Mispricing in the Japanese Corporate Bond Market

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ABSTRACT

The purpose of this paper is to determine whether there is any mispricing of initial public offerings (IPOs) of straight corporate bonds in Japan, and to determine what factors explain variations in the degree of mispricing. Significant evidence of overpricing of IPO issues of straight corporate bonds is presented. It is found that the degree of overpricing tends to increase both as: the volatility of interest rates at the bond conditions were determined increases; and the volatility of interest rates increases during the subscription period.

Keywords: banks, bond pricing, interest rate volatility, investment houses, IPOs, mispricing, overpricing, underwriting.

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1 Introduction

The purpose of this paper is to determine whether there is any mispricing of initial issues of publicly issued straight corporate bonds in Japan, and to determine what factors explain variations in the degree of mispricing. While there is an extremely large literature devoted to investigating the extent of mispricing of initial public offerings (IPOs) of equity in both the United States, and Japan[2], there appear to be very few studies examining the extent of mispricing of IPOs of straight corporate bonds in the United States and no study for Japan[3]. The key study for the United States is Datta et al. (1997) who find that IPOs of speculative grade ("junk") bonds are underpriced, but those rated investment grade are overpriced[4]. Two later studies for the United States report underpricing rather than overpricing (see Helwege and Kleiman (1998) and Cai et al. (2003)). For Japan, Matsui (2000) finds that IPO and seasoned issues when analysed together exhibit significant overpricing too.

In this paper, using data on initial issues of publicly issued straight bonds in Japan between March 1992 and March 2002, evidence is presented that suggests the existence of significant mispricing, in particular, *overpricing*, of these bonds. The impact of five groups of factors that can potentially affect the degree of mispricing of these IPOs is investigated. These five groups are: (i) characteristics of the issuing firm, for example, the issuing firm's rating and Tobin's q[5]; (ii) characteristics of the underwriting firm, for example, the underwriting firm's reputation and quality[6], the issuing firm's relationships with its underwriter[7], and whether the

[2]Studies for the United States include Carter and Manaster (1990), Michaely and Shaw (1994), Carter et al. (1998), Ber et al. (2001), Pettway (2003), Schenone (2003), Benzonni and Schenone (2004), and Loughran and Ritter (2004). Studies for Japan include Jenkinson (1990), Isobe et al. (1998), Hamao et al. (2000), Beckman et al. (2001), Kaneko (2002) and Pettway (2003).

[3]Matsui (2000) is a study of mispricing of IPOs and seasoned issues of straight bonds in Japan between January 1995 and June 1999, but the empirical analysis does not distinguish between IPO and seasoned issues.

[4]Datta, Iskandar-Datta and Patel (2000) find that announcements of debt IPOs produce significantly negative stock price responses, while Datta, Iskandar-Datta and Raman (2000) find that firms engaging in debt IPOs substantially under perform their size-and-book-to-market-matched benchmarks.

[5]For IPOs of corporate bonds in the United States, Datta et al. (1997) investigate the impact of issuer ratings and the market the firm is listed on. For Japan, Matsui (2000) investigates the impact of high (AAA and AA+) issuer ratings.

[6]For IPOs of equity, investigations of the importance of underwriter reputation include Carter and Manaster (1990), Michaely and Shaw (1994) Carter et al. (1998) for the United States, and Beckman et al. (2001) and Pettway (2003) for Japan. Datta et al. (1997) investigate its importance for IPOs of corporate bonds using Carter and Manaster's (1990) quality rankings of lead underwriters and underwriter compensation.

[7]Schenone (2003) and Benzonni and Schenone (2004) have investigated the effect of banking relationships on

underwriting firm is an investment house or a bank subsidiary[8]; (iii) characteristics of the bond being issued, for example, the maturity of the bond[9]; (iv) macroeconomic characteristics, that is, interest rate risk; and (v) characteristics of the underwriting process[10].

There are two standard explanations for mispricing: the existence of asymmetric information between investors and issuers; and excessive competition between underwriters. For IPO of equities, significant underpricing has been confirmed consistently, although the size of the underpricing differs across countries and over time (see, Jenkinson (1990) for some cross-country evidence, and Loughran and Ritter (2004) for evidence for the United States between 1980 and 2003). The standard economic explanation of underpricing relies on the existence of asymmetric information between informed and uninformed investors. Since the issue price of a bond does not change to eliminate excess demand or supply, underpricing is needed to compensate uninformed investors for the risk of trading against superior information. As the Flow of Funds Accounts for Japan indicate, bonds are mostly held by what appear to be institutional investors, so the sort of explanations appropriate for equity mispricing are unlikely to be appropriate for bond mispricing in Japan[11].

This paper offers another explanation for mispricing based on interest rate volatility. Several papers have recently highlighted the importance of the impact of market volatility on corporate financing decisions. Wolfe et al. (1994) find that stock market volatility and interest rate volatility are important determinants of whether a prestigious underwriter underwrites an IPO equity issue. Schill (2004) finds that increases in market volatility dampens financial

underpricing of equity IPOs in the United States, and Ber et al. (2001) have examined the issue for Israeli data, while Matsui (2000) investigates it for IPOs of corporate straight bonds in Japan.

[8]Ber et al. (2001) and Schenone (2003) examine this issue for IPOs of equity in Israel and the United States, respectively, while Matsui (2000) investigates it for IPOs of corporate straight bonds in Japan.

[9]For IPOs of corporate bonds in the United States, Datta et al. (1997) investigate the impact of the size of the issue relative to the market value of equity and book value of debt of the firm, while Matsui (2000) investigates the impact of issue size and a non-linear function of maturity for IPOs of corporate straight bonds in Japan.

[10]For IPOs of equity in Japan, the importance of the method use to determine the issuing price has been investigated by Kaneko (2002).

[11]However, Tokushima (2000, p. 60) indicates that the share of corporate bond issues held by individuals has risen from 5% in 1996 to 16% in 1999. A critical assumption of many of the models seeking to explain underpricing is that there are cases where the uninformed investors (here taken to be individual investors) will be required to take up the entire issue when informed investors all withdraw from the market. This assumption does not appear to be consistent with the outcomes observed in the Japanese corporate bond market.

transactions, generates greater underwriting fees for IPO equity issues, but does not affect the degree of underpricing of IPO equity. Bewley et al. (2004) find that an increase in stock market volatility causes a decrease in the spread on corporate bonds.e has recently been highlighted in a ing transactions. Following this literature, this paper examines the impact on the degree of mispricing of IPO bond issues of: (a) the volatility of interest rates at the bond conditions were determined; and (b) changes the volatility of interest rates increases during the subscription period.

Despite Matsui's (2000) paper which analyses of IPO and seasoned issues of straight corporate bonds issued in Japan together and without distinguishing between the two types of bonds, there are reasons to believe that the degree of overpricing for IPO and seasoned issues will be significantly different. First, Datta et al. (2000) have found that the reaction of share prices to announcements of IPO bond issues differs substantially from the reaction of share pries to announcement of seasoned bond issues. Second, for IPO issues of bonds, there is no prior information on bond prices to assist in the pricing of the bond, so this situation is similar to the case of IPO issues of equity. IPO issues are the focus of attention because for seasoned equity issues market prices of earlier issues provide an accurate benchmark for pricing. For seasoned bond issues, earlier issues even if of a different maturity will be of great assistance in pricing the issue.

This paper makes several contributions to the small literature on mispricing for IPO issues of straight corporate bonds. First, in order to explain variations in the degree of mispricing of corporate bonds an estimate of interest rate volatility at the time the issuing conditions for the corporate bond were determinedas issued and an estimate of the change in interest rate volatility over the subscription period for the bond are used as explanatory variables. Second, it is the first analysis of the IPO issues of straight corporate bonds for Japan. Third,c ratings of the underwriting firm are used as an alternative new measure of underwriter reputation. Fourth, account is taken of simultaneous issues of IPOs. In contrast to Datta et al.'s (1997) sample size of 50 issues, the minimum number of issues in our regressions is 132.

