

# **Underpricing and Reputation Acquisition In the Corporate Bond Market**

Nianyun (Kelly) Cai  
Department of Accounting and Finance  
The University of Michigan – Dearborn  
4901 Evergreen Rd.  
Dearborn, MI 48128-1491  
(313) 593-4002  
[kcai@umd.umich.edu](mailto:kcai@umd.umich.edu)

Jean Helwege  
Department of Finance  
The Ohio State University  
812 Fisher Hall  
2100 Neil Avenue  
Columbus, OH 43210  
[Helwege\\_1@cob.osu.edu](mailto:Helwege_1@cob.osu.edu)

and

Arthur Warga  
Bauer College of Business  
University of Houston  
4800 Calhoun Rd.  
Houston, TX 77204-6282

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### **ABSTRACT**

This paper examines initial returns (underpricing) of initial public offerings (IPOs) of corporate bonds in relationship to reputations in the bond market. Underpricing of debt is small, although statistically significant, but it occurs among both IPOs and seasoned bond offerings. The initial returns are highest among firms with a high risk of default and among private firms, for which the debt IPO is the firm's first public offering. The evidence supports Diamond's (1989) theory that corporate bond issuers have incentives to acquire reputations for timely debt repayment. However, many firms have yet to build a reputation, and for these underpricing is the favored method for dealing with information problems in the bond market.

## **Underpricing and Reputation Acquisition In the Corporate Bond Market**

Underpricing of initial public offerings (IPOs) of equity has occurred so frequently, in so many countries, and for such a long time that financial economists no longer question whether it exists, but only why it exists.<sup>1</sup> A common explanation for the underpricing of equity IPOs is that it solves or alleviates information problems. For example, Rock (1986) claims that underpricing solves the winner's curse problem; Benveniste and Spindt (1989) and Benveniste, Busaba and Wilhelm (2001) posit that underpricing is a form of payment to institutional investors for providing information; and Allen and Faulhaber (1989), Welch (1989), and Grinblatt and Hwang (1989) show that underpricing can signal that an IPO firm is of superior quality.<sup>2</sup> In each of the theories, the greater the information problems associated with the firm, the greater the underpricing in the equity IPO.

If underpricing in the equity markets is an optimal method of solving an information problem, then might underpricing serve a similar purpose in the corporate bond market? Although bond IPO firms tend to be larger and more established than the typical firm in the equity IPO market, the advent of the high yield bond market has led to an influx of companies with weaker prospects for debt repayment. These firms may find it optimal to use underpricing for the same reason that equity IPO firms do.

Indeed, several papers on the "seasoning" of corporate bonds show that underpricing exists on bond offerings, and Datta, Iskandar-Datta, and Patel (1997) report

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<sup>1</sup> For empirical studies documenting the underpricing phenomenon, see Logue (1973), Ritter (1984), Barry, Muscarella, and Vetsuypens (1991), Carter and Manaster (1990), Hanley (1993), James and Wier (1990), Michaely and Shaw (1994), Ibbotson and Ritter (1995), and Miller and Reilly (1987).

<sup>2</sup> Stoughton, Wong and Zechner (2001), Welch (1992), and Maksimovic and Pichler (2001) also provide theories for underpricing of equity IPOs.

significant underpricing on IPOs of bonds.<sup>3</sup> Helwege and Kleiman (1999) estimate that initial returns on speculative-grade bond IPOs are far smaller than the initial returns reported by Datta et al., but still positive and significantly different from zero.

In recent years, the signaling models of equity underpricing have been criticized on the grounds that underpricing is a costly way to signal superior quality in comparison to other available methods (e.g., Spiess and Pettway (1997)). If underpricing in the corporate bond market occurs as a solution to information problems, then one must consider whether this solution is the best solution. In particular, an alternative method of dealing with information asymmetries in the bond market is to develop a reputation for creditworthiness (Diamond (1989)). Diamond argues that firms with poor or nonexistent reputations will be forced to pay higher interest rates, and thus have an incentive to gain better reputations. Gorton (1996) and Carty (1996) find support for this theory.

In this paper, we consider the use of underpricing and reputation acquisition in the corporate bond market. We expect underpricing to occur more often among first time issuers (debt IPOs), as they have virtually no reputation for timely debt repayment. However, as firms build reputations as creditworthy borrowers the reliance on underpricing as a solution to information problems might diminish. We also consider differences in underpricing among private and public firms, on the assumption that a firm with actively traded equity is likely to have progressed further in establishing a reputation than one with no publicly traded equity. We examine underpricing and reputation acquisition with a sample of 418 bond IPOs between 1995 and 1999, and a comparison

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<sup>3</sup> The “seasoning” literature, discussed in more detail later, initially focused on differentials in the yield-to-maturity (YTM) between new bond offerings and existing bonds, and on how long it took for the YTM to converge. Quick convergence was referred to as underpricing, while convergence over several months or longer was referred to as seasoning. These researchers did not distinguish bond IPOs from other bond offerings.

sample of 2429 bond offerings made by firms with prior debt issues. Our price data are from transactions reported in the UH-NAIC database.

We find significant underpricing on speculative-grade IPOs of bonds that averages about 36 basis points, but no significant underpricing on investment-grade bonds. However, significant positive initial returns in the corporate bond market also occur with speculative grade bonds that are not initial public offerings. We find that underpricing is greater for riskier firms that have not established reputations in the bond market, such as private firms for which the debt IPO is the very first offering. Initial returns are also lower if the issuer has issued in the bond market recently, suggesting that a second bookbuilding process in a short period of time need not collect as much information as the first. We find that having a long history in the bond market helps to reduce underpricing, which supports Diamond's view of reputation acquisition, but we also find that this effect is not significant once bond ratings are included in the analysis.

The remainder of the article is organized as follows. Section 2 reviews existing theory and evidence. Section 3 describes the data. Section 4 discusses the methodologies of market-adjusted returns and mean-adjusted returns for analyzing initial returns. The empirical analysis of bond IPOs and post-IPO offerings appears in Section 5. Section 6 concludes the study and summarizes the results.

## **II. Underpricing and Reputation: Theory and Evidence**

In our review of the literature we discuss two areas of research: reputation acquisition in debt markets; and underpricing of new issues. The latter literature is quite

extensive and more often applies to the underpricing of equity offerings. Our treatment of these studies will be brief, save for the studies on bond underpricing.

