Insider Trading and Conflicts of Interest: Evidence from Corporate Bonds

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ABSTRACT

This paper examines the prevalence of insider trading in the corporate debt market prior to takeover announcements, and the related conflicts of interest within financial intermediaries. We document significant pre-announcement trading activities and price movements in target bonds, in directions consistent with the nature of pending information. Unlike target stocks, target bonds do not always gain in an acquisition. Target bonds rated higher than the acquirer's stand to lose whereas those rated lower stand to gain. Since selling (buying) target bonds that stand to lose (gain) prior to the public announcement requires information about acquirer characteristics, our evidence cannot be attributed to market anticipation, but is consistent with insider trading. Further, bond dealers affiliated with advisory investment banks sell in anticipation of negative news on bonds, pointing to a possible channel of information leakage. Such negative news seems to be incorporated into bond prices no slower than into the target stocks. Finally, recent improvements in bond market transparency appear to deter insider trading in bonds.

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In a recent keynote address, Linda Thomsen, director of the SEC enforcement division, announced the establishment of the Hedge Fund Working Group for the purpose of addressing "securities law violations by hedge funds, with particular attention to the issue of insider trading…."[2] This was motivated by the recent unusual spikes in stock trading prior to corporate mergers and acquisitions. While such attention to insider trading in the stock markets reflects the regulators' continuing scrutiny of potential abuse of material nonpublic information, it also raises questions and accompanying concerns about the relatively scant surveillance of the workings of the corporate bond market, given its importance in corporate financing.[3] In particular, does insider trading ever occur in the corporate bond market? If so, what are the potential channels for information leakage prior to its public release? Further, how do informed traders time and distribute their trading activities across the issuer's stock and bonds given the nature of new information? And finally, has the market transparency brought by recent implementation of the Trade Reporting and Compliance Engine (TRACE) helped deter insider trading in bonds?

In this paper, we try to address these questions by examining trading activities in the corporate bond market prior to merger and acquisition (M&A) announcements. Corporate bonds provide a more effective tool than traditional stock prices for examining the potential leakage of information prior to its public releases. As target shareholders always gain in a merger, a run-up in stock prices prior to the announcement of the takeover can either be attributed to the leakage of information, or market anticipation. It

[2] Regulatory Keynote Address at the Second Annual Capital Markets Summit at the U.S. Chamber of Commerce on March 26, 2008.
[3] Edwards, Harris and Piwowar (2007) find that the aggregate value of corporate bonds is roughly equal to that of stocks in the U.S.

is difficult to distinguish between these two possibilities by studying prices and trading volume of the target equity. Target bond holders, by contrast, do not always benefit in a takeover. In fact, target bondholders only benefit when their bonds carry greater risk than those of the acquiring company, and will lose out otherwise. Therefore, profitable trading strategies, i.e., selling target bonds that stand to lose or buying target bonds that stand to gain prior to the public announcement, require information about acquirer characteristics, and this cannot be attributed simply to market anticipation of a takeover. Further, the bond market also facilitates an examination of potential channels of information leakage by making it possible to identify the dealers involved in a bond trade. Such information allows us to examine whether affiliation of the bond dealers with target/acquirer advisory investment banks, who are privy to the takeover details, is a potential source of informed trading.

Despite extensive study on insider trading in equity and derivative markets, there has been no systematic work on potential insider trading in the corporate bond market. Even though bond investors face lower overall liquidity than investors in other securities, the lack of regulatory oversight and the relative opacity of the bond market may render it a preferred venue for informed trading.[4] Using all completed merger and acquisition deals from 1994 to 2006 where both the target and acquirer have bonds that are included on the Mergent Fixed Income Securities Database (FISD), we find that relative to a

[4] Rule 10b-5 prohibits "any" fraudulent or deceptive scheme "in connection with the purchase and sale of any security by any individual with fiduciary duty to a firm's shareholders." However, the legal rule of liability with respect to corporate bonds has never been as broad as the literal language of Rule 10b-5 partially due to ambiguous nature of "fiduciary" duty owed to bondholders. On the other hand, Rule 14e-3 appears to clearly bar insider trading in corporate bonds during the takeover process. The lack of reporting on bond trades and the resulting market opacity makes it extremely difficult to detect any violation of the insider trading law in the corporate bond market. Lower regulatory oversight in bonds is also evidenced by the fact that insiders do not have to report their transactions in straight bonds to the SEC under Section 16(a) of the Securities Exchange Act of 1934.

control group, target bonds are significantly more likely to be traded in the three month period prior to announcement (See Figure 1A). Accompanying this higher volume, abnormal target bond returns in the three month pre-announcement period are highly related to the degree of risk of target bonds relative to that of the acquirer bonds. In other words, pre-announcement abnormal bond returns are positive when the target bond stands to gain and negative when the target bond stands to lose (Figure 1B). The fact that the pre-announcement bond returns are significantly related to acquirer characteristics suggests the role of information rather than anticipation of the acquisition.

Of great interest are the potential channels for such information leakage prior to its public release. The National Association of Insurance Commissioners (NAIC) bond transaction data used in this study provides information identifying the broker/dealer and the direction of their transactions. For each trade, we identify the bond dealer as potentially informed if they are affiliated with one of the M&A advisors. We find that active trading by affiliated dealers is associated with larger pre-announcement returns. Further, when bond dealers are affiliated with one of the target advisors they tend to sell more of the bonds that stand to lose. These results suggest that information flows between groups within investment banks.

If such informed trading does occur in the corporate bond market, how is it related to the trading activities in the issuer's equity? We find that the timing of informed trading between these two markets seems to be determined by the nature of the information. When target bonds stand to gain from the acquisition, target stock experiences positive returns before significant bond trading occurs. However, when target bonds stand to lose from the acquisition, the direction of information flow is

reversed: information is first incorporated in the bond market, followed by a substantial positive return in the stock market. Therefore, bond markets appear to be the first choice of informed traders when the acquisition has negative influence on the bond value. This evidence of informed trading, together with the bond market's great appeal for informed trading in certain scenarios, suggests the need to increase transparency and surveillance in these markets.

To explore the potential effect of improved transparency in the bond market, we directly examine whether the recent implementation of the TRACE system helped deter informed trading in bonds. Centralized reporting and immediate dissemination on bond transaction information should facilitate effective monitoring of the market and result in a lower incidence of insider trading. In fact, we find that targets which have at least one bond included in the TRACE system at the time of merger announcement experience less pre-announcement price movement, and there is less evidence of the affiliated bond dealer's informed trading prior to the public announcement. Our findings suggest an important role of transparency in limiting informed trading.

The rest of the paper is organized as follows. Section I discusses related literature while section II presents information on the sample data and methodology used in this study. We examine pre-announcement abnormal bond returns in section III. Section IV explores the potential channels of information leakage. Section V discusses the impact of market transparency, and section VI focuses on the flow of information across stock and bond markets. Section VII concludes.

I. Related Literature

Our study relates to several strands of literature. First, it is linked to the literature on insider trading and its influences on market prices. Several studies find evidence of abnormal volume and price increases during periods of known insider trading (see Cornell and Sirri (1992), Meulbroek (1992), Meulbroek and Hart (1997), Chakravarty and McConnell (1997, 1999), Fishe and Robe (2004)). However, if it is not known when insider trading occurs, it is difficult to conclude its prevalence from a study of stock price and volume in the period prior to announcement. Indeed, by examining trading in target firms prior to M&A announcements, other studies (Jarrell and Poulsen (1989), King and Padalko (2005), Gao and Oler (2008)) conclude that the observed abnormal trading activities and the resulting price run-ups are consistent with market anticipation of a takeover announcement, and hence cannot be used as evidence of insider trading.

We differentiate between insider trading and market anticipation by examining pre-announcement activity in the corporate bond market. Unlike equity, target bonds do not always gain in an acquisition. Early theoretical work suggests that target bondholders could lose if the target's credit worthiness exceeds that of the acquirer. On the other hand, target bondholders could gain if the coinsurance effect of combining the two imperfectly correlated cash flows result in a reduction in default risk (see Levy and Sarnat (1970), Lewllen (1971), Higgins and Schall (1975), Galai and Masulis (1976), Shastri (1990)). Though earlier empirical studies failed to find significant abnormal bond returns prior to M&A announcements (see Kim and McConnell (1977), Asquith and Kim (1982), Eger (1983), Dennis and McConnel (1986), and Maquieira, Megginson, and Nail (1998)), Billett, King and Mauer (2004) (BKM thereafter) use relatively new data and find

significant support for the theoretical predictions. In particular, they find that target bonds rated below the acquirer's earn significant positive returns while those rated no lower than the acquirer's experience significant negative returns. As target bond returns are determined by acquirer characteristics, any evidence of pre-announcement trading in a direction consistent with acquirer characteristics suggests a possible leakage of information, rather than market anticipation.

