Analysis of credit spread in Japan's corporate bond market

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Abstract

This paper analyses the determinants of variation in the yield spread (credit spread) between government bonds and corporate bonds in Japan's bond market after 1997. The authors conduct empirical tests on the relationship between credit spreads and several economic and financial variables. A key finding is that default risk and the overall financial situation in Japan were the most significant factors in explaining the credit spread. The ratio of corporate bond issuance to government bond issuance is also an important determinant of the spread, a result that preceding studies had been unable to either prove or disprove conclusively. Notably, some of the factors that market participants claim to focus on in their bond dealing activities, in particular duration risk and the crowding-out effects of higher government debt, did not appear to have a significant impact on credit spreads.

1. Introduction

This paper discusses the determinants of variation in the yield spread between government bonds and corporate bonds (hereafter credit spread) in Japan's bond market after 1997 (an overview of Japan's corporate bond market after 1997 is given in the Annex). When we discuss credit spread, the default risk of the issuer is the most important determinant of its value and variation. Hence, many studies have been undertaken seeking an appropriate definition of default risk and its relation to pricing bonds.

However, in the course of explaining the variation in credit spread in Japan's corporate bond market, we look for factors other than default risk. As a first step, the possible significance of each factor is conjectured either by observing the relation between the data in question and credit spread or by interviewing market participants regarding their practices. We conducted regression analyses to assess the degree of significance of each factor as a determinant of variation in credit spread by using the data from Japan's corporate bond market.[2] Despite the limited availability of appropriate data, we think the results of the regression analyses succeed to some degree in shedding light on the significance of those factors that have hitherto not been the focus of attention.

The organisation of this paper is as follows. In Section 2, the factors which we think would be influential are introduced and we attempt to explain the mechanism through which each contributes to variation. In Section 3, regression analyses including the factors as regressors for the variation in the credit spread are conducted. The results are given with some caveats. Section 4 contains concluding remarks.

[1] We wish to thank Mr Isao Hishikawa and Mr Keiichiro Inaba for their contribution to this paper.

[2] In this paper, we only deal with the data on corporate bonds issued in the domestic market.

2. Determinants of variation in credit spread

Concerning the relation between credit spread and default risk, Chart 2 depicts credit spread and the total liabilities of bankrupt firms. While they move in the same direction for most periods, as theoretically expected, they also show no correlation for some periods. For example, through 1999 the decrease in the total liabilities of bankrupt firms was not accompanied by a narrowing of credit spread. Another example is the most recent period. Despite the increasing trend and historical peak of the total liabilities of bankrupt firms,[3] credit spread does not show any strong sign of rising. The existence of such periods motivated us to explore other variables which might affect the variation in credit spread.

In this section, we explore possible determinates as determinants of credit spread in the secondary market referring to data from Japan's domestic corporate bond market. We use the indication rates announced by the Japan Securities Dealers Association (JSDA)[4] for the yield of corporate bonds, such rates being the average for bonds with the same credit rating. In the following examination we use monthly data for all variables in question. Volume and spread data are averages for end-of-day values through each month.

The variables whose explanatory power vis-à-vis variation in credit spread in the secondary market we examined were as follows:

(a) Total liabilities of bankrupt firms

(b) Spread between Tibor (Tokyo interbank offered rate) and Libor

(c) Monetary base

(d) Relative volume of corporate bond issues and government bond issues

(e) Value of government bonds outstanding

(f) Yield spread between five- and 10-year government bonds

(g) Lag of credit spread

Below we explain the mechanism which we believe gives each factor its explanatory power for the variation in credit spread.

(a) Total liabilities of bankrupt firms

An increase in the total liabilities of bankrupt firms would signal a rise in the default risk of issued bonds, which causes widening credit spread (Chart 2).

As already mentioned, there were some periods when a decoupling of credit spread and the total liabilities of bankrupt firms was observed. The following subsections introduce some candidates other than the total liabilities of bankrupt firms to explain the variation in credit spread.

(b) Spread between Tibor and Libor

In addition to the default risk attaching to individual bonds, financial uncertainty also seems to be of significance, which includes financial system uncertainty, distrust of government policy, etc. As a proxy, we chose the spread between Tibor and Libor (hereafter Tibor-Libor spread). Although the Tibor-Libor spread is an indication of the creditworthiness of Japanese banks, it is generally accepted that it expresses the "Japan premium", ie the overall financial condition of Japan.[5]

In Chart 3, the Tibor-Libor spread and credit spread are depicted. The shape of the humps in the Tibor-Libor spread look quite similar to those in the credit spread.

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[3] Sogo Group, one of Japan's biggest department stores, and related companies went bankrupt on 12 July 2000.

[4] The Japan Securities Dealers Association is a self-regulating body under the Securities Transaction Law.

[5] Strictly speaking, Tibor-Libor spread may not represent the "Japan premium" accurately, since Libor might also include Japanese banks' offered rate in London (and vice versa for Tibor) and the banks comprising the index occasionally change.

(c) Monetary base

When market participants have excess liquid assets, reflecting the Bank of Japan's easy monetary policy, they want to obtain less liquid assets to rebalance portfolios. This can be attributed to investors' appetite for risk assets including corporate bonds. Or, due to the increase in market liquidity, asset prices as collateral security rise. This can be attributed to a reduction in the exposure of investors to credit risk and greater capacity to purchase risk assets. Both cases could explain a narrowing credit spread. In any case, it seems that market liquidity is significant in explaining the variation in credit spread. To express market liquidity, it is believed that use of the monetary base is appropriate. The relationship between changes in credit spread and those in monetary base is not obvious as shown in Chart 4, but may exist loosely.

(d) Relative volume of corporate bond issues and government bond issues[6]

The issue volume of corporate bonds and government bonds is often referred to by market participants as an influential factor explaining the variation in credit spread.

The important point vis-à-vis their explanatory power is to understand the supply-demand balance within each bond market and the overall bond market. When supply in one bond market increases, the yield in that market rises. At the same time, yields on other bonds also rise because of the increase in supply in the bond market as a whole. If the supply of corporate bonds increases more than that of government bonds, the yield on corporate bonds usually rises more than that on government bonds. As a result, credit spread between corporate and government bond yields widens. In the next section, we try to examine whether or not the ratio of the volume of new corporate bond issues to that of government bonds (Chart 5) is significant for regression analyses.

(e) Value of government bonds outstanding

On the other hand, the value of government bonds outstanding is also pointed out by economists as an important factor in accounting for the variation in credit spread. It is supposed that the accumulation of government bonds reduces an investor's ability to purchase other bonds. Economists hold that this is one of the reasons behind a rising credit spread and term it "crowding-out".

Value of government bonds outstanding, which has been increasing month by month because the government has taken repeated measures to counter the recession. However, the credit spread has not risen much. We will examine this point in the next section.

(f) Yield spread between five- and 10-year government bonds

We conjecture that the yield spread between five- and 10-year government bonds (hereafter the five-10 year government bond spread)[7] moves in the opposite direction to the variation in credit spread. The market participants interviewed pointed out that this negative correlation between the two spreads was not constantly observed over the whole period but significantly determined the variation in credit spread in past phases. The mechanism linking the two spreads is market participant behaviour where they compare returns from shouldering the credit risk inherent in corporate bonds and the duration risk of long government bonds which are credit risk free. When rate rises are expected in the near future, investors hesitate to hold long bonds of any kind and try to find alternatives to obtain returns. Investing in corporate bonds of shorter maturity is one such alternative. By investing in such corporate bonds investors can avoid duration risk though they are exposed to credit risk. In this way a link between the two spreads would emerge.

In our study of bond market data (Chart 7), it is difficult to find a negative correlation between the credit spread of corporate bonds and yield spread on government bonds.

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[6] Excludes treasury bills and bonds purchased by the Bank of Japan and the Trust Fund Bureau of the Ministry of Finance.

[7] The five-10 year government bond spread is calculated as the yield on 10-year government bonds minus that on five-year government bonds.

(g) Lag of credit spread

It is observed in tracing credit spread that it tends to move with some degree of inertia unless there is a sudden shock, for example the sudden announcement of a large-scale bankruptcy.

The reasons behind this tendency can be explained by the following hypotheses. The first is that influential factors remain for some length of time. In other words, it is not realistic to think that a factor affecting credit spread in a certain period suddenly loses its influence in the next.

The second hypothesis is that movements in credit spread may convey information possessed by informed investors regarding the appropriate level of credit spread to uninformed investors who temporarily take a "wait -and -see" stance. The widening of spreads in one period reveals the perception of informed investors vis-à-vis credit spread and uninformed investors would then recognise the real state of market conditions and also start behaving like informed investors. This information spillover among investors may contribute to inertia in credit spread movements.

3. Regression analyses

In this section, we attempt regression analyses to examine the relation between variation in credit spread and the variables introduced in the last section.

3.1 Data descriptions

We assemble monthly yields of corporate bonds with five-year maturity and calculate corresponding credit spreads for three rating categories (Aa, A and Baa). We use the indication rates announced by the JSDA as yields for corporate bonds of five-year maturity and a particular credit rating.[8]

Other regressors in the regression equation are: total liabilities of bankrupt firms, Tibor-Libor spread, five-10 year government spread, relative volume of corporate bonds and government bonds outstanding, monetary base, and lag of credit spread.

3.2 Test methodology

We estimate regressions in the following form, which models the determination of variation in credit spread.

$$D(CS_t) = \alpha_1 \cdot (100 \cdot D(\ln DEB_t)) + \alpha_2 \cdot D(TLS_{t-1}) + \alpha_3 \cdot (100 \cdot D(\ln MB_t)) + \alpha_4 \cdot D(CGR_{t+1}) + \alpha_5 \cdot (100 \cdot D(\ln GBO_{t+1})) + \alpha_6 \cdot D(LMS_t) \cdot + \alpha_7 \cdot D(CS_{t-1}) + \varepsilon_t$$

$$\varepsilon_t \sim N(0, \sigma^2)$$

CS: credit spread (bp, monthly average)

DEB: total liabilities of bankrupt firms (million yen, monthly)

TLS: Tibor-Libor spread (bp, monthly average)

MB: monetary base (100 million yen, monthly average)

CGR: ratio of the volume of new corporate bond issues to that of new government bond issues (%, monthly)

GBO: value of government bonds outstanding (100 million yen, end of month)

LMS: five-10 year government bond spread (bp, monthly average)

D(•): the first differential of the variable in parentheses.

[8] The JSDA collects the data on issued corporate bonds and categorises them in terms of maturity and credit rating. The indication rates are the arithmetic mean of yields of corporate bonds in a certain maturity category and credit rating.

All variables including the dependent variable are averages for the latest three months. For example, CS_t is the average of the credit spread in months t, t-1 and t-2. By taking the first difference of all variables they are then transformed into the form of a three-month change.

The reason for this treatment is to smooth the relation between action and reaction and to adjust for quarterly seasonality. While it may cause multicollinearity, since this handling of data with a Koyck lag includes the same period between dependent and independent variables, we want to justify this transformation in our regression analyses because of smoothing needs.

3.3 Regression period

As mentioned, there are no corporate bond yield data sufficient for analyses before June 1997. Therefore, only 33 observations from November 1997 to July 2000 are efficient because of the transformation of three-month averages and adoption of the credit spread lag as the regressor. This limit to degree of freedom is the main problem throughout our regression analyses.

3.4 Regression results

The table below reports OLS estimates of the regression equation set in the last subsection for different credit ratings.

	α_1	α_2	α_3	α_4	α_5	α_6	α_7	Adj R^2	D-H
Aa	0.02	0.19	——	——	——	——	0.62	0.72	1.90
	(2.41)	(4.32)	(——)	(——)	(——)	(——)	(6.56)		
A	0.03	0.45	– 0.19	0.09	——	——	0.80	0.93	– 0.02
	(3.77)	(9.14)	(– 1.85)	(2.32)	(——)	(——)	(16.35)		
Baa	0.03	0.43	——	0.20	——	——	0.83	0.92	1.11
	(2.28)	(5.80)	(——)	(3.63)	(——)	(——)	(15.83)		

$$D(CS_t) = \alpha_1 \cdot (100 \cdot D(\ln DEB_t)) + \alpha_2 \cdot D(TLS_{t-1}) + \alpha_3 \cdot (100 \cdot D(\ln MB_t)) + \alpha_4 \cdot D(CGR_{t+1}) + \alpha_5 \cdot (100 \cdot D(\ln GBO_{t+1})) + \alpha_6 \cdot D(LMS_t) \cdot + \alpha_7 \cdot D(CS_{t-1}) + \varepsilon_t, \quad \varepsilon_t \sim N(0, \sigma^2)$$

Note: Figures in the upper rows of variables indicate coefficients, and figures in lower rows (in parentheses) indicate their t-values. Regression period: November 1997 to July 2000.

The table shows that all regression equations satisfactorily explain the credit spread, though it must be deduced that there is a problem in terms of the limit to degree of freedom. Following is a brief rationale for each explanatory factor.

The most significant variable in all credit rating categories is the Koyck lag (CS_{t-1}, the parameter is α_7), which indicates the existence of inertia in credit spread variation. To some extent it is natural because of including the same period between dependent and independent variables. Also there is some doubt about data stationarity as its coefficient is close to 1 and the t-value is large, especially for A and Baa ratings. However, we do not consider this problem here since there is no way to avoid it in such a short regression period.

The total liabilities of bankrupt firms (*DEB*, the parameter is α_1) is also statistically significant in all credit rating categories. The theoretical relation between default risk and credit spread is confirmed as we expected.

The Tibor-Libor spread (*TLS*, the parameter is α_2) is also one of the most influential factors in all credit rating categories. This shows, as we expected, that overall financial conditions in Japan cannot be neglected in explaining the variation in credit spread.

The regression results show that the coefficient of *CGR* (the parameter is α_4) has a positive sign and is statistically significant for A and Baa. This is supportive of our conjecture that the relative tightness

of supply-demand conditions in corporate and government bond markets affects credit spread. The result that the variable is significant for A and Baa ratings is attributable to the fact that these bonds are liable to be influenced by supply shocks because they may be bought marginally by investors.

The coefficient of monetary base (*MB*, the parameter is α_3) just managed to pass the *t*-test by 90% significance only in the case of A. This partly proves that the excess supply of money reduces credit spread. However, its explanatory power is weak.

The volume of government bonds outstanding (*GBO*, the parameter is α_5) does not explain credit spread. We suppose that the crowding-out effect has not existed for the three years under review. This might be because volume is increasing constantly but not rapidly. Though the result shows no evidence of crowding-out, we cannot say the situation will continue in the future.

