificial.

only financial market of any importance. 1/ In this system, bank finance dominated not only the bank loans market but also the small primary bond market. 2/ Interest rates were regulated rigidly and there was little arbitrage between markets or maturities. To reinforce this domestic rigidity, the Foreign Exchange and Foreign Trade Control Law (FEFTCL) of 1949 prohibited in principle all foreign exchange transactions. 3/

The most notable feature of Japan's traditional financial system was the virtual absence of a government bond market. In the light of rampant inflation caused by wartime deficit spending, 4/ the Fiscal Law of 1947 stipulated that the Government could issue bonds only for construction (Clause 4); that the proceeds from these bond issues could not be used for general expenditures except under special authorizations (also Clause 4); and that the Bank of Japan could not directly purchase these newly issued government bonds (Clause 5). 5/ As a result partly of these stringent fiscal requirements and partly of the rapidly expanding tax revenues during the years of high growth, the central government issued virtually no bonds for over fifteen years. 6/

There was, however, a small primary market for non-government bonds. The flotation of corporate bonds commenced in 1949 with the active encouragement of the monetary authorities, who desired to have instruments with which to conduct market operations. This was followed by the flotation of local government bonds in 1952, and government-guaranteed bonds of public enterprises in 1953. Moreover, in 1953, long-term credit banks were authorized to issue 5-year and 1-year debentures (kinyusai)

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1/ In this paper, a distinction is made between the interbank and open markets. In the Japanese context, the interbank market, from which non-financial institutions are excluded, includes the call and bill-discount markets. This distinction is emphasized because of the highly regulated nature of the interbank market in the traditional financial system.

2/ Bank lending constituted over 80 percent, and equity issues about 10 percent, of corporate borrowing. In contrast, bond issues amounted to around 5 percent (Takada, 1985).

3/ However, implementation of the law was progressively relaxed. See Section IV (c).

4/ The Bank of Japan was authorized to purchase general-revenue bonds directly from the government in 1932 (Nanto and Takagi, 1985). This central bank financing of deficit spending continued through the end of World War II.

5/ These stipulations, however, do not apply to bonds with maturities of less than one year (i.e., Treasury bills) that are issued for seasonal (intra-fiscal-year) financing.

6/ The government did issue, in addition to Treasury bills, a small amount of special authorization bonds for compensation of the war dead, and for subscription to international organizations.

partly as a compensation for restrictions on branching and other deposit-taking activities and partly in recognition of their need to maintain a secure funding base for long-term lending operations. 1/

The issuance of all these types of bonds, however, did not immediately translate into the rapid development of a deep secondary bond market. Because, under the guidance of the Ministry of Finance, the primary bond yields were generally set below the secondary yields, a secondary sale of once-purchased bonds would result in a capital loss; consequently, there was little public demand for bonds. At the same time, in order to accommodate the excess demand for credit, corporate bond issues were rationed by the semi-official Bond Flotation Committee (Kisai-kai) composed of underwriting securities companies and commissioned banks. 2/ Under this credit rationing scheme, the general practice was to issue bonds in small lots, and the market for any one type of bonds was thin.

Under these circumstances, bank purchases dominated the primary bond market. The "main banks" purchased most of the newly issued corporate bonds; in 1955, for example, as much as 90 percent of corporate bonds were held by financial institutions. 3/ Similarly, the regional banks that were designated as the fiscal agents of the prefectural or municipal governments purchased most local government bonds. 4/ The banks were in a better position to purchase bonds because they could increase the effective yields by holding compensating deposit balances. 5/

Bank purchases were also prominent in the primary market for bank debentures. Many of the debentures issued by the long-term credit banks were purchased by other financial institutions. Commercial

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1/ Currently, three banks are chartered under the Long-term Credit Bank Law of 1952. In addition, one specialized foreign exchange bank and two central cooperative banks are allowed to issue debentures. For the specialized foreign exchange bank, the maturities of debentures are three years and one year.

2/ Sakakibara and Feldman (1983) describe the Japanese system of commissioned underwriting. The Bond Flotation Committee was an official entity from its inception in 1947 until 1956. The present committee, which was reorganized in 1968, consists of 22 banks and 4 securities companies (Sakakibara and Nagao, 1985).

3/ The "main bank" system originated in the policy of wartime mobilization, under which one bank was typically designated for each major manufacturing firm (Hodder and Tschöegl, 1985; Takada, 1985).

4/ A large number of regional banks were consolidated during the interwar period according to the "one prefecture-one bank" principle. Thus, there is generally only one bank headquartered in each of some 50 prefectures, except in a few metropolitan prefectures.

5/ Additionally, the main banks exercised managerial control over the issuing firms.

banks, which were mostly engaged in short-term lending, purchased the newly issued debentures with the implicit understanding that the issuing institutions would give preferential long-term lending to their corporate customers. Smaller financial institutions, which had perennial surpluses of funds, purchased bank debentures as a means of securing profitable on-lending arrangements with the issuing banks. 1/

### III. Developments in the Bond Market and the Emergence of an Open Money Market in the 1960s

Continued issues of bonds began to facilitate the development of a secondary bond market in the 1960s. First, a secondary market developed for the bonds issued by the Nippon Telegraph and Telephone (NTT) Public Corporation. This was a result of the special circumstances surrounding the expanding telephone service. As the number of telephone subscribers increased starting from the late 1950s, the NTT floated many issues of bonds to support its ambitious capital investment program, and the new subscribers were required to purchase them. 2/ Because the initial subscribers were not required to hold the bonds until maturity, many sold them immediately after the subscription. The capital loss was simply thought of as the necessary expense associated with the installation of telephone service, and secondary trading in NTT bonds expanded. NTT bonds were the only type of bonds traded in organized securities exchanges in Tokyo and Osaka after April 1962, when trading in other types of bonds had ceased. 3/

Second, an over-the-counter (OTC) market developed for bank debentures in the 1960s along with the rapidly growing Japanese industry, which required large-scale capital investment. This in turn required large issues of bank debentures, and a need arose for a secondary market in which bank debentures could be traded by the purchasing financial institutions. With the secondary market, the issuing yields on bank debentures came to be increasingly influenced by prevailing market conditions, 4/ and bank debentures became attractive investment

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1/ These smaller financial institutions include some 70 mutual savings and loans banks and over 400 credit associations. Under the Banking Law, the lending activities of these smaller institutions are to be limited mainly to small firms (defined in terms of equity capital). However, the on-lending arrangements allow them to lend to larger firms on behalf of the long-term credit banks.

2/ This practice, which began in 1953, ended in March 1983.

3/ Earlier in April 1956, the Government re-opened the long-closed securities exchanges in Tokyo and Osaka. As the volume of trading did not increase, however, it formally closed them again in April 1962.

4/ Otherwise, it would have been difficult to find purchasers of primary debentures. Thus, the primary yields were adjusted from time to time.

instruments. Smaller financial institutions, in particular, began to purchase bank debentures as liquid assets because the debentures were designated as safe assets under the prudential guidelines of the Bank of Japan. As a result of the development of the OTC market, securities companies began to publish OTC bond quotations in August 1965.

Third, along with this expansion of the OTC market, the market for bond trading with repurchase agreements--the Gensaki market--evolved as a short-term money market because the increase in secondary trading necessitated an outlet for short-term inventory financing. While an informal market for Gensaki transactions had always existed, 1/ a formal Gensaki market developed only in the early 1960s, when the attempt by the central bank to tighten credit prompted corporations to obtain short-term financing through conditional sales of securities. The market expanded during the latter half of the 1960s when a recession coincided with a temporary fall in corporate investment demand and corporations with surplus cash found it advantageous to invest in short-term funds through conditional purchases of securities at yields higher than bank deposit rates.

Finally, the deterioration in the fiscal position that had resulted from a recession in the mid-1960s forced the Government to begin issuing construction bonds in January 1966; this prompted the commencement of secondary trading in government bonds in organized securities exchanges in Tokyo and Osaka in October 1966. 2/ However, a wholesale development of the secondary market in government bonds did not take place at that time for two reasons. First, the Ministry of Finance devised the system under which the new issues of government bonds were subscribed by underwriting syndicates of financial institutions below the secondary yields, with the restriction that the purchased bonds not be sold in the secondary market. 3/ The banks were willing to subscribe to these new issues of government bonds only because of the implicit guarantee that the bonds in their portfolios would be purchased by the Bank of Japan after one year and because the initial holding period returns, which included the commissions they earned, were closer to the market rates. Second, the syndicate-member securities companies were under administrative guidance to maintain the secondary yields in the organized exchanges as close as possible to the primary yields. 4/ They did this

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1/ The securities companies always had an intrinsic need to make adjustments in their inventory positions.

2/ Much later, another exchange was opened in Nagoya in January 1973.

3/ The Ministry did this to circumvent the stipulation of the Fiscal Law prohibiting direct sales of bonds to the Bank of Japan, while insulating the issuing yields from the influences of an open market.

4/ There were no restrictions on secondary sales of a small amount of government bonds held by individual investors and life-insurance companies (Kuroda, 1982).

by purchasing government bonds sold by non-syndicate-member companies under the system of coordinated buying (kyochogai) and by placing a buying order for each selling order that had been placed by an investor for whom they acted as brokers.

#### IV. Liberalization of the Bond and Money Markets from mid-1970s through 1985

##### a. Structural change in the flow of funds

In the middle of the 1970s, a fundamental change in the flow of funds between the corporate and public sectors took place and facilitated the development of two major open markets. First, the Gensaki market became a major short-term money market after 1974 when the first oil shock coincided with a permanent deceleration in the growth of corporate investment, resulting in an improvement in the cash position of the corporate sector. As corporations with surplus funds found the rate of return from conditional purchases of securities higher than bank deposit rates, a substantial volume of short-term funds shifted from the regulated bank deposit market. This increased volume prompted the Government to recognize the Gensaki market and to institute prudential guidelines in 1976.

Second, the secondary market for government bonds became a major open market in the latter part of the 1970s when the slowdown in economic growth resulted in a sharp deterioration in the Government's fiscal position and necessitated large continuous issues of government bonds. For example, the stock of outstanding government bonds held outside the official entities <sup>1/</sup> increased from 1.4 trillion yen at the end of 1974 to 6.6 trillion yen at the end of 1975 (Table 1). This increased amount of government bonds in bank portfolios led not only to the suspension of the Bank of Japan's guaranteed full repurchase but also to a deterioration in the liquidity position of the syndicate-member banks. Consequently, in April 1977, they were allowed to sell government bonds in the secondary market after the minimum holding period of one year; at around the same time, the price support measures applied to syndicate-member securities companies were lifted. By 1980, with the expansion of the secondary government bond market, the volume of secondary trading in government bonds in the OTC market had exceeded the volume of trading in all other types of bonds combined (Table 2).

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<sup>1/</sup> The official entities are the Trust Fund Bureau of the Ministry of Finance and the Bank of Japan.