Significant evidence of overpricing of IPO issues of straight corporate bonds is presented. It is found that the degree of overpricing tends to increase both as the volatility of interest rates at the bond conditions were determined; and the volatility of interest rates increases during the subscription period. In sharp contrast to the findings by Datta el al (1997) and Matsui (2000), issuer ratings are found to be of little value in explaianing variations in the degree of mispricing.

The plan of this paper is as follows. Section 2 briefly describes the Japanese underwriting market, changes in regulations relating to issuing requirements, and the method used for underwriting bonds in Japan. The implications for mispricing of IPO bond issues of relationship between bond and share prices based on option models is discussed in section 3.1, and the models to be estimated and the hypotheses to be tested empirically are discussed in section 3.2. The data used are explained in section 4, and section 5 presents the empirical results on mispricing. Section 6 concludes the paper.

[Figure 1 around here]

2 Mispricing: Model and Hypotheses

2.1 Bond Issuing in Japan

Figure 1 provides a time line indicating the key steps in the bond issuing process in Japan[12]. The focus of our study is on how bond prices change between the time the conditions for the bond are determined, and when the bond is first transacted in the secondary market. In Japan, the subscription period for the bond typically opens on the same day or the following day that the issuing conditions are usually decided. For corporate and government bonds in Japan, the subscription period is usually set for about three weeks. Payment for the bond Price data for the secondary market is usually observed on the first week day following the issue day.

Since 1988, all straight bonds have been issued according to "the proposal method", whereby an issuing firms requests secuities companies to presemt proposals concerning the issuing conditions, the issuing firm then decides on a lead underwrwriter on the basies of the proposals

[12]This section is based on information contained in Matsuo (1999), Takeda et al (2002), and Tokushima (2004).

presented and other relevant factors, issuing conditions are then finalised following discussions between the issuing firm and the chosen securities company, with the securities company acting on its own or as the representative of an issuing syndicate, and finally an underwriting syndicate is assembled. In order to prevent discount selling of bonds during ths subscription, in late 1991, a new method for issuing bonds, the 'fixed price reoffer method' (*kinitsu kakaku hanbai hoshiki*), which requires that during the subscription period the bonds are sold to investors at this uniform price was introduced.

2.2 Competition

Datta et al. (1997) who find evidence of overpricing for high grade bonds suggest that this may be the result of price competition among underwriters. They suggest that underwriters will compete more for high quality (highly rated) issues than for low quality issues driving up issuing prices, and other things being equal producing a lower return after the bond is traded. Matsui's (2000) study of mispricing of IPOs and seasoned issues of straight corporate bonds in Japan also finds evidence of significant overpricing, and provides a theoretical justification for why increasing competition among underwriters will lead to lower issuing returns when underwriting commissions are fixed[13]. Two problems with this competition argument are: the story for why investors are willing to accept issues that are overpriced; and the dimensions over which underwriters compete with one another for business, for example, size of the issue, the initial issuing price (or rate of return on the issue) on the issue, or underwriting commissions.

The potential impact of competition on the degree of mispricing of IPO issues of bonds is likely to be critically dependent on whether underwriting commissions for bonds are fixed or can be varied by individual underwriters in response to changes in market conditions including competition. If underwriting commissions are fixed, then competition among underwriters through the offering of favourable issuing conditions to issuers makes some sense. Increased competition among underwriters could also lead to lower underwriter commissions. When

[13]In Matsui's (2000) study, explanatory variables that significant explain variations in overpricing include: the maturity of the bond; very high issuer ratings; and issue size. It should be noted that Matsui's (2000) estimate of the extent of mispricing for each bond issue is not computed from the prices for individual bonds, but rather from the values of a corporate bond index.

underwriting commissions can be decided on the basis of negotiations between issuers and underwriters, it is likely the first dimension of competition is through changes in underwriting commissions. Although there are some claims in the literature that underwriting commissions in Japan in the 1990s were fixed[14]. Takaoka and McKenzie (2005) provide several pieces of evidence from newspaper articles[15], books on the Japanese bond market[16], and underwriting commission data on individual issues from the IN Information System's (INIS) IN Firm Finance Data Base to support their argument that from at least March 1992 underwriting commissions were not fixed. Furthermore, as Takaoka and McKenzie (2005) show underwriter commissions tend to rise as the rating of the issuing company worsens.

Several papers have discussed the role of competition among underwriters as a possible reason for observing overpricing in the IPO bond market. Datta et al. (1997) find that the degree of overpricing is high for highly rated bonds, whereas poorly rated bonds are underpriced. Datta et al. (1997) suggest that underwriters will compete more for high quality issues than for low quality issues, and that competition among underwriters for high quality IPO bond issues will lead to higher prices for these bonds. Based on first price auction theory discussed in Milgrom and Weber (1982) and McAfee and McMillan (1987), Matsui (2000) provides a theoretical model where an increase in the number of underwriters competing for a particular issue leads to a reduction in the rate of return (increase in the price) that underwriters offer for the bond. This can be interpreted as a close to the standard result in auction theory that in benchmark models, the more bidders there are the higher is the average price received by the seller (see McAfee and McMillan (1987)). On its face value, this would appear that more underwriters competing for a given issue will lead to higher prices, but not necessarily to more

[14]For example, Hamao and Hoshi (2003, p. 10) claim that 'underwriting fees for corporate bonds of the same maturity were fixed across underwriters until the beginning of 1998', so that underwriters could not undercut the market in setting conditions.

[15]For example, the 2 June 1993 issue of the Nihon Keizai Shinbun reports Nomura Securities cutting commissions in anticipation of bank entry. Takaoka and McKenzie (2005) also argue that Hamao and Hoshi's (2003) interpretation of an article on underwriting commissions in the 3 February 1998 issue of the Nikkei Financial is correct.

[16]Matsuo (1999, p. 101) and Okamura (2003, p. 17). Tokushima's (2000, pp. 33-40) time line of important events relating to the Japanese corporate bond market over the period 1878-1999 makes no mention of any switch from fixed to variable commissions in 1998.

overpricing. In the standard literature on auctions, the item being auctioned has some true value, and each bidder has an independent draw from some probability distribution. More bidders means that it is more likely that a higher draw (relative to the true value) from the distribution is drawn leading to a higher bid price, and higher degree of overpricing. For a fixed number of lead underwriters, Matsui (2000) also investigates how an increase in the number of underwriters in an underwriting syndicate will affect offered returns and prices, and suggests that an increase in the number of members of an underwriting syndicate will reduce the degree of overpricing. Matsui's (2000) analysis is predicated on the assumption that underwriting commissions are fixed, but this assumption is inappropriate for Japan after 1992 (see Takaoka and McKenzie 2005). Thus, an alternative tool of competition for lead underwriters is the commission that they charge to handle an issue.

2.3 Model and Hypotheses

Once the issuing conditions of a bond including the maturity, coupon payment dates, issue date and coupon rate are decided, and provided the issuing firm does not get into financial difficulties, the timing and the amount of future coupon payments and principal to be repaid when the bond matures are fixed. Determining the issue price of this bond requires determining the expected present discounted value of this income stream taking into the possibility that the firm might get into financial difficulty before the bond matures and that the level of interest rates may vary considerably over the lifetime of the bond.