The regression results also show that there is no compelling evidence that credit spread is affected by the five-10 year government bond spread (LMS, the parameter is α_6) from the perspective of statistical significance. Nevertheless, we think it is a little too hasty to conclude that this relation does not exist. According to some market participants, they actively conduct bond trading based on a comparison of return on duration risk in long government bonds and credit risk in corporate bonds with a shorter period to maturity from time to time. Although we could not statistically prove the significance of such a trading practice as a determinant of credit spread, we believe that its influence cannot be ignored.

The breakdown of the contribution of each regressor for the variation of A- and Baa-rated credit spread is shown in Charts 8 and 9. We see that the outline is explained by the Koyck lag term and that the slight changes and turning points are explained by the other variables. It is confirmed that this regression function succeeds in indicating the turning points with considerable accuracy in spite of the large size of the Koyck lag parameter. The result of the one-step forecast (Charts 10 and 11) evidences its forecasting ability.

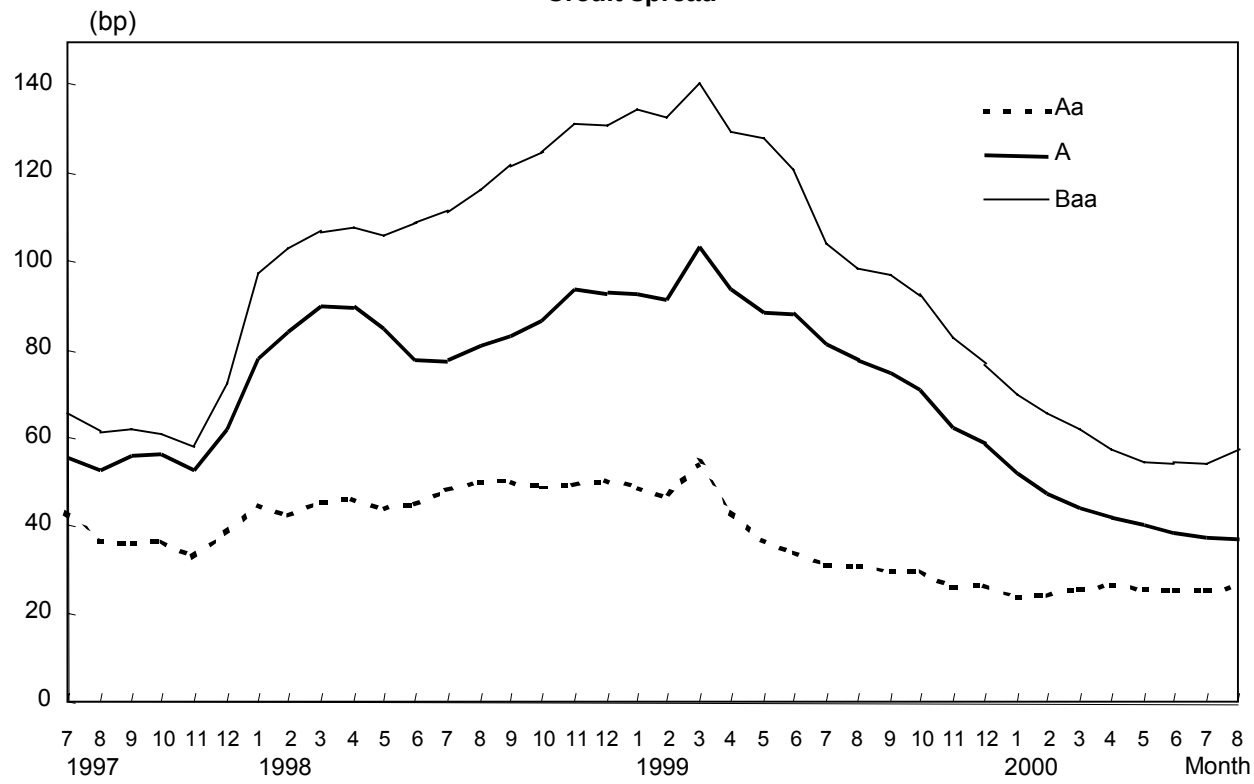
4. Concluding remarks

In this paper we showed that default risk, the overall financial situation in Japan, etc are the significant factors in explaining credit spread. In particular, it was fruitful to prove the importance of the ratio of corporate bond issue amounts to government bond issue amounts because preceding studies had not confirmed it conclusively. On the other hand, we could not prove the existence of the relative significance of credit risk to duration risk or the crowding-out effect that are monitored by market participants in their dealing. In addition, there still remain some problems which have not been solved because of the shortness of the regression period.[9] These are future studies to be undertaken.

[9] Especially for Aa class, it is desirable to add other variables to improve the performance of the equation because of the relatively low R^2 and high D-H. Though some variables on industrial attributes of each security would be important (eg the weighting of banks has been lower than before), we could not obtain such data in time series.

Chart 1

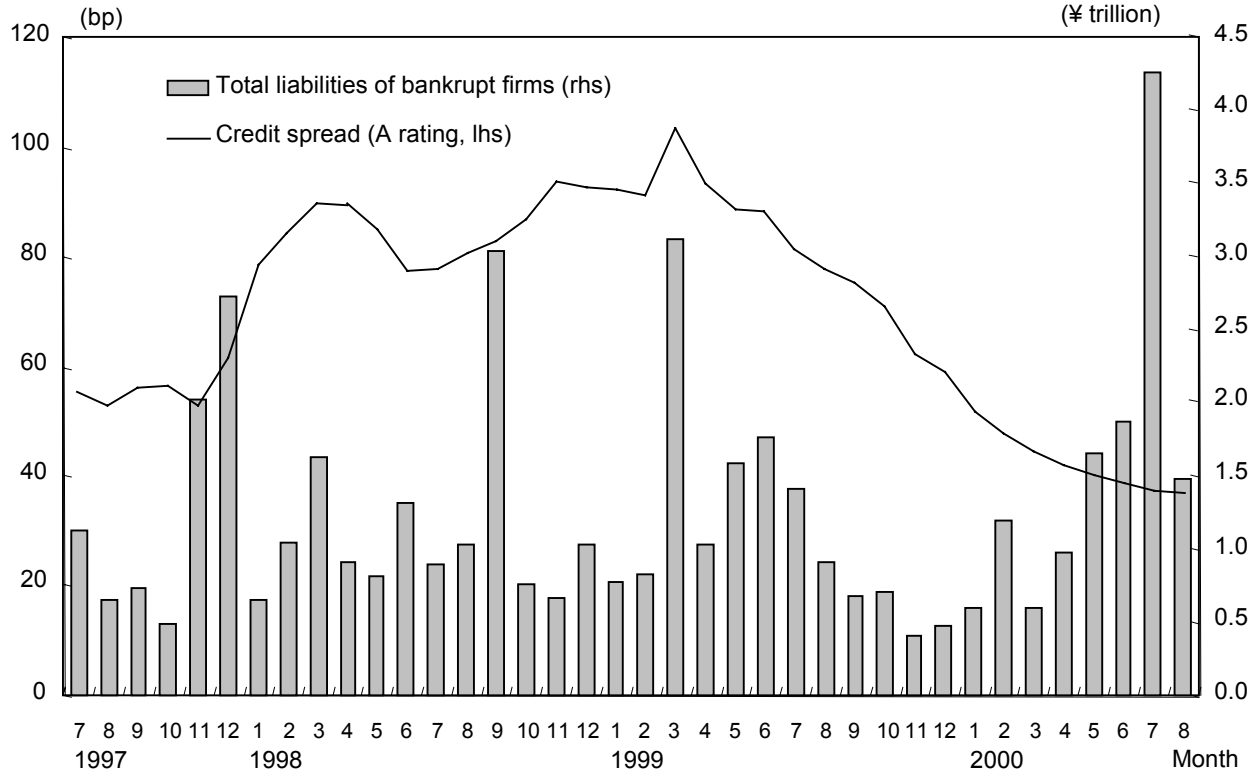
Credit spread



Source: Bank of Japan; Japan Securities Dealers Association.

Chart 2

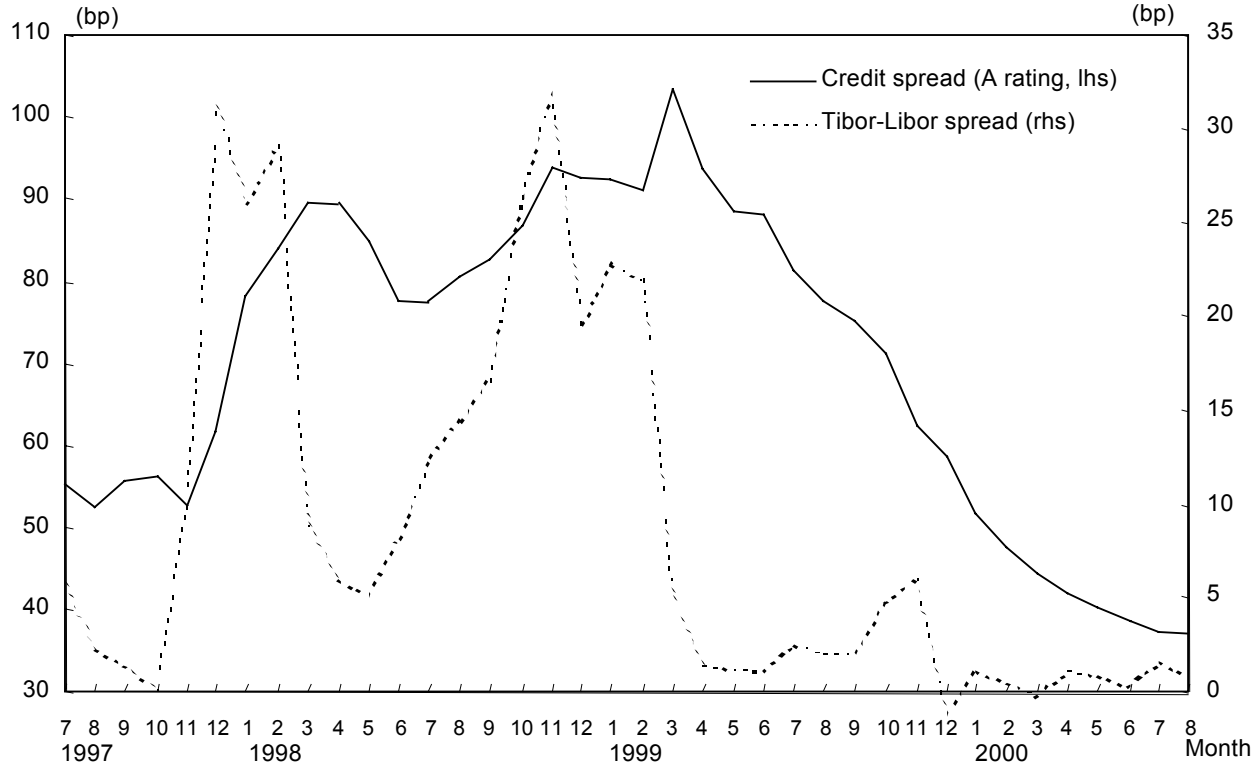
Credit spread and total liabilities of bankrupt firms



Sources: Japan Securities Dealers Association; Tokyo Shohkoh Research.

Chart 3

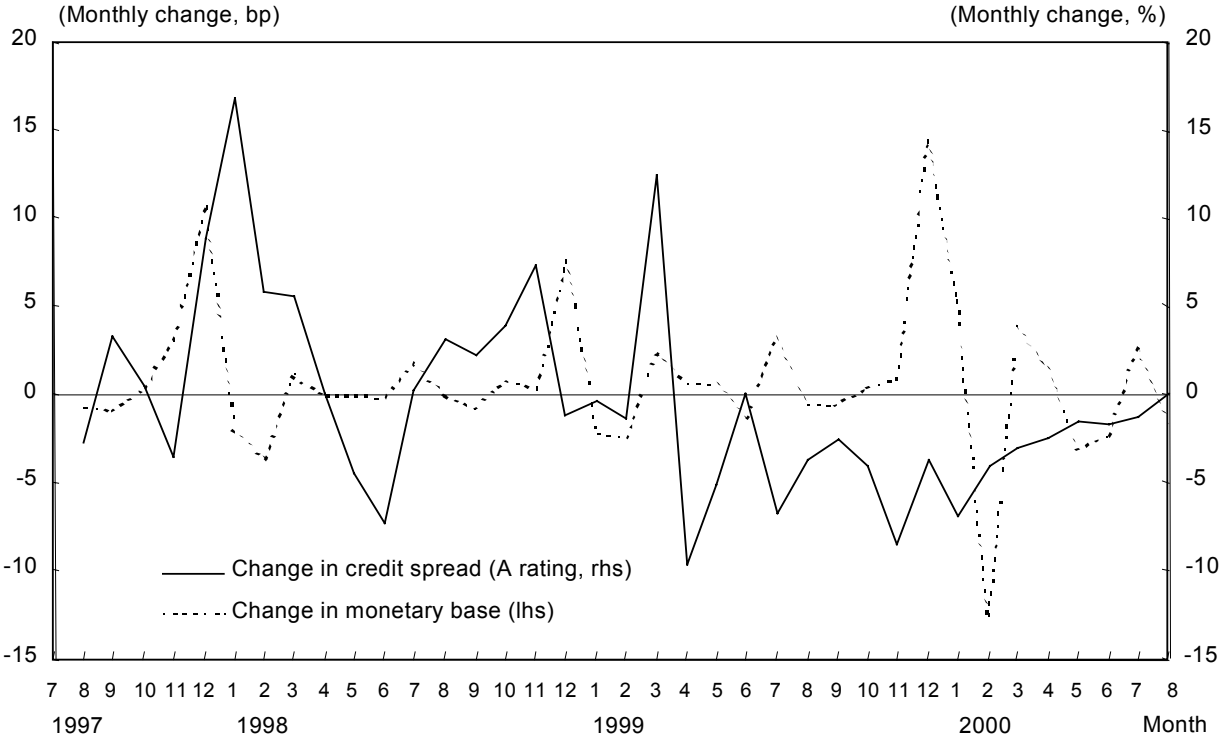
Credit spread and Tibor-Libor spread



Sources: Japanese Bankers Association; British Bankers Association.