Second, this paper fits into the literature on the conflicts of interest within financial intermediaries. Acharya and Johnson (2007, 2008) and Ivashina and Sun (2007) document evidence that banks potentially use information from lending relationships to trade credit default swaps and equity. Ritter and Zhang (2007) find that lead underwriters allocate hot IPOs to affiliated funds. Ellis, Michaely, and O'Hara (2000) show that NASDAQ market makers support the post-IPO stock price of firms underwritten by affiliated investment banks. Our paper is also related to and complements Bodnaruk, Massa and Simonov (2007), who find that equity investment desks affiliated with acquirer investment banks increase their investment in target equities prior to takeover announcements. Though they conduct robustness tests to control for potential anticipation of the takeover, our use of corporate bonds allows us to better rule out this possibility. Moreover, the exact timing of bond trades and dealer identification information contained in the NAIC database allows us to examine trading activities close to the announcement of the takeover, rather than be restricted to examining equity positions at the end of calendar quarters. Further, changes in bond regulation over this time period allow us to shed some light on potential approaches to control insider trading. Along with Bodnaruk, Massa and Simonov (2007), our findings of abnormal trading

behavior by dealers who are affiliated with M&A advisors, but not by those without, provide significant insights into the potential channels of information leakage in these corporate events, and the resulting conflicts of interest within financial intermediaries.

Third, our study is also related to several recent papers that examine the influence of market transparency brought by the implementation of the TRACE system.[5] TRACE-induced transparency has been shown to reduce transaction costs in bonds (Edwards, Harris and Piwowar (2007)), lower spreads for large trades in a sample of BBB bonds (Goldstein, Hotchkiss and Sirri (2007)), cut transaction costs by 50% for TRACE-eligible bonds and by 20% for non-eligible ones (Bessembinder, Maxwell and Venkataraman (2006)) and decrease volatility and reaction time to news (Ronen and Zhou (2008)). However, Bessembinder and Maxwell (2008) find that improved transparency in bond markets may shift trading towards other securities such as syndicated bank loans and credit default swaps (CDS), as it discourages dealers from carrying inventory and sharing their research. Our paper compares the pre-announcement abnormal returns for bonds by firms with TRACE coverage versus those without to study whether increased bond transparency impacts the incidence of insider trading.

Finally, the question of 'where does information-based trading occur first' has been receiving much attention in the literature recently. While earlier studies have relied on the Vector Auto-regression (VAR) models to determine the lead-lag relationships between stock and bond returns, Ronen and Zhou (2008) question this approach in capturing the dynamics of information revelation. In fact, by studying bond trade and price reactions to earnings announcements, they find that bond markets serve as an

[5] The TRACE system began in July 1, 2002 and requires all its members to report corporate bond market transactions within 75 minutes (now 15 minutes). Dissemination of trade information was gradually phased in, and since February 7, 2005, all corporate bonds are subject to immediate dissemination.

important venue for informed trading, especially when equity liquidity is low. Datta and Iskandar-Datta (1993) find significant bond price response to the Wall Street Journal's Insider Trading Spotlight publication of insiders' stock trading. Acharya and Johnson (2008) find that equity related news appears to be incorporated in the stock and options markets first, while credit news is initially traded in the debt and CDS markets. By studying the stock price reaction prior to and around potentially informed bond trades, our paper highlights the importance of the nature of information in the determination of where informed traders trade.

II. Data, Methodology and Summary Statistics

A. Sample

Our sample consists of all completed M&As from 1994 through 2006.[6] Of the 3,406 deals for which we were able to retrieve deal information from SDC and firm characteristics from Compustat, 642 involve a target and an acquirer which have bond characteristic information from the FISD database. These 642 target firms had a total of 2,344 bonds outstanding during the merger or acquisition period.[7] Since credit rating changes tend to be accompanied by abnormal volume and price changes, we excluded bonds which experienced any rating changes in three-month pre-announcement period. The final sample consists of 1,611 bonds issued by 442 unique target firms.

[6] The sample included transactions that involved full acquisitions or acquisition of majority interest, and where both the target and acquirer were public firms. This resulted in 4,168 deals, which was further reduced to 3,406 after ensuring that both target and acquirer were covered in CRSP and Compustat.

[7] We remove 13 bonds due to missing value of coupons, 66 bonds due to missing day count basis, 79 bonds with floating coupon rates, 21 bonds with non semi-annual coupon payments, and 67 bonds with missing information on first coupon date. Bonds that are in default and bonds that are callable following the merger have also been removed. Finally, we exclude bonds that have change in control provisions and a bond price that is below par. As most of change in control provisions specify that bonds are putable at par, these provisions are not meaningful if bonds are trading above par.

We obtained tick-by-tick trade information for this sample of bonds from the FISD's NAIC bond transactions file. This data file includes all purchases and sales of public fixed income securities by insurance companies who are required to report all their bond trades to NAIC[8]. We then applied the reversal filter from Edwards, Harris and Piwowar (2007) to exclude trades with suspicious data pricing errors. Equity data for the target firms were retrieved from CRSP.

B. Trading Frequency and Volume

As discussed above, several studies find significant increases in equity volume during episodes of insider trading. The possible leakage of information in the corporate bond market prior to its public announcement should also be marked by abnormally high trading activities. We begin by examining the propensity of target bonds to be traded in the three-month pre-announcement period. We first calculate the total number of trades and turnover for each bond within this period.[9] We then benchmark these two measures to those of a control group of bonds, which consists of all other bonds (not subject to any takeover) that had a similar credit rating and time to maturity as the target bond over the same period.[10] On average, the control-adjusted number of trades and turnovers are 1.357 trades and 1.2% respectively, and are both significant (Table 1). In summary, target bonds have a significantly higher frequency and volume of trading in the three months prior to announcement.

[8] The NAIC data have also been analyzed in a number of papers such as Schultz (2001), Campbell and Taksler (2003), Krishnan, Ritchken, Thomson (2004), Bessembinder, Maxwell and Venkataraman (2006), and Cai, Helwege and Warga (2007).

[9] Turnover is calculated by dividing the aggregate three month trading volume by the bond's issue size.

[10] We consider two bonds with maturities within one year of each other to have similar time to maturity. Further, all bonds in the control group should have no credit rating changes during this three month period. If a target bond did not have at least 5 control bonds, we excluded it from this analysis.

To examine if this higher trade volume observed at the bond level is also seen at the firm level, we calculate the weighted average trading frequency and turnover across all bonds by a single firm, with the weights being the bond issue size. Consistent with the bond level results, there exist significant evidence of high trading frequency and volume at the firm level prior to the public release of corporate takeovers.

C. Abnormal Bond Returns

For each of our sample bonds, we also calculate the abnormal bond returns in a way similar to that of Cai, Helwege and Warga (2007) and Bessembinder, Kahle, Maxwell and Xu (2008). Since bond trades of different sizes tend to occur at very different prices, we calculate daily volume weighted average price to get a better estimate of the value of the bond at date *t*. Bessembinder, Kahle, Maxwell and Xu (2008) also favor weighting individual bond trades by size, rather than using the last trade of the day.[11] We then add the accrued interest to get the full bond price for date *t*. The actual bond return is calculated as the percentage change in the full price across two trading days, where both trading days are within the three months period prior to the announcement of the acquisition. 299 bonds issued by 118 firms meet this criterion and comprise the sample for the remainder of our study.

Table 2 provides descriptive information on our sample bonds and their issuing firms. The average market value of the equity of our sample target firms is 9.03 billion, with an average financial leverage of 0.32. While these target firms on average have about 8 bonds outstanding, less than 3 of them are traded during the three-month pre-

[11] Bessembinder, Kahle, Maxwell and Xu (2008) also suggest excluding non-institutional trades (defined as trades under $100,000) in calculating the weighted average daily prices. As our sample consists only of bond trades by insurance companies, we do not eliminate trades less than $100,000 from our sample.

announcement period. Further, these 299 sample bonds on average have about 9 years till maturity and are rated between BBB and A by Standard & Poor during the sample period, with almost 75% of our sample target bonds rated either BBB or A (panel B). We also calculated the difference between a target bond's rating and the average rating of the acquirer bonds (weighted by issue size). Target bonds are rated slightly lower than the acquirer bonds, with an average difference of 0.27 in the credit rating differences.