The following model was assumed to explain variations in the excess return on bonds:

$$\begin{aligned} ExcessReturn_j = {} & \alpha_0 + \alpha_1 DIAA_j + \alpha_2 DIA_j + \alpha_3 DIBBB_j + \alpha_4 Age_j + \alpha_5 Tobin's\ q_j \\ & + \alpha_6 DUWA_j + \alpha_7 DUWBBB_j + \alpha_8 DUWBB_j + \alpha_9 Commission_j \\ & + \alpha_{10} Bank\ U/W_j + \alpha_{11} Maturity_j + \alpha_{12} Log(Amount_j) \\ & + \alpha_{13} Simultaneous_j + \alpha_{14} Volatility_j + \alpha_{15} \Delta Volatility_j + u_j, \qquad (1) \end{aligned}$$

where Excess Return is the excess return on the initial issue; DIAA is a 0-1 dummy variable taking the value unity if the issuing firm's rating is AA+, AA or AA-, and zero otherwise; DIA is a 0-1 dummy variable taking the value unity if the issuing firm's rating is A+, A or A-, and zero otherwise; DIBBB is a 0-1 dummy variable taking the value unity if the issuing firm's rating is BBB+, BBB or BBB-, and zero otherwise; AGE is the number of years that have elapsed since the company was formed; Tobin's q is the value of the issuing firm's Tobin q in the accounting year immediately prior to the issuing year; DUWA is a 0-1 dummy variable taking the value unity if the underwriter's rating is A+, A or A-, and zero otherwise; DUWBBB is a 0-1 dummy variable taking the value unity if the underwriter's rating is BBB+, BBB or BBB-, and zero otherwise; DUWBB is a 0-1 dummy variable taking the value unity if the underwriter's rating is BB+, BB or BB-, and zero otherwise; Commission is the underwriting commission paid for issue j; Bank U/W is a 0-1 dummy variable taking the value unity if the lead underwriter is a bank-owned securities subsidiary, and zero otherwise; Maturity is the maturity of the bond; Amount is the size of the bond issue; Simultaneous is a 0-1 dummy variable taking the value unity if more than one bond issue was issued by the firm at the same time, and zero otherwise; Volatility is a measure of interest rate volatility at the time the bond's conditions were decided; $\Delta Volatility$ is the change in the interest rate volatility between the time the bond's conditions were decided and the time the bond was transacted in the secondary market and u is a disturbance.

The definitions for the issuer ratings variables (DIAA, DIA, DIBBB) indicate that the base ratings group is AAA. Given Datta et al.'s (1997) finding that speculative grade debt tends to be underpriced, and investment grade bonds tends to be overpriced, it can be conjectured that the coefficients on these ratings variables should be positive and increase as the ratings fall, that is, $\alpha_3 > \alpha_2 > \alpha_1 > 0$. Matsui's (2000) finding that AAA issuers tend to be overpriced compared with lower rated issues is consistent with this expectation. In analyses of equity IPOs, the age of the firm has been suggested. Given the difficulty of valuing a firm, although in Carter and Manaster (1980)'s multivariate results age is not a significant explanatory of returns. Assuming that Tobin's q is a measure of the firm's investment opportunities, we might expect that a firm with a higher Tobin's q to be treated as a firm with a lower probability of bankruptcy. As a result, the bond is likely to be in demand by investors so overpricing may result, that is, $\alpha_5 > 0$[17]. For IPO issues of both bonds and equity, the reputation of the underwriter has been found to be a crucial variable (see, for example, Carter and Manaster for equity issues, and Datta et al. (1997) for bond issues). The lack of any underwriters in our sample having a AAA rating and the definitions for the issuer ratings variables (DUA, DUBBB, DUBB) indicate that the base ratings group for underwriters is AA-, AA or AA-. Datta et al. (1997) find that as investor reputation improves, overpricing increases. If underwriter ratings are good measures of underwriter reputation, then we would expect that the coefficients on these ratings variables should be positive and increase as the ratings fall, that is, $\alpha_8 > \alpha_7 > \alpha_6 > 0$. As an alternative measure of underwriter reputation, Datta et al. (1997) also use underwriter compensation and argue that $\alpha_9 > 0$[18].

In the literature discussing the impact of bank entry into the underwriting industry, it is often suggested that compared to investment houses, banks potentially have superior information about issuing firms because of their lending to the firms. If this is true, banks may have the ability to evaluate issuing firms more accurately than investment houses. This is called

[17]It is possible that the investor or underwriter will take the value of the firm's Tobin's q into account in setting the bond's price leading to a more complicated impact of Tobin's q on excess returns.

[18]Datta et al.'s (1997) argument concerning the use of Commission is as follows. If the costs of certifying the issue are a function of degree of asymmetric information between the issuer and investors, high commissions reflect high certification costs (and a large degree of asymmetric information). A greater degree of asymmetric information is argued to lead to more underpricing, so that a higher value of Commission should increase the excess return. It should be noted that this is not an argument about underwriter reputation, but rather an argument about asymmetric information. Studies of underwriting commissions for corporate bonds have not really addressed the issue of high asymmetric information between issuers and investors is reflected in underwriting commissions (see, for example, Gande et al. (1999), Roten and Mullineaux (2002), and Takaoka and McKenzie (2005)).

the bank certification effect (see, for example, Gande et al. (1999) and Roten and Mullineaux (2002))[19]. If this argument was correct, it would suggest that banks have better information on which to price bonds leading to a smaller degree of mispricing compared to investment houses, that is, $\alpha_{10} > 0$[20].

As the maturity of a bond declines, it might be expected that the pricing problem becomes easier because the period for calculating the next present value of the bond's income stream is shorter and less can go wrong in a shorter period. We have no apriori expectations about the sign of α_{11}[21]. Datta et al.'s (1997) empirical results suggest that increases in the size of the issue lead to falls in excess returns (a tendency to greater overpricing), so that $\alpha_{12} < 0$[22]. Given that the issuing price is fixed, increases in interest rate volatility at the date of the issue of the bond are likely to lead to a fall in investor valuations of the future payments associated with a bond, leading to overpricing, that is, $\alpha_{13} < 0$. For simultaneous issues (especially those with different underwriters), a smaller degree of asymmetric information (better certification of the issues) might be expected and smaller excess returns, that is, $\alpha_{14} < 0$.

Two types of underwriting agreement are typically used in Japan, the firm commitment (*sogaku kaitori*) underwriting agreement and the stand by (*zangaku kaitori*) underwriting agreement[23]. In the case of a firm commitment agreement, the underwriter purchases the full issue from the firm, and then proceeds to sell it to investors. For a standby agreement, the underwriter agrees to purchase at the issue price any of the securities that remain unsold after the subscription period closes (see Takeda et al. (2002)). Whether the underwriting agreement is a stand by or firm commitment agreement, the amount the investor will receive from the bond issue is identical, and the underwriter will be left holding any bonds are left unsold at

[19]For spreads on small corporate bond issues in Japan, Takaoka and McKenzie (2005) find some evidence consistent with this argument.

[20]Matsui (2000) finds no evidence in support of this proposition.

[21]Matsui (2000) includes both the level and the log of maturity, where the former typically has an estimated coefficient that is negative and significant and the latter has an estimated coefficient that is positive and significant.

[22]Matsui's (2000) evidence is consistent with this expectation.

[23]A third type of underwriting agreement, best effort underwriting, where the underwriter makes its best efforts to sell the issue at the agreed price, but is not required to purchase any of the issue that remains unsold, does not appear to be used in Japan.

the end of the subscription period[24]. As a result, no difference is expected in the returns for the two types of agreement, that is, it is expected that $\alpha_{15} = 0$.

3 Data

Three major data bases were used in this study: the IN Information System's (INIS) IN Firm Finance Data Base; the Nikkei NEEDS Government Bond Data Base; and the Nikkei NEEDS Over the Counter (OTC) bond data base. The sample period in this paper runs from 1 March 1992 to 31 March 2002. The starting point of March 1992 is chosen to avoid a short period where there are new bonds were issued using the old and new underwriting methods. The end point of the data is governed by the time we accessed the INIS Data Base. While there were forty five IPO issues of corporate bonds between 1 March 1992 and 28 February 1995, the lack of data on their bond prices after they were issued means that none of these bonds appear in the samples examined in section 5. As a result, the IPO issues examined in section 5 all occur between 28 February 1995 and 31 March 2002[25].