Table 1. Stocks of Outstanding Bonds in Japan, 1974-85 <sup>1/</sup>  
(In trillions of yen)

End of year	Government bonds <sup>2/</sup>	Bank debentures	Other bonds <sup>3/</sup>	Total
1974	13.3 ( 1.4)	12.9	21.1	47.3
1975	18.6 ( 6.6)	15.5	25.8	59.9
1976	26.4 (13.9)	17.8	30.8	75.0
1977	37.1 (20.7)	20.2	35.9	93.2
1978	54.5 (33.2)	22.4	41.5	118.4
1979	65.0 (42.1)	24.3	47.3	136.6
1980	80.0 (51.9)	26.0	52.3	158.3
1981	96.0 (62.3)	27.8	58.1	181.9
1982	107.4 (71.6)	31.0	63.4	201.8
1983	122.4 (81.7)	34.8	67.8	225.0
1984	134.5 (90.4)	38.8	72.7	246.0
1985	146.7 (94.6)	41.3	76.4	264.4

Source: The Bank of Japan, Economic Statistics Monthly.

<sup>1/</sup> Excludes yen-denominated foreign bonds.

<sup>2/</sup> Includes short-term Treasury bills; the figures in parentheses refer to the stock of government bonds held outside the official entities, i.e. the Trust Fund Bureau of the Ministry of Finance and the Bank of Japan.

<sup>3/</sup> Includes local government, public corporation, and corporate bonds; they are all held outside the official entities.

Table 2. Sales in the OTC Bond Market (Tokyo)  
by Type of Bonds, 1974-85 1/

(In trillions of yen)

Year	Government bonds <u>2/</u>	Bank debentures	Other bonds <u>3/</u>	Total
1974	1.7	16.1	20.1	37.9
1975	1.2	21.4	33.1	55.7
1976	3.2	27.5	40.7	71.4
1977	21.8	43.2	68.7	133.7
1978	68.3	51.2	77.1	196.6
1979	109.7	40.2	72.8	222.7
1980	162.8	43.4	74.8	281.0
1981	180.4	39.2	68.8	288.4
1982	202.6	30.9	93.6	327.1
1983	246.0	29.5	109.6	385.1
1984	393.3	27.2	272.0	692.5
1985	1258.7	20.1	885.9	2164.7

Source: The Bank of Japan, Economic Statistics Monthly.

1/ Includes both outright and repurchase (Gensaki) transactions.

2/ Excludes a small amount of trading in discount bonds.

3/ Includes local government, public corporation, and corporate bonds.

b. Domestic policy measures 1/

Concurrently, in response to these developments, a series of liberalization measures was implemented in the open money market, in the interbank market, and in the government bond market. In the light of large outflows of short-term funds away from the regulated bank deposit market, the authorities allowed banks to issue negotiable certificates of deposits (CDs) at market rates in 1979. This contributed to the further expansion of the open money market: the share of the two major open markets in the short-term money market increased from 19 percent in 1974 to almost 50 percent in 1981 (Chart 1). 2/ The open money market further developed with the progressive easing of the issuing conditions on bank CDs during 1981-85 and with the establishment of a market for yen-denominated bankers' acceptances (BAs) in June 1985.

In the interbank market, the Bank of Japan liberalized various types of restrictive practices. In 1978-79, the Bank abolished the so-called "posted rate system", under which interest rates were "posted" once a day by the lead money broker. 3/ At the same time, the Bank diversified the maturities of instruments by introducing 7-day and 1-month bills at market rates. Finally, during 1978-81, the Bank eased restrictions on Gensaki trading by banks and allowed securities companies to borrow in the call market for the first time since 1965. By taking these measures, the authorities sought to maintain the depth of the interbank market and to facilitate arbitrage with the open market, in which they lacked instruments to intervene directly.

The continued large financial deficit of the government sector necessitated the further easing of restrictions in the government bond market. The Ministry of Finance began to issue 5-year discount bonds in January 1977 and coupon-bearing bonds with shorter maturities of 2-4 years (designated as medium-term bonds) at market rates in June 1978. From 1968 until 1977, the Ministry issued only 10-year government bonds (designated as long-term bonds). 4/ The minimum holding period for the

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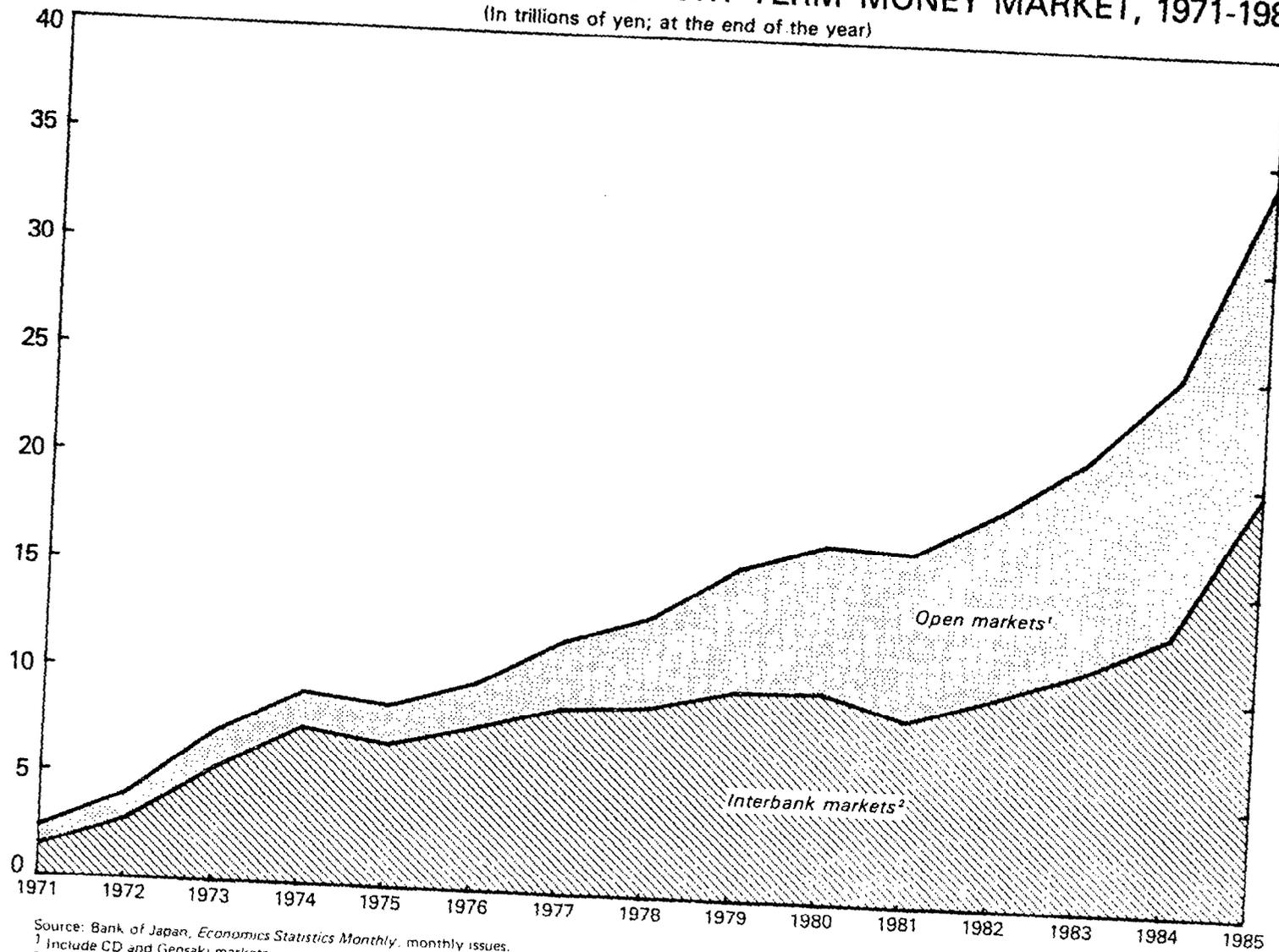
1/ A chronological summary of domestic liberalization measures, including those undertaken in 1986, is provided in Appendix II.

2/ Another important short-term market, the dollar-call market, is excluded in the definition of the money market in this paper, because it does not involve yen-denominated assets.

3/ The posted rates often reflected the views and policy stance of the Bank of Japan.

4/ From January 1966 until January 1968, the maturity of long-term government bonds was 7 years. Since February 1983, 15-year bonds with variable interest rates have been issued mainly to trust banks; since September 1983, 20-year bonds with fixed interest rates have been issued to life insurance companies. It is expected that 20-year bonds will be issued to an underwriting syndicate of financial institutions, starting in October 1986.

CHART 1  
 JAPAN  
 OUTSTANDING BALANCES IN THE SHORT-TERM MONEY MARKET, 1971-1985  
 (In trillions of yen; at the end of the year)



Source: Bank of Japan, *Economics Statistics Monthly*, monthly issues.  
<sup>1</sup> Include CD and Gensaki markets.  
<sup>2</sup> Include Call and Bill-discount markets.



syndicate-member banks was reduced to about 7-9 months (depending on the month of issue) in May 1980, to about 100 days in April 1981, and to 40 days in January 1985. 1/ In April 1983, the banks were allowed to sell over the counter the newly issued long-term government bonds and, in October 1983, were allowed to sell the newly issued medium-term government bonds. In June 1984, they were further authorized to deal in secondary trading for public sector bonds.

c. External policy measures

No discussion of recent developments in Japan's bond and money markets would be complete without an explicit recognition of their interaction with the parallel regulatory developments regarding cross-border capital flows. In fact, just as the restriction of capital flows was an integral part of the highly regulated traditional system, the liberalization of capital flows was an integral part of the domestic liberalization process. At the same time, it acted as a catalyst for further domestic liberalization measures.

While the Foreign Exchange and Foreign Trade Control Law (FEFTCL) of 1949 prohibited in principle all foreign exchange transactions except by administrative fiat, the authorities took a series of measures to ease restrictions on capital flows, as Japan's trade system was increasingly integrated with the rest of the world throughout the 1960s and 1970s. 2/ This process of liberalization was gradual but continuous, although there were temporal reversals associated with large swings in the exchange rate or the current account position. As a culmination of a series of liberalization measures that had been previously taken, the authorities totally liberalized non-residents' investment in Japanese securities in February in 1979 and restrictions on non-residents' Gensaki transactions in May 1979. In the light of the difference that had emerged between the existing prohibitive law and the liberalized practice, the need to simplify procedures led to the enactment, in December 1980, of the new FEFTCL, which embodied the principle that all foreign exchange transactions could be freely made unless expressly prohibited. 3/

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1/ This 40-day holding period applied only to the dealing account. Effective in April 1986, the minimum holding periods are 10 days for the dealing account and 40 days for the investment account.

2/ Adams and Hoshi (1972) present a detailed discussion on these liberalization measures in the 1960s, and Horne (1985) discusses those in the 1970s.

3/ The work on the revision of the old FEFTCL began in 1978 as part of trade diplomacy between the United States and Japan at the initiative of Prime Minister Fukuda, who thought the old law was a public relations problem. According to Horne (1985), neither the Prime Minister nor the Ministry of Finance had any intention of changing the substance of the law.