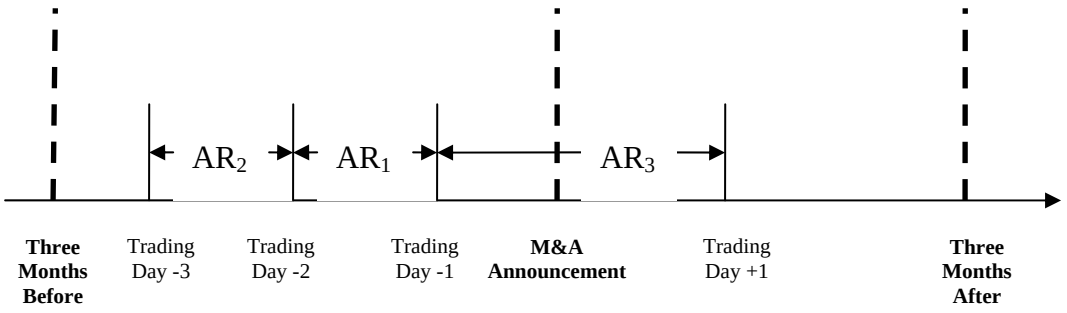
We estimate abnormal bond returns by subtracting the market returns, proxied by the returns in the Lehman Brothers Corporate Indices for bonds with similar credit ratings and maturity from raw returns.[12] Since trading on inside information is more likely to occur in the days immediately prior to the announcement of the merger, we examine the abnormal bond returns over the last two days when trading occurred prior to the announcement, which we refer to as the last abnormal return. We also examine the cumulative abnormal returns (CAR) over the three month period by accumulating abnormal returns over all bond transactions in this period. As illustrated in Figure 2, the last abnormal return and the three month CAR can be represented as AR_1 and (AR_1+AR_2) respectively.

The abnormal returns around takeover announcements are also calculated using two trading days, where the first trading day is the last day the bond is traded prior to announcement, and the second trading day is the first day the bond is traded after the announcement. To calculate this cross announcement return, we require the second day to be within three months of the acquisition announcement, which is available for only

[12] We classified a bond into intermediate (long-term) if its time to maturity is less (no less) than 10 years followings Lehman Brothers rules in constructing their indices for bonds with different maturities.

256 out of the total 299 sample bonds. In Figure 2, the cross announcement abnormal return is represented by AR3.

Figure 2
Timing of Bond Trades around M&A Announcement



Consistent with BKM, we find that target bonds on average earn abnormal returns of 1.1% across announcements, which is significant at 1% level (Table 3). Mean pre-announcement returns, measured by both last abnormal return and CAR are positive and significant. A similar pattern emerges when bond returns are aggregated at the firm level (Panel B of Table 3).

As discussed in section I, target bonds could gain or lose depending on its credit rating relative to that of the acquirer bonds. Target bonds are classified as losing (gaining) bonds if they stand to lose (gain) in the acquisition, i.e., if their rating is better (worse) than the highest (lowest) rated acquirer bond.[13] All remaining bonds are in the other

[13] We assign a numeric value to each credit rating from Standard and Poor, with 1, 2, …, 11 denoting AAA, AA, …, NR respectively. As better rated bonds have smaller ratings, losing bonds would have a value that is smaller than the lowest rated acquirer bond.

category. Note that this is a conservative classification, with bonds being classified as gaining or losing only if they are going to benefit or lose unambiguously.

As expected, the bonds in the losing category have negative pre-bond returns though these are not significant. The across announcement return for the losing bonds is negative though again not significant. The last returns are positive for bonds that stand to gain and those that belong to the intermediate category. Not surprisingly, the difference between gaining and losing bonds is significant.

III. Evidence of Insider Trading: Target Bond Prices and Acquirer Characteristics

A. Abnormal Pre-announcement Bond Returns

In this section, we do multivariate analysis to explore the informational content of pre-announcement abnormal bond returns. Instead of examining the two extreme groups of gaining/losing bonds, in this section we create a continuous variable to capture the potential gain/loss of the target bond. We first estimate the acquirer's average credit rating across all its bonds, which is the weighted average rating with the weights being issue size.[14] The difference between an individual target bond rating and the acquirer's average bond rating, referred to as CreditDiff, captures the potential gain for the target. The larger this CreditDiff the lower the target bond rating relative to the average acquirer rating, and the more the target bond is expected to gain. This is so because lower rated bonds have higher numerical values. In particular, if the CreditDiff is negative it signifies that the target bonds are likely to lose from the acquisition. If informed trading exists in the bond market prior to the announcement, then CreditDiff should be positively related to pre-announcement abnormal returns.

[14] As some of a firm's bonds are not traded in the same period, we use each bond's issue size (instead of its market value as in BKM) as the weight to calculate the average credit rating for the acquirer.

Our tests control for bond credit ratings and maturities as the abnormal bond returns are estimated by subtracting the same period return in the Lehman Index matched on credit rating and maturity. In addition, we control for potential bond liquidity effects by including the age and issue size of the bond. Finally, we control for firm specific characteristics, such as market value of the issuer, financial leverage (the ratio of total debt to total assets) and profit margin (net income to sales ratio) from the last fiscal year prior to the acquisition announcement. The base specification, whose results are reported in Table 4, is as follows:

$$ABR_i = \alpha + \beta_{CreditDiff} * CreditDiff_i + \beta_{Issue\ Size} * IssueSize + \beta_{age} * Age + \beta_{size} * IssuerSize + \beta_{leverage} * FinLev + \beta_{PM} * PM \quad (1)$$

where ABR_i denotes the ith target bond's last abnormal return, and other variables are as discussed above. Note that if the variable of interest, CreditDiff has a positive coefficient, it implies that there is a price run-up (decline) in target bonds which is associated with positive (negative) information on bonds.

As seen in the Table 4, the coefficient of CreditDiff is positive and significant at 1% level. The results are robust to controlling for target bond and firm characteristics. A significant positive coefficient on CreditDiff implies that target bonds that have a better (worse) rating than the acquirer have significant negative (positive) abnormal returns. The coefficient on CreditDiff of 0.357 implies that almost 25% of the total gain arising from the acquisition of target bonds, rated one category lower than the acquirer bonds, are realized prior to the public announcement.[15]

[15] Since the average last return is 0.348 and the average return across M&A is 1.102, the overall average return from the M&A is 1.45%. The return of 0.357 for one credit rating difference is about 25% of the total return.

As Acharya and Johnson (2008) find that credit default swaps are more sensitive to negative news, we examine if there is a similar effect for the bonds that stand to lose. To capture this effect we introduce a loss dummy that takes the value of one if the target bond is rated better than the highest rated bond of the acquirer. As shown in Panel IV of Table 4, the coefficient of Loss Dummy is negative though not significant. The lower abnormal return for the losing bonds appears to be mostly captured by CreditDiff.

B. Robustness Check

In this section we examine the sensitivity of our results to 1) analysis conducted at the aggregate firm level, 2) alternate ways to estimate the potential for gain or loss of target bonds, 3) using a six month period prior to announcement for our analysis, 4) an alternate proxy for pre-announcement returns, and 5) extending the sample to also include private acquirers and Leveraged Buyout transactions (LBOs).

While the focus of our analysis in on the bond level, we also conduct our analysis at the firm level to address concerns of possible correlation among bonds issued by the firm and overweighing firms with multiple bond issues (see Bessembinder, Kahle, Maxwell and Xu (2008)). A firm's abnormal bond return is estimated by averaging the last abnormal return across bond issues by the same firm weighted by its issue size. CreditDiff is then redefined as the difference between the weighted average rating of target bonds and that of the acquirer bonds. Panel A of table 5 shows that CreditDiff continues to be positive and significant, with its economic magnitude somewhat higher than that estimated at the bond level.

To examine if our results are sensitive to our methodology of estimating CreditDiff, we estimate our model using two alternative measures. First, we use acquirer

median bond rating rather than its mean bond rating to calculate CreditDiff. This ensures that the acquirer ratings are not influenced by a few bond issues with extreme ratings. As seen in Panel B, this does not materially change our results. Second, we use finer credit ratings from Standard and Poor's to estimate the CreditDiff variable. Consider for example a target bond with a rating of A+ while the acquirer rating is A-. Our new measure, based on finer bond ratings, will capture this difference even though their broad credit ratings are the same. The coefficient of the new Creditdiff continues to be highly significant as seen in Panel C. The estimated coefficient is smaller, which is not surprising as this measure captures smaller changes in credit differences.

Next, we increased the window of investigation from three months to six months by including those target bonds that were traded at least two days in the six month period, with the last trade occurring within three months before the public announcement. This has the advantage of increasing our sample from 299 bonds to 377 bonds, though potentially adding noise to our estimation. Our results are robust: the coefficient of CreditDiff remains positive and highly significant (see Panel D).