The INIS Data Base contains data on straight corporate bond issues within Japan by individual firms, and includes ratings information, issue rates, issue amounts, the date of the issue, the date the conditions of the issue were decided, the type of underwriting arrangement associated with the issue[26], the names of the lead underwriter, the maturity of the issue, the year the issuing firm was established, details of any mortgages associated with the issue, and the number of the issue. It should be noted that the names of underwriters reported in this INIS data base are not the names of the underwriters at the time an issue is made, but rather the name of the financial institution that has succeeded to its business as of 2002 because of mergers, takeovers and bankruptcies of financial institutions between 1992 and 2002[27]. The

[24]For issuing firms, Takeda et al. (2002, p. 297) claim there is no difference in the risk associated with firm commitment underwriting and stand by underwriting agreements.

[25]Given Takaoka and McKenzie's (2005) research on the impact of bank entry into the underwriting market on underwriting commissions and spreads, it would have been interesting to examine whether bank entry had any impact on the degree of mispricing but this turns out not to be possible.

[26]For issues where the issuer was a securities company and the issue was a direct placement, information on this item is missing.

[27]The recent massive reorganization of financial institutions, in general, and the mergers, reorganizations and withdrawals of bank-owned subsidiaries (see Tokushima (2000, p. 44)) raises a fundamental question of how to

names of the original underwriters were recovered by checking the details of individual straight bond issues in various issues of the Bond Underwriters Association of Japan's Bond Review (*Koshasai Geppo*), and the Industrial Bank of Japan's Securities Handbook (*Shoken Binran*). The original underwriter names are used to classify each underwriter as either a bank subsidiary or an investment house.

The Nikkei NEEDS Government Bond Data Base contains daily observations on the prices of all types of Japanese Government bonds issued in Japan between 1987 and 2003. For each bond, the Data Base also contains details of date of issue, the issue price, the coupon rate, and the dates interest payments are made. Up until December 1998, the prices of government bonds are those for transactions on the Tokyo Stock Exchange (TSE). From December 1998, over the counter transactions in Government Bonds became possible. Although transactions continue on both the TSE and over the counter, the majority of transactions are undertaken on over the counter. As a result, we use price data from the over the counter transactions from December 1998.

The Nikkei NEEDS Over the Counter (OTC) bond data base contains information on over the counter reference prices (*tento baibai sankochi*) from February 1992 for publicly placed straight corporate bonds issued in Japan[28]. These OTC prices are published by Japan Securities Dealers Association (JSDA) on the basis of information provided by members of the JSDA to the JSDA[29].

distinguish a bank-owned securities subsidiary and an investment bank. Those securities companies that engaged in securities business prior to April 1993, are all treated as "investment houses" even though they may have a 100% fully owned bank subsidiary. The new domestic entrants into the securities business after April 1993 are all bank-owned security subsidiaries. Daiwa SMBC is probably the most difficult case as it has a securities company, Daiwa Securities Group, and a bank, Sumitomo Mitsui Financial Group, with very large shareholdings (60% and 40%, respectively). Given that the securities company has the largest shareholding this was treated as an investment bank.

[28]In this paper, data on the average over the counter reference prices has been used to compute the one day returns. Data on the median OTC reference price, and the maximum and minimum OTC reference prices and the number of companies reporting prices did not become available until 5 August 2002, and 7 June 2001, respectively. As a result, this data was not used in the current analysis.

[29]Further details on these OTC prices can be obtained from the JSDA's homepage: see http://www.jsda.or.jp/html/saiken/kehai2/seido.html (accessed 14 August 2004). Prior to the abolition of the market centralization obligation (*shijo shuchu gimu*), price information for straight corporate bonds for transactions on the Tokyo Stock Exchange is available for a limited number of issues. After the abolition of the market centralization obligation, the number of issues transacted on the TSE is even far fewer. Data in the Bank of Japan's Kinyu Tokei Geppo.

In computing excess returns on corporate bonds, we follow Handjinicolaou and Kalay (1984). As a benchmark for each corporate bond, a government bond with the closest maturity and closest coupon rate to the corporate bond in question was used[30]. Details of the method used to compute the excess returns on a bond are contained in Appendix 1.

In order to maximize the sample size, the maximum of the available issuer ratings in the INIS data base provided by four ratings institutions, Rating and Investment Information, Inc., Japan Credit Rating Agency, Japan Bond Rating Institute, and Standard and Poors, was used. Information on the ratings of underwriters at the time they underwrote a bond issue were taken from various issues of the Japan Bond Research Institute's (*Nihon Koshai Kenkyusho*) Nikkei Newsletter on Bond and Money (*Nikkei koshasai joho*).

Initial issues were defined in the following way. First, issues between 1 March 1992 to 31 March 2002 in the INIS Data Base with an issue number of one were chosen. Second, any issues with an issue number of two, three or four that were issued on the same day as the issue with an issue number of one were also treated as initial issues. Third, this group of initial issues included several dual currency and subordinated bonds. These dual currency and subordinated bonds were dropped from the sample because the characteristics of these bonds are likely to differ from the characteristics of straight bonds. Fourth, for the group of initial bonds remaining, a check was made of the INIS data base to determine if there was any record of the issuer having made an earlier issue of straight bond[31]. After all this, we were left with a sample of 420 IPO issues. Of these issues, there were 203 single issues, 94 double issues, seven triple issues, and two quadruple issues. Where more than one bond is issued at the same time, the same underwriter is used for all issues for 28 double issues, one triple issue and one quadruple issue.

[30] For example, for a five year corporate bond we first searched for a five year government bond that was issued just before the corporate bond. If such a government bond was not available, we searched for a six year bond that had a remaining maturity that was as close as possible to the maturity of the corporate bond. If there were no such bonds, we used a ten year government with a remaining maturity that was as close as possible to the maturity of the corporate bond. In this case, the coupon rates could be quite different.

[31] For reasons unknown to us, the issue numbers allocated to bonds can quite suddenly revert to one, so this check is essential. The extent to which the check will pick up earlier issues is limited by the starting date of the INIS data base which is 1978.

Tobin's q is proxied by the market to book ratio of the firm, where the market value of the firm is defined as the sum of the market values of stocks outstanding and interest bearing debt, and the total amount of assets is used as a proxy for the book value. Data on these variables are obtained from the Nikkei Needs Corporate Data Base. The age of a company at the time a bond was issued was computed as the difference between the year of issue and the year the company was established, where data on establishment years were obtained from the INIS Data Base. Appendix 2 contains a detailed description of how returns on various ten year government available in the Nikkei NEEDS Government Bond Data Base were used to compute estimates of interest volatility contained in the variable Volatility.

4 Empirical Results

There are 289 initial issues of corporate bonds in the period 1 March 1992 to 31 March 2002 for which sufficient data is available to compute the initial excess return using the method and conditions explained in Appendix 1. One bond with a standardized excess return in excess of 14,000 was dropped as being an outlier giving 288 observations on IPO issues. For 203 of these 288 issues, the price of the corporate bond is available on the day immediately following its issue. For 50 bonds issued on Fridays, the price of the corporate bond is not available until three days later.