Chart 4

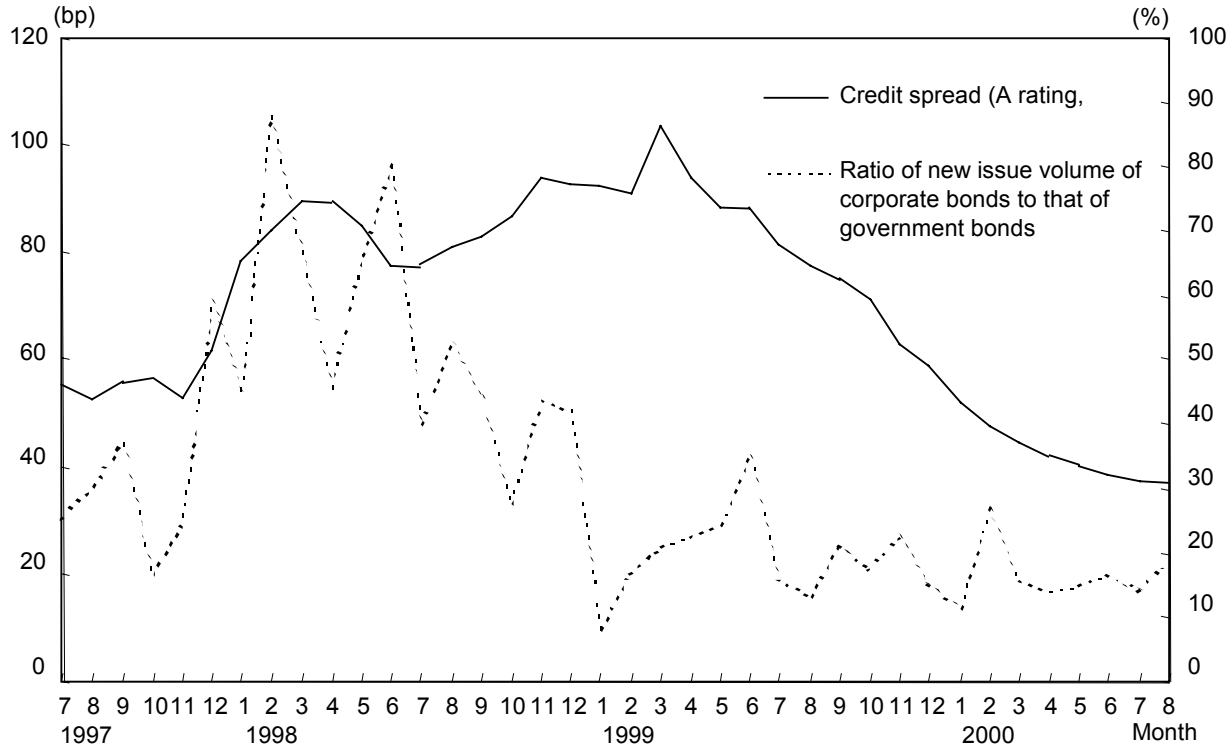
Changes in credit spread and monetary base



Source: Bank of Japan.

Chart 5

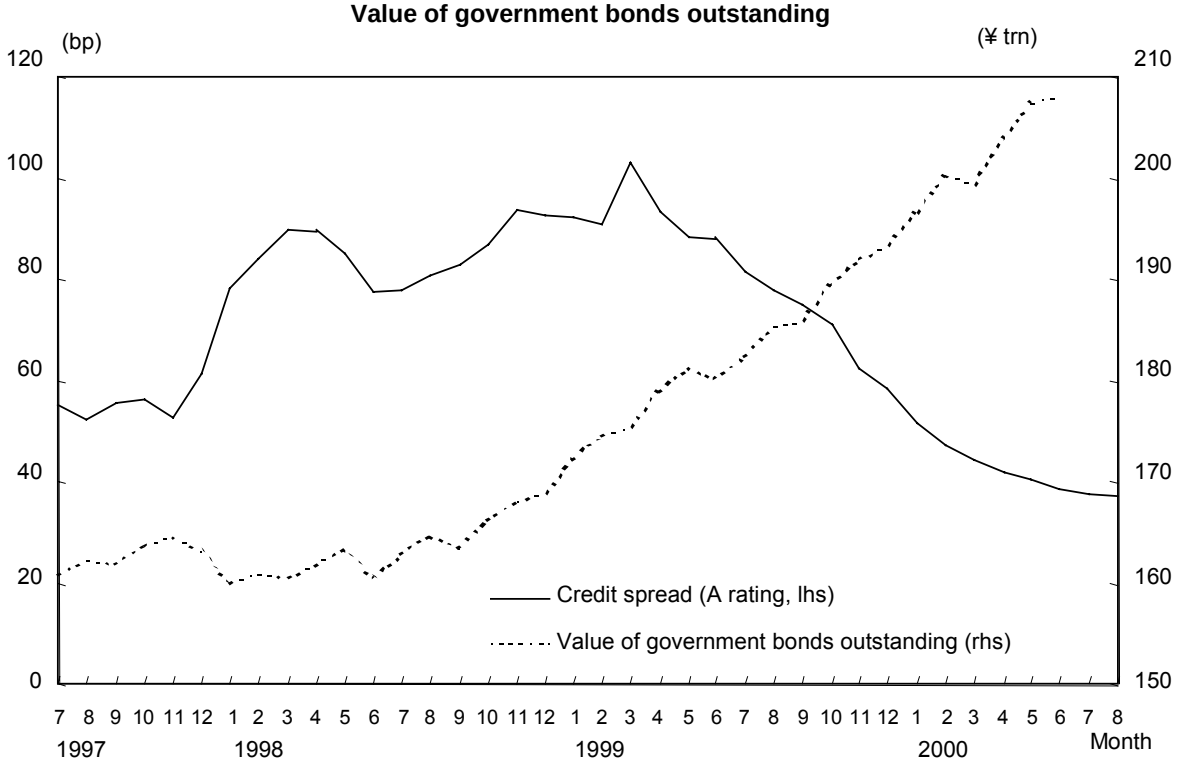
Credit spread and ratio of new issue volume of corporate bonds to that of government bonds



Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 6

Value of government bonds outstanding

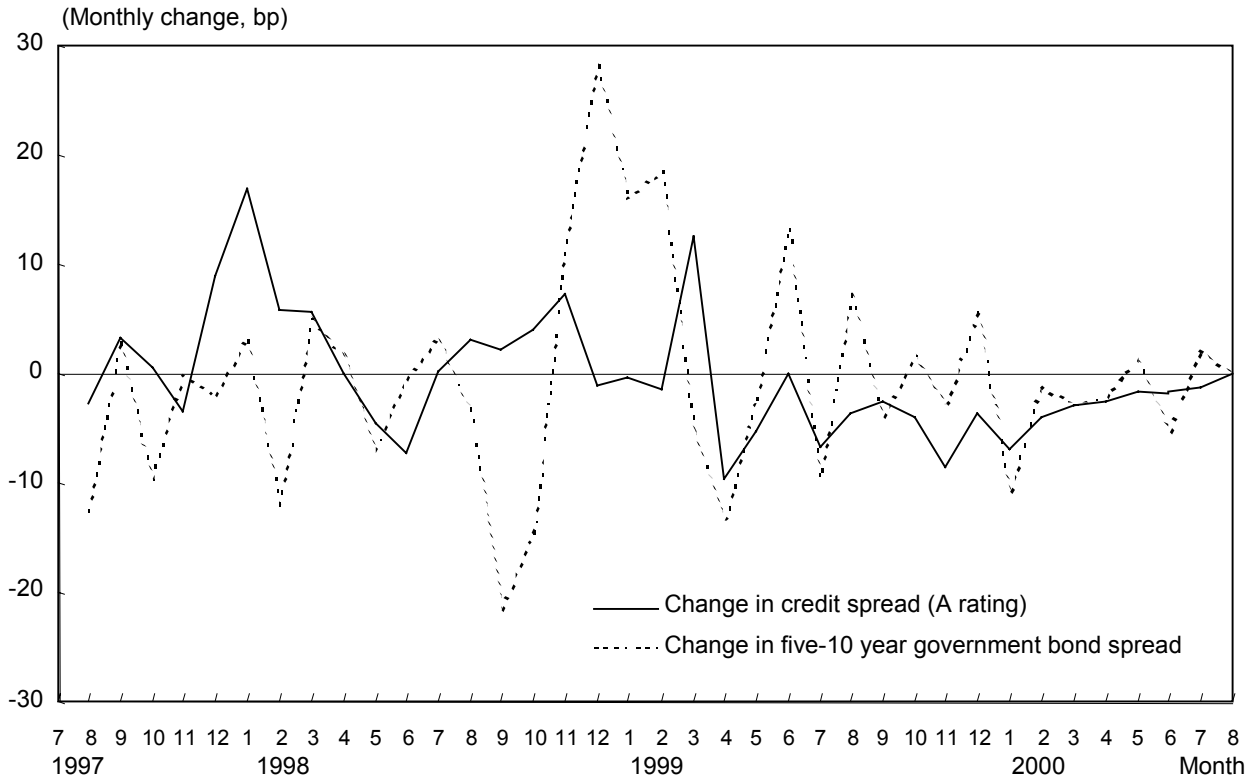


Note: Value of government bonds outstanding (public offering basis only).

Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 7

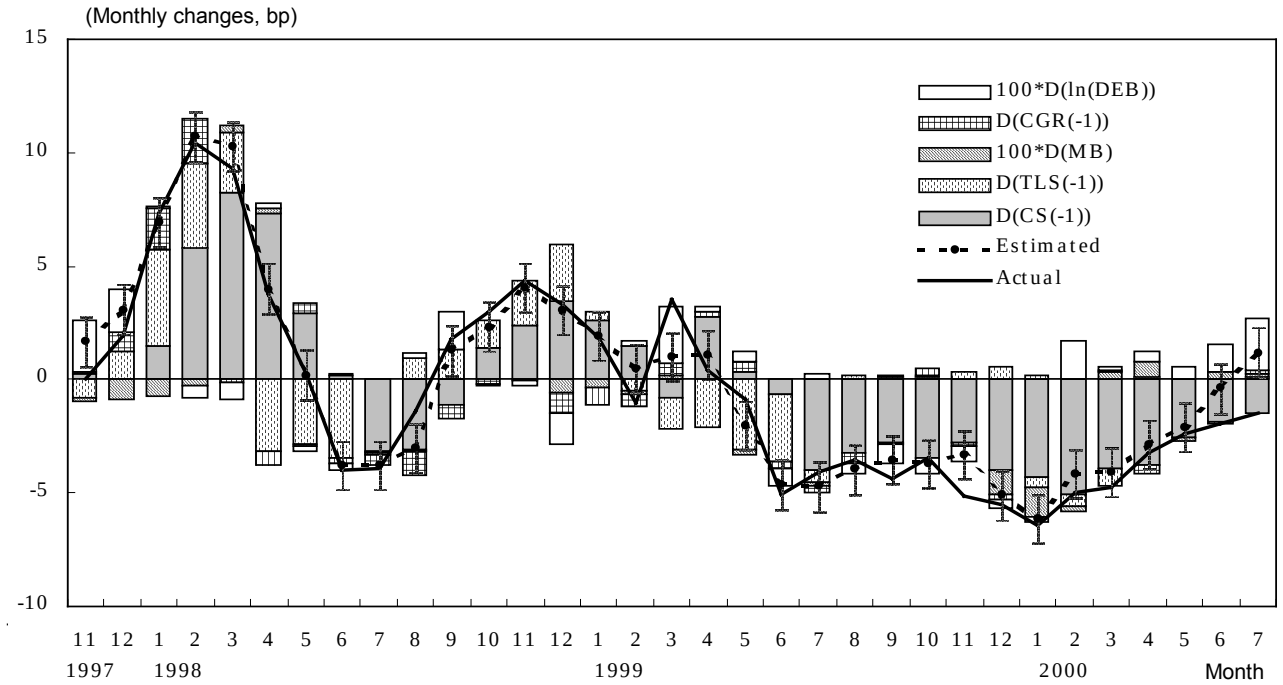
Changes in credit spread and five-10 year government bond spread



Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 8

Contribution of each regressor to change in credit spread (A rating)

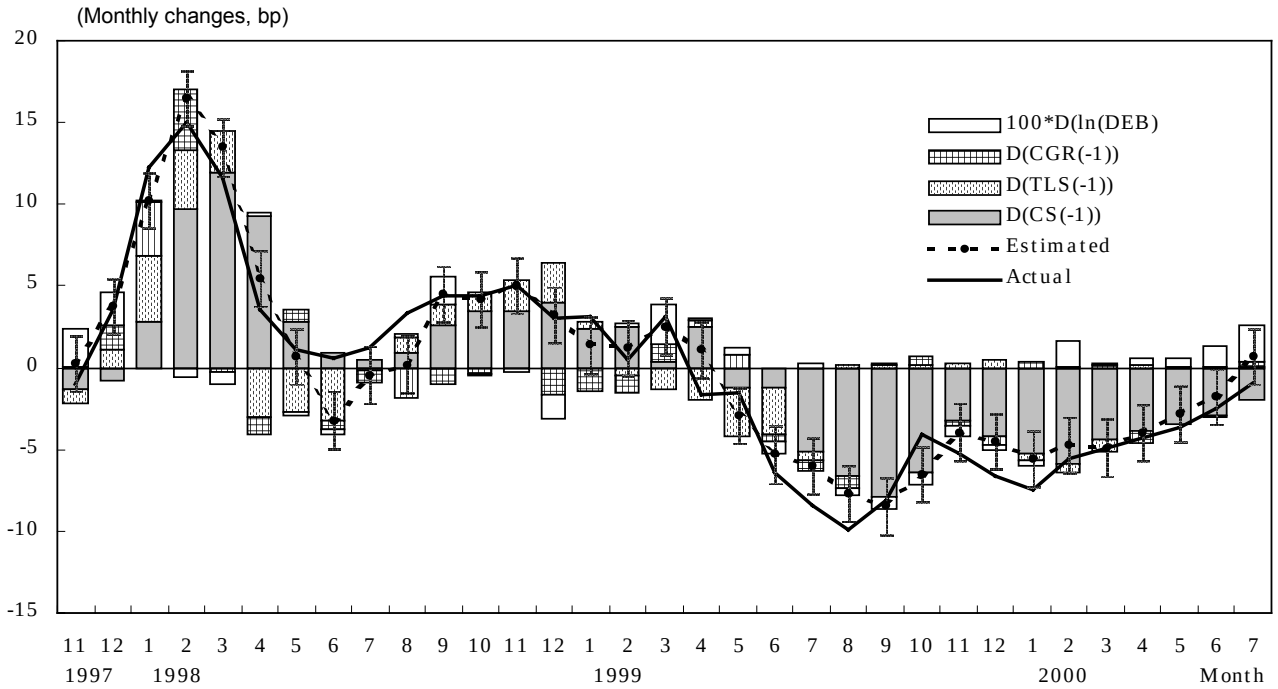


Notes: The error marks express 1 SE of estimation. Estimated line is the result of a one-step forecast. All variables are latest three-month averages.

Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 9

Contribution of each regressor to change in credit spread (Baa rating)

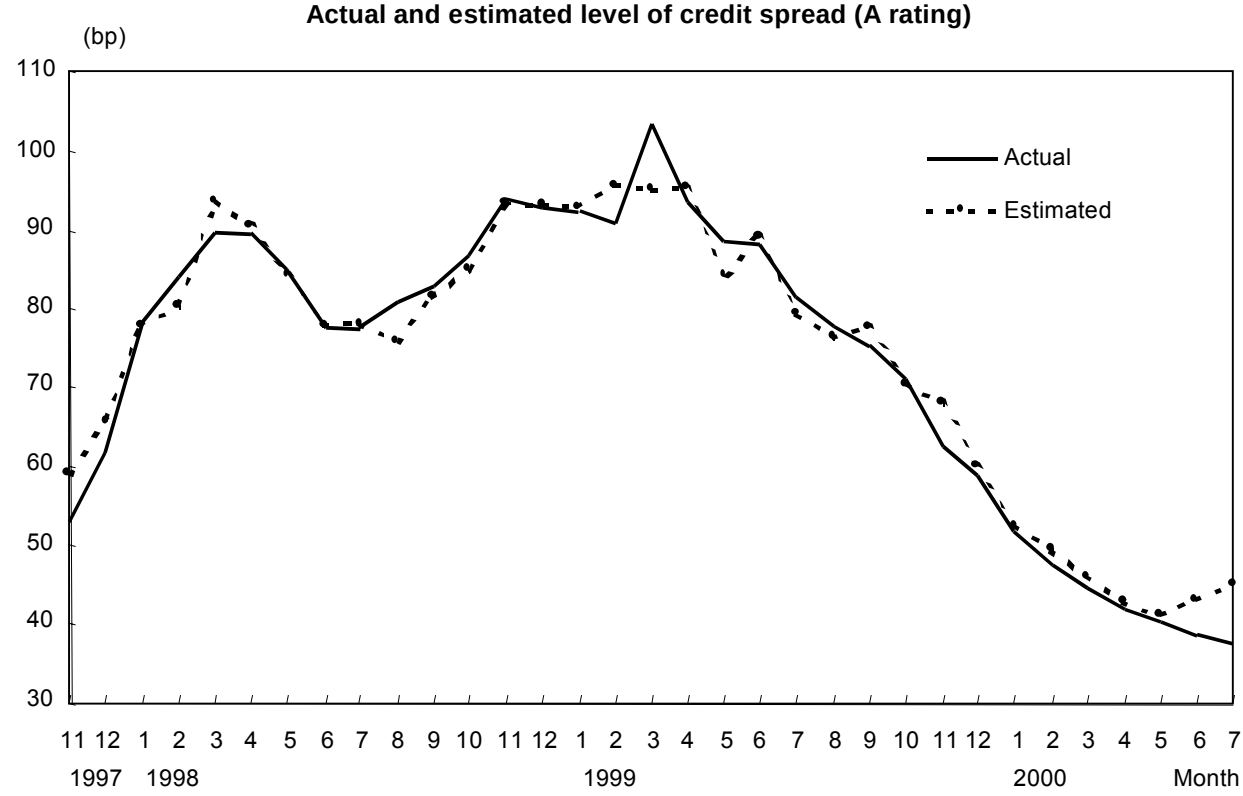


Notes: The error marks express 1 SE of estimation. Estimated line is the result of a one-step forecast. All variables are latest three-month averages.

Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 10

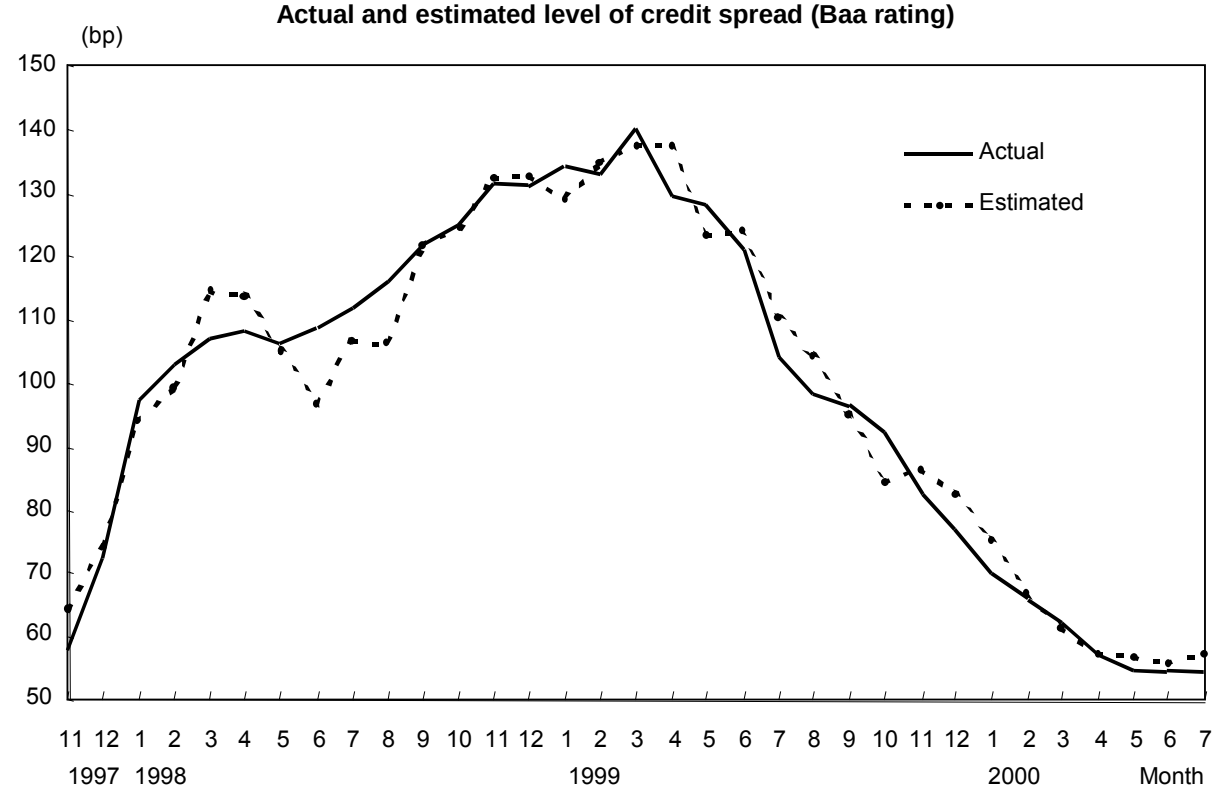
Actual and estimated level of credit spread (A rating)



Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 11

Actual and estimated level of credit spread (Baa rating)



Sources: Bank of Japan; Japan Securities Dealers Association.

Annex:
Overview of Japan's corporate bond markets

A.1 Development after 1997

1997[10] was a big turning point for Japanese corporate bond markets.

Until then, there had been no case of the default of publicly issued bonds in Japan and market prices did not sufficiently reflect the credit risk of issuers.

This situation changed in 1997, when a severe financial environment surrounding Japanese financial institutions emerged. Specifically, at the beginning of 1997 credit concerns arose regarding *Nippon Credit Bank*, which led to a rapid widening in the spread on its debentures as shown in Chart A1. Then, in September 1997, the first default in Japan of publicly issued bonds was seen, namely the convertible bonds of retailer *Yaohan*.

In November 1997, several large and medium-sized banks and securities companies successively defaulted: *Sanyo Securities* (3 November) *Hokkaido Takushoku Bank* (17 November), *Yamaichi Securities* (24 November) and *Tokuyo City Bank* (26 November). These events saw the start of widening corporate bond spreads as shown in Chart A2.1.

In autumn 1998, Japan's financial system again experienced the collapse of large financial institutions: *The Long-Term Credit Bank of Japan* (October) and *Nippon Credit Bank* (November). The focus of market players in 1998 was mainly on 1) political debate in the Diet regarding the proposed framework to deal with the resolution of failed financial institutions, and 2) the downgrading of Japan's sovereign credit rating by Moody's.[11] Against this background, the spreads of both corporate bonds and bank debentures widened dramatically again in 1998 (Charts A1 and A2). Such widening of credit spreads after November 1997 may be interpreted as a manifestation of the decision of market participants to incorporate credit risk into the pricing of these bonds in a way which reflected the increase in default probability.

Meanwhile, the number of corporate bond issues for which quotations[12] were announced by the JSDA was expanded to all issues from April 1997. Also, restrictions on bond transaction price range (government bonds, corporate bonds, etc) were abolished in December 1998. These revisions contributed to price transparency and market liquidity.

After the "financial crisis", both corporate bond and bank debenture spreads tended to shrink as concern over financial turmoil calmed down (Chart A2.2). In particular, the Bank of Japan's zero interest rate policy and the injection of capital into banks by the government in the first quarter of 1999 were considered to have a big impact in reducing credit risk worries and in narrowing bond spreads.

Supply and demand factors in the corporate bond market also contributed to the narrowing. During the financial turmoil in 1998 the issuance of corporate bonds increased sharply (Chart A3), possibly boosted by large companies shifting fund-raising from bank loans to corporate bonds reflecting the tighter lending policies of banks. After the "financial crisis", firms had no more need to raise money by issuing bonds and had excessive liquidity. Thus, the volume of corporate bond issues declined from 1999. Because of this supply and demand factor, the shrinkage in the bond spread was conspicuous from the latter half of 1999 (Chart A2.2), which level did not seem to correspond properly to credit risk.

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[10] By then, most of the restrictions on corporate bond issues had already been relaxed. For example, in 1990, eligibility criteria based on accounting information were replaced by a single bond rating criterion. After that, other restrictions on corporate bond issues were gradually relaxed and in 1996 eligibility criteria were removed in the final stage of the liberalisation of Japanese corporate bond markets. At that time, with regard to primary markets, the institutional framework of Japanese corporate bond markets was already said to have been sufficiently improved so as to meet minimum global standards.

[11] Moody's placed its foreign currency country ceiling for Japan and the domestic currency rating of the government of Japan under review for possible downgrade on 23 July and eventually downgraded them from Aaa to Aa1 on 17 November 1998. Incidentally, the domestic currency rating of the government of Japan was further downgraded on 8 September 2000.

[12] Quotations for corporate bonds are reported by securities firms and banks. These quotations are used for reference in OTC bond transactions.

A.2 Characteristics of Japan's corporate bond market

This section discusses characteristics of Japan's corporate bond market compared with the United States market.

A.2.1 Size

Chart A4, drawn from OECD's *Financial Statistics*, shows the issuance of corporate bonds in Japan and the United States. Issuance in Japan's corporate bond market (including bonds issued outside Japan) totalled US$ 64 billion in 1997, less than half the figure in the United States corporate bond market. As a proportion of GDP, the figure for Japan is 1.5%, which is smaller than that for the United States. Also, in terms of the fixed income market the proportion of corporate bond issuance to government bond issuance is quite different between the two countries.

When comparing the size of the yen-denominated corporate bond market (domestic[13]) with other currency counterpart markets, the yen market ranks second (as of end-1998; Chart A6). However, that share seems to be declining compared with figures in 1994 (Chart A7).

A.2.2 Categories

Next, ratings and maturities of corporate bonds between the United States and Japan are compared.

AAA- and AA-rated corporate bonds account for more than 50% of the total in Japan, but less than 30% in the United States (Chart A8). In other words, the United States corporate bond market has more heterogeneity than its Japanese counterpart. It is considered that corporate bond pricing reflects credit risk more properly in the United States, where credit risk management is developed and issuers with various ratings can more easily issue bonds.

Chart A9 compares United States and Japanese spreads based on OTC bond quotations as of the beginning of June 2000. In the mature United States dollar bond market, the spread of Ba bonds (similar to Japanese BBB) is 0.47X the yield on United States Treasuries of the same maturity. In the domestic yen bond market, the spread of Japanese BBB bonds (Ba2 bonds in the United States) reached 1.3X before taking off. Thus, spreads of bonds below the BBB level are extremely wide vis-à-vis Japanese Government Security (JGS) yields compared with the United States counterpart. This is attributable to the fact that Japanese institutional investors remain conservative in their preferences and tend to focus on bonds graded A and above, which results in a thin market below the BBB level.

Also, the United States corporate bond market has more heterogeneity in terms of maturity (Chart A10). There is little volume in long-term maturities of over 11 years in Japan's corporate bond markets. In Japan, it is difficult to effect pricing in such long-term corporate bonds because of a liquidity shortage in the maturity-matched government bond market, which is the base rate for corporate bond pricing.

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[13] The bond issuance of Japanese firms became larger in domestic markets than in overseas markets after FY 1993 (Chart A5). Formerly, at the time of the stock market boom of the late 1980s, many firms issued, in particular, equity-related bond instruments (convertible bonds and warrant bonds) which were mainly issued in the euro market. As shown in Chart A5, from FY 1983 until FY 1992, except for a few brief periods from FY 1986 to FY 1988, the volume of bonds issued by Japanese firms was larger in overseas markets than in domestic markets.

At that time, the Ministry of Finance applied essentially the same criteria to overseas bond issues as domestic bond issues, so that there was virtually no case of a euro issue of a corporate bond by a domestically ineligible firm. Euro issues did, however, offer institutional advantages: (1) in contrast to the domestic market, where collateral is normally required, the euro market did not require collateral; and therefore (2) bond trustee administration fees for euro issues were much lower than for domestic ones.

A.2.3 Market liquidity

A large, efficient and liquid secondary bond market is highly desirable from the perspective of issuers, investors and dealers that trade and sell corporate bonds.

When comparing trading volume and turnover between Japan and the United States, the turnover ratio of the United States corporate bond market is about five times bigger than that of Japan's market (Chart A11), evidencing that the United States corporate bond market is more liquid and active with heterogeneous investors.

Why is Japan's corporate bond market not as well developed and less liquid than its United States counterpart? The lack of a reliable JGS yield curve across maturities can be cited as one reason, since the yield curve of government securities in a liquid market serves as the benchmark for pricing other financial products including corporate bonds.