As an alternative to the last abnormal return we also use three month cumulative abnormal bond returns. The results, as provided in Panel E, again are qualitatively similar. Lastly, we expand our sample to also include M&A transactions where the acquirer is a private firm or where the acquirer bonds were not covered in FISD. Note that this sample includes Leverage buyouts (LBO) transactions. As acquirers in these transactions do not have bond ratings, we are unable to estimate our Creditdiff variable to capture the extent of expected gain or loss for target bonds. Therefore, we use actual bond rating changes within three months of the M&A to create a pseudo CreditDiff

variable. This Psuedo CreditDiff can be created for all target bonds irrespective of whether the acquirer bonds are covered under FISD. For example, consider a BBB target bond that is acquired by a private acquirer and subsequent to the merger the bond was downgraded to B. In this case, the Psuedo CreditDiff takes the value -2.

Though Pseudo CreditDiff is a noisy measure of the expected gain or loss for the target bonds, it expands our sample of bonds to 362. As this measure is based on actual bond rating changes, it takes into account change in control provisions that were not explicitly mentioned (and hence not taken into account in our ex ante measure) but nevertheless impacts pre-announcement returns. As shown in Panel F, we continue to find significant pre-announcement bond returns. Bonds that experience a downgrade (upgrade) after the merger have significant negative (positive) returns prior to the merger announcement.

IV. Information Leakage: What is the Potential Channel?

If trading on nonpublic information about pending corporate takeovers does occur in the corporate bond market, what is the source of this information? Several recent studies point to a promising direction. In particular, Acharya and Johnson (2007) find that the number of financing participants in private equity buyouts is related to the likelihood of insider trading prior to the bid announcement. Bodnaruk, Massa and Simonov (2007) show that advisory banks take positions in the target's equity before the announcement of the M&A deal. If information flows within financial institutions as suggested by the papers above, it is possible that bond dealers who are affiliated with the investment advisors in the acquisition are informed about the transaction prior to its announcement.

We retrieved a list of advisory investment banks for each M&A deal from SDC, and hand matched it with bond dealers to generate a variable on the affiliation between bond dealers and investment banks. In creating this affiliation variable, we took into account various mergers between investment banks during this time period. For example, Travelers acquired Smith Barney in 1988 and was acquired by Citigroup in 1997. In 1998, if Citigroup was an investment advisor in an acquisition deal and the bond dealer was Smith Barney, they were classified as being affiliated.

We examine the potential impact of informed affiliated dealers by examining whether 1) active trading by affiliated dealers is associated with larger pre-announcement returns, and 2) affiliated dealers' net trading volume is in line with the bond's expected M&A return. In other words, are affiliated dealers net sellers of the bonds that are going to lose value in the M&A transactions?

To examine whether the presence of affiliated dealers makes the pre-announcement bond price more informative, we create a dummy variable, AF dummy, to capture whether the affiliated dealer traded in the last day of trading prior to the announcement of the acquisition. Abnormal last returns should move more in response to CreditDiff when affiliated dealers trade, i.e., when AF dummy is 1. As shown in Panel A of Table 6, the coefficient of CreditDiff is higher when affiliated dealers are present than when they are not present, though the statistic significance is low (p value = 0.115).

Second, we classify bond transactions into two categories based on whether the corresponding bond dealer is affiliated with the advisors in the M&A deal, and calculate the aggregate net selling by bond dealers for each category. We then estimate the following model:

$$NetSell_i = \alpha + \beta_{CreditDiff} * CreditDiff_i + \beta_{LoseDum} * LoseDummy + \beta_{Issue\ Size} * Issue\ Size + \beta_{age} * Age + \beta_{size} * IssuerSize + \beta_{leverage} * FinLev + \beta_{PM} * PM \quad (2)$$

where $NetSell_i$ denotes net selling by affiliated and non-affiliated bond dealers for bond *i*, and the explanatory variables are the same as those included in model (1).

The results from the estimation of model (2) are displayed in Panel B of Table 6. We find that the coefficient for the Loss Dummy is positive and significant, suggesting that affiliated bond dealers sell aggressively (and hence reduce their inventories) in bonds which are going to lose value in the subsequent M&A announcement. We find no evidence that that non-affiliated dealers are informed (Panel C). This finding implies that affiliated dealers exploit information in the bond market, especially in anticipation of negative news.

V. Market Transparency and Informed Trading

The documented empirical evidence of insider trading confirms regulators' concern of possible violation of security laws in the corporate debt markets, and validates efforts in improving its transparency. Arthur Levitt, former SEC chairman, stated that the SEC has "found anecdotal evidence of the possible misuse of inside information in the high-yield (debt) market."[16] Such concerns resulting from the opacity of the market started to be addressed by the implementation of the FIPS and the later TRACE systems.

Several studies in the equity literature have examined the effect of transparency on market quality, resulting in contradictory conclusions. Taking advantage of recent available bond transaction data from TRACE, a few papers study the impact of price dissemination through the TRACE system on corporate bond liquidity and transaction

[16] See speech by SEC Chairman Arthur Levitt: "The Importance of Transparency in America's Debt Market", at the Media Studies Center, New York, N.Y., on September 9th, 1998.

costs. Using the same NAIC bond transaction data as in our study, Bessembinder, Maxwell and Venkataraman (2006) find trade execution costs for institutional investors dramatically drop following the initiation of public reporting through the TRACE system. Consistent transparency effects from TRACE data are documented in Edwards, Harris and Piwowar (2007) and Goldstein, Hotchkiss and Sirri (2007).

In this section, we examine whether improved transparency in the corporate bond market discourages insider trading. We first classify target firms into pre- and post-TRACE targets based on whether the target firm has bonds subject to TRACE dissemination at the time of M&A announcements. We then estimate the following model to address whether pre-announcement price changes and net selling by target affiliated dealers exhibit different patterns during these two periods:

$$ABR_i(NetSell_i) = \alpha + \beta_{CreditDiff}^{preTrace} * preTRACE * CreditDiff_i + \beta_{CreditDiff}^{postTrace} * postTRACE * CreditDiff_i$$
$$+ \beta_{LoseDum}^{preTRACE} preTRACE * LoseDummy + \beta_{LoseDum}^{postTRACE} postTRACE * LoseDummy$$
$$+ \beta_{Issue\ Size} * Issue\ Size + \beta_{age} * Age + \beta_{size} * IssuerSize + \beta_{leverage} * FinLev + \beta_{PM} * PM$$

where the independent variable is either abnormal bond returns or the net selling by affiliated bond dealers, and preTRACE (postTRACE) is a dummy variable which takes a value of 1 if the issuing firm is in its pre-TRACE (post-TRACE) period at the time of merger announcement. Other variables are defined as in Models (1) and (2).

Panel A of Table 7 shows that the coefficient for the term preTRACE*CreditDiff is 0.389, significant at 1% level, while the coefficient for postTRACE*CreditDiff is 0.07 and not significant. This finding suggests that there is very little evidence of insider trading after the implementation of the TRACE system. As insider trading by affiliated dealers is more likely to be detected, we examine if TRACE has a larger effect on insider trading by affiliated dealers. As seen in Panel B, the impact of CreditDiff on last bond

returns drops from 0.474 in the pre-TRACE period to -0.036 in the post-TRACE period for affiliated dealers and this drop in insider trading is significant at the 10% level. In contrast, the coefficient of CreditDiff drops from 0.354 in the pre-TRACE period to 0.153 in the post-TRACE period for the non-affiliated dealers with the difference not being statistically significant. As expected, increased disclosure through TRACE has a stronger impact of curbing insider trading by affiliated dealers.

Further support for the effect of TRACE on insider trading by affiliated dealers is provided when we study its effect on net selling by affiliated advisors. As seen in Panel C, there is significant evidence that pre-announcement selling of bonds that stand to lose by affiliated dealers occurs only in the period prior to the TRACE implementation. Evidence that insider trading is lower in the post-TRACE period is consistent with the notion that greater transparency reduces the opportunities for taking advantage of uninformed traders.

VI. Where do Informed Traders Trade first?

In this section, we examine trading in the target bond market in conjunction with that in the target's stock to explore where informed traders trade. As the timing of the bond trades is known, we can examine abnormal target stock price movements around bond trading. If informed traders primarily trade in target stock, then the abnormal stock returns should precede bond trades. Further, there should be little impact of bond trading on subsequent abnormal stock returns.