### **A. Underpricing of new issues**

As Ibbotson and Ritter (1995) note, underpricing in the equity markets was first documented in a 1963 Securities and Exchange Commission study and has since been confirmed in numerous studies of the U.S. IPO market (see footnote 1 above). And, Ibbotson and Ritter point out that it exists “in every nation with a stock market.” A variety of theories explain the equilibrium phenomenon of underpricing of equity IPOs and many have been tested empirically.

Among the more recent theories of IPO underpricing are a number of papers with elaborate models of information flows. In contrast, the earlier explanations for underpricing more often focus on practical considerations such as fear of lawsuits (Tinic (1988)), the relatively greater bargaining power of investment banks, and stabilization practices of underwriters (Ruud (1993)).<sup>4</sup> Information-based models address such problems as the winner’s curse (Rock (1986)), how to signal superior quality (Allen and Faulhaber (1989), Grinblatt and Hwang (1989), Welch (1989) and Stoughton, Wong and Zechner (2001)), cascades in price-setting (Welch 1992), and how to extract truthful valuation information from institutional investors (Benveniste and Spindt (1989) and Benveniste, Busaba and Wilhelm (2002)).

Empirical studies of bond underpricing largely predate the information-based theories of underpricing, and, indeed, rarely restrict their analysis to bond IPOs. Early studies, such as Ederington (1974), Lindvall (1977), Weinstein (1978), and Sorenson (1982) consider the question of why the yield to maturity (YTM) on a new bond offering

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<sup>4</sup> See Ibbotson and Ritter (1995) for a summary of theory and evidence on equity IPO underpricing.

is usually higher than the YTM on an existing corporate bond that trades in the secondary market. In addition to differences in coupons, call option values and liquidity, these researchers also consider the possibility that new bond offerings are underpriced as a method of reducing underwriter risk. They also examine the issue of when the YTM's converge. If the YTM's converge quickly, then the differentials are ascribed to underpricing, and if they converge over several months, then new issues are deemed to undergo a seasoning process. The most recent of the papers, Sorenson (1982), concludes that the seasoning process observed in previous papers is mostly an underpricing phenomenon and that it does not occur to the same extent on all bonds. Wasserfallen and Wydler (1988) find evidence of underpricing of new bonds in the Swiss market, again ignoring whether the issues are IPOs or not.

The most recent empirical studies of bond underpricing are those of Datta, Iskandar-Datta and Patel (1997) and Helwege and Kleiman (1999), which focus exclusively on initial public offerings of bonds. Datta et al. use transaction data from the NYSE and find initial returns for speculative-grade bonds of 1.86 percent and *negative* initial returns for investment-grade bond IPOs that are even larger in magnitude. Helwege and Kleiman calculate underpricing using Lehman Brothers' trader quotes, and find that underpricing on speculative-grade bond IPOs averages only 39 basis points. Still, their figure is significantly different from zero. A likely explanation for the discrepancy in the results is that bond trading on the NYSE is sparse and some of the bonds used in Datta et al. do not have trades until quite some time after the bond IPO. Helwege and Kleiman (1999) also examine whether underpricing is greater for firms that have not yet completed equity IPOs (private firms), and find that the opposite is true.

## **B. Reputation acquisition in debt markets**

Diamond (1989) considers the required rate of return on a public bond when investors are unable to distinguish good firms from bad firms. In this model, some firms have only positive NPV projects, others only negative NPV projects, and a third group has the ability to choose between either. A lemons problem develops in the bond market, leading to premiums in interest rates. Over time, however, investors learn that the type one firms are more likely to repay their debt (they acquire a reputation) and that the type two firms are more likely to default, and consequently the interest rates facing type one borrowers decline. Because of the lower interest rate on safer firms' debt, the third type of firm has an incentive to become a safer firm and also build a reputation. Diamond (1991) considers the situation where the firms may also borrow in the bank loan market where costly monitoring can overcome the lemons problem.

Gorton (1996) studies Diamond's (1989) model in the context of bank notes from the free banking era. Bank notes carried the risk of default by the issuing bank and thus were routinely discounted from their face value. Gorton shows that the newer banks that had not developed a reputation experienced greater discounting on their notes than seasoned banks. Similarly, Carty (1996) shows that firms that are more well-known in the corporate bond market, because they have been in the market longer, have lower interest rates on their bonds, *ceteris paribus*.

Neither the bond underpricing literature nor the reputation acquisition literature considers the existence of the other mechanism for dealing with information problems. If the two are direct substitutes, and firms have frequent needs for entering the bond market, then reputation-building is likely to supercede underpricing as the main solution

to resolve information problems. For a firm that has never issued in the public bond market before, underpricing is likely to be a more effective tool. In the following sections, we analyze initial returns of bond IPOs, keeping in mind factors that might affect the degree of information problems. Then we compare underpricing of IPOs to underpricing on bonds of firms that have had time to acquire a reputation.

### **III. Data**

We identify first-time issuers in the U.S. corporate bond market through the Fixed Income Securities Database (FISD).<sup>5</sup> This database maintains issuance information on all fixed income securities that are assigned CUSIPs, or instruments that are likely to receive one in the near future.<sup>6</sup> FISD represents one of the most comprehensive bond-issuance databases extant, and serves as the issuance database engine for a variety of data resellers.

Using FISD, we first identify all firms that completed new debt offerings between 1995 and 1999, but have no debt outstanding prior to 1995. This sample of potential bond IPOs is then screened further to ascertain that the first offering observed in FISD is indeed a bond IPO. We use data on outstanding public bonds reported by Lehman Brothers in the Fixed Income Database (FID) records, as well as Moody's Annual Bond Records, to eliminate firms that had outstanding public straight bonds before 1995, when the FISD starts.<sup>7</sup>

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<sup>5</sup> This is a product of LJS Global Information Services Inc.

<sup>6</sup> The latter are principally 144as that often receive a CUSIP within three months of issuance. See Chaplinsky and Ramchand (2000) for a detailed study on the issuance and market performance characteristics of Rule 144a securities.

<sup>7</sup> FISD includes all public bonds that mature in 1990 or later. Thus, a firm that issued a bond prior to 1990 that had already matured would be mistakenly identified as having a bond IPO were it not for the crosscheck in the other databases.

Our definition of bond IPOs excludes offerings by firms that had issued debt in some other corporate form. For example, NTL Communications Corp issued debt for the first time after 1995, but this firm was spun off from NTL Inc., and the latter had issued public debt earlier. We exclude such offerings from our sample of bond IPOs after checking the issuers in the CD-Rom version of Moody's Industrial manuals and the Directory of Corporate Affiliates. We use these two databases to identify parent-subsidary relationships, as well as mergers and name changes.