According to the report of a study group on market liquidity under the Committee on the Global Financial System (CGFS), liquidity in the JGS market is the lowest among major countries in that bid-ask spreads are the widest in Japan and the turnover ratio the lowest among Group of Seven countries (charts A12 and A13).[14]

Having said that, some progress has been seen in JGS markets. In fiscal 1999, the government started issuing one-year Treasury bills and five- and 30-year coupon bearing bonds. As a result, the line-up of original maturities now covers most investment horizons, although issuance volume is still heavily skewed to 10-year bonds.

Another reason why Japan's corporate bond market is less liquid than its United States counterpart may come from the lack of a corporate bond lending market in Japan. Bond lending is necessary to enable dealers to conduct market-making temporarily without owning bonds or buying from accounts. In the United States, the borrowing or repo market, which is a well established feature of most bond and equity markets, enables dealers to sell bonds they do not own. This allows dealers to manage their inventory of bonds more effectively, reduce their overall risk exposure and serve a large customer base. Thus, in the United States, the repo market results in greater competition, lower transaction costs, and improved liquidity in the corporate bond market.

In contrast, in Japan, the repo market is less developed, which makes shorting corporate bonds difficult. One big reason for this is a lack of consensus on the level of haircut among market players when conducting a repo transaction in the corporate bond market. As mentioned, in Japan investors in corporate bonds do not effect sufficient credit analysis, and the market has not really imposed a credit spread which is properly linked to the credit of the firm issuing bonds. This is also the case of the haircut rate in the corporate bond market.

The absence of allowing "failure" can also be considered one reason why the development of the corporate bond repo market in Japan is in marked contrast to that in the United States. There, if a dealer cannot generate bonds outright or through the repo market by the settlement date, he will "fail", ie, be unable to deliver bonds on the settlement date. This is a necessary feature of the market in that it provides a safety relief valve that gives the dealer some level of comfort in making active markets in bonds he does not have in his inventory.

In Japan, market practice did not permit failure to deliver bonds on the settlement date. However, regarding the JGS market alone, allowing "failure" was introduced at the beginning of this year when the Bank of Japan started to settle almost all JGSs on a real-time gross settlement (RTGS) basis. The introduction of "failure" to the corporate bond market remains a future task in terms of activating corporate bond repo markets.

A.2.4 Pricing

As the benchmark for the pricing of corporate bonds, most corporate bond dealers in Japan traditionally use interest rate swaps for less creditworthy issues (rated below A) and JGSs for highly creditworthy issues (above AA).

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[14] BIS (1999).

The turmoil following the Russian crisis saw a change in the pricing of corporate bonds by some dealers. The stable correlation between corporate bonds and the benchmark[15] (JGS) was broken during the flight to quality wave to JGSs. Then, some dealers also used interest rate swaps for highly rated issues. Currently, pricing practice has reverted to pre-turmoil times, and JGSs have come to again be widely used as the benchmark for the pricing of highly rated corporate bond issues (above AA), which account for more than half of total corporate bond issues in Japan as shown in Chart A8. This is in contrast to recent developments in other markets and might be partly due to the difference in trend of JGSs outstanding between Japan and other developed countries.

In any event, dealers have come to choose the benchmark for the pricing of corporate bonds more flexibly according to the correlation between corporate bonds and the benchmark. Such practices are expected to gradually contribute to the development of the corporate bond market in Japan (for an overview of the yen interest rate swap market, see Appendix).

Settlement system and market practices

We can point to the regulatory environment and market practices as important ingredients for the success of a financial market. A settlement system is one such important ingredient in considering market design.

In the United States, the creation of an impartial depository such as the Depository Trust Company (DTC) has simplified the handling of securities and reduced barriers to participating in this market. This encourages more trading, better distribution and tighter margins. In Japan, the settlement of corporate bonds is handled in a decentralised way by about 160 banks with whom corporate bonds are registered. Currently, there are discussions under way as to the possibility of the creation of a centralised depository like the DTC for the more efficient settlement of corporate bonds.

Regarding market practices, one of the most important differences between Japan and the United States lies in the role of the trustee. In the absence of financial distress, a United States trustee's function is limited to managing the ownership records and acting as paying agent. In Japan, the trustee banks are traditionally involved in the formative stages of bond deals, offering financial advice to the issuers and negotiating indenture terms. They monitor the financial condition of companies and are involved in distress situations to avoid default. In particular, before default of the convertible bonds of retailer *Yaohan*, there was a general practice that trustee banks should even purchase distressed bonds so that no investor lost money.[16] Thus, the trustee banks that structure bonds have, to some extent, implicitly provided a guarantee of performance which is considered one reason why good credit analysis has been comparatively weak in Japan. Also, high trustee fees are considered to have held back the development of Japanese domestic bond issuances.

This is in marked contrast to the United States, although the concept of the trustee as implicit guarantor in Japan weakened considerably after financial turmoil in 1997 and 1998. In the United States, investors bear credit risk and are paid a premium coupon for taking on such an obligation. The rating agencies, bond research departments at investment banks and other private services provide information and analysis of the credit quality of companies as well as market trends bearing on valuation.

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[15] Incidentally, until the large-scale flotation of government bonds after 1975, there were times when benchmark issues in Japan's secondary bond markets were interest bearing telegraph and telephone bonds (long-term interest rates) and bank debentures (medium-term interest rates). Chart A14 compares interest rates and price fluctuations with respect to the former. As the chart shows, before the large-scale flotation of government bonds, interest rates on interest-bearing telegraph and telephone bonds were determined freely to a considerable degree, reflecting inflationary expectations, and already played the role of supplying information regarding market expectations of interest rates.

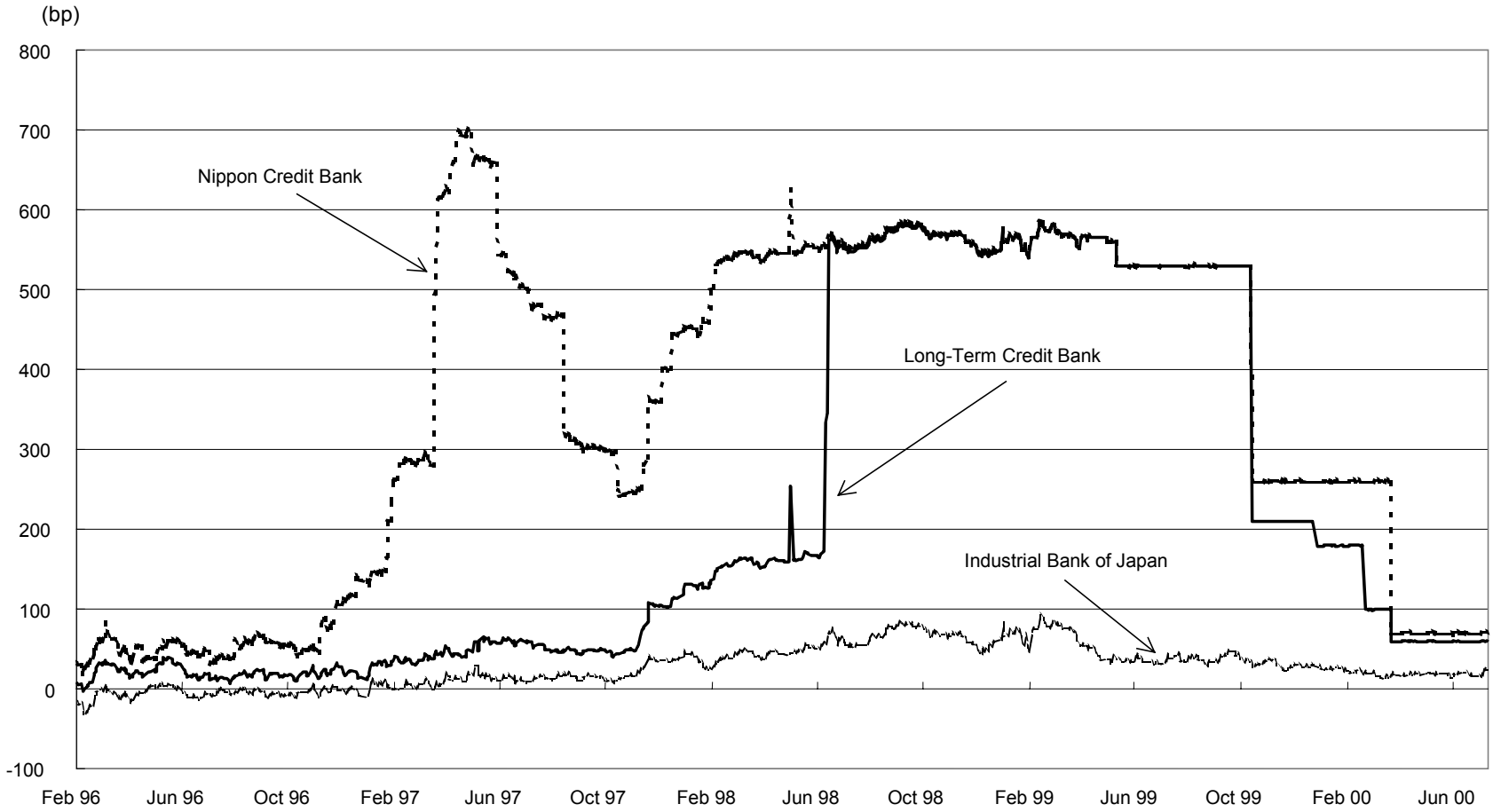
[16] Traditionally, corporate bond issuers had close connections with financial institutions. For example, in the 1950s and 1960s, the Bond Issue Arrangement Committee, which was composed of representatives from big banks and major securities firms, adjusted corporate bond financing at rigidly set low interest rates for newly issued bonds. Under this artificial low interest rate policy the only firms that were able to issue bonds were those that had close connections with financial institutions, and it was these financial institutions that bought the bonds. In a sense, corporate bonds were really just another form of bank loan.

A.3 Conclusion

The Japanese corporate bond market has improved, particularly in the 1990s. However, there remains room for further improvement in several areas, such as market design, market practice and credit analysis, compared with the United States counterpart. In the United States, the corporate bond market has opened up to less creditworthy firms, and regular issuers can float bonds nearly at will in large volume. Investors' preferences are increasingly being met with customised products that best accommodate their portfolio requirements and views. Fund intermediation can be achieved at lower cost through the bond market than through bank loans. In these respects, when the Japanese corporate bond market nears the level of its United States counterpart, trading volume will probably increase and market liquidity be enhanced.

Chart A1

Spread of five-year bank debentures over maturity-matched JGSs



Sources: Japan Securities Dealers Association; Bloomberg.

Chart A2

Spread of five-year corporate bonds by rating over maturity-matched JGSs

Chart A2.1

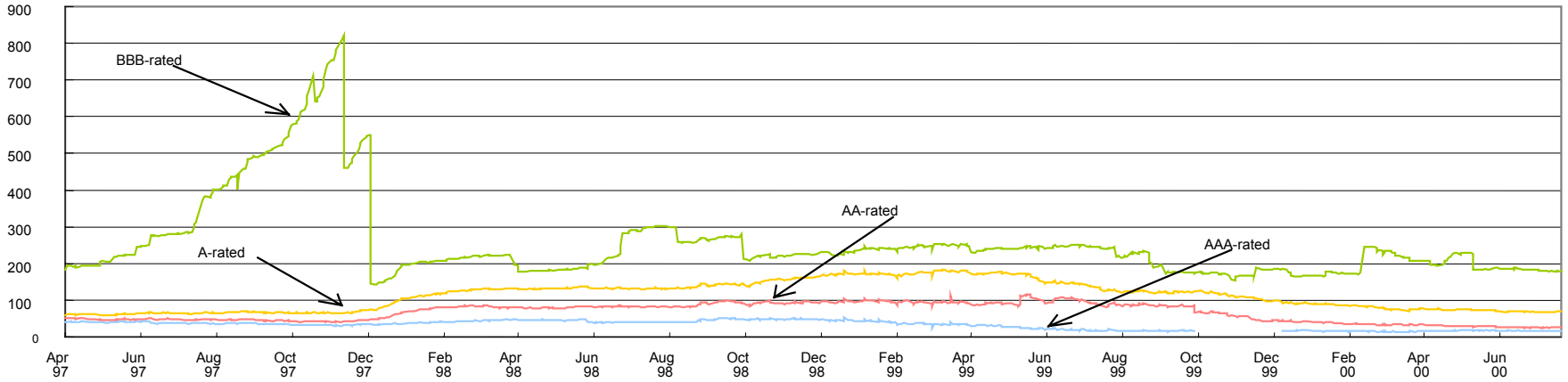
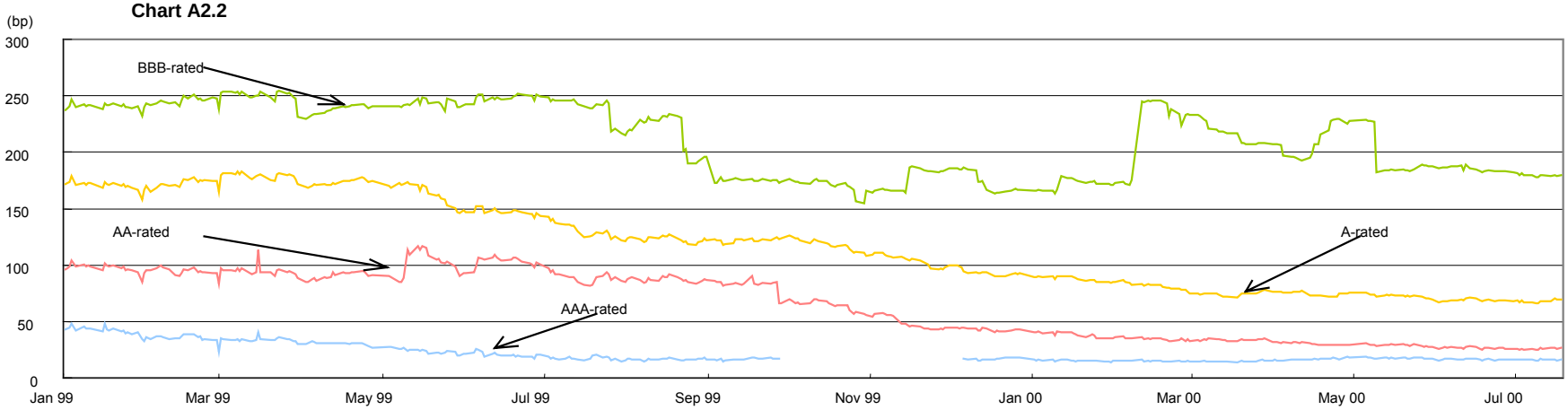