We examine the stock price reaction to the last bond trade for each firm. This is consistent with the prior return results as the price of the bond on the last bond trading day is used to calculate the last abnormal return for the bond. As the abnormal stock

returns are estimated for the firm, we classify the last bond trading day for the whole firm as the last day of trading across all its traded bonds. For our sample of 118 targets with traded bonds in the three months prior to announcement, the average last bond trading day is about 12 days prior to the announcement of the acquisition, with the median being 8 days prior. As seen in Table 8, we find that the mean cumulative abnormal stock return (CAR) from days -5 to -2 where 0 is the last bond trading day is a significant 0.8%. The CAR over the three day period, -1 to 1 around the last bond trading day is a significant 2.04% where the difference between the two is not statistically significant. As the CAR prior to bond trading is significant, and there is no significant change around bond trading, this suggests that information first gets incorporated in the stock markets with there being little additional impact of bond trades.

However, as documented by Acharya and Johnson (2007) the credit markets react faster to negative information. Therefore, we split our sample into firms where the bonds stand to clearly gain or lose due to the takeover. As firms carry bonds with different credit ratings, we classify a firm as a winner in the bond market if it has at least one bond that is clearly going to gain (i.e., when it is has credit rating that is worse than the lowest rated bond of the acquirer). Similarly, a firm is classified as a losing firm if it has at least one bond that clearly stands to lose. There are no firms in our sample that span both these categories, i.e., have both a bond that stands to clearly gain and one that stands to clearly lose. The remaining firms are classified as belonging to an intermediate group. Of the 118 firms in our sample, 42 stand to clearly gain, 14 stands to clearly lose and 62 belong to the intermediate group.

As expected, for firms whose bonds stand to lose the patterns are different. The abnormal stock returns prior to the last bond trade are zero. These become significantly positive after the last bond trading. The positive abnormal return of 3.19% is striking because it accompanies a -0.91% return in the bond market. This suggests that the stock markets do not interpret the negative last bond return as information that points to worsening prospects for the firms, but rather correctly as an event that has negative consequences for the bond market but positive consequences for stock. In summary, the results suggest that, at least for the losing category, the bond markets appear to be the preferred venue of trading for informed traders.

We also examine the 332 target firms with bonds outstanding that are covered in FISD but with no trades in the three month period prior to the announcement of the acquisition. As these firms do not have any bond trading, we examine abnormal stock returns 8 days prior to the announcement, which is the median time from the last bond trade to the announcement in our sample. The CARs before and after the pseudo bond trading day are significantly positive but not significantly different from each other. One reason for the lack of any bond trading prior to the merger announcement may be bond characteristics associated with reduced liquidity.

To shed light on characteristics that may be associated with liquidity we compare the 299 bonds that were traded and have been studied so far with the other non traded bonds issued by sample firms. There are in total 468 bonds issued by our target firms that did not trade in the three months prior to the announcement. As seen in Table 9 there are significant differences in the traded and non-traded bonds of our sample firms. Briefly, we find that liquid and traded bonds are younger, have higher offering amounts,

have better credit ratings, are less likely to have embedded options, and are more likely to be public. When we examine bonds of the non traded firms, i.e., target firms that had no bonds that were traded three months prior to announcement, we find characteristics more likely to be associated with lower liquidity. These bonds have historically also had low liquidity, few trades and low trading volume in the two years prior to the announcement.[17] In summary, firms with no bond trading in the three months prior to announcement are firms whose bonds have low liquidity.

VII. Concluding Remarks

Taking advantage of the unique case provided by corporate bonds, this paper documents strong evidence of informed trading on pending takeovers in the corporate bond market. Unlike target shareholders, who always benefit in a merger deal, target bondholders could either lose or gain, depending on whether the takeover increases or reduces the credit risks embedded in the bonds. We find that target bonds experienced abnormal trading volumes prior to the public announcement of the M&A deal, and that their prices increases (declines) before they are acquired by firms with better (worse) rated bonds. As profitable trading in bonds requires information for target and acquirer characteristics, our findings are more likely to be attributed to insider information rather than market anticipation.

Our study also finds that one possible channel for such information leakage can be traced to the affiliation of the bond dealers with investment banks involved in the acquisition. We find somewhat higher price impact of affiliated trades, and further in

[17] Hotchkiss, Jostova and Warga (2007) find that bonds of public companies are more likely to be traded than those with private equity. As our sample consists of only public firms this characteristics is not relevant for our study.

cases when the target bonds stand to lose from the merger, affiliated bond dealers exhibit much more selling than buying. This suggests a possible breach of the Chinese wall within financial intermediaries. We also find that such information tends to arrive in the bond market first, followed by significant positive stock returns.

Finally, the longstanding opacity and the resulting potential misuse of nonpublic information in the corporate bond market has drawn much effort from regulators toward increasing the transparency of the market. Our findings of less insider trading, especially through affiliated bond dealers, during the post-TRACE periods seem to validate the role of transparency in reducing the opportunities for taking advantages of uninformed traders.

REFERENCES

Andrade, Gregor, Mark Mitchess and Erik Stafford, 2001, New evidence and perspectives on mergers, *Journal of Economic Perspectives* 15, 103-120.

Acharya, Viral, and Timothy Johnson, 2007, Insider trading in credit derivatives, *Journal of Financial* Economics 84, 110-141.

Acharya, Viral, and Timothy Johnson, 2008, More insiders, more insider trading: Evidence from private equity buyouts, working paper.

Asquith, Paul, and E. Han Kim, 1982, The impact of merger bids on the participating firms' security holders, *Journal of Finance* 37, 1209-1228.

Bessembinder, Hendrick, Kathleen M. Kahle, William M. Maxwell, and Danielle Xu, 2008, Measuring abnormal bond performance, *Review of Financial Studies*, Forthcoming.

Bessembinder, Hendrick, and William F. Maxwell, 2008, Transparency and the corporate bond market, *Journal of Economic Perspectives* , Forthcoming.

Bessembinder, Hendrick, William F. Maxwell, and Kumar Venkataraman, 2006, Market transparency, liquidity externalities, and institutional trading costs in corporate bonds, *Journal of Financial Economics* 82, 251-288.

Billett, Matthem T., Tao-Hsien Dolly King and David C. Mauer, 2004, Bondholder wealth effects in mergers and acquisitions: new evidence from the 1980s and 1990s. *Journal of Finance*, 107-135.

Bloomfield, Robert, and Maureen O'Hara, 1999, Market transparency: Who wins and who loses? *Review of Financial Studies* 12, 5-35.

Bloomfield, Robert, and Maureen O'Hara, 2000, Can transparent markets survive? *Journal of Financial Economics* 55, 425-459.

Bodnaruk, Andriy, Massimo Massa, and Andrei Simonov, 2007, Investment Bank as Insiders and the market for corporate control, working paper.

Cai, Nianyun, Jean Helwege and Arthur Warga, 2007, Underpricing in the corporate bond market, *Review of Financial Studies* 20, 2021-2046.

Campbell, J., and G. Taksler, 2003, Equity Volatility and Corporate Bond Yields, *Journal of Finance*, Vol. 58 2321-2349.

Chakravarty, Sugato, and John J. McConnell, 1997, An analysis of prices, bid/ask spreads, and bid and ask depths surrounding Ivan Boesky's illegal trading in Carnation's stock, *Financial Management* 26, 18-34.

Chakravarty, Sugato, and John J. McConnell, 1999, Does insider trading really move stock prices? *Journal of Financial and Quantitative Analysis* 34, 191-209.

Cornell, Bradford, and Eric Sirri, 1992, The reaction of investors and stock prices to insider rrading," *Journal of Finance*, 1031-1059.

Datta, Sudip, and Mai. Iskandar-Datta, 1996, Does insider trading have information content for the bond market? *Journal of Banking and Finance* 20, 555-575.

Dennis, Debra K., and John J. McConnell, 1986, Corporate mergers and security returns, *Journal of Financial Economics* 16, 143-87.

Edwards, Amy K., Lawrence Harris, and Michael S. Piwowar, 2007, Corporate bond market transaction costs and transparency, *Journal of Finance* 62, 1421-1451.

Eger, Carol E., 1983, An empirical test of the redistribution effect in pure exchange mergers, *Journal of Financial and Quantitative Analysis* 4, 547–572.

Ellis, Katrina, R. Michaely and Maureen O'Hara, 2006, Competition in Investment Banking, Working paper, Cornell University

Fishe, Raymond P., and Michel.A. Robe, 2004, The impact of illegal insider trading in dealer and specialist markets: Evidence from a natural experiment, Journal *of Financial Economics* 71, 461-88.

Flood, Mark, Ronald Huisman, Kees Koedijk, and Ronald Mahieu, 1999, Quote disclosure and price discovery in multipledealer financial markets, *Review of Financial Studies* 12, 37-59.