We exclude all bonds, whether they are IPOs or not, that have unusual features that could affect underpricing or YTMs. These include foreign issues, private placements, convertible bonds, pay-in-kind bonds, and corporate pass thru trusts.

Next, as in Helwege and Kleiman (1998), we exclude all offerings over \$500 million on the assumption that any firm that could raise such a large amount in its first offering has qualities that would make it less informationally constrained. Lastly, we exclude all financial firms.<sup>8</sup> In total, there are 485 bond offerings meeting our criteria. Our sample is larger than those used by Datta et al. and Helwege and Kleiman largely because we examine a more recent time period in which there was a higher volume of offerings in the high yield market. In addition, the former study is restricted to exchanged-traded bonds, which are a smaller portion of the public bond market.

We obtained secondary bond prices for these 485 bond offerings from the UH-NAIC Database. This database includes prices of all purchases and sales of publicly traded corporate bonds made by insurance companies. Insurers are required to report this information to the National Association of Insurance Commissioners (NAIC) on an

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<sup>8</sup> Financial firms are excluded because their offer prices are likely to be affected by regulatory factors. In addition, leverage ratios are not comparable between financial and nonfinancial firms.

annual basis. The University of Houston (UH) supplies these data to academic institutions after matching the transaction records with the FISD issuance database described above. The UH-NAIC database covers the period 1995 through 1999.

In the equity IPO literature, underpricing is typically calculated as the percentage difference between the offer price and the closing price on the first day of trading. In the corporate bond market, trading occurs less frequently and none of the available databases include all trades. Consequently, defining underpricing by the same method as is used in the equity IPO literature would result in a very large fraction of missing observations. Essentially, there is a trade-off between reducing the noise in the underpricing data series and increasing the size of the underpricing data sample. We calculate initial returns on bonds for which transaction data is available within seven days of the offering date.<sup>9</sup> We require that all bonds in our sample have at least one transaction during this period (otherwise we delete them from the analysis). This results in a final sample of 418 initial public offerings of bonds, which were completed by 398 firms (some firms issued two bonds simultaneously in their IPOs).

As in any pricing database, filters need to be applied to check for errors. For example, we found that for some bonds that traded more than once in the same day, the reported accrued interest differed to an extent not due to rounding error. We examine all the accrued interest figures by calculating their value according to the Security Industry handbook and comparing this value to the reported one. If the difference between the two accrued interest figures is less than 10-day's accrued interest, we assume that the accrued interest reported in UH-NAIC is accurate and keep the trading record, otherwise

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<sup>9</sup> In results not reported, we also calculate returns if the initial trade is within 14 days of the issuance date and find they are qualitatively similar.

it is deleted.<sup>10</sup> This screen results in the deletion of 120 bond trades. For bonds that have several trades occurring on the same day and have different reported accrued interest, if the difference between the same day accrued interest is less than 0.01 (per \$100 par bond value), we consider it as rounding error and keep it, otherwise, we delete all the observations of that bond on that day. This filter causes 50 IPO transactions to be deleted.

For issues with more than one trade in a day we make use of all of the information reported for the day. We do this using a weighted average price, where the weights are the fraction of the day's total transactions accounted for by each trade. The final sample includes 647 price observations for 418 IPO bonds.

We obtain bond ratings from FISD, which reports each bond's ratings (from Standard & Poor's, Moody's and Fitch) within one month of the offering. If a bond has no ratings from any of the rating agencies during the first month (there are only 4 such issues), then we use the bond's rating in the month after the IPO. In the case of multiple ratings, we use S&P's rating when available, Moody's next, and only the Fitch rating when no other ratings are reported. For ease of comparison, we convert all bond ratings to S&P's scale.

We compare initial returns on bond IPOs with initial returns on bonds of firms that have already tapped the public bond market. The non-IPO bond sample includes all the nonfinancial bond offerings in the FISD that are not bond IPOs, except those excluded for having unusual features or offering amounts over \$500 million. We apply the same filters to the price data as we did for the IPO sample, as the pricing source (UH-

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<sup>10</sup> Bonds sometimes have long or short initial coupon periods that can lead to discrepancies between the "theoretical" accrued interest and reported interest. Since this information is not always available we are forced to assume that the reported accrued interest figure can deviate from the "theoretical" value.

NAIC) is identical. Again, if there is more than one trade in a day we calculate the weighted average price, weighting by the transaction amount. The final sample includes 3987 price observations for 2429 bond offerings made by firms that had already issued a public bond.

#### **IV. Methodologies for Calculating Initial Returns**

As mentioned earlier, the calculation of underpricing in the bond market differs from that used in equity underpricing studies because bonds often do not trade daily. Moreover, the quality of bond pricing data is not as good as that typically available for equity market studies, so using a number of trading observations for the same bond improves the precision of the estimates. Relative to previous studies, our window of analysis is quite narrow, an improvement that owes to the superior quality of the UH-NAIC data.<sup>11</sup> Nevertheless, the benchmark bond index could move sharply even during a seven-day window. Consequently, we must consider the appropriate benchmark for determining excess returns. There are two methods commonly used in the literature: market-adjusted returns and mean-adjusted returns.

##### **A. Market-Adjusted Returns**

Market-adjusted returns adjust individual bond returns by subtracting off the return on a bond index during the same period over which the individual bond return is calculated. Because the period of analysis in our study is quite recent, we are able to use benchmark indices that are rather detailed. Depending on the rating of the bond, we use

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<sup>11</sup> Recall that we calculate initial returns on trades that occur within seven days of the IPO date. In contrast, Datta et al. may estimate initial returns over a period as long as several months and Helwege and Kleiman restrict their returns to those observed in the same month as the IPO date (they also examine a smaller subsample where the return period is restricted to no more than two weeks).

either the Lehman Brothers Investment Grade Corporate Index and or the Lehman Brother High Yield Index as benchmarks in calculating initial returns. The Lehman Brothers Corporate Indices include all publicly traded U.S. corporate debentures and secured notes that meet prescribed maturity, liquidity, and quality guidelines. Securities with calls, puts and sinking fund provisions are included, which is standard for indices. However, the indices exclude private placements, 144A securities, floating rate securities, and Eurobonds. In addition, the Lehman Brothers High Yield Index excludes Pay-in-Kind (PIK) bonds and (as already noted) debt issues from countries designated as emerging markets.