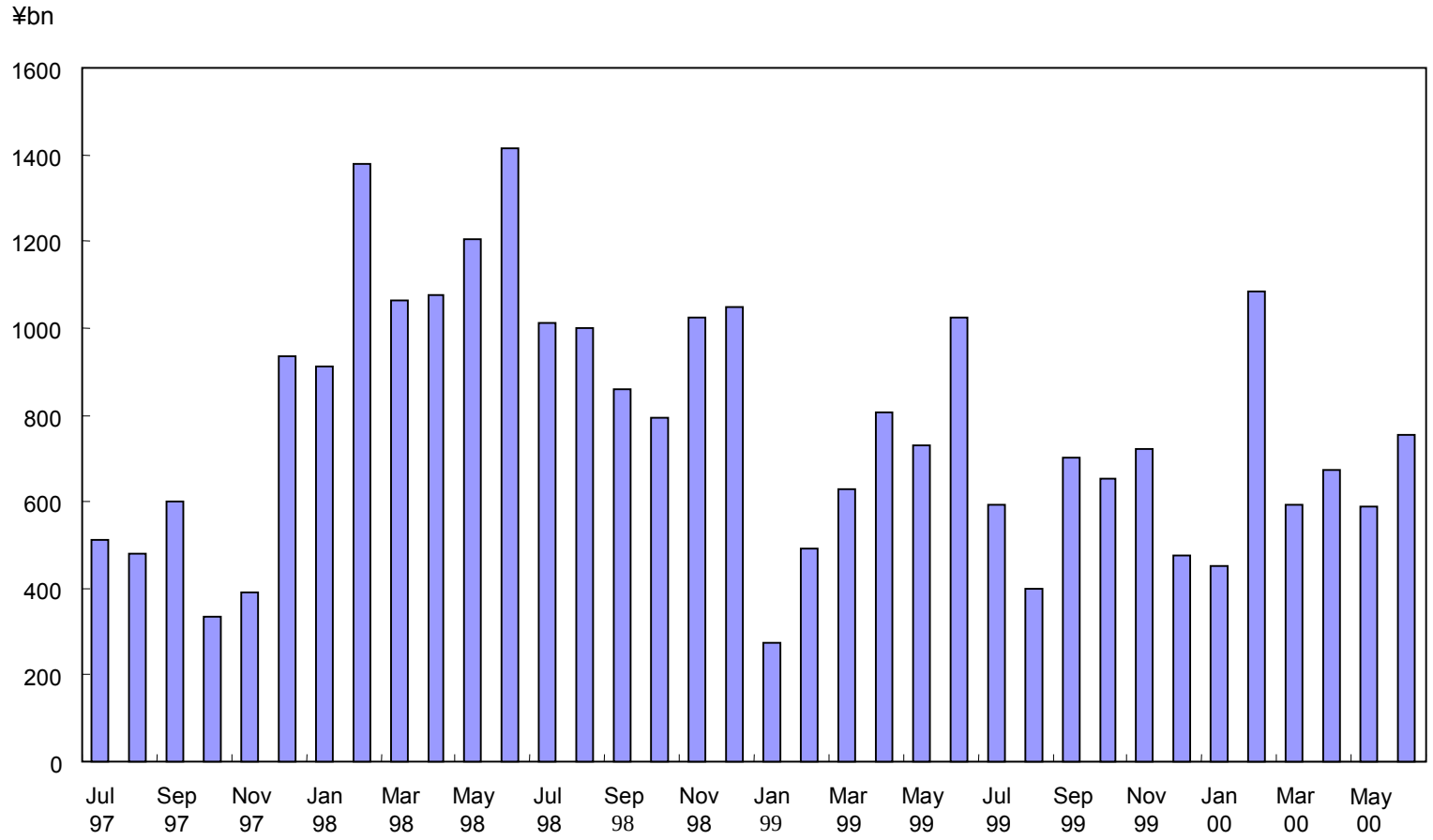
Chart A2.2



Sources: Japan Securities Dealers Association; Bloomberg.

Chart A3

Corporate bond issuance (straight bonds and asset-backed securities)



Source: Japan Securities Dealers Association.

Chart A4

Comparison of corporate bond issuance (1997)

in billions of US dollars and percentages

	Corporate bond issuance (A)	Government bond issuance (B)	Porportion of government bond issuance (A)/(B)	Nominal GDP (C)	Proportion of nominal GDP (A)/(C)
Japan	64	505	12.7	4,190	1.5
United States	168	567	29.6	8,080	2.1

Source: OECD, *Financial Statistics Monthly*, Part 1, Section 2: Domestic Markets, March 1998.

Chart A5.1

Bonds issued by Japanese firms in Japan

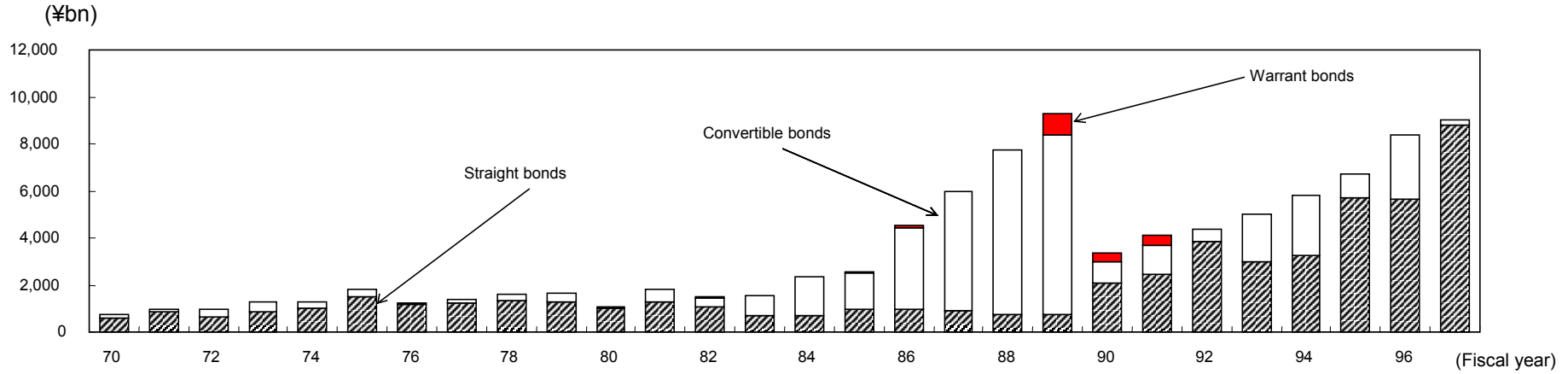
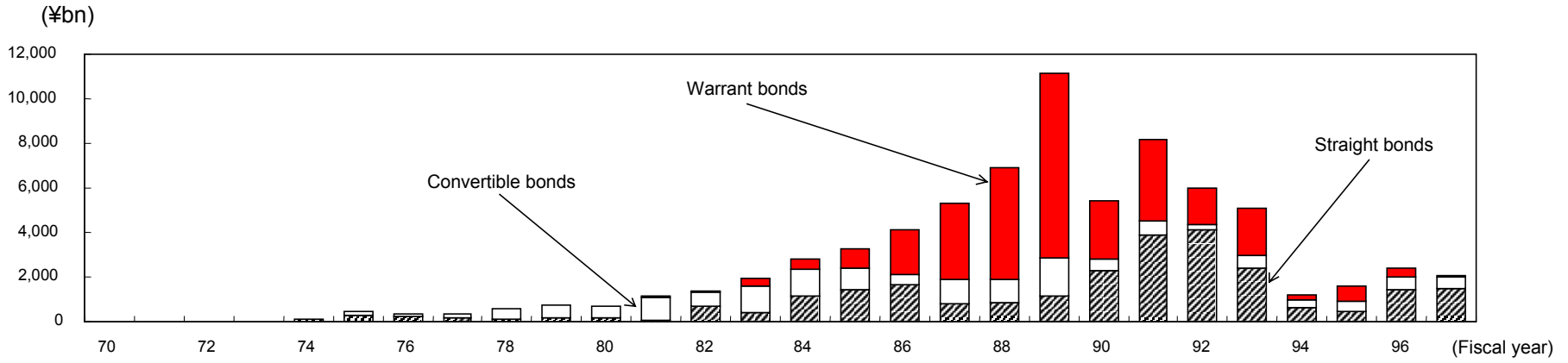


Chart A5.2

Bonds issued by Japanese firms outside Japan



Source: Japan Securities Dealers Association.

Chart A6

Size of major bond markets at year-end 1998 (nominal value outstanding)

in billions of US dollars

	Total publicly issued		Domestic bonds		Corporate bonds		International bonds	
		% of total		% of total		% of total		% of total
US dollar	12,476	(49)	10,791	(49)	3,675	(50)	1,685	(47)
Japanese	3,924	(15)	3,575	(16)	990	(13)	349	(10)
Deutsche mark	2,579	(10)	2,208	(10)	1,353	(18)	370	(10)
Italian lira	1,462	(6)	1,331	(6)	270	(4)	131	(4)
French franc	1,075	(4)	864	(4)	139	(2)	211	(6)
Pound sterling	790	(3)	507	(2)	55	(1)	283	(8)
Dutch	442	(2)	339	(2)	153	(2)	103	(3)
Canadian	432	(2)	382	(2)	73	(1)	50	(1)
Others	2,306	(9)	1,895	(9)	679	(9)	412	(11)
Total	25,484	(100)	21,891	(100)	7,370	(100)	3,594	(100)

Source: Salomon Brothers, *International Bond Market Analysis; How Big is the World Bond Market?* August 1999, Figure 1.

Chart A7

Size of major bond markets at year-end 1994 (nominal value outstanding)

in billions of US dollars

	Total publicly issued		Domestic bonds		Corporate bonds		International bonds	
		% of total		% of total		% of total		% of total
US dollar	8,023	(43)	7,266	(44)	1,509	(66)	757	(38)
Japanese	3,699	(20)	3,362	(20)	383	(17)	308	(15)
Deutsche mark	1,964	(11)	1,722	(10)	2	(0)	242	(12)
Italian lira	956	(5)	909	(6)	4	(0)	47	(2)
French franc	894	(5)	766	(5)	144	(6)	125	(6)
Pound sterling	502	(3)	360	(2)	29	(1)	142	(7)
Canadian	404	(2)	326	(2)	52	(2)	78	(4)
Others	2,073	(11)	1,760	(11)	177	(8)	312	(16)
Total	18,515	(100)	16,471	(100)	2,299	(100)	2,011	(100)

Source: Salomon Brothers, *International Bond Market Analysis; How Big is the World Bond Market?* August 1995, Figure 1.

Chart A8

Comparison of corporate bonds outstanding by rating[1]

in billions of US dollars and percentages

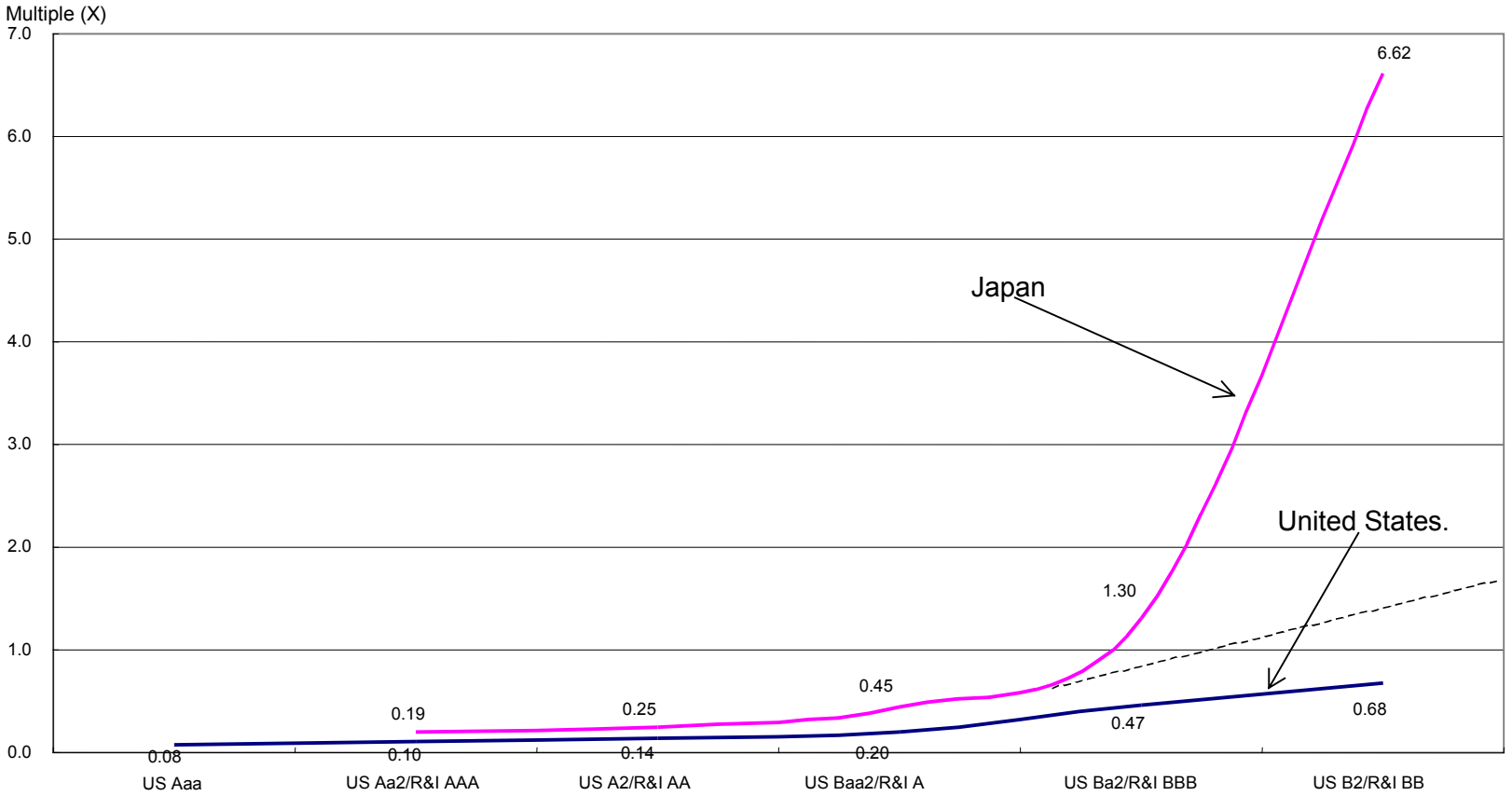
		AAA (Aaa)	AA (Aa)	A (A)	BBB (Baa)	Total
Japan	1997	30.2	42.1	26.3	1.4	100.0
	1998	30.4	40.3	29.1	0.2	100.0
	1999	33.6	25.4	34.6	6.4	100.0
United States	1997	7.7	19.2	43.9	29.3	100.0
	1998	7.8	18.0	43.4	30.8	100.0
	1999	7.4	17.2	43.5	31.9	100.0

[1] Japan: Rated by Japan Credit Rating Agency or Rating and Investment Information (R&I). United States: Rated by Moody's or S&P.