While the new FEFTCL did totally liberalize some foreign exchange transactions, most notably foreign currency loans and deposits, it still allowed the Ministry of Finance to retain much administrative control in areas that were thought sensitive to the regulation of the domestic financial system. The issuance of yen bonds, for example, remained subject to the control of the Ministry. 1/ However, in part responding to outside pressure arising from Japan's large current account surpluses, the authorities continued to ease restrictions on capital flows under the framework of the new law. 2/ Of these further measures, those particularly relevant to the bond market included: the authorization for resident firms to issue Euro-yen bonds (provided that these bonds not be sold to residents for 180 days) in April 1984; and a series of measures to relax the eligibility requirements for non-resident issues of Euro-yen bonds in December 1984 and April 1985. The measures relevant to the money market included: the abolition in April 1984 of the so-called "real demand rule" on forward exchange transactions; 3/ the abolition in June 1984 of restrictions on the amount of foreign exchange that could be converted to yen by financial institutions; 4/ and the authorization in December 1984 for banks to issue Euro-yen CDs of maturities of less than 6 months.

#### V. The Effect of Liberalization on the Bond Market

The expansion of secondary trading in government bonds in recent years was very rapid. From 1976 to 1977, for example, the annual volume of trading in government bonds in the OTC market--which accounts for more than 90 percent of total trading--increased from 3 to 22 trillion yen; from 1977 to 1985, the annual volume exploded from 22 to 1,260 trillion yen (Table 2). In contrast, the annual volume of trading in bank debentures leveled off after peaking in 1978, when they were overtaken by government bonds as the most actively traded bonds. In more recent years, government bonds far exceeded bank debentures in terms of both the volume of secondary trading and the value of outstanding bonds (Table 1).

##### a. Determinants of the bid-ask price spread

This rapid expansion of secondary trading in government bonds reduced the transactions cost of secondary bond trading as measured by

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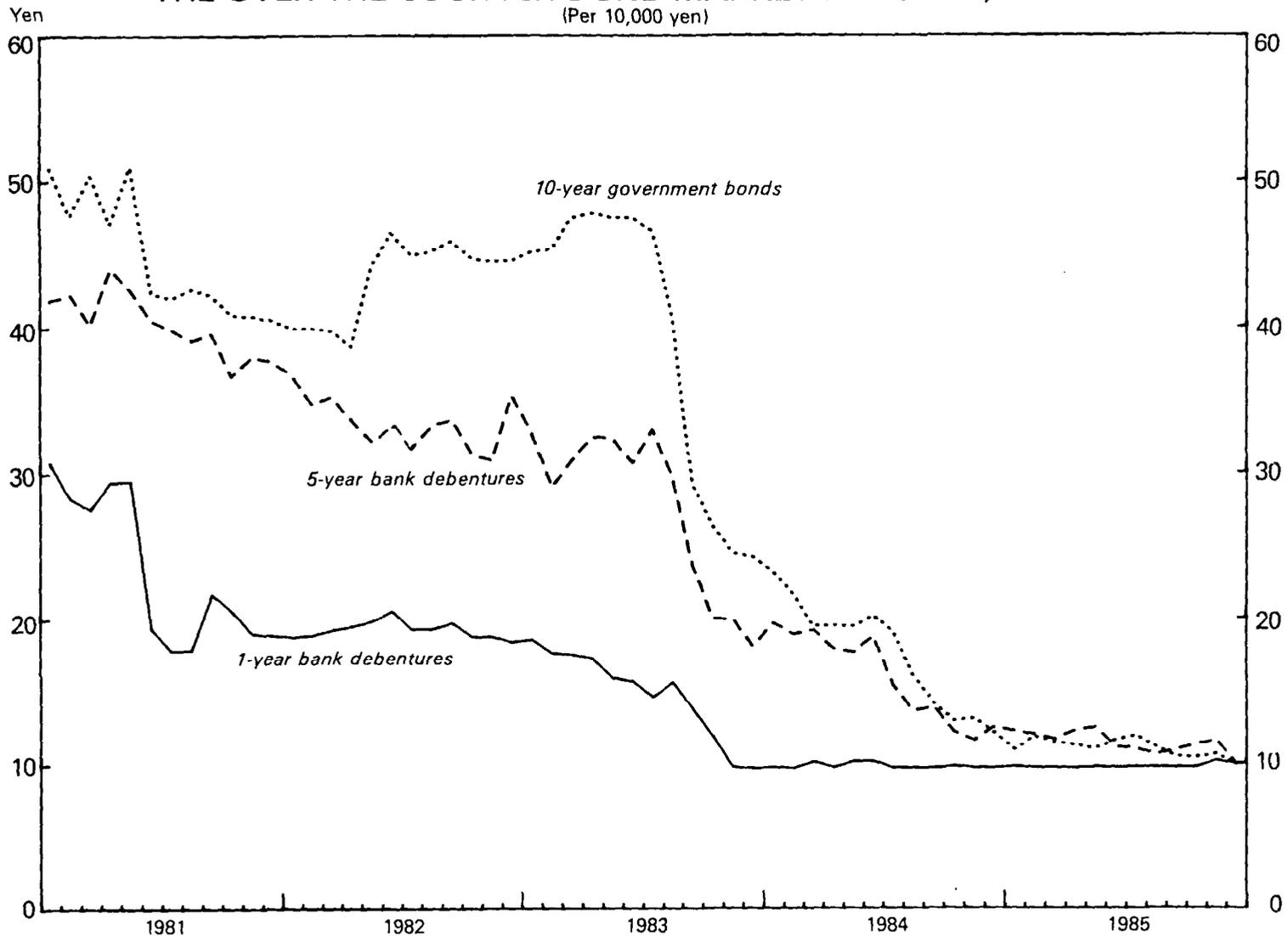
1/ The new law simply shifted the issuing of yen bonds from a licensing requirement to a requirement of prior notice and screening.

2/ See Frankel (1984).

3/ Under this rule, forward exchange transactions could in principle be made only for trade financing purposes.

4/ See Section VIII for a further explanation of this regulation.

CHART 2  
 MONTHLY AVERAGE BID-ASK SPREADS IN  
 THE OVER-THE-COUNTER BOND MARKET IN TOKYO, 1981-85  
 (Per 10,000 yen)



Source: Underlying daily data obtained from *Nihon Keizai Shimbun*.  
 † Price spreads calculated from the average monthly percentage spreads.



the bid-ask price spreads. 1/ The average monthly price spread on 10-year government bonds, for example, fell from 51 yen (for the face value of 10,000 yen) in January 1981 to 10 yen in December 1985 (Chart 2). 2/ The fall in the bid-ask spreads on government bonds was associated with a similar fall in the price spreads on other types of bonds that are close substitutes for government bonds: 3/ the spread on 5-year bank debentures fell from 42 in January 1981 to 10 yen in December 1985, and the spread on 1-year bank debentures from 31 to 10 yen.

This dramatic fall in the bid-ask spreads in the Japanese bond market can be explained by a simple theoretical model in which the spread is thought of as the price of dealer services. 4/ Then the spread is given by:

$$(1) \text{ SPD} = F(R, \text{VT}, \text{MC})$$

+   -   -

where SPD is the price spread as a percentage of the market price, R is a measure of risk associated with holding the bonds, VT is the volume of transactions, MC is the competitive environment of the market, and the signs refer to the partial derivatives of SPD with respect to the above variables. The effect of R on SPD is positive because a dealer would demand greater compensation for bearing greater risk; the effect of VT is negative because a larger volume of transactions would facilitate the matching of selling and buying orders and thus reduce the amount of inventories to be held; 5/ and the effect of MC is negative because increased competition would reduce the price in excess of the marginal cost of providing dealer services.

Assuming a linear specification, the contribution of the movement in each of these variables to the recent fall in the bid-ask spread on 10-year government bonds 6/ can be assessed by least-squares regression.

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1/ See the Bank of Japan (1982, 1986), the OECD (1984) and Maru and Takahashi (1985).

2/ This is smaller than the comparable spread in the U.S. bond market (Bank of Japan, 1986).

3/ This is because the rates of return net of transactions costs on substitute bonds move in the same direction.

4/ See Demsetz (1968) and Stoll (1978) for the formal theory underlying this section.

5/ The cost of maintaining a larger inventory of interest-bearing securities involves greater exposure to risk and a greater deviation from the optimal portfolio.

6/ 10-year bonds are the only type of government bonds for which there exists consistent time-series data for the entire sample period.

Least-squares estimates of equation (1) for the monthly average price spread during the period of July 1980 to December 1985 are given (with standard errors in parentheses) by:

$$(2) \text{ SPD} = 1.475 + 0.258 R - 0.111 \text{ LVT} - 0.071 \text{ BS} - 0.016 \text{ BD}$$

(0.284) (0.190) (0.028) (0.028) (0.029)

$$R^2 = 0.42 \quad \rho = 0.83 \text{ 1/}$$

where R is the standard deviation of daily yield changes; LVT is the log of the yen value of transactions in government bonds (calculated as the simple average of monthly transactions during the current and past months); BS is a dummy variable for the months when banks were authorized to sell government bonds over the counter, and BD is a dummy for the months when they were authorized to deal in government bonds. According to equation (2), all four coefficients have the expected signs. Moreover, the volume of trading and the dummy variable for bank sales are significant at the 1 percent level.

b. Pricing of bonds

Partly because of the large transactions cost and partly because of the unique nature of the primary market, it was long taken for granted that the secondary bond market in Japan was highly segmented and that the pricing of one type of bond was made quite independently of the pricing of another. 2/ If such were the case, it might be expected that the price of one type of bonds would adjust only with a lag to a change in the price of another. Under this segmented market view, it might be the case that the pricing of relatively inactively traded non-government bonds would consistently lag the pricing of much more actively traded government bonds.

Given the wide acceptance of the segmented-market view prior to the financial market liberalization, it would be of interest to test its applicability in the context of a more deregulated financial environment in Japan. In order to do this in various markets, standard causality tests on daily data are used in this paper for the period of 1981-85. 3/ Admittedly,

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1/ A first-order autoregression was used to correct for serial correlation in residuals.

2/ Kuroda (1982) reviews some of these traditional views of the pricing mechanism in the Japanese bond market. The unique nature of the primary market, as discussed earlier in the text, created an environment where the pricing of bonds was dictated by large secondary sales by commercial banks, which willingly incurred a capital loss by selling the primary bonds they had been required to purchase.

3/ The choice of this sample period was made on the basis of the availability of data and the consideration of uniformity throughout the empirical sections of the paper.

there are a number of conceptual difficulties associated with such causality tests. For one thing, they are strictly tests of statistical predictability. Moreover, they consider only lead-lag (time-domain) relationships and do not take into account expectational factors that may be important in the pricing of financial assets. More fundamentally, these causality tests may be particularly inappropriate when the relationship between the two variables is not sequential but instantaneous, as is likely in a well-developed financial market. <sup>1/</sup>

Bearing in mind these and other conceptual limitations, two sets of causality tests, the Granger test and a version of the Sims test, are used to test the validity of the segmented-market hypothesis in this and other sections of the paper. In this section, the validity of the segmented-market hypothesis within the bond market is examined by using the daily bi-variate time-series of the 10-year government bond and the 5-year bank debenture yields. <sup>2/</sup> It is hypothesized that, under the segmented-market view, the government bond yield would consistently lead the bank debenture yield. According to the chi-square statistics (Table 3),

Table 3. Wald Statistics for Causality Tests between 5-year Bank Debenture Yield and 10-year Government Bond Yield, 1981-85

(30 daily leads/lags)

	5-year bank debenture to 10-year government bond		10-year government bond to 5-year bank debenture	
	Granger Test	Sims Test	Granger Test	Sims Test
1981	25.1	43.7	37.1	48.1
1982	31.6	73.5**	90.6**	153.3**
1983	41.0	82.1**	62.1**	114.4**
1984	42.2	50.0*	20.2	24.0
1985	42.5	54.3**	70.2**	148.5**

Note: \*\* (\*) indicates that the chi-square statistic is significant at 1 (5) percent.