Galai, D., and R. Masulis, 1976, The Option Pricing Model and the Risk Factor of Stock, *Journal of Financial Economics*, V. 3, 53-81.

Gao, Yuan, and Derek Oler, 2008, Rumors and pre-announcement trading: Why sell target stocks before acquisition announcements? Working paper.

Gemmill, Gordon., 1996, Transparency and liquidity: A study of block trades on the London Stock Exchange under different publication rules, *Journal of Finance* 51, 1765-1790.

Goldstein, Michael A., Hotchkiss, Edith S., and Erik R. Sirri, 2007, Transparency and liquidity: A controlled experiment on corporate bonds, *Review of Financial Studies* 20, 235 - 273.

Higgins, R., and L.Schall, 1975, Corporate Bankruptcy and Conglomerate Merger, *Journal of Finance*, Vol 30, 93-113.

Hotchkiss, Edith, Gergana Jostova, and Arthur Warga, 2007, Determinants of corporate bond trading: A comprehensive analysis, working paper.

Insider trading in junk bonds source, *Harvard Law Review*, Vol. 105, No. 7 (May, 1992), 1720-1740.

Ivashina, V. and Z. Sun, 2007, Institutional Stock Trading on Loan Market Information, Working Paper, Harvard Univesity.

Jarrell, Gregg A., and Annette E. Poulsen, 1989, Stock trading before the annoucement of tender offers: Insider trading or market anticipation? *Journal of Law, Economics, and Organization* 5, 225-248.

Jensen, Michael C., and Richard S. Ruback, 1983, The market for corporate control: The scientific evidence, *Journal of Financial Economics* 11, 5-50.

Kim, E. Han, and John J. McConnell, 1977, Corporate mergers and the co-insurance of corpo- rate debt. *Journal of Finance* 32, 349-65.

King, Michael R., and Maksym Padalko, 2005, Pre-bid run-ups head of Canadian takeovers: How big is the problem? Working paper, Bank of Canada.

Krishnan, C., P. Ritchken, and J. Thomson, 2006, On Credit-Spread Slopes and Predicting Bank Risk, *Journal of Money, Credit, and Banking*, Vol 38, 1545-1574.

Levy, H. and M. Sarnat, 1970, Diversification, Portfolio Analysis and the Uneasy Case for Conglomerate Mergers, *Journal of Finance*, V 25, 795-802

Lewellen, W., 1971, A Pure Financial Rational for Conglomerate Merger, *Journal of Finance*, Vol 26, 521-537.

Madhavan, Ananth. 1995, Consolidation, fragmentation, and the disclosure of trading information, *Review of Financial Studies* 8, 579-603.

Madhavan, Ananth, 2000, Market microstructure: A survey, *Journal of Financial Markets* 3, 205-208.

Madhavan, Ananth, David Porter, and Daniel Weaver, 2005, Should securities markets be transparent? *Journal of Financial Markets* 8, 265-287.

Maquieira, Carlos P., William L. Megginson, and Lance A. Nail, 1998, Wealth creation versus wealth redistributions in pure stock-for-stock mergers, *Journal of Financial Economics* 48, 3–33.

Meulbroek, Lisa K., 1992, An Empirical analysis of illegal insider trading, *Journal of Finance*, 1661-1699.

Meulbroek, Lisa and Carolyn Hart, 1997, The Effect of Illegal Insider Trading on Takeover Premia, European Economic Review 1, 51-80.

Naik, Narayan, Anthony Nueberger, and S. Viswanathan, 1999, Disclosure regulation in markets with negotiated trades, *Review of Financial Studies* 12, 873-900.

O'Hara, Maureen, 1997, Market microstructure theory, Basil Blackwell, Cambridge, MA.

Pagano, Marco, and Ailsa Roell, 1996, Transparency and liquidity: A comparison of auction and dealer markets with informed trading, *Journal of Finance* 51, 579-611.

Ritter, Jay and D. Zhang, 2007, Affiliated Mutual Funds and the Allocation of Initial Public Offerings, Working paper, University of Florida

Ronen, T and X. Zhou, 2008, Where did all the Information Go? Trade in the Corporate Bond Market, Working Paper, Rutgers University.

Shastri, K., 1990, The Differential Effects of Mergers on Corporate Security Values, *Research in Finance*, Vol. 8, 179-201

Shultz, P, 2001, Corporate Bond Trading Costs: A Peek behind the Curtain, *Journal of Finance*, Vol. 56, 677-698.

Figure 1A

Turnover is target bond volume normalized by issue size and expressed as a percentage. The number of trades, as well as turnover, is over the three months prior to the takeover announcement. Both turnover and number of trades are control adjusted, where the control group is all bonds with the same credit rating and time to maturity. Gaining (Losing) Bonds are target bonds where the acquirer has a better (worse) credit rating than the target bond.

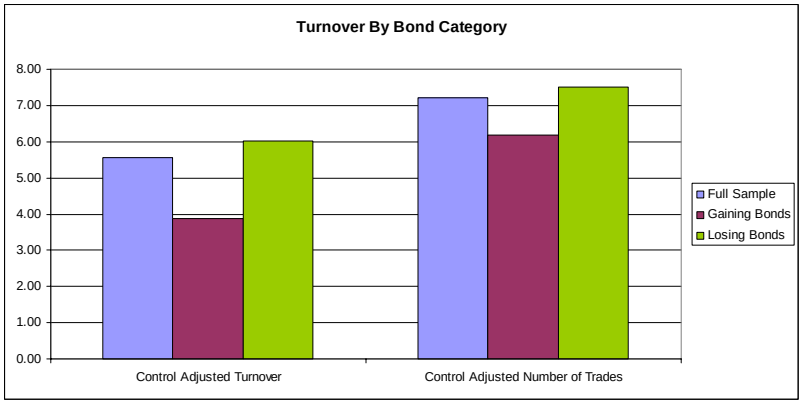


Figure 1B

Last abnormal bond return is the abnormal return for the last target bond transaction prior to the announcement of the takeover. The abnormal return is defined as the difference between the last bond return and the return to credit and maturity matched Lehman Bond Index. M&A Bond return is the abnormal bond return across the M&A announcement. The returns are expressed in percentages. Gaining (Losing) Bonds are target bonds where the acquirer has a better (worse) credit rating than the target bond.

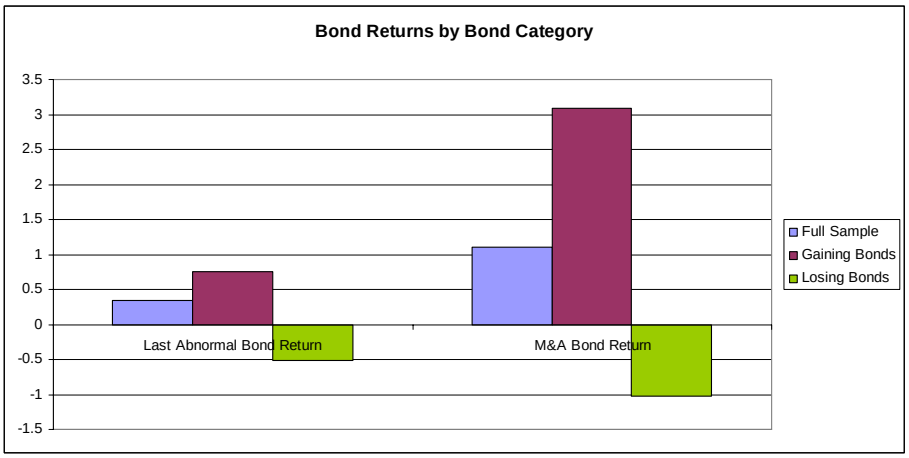


Table1
Trading in Target Bonds within Three Months prior to Merger Announcements

This table presents summary information on the trading activities in target bonds in the three months before the announcement of mergers, both in terms of number of trades and turnover. Bond turnover is calculated by dividing the total dollar trading volume in bonds by their issue size. We examine the raw value of trading frequency and turnover, as well as, their adjusted value by subtracting the average of a control sample. For each of the target bonds in our sample, the control group consists of all other bonds, not subject to any takeover, that had a similar credit rating and time to maturity, and also did not experience any credit rating changes over the same period.