Actually, each of the indices representing investment-grade (IG) and speculative-grade (SG) bonds has several components. The indices are broken down by maturity (Intermediate indices include bonds with maturities of less than 10 years; long term indices include bonds with maturities of 10 years or more) and by credit quality (indices are available for each of the major rating categories). Lehman indices use Moody's ratings to classify investment grade bonds, and S&P ratings for high yield issues. In order to maintain consistency, we convert all ratings into their equivalent S&P category.

To calculate adjusted returns, first we calculate raw returns for the individual bonds. Let  $n$  be the number of days between reported bond trades. We begin by defining the bond return over  $n$  days as follows:

$$BR_{t,n} = (P_{t+n} - P_t) / P_t \quad (1)$$

where  $P_t$  is the price reported for the transaction on date  $t$ , and  $P_{t+n}$  is the price of the bond at the next transaction  $n$  days later, and both prices are expressed as the sum of the flat price and accrued interest. If the bond has more than one trade, then as stated

earlier, the return on bond  $i$  is based on the weighted average price. The calculation of the bond return is the same whether it is the initial return associated with the IPO ( $P_t$  is the offering price) or a subsequent return.

Once we have an individual bond return, we adjust for changes in the corporate bond market. Using equation (1) to define the individual bond return ( $BR_{i,n}$ ), we then find the comparable index based on rating and maturity.

The excess return over the initial return trading period is:

$$MARK_{i,n} = BR_{i,n} - \sum_{j=1}^n (INDX_{i,t-n+j}) \quad (2)$$

Where  $BR_{i,n}$  is the raw bond return on bond  $i$  over  $n$  days that first trades on day  $t$ .  $\Sigma INDX$  over  $n$  days is the sum of the index returns over the  $n$  days also starting on day  $t$  for the Lehman Brothers' index with the same rating and similar maturity. We refer to  $MARK$  as a market-adjusted return.

## **B. Mean-Adjusted Returns**

The concept of mean-adjusted returns was introduced by Masulis (1978, 1980a, 1980b) and applied to bonds by Dann (1980, 1981). These studies did not address underpricing of bonds, but focused on announcement returns when a corporate event occurred, such as an earnings announcement. Handjinicolaou and Kalay (1984) improve on their methodology by taking into account the intermittent nature of bond trading (and thus of bond return observations). In these studies, excess returns are defined as the difference between the “event window” return (in our case the window being from the offering to the first observed trade) and the return the bond normally earns over a period of 365 days. In their studies, the interval is centered on the event day, but as our event is

an IPO or other offering, the interval necessarily includes only observations after the event (after the offering date). To be precise, we take observations up to a week after the IPO or other offering as part of the initial return period, and the comparison period interval begins seven days after the offering. We are implicitly assuming by using this method that abnormal returns only occur during the initial trading period and there is no “seasoning.”

The standard procedure is to first adjust the bond return (calculated in equation (1)) by subtracting the return on a comparable Treasury bond ( $TBR_{i,n}$ ) over the same  $n$ -day period:<sup>12</sup>

$$ABR_{i,n} = BR_{i,n} - TBR_{i,n} \quad (3)$$

The mean return used as the benchmark for adjusting the initial returns is then the average of the ABRs over the 365-day interval (the comparison period) described earlier. We refer to this average return as the comparison period return ( $R_{i,cp}$ ):

$$R_{i,cp} = \frac{1}{K_{cp}} \sum_{cp} \left( \frac{ABR_{i,n}}{n} \right) \quad (4)$$

where  $K$  is the number of recorded trades for bond  $i$  over the comparison period, and the summation  $\sum_{cp}$  involves summing up the  $K$  returns in the comparison period. This calculation is equivalent to equation (6) of Handjinicolaou and Kalay (p. 44).

Now that we have a comparison period return to use as a benchmark, we adjust initial returns (that may occur over  $n=1$  to 7 days after the IPO) as follows:

$$MER_{i,n} = ABR_{i,n} - n * R_{i,cp} \quad (5)$$

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<sup>12</sup> The comparable Treasury bond is the one with the nearest maturity and coupon.

In the analysis that follows, we consider excess returns that are calculated by the market-adjusted method ( $MARK_{i,n}$ ) and the mean-adjusted method ( $MER_{i,n}$ ). The latter method is very common in the literature, but the  $MER_{i,n}$  is likely to be less accurate in our sample compared to previous studies that use it because, by definition, we do not use a benchmark based on returns that are centered around the event. Instead, we use a year of data after the event, and if that year has a trend in returns then the benchmark will not be as accurate as one based on data six months before and six months after the event. Furthermore, bond trading is rather sparse, so the average return over the comparison period is more likely to suffer from small sample problems than the return of a market index. On the other hand, the market-adjusted returns could suffer from inaccuracy if the firm's bonds always had returns that differed greatly from the index.

## **V. Empirical Investigation**

### **A. Univariate Analysis**

We begin our empirical analysis with summary statistics of the sample of 418 debt IPOs and the 2429 non-IPO bond offerings. We then present univariate statistics and t-tests of differences in underpricing in the two samples. Because the first trade after the IPO is more informative than a randomly drawn trade during the seven-day window, we do separate analyses of underpricing over the full seven-day window and underpricing calculated off of the first trade. We follow with a multivariate analysis of underpricing, keeping in mind that firms with established reputations are expected to issue bonds with less or no underpricing.

Table I reports summary statistics for the sample of bond IPOs and the sample of bonds issued by the experienced firms (2429 bonds issued by 979 firms). Panel A summarizes S&P ratings information for the issuers at the time of the offering. The majority of the bond IPO firms are rated speculative-grade, with only 23 percent of the sample bonds at the BBB level or higher. In contrast, more than 78 percent of the seasoned bond offerings were completed by investment-grade firms. Panel B, which breaks down the firms by the exchange on which their equity is traded, indicates that nearly half of initial public offerings of bonds are done by firms that are still private (they have not yet completed a public offering of equity). Again, the non-IPO firms deviate dramatically, as fewer than 11 percent are private. In Panels C, D and E, we examine the industry distributions, maturities and offering sizes of the debt IPO firms relative to these features of the experienced firm. The two sets are fairly similar with regard to the industries represented (the largest number of debt IPOs occurs in manufacturing (42.6%), with only somewhat less in manufacturing (35.1%) for the seasoned issuers). Panel D indicates that 76 percent of the IPO bonds are long-term (maturity greater than ten years). Panel E indicates that the offering sizes of the two types of firms do not differ markedly.