Sources: Japan: Japan Securities Dealers Association; United States: Corporate bonds in Salomon Smith Barney's BIG (broad investment grade) index (the index follows design criteria including a screen for a minimum amount outstanding of US$ 100 million for corporate issues, and a minimum quality of BBB-/Baa3 by S&P/Moody's).

Chart A9

United States-Japan comparison (multiples of spread/Treasury bonds, JGS yields) as of beginning of June 2000



Note: Maturity of three years as of early June: US$ market: T+Spread (industrials) / Treasury bond yields. JPY market: T+Spread[1]/JGS yields.

[1] Adjusted from the JSDA's October bond (Standard) quotation, Moody's ratings and one category higher R&I ratings.

Sources: Japan Securities Dealers Association; Bloomberg; Deutsche Securities.

Chart A10

Comparison of corporate bonds outstanding by maturity

		Short-term (one to three years)	Medium-term (four to 10 years)	Long-term (over 11 years)	Total
Japan	1997	3.3	67.5	29.2	100.0
	1998	12.2	75.4	12.4	100.0
	1999	12.2	77.1	10.8	100.0
United States	1997	14.3	50.3	35.4	100.0
	1998	15.3	48.8	36.0	100.0
	1999	16.2	51.8	32.0	100.0

Sources: Japan: Japan Securities Dealers Association. United States: Corporate bonds in Salomon Smith Barney's BIG (broad investment grade) index (the index follows design criteria including a screen for a minimum amount outstanding of US$ 100 million for corporate issues, and a minimum quality of BBB-/Baa3 by S&P/Moody's).

Chart A11

Trading volume and turnover ratio in the corporate bond market as of Q1 2000

in billions of US dollars

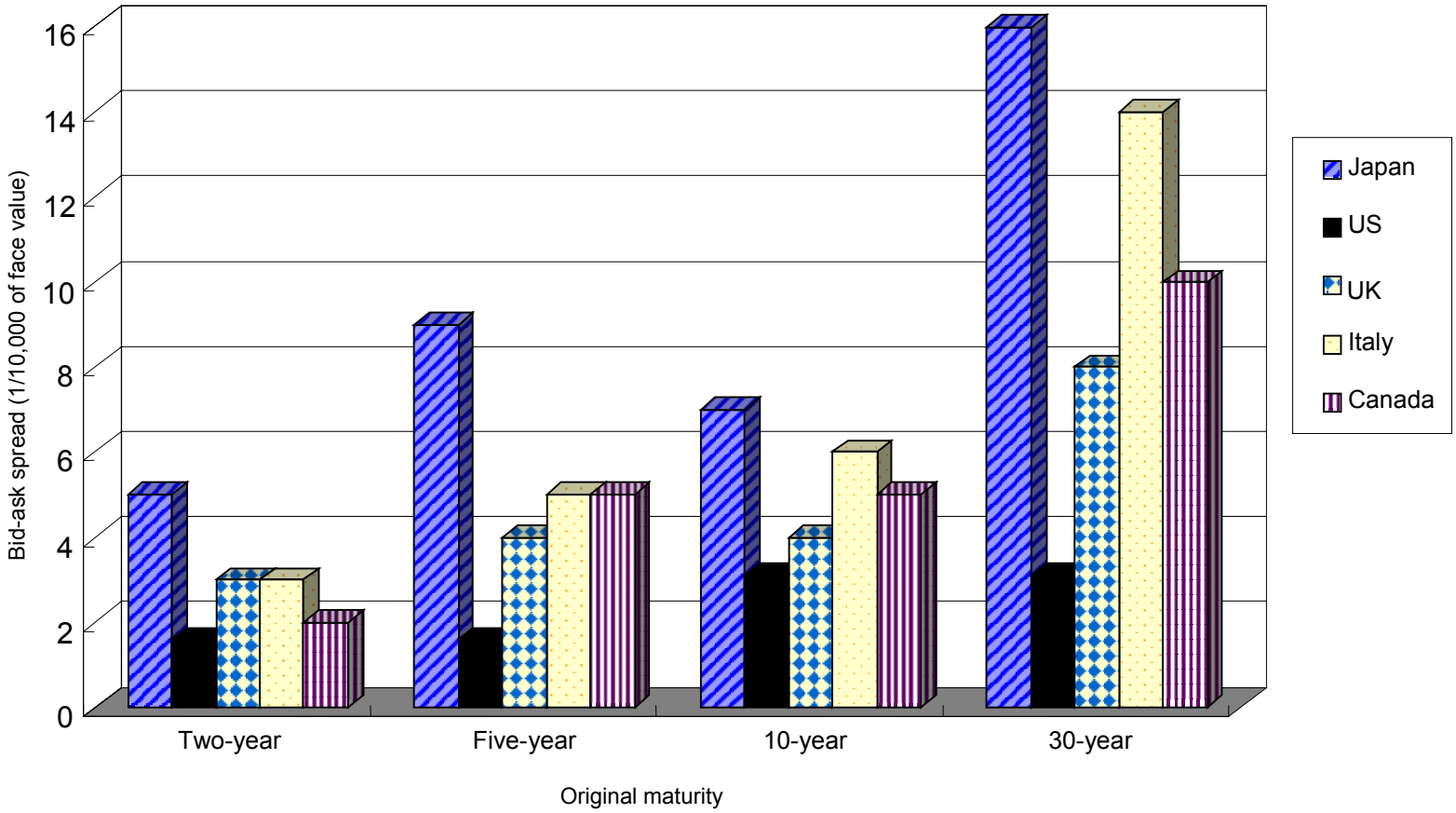
	Trading volume (A)	Outstanding volume (B)	Turnover ratio (A)/(B)
Japan	151	968	0.16
United States	2,500	3,100	0.81

Note: Turnover ratio = Trading volume/Outstanding volume (trading volume estimated by annualising daily data).

Sources: Japan: Japan Securities Dealers Association. United States: Bond Market Association.

Chart A12

Comparison of bid-ask spread

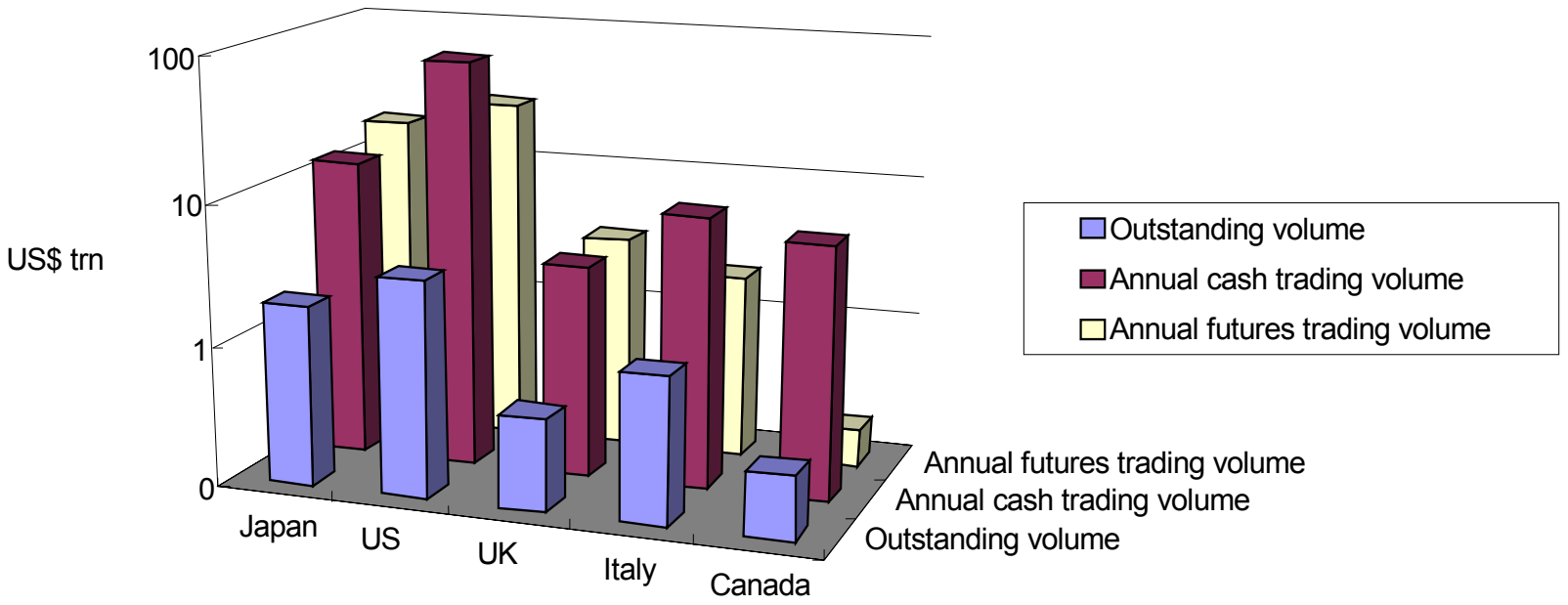


Note: The spreads for five- and 30-year JGSs are those of six- and 20-year bonds.

Source: BIS, *Market liquidity: research findings and selected policy implications*, 1999.

Chart A13

Turnover ratios



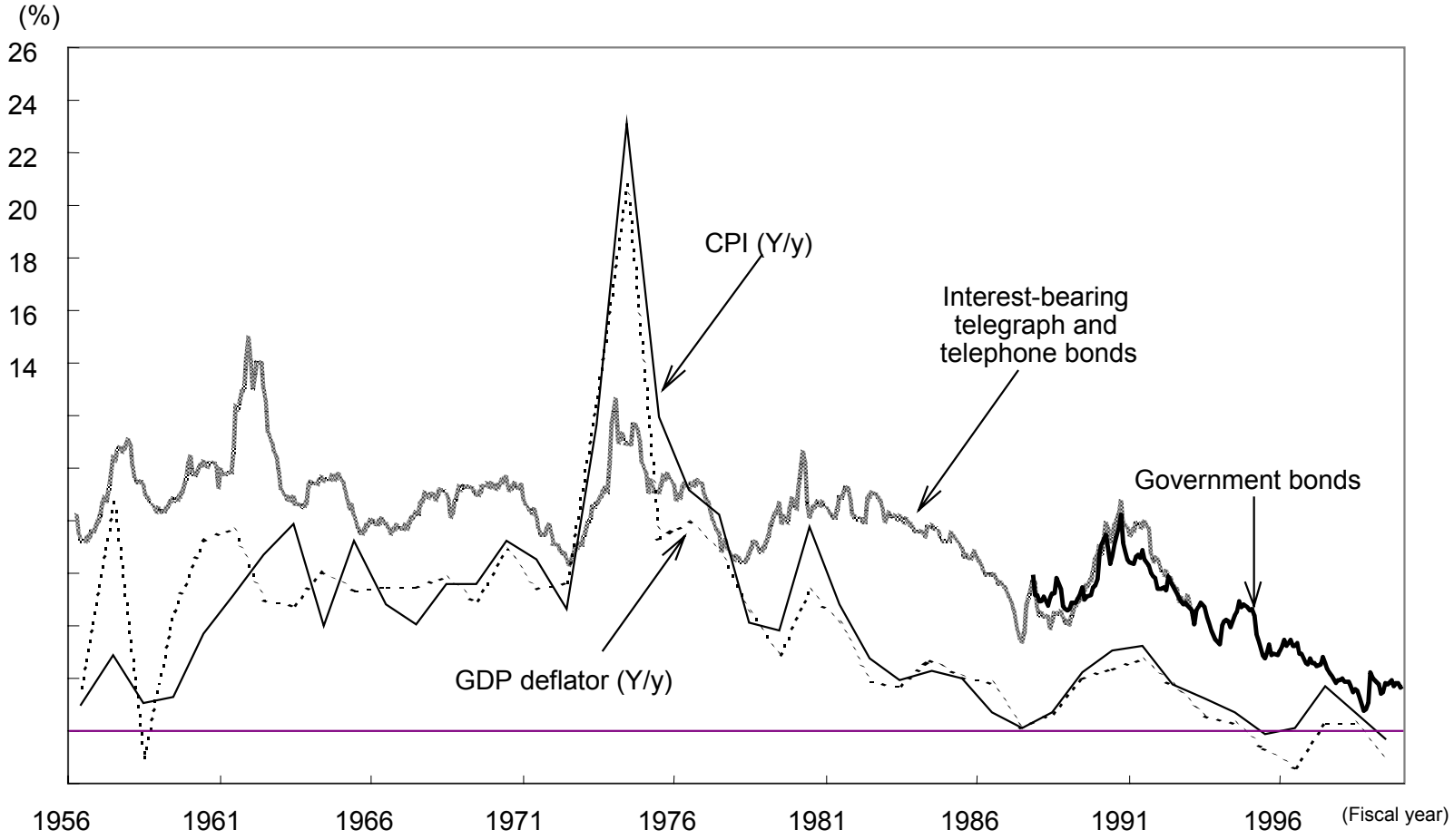
	Japan	United States	United Kingdom	Italy	Canada
Cash turnover ratio	6.9	22.0	7.0	7.7	21.9
Cash/futures ratio	0.7	2.7	1.0	4.1	33.7

Note: As of 1997. Cash turnover ratio = Trading volume (two-way basis)/Outstanding volume; Cash/futures ratio = Cash trading volume/Futures trading volume.

Source: BIS, *Market liquidity: research findings and selected policy implications*, 1999.

