Insider Trading in the Bond Market:

Evidence from Loan Sale Events

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Abstract

We investigate the pricing implications of the parallel trading of loans and bonds of the same firm. Loan sales require lenders to share sensitive information about the borrower with the loan market participants and therefore reduces the lenders' informational advantage. We argue and show that this lowers the flow of information to the lender's affiliated asset managers who respond by reducing their stake in the bonds of the firm whose loans are sold, *independently of considerations about the future value of the firm*. This lowers information asymmetry in the bond market and improves its liquidity. These findings provide the first evidence of a direct informational link between the loan trading market and the corporate bond market: bondholders value the information generated in the secondary loan market and the entailed reduction in information asymmetry in the bond market. These findings have important normative implications for the debates on market transparency and the role of financial conglomerates. Indeed, they show that the very market participants endowed with superior inside information – the lenders – are willing to share part of this information in order to access the benefits of risk sharing provided by the existence of the secondary loan market. Furthermore, the evidence of insider trading in the bond market is itself a relevant finding given that corporate bonds are mostly regarded as information-insensitive securities.

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Introduction

One important question is how the existence of parallel markets affects investor trading behavior and market liquidity. The literature on strategic multi-market trading (Chowdry and Nanda, 1991, Biais, 1993, Lyons, 1996, Porter and Weaver, 1996, Hansch et al.,1998, Doidge, Karolyi, and Stulz, 2004, 2007, Karolyi, 2004, 2006) has looked at the link between market transparency, information asymmetry and liquidity.

The focus of this analysis has traditionally been limited to the equity market. However, the last decade has seen a dramatic growth in secondary debt markets. For example, Figure 1 shows that trading volume in the market for *commercial* loans has risen from less than 10 Billion USD to a peak of almost 350 Billion USD in 2007. Even the 2008 financial crisis did not reverse this trend as loan trading volume fell only moderately to 280 Billion USD and grew again in 2009.

To date, the literature has been mostly concerned with the moral hazard implications of loan trading. Indeed, the recent financial crisis has highlighted the problems arising from debt securitization in terms of lax screening and monitoring. In contrast, the informational repercussions of the existence of parallel debt markets – i.e., loan and bond trading markets – have been largely ignored. In fact, the existence of a loan trading market has major implications for the corporate bond market because, due to the payoff-similarity of loans and bonds, bonds are particularly sensitive to loan market information. Unlike the trading in securitized assets such as CDOs or MBSs, loan trading provides useful information about the underlying firm that was previously concentrated among its lenders and their affiliated asset managers. If the latter exploit the privileged information obtained from lending to speculate in the bond market, loan trading will help to mitigate this adverse selection risk. This is because loan trading broadens the access to and reduces the concentration of information about the borrower. This should reduce the information asymmetry for the corporate bonds issued by firms whose loans are traded ("sold borrowers").

In this paper, we fill this gap by studying the implications of loan sales as information-redistributing events. We start from the stylized fact that the lending process provides banks with precious information about their borrowers that, if exploited in the financial markets, can turn them into insiders (e.g. Diamond, 1984, Boot, 2000, Ivashina and Sun, 2011). A growing evidence documents transfers of information within financial conglomerates and shows that such information is used by lenders and their affiliated asset managers to trade, creating information asymmetry and reducing liquidity (e.g., Acharya and Johnson, 2007, Dass and Massa, 2009). Against this background, loan sales constitute a potential major redistribution of information from insiders (the lenders and their affiliated asset managers) to the market that may affect information asymmetry and liquidity. In other words, through the redistribution of loan-specific information, loan sales help to solve the agency problem stemming from the possible (mis)use of the privileged information obtained in the lending process by tipping off affiliated asset managers. This makes loan sales ideal events to study *the implications of parallel market trading on information asymmetry, equilibrium pricing and liquidity* in the presence of financial conglomerates with a superior access to information.

We focus on the U.S. loan trading market over the period 1998-2007. We have information on the secondary market price of loans and bonds of the same firms as well as information about the bond holdings of institutional investors who are affiliated with the lenders that grant and sell these loans.

We start by exploring the impact of the initiation of loan trading on bond yield spreads. We contrast two possibilities. First, if loan trading leads to a more equitable distribution of privileged information and reduces the fundamental uncertainty about the borrower, then loan trading should decrease bond yield spreads. Alternatively, if loan trading increases adverse selection and moral hazard, then loan trading should raise bond yield spreads. We show that the first effect prevails: in the month of the loan sale, the bond yield spreads of sold borrowers drop by approximately 17 basis points, representing 8.5% of the average bond yield spread in our sample. The drop in bond yield spreads upon loan sales is larger for more risky (speculative-grade) and more opaque (smaller) borrowers. The effect is also pronounced for bonds that are not protected by a credit enhancement.

These results are robust to different ways of measuring changes in bond value as well as to controlling for an array of firm and market characteristics that could affect yield spread changes. Most notably, they are not driven by changes in the fundamental risk of the borrower. Moreover, loan sales do not predict negative future performance of these loans, even when asset managers affiliated to the loan-selling lender simultaneously sell the bonds of the borrower. Taken together, these findings suggest that loan trading benefits bond market investors, rather than raising adverse selection or moral hazard concerns.