Figure I shows the frequency of bond trading in each trading day of the week following the offering. On the first trading day after the IPO is completed, 119 of the 398 bond IPO firms have trades reported in the database. On the second trading day after the IPO, 39 firms' bonds trade, including 23 for which this day is the first day of trading after the IPO. Altogether, we have 647 trades for the 418 IPO bond offerings in the 7 days after the bond offering. Trading observations for the seasoned issuer sample appear in

Panel B of Figure 1. The frequency of trading is fairly similar to that observed in the IPO sample.

Before considering the topic of underpricing in detail, we investigate trading during the first week after the offering date to determine whether there is a seasoning process. Weinstein (1978) finds that there is no seasoning – once the bond begins trading there are no abnormal returns and only initial returns (the difference between the trading price and the offering price) are unusual. If there is no seasoning in our sample, then virtually any price during the first week of trading would provide the same estimate of underpricing. Panel A of Table II shows market-adjusted returns on each trade after the bond offering, while Panel B shows mean-adjusted returns on these same trades. The table shows that, as indicated previously in the literature, seasoning is absent from the data. As the results would not be affected by this choice, hereafter, our analysis is restricted to the first recorded trades after the bond offering.

We undertake univariate comparisons of initial returns in Tables III and IV, showing how underpricing varies by rating, maturity, private/public status and offering size for the two samples. Table III and IV differ in the calculation of excess returns, with the former using the market-adjusted returns and the latter using the mean-adjusted return method (where the bond's own subsequent returns are the benchmark).

We expect that riskier debt offerings will have a higher degree of information hurdles and thus more underpricing. Likewise, private firms, which have had no chance to build a reputation through the information in their equity trading, should also have greater underpricing. And to the extent that offering size proxies for the size of the firm, the smaller offerings should also exhibit higher initial returns. Within each of these

categories, we expect the debt IPOs to record the higher initial returns. We also report underpricing by maturity category, although we should keep in mind that maturity is positively correlated with rating. Lastly, we expect that seasoned bond offerings overall will have less underpricing, as those issuers would have had more time to establish a reputation as creditworthy issuers.

Panel A in each of the two tables reports initial returns for different rating classes. For investment grade bonds, initial returns are not significantly different from zero, regardless of whether the bond is issued by an IPO firm or an experienced firm. This finding contrasts sharply with that of Datta et al., who find significant overpricing on investment-grade bond IPOs. However, high yield bond IPOs exhibit an average initial return of about 35 basis points, with a rather high t-statistic (well over 5 in each table). These returns are very similar to those on high yield bonds reported by Helwege and Kleiman, who use a different database, but who also use price data from very shortly after the offering date. The seasoned issuer sample also has a significant amount of underpricing among the speculative-grade sample, although the magnitude is smaller than that observed among the debt IPOs.

Panel B in Tables III and IV indicates that underpricing is sharply higher among private firms' bond offerings. "Private" means the bond issuer has no public equity outstanding at the time of bond offering, and hence its bond IPO is the first public security offering ever made by the firm. This result is consistent with the idea that underpricing solves an information problem. The seasoned bond offerings of private firms also show some evidence of underpricing, suggesting that reputation acquisition is substantially harder if the equity market is not producing information about this firm.

We further examine the pricing of bond IPOs by splitting the sample according to maturity and according to the size of the offering. Neither variable strongly affects underpricing.

## **B. Multivariate Analysis**

Next, we analyze initial returns on bond offerings in a multivariate setting. Tables V and VI present regressions of returns (market-adjusted and mean-adjusted) on a number of control variables to determine whether bond IPOs are significantly underpriced and whether this underpricing appears in subsequent offerings once firms have begun to build reputations. The significance levels in these tables are computed using White's (1980) correction for heteroskedasticity.

Our control variables include the logarithm of the firm's offering amount, an indicator variable set to 1 if the bond has maturity over 10 years and 0 otherwise and ratings indicators. The size of the offering might be related to information effects if the amount of the offering is highly correlated with firm size, but this is unlikely to be the case. Alternatively, the size of the offering may matter if large offerings are more difficult to complete (e.g., because of a downward sloping demand curve for the security). The ratings indicator variables may proxy for reputation effects, and may not strictly be considered control variables. Yet, they are standard measures of risk in the corporate bond market. When we use ratings indicator variables, the left out category includes firms that are rated investment-grade.

To measure the potential for reputation to substitute for underpricing, we include a variety of proxies: an indicator variable for IPO issues; the number of years since the firm first issued a public bond and this variable squared (to allow for a potentially

concave shape - on the assumption that 50 years in the bond market does not add much to one's reputation relative to 30 years in the bond market); an indicator variable for firms that are private (takes a value of 1 if the firm has no public equity outstanding at the time of debt offering, and 0 otherwise); the length of time since the firm first listed on the stock market; and an indicator variable for firms that have made an offering in the bond market recently (within the previous two years). The last variable is expected to capture the effects of having just done the bookbuilding process and therefore potentially requiring less underpricing. In addition, we create interaction variables to determine if certain types of debt IPOs have more underpricing.

Tables V and VI each include five specifications, and differ only in the definition of the initial return (market adjusted returns in Table V or mean adjusted returns in Table VI). From Model 1, we can see that the overall excess returns for IPO bonds are significantly higher than those of experienced issuer bonds, regardless of whether returns are mean-adjusted or market-adjusted. In Model 2, we include control variables for the effects of offering size and maturity, as well as factors related to reputation, such as public/private status and how long the firm has been issuing in the bond market. The IPO coefficient is still significantly positive now, but lower than in Model 1. Model 2 suggests that much of the underpricing of debt IPOs owes to underpricing on debt IPOs of private firms. The estimates in Table V also indicate that underpricing exists on non-IPOs, but is smaller for firms that have established a presence in the bond market over time. The size of the offering is significantly positive, which suggests both that offering sizes are not highly correlated with firm size and that larger offerings are more difficult to place. These last two effects are not significant in Table VI, however. The results of

Model 2 suggest that underpricing is related to information problems and can be reduced if one has built a reputation.