Table 1 provides some descriptive statistics for the standardized excess returns. In all cases there is extremely strong evidence of significantly negative excess returns, that is, overpricing. There are always far more negative excess returns than positive excess returns, and the number of significantly negative returns is far greater than the number of significantly positive excess returns. The normality tests all indicate strong deviations from normality. First day (non-first day) issues refer to those issues where the first bond price is (not) observed on the day immediately following the issue day, whereas third day issues refer to those issues where the first bond price is not observed until three days after the issue. Figures 2 provides graph of the kernel estimates of the standardized return density for all issues (a graph of the kernel estimates of the standardized return density for first day issues is very similar). In this figure, the large left hand tail of the density (indicating overpriced issues) is apparent. Table 1 also contains details of the number of observations on corporate and government returns used to estimate excess bond returns. Although Appendix 1 imposes a minimum level of fifteen observations, Table indicates that the minimum number of observations used was eighteen. In fact, excluding one with using eighteen observations and another using twenty eight observations, the minimum number of observations used is forty four observations.

[Table 1 around here]

[Figure 2 around here]

Following the issue of a bond, new information arrives every day that can potentially influence the price of a bond and its excess return. Since the amount of new information hitting the market by the day following the issue and latter days will differ, it is possible that the behaviour of first day and non-first day issues differ. Table 1 indicates that average standardized excess returns tend to be smaller for non-first day issues. Testing the differences of the means for the first and non-first day issues, and for the first and third day issues strongly suggest that in each case, the means are statistically different (the absolute values of the t-values are 4.62 and 3.04, respectively). Given these differences between first day and later issues, the analysis that follows focuses solely on 203 first day issues.

Tables 2-4 contain details of the excess returns by the ratings of the issuing firm and underwriting firm, the year of the issue, and the maturity of the issue, respectively. Table 2 suggests that as the rating of the issuer falls the degree of overpricing tends to increase, and that as the rating of the underwriter of the issuer falls the degree of overpricing also tends to increase. For IPOs of equity, Loughran and Ritter (2004) observe that the degree of underpricing increases from the 1980s to the year 2000, and then falls dramatically between 2001-2003. Table 3 suggests that there is some variation in the degree of overpricing over time, but it is not clear whether this is just due to macroeconomic factors or due to changes in the characteristics of the bonds being issued. Table 4 would appear to suggest that as the maturity of the bond increases, the degree of overpricing falls.

[Table 2 around here]

[Table 3 around here]

[Table 4 around here]

Table 5 provides some descriptive statistics on all the variables that will be used in the regression analysis that follows. The sample size is set to be consistent with the sample used in equation (7.1) in Table 7. These descriptive statistics indicate that the majority of issuers have an A (A+, A or A-) rating, whereas underwriters are quite even split between AA (AA+, AA or AA-) ratings and A (A+, A or A-) ratings. One third of the issues have Stand by underwriting arrangements and a little over half of the issues are underwritten by investment houses. A comparison of the average values of the variables for initial issues and those reported in Takaoka and McKenzie (2005) for an unrestricted sample of straight corporate bonds issued between February 1994 and March 2002 indicates that firm's making initial issues tend to: be younger; issue bonds of a shorter maturity and smaller size; have lower ratings; and pay slightly smaller underwriting commissions.

[Table 5 around here]

Table 6 and 7 present the results of estimating various special cases of (3) by ordinary least squares (OLS) using LIMDEP 8.0 (see Greene (2002a, b))[32]. To take account of heteroscedasticity, only t-values based on White (1980)-adjusted standard errors are reported. Table 6 presents regression results where in each regression only factors from one of the five groups of characteristics discussed in section 1 are included. Equations (6.1) and (6.2) include only characteristic of the issuing firm (issuing firm's rating and issuer's age, and in equation (6.2) Tobin's q)[33]. Equations (6.3), (6.4), (6.5) and (6.6) include only characteristics of the underwriting firm (underwriting firm's rating, underwriting commissions, and whether the underwriting firm is an investment house or a bank subsidiary), characteristics of the bond being

[32]Three issues with maturities greater than ten years and the two issues that were directly placed are excluded from the analysis that follows giving a maximum sample size of 198 issues.

[33]The sample size declines substantially when Tobin's q is included because the variable cannot be computed for financial institutions and unlisted firms.

issued (maturity, the size of the issue, and whether there are simultaneous issues), macroeconomic characteristics (interest rate risk), and characteristics of the underwriting process (Stand by), respectively. The sample sizes used to estimate these models differ because missing values are much more of a problem for some variables like underwriter ratings and Tobin's q than for other variables. It is worth highlighting the extremely low explanatory powers of all the models except equation (6.5). The results in Table 6 suggest that increases in Tobin's q, a switch to a poorly rated underwriter, increases in maturity, and reductions in interest rate volatility will lead to underpricing (see equations (6.2), (6.3), (6.4) and (6.5), respectively). The signs of these responses are consistent with the a priori expectations discussed in section 3. Stand by's insignificance in (6.6) is also consistent with the discussion in section 3.

[Table 6 around here]

In Table 7, all the variables in the five groups are included in one regression. As in Table 6, falls in interest rate volatility and a shift to a poorly rated underwriter lead to significant increases in the excess returns. Tobin's q is significant in equation (7.2), while Maturity is significant in equation (7.1), but not equation (7.2). The finding that pricing outcomes for bonds underwritten by bank subsidiaries and investment houses are the same suggests that banks cannot make use of any superior information they have on firms as a result of lending relationships. This is consistent with Takaoka and McKenzie's (2005) finding that for large bond issues there is no difference in the spreads on corporate bonds underwritten by banks and investment houses.

[Table 7 around here]

In Table 8, the dummy variables relating to underwriter ratings are replaced by fixed effect dummies for each underwriter with Nomura Securities being the base group. Increases in maturity and reductions in volatility both lead to significant increases in excess returns. Unlike in equation (6.2) and (7.2), Tobin's q is not significant in equation (8.2). The significance of two variables, Commission and Stand by, depend on the equation estimated. An examination of the significance of the fixed effect dummies suggests that issues underwritten by Kokusai

Securities and possibly Tokai International exhibit even greater overpricing than the average issue.

[Table 8 around here]

5 Conclusion

This paper has presented evidence that strongly suggests that on average IPO issues of straight corporate bonds in Japan are overpriced. Interest rate volatility at the time of the issue, the maturity of the bond issued, and the rating of the underwriter underwriting the issue appear to significantly explain variation in the size of excess returns on bonds. The type of underwriter (investment house versus bank subsidiary), the type of underwriting agreement (firm commitment versus stand by), and the size of the issue do not explain variations in the degree of overpricing.

Many problems remain outstanding. There are several potential missing explanatory variables in the analysis. For example, the riskiness of the firm as measured by the volatility of the firm's share at the time the conditions of the issue are being determined and at the time of the issue may also explain the degree of mispricing. Although Takaoka and McKenzie (2005) find no evidence that lending or equity relationships between underwriters and issuers influence commissions and spreads on straight corporate bonds, it is possible that these relationships are important for initial pricing decisions[34]. In the literature on IPO equity issues in Japan, Beckman et al. (2001) have highlighted the role of keiretsu affiliation[35]. It is possible that a history of issues of other types securities (warrants, convertible bonds or corporate bonds by private placement) either domestically or in the Euro market will reduce the degree of asymmetric information between issuers and investors, thus influencing the degree of mispricing.

Even though they turn out to be insignificant explanatory variables in the regressions estimated by OLS, several variables used in explaining variations in excess returns, for example,

[34]Schenone (2003) and Benzonni and Schenone (2004) have investigated the effect of banking relationships on underpricing of equity IPOs in the United States.

[35]Matsui (2000) finds main bank afiliation is unimportant.

underwriting commissions (Commission)[36], whether the underwriter is a bank or an investment house (Bank U/W)[37], issuing bonds of several maturities at the same time (Simultaneous), and the type of underwriting arrangement adopted (Stand by) are potentially endogenous.