Chart A14

Japanese long-term interest rates and inflation rates

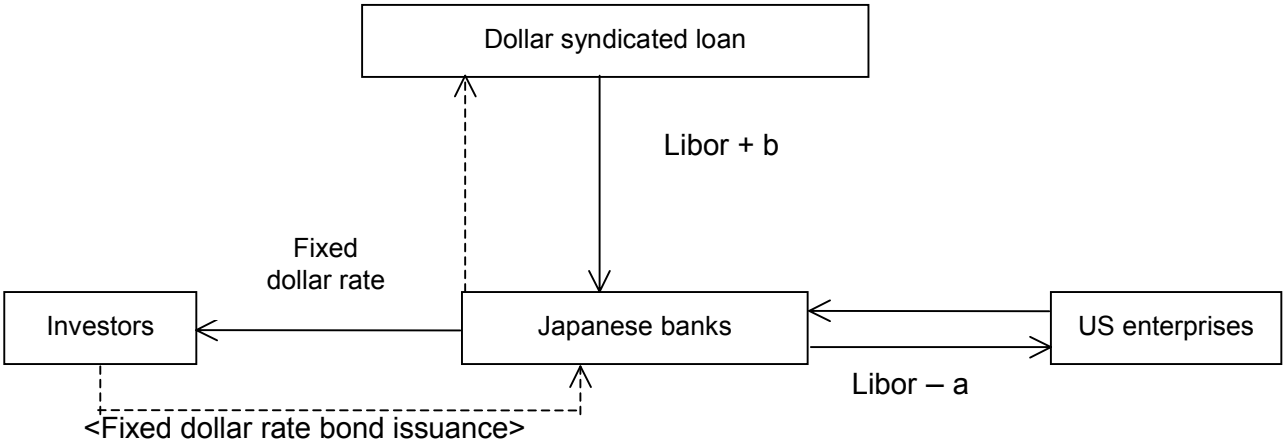


Sources: CPI: Management and Coordination Agency. GDP: Economic Planning Agency. Other: Japan Securities Dealers Association.

Appendix:
Overview of the yen interest rate swap market

Currency swap market transactions started in the Tokyo market around 1980 when the Foreign Exchange and Foreign Trade Control Law was revised. About two years later, interest rate swap transactions started in the Tokyo market when Japanese banks conducted dollar interest rate swaps with United States enterprises in order to raise floating rate funds using the following scheme (Figure 1).

Figure 1



Yen swap transactions started several years later, around 1986. At that time, most swap transactions were closely connected with the foreign bond issuance of Japanese enterprises or yen bond issuance by foreign enterprises via the following schemes (Figures 2, 3).

Figure 2

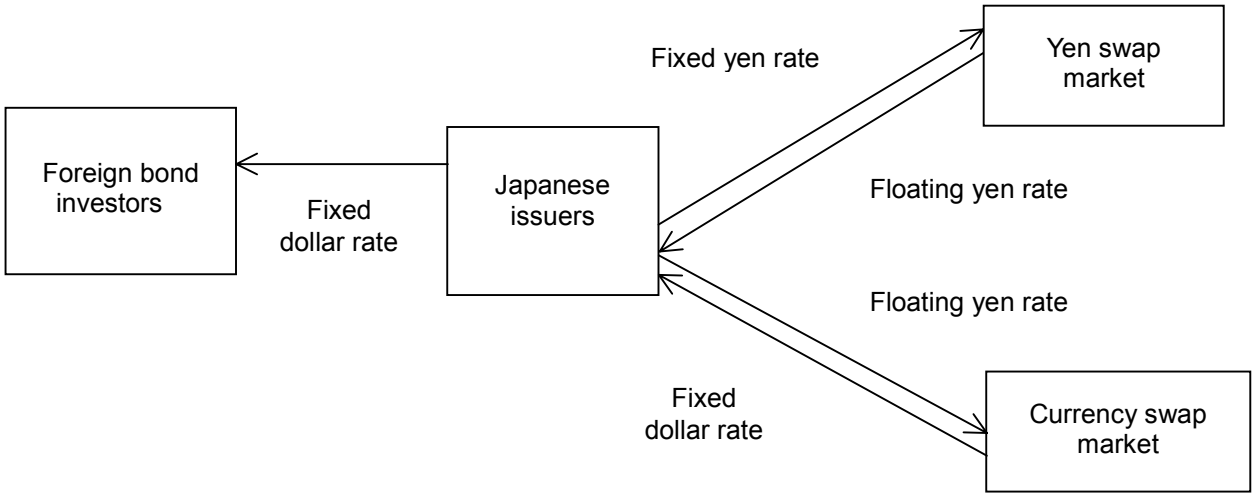
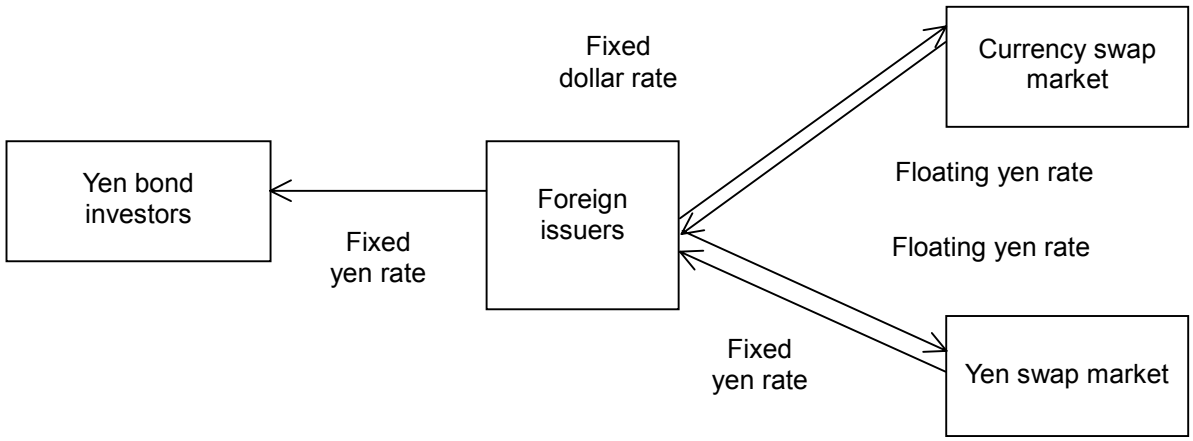


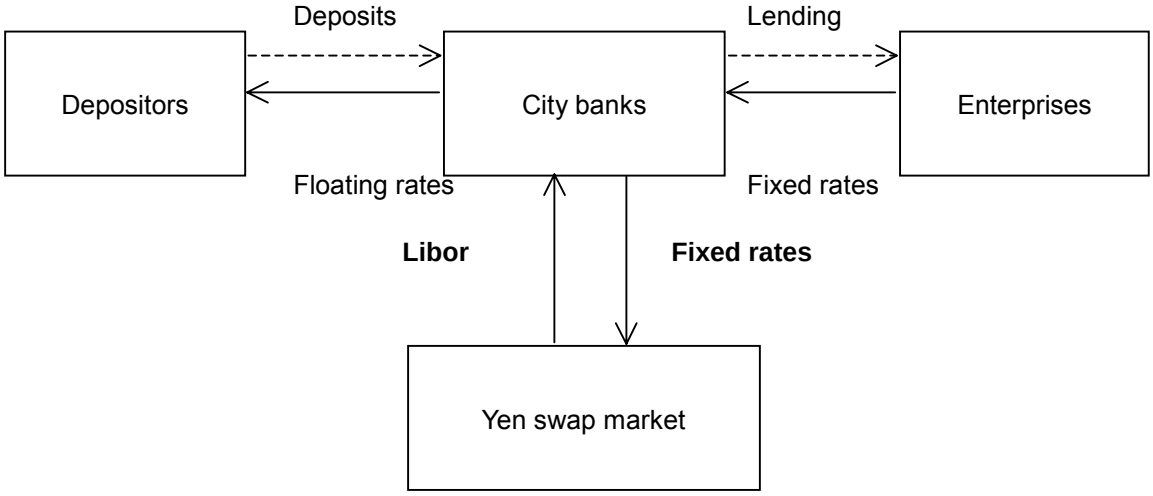
Figure 3



When Japan's interest rates rose under tight monetary policy after 1989, the need to hedge interest rate risk increased among city banks. As city banks' hedging needs increased, yen swap transactions became more prevalent.

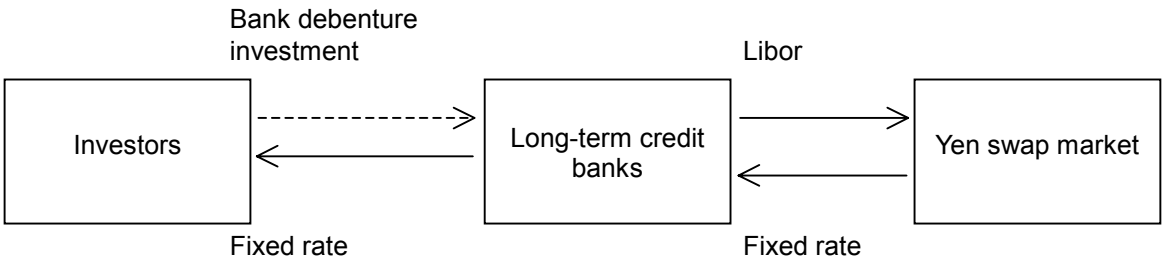
City banks have paid fixed/received floating positions using yen swap transactions as follows (Figure 4).

Figure 4



Also, other main players such as long-term credit banks, which receive fixed so as to hedge bank debenture issuance, became active in the yen swap market (Figure 5).

Figure 5

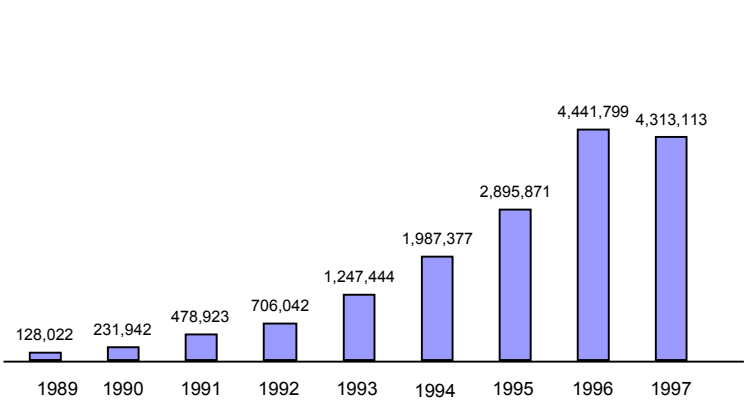


In addition, large Japanese banks, securities houses and foreign investment banks actively effected yen swaps in the Tokyo market in the 1990s. Thus, transaction volume of the yen swap market increased remarkably as shown in Figure 6.

Figure 6

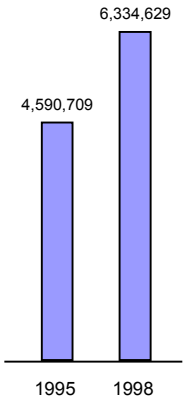
Notional yen interest rate swap amounts outstanding at year-end

(US$ equivalent in millions of United States dollars)



Source: ISDA.

(US$ equivalent in millions of United States dollars)



Source: Central bank survey of foreign exchange and derivatives market activity.

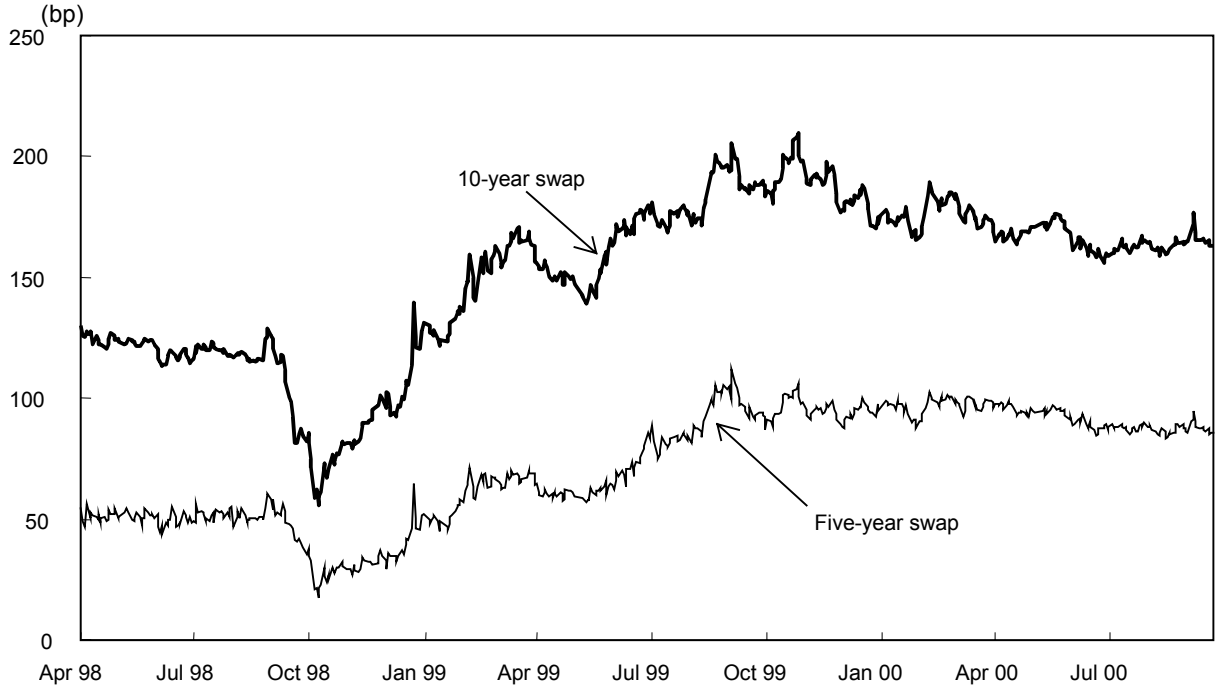
With the increased transaction volume in yen interest rate swaps, yen swap rates have become more prevalent as the benchmark for long-term interest rates in the Tokyo market. As a result, the yen swap market and bond market have become more closely connected.

A typical example was the effect of some disruption in the JGS market in mid-August 1999, which was reported to be due to Y2K concerns.

Concretely, the JGS futures market did not function as a hedging tool because of a malfunction in repo transactions for cheapest to deliver issues. Reports surfaced of the hoarding of the desired securities by some Japanese institutions. This turbulence in the JGS market also affected the yen swap market. During the turbulence, JGS market players switched hedging tools for JGS cash transactions from JGS futures to yen swaps, which resulted in a widening yen swap spread as shown in Figure 7.

Figure 7

Spread of Japanese yen interest rate swaps over the JGS benchmark



Source: Bloomberg.

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