In Model 3, we include variables to control for ratings and each of the rating categories is interacted with the IPO indicator. Ratings are largely driven by leverage, but it is possible that the rating agencies consider a firm's reputation in assigning a rating as well. Once ratings are included in the analysis, it is apparent that the excess initial returns for IPOs are largely limited to the speculative-grade bonds (note that the constant term includes the effects of the left-out category of experienced issuers that are investment-grade). However, not all the IPO interaction variables are significant, while some of the speculative-grade ratings indicators are. Thus underpricing is not limited to the IPO market, but occurs with many risky debt issuers. As we expect these firms to suffer from poor or nonexistent reputations in the bond market, we interpret this as evidence that underpricing substitutes for reputation in this market. However, the length of time the bond has been in the bond market is no longer significantly negative, which may result from a collinearity problem (few firms have been in the bond market for 20 or more years and are still rated speculative-grade) or that underpricing is more closely related to risk than history in the bond market. The effect of private firm status is still strong once ratings are taken into account.

Although much of the evidence presented so far indicates that reputation acquisition offsets the need for underpricing, it is possible that much of the underpricing observed in the sample is more specifically related to the bookbuilding effort and the amount of uncertainty about demand for the offering. In Model 4, we include an indicator variable for bond issuers that have tapped the bond market in the previous two

years. These issues have significantly less underpricing than other seasoned bond offerings, suggesting that underpricing is not as necessary if the issuer has recently undergone this process. This variable is only significant when initial returns are based on market returns, but this may indicate that the mean adjusted return is not as accurate when the firm issues debt more than once during the comparison period.

In all of the estimations presented in Tables V and VI, the coefficient on the interaction variable of private firms and IPO is significantly positive, indicating that a firm that has never issued a public security before must sell its debt IPO at a significant discount to its intrinsic value. Nonetheless, we find that the private firms that have previously issued debt do not pay a significant discount and in Table VI, the coefficient on private firms is actually significantly positive. Here is where the mean-adjusted return appears to be biased, because it uses as a benchmark the firm's returns over the next year. In the case of the private firms, several of them subsequently do an equity offering, which is very good news for bondholders. As a result the benchmark return is very high and the initial return at the offering is relatively low. If we remove the firms that complete equity IPOs during the benchmark period from the analysis, the private firm coefficient is usually insignificant in Table VI (not reported).

Given that private firms have greater underpricing on their IPOs, a natural question is whether a firm that only recently issued public equity would also have more underpricing on its bonds. To examine this possibility, we include the length of time since the firm's equity IPO for those firms that are public (this variable is 0 for the private firms) in Model 5. We find no evidence that the length of time in the equity

market affects the underpricing on the bonds, as the variable is not significant in Model 5 in either table.

## **VII. Conclusion**

This paper investigates the pricing of initial public offerings of corporate straight debt. We find a significant, but fairly small amount of underpricing on high yield bonds, whether we adjust returns by the mean-adjusted method or by the market index. Consistent with the literature (e.g., Weinstein (1978)), there is no evidence that “seasoning” occurs, in the sense that after the IPO, the bond trades as normal. Most of the underpricing occurs among high yield bonds and firms that did not have public equity outstanding at the time of the debt IPO.

Multivariate analysis reveals similar results, but in these settings we can more carefully control for private/public status, rating, time since the firm completed its equity IPO, and the frequency with which the firm has entered the corporate bond market. Bonds with speculative-grade ratings are often underpriced, even if they are not IPOs, suggesting that acquiring a reputation is not easily done. When detailed ratings are included in the regression, the clearest impact of reputation is found among firms for which the bond IPO is the firm’s very first public security offering. This suggests an important role for reputation acquisition as a substitute for underpricing

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**Table I: Summary Statistics**

Initial public offerings of bonds are identified using the Fixed Income Securities Database (FISD). Bond ratings are the average of the Moody's and S&P ratings. Ratings, maturity, exchange where the firm's equity is listed, and industry are obtained from FISD. The IPO issues sample includes 418 bonds issued by 398 firms. The non-IPO issues sample includes 2429 bonds issued by 979 firms, or an average of 2.5 offerings per firm.

	IPO Issues		Non-IPO Issues	
	Number	Percent	Number	Percent
Panel A: Bond Rating				
A or Better	32	7.7%	1068	44.0%
BBB	63	15.1%	830	34.2%
BB	29	6.9%	198	8.2%
B	250	59.8%	294	12.1%
CCC or lower	29	6.9%	28	1.2%
Not rated	15	3.6%	11	0.5%
Panel B: Exchange where the firm's equity is listed				
NYSE/AMEX	134	32.1%	1959	80.7%
OTC	66	15.8%	213	8.8%
Private firms	218	52.2%	257	10.6%
Panel C: Industry				
Agriculture, Forestry, Fishing, Mining, & Construction	38	9.1%	187	7.7%
Manufacturing	178	42.6%	852	35.1%
Transportation & Public Utilities	65	15.6%	806	33.2%
Wholesale & Retail Trade	55	13.2%	247	10.2%
Services	59	14.1%	297	12.2%
Others	23	5.5%	40	1.6%
Panel D: Maturity				
Long term	316	75.6%	1571	64.7%
Intermediate	102	24.4%	858	35.3%
Panel E: Offering Size				
Bond offerings over \$125 million	229	54.8%	1413	58.2%
Bond offerings of \$125 million or less	189	45.2%	1016	41.8%

## Table II: Initial Returns

Initial returns of bond IPOs on date  $t$  are adjusted for market returns using the date  $t$  Lehman Brother's index return, where the index is matched by maturity and rating.  $BR_{i,n}$  is the return for bond  $i$  over  $n$  days for IPO firms,  $INDX_{i,n}$  is the same day Lehman Brothers index return of the same rating and maturity. The initial (excess) return over  $n$  days ( $BR_{i,n}$ ) for firm  $i$  for its bond IPO is then:

$$MARK_{i,n} = BR_{i,n} - \sum_{j=1}^n (INDX_{i,t-n+j})$$

Mean-adjusted bond returns for the IPOs are calculated by using the average bond return during a 365-day interval that begins 7 days after the bond IPO date. Mean-adjusted bond returns are calculated using the method in Handjinicolaou and Kalay (equation (6), p.44). Let  $n$  be the number of days between reported bond trades. Abnormal bond returns ( $ABR_{i,n}$ ) observed over the 365-day interval are calculated as follows:

$$ABR_{i,n} = BR_{i,n} - TBR_{i,n}$$

where  $BR_{i,n}$  is the return for bond  $i$  over  $n$  days and  $TBR_{i,n}$  is the return over the same holding period for an equivalent maturity Treasury bond. The mean of the comparison period returns ( $R_{i,cp}$ ) for bond  $i$  is then the average of the abnormal (daily) returns reported in the 365-day comparison period:

$$R_{i,cp} = \frac{1}{K_{cp}} \sum \left( \frac{ABR_{i,n}}{n} \right)$$

where  $K$  is the number of recorded trades for bond  $i$  over the comparison period, and  $cp$  refers to the comparison period. The initial (excess) return over  $n$  days ( $BR_{i,n}$ ) for firm  $i$  for its bond IPO is then:

$$MER_{i,n} = ABR_{i,n} - n * R_{i,cp}$$

Panel A: Market-Adjusted Returns				Non-IPO Issues		
Order of Trade	IPO Issues			Number of Trades	Mean	t-statistic
	Number of Trades	Mean	t-statistic			
1st Trade	418	0.260***	6.611	2429	0.041***	3.633
2nd Trade	158	-0.168	-1.158	1064	-0.014	-0.814
3rd Trade	54	0.051	0.389	376	0.020	0.536
4th Trade	17	0.219	0.930	105	0.127	1.358

Panel B: Mean-Adjusted Returns				Non-IPO Issues		
Order of Trade	IPO Issues			Number of Trades	Mean	t-statistic
	Number of Trades	Mean	t-statistic			
1st Trade	418	0.259***	5.088	2429	0.032*	1.892
2nd Trade	158	-0.128	-1.504	1064	0.024	0.908
3rd Trade	54	0.307	0.985	376	0.007	0.168
4th Trade	17	0.134	0.605	105	0.157	1.531

**Table III: Initial Returns by Rating, Public/Private Status, Maturity and Offering Size  
(Market-Adjusted Returns)**

The analysis is based on market-adjusted returns. "Investment-Grade" bonds have ratings of BBB or higher while "High-Yield" bonds have ratings of BB or lower. "Private" means the bond issuer does not have public equity outstanding at the time of bond offering while "public" firms do. Intermediate bonds have a maturity of ten years or less, while long-term bonds have a maturity of more than ten years.

Panel A: By Rating						
Rating	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
High yield	323	0.361***	7.132	531	0.226***	6.095
Investment grade	95	-0.025	-0.735	1898	-0.012	-1.277
	418	0.260***	6.611	2429	0.041***	3.633

Panel B: By Public/Private Status						
Status at time of bond offering	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Public	200	0.163***	3.860	2172	0.024**	2.159
Private	218	0.369***	5.424	257	0.176***	3.497
	418	0.260***	6.611	2429	0.041***	3.633

Panel C: By Maturity						
Maturity	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Intermediate	102	0.374***	4.904	858	0.015	0.889
Long term	316	0.223***	4.883	1571	0.055***	3.749
	418	0.260***	6.611	2429	0.041***	3.633

Panel D: By Offering Size						
Amount raised in offering	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Greater than \$125 million	229	0.298***	5.425	1413	0.059***	3.867
Less than or equal to \$125 million	189	0.218***	3.882	1016	0.015	0.925
	418	0.260***	6.611	2429	0.041***	3.633

**Table IV: Initial Returns by Rating, Public/Private Status, Maturity and Offering Size  
(Mean-Adjusted Returns)**

The analysis is based on mean adjusted method (see Table II for details). "Investment-Grade" bond have ratings of BBB or higher while "High-Yield" bonds have ratings of BB or lower. "Private" means the bond issuer does not have public equity outstanding at the time of bond offering while "public" firms do. Intermediate bonds have a maturity of ten years or less, while long-term bonds have a maturity of more than ten years.

Panel A: By Rating						
Rating	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
High yield	323	0.353***	5.437	531	0.147***	2.802
Investment grade	95	-0.008	-0.134	1898	-0.001	-0.047
	418	0.259***	5.088	2429	0.032*	1.892

Panel B: By Public/Private Status						
Status at time of bond offering	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Public	200	0.078	1.362	2172	0.020	1.232
Private	218	0.464***	5.475	257	0.127	1.591
	418	0.259***	5.088	2429	0.032*	1.892

Panel C: By Maturity						
Maturity	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Intermediate	102	0.249***	2.947	858	0.022	0.923
Long term	316	0.262***	4.255	1571	0.038	1.651
	418	0.259***	5.088	2429	0.032*	1.892

Panel D: By Offering Size						
Amount raised in offering	IPO Issues			Non-IPO Issues		
	Number	Mean	t-Statistic	Number	Mean	t-Statistic
Greater than \$125 million	229	0.292***	4.557	1413	0.034	1.327
Less than or equal to \$125 million	189	0.222***	2.778	1016	0.030	1.511
	418	0.259***	5.088	2429	0.032*	1.892

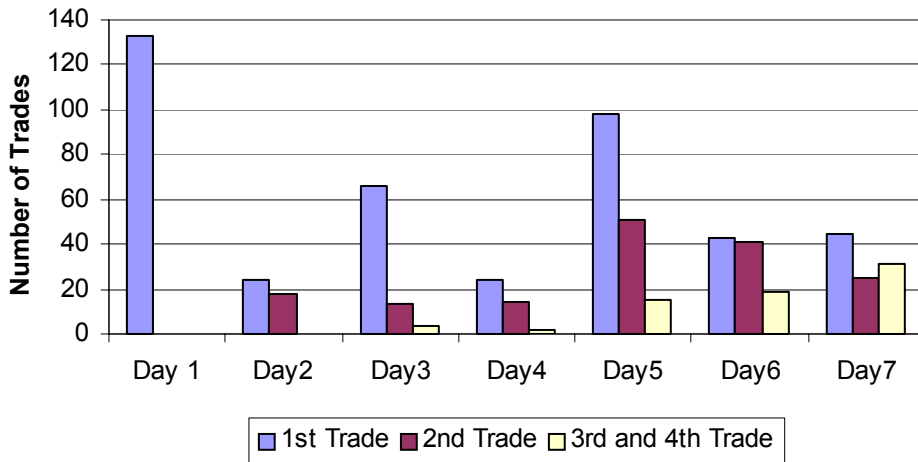
**Table V: Multivariate Analysis of Market-Adjusted Initial Returns**  
T-tests based on White heteroskedasticity corrected errors are reported below coefficients.