<sup>1/</sup> See Appendix I.

<sup>2/</sup> These tests are used to test the segmented-market hypothesis within the money market in Section VI and between the bond and money market in Section VII.

there is some evidence of a feedback relationship (i.e., causality in both directions) between the two bond yields for three of the five years; there is, however, no consistently uni-directional causality relationship. While these results are by no means conclusive, they may be indicative of the highly integrated nature of the Japanese secondary bond market. Whatever validity such a view might have had prior to the radical transformation of the market, the view that the Japanese bond market is highly segmented receives little support.

## VI. The Effect of Liberalization on the Money Market

The size of the short-term money market increased rapidly in recent years: the value of outstanding balances in the four major markets that comprise the money market, for example, increased from 12 trillion yen in 1977 to 34 trillion in 1985 (Table 4). 1/ The shares of the bill-discount market and the CD market increased in more recent years. 2/ In contrast, the shares of the call market and Gensaki markets decreased, although there is some indication that that of the call market began to increase again with the introduction of unsecured instruments in July 1985.

### a. Arbitrage among interbank markets

In the traditional operation of the call market, regional and trust banks had been suppliers of funds, and city banks had been users of funds. In late 1980 and early 1981, however, the Bank of Japan allowed the former to borrow and the latter to lend in the call market; moreover, in early 1982, the Bank of Japan authorized money market brokers to act as dealers in the bill-discount market. As a result, there has been a greater degree of arbitrage between the call and bill-discount markets.

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1/ At the end of 1985, the other two money markets were insignificant: the value of outstanding balances in the BA market was 0.2 trillion and that in the TB market (outside the official entities) 0.6 trillion yen. It should be noted, however, that the size of the TB market varies seasonally; it reached close to 4 trillion yen in March 1985.

2/ The bill-discount market was created from the call market in May 1971 as a market in which primarily 2-month bills were to be traded. The creation of this new interbank market was motivated by two factors: (1) an increasing amount of bills with longer maturities (i.e., over one month) came to be traded in the call market, distorting its original function strictly as a short-term (i.e., less than one month) market; (2) the Bank of Japan desired to have market instruments of longer maturities that were better suited for its market operations. Trading in bills of maturities greater than one month was discontinued in the call market in June 1972.

Table 4. Outstanding Balances in Short-term Money Markets  
in Japan, 1974-85 <sup>1/</sup>

(In trillions of yen; percent)

End of year	Interbank markets		Open markets		Total
	Call	Bill-discount	Gensaki	CD's	
1974	2.2 (24.2)	5.2 (57.1)	1.7 (18.7)	--- (---)	9.1
1975	2.3 (27.1)	4.4 (51.8)	1.8 (21.1)	--- (---)	8.5
1976	2.6 (26.5)	5.1 (52.0)	2.1 (21.5)	--- (---)	9.8
1977	2.6 (21.8)	6.1 (51.3)	3.2 (26.9)	--- (---)	11.9
1978	2.3 (17.6)	6.6 (50.4)	4.2 (32.0)	--- (---)	13.1
1979	3.5 (22.4)	6.3 (40.4)	4.0 (25.7)	1.8 (11.5)	15.6
1980	4.1 (24.6)	5.7 (34.1)	4.5 (26.9)	2.4 (14.4)	16.7
1981	4.7 (28.5)	4.0 (24.2)	4.5 (27.3)	3.3 (20.0)	16.5
1982	4.5 (24.3)	5.4 (29.2)	4.3 (23.3)	4.3 (23.2)	18.5
1983	4.5 (21.1)	6.8 (31.9)	4.3 (20.2)	5.7 (26.8)	21.3
1984	5.0 (19.9)	8.0 (31.9)	3.6 (14.3)	8.5 (33.9)	25.1
1985	5.1 (15.0)	14.7 (43.1)	4.6 (13.5)	9.7 (28.4)	34.1

Source: The Bank of Japan, Economic Statistics Monthly.

<sup>1/</sup> The figures in parentheses are market shares as percentage of total.

One way to verify this increased arbitrage is to see if there was any unexploited arbitrage opportunity across the two markets. A comparison of the daily time series of the 2-month bill-discount rate and the 2-month ex-post return from rolling over unconditional call loans indicates that no such unexploited profit opportunity seemed to exist during most of the period 1981-85 (Chart 3). <sup>1/</sup> The difference between the two rates during this period can be accounted for by the fixed bid-ask spread of 0.125 percent per annum for each transaction in the call and bill-discount markets, once allowance is made for risk premium and expectational errors. As an additional evidence of this close relationship between the two markets, causality tests suggest the presence of statistically significant feedback between the unconditional call rate and the daily return on 2-month bills for each year during 1981-85 (Table 5).

Table 5. Wald Statistics for Causality Tests between Unconditional Call Rate and 2-Month Bill-discount Rate, 1981-85

(30 daily leads/lags)

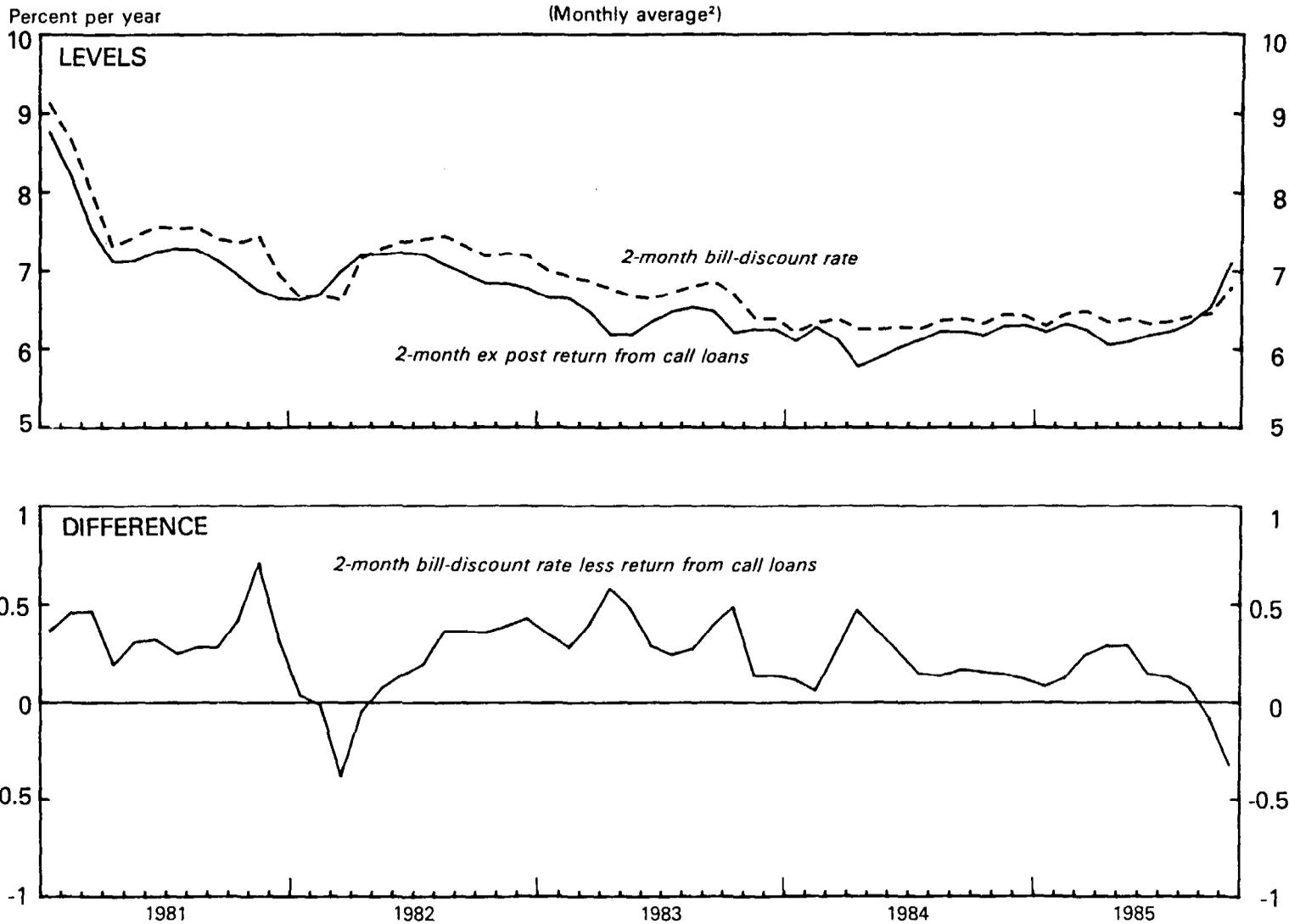
	<u>Unconditional call rate to 2-month bill-discount rate</u>		<u>2-month bill-discount rate to Unconditional call rate</u>	
	Granger Test	Sims Test	Granger Test	Sims Test
1981	52.0**	69.0**	225.6**	247.1**
1982	66.2**	78.2**	59.7**	112.7**
1983	52.0**	90.1**	71.0**	56.3**
1984	49.8*	68.7**	31.2	72.7**
1985	146.5**	197.8**	37.8	64.5**

Note: \*\* (\*) indicates that the chi-square statistic is significant at 1 (5) percent.

<sup>1/</sup> Unconditional call loans can be recalled at any time on demand by either party; otherwise, they are automatically rolled over indefinitely.

CHART 3

# MOVEMENTS OF 2-MONTH BILL-DISCOUNT RATE AND 2-MONTH EX POST RETURN FROM UNCONDITIONAL CALL LOANS, 1981-85<sup>1</sup>



Sources: Underlying daily data obtained from *Nihon Keizai Shimbun*.

<sup>1</sup> 14-day call loans are assumed.

<sup>2</sup> Calculated as the mean of daily rates.



b. Arbitrage between interbank and open markets

Along with the liberalization of the interbank market, the issuing terms on bank CDs were relaxed from 1979 (Appendix II). As a result, arbitrage between the CD and interbank market increased. This in turn led to an even greater degree of arbitrage between the Gensaki and interbank markets. This greater integration of the open and interbank markets accelerated with the establishment, in June 1985, of a bankers' acceptance (BA) market, to which both financial and non-financial institutions have unrestricted access.

Table 6. Wald Statistics for Causality Tests between 2-month Bill-discount Rate and 2-month Gensaki Rate, 1981-85

(30 daily leads/lags)

	2-month bill-discount rate to 2-month Gensaki rate		2-month Gensaki rate to 2-month bill-discount rate	
	Granger Test	Sims Test	Granger Test	Sims Test
1981	107.2**	169.0**	98.6**	108.5**
1982	62.8**	80.6**	25.8	56.0**
1983	59.6**	99.1**	55.1**	98.3**
1984	33.7	41.1	28.2	51.8**
1985	417.4**	557.7**	44.2*	67.3**

Note: \*\* (\*) indicates that the chi-square statistic is significant at 1 (5) percent.