	Number of Trades		Turnover	
	Raw Values	Control Adjusted	Raw Values	Control Adjusted
Panel A: Bond Level				
Mean	1.866	1.357	1.939%	1.203%
T-stat	15.00	11.20	15.04	9.51
# of Bonds	1,611	1,611	1,611	1,611
Panel B: Firm Level				
Mean	1.430	0.908	1.507%	0.867%
T Stat	8.42	5.56	10.54	6.32
# of Firms	442	442	442	442

Table 2
Descriptive Information on Sample Target Bonds and their Issuing Firms

This table presents descriptive information for the 299 target bonds which have traded at least two trading days within the three month period prior to the announcement of the acquisition and their issuing firms. The book value of total assets, market value of equity and financial leverage are retrieved from COMPUSTAT. Bond characteristic information, including the issuing amount (face value), maturity date and credit ratings are from Mergent FISD database. We assign a numeric value to each credit rating from Standard and Poor, with 1, 2, …, 11 denoting AAA, AA, …, NR respectively. The rating difference between a target bond and the acquirer's bonds is calculated by subtracting the average rating of acquirer bonds (weighted by issue size) from the rating of the target bond. Panel A provides summary information on the characteristics of the sample target bonds and their issuing firms, and Panel B includes a detailed distribution of target bonds across credit rating categories.

Panel A: Summary Information on Target Bonds and Their Issuing Firms

	Mean	Median	Std	N
Issuing Firm Characteristics				
Total Asset ($ Million)	26,129.79	5,098.90	55,853.87	118
Market Value of Equity ($ Million)	9,028.46	4,186.83	14,109.30	118
Financial Leverage (Total Debt/Total Assets)	0.316	0.298	0.224	118
Number of Traded Bonds per Firm	2.831	2.000	3.179	118
Number of Total Bonds per Firm	7.822	5.000	8.532	118
Target Bond Characteristics				
Offering Amount ($ Million)	379.297	250.000	377.163	299
Bond Maturity (number of years till maturity)	9.285	6.658	9.281	299
Bond Rating (AAA=1, AA=2, …D=10, NR=11)	3.943	4.000	1.456	299
Rating Difference between Target and Acquirer	0.270	0.000	1.800	299

Panel B: The Distribution of Target Bonds across Credit Ratings

Rating	1	2	3	4	5	6	7	8	9	10	11
# of Bonds	0	12	118	108	34	18	2	0	0	0	7
Percentage	0.00	4.01	39.46	36.12	11.37	6.02	0.67	0.00	0.00	0.00	2.34

Table 3
Summary Statistics for Abnormal Bond Returns

Abnormal returns are defined as the difference between the bond return and the return on a maturity and credit rating matched Lehman Index. Last return is the last abnormal bonds return prior to the merger announcement and is estimated from the last two days traded prior to the announcement of the merger. CAR is the cumulative abnormal return a target bond earns during the three month period prior to the announcement. M&A return (announcement return) refers to the abnormal return following the merger announcement and is calculated from the last day traded in the three months prior to the announcement and the first day traded in the three month period following the announcement. Losing bonds include all target bonds whose credit ratings were better than the highest rated acquirer bond. Gaining bonds include target bonds whose credit ratings were worse than the worst rated acquirer bond. All other target bonds were included in the other bonds category. Panel B reports summary statistics at the firm level, which are a weighted average of all the bond values, with the weights being issue size. ***, **, and * represent significance at the 1%, 5% and 10% level respectively.

	Panel A: Bond Level					Panel B: Firm Level				
	Mean	T-test	Median	Wilcoxon test	# of Obs.	Mean	T-test	Median	Wilcoxon test	# of Obs.
					Full Sample					
Last Return	0.348	(0.006)***	0.269	(<0.0001)***	299	0.590	(0.009)***	0.372	(<0.0001)***	118
CAR	0.660	(0.0001)***	0.562	(<0.0001)***	299	1.046	(0.001)***	0.670	(<0.0001)***	118
M&A Return	1.102	(0.0001)***	0.695	(0.0001)***	256	1.377	(0.001)***	0.894	(0.0001)***	104
					Losing Bonds					
Last Return	-0.510	(0.356)	-0.188	(0.245)	29	-0.882	(0.239)	0.021	(0.502)	14
CAR	-0.101	(0.876)	0.006	(0.876)	29	-0.269	(0.798)	-0.172	(1.000)	14
M&A Return	-1.016	(0.345)	0.386	(0.890)	24	-0.562	(0.751)	-0.024	(0.622)	12
					Gaining Bonds					
Last Return	0.750	(0.020)**	0.432	(0.008)***	75	1.158	(0.006)***	0.590	(0.0007)***	42
CAR	1.041	(0.023)**	0.611	(0.013)**	75	1.637	(0.013)**	0.752	(0.0007)***	42
M&A Return	3.091	(<.0001)***	2.116	(<.0001)***	61	2.845	(0.0004)***	2.079	(<0.0001)***	34
					Other Bonds					
Last Return	0.321	(0.010)***	0.285	(<.0001)***	195	0.537	(0.048)**	0.322	(0.0024)***	62
CAR	0.597	(0.0007)**	0.583	(0.0001)***	195	0.942	(0.007)***	0.651	(0.0004)***	62
M&A Return	0.690	(0.011)**	0.445	(0.0009)***	171	0.917	(0.048)**	0.433	(0.069)**	58
					Difference Between Losing and Gaining bonds					
Last Return		(0.025)**		(0.009)***			(0.010)**		(0.014)**	
CAR		(0.119)		(0.073)*			(0.064)*		(0.149)	
M&A Return		(0.0007)***		(<.0001)***			(0.044)**		(0.006)***	

Table 4
Pre-announcement Abnormal Bond Returns

The dependent variable for regression analysis reported in this table is the last abnormal bond return prior to the announcement of the merger. CreditDiff is the difference between the credit rating of the target bond and the weighted average rating of the acquirer bond. Loss dummy takes the value one when the credit rating of the target bond is better than the best rated bond of the acquirer, and zero otherwise. Issuer market value is the market value of the target firm, financial leverage is the total debt to asset ratio for the target, and profit margin is the net income to sales ratio for the target firm. We also control for bond liquidity using its age and issue size. Age is the number of years since bond issuance and issue size is the bond offering amount. Only target bonds that traded at least twice in the three months prior to the announcement were included. There are 299 bonds in the sample. ***, **, and * represent significance at the 1%, 5% and 10% level respectively. The standard errors are corrected for firm level clustering.

	I	II	III	IV
Intercept	0.252	0.463	-0.007	0.048
	(0.039)**	(0.044)**	(0.993)	(0.947)
CreditDiff	0.357	0.361	0.341	0.330
	(<.0001)***	(<.0001)***	(<.0001)***	(<.0001)***
Loss Dummy				-0.193
				(0.694)
Age		-0.021	-0.032	-0.033
		(0.674)	(0.603)	(0.592)
Issue Size		-0.401	-0.189	-0.194
		(0.208)	(0.621)	(0.612)
Issuer Market Value			-0.148	-0.140
			(0.252)	(0.285)
Financial Leverage			-0.563	-0.521
			(0.452)	(0.491)
Profit Margin			-0.722	-0.779
			(0.576)	(0.548)
Adj. R-Square (%)	8.47	8.36	8.39	8.09

Table 5
Robustness Check

This table provides robustness checks of our results on the informational content of pre-announcement target bond abnormal returns. The dependent variable for Panels A to D is the last return prior to the announcement and for Panels E and F is the three month cumulative abnormal bond return. The sample includes all bonds that are traded at least two days within the three months prior to announcement. For Panel A, firm level last return is the weighted average last return for all bonds issued by the same firm weighted by issue size. Panel B uses median acquirer bond ratings while Panel C uses finer notches of rating to estimate CreditDiff. CreditDiff is the difference between the credit rating of the target bond and the weighted average rating of acquirer bonds. Psuedo CreditDiff is the difference between the target bond rating before the M&A announcement and its rating within three months after the M&A. Issuer Market Value is the market value of the issuing firm, Financial Leverage is the ratio of total debt to total assets, and Profit Margin is the ratio of net income to sales. Age is the number of years since bond issuance and issue size is the bond offering amount. ***, **, and * represent significance at the 1%, 5% and 10% level respectively. Standard errors are corrected for firm level clustering.