Using estimates of interest rate volatility computed from a GARCH model as an explanatory variable will potentially lead to a generated regressor problem which affects the efficiency of estimation and hypothesis testing (see Pagan (1984, 1986) and McKenzie and McAleer (1997)). This problem has been completely ignored. On the assumption that the errors of the GARCH model and the errors of the excess return model are not correlated, it is easily shown that the conventional OLS standard errors for the estimated coefficients in the excess return equation are no larger than the true standard errors, that is, the corrected t-statistics will be smaller than OLS formula t-statistics. This demonstration proceeds by reordering the sample according to the year of issue (and the common GARCH model for interest rate volatility) and noting that the true errors in the excess return equation are correlated across issues in the same year, but not with issues made in other years. The covariance matrix of the true errors in the excess return equation will be block diagonal. The known relationship between the corrected t-statistics and the computed t-statistics means that findings in this paper that a variable is insignificant using OLS formula t-statistics cannot be overturned by computing a t-statistic that takes account of the generated regressor problem. The same cannot be said in the case of significant variables. However, one exception is a test of the null hypothesis that $\alpha_{14} = 0$, namely, the significance of Volatility. In this case, under the null hypothesis, a test of the null hypothesis is unaffected by the generated regressor problem (see McKenzie and McAleer (1997)).

[36]Takaoka and McKenzie (2005) show that the important variables explaining underwriting commissions on straight corporate bonds in Japan are the rating of the issuing firm, the size of the issue, the maturity of the issue, whether the issue is secured, and whether the underwriter is a bank or an investment house.

[37]In the literature explaining variations in spreads on corporate bonds, Konishi (2002), Hamao and Hoshi (2003) and Takaoka and McKenzie (2005) have considered the possibility that the choice of underwriter is an endogenous variable.

Appendix 1: Computation of Standardized Excess Returns[38]

Following Handjinicolaou and Kalay (1984), the premium bond return for the ith corporate bond on the tth day after its issue, $P_{i,t}$, is defined as:

$$P_{i,t} = SR_{i,t} - GR_{i,t}, \tag{2}$$

where $SR_{i,t}$ is the single day holding return for the ith corporate bond on the tth day after the issue of the bond, and $GR_{i,t}$ is the single day holding return for a government bond with a maturity and coupon rate that is similar to the ith corporate bond. As in Handjinicolaou and Kalay (1984), $P_{i,t}$, is assumed to be normally, independently and identically (niid) distributed with a mean μ_i and variance σ_i^2.

Due to weekends, national holidays, and infrequent trades, prices on corporate straight bonds are not observed everyday after a bond is issued. For government bonds, prices are not observed on weekends and national holidays. If $n(i,k)$ denotes the number of days that elapse after the issue day of the ith bond until a price of the corporate bond is observed for the kth time, then the number of calendar days between the $(k-1)$th observed price and the kth observed price, $p(i,k)$, can be defined as

$$p(i,k) = \begin{cases} n(i,k) - n(i,k-1), & k > 1, \\ n(i,1), & k = 1. \end{cases}$$

Given the assumptions about the distribution of $P_{i,t}$, the observed multiday premium bond return can written as[39]

$$SP_{i,n(i,k)} = \mu_i p(i,k) + \epsilon_{i,n(i,k)}, \tag{3}$$

where $SP_{i,n(i,k)} = \Sigma_{j=1}^{p(i,k)} P_{i,n(i,k-1)+j}$, and $\epsilon_{i,n(i,k)}$ is normally distributed with mean zero and variance $\sigma_i^2 p(i,k)$. The standard generalized least squares transformation of dividing both

[38] Matsui (2000) avoids many of the complicating factors relating to the choice of the appropriate matching government bond by using a public securities index(*koshasai indekkusu*).

[39] Although the notation used here differs slightly from Handjiniolaou and Kalay (1984), equation (5) corresponds to their equation (A.2).

sides of (5) by $p(i,k)^{0.5}$ is used to eliminate the known form of the heteroscedasticity in the error term of (5) to give

$$SP^*_{i,n(i,k)} = \mu_i p(i,k)^{0.5} + \epsilon^*_{i,n(i,k)}, \tag{4}$$

where $SP^*_{i,n(i,k)} = SP_{i,n(i,k)}/p(i,k)^{0.5}$ and $\epsilon^*_{i,n(i,k)} = \epsilon_{i,n(i,k)}/p(i,k)^{0.5}$. The variable $\epsilon^*_{i,n(i,k)}$ should be normally distributed with mean zero and variance σ_i^2.

In line with Datta et al.'s (1997) study of initial public offers of corporate straight debt in the United States, the parameters in (6), μ_i and σ_i^2, are estimated by OLS using the premium bond returns that are observed in the period between the 61st and the 131st calendar days after the issue day. Define the set S_i as $S_i = \{k : n(i,k)\epsilon[61, 131]\}$. This set contains information on which bond returns appear in the estimation window for estimating (6). If the OLS estimates of μ_i and σ_i^2, are denoted by $\hat{\mu}_i$ and $\hat{\sigma}_i^2$, then the standardized excess premium bond return on the ith bond, ER_i is given by:

$$ER_i = (SP^*_{i,n(i,1)} - \hat{\mu}_i p(i,1)^{0.5})/\hat{s}_i, \tag{5}$$

where $\hat{s}_i^2 = \hat{\sigma}_i^2[1 + p(i,1)/\sum_{k\epsilon S_i} p(i,k)]$. A negative (positive) value of ER_i indicates overpricing (underpricing).

By making use of Salkever's (1976) result on the use of dummy variables to compute forecast errors and their associated t-statistics, the standardized excess premium bond return in (7) can be computed as the t-statistic of the coefficient δ in the regression

$$SP^*_{i,n(i,k)} = p(i,k)^{0.5}\mu_i + \delta DUM_{i,n(i,k)} + \epsilon^*_{i,n(i,k)}, \tag{6}$$

where DUM is a 0-1 dummy variable defined as

$$DUM_{i,n(i,k)} = \begin{cases} 1, & \text{k=1,} \\ 0, & \text{otherwise,} \end{cases}$$

and equation (6) is estimated by ordinary least squares (OLS) using the observations on $SP^*_{i,n(i,k)}$ where k ϵ $S_i \cup 1$.

Given the assumptions made and in the absence of any mispricing, the t-statistic associated with the coefficient δ in the OLS regression of (8) should be distributed as a Student t distribution with $N_i - 2$ degrees of freedom, where N_i is the number of observations used to estimate (8).

In computing these excess returns, issues were eliminated if: (a) the first observed price of the straight bond is not observed until more than 40 days after the bond is first issued ($n(i,1) > 40$); and/or (b) there were less than fifteen observations available to estimate μ_i and σ_i^2.

Appendix 2: Interest Rate Volatility

In order to compute the interest rate volatility at the time each bond was used, the following procedure was adopted. For each calendar year between 1995 and 2002, a ten year government bond was chosen. In year j, a ten year government bond was selected that satisfied the following criteria: it was the last ten year bond issued in year j-1 for which bond price and bond returns were available for the whole of year j. For the selected government bonds, a preliminary analysis was conducted to determine if its daily rate of return contained a unit root. In all cases, unit roots appeared to be present, so the return data was differenced[40].

Denoting the differenced return for the jth year at time t by $DR_{j,t}$, the following AR(1) model with GARCH(1,1) error terms was assumed:

$$DR_{j,t} = \beta_{j,1} + \beta_2 DR_{j,t-1} + v_{j,t}, \tag{7}$$

$$\sigma^2_{j,t} = \omega_j + \alpha_j v^2_{j,t-1} + \beta_j \sigma^2_{j,t-1}. \tag{8}$$

For each selected government bond, this AR(1)-GARCH(1,1) was estimated for all the data available for the year in question using the maximum likelihood (ML) estimator in EViews 5.0 (see Quantitative Micro Software (2004)).