A comparison of the daily time-series of the 2-month bill-discount rate and the 2-month Gensaki rate indicates that the two rates moved closely together during 1981-85 (Chart 4). This close relationship between the two interest rates is also demonstrated by the presence of statistically significant feedback between them during this period (Table 6). As is expected in any efficient market, the speed of adjustment in the money market appears to be quite fast. Moreover, no consistently uni-directional causality relationship was found. This contrasts with the traditional view that the Gensaki rate responds to the bill-

discount rate with a lag of up to a few months. <sup>1/</sup> Of particular interest are the large chi-square statistics (417 and 558) on the hypothesis that the 2-month bill-discount rate caused the 2-month Gensaki rate in 1985. This may be indicative of the Bank of Japan's greater ability, made possible by the earlier policy measures, to influence open market rates through interbank market operations. <sup>2/</sup>

### VII. The Effect of Liberalization on the Integration of the Bond and Money Markets

While both markets expanded rapidly in recent years, the bond market expanded somewhat more rapidly, growing at the compound rate of 16 percent per annum from 1974 to 1985, than the money market which grew at 12 percent. In terms of the outstanding stock, the size of the bond market far exceeded the size of the money market (Chart 5); in 1985, the bond market was almost 9 times larger. In terms of the flow volume of transactions, however, the relative size of the bond market was probably not as great, because the turn-over ratio (the value of transactions divided by the outstanding stock) is usually much larger for the money market. For example, as recently as in 1981, the volume of Gensaki trading exceeded that of outright bond trading in the OTC market (Table 7), despite the fact that the outstanding stock in the Gensaki market was only a small fraction of the bond market. Nevertheless, with its rapid expansion, the bond market is estimated to have recently overtaken the money market in terms of the flow volume of transactions as well.

#### a. Arbitrage between the bond and money markets

In the traditional policy framework of the Bank of Japan, the direction of causality was thought to run from the short-term interest rates to the long-term bond yields. Moreover, some have even argued that the long-term bond yields typically lagged up to 4 months behind the Gensaki rates. <sup>3/</sup> The validity of this view can be examined by causality tests on the daily bi-variate time-series of the daily return on 3-month Gensaki transactions and the daily return on 1-year bank debentures (Table 8).

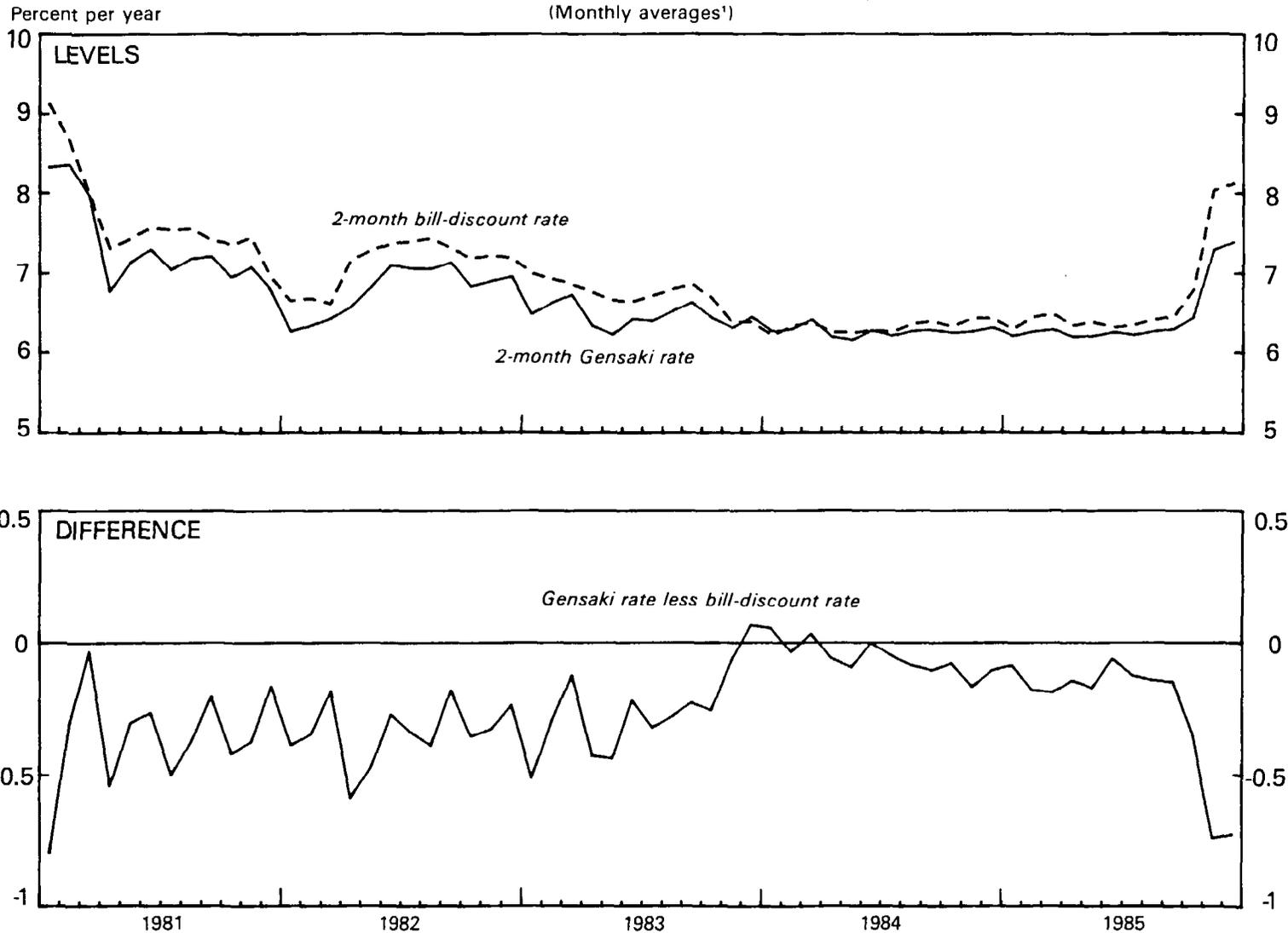
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<sup>1/</sup> This view is expressed, for example, in the February and May 1986 issues of the Bank of Japan, Chosa Geppo. According to the May issue, the length of the lag is said to have been reduced from 4 months to 2 months by the financial liberalization after 1978.

<sup>2/</sup> Following the meeting of the Group of Five countries in September 1985, the Bank of Japan intervened heavily in the interbank market to drive up interest rates. While a sharp rise in open rates was accompanied by a similarly sharp rise in interbank market rates, the deviation between the two sets of rates also increased. It is beyond the scope of this paper to explain this somewhat anomalous phenomenon.

<sup>3/</sup> This view is expressed, for example, in the Bank of Japan (1986) and the May 1986 issue of the Bank of Japan, Chosa Geppo.

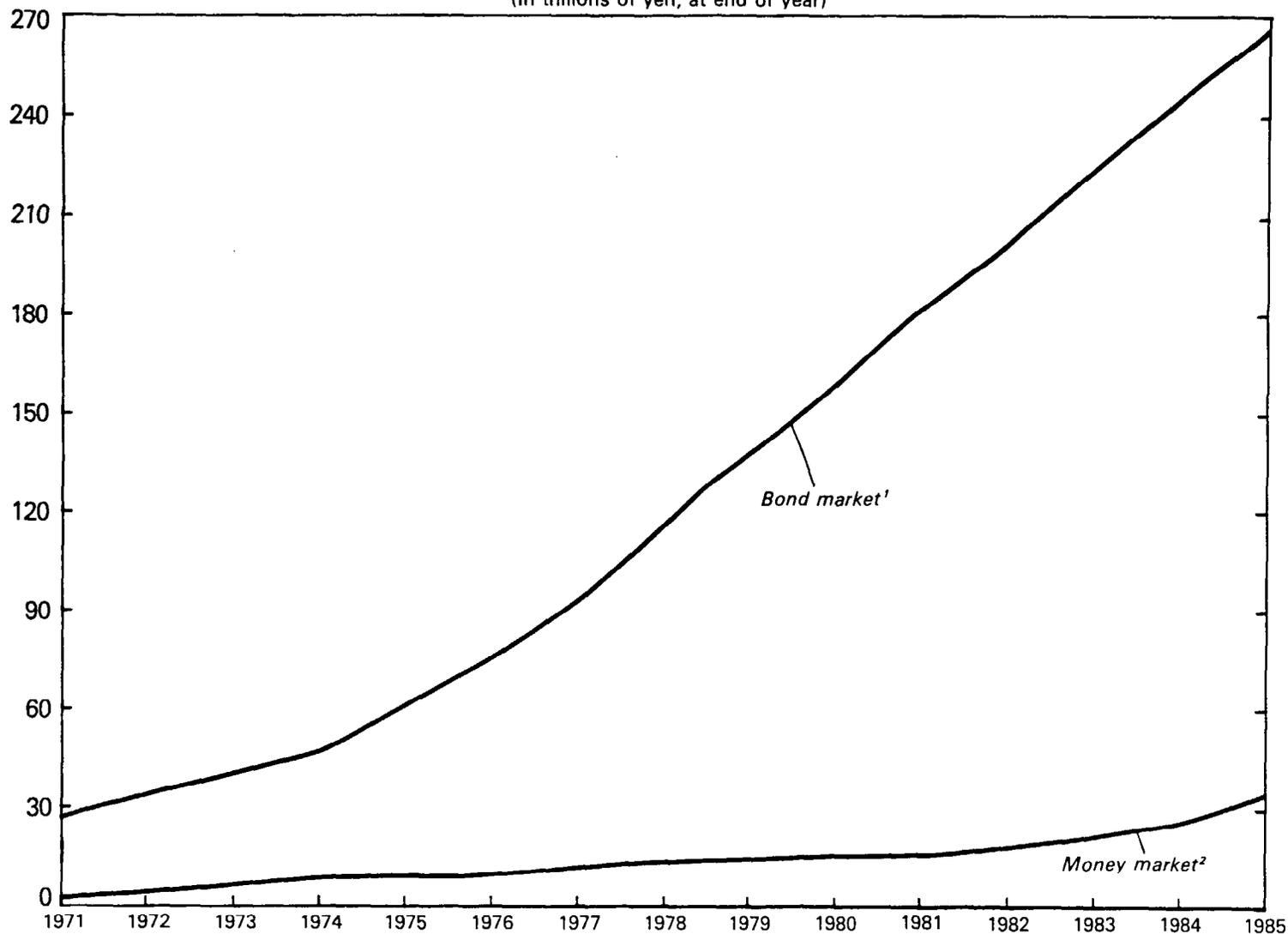
CHART 4  
**MOVEMENTS OF 2-MONTH GENSAKI RATE  
 AND 2-MONTH BILL-DISCOUNT RATE, 1981-85**  
 (Monthly averages<sup>1</sup>)



Sources: Underlying daily data obtained from *Nihon Keizai Shimbun* and IMF Treasurer's Department.  
<sup>1</sup> Calculated as the mean of daily rates.