	Panel A: Firm Level	Panel B: Median Rating of Acquirer Bonds	Panel C: Fine Rating Category	Panel D: Six Month Window	Panel E: Three-Month CAR	Panel F: Expanded Sample: Private Acquirers and LBOs
Intercept	-0.351	-0.010	-0.066	0.163	-1.732	-2.123
	(0.788)	(0.989)	(0.928)	(0.824)	(0.064)*	(0.008)***
CreditDiff	0.442	0.300	0.118	0.372	0.482	
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<.0001)***	(<.0001)***	
Psuedo CreditDiff						0.634
						(0.006)***
Age	-0.012	-0.036	-0.034	-0.050	-0.093	-0.081
	(0.923)**	(0.552)	(0.583)	(0.392)	(0.242)	(0.204)
Issue Size	-0.352	-0.143	-0.136	-0.208	0.628	0.979
	(0.601)	(0.709)	(0.724)	(0.623)	(0.209)	(0.039)**
Issuer Market Value	-0.221	-0.153	-0.156	-0.162	-0.421	-0.501
	(0.310)	(0.242)	(0.235)	(0.191)	(0.013)*	(0.004)***
Financial Leverage	-0.452	-0.662	-0.542	-0.957	0.931	1.075
	(0.660)	(0.378)	(0.474)	(0.208)	(0.342)	(0.207)
Profit Margin	-1.304	-0.909	-0.768	-1.345	2.467	1.066
	(0.396)	(0.482)	(0.573)	(0.334)	(0.144)	(0.318)
Adj. R-Square (%)	20.27	7.36	6.91	7.24	14.30	6.72
Number of Observations	118	299	298	377	299	362

Table 6
Pre-announcement Trading by Affiliated Bond Dealers

The dependent variable for Panel A is the last abnormal bond return prior to the acquisition announcement. The dependent variable for Panel B (Panel C) is net selling by affiliated (non-affiliated) bond dealers. The explanatory variables of interest are CreditDiff and Loss Dummy. CreditDiff represent the difference between the credit rating of the target bond and the weighted average rating of acquirer bonds. Loss dummy takes the value one when the target credit rating is better than the best rated acquirer bond, and zero otherwise. AF dummy takes the value one when the affiliated dealer trades on the last trading day prior to the acquisition announcement. We include both bond level specific controls, such as age and issue size, as well as firm level controls, including issuer market value, financial leverage and profit margin, which are defined similarly as in Table 5. ***, **, and * represent significance at the 1%, 5% and 10% level respectively. Standard errors are corrected for firm level clustering.

	Panel A: Last Abnormal Bond Return	Panel B: Affiliated Dealer Selling	Panel C: Non-Affiliated Dealer Selling
Intercept	0.034	-0.234	-0.167
	(0.962)	(0.787)	(0.918)
CreditDiff*AF Dummy	0.498		
	(0.003)***		
CreditDiff*NonAF Dummy	0.301		
	(0.0003)***		
CreditDiff		0.088	-0.157
		(0.353)	(0.379)
Loss Dummy		1.238	-0.727
		(0.034)**	(0.507)
Age	-0.035	0.105	-0.136
	(0.564)	(0.146)	(0.32)
Issue Size	-0.167	-0.352	-1.072
	(0.662)	(0.439)	(0.21)
Issuer Market Value	-0.152	0.060	-0.055
	(0.241)	(0.699)	(0.851)
Financial Leverage	-0.659	0.671	1.414
	(0.381)	(0.456)	(0.403)
Profit Margin	-1.109	1.068	3.272
	(0.408)	(0.489)	(0.26)
Adj. R-Square (%)	8.41	0.38	0.00

Table 7
The Influence of TRACE Implementation on Informed Trading in Corporate Bonds

This table examines the effect of TRACE implementation on informed trading in corporate bonds. The dependent variables in Panels A and B are the last abnormal bond returns in the three months prior to the announcement, while in Panel C it is net selling by affiliated bond dealers. Pre- (Post-) TRACE dummy takes the value one for bonds whose issuer's debt instruments are subject to TRACE dissemination. CreditDiff is the difference between the credit rating of the target bond and the weighted average rating of acquirer bonds. AF Dummy takes the value one when affiliated dealers trade on the last trading day before the acquisition announcement. Loss dummy takes the value one when the target credit rating is better than the best rated acquirer bond, and zero otherwise. We include both bond level specific controls, such as age and issue size, as well as firm level controls, including Issuer Market Value, Financial Leverage and Profit Margin, which are defined similarly as in Table 5. ***, **, and * represent significance at the 1%, 5% and 10% level respectively. Standard Errors are corrected for firm level clustering.

	Panel A: Pre- and Post-TRACE	Panel B: Affiliated vs. Non-Affiliated	Panel C: Net Selling by Affiliated Dealers
Intercept	-0.114	-0.049	-0.322
	(0.874)	(0.945)	(0.711)
CreditDiff *Pre-TRACE Dummy	0.389		0.024
	(<.0001)***		(0.877)
CreditDiff *Post-TRACE Dummy	0.070		0.117
	(0.704)		(0.295)
Loss Dummy*Pre-TRACE Dummy			1.489
			(0.016)**
Loss Dummy*Post-TRACE Dummy			-0.462
			(0.759)
CreditDiff*AF Dummy* Pre-TRACE Dummy		0.474	
		(0.002)***	
CreditDiff*AF Dummy* Post-TRACE Dummy		-0.036	
		(0.888)	
CreditDiff*NonAF Dummy* Pre-TRACE Dummy		0.354	
		(0.0002)***	
CreditDiff*NonAF Dummy* Post-TRACE Dummy		0.153	
		(0.525)	
Age	-0.025	-0.028	0.104
	(0.684)	(0.651)	(0.150)
Issue Size	0.045	0.018	-0.319
	(0.911)	(0.966)	(0.483)
Issuer Market Value	-0.153	-0.153	0.036
	(0.234)	(0.235)	(0.817)
Financial Leverage	-0.529	-0.610	0.537
	(0.478)	(0.416)	(0.553)
Profit Margin	-0.837	-1.175	1.184
	(0.515)	(0.389)	(0.452)
Adj. R-Square (%)	8.92	8.46	0.24

Table 8
Trading across Issuer's Equity and Debt

This table presents the timing and distribution of informed trading across the target's equity and debt. We calculate the cumulative abnormal returns in the target's stock surrounding its bond transactions, expressed as percentage returns, and examine the patterns for different groups of target firms based on whether their bonds are traded and their relative credit quality compared to that of the acquirer using both t-test and Wilcoxon signed rank test. ***, **, and * represent significance at the 1%, 5% and 10% level respectively.

	Full Traded Sample	Firms whose Bonds Gain from Merger	Firms whose Bonds Lose from Merger	Firms whose bonds are rated similar to acquirer	Firms which have no bonds traded
		Group 1	Group 2	Group 3	Group 4
CARs from (-5,-2) relative to the last bond trade (A)					
Mean	0.8**	1.24**	0.13	0.7	0.84**
Median	0.0	0.8*	0.0	0.0	0.269
CARs from (-1,+1) around the last bond trade (B)					
Mean	2.04***	1.4	3.19*	2.2**	0.89***
Median	0.63**	0.16	0.18	0.7**	0.17**
CAR from (-1,1) around the announcement of the Merger					
	14.86	16.2	9.8	15.06	17.89
Average Last Bond Return					
	0.487	1.18	-0.91	0.33	0
T statistic for the paired T-test for difference in (A) and (B)					
	1.62	0.14	1.52	1.33	0.13
Z statistic for the Wilcoxon matched pairs signed rank test for difference in (A) and (B)					
	0.86	0.68	1.6*	0.91	0.11
Number of Observations	118	42	14	62	332

Table 9
Which Bonds are more likely to be Traded?

This table provides summary information on the characteristics of bonds that are traded prior to M&A announcements versus those which are not traded. Such information includes the total amount offered to the market, the credit rating, time to maturity, and age at the time of the M&A. We also provide information on the likelihood that each group of bonds examined have some type of embedded options, whether they are Rule 144a bonds or medium term bonds, the seniority of the bonds, as well as how likely they are to be traded within the past 2 years before the three-month period. ***, **, and * represent significance at the 1%, 5% and 10% level respectively.

	Target Firms with Bonds Traded in the Three-month Pre-announcement Period			Target Firms with No Bonds Traded in Three-month Pre-announcement Period
	Bonds that are Traded at least 2 Days in the three months prior to announcements (Group 1)	Bonds that did not trade (Group 2)	T-test for difference between Group 1 and Group 2	
Offering Amount ($Million)	379.297	293.973	(0.003)***	193.048
Credit Rating	3.936	4.603	(<0.0001)***	5.604
Time to Maturity	9.285	9.083	(0.772)	9.207
Age	2.818	7.053	(<0.0001)***	5.729
Embedded Options:				
Putable	0.033	0.079	(0.005)***	0.080
Convertible	0.037	0.113	(<0.0001)***	0.223
Redeemable	0.415	0.630	(<0.0001)***	0.732
Rule 144a	0.037	0.171	(<0.0001)***	0.158
Medium Term Note	0.000	0.034	(<0.0001)***	0.021
Seniority	0.926	0.959	(0.0477)**	0.99969
Total Number of Trades	43.657	8.038	(<0.0001)***	10.740
Total Trade Volume ($million)	311.111	104.691	(<0.0001)***	124.733
Number of Observation	299	468		994