Based on the estimated parameters values for the AR(1)-GARCH(1,1) model for the jth year bond, an estimate of $\sigma^2_{j,t}$, $\hat{\sigma}^2_{j,t}$, is computed as

$$\hat{\sigma}^2_{j,t} = \hat{\omega}_j + \hat{\alpha}_j \hat{v}^2_{j,t-1} + \hat{\beta}_j \hat{\sigma}^2_{j,t-1}, \tag{9}$$

where $\hat{}$ denotes the ML estimate. The interest rate volatility for any corporate bond is assumed to be the value of $\hat{\sigma}^2_{j,t}$ computed according to (11) on the day the corporate bond was issued.

[40] Due to weekends and national holidays, bond data is not observed on every day. In computing the differences, all the missing data is ignored.

Table 1: Descriptive Statistics for Excess Returns

									Samples in Regression		
	Average	T-Value	Min.	Max.	No.	Pos.	Neg.	Norm	Average	Min.	Max.
All	-1.65	-7.56*	-19.39	8.13	273	96 (25)	177 (100)	206.30*	48.79	18	52
First	-2.18	-7.45*	-19.39	8.13	188	59 (17)	129 (86)	72.27*	48.96	28	52
Non-First	-0.47	-2.14*	-8.06	3.80	85	37 (8)	48 (14)	24.49*	48.41	18	52
Third	-0.83	-2.63*	-8.06	3.80	50	21 (3)	29 (11)	11.08*	48.06	18	52

Notes:

(1) A '*' indicates the average is statistically significantly different from zero at the five per cent significance level.
(2) Pos. (Neg.) indicates the number of positive (negative) excess returns, and the number in parentheses is the number of statistically significant returns at the five percent significance level.
(3) Norm indicates the Jarque-Bera (1980) normality test.
(4) All, First, Non-First, and Third denote all the IPO issues, issues where the first bond price is observed on the day following the issue, issues where the first bond price is not observed on the day following the issue, and issues where the first price is not observed until three days after the bond issues (Friday issues), respectively.
(5) The figures in the Average, Min. and Max. columns for 'Samples in Regression' are the average, minimum and maximum sample sizes used to calculate the excess returns for each bond issue according to the method outlined in Appendix 1.

Table 2: First Day Excess Returns by Ratings, Issue Year and Maturity

Variable	Value	Average	T-Value	Number	Normality
Issuer Ratings	AAA	-1.39	-1.74	11	1.67
	AA	-1.41	-3.07*	38	1.66
	A	-2.44	-6.48*	113	15.68*
	BBB	-2.87	-2.53*	24	7.48*
Underwriter Ratings	AA	-1.69	-4.65*	88	1.71
	A	-2.69	-5.17*	78	36.99*
	Lowly Rated	-2.54	-1.78	10	0.48
Issue Year	1995	-4.12	-4.59*	14	0.57
	1996	-1.71	-1.68	11	1.07
	1997	-1.78	-3.89*	33	0.36
	1998	-1.26	-2.84*	65	26.11*
	1999	-4.25	-4.40*	34	3.22
	2000	-1.44	-2.63*	25	0.31
	2001	0.24	0.14	4	0.64
Maturity	3	-2.98	-1.68	14	3.00
	4	-4.08	-3.86*	24	1.10
	5	-2.38	-5.01*	55	3.99*
	6	-2.68	-1.90	13	0.24
	7	-0.98	-2.94*	55	0.44
	10	-1.61	-3.19*	23	1.16

Notes:
(1) Issuer ratings are not available for two issues, and underwriter ratings are not available for fifteen issues.
(2) Lowly Rated refers to the underwrters with BBB and BB rating grades.
(3) Excess return of the issue year 2002 is not reported due to the small sample size.
(4) Excess return of maturity in 2, 12 and 20 years are not reported due to the small sample size.

Table 3: Descriptive Statistics for Regression Samples

Variables	Mean	Std.Dev.	Min.	Max.	Mean(TM)
Excess Return	-2.27	4.10	-19.39	8.13	na
Issuer Rating					
$DIAAA$	0.06	0.24	0	1	0.16
$DIAA$	0.20	0.40	0	1	0.35
DIA	0.60	0.49	0	1	0.45
$DIBBB$	0.14	0.35	0	1	0.06
Age	60.64	20.10	13	125	63.85
Tobin's q	1.00	0.50	0.28	3.17	0.98
U/W Rating					
$DUWAA$	0.50	0.50	0	1	na
$DUWA$	0.44	0.50	0	1	na
Lowly Rated	0.05	0.23	0	1	na
Commission	40.38	8.22	30	100	41.01
Bank U/W	0.43	0.50	0	1	0.48
Maturity	5.97	1.98	2	10	7.01
ln(Amount)	9.20	0.82	7.82	11.92	19.1
Simultaneous	0.59	0.49	0	1	na
Volatility	0.002	0.001	0.0004	0.01	na
ΔVolatility	15.56	95.00	-72.69	813.77	na
Stand by	0.33	0.47	0	1	na

Notes:

(1) For the figures in the columns 2 to column 5, the sample size for each variable is 181, the same as for equation (7.1) in Table 7. For Tobin's q the sample size is 144. Mean(TM) refers to the means of the variables computed from the Post Entry Data reported in Takaoka and McKenzie (2005, Table 1), and are based on a sample of 2,009 issues (1,682 issues for Tobin's q). D1AAA is a 0-1 dummy variable taking the value unity if the issuer's rating is AAA, and zero otherwise. DUWAA is a 0-1 dummy variable taking the value unity if the underwriter's rating is AA+, AA or AA-, and zero otherwise. na denotes not available.

Table 4: Excess Returns by Characteristic Categories

Variables	(4.1) Coeff.	(4.2) Coeff.	(4.3) Coeff.	(4.4) Coeff.	(4.5) Coeff.	(4.6) Coeff.
Volatility	-1489.69(4.86)*	-1452.81(4.79)*	-1669.49(5.72)*	-1576.87(5.12)*	-1415.83(4.89)*	-1450.49(4.76)*
ΔVolatility	-0.01(8.13)*	-0.01(8.12)*	-0.01(8.11)*	-0.01(7.80)*	-0.01(7.85)*	-0.01(8.26)*
Issuer Rating						
$DIAA$		0.82(1.18)	2.42(2.70)*			
DIA		0.02(0.03)	1.78(2.02)*			
$DIBBB$		-0.23 (0.21)	2.31(1.80)			
Age		-0.01(0.50)	-0.01(0.51)			
Tobin's q			1.77(3.08)*			
U/W Rating						
$DUWA$				-0.42(0.79)		
Lowly Rated				-0.21(0.18)		
Commission				0.04(0.96)		
Bank U/W				0.36(0.68)		
Maturity					0.23(1.79)	
Ln(Amount)					0.41(1.31)	
Simultaneous					-0.46(0.86)	
Stand by						-0.69(1.28)
R^2	0.28	0.29	0.38	0.31	0.30	0.29
Sample size	183	181	143	170	183	183

Notes:

(1) Figures in parentheses are the absolute values of t-statistics computed using estimates of standard errors adjusted by White's (1980) method.

(2) A '*' indicates the coefficient is statistically significantly different from zero at the five per cent significance level.

(3) All equations include a constant, but its estimated values and t-statistics are not reported.