CHART 5  
 JAPAN  
 OUTSTANDING BALANCES IN THE BOND AND MONEY MARKETS, 1971-1985  
 (In trillions of yen; at end of year)



Source: Bank of Japan, *Economic Statistics Monthly*, monthly issue.

<sup>1</sup> Excludes yen denominated foreign bonds.

<sup>2</sup> Includes CD, Gensaki, Call and Bill-discount markets.



Table 7. Sales in the OTC Bond Market (Tokyo)  
By Type of Transactions, 1974-85 1/

(In trillions of yen)

	Outright Sales	Gensaki Sales	Total
1974	15.3 (0.3)	22.6 (13.5)	37.9
1975	24.1 (0.4)	31.6 (17.2)	55.7
1976	30.9 (0.4)	40.5 (19.4)	71.4
1977	63.0 (0.7)	70.7 (22.5)	133.7
1978	85.2 (0.7)	111.4 (26.5)	196.6
1979	96.9 (0.7)	125.8 (31.8)	222.7
1980	120.9 (0.8)	160.1 (35.5)	281.0
1981	146.9 (0.8)	141.5 (31.6)	288.4
1982	191.8 (1.0)	135.3 (31.4)	327.1
1983	247.9 (1.1)	137.2 (32.0)	385.1
1984	543.8 (2.2)	148.7 (41.7)	692.5
1985	1913.1 (7.2)	251.6 (54.2)	2164.7

Source: The Bank of Japan, Economic Statistics Monthly.

1/ The figures in parentheses are turn-over ratios defined as the volume of sales divided by the existing balance in each respective market.

Table 8. Wald Statistics for Causality Tests between 1-year Bank Debenture Yield and 3-month Gensaki Rate, 1981-85

(30 daily leads/lags)

	1-year bank debenture to 3-month Gensaki rate		3-month Gensaki rate to 1-year bank debenture	
	Granger Test	Sims Test	Granger Test	Sims Test
1981	20.8	32.3	29.2	31.1
1982	32.6	46.3*	28.7	38.2
1983	46.0*	47.7*	58.7*	64.2**
1984	53.4**	86.5**	162.1**	302.3**
1985	95.2**	175.0**	84.8**	132.8**

Note: \*\* (\*) indicates that the chi-square statistic is significant at 1 (5) percent.

The chi-square statistics suggest that the degree of feedback became intensified over time. Moreover, there is no evidence to suggest that the direction of causality was uni-directional from the short-term money market rate to the long-term bond yield. As is expected in an efficient and integrated market, it appears that the speed of adjustment between the bond and money markets was quite fast, giving little credence to the view that the interest rates in one market responded to those in the other with a lag of up to a few months.

b. Term structure of interest rates

The greater integration of the bond and money markets can be more directly observed in the term structure of interest rates between the rates of return from Gensaki and outright transactions. As an example, take two investment strategies of an investor who desires to invest funds for a period of one year: in the first strategy, the investor purchases a bank debenture with a 1-year maturity in the bond market; in the second strategy, he repeatedly invests in 3-month Gensaki funds in the money market. Arbitrage between the two investment strategies implies the following differential between the two rates of return:

$$(3) \quad Z = \pm h + p + e ,$$

where  $h$  is the differential attributable to the transactions cost,  $p$  the risk premium, 1/ and  $e$  an expectational error.

We demonstrate that the falling transactions cost in the bond market reduced the "h" component of  $Z$ . 2/ To do this, we assume that the averages of bid and ask rates in the Euro-yen market represent the theoretical rates that are free from transactions costs and that the market is efficient; these assumptions allow us to treat the deviation from the term structure in the Euro-yen market as consisting of the risk premium and a white-noise error.

Least-squares estimates of equation (3) for the monthly period of January 1981 to December 1985 are given by:

$$(4) \quad Z = -0.001 + 0.021 h' + 0.798 p'$$

(0.002) (0.009) (0.125)

$$R^2=0.60 \quad \rho's = (0.68, 0.11, -0.15) \quad \underline{3/}$$

where  $h'$  is the average monthly percentage bid-ask spread on 1-year bank debentures, and  $p'$  is the risk premium calculated from the 1-year and 3-month Euro-yen rates. 4/ The statistically significant positive estimate of the coefficient of  $h'$  suggests that the fall in the bid-ask spread had indeed reduced the wedge that existed between the rate of return from outright bond transactions and that from Gensaki transactions.

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1/ Strictly, whether the risk premium is positive or negative depends on the investor's holding period. If the holding period is one year, as is assumed here, the second strategy may become more risky. However, the literature generally assumes that the risk premium on the bond with the longer maturity is positive.

2/ In principle, the "h" component can be either positive or negative. However, in the Japanese context, it is assumed that the "h" component was consistently positive. That is to say, the presence of the transactions cost allowed the rates of return in the money market to remain lower than the comparable yields in the bond market, where bonds were often sold at a discount by commercial banks.

3/ A third-order autoregression was used to correct for serial correlation in residuals.

4/ This was calculated by finding the difference between the 1-year Euro-yen deposit rate and the 1-year ex-post rate of return from repeatedly investing funds at the 3-month Euro-yen deposit rate.

### VIII. The Effect of Liberalization on the Integration of the Domestic and Euro-yen Markets

There has been a high degree of arbitrage between the Euro-yen market and the Gensaki market since May 1979, when restrictions on non-residents' Gensaki transactions were completely eliminated (Chart 6). Moreover, because there have been no formal restrictions on non-financial institutions' short-term capital transactions, the Euro-yen market and other domestic open money markets, to which they have access, have been fully integrated for some time.

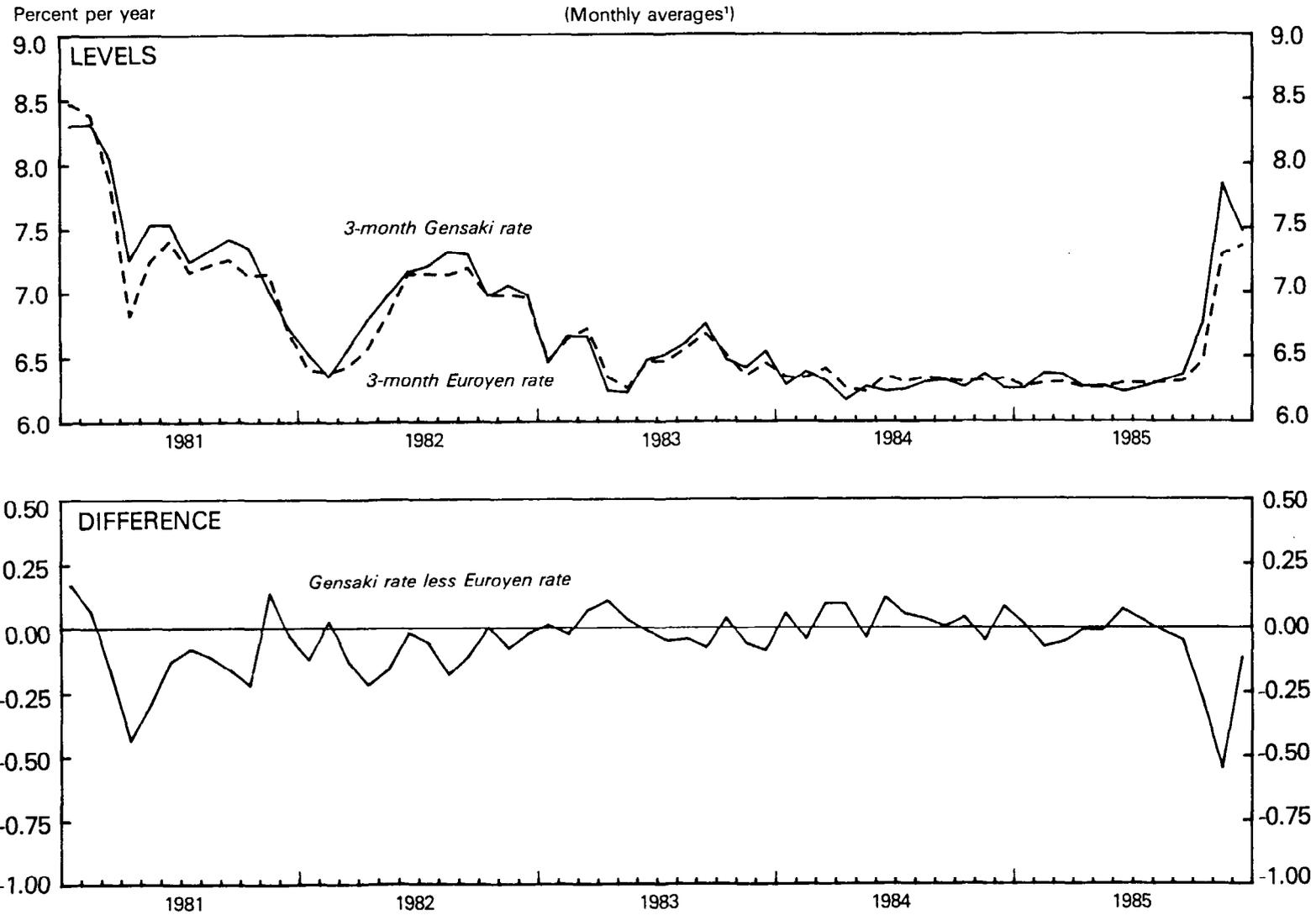
The integration of the interbank and bond markets with the Euro-yen market, however, was more recent. The integration of the bond market with the Euro-yen market took place as the recent fall in the transactions cost in the bond market facilitated its integration with the domestic money market. Because the open money market and the Euro-yen market were already integrated for some time, the integration of the bond market with the money market also meant its integration with the Euro-yen market. As a clear manifestation of this, the yield on 1-year bank debentures converged to the 1-year Euro-yen deposit rate (Chart 7).

As for the interbank market, restrictions on the amount of foreign exchange that could be converted into yen by financial institutions limited the volume of arbitrage funds between the interbank market, to which only financial institutions have access, and the Euro market prior to June 1984. This regulation on the amount of yen conversion had tended to allow the interbank rates to remain somewhat above the corresponding Euro-yen rates by regulating inflows of yen funds which were typically raised in the Euro market by swap operations (i.e., simultaneous spot sales and forward purchases of dollars), although it did not always result in a large rate differential because of the absence of restrictions on direct inflows of capital from the Euro-yen to the interbank markets or indirect inflows through the domestic open market (Chart 8). The abolition of the restriction on yen conversion in June 1984, however, did serve to facilitate the full integration of the Euro market and the interbank market.