Variables	(1)	(2)	(3)	(4)	(5)
Constant	0.023**	-0.329**	-0.288**	-0.222*	-0.281*
	<b>2.108</b>	<b>-2.838</b>	<b>-2.480</b>	<b>-1.940</b>	<b>-1.807</b>
IPO	0.346***	0.168***			
	<b>7.746</b>	<b>3.017</b>			
Issued in last 2 years				-0.047**	-0.049**
				<b>-2.008</b>	<b>-2.054</b>
BB			0.013	0.010	0.012
			<b>0.233</b>	<b>0.171</b>	<b>0.206</b>
B1			0.340***	0.333***	0.337***
			<b>3.817</b>	<b>3.721</b>	<b>3.765</b>
B2			0.208***	0.201***	0.200***
			<b>3.200</b>	<b>3.058</b>	<b>3.037</b>
B3			0.329***	0.324***	0.322***
			<b>3.486</b>	<b>3.438</b>	<b>3.429</b>
CCC and below			0.103	0.095	0.097
			<b>0.878</b>	<b>0.816</b>	<b>0.829</b>
IPO*IG			-0.013	-0.043	-0.041
			<b>-0.244</b>	<b>-0.778</b>	<b>-0.731</b>
IPO*BB			0.306***	0.280**	0.282**
			<b>2.718</b>	<b>2.508</b>	<b>2.519</b>
IPO*B1			0.123	0.100	0.097
			<b>0.816</b>	<b>0.661</b>	<b>0.644</b>
IPO*B2			0.306**	0.283**	0.286**
			<b>2.298</b>	<b>2.131</b>	<b>2.147</b>
IPO*B3			-0.006	-0.031	-0.027
			<b>-0.040</b>	<b>-0.220</b>	<b>-0.188</b>
IPO*CCC and below			0.124	0.101	0.100
			<b>0.653</b>	<b>0.531</b>	<b>0.526</b>
Offering Size		0.033**	0.024**	0.021**	0.025**
		<b>3.377</b>	<b>2.356</b>	<b>2.105</b>	<b>1.982</b>
Private firm		0.021	-0.036	-0.043	-0.054
		<b>0.459</b>	<b>-0.777</b>	<b>-0.920</b>	<b>-1.065</b>
IPO*Private firm		0.242**	0.218**	0.225**	0.223**
		<b>2.514</b>	<b>2.233</b>	<b>2.299</b>	<b>2.283</b>
Maturity		-0.003	-0.012	-0.015	-0.014
		<b>-0.149</b>	<b>-0.524</b>	<b>-0.660</b>	<b>-0.604</b>
Years since equity IPO					0.022
					<b>0.775</b>
Length of time in the bond market		-0.565*	-0.065	-0.046	0.001
		<b>-1.866</b>	<b>-0.220</b>	<b>-0.154</b>	<b>0.002</b>
Time in the bond market squared		1.358*	0.576	0.559	0.470
		<b>1.751</b>	<b>0.754</b>	<b>0.732</b>	<b>0.613</b>
R <sup>2</sup>	0.041	0.052	0.084	0.085	0.085
Adjusted R <sup>2</sup>	0.041	0.050	0.079	0.079	0.079

**Table VI: Cross-Sectional Analysis of Mean-Adjusted Initial Returns**  
T-tests based on White heteroskedasticity corrected errors are reported below coefficients.

Variables	(1)	(2)	(3)	(4)	(5)
Constant	0.004	-0.199	-0.164	-0.137	-0.311
	<b>0.266</b>	<b>-1.384</b>	<b>-1.160</b>	<b>-0.943</b>	<b>-1.498</b>
IPO	0.419***	0.125			
	<b>6.314</b>	<b>1.537</b>			
Issued in last 2 years				-0.019	-0.025
				<b>-0.562</b>	<b>-0.749</b>
BB			-0.035	-0.037	-0.031
			<b>-0.426</b>	<b>-0.441</b>	<b>-0.372</b>
B1			0.384***	0.381***	0.393***
			<b>3.149</b>	<b>3.128</b>	<b>3.241</b>
B2			0.046	0.043	0.038
			<b>0.479</b>	<b>0.446</b>	<b>0.400</b>
B3			0.187	0.185	0.180
			<b>1.559</b>	<b>1.546</b>	<b>1.507</b>
CCC and below			-0.127	-0.130	-0.126
			<b>-0.631</b>	<b>-0.648</b>	<b>-0.625</b>
IPO*IG			0.059	0.047	0.055
			<b>0.442</b>	<b>0.349</b>	<b>0.404</b>
IPO*BB			0.493**	0.483**	0.487**
			<b>2.467</b>	<b>2.436</b>	<b>2.473</b>
IPO*B1			-0.234	-0.243	-0.251
			<b>-1.161</b>	<b>-1.209</b>	<b>-1.250</b>
IPO*B2			0.309	0.300	0.309
			<b>1.556</b>	<b>1.520</b>	<b>1.564</b>
IPO*B3			-0.149	-0.159	-0.146
			<b>-0.721</b>	<b>-0.768</b>	<b>-0.707</b>
IPO*CCC and below			0.210	0.200	0.197
			<b>0.724</b>	<b>0.688</b>	<b>0.680</b>
Offering Size		0.020	0.014	0.013	0.025
		<b>1.564</b>	<b>1.153</b>	<b>1.047</b>	<b>1.501</b>
Private firm		-0.092	-0.121**	-0.123**	-0.157**
		<b>-1.539</b>	<b>-2.036</b>	<b>-2.105</b>	<b>-2.453</b>
IPO*Private firm		0.601***	0.646***	0.649***	0.645***
		<b>4.333</b>	<b>3.698</b>	<b>3.721</b>	<b>3.708</b>
Maturity		-0.001	-0.012	-0.013	-0.010
		<b>-0.031</b>	<b>-0.381</b>	<b>-0.420</b>	<b>-0.303</b>
Years since equity IPO					0.064
					<b>1.558</b>
Length of time in the bond market		-0.316	-0.118	-0.111	0.027
		<b>-0.771</b>	<b>-0.289</b>	<b>-0.268</b>	<b>0.066</b>
Time in the bond market squared		0.896	0.645	0.638	0.377
		<b>0.899</b>	<b>0.646</b>	<b>0.637</b>	<b>0.385</b>
R <sup>2</sup>	0.029	0.042	0.054	0.054	0.054
Adjusted R <sup>2</sup>	0.028	0.040	0.048	0.048	0.048

**Figure 1a. Trade Frequency For IPO Bonds**



**Figure 1b. Trade Frequency For New Issues Offered By Seasoned Issuers**