Table 5: Models of Excess Returns

Variables	(5.1) Coeff.	(5.2) Coeff.
Volatility	-1475.24(6.81)*	-1661.74(7.14)*
ΔVolatility	-0.01(3.96)*	-0.01(3.80)*
Issuer Rating		
DIAA	0.77(0.57)	1.82(0.99)
DIA	0.36(0.27)	0.97(0.51)
DIBBB	0.47(0.28)	1.01(0.44)
Tobin's q		1.49(2.12)*
Age	-0.003(0.19)	-0.0003(0.02)
U/W Rating		
DUWA	-0.13(0.21)	0.20(0.29)
Lowly Rated	-0.47(0.38)	-0.97(0.65)
Commission	0.03(0.88)	0.08(1.90)
Bank U/W	0.78(1.28)	0.52(0.74)
Maturity	0.23(1.53)	0.23(1.35)
Ln(Amount)	0.40(0.99)	0.002(0.003)
Simultaneous	-0.51(0.76)	-0.98(1.30)
Stand by	-0.67(1.01)	-0.28(0.38)
R^2	0.35	0.46
Sample size	169	132
Wald (1)	0.51	5.75
Wald (2)	2.66	4.98
Wald (3)	4.57	3.60
Wald (4)	10.74	21.69

Notes:

(1) As for Table 4.

(2) Wald (1) tests if the coefficients of *DIAA*, *DIA*, *DIBBB* and Age are simultaneously zero. Wald (2) tests if the coefficients of *DUWA*, *Lowly Rated*, Commission and Bank U/W are simultaneously zero. Wald (3) tests if the coefficients of Maturity, Ln(Amount) and Simultaneous are simultaneously zero. Wald (4) tests if the coefficients of explanatory variables except Volatility are simultaneously zero.

Table 6: Fixed Effect Analysis

Variables	(6.1) Coeff.	(6.2) Coeff.	(6.3) Coeff.
Volatility		-1425.56(5.37)*	-1605.31(6.47)*
ΔVolatility		-0.01(4.14)*	-0.01(4.86)*
Issuer Rating			
DIAA		0.98(1.11)	1.56(1.54)
DIA		1.08(1.15)	1.46(1.29)
DIBBB		1.05(0.71)	1.33(0.81)
Age		-0.001(0.11)	-0.001(0.10)
Tobin's q			1.43(2.32)*
Commission		0.03(0.66)	0.08(2.93)*
Bank U/W		-1.33(0.59)	-1.90(0.77)
Maturity		0.30(2.28)*	0.38(2.65)*
Ln(Amount)		0.47(1.33)	-0.24(0.45)
Simultaneous		-0.90(1.73)	-1.30(2.14)*
Stand by		-1.58(2.50)*	-1.13(1.59)
Asahi	-1.46(0.50)	1.96(0.79)	2.29(0.87)
Mizuho Investors	0.70(0.17)	1.47(1.29)	2.24(1.66)
Mizuho	-0.30(0.23)	2.98(1.19)	3.28(1.21)
Kokusai	-3.53(0.87)	-4.52(4.32)*	-5.46(4.16)*
Sakura	-1.37(1.09)	1.81(0.73)	2.37(0.88)
UFJ Capital Market	-1.53(0.88)	-1.06(0.44)	-0.84(0.32)
Shinko	-1.05(0.44)	2.00(0.95)	-0.29(0.23)
Sumitomo Trust	0.70(0.33)	3.30(1.36)	2.70(0.93)
Sumitomo Capital	-0.59(0.34)	0.69(0.30)	0.47(0.19)
Dai-Ichi Kangyo	-0.16(0.10)	3.58(1.43)	3.78(1.42)
Daiwa	-3.50(2.78)*	-3.08(2.59)*	-2.00(1.62)
Long-Term Credit	-0.54(0.29)	1.22(0.50)	0.53(0.18)
Tokai Int'l	-5.92(2.47)*	-2.95(0.85)	-5.23(2.16)*
Nikko	-1.41(1.49)	0.01(0.02)	-0.43(0.50)
Norin Chukin	1.69(0.58)		
Fuji	-0.11(0.08)	2.94(1.18)	4.09(1.49)
Mitsubishi Trust	-6.99(1.72)		
Tokyo Mitsubishi	0.81(0.63)	2.60(1.11)	1.91(0.74)
Yasuda Trust	-0.67(0.17)	1.16(0.47)	
Yamaichi	0.59(0.36)	0.53(0.59)	0.42(0.38)
R^2	0.12	0.43	0.53
Sample size	183	181	143

Notes: (1) As for Table 4.

Figure 1: Issuing Time Line

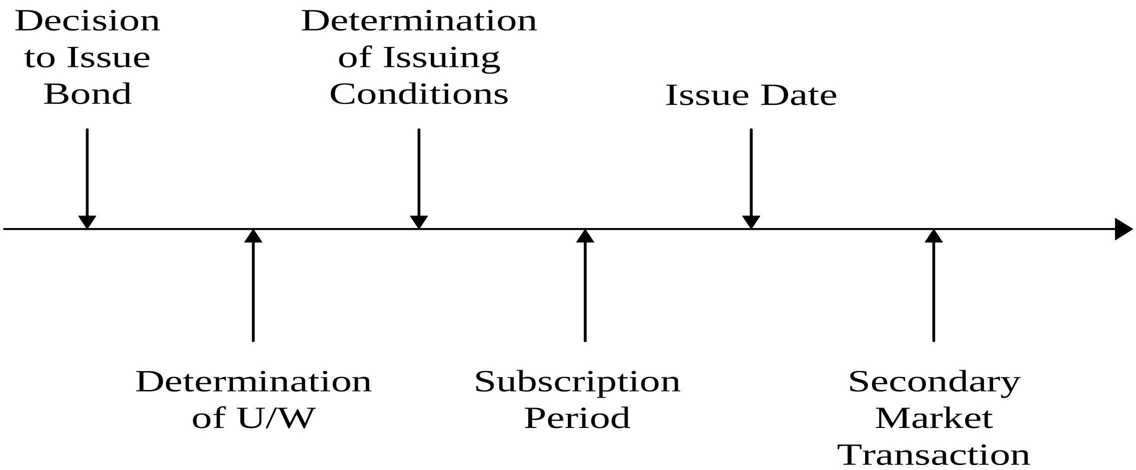
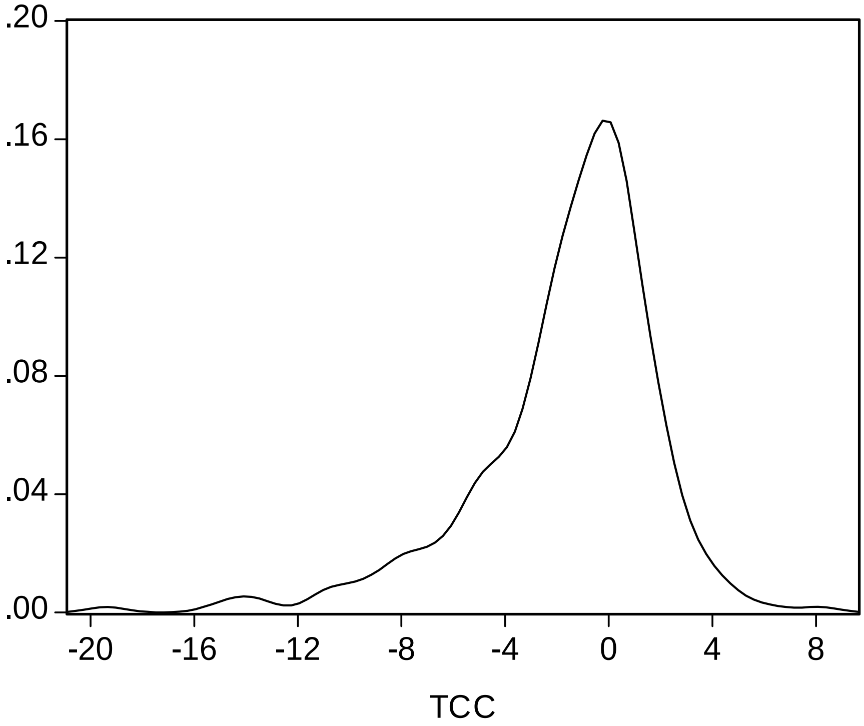


Figure 2: Kernel Estimate of Standardized Return Density: All Issues



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