### IX. Further Developments in 1986 and the Outlook for the Bond and Money Markets

Because, under the traditional financial system, the effectiveness of one set of regulatory restrictions was often dependent upon the presence of another type of restrictions, one set of financial market liberalization measures tends to necessitate additional measures as the traditional system breaks down. It is thus inevitable that the process of liberalization will continue until the transition to a fully deregulated system is completed. In the area of monetary policy, recent developments have already caused the Bank of Japan to experiment with new procedures,

CHART 6  
**MOVEMENTS OF 3-MONTH EUROYEN DEPOSIT RATE  
 AND 3-MONTH GENSAKI RATE, 1981-85**

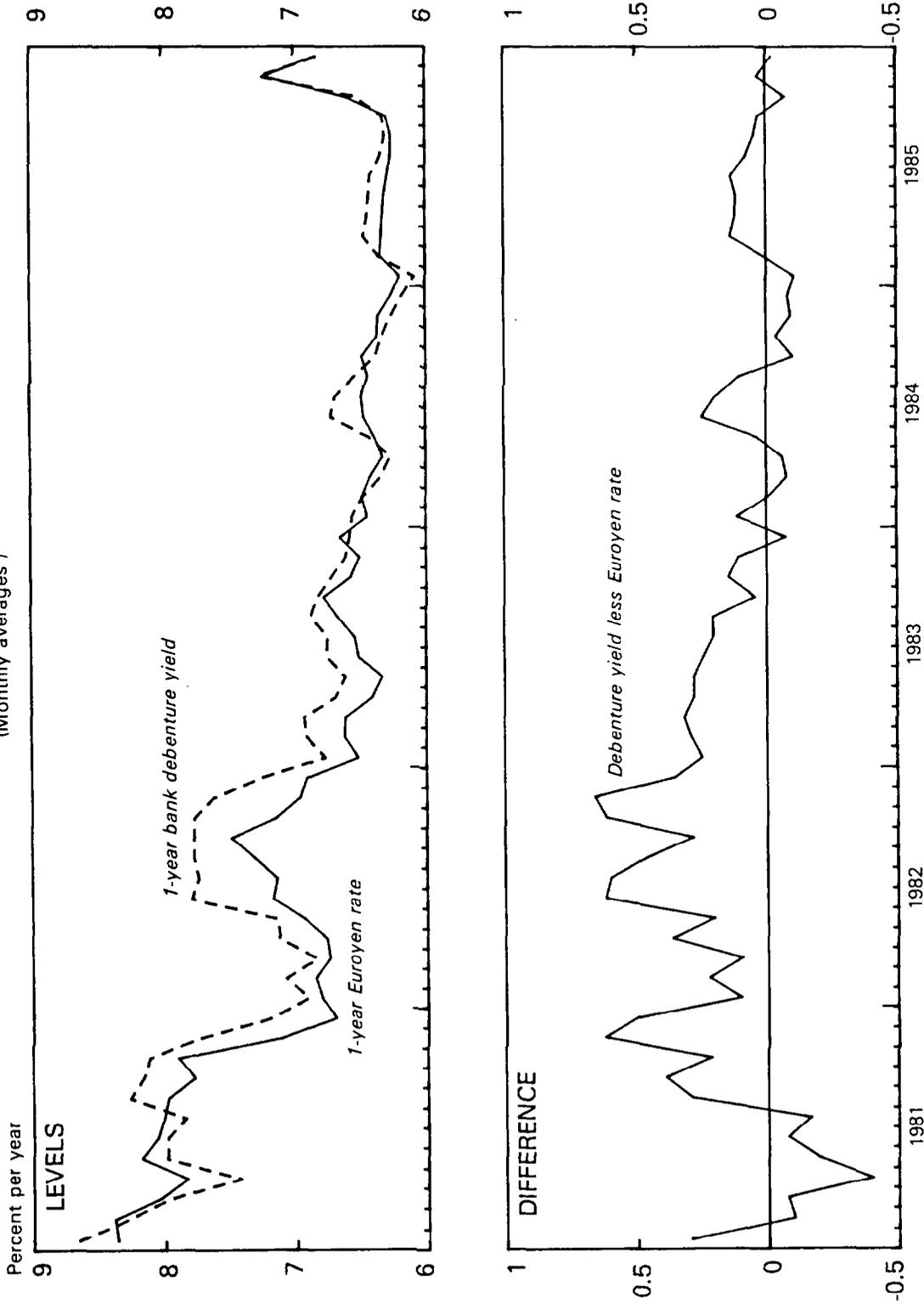


Sources: Underlying daily data obtained from Nihon Keizai Shimbun and Data Resources, Inc.

<sup>1</sup> Calculated as the mean of daily rates.



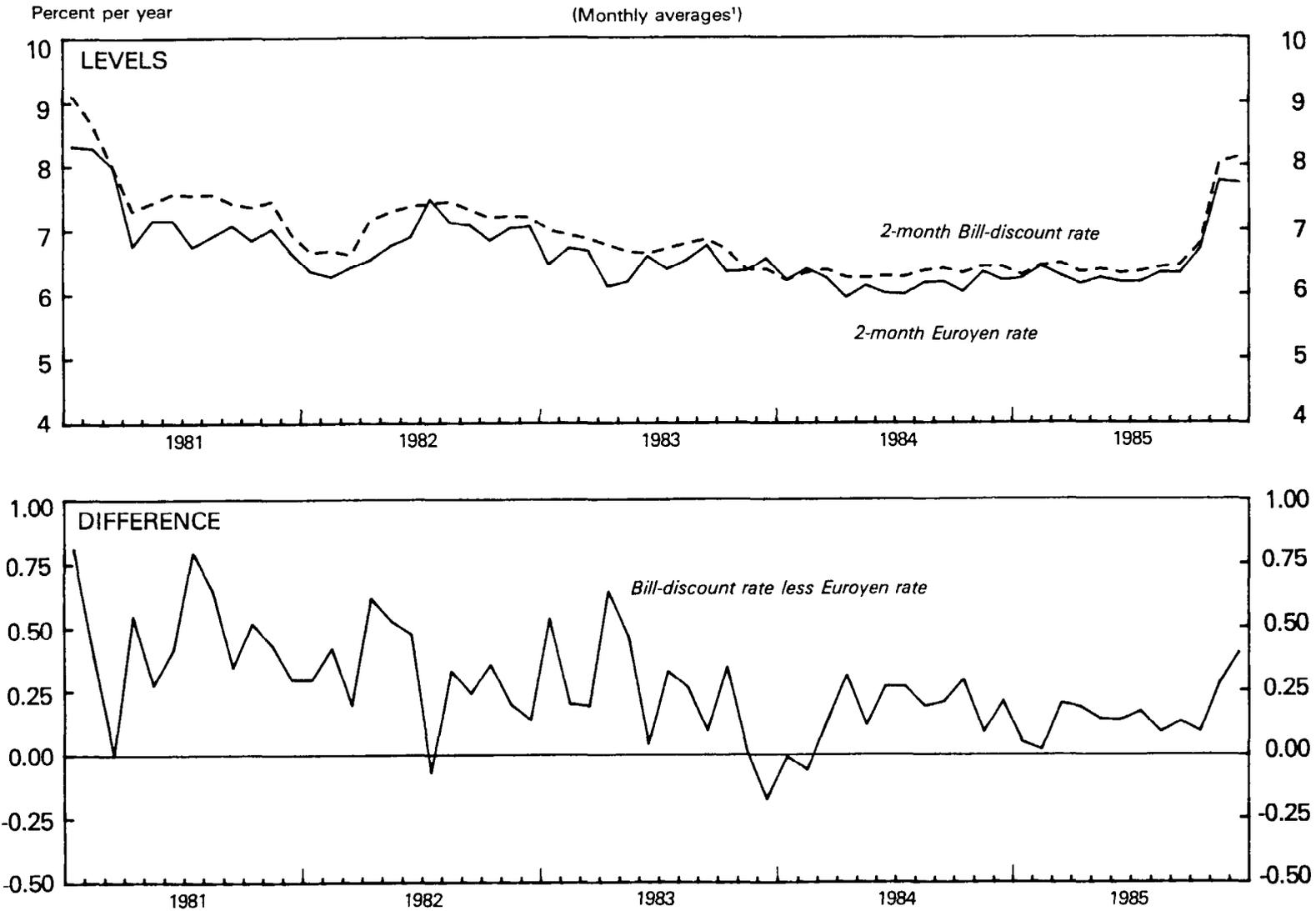
CHART 8  
MOVEMENTS OF 1-YEAR EUROYEN DEPOSIT RATE  
AND 1-YEAR BANK DEBENTURE YIELD, 1981-85  
(Monthly averages<sup>1</sup>)



Sources: Underlying daily data obtained from Nihon Keizai Shimbun and Data Resources, Inc.  
<sup>1</sup> Calculated as the mean of daily rates.



CHART 7  
**MOVEMENTS OF 2-MONTH EUROYEN DEPOSIT RATE  
 AND 2-MONTH BILL-DISCOUNT RATE, 1981-85**



Sources: Underlying daily data obtained from Nihon Keizai Shinbun and Data Resources, Inc.

<sup>1</sup> Calculated as the mean of daily rates; the 2-month Euroyen deposit rate is a theoretical rate calculated from the 2-month Eurodollar deposit rate and the 2-month forward premium on the yen, using the average of the bid and ask rates.



as the Bank has increasingly come to question the effectiveness of traditional interbank operations to influence other interest rates in a more deregulated environment. In March 1986, it began open market operations in the CD market through short-term money brokers. The use of CDs in open market operations was necessitated by the absence of a well-developed secondary market in short-term Treasury bills (TBs). TBs are almost entirely purchased by the Bank of Japan at present owing to their yield being set at 0.125 percent below the official discount rate, and there is little private holding. 1/ However, the scale of CD operations is constrained by the apprehension that central bank purchases of bank CDs might be interpreted as a "deposit of the central bank" with the issuing bank. 2/

Consequently, in order to obtain a more appropriate means of conducting short-term open market operations, the Bank of Japan intends to develop a secondary market in TBs. With this objective in mind, the Bank began open-market sales of TBs with repurchase agreements in January 1986, 3/ although such TB operations will be constrained by the limited volume and highly seasonal pattern of TB issues. However, the issuing of short-term refinancing bonds, which began in February 1986, is likely to change the nature of the TB market. 4/ Because the refinancing of the growing amount of maturing debt will necessitate more frequent issues of short-term bonds in the future, the market for such bonds will become deep and, from the investors' point of view, there will be little justification for differentiating between short-term government bonds and TBs. It is thus likely that operations in the integrated TB and short-term government bond market will become the principal tool of monetary policy in Japan, although the primary markets for these two types of government bonds may remain distinct.

In the area of banking and corporate finance, the greater access by Japanese firms to the Euro-yen market for domestic financing will work in the direction of further deregulating the domestic market, because the terms on bond issues are less stringent in the Euro-yen market. As an important step in this direction, resident firms were permitted to issue floating bonds in the Euro-yen market in April 1986; at the same time, the waiting period before the resale of Euro-yen bonds issued by resident

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1/ The maturity of TBs is 60 days. The discount rate of the Bank of Japan is always set below the interbank rates so that the banking sector is constantly in a net debtor position to the central bank.

2/ This official position is stated in Fukui (1986).

3/ The Bank of Japan began open-market outright sales of TBs in May 1981 with the objective of absorbing what it considered to be excess credit.

4/ At present, TBs differ from short-term government bonds in terms of the minimum denomination (i.e., Y1 million for the former vs. Y100 million for the latter), the frequency of issues (three times a week vs. at most once a month), the issuing terms (0.125 percent below the discount rate vs. market rates) and the maturity (60 days vs. less than 6 months).

firms to residents was reduced from 180 to 90 days. 1/ The convergence of domestic and Euro market practices also means a breakdown of the traditional separation between different types of financial institutions. As an important development in this direction, foreign commercial banks were permitted to issue Euro-yen bonds in June 1986, with the condition that the proceeds not be used in Japan. As Japanese banks are permitted to issue Euro-yen bonds and the restriction on the repatriation of the proceeds is eased, the current functional separation between long-term credit banks, which are permitted to issue long-term domestic debentures, and the ordinary banks, whose primary sources of funds are short-term deposits, will tend to break down.

In the area of bank regulation, the greater integration of the bond market (to which individuals have access) with the money market (from which they are excluded) is likely to speed up the process of deregulation in the bank deposit market. Under the present round of financial liberalization in the money market, the exclusion of individuals from access to the market has been the guiding principle. 2/ This has been done either by legally excluding unincorporated entities as in the Gensaki market or by setting a high minimum denomination (currently at Y100 million) as in the CD and BA markets. This guiding principle was manifested in the decision of the Ministry of Finance to set the minimum denomination of short-term government bonds also at Y100 million, far above the minimum denomination of Y50,000 for long-term and medium-term government bonds. However, with the greater integration of the bond and money markets, there is less and less distinction between short-term and long-term markets. Moreover, with the maturing of long-term and medium-term government bonds, there already is a de facto market in short-term government bonds to which individuals have access. These developments will have far-reaching consequences for regulations covering small-denomination bank deposits. 3/

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1/ As a part of the same package of measures in April 1986, the eligibility requirement for non-resident issues of Euroyen bonds was abolished except for the requirement that the issuing firms have a credit rating of A or above.

2/ This was prompted by the concern that allowing individuals access to the money market would result in disintermediation, perhaps endangering the stability of the banking system.

3/ The Ministry of Finance liberalized interest rates on bank deposits in excess of Y1 billion in October 1985, those in excess of Y500 million in April 1986, and those in excess of Y300 million in September 1986. The minimum denomination is expected to be lowered to Y100 million in the spring of 1987.

## X. Summary

This paper has traced the evolution and liberalization of Japan's bond and money markets and suggested an outlook for further developments. Major findings of the paper can be summarized as follows:

1. The Government's policy of setting primary bond yields below secondary market yields created a primary bond market in which most issues were purchased by financial institutions, restricted the development of the secondary bond market, and helped maintain a financial system in which all interest rates were rigidly regulated during much of the first 30 years of the post-war era.

2. In the 1960s, special factors contributed to a limited development of the secondary bond market in NTT bonds and bank debentures within the traditional financial system. This in turn facilitated the development of the Gensaki market as a short-term money market.

3. The change in the flow of funds between the corporate and public sectors that took place in the mid-1970s began to place a strain on the traditional financial system. First, the improvement in the cash position of the corporate sector facilitated the expansion of the Gensaki market. Second, the deterioration in the fiscal position of the Government necessitated large continuous issues of government bonds.

4. From the latter half of the 1970s, the authorities responded to these developments by taking a series of measures to liberalize the traditional system. First, in the face of outflows of funds from the regulated markets, they allowed banks to issue negotiable CDs and liberalized the interbank market. Second, in order to accommodate the growing balance of government bonds, they eased restrictions on secondary sales of government bonds by banks. Third, with the continuing large current account surpluses, they proceeded with the easing of restrictions on capital outflows.

5. These and other accompanying regulatory changes resulted in a rapid expansion as well as a more efficient functioning of the bond and money markets. Moreover, the substantial fall in the transactions cost in the bond market brought about by the expansion of secondary bond trading led to a greater integration of the bond and money markets as well as the *domestic and Euro-yen markets*.

6. The greater integration of the bond and money markets has diminished the effectiveness of the policy of excluding individuals from participating in the short-term money market either legally or by setting a high minimum denomination. The recent liberalization of the bond and money markets thus should eventually lead to the easing of regulations on small-denomination bank deposits. Similarly, the greater integration of the *domestic and Euro-yen markets* is likely to result in a radical restructuring of the traditional banking and corporate finance practices.

A Note on Causality Tests

The causality tests that are used in the text are the Wald variants of the Granger test and a lagged dependent variable version of the Sims test. These two tests are chosen in light of Geweke, Meese, and Dent (1983), who suggested their generally more satisfactory performance compared with other tests. Both interest rate variables are first-differenced in order to approximate stationarity.

The Granger test on a stationary bi-variate time-series of any two variable x and y is done by twice running the following regression:

$$(5) \quad x_t = \sum_{i=1}^k a_i x_{t-i} + \sum_{i=1}^k b_i y_{t-i} + u_t,$$

where u is a serially uncorrelated disturbance, k is the number of lags, and t is a time subscript, with and without the restriction that  $b_i=0$  for all i. A time-series {y} is said to cause another time-series {x} in the sense of Granger if the hypothesis about the restriction can be rejected at a given significance level.

A lagged dependent variable version of the Sims test (simply the Sims test in the text) is done by twice running the following regression:

$$(6) \quad y_t = \sum_{i=1}^k c_i y_{t-i} + \sum_{i=-q}^k d_i x_{t-i} + v_t,$$

where v is a serially uncorrelated error term and q is the number of leads, with and without the restriction that  $d_i=0$  for all  $i=-q$  to  $-1$ . {y} is said to cause {x} in the sense of Sims if the restriction can be rejected at a given significance level.

In both cases, the Wald statistics for the test of the restriction are given by:

$$(7) \quad T_n = n(\sigma' - \sigma) / \sigma,$$

where n is the size of the sample, and  $\sigma'$  and  $\sigma$  are the maximum likelihood estimates of the variances of the residuals with and without the restriction, respectively.  $T_n$  converges uniformly to a chi-square distribution with k (or q) degrees of freedom as n increases without bound. The Wald statistics are calculated using 30 leads (q)/lags(k).

These causality tests, however, are subject to conceptual limitations, and the test results should be interpreted with caution. First, they are strictly tests of statistical predictability. Second, this statistical predictability does not take into account expectational factors. For example, a time-series {x} may be found to help predict another time-series {y} on the basis of a causality test. But, it may be that {x} always moves in response to anticipated movements in {y}. In this case, the results of a causality test that indicates the direction of causality going from {x} to {y} gives an erroneous conclusion.

A Brief Chronological Summary of  
Major Financial Liberalization Measures

(i) Those Relating to the Government Bond Market

January 1977: 5-year discount bonds issued.

April 1977: Secondary sales of special authorization ('deficit') bonds by banks authorized after the minimum holding period of one year.

October 1977: Secondary sales of construction bonds by banks authorized after the minimum holding period of one year.

June 1978: 3-year bonds issued at market rates.

May 1979: 2-year bonds issued at market rates.

May 1980: Secondary sales of bonds by banks authorized following the commencement of trading in organized securities exchanges (i.e., about 7-9 months after the subscription).

June 1980: 4-year bonds issued at market rates.

April 1981: Secondary sales of bonds by banks authorized following the first business day in the fourth month after the subscription (i.e., about 100 days).

February 1983: 15-year bonds with variable interest rates issued.

April 1983: Over-the-counter sales of the newly issued long-term (10-year) bonds by banks authorized .

September 1983: 20-year bonds with fixed interest rates issued.

October 1983: Over-the-counter sales of the newly issued medium-term (2 to 5-year) bonds by banks authorized.

June 1984: Bank dealing in bonds with remaining maturities of less than 2 years authorized.

June 1985: Banks allowed to use interdealer brokerage services provided by the Nihon Sogo Shoken.

June 1985: Bank dealing in bonds completely liberalized.

June 1985: Secondary sales of bonds by banks authorized following the first business day in the second calendar month after the subscription (i.e., about 40 days) for the dealing account only.

October 1985: A bond futures market established.

February 1986: 6-month bonds issued at market rate with the minimum denomination of Y100 million.

April 1986: Secondary sales of bonds by banks authorized following the first business day in the first calendar month after the subscription (i.e., about 10 days) for the dealing account; following the first business day in the second calendar month after the subscription (i.e., about 40 days) for the investment account.

(ii) Those Relating to the Money Market

a. Relating to the interbank market

June 1978: Flexible pricing introduced in the call market.

June 1978: Resales of bills before maturity at free rates permitted in the bill-discount market.

October 1978: New 7-day instruments with free rates introduced in the call market.

November 1978: New 1-month instruments with free rates introduced in the bill-discount market.

November 1978: Posted rates abolished for 3- and 4-month instruments in the bill-discount market.

April 1979: Posted rates abolished in the call market.

April 1979: New 2 to 6-day instruments introduced in the call market.

October 1979: Posted rates abolished in the bill-discount market.

November 1980: Simultaneous borrowing in the call market and investing in the bill-discount market authorized for regional and trust banks.

April 1981: Simultaneous borrowing in the bill-discount market and investing in the call market authorized for city banks.

April 1982: Money brokers authorized to deal in the bill-discount market.

March 1985: Simultaneous borrowing and investing in the bill-discount market authorized.

June 1985: New 5- and 6-month instruments introduced in the bill-discount market.

July 1985: Unsecured call loans authorized.

August 1985: New 2- and 3-week instruments (secured) introduced in the call market.

September 1985: New 2- and 3-week instruments (unsecured) introduced in the call market.

December 1985: Mutual savings and loans banks authorized to raise funds in the bill-discount market.

b. Relating to the open market.

May 1979: Negotiable CDs with maturities of 3 to 6 months and the minimum denomination of Y500 million introduced up to 10 percent of the issuing banks' net worth.

April 1980: The ceiling for CDs raised to 50 percent of net worth.

February 1983: The ceiling for CDs raised to 75 percent of net worth.

January 1984: The minimum denomination for CDs reduced to Y300 million.

March 1985: Money market certificates (MMCs) with maturities of 1 to 6 months and the minimum denomination of Y50 million introduced.

April 1985: The ceiling for CDs raised to 100 percent of net worth; the minimum denomination reduced to Y100 million; and the minimum maturity reduced to 1 month.

June 1985: Yen-denominated bankers' acceptance (BA) market established with the minimum denomination of Y100 million and maturities of 1 to 6 months.

October 1985: The ceiling for CDs raised to 150 percent of net worth.

April 1986: The ceiling for CDs raised to 200 percent of net worth.

April 1986: The maximum maturity of CDs and MMCs increased to 12 months.

September 1986: The minimum denomination of MMCs reduced to Y30 million.

September 1986: The ceiling for CDs raised to 250 percent of net worth.

c. Relating to intermarket arbitrage.

October 1978: City banks authorized to borrow up to Y20 billion in the Gensaki market.

January 1979: Step-wise easing of the ceiling on Gensaki borrowing by city banks began.

April 1980: The ceiling on Gensaki borrowing by city banks raised to Y150 billion (the step-wise easing completed).

November 1980: The largest 4 securities companies authorized, for the first time since 1965, to borrow in the call market up to Y10 billion.

April 1981: City banks authorized to invest in the Gansaki market for the first time.

December 1981: Borrowing in the call market authorized for 8 additional securities companies up to Y5 billion each.

December 1981: The ceiling on borrowing in the call market by the target 4 securities companies raised to Y30 billion.

January 1982: 2 additional securities companies permitted to borrow in the call market.

May 1985: Securities companies authorized to lend in the interbank market.

June 1985: Securities companies authorized to deal in secondary bank CDs.

April 1986: Securities companies authorized to deal in yen BAs.

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