Next, we investigate the source of this effect. We identify two channels. First, loan trading provides a direct information flow from the secondary loan market to the bond market:

bondholders learn about the borrowing firm by observing price and volume quotations in the secondary loan market. Second, loan trading reduces the privileged use of information by lender-affiliated asset managers. While we cannot rule out that the first effect plays a role in explaining our findings, we provide direct evidence for the second channel. This suggests that, despite the existence of Chinese Walls, information flows within financial conglomerates.

To investigate this issue in more detail, we look at the trading behavior of the asset managers belonging to the financial conglomerate of the lenders of a sold borrower ("affiliated asset managers"). We argue that, given that the loan sale lowers the informational advantage of the affiliated traders, this induces them to reduce their stakes in the bonds of the sold borrowers. And indeed, we find that the affiliated asset managers reduce their holdings in sold borrowers by approximately 7.5% relative to both their trading in other bonds and the trading of comparable non-affiliated asset managers. This is consistent with the view that affiliated asset managers had access to privileged information prior to the loan sale and rebalance their portfolio when their information advantage is reduced.

We then provide more direct evidence for the link between loan sales and changes in "informed" trading in the bond market. First, we analyze the lending demand in the bond short-selling market – an important arena for informed speculators. Consistent with the view that there is less informed trading after the initiation of loan trading, we find that the short-selling demand shifts inward around the loan sale.

Second, we examine how bond market liquidity is affected by loan trading. To this end, we decompose credit spreads into a default premium, represented by the CDS spread, and a liquidity premium, represented by the bond basis (see Beber et al., 2009; Bai and Collin-Dufresne, 2011). We find that the loan sale effect is concentrated in the latter. While CDS spreads are hardly affected by the loan sale, the bond basis – which itself is negatively related to liquidity risk – is significantly increased by 14 to 19 basis points, representing 16%-21% of its standard deviation. We also show that the Amihud (2002) illiquidity ratio drops significantly after the loan sale.

Overall, our results suggest that loan sales benefit bondholders because they ameliorate liquidity by decreasing the information asymmetry in the bond market. They contribute to different literatures. First, they relate to the literature on insider trading. We document its existence in the bond market. This is a relevant finding given that corporate bonds are mostly regarded as information-insensitive securities. While we agree that bonds are less sensitive to information regarding the "upside" (growth) potential of a firm, we argue that bonds are very sensitive to "downside" (solvency) information. For example, while both bonds and equity respond to changes in the probability of distress, bonds are more likely to respond to information about the recovery value in distress. It is exactly this downside information that lenders accumulate in the lending process.

Second, our findings speak to the literature on loan sales. To date, this literature has mostly focused on the moral hazard implications of loan sales and has reached mixed results. Dahiya et al. (2003) find that stock prices drop around the announcement of a loan sale – suggesting that investors are concerned about the adverse selection and moral hazard implications of this event. In contrast, in a different and more recent sample of syndicated loan sales, Gande and Saunders

(2012) find a positive stock return reaction.[2] They argue that loan sales alleviate the borrowing firm's financial constraints and show that the positive effect is bigger for distressed borrowers who are ex ante more likely to be financially constrained. The difference in the nature of loan sales with respect to the sample in Dahiya et al. (2003) is also confirmed by Drucker and Puri (2009) who find that a majority of tradable loans become tradable shortly after their origination, suggesting that these loans were meant to be sold from the beginning. We contribute by confirming that market participants perceive secondary loan trading as good news.

More importantly, we complement Gande and Saunders' (2012) analysis by focusing on the informational effect of loan sales. We argue that, at least for the bond market, the benefit of loan trading does not only come from changes to a firm's outstanding loans and default risk (for which we control in our analysis), but is primarily *informational*: bondholders value the information generated in the secondary loan market and the entailed reduction in information asymmetry in the bond market. When a bank decides to sell a loan it has originated, it is renouncing part of its informational advantage by allowing other market players to access the privileged information generated through the lending process.

Third, our results contribute to the literature on financial intermediation. Recent evidence suggests that there are flows of information within financial conglomerates (e.g., Irvine et al.,

[2] For a sample of roughly 130 loan sales, Gande and Saunders (2012) also find a negative price response for corporate bonds, which they attribute to risk shifting. The difference between this result and ours is likely due to a combination of factors: First, their loan sale sample covers the period 1999 to 2003, while we consider the period 2002 to 2007 (over which TRACE bond data has become increasingly available). Second, they focus on the first loan sale, while we consider subsequent ones as well. Third, they employ an event study methodology (controlling only for market returns), while we focus on yield spreads (controlling for a whole array of firm-specific and market-level yield spread determinants).

2007; Ritter and Zhang, 2006; Massa and Rehman, 2008). We contribute by showing the implications of these information flows for the bond market.

In the remainder of the paper, we proceed as follows. In Section 2, we develop our hypotheses. In Section 3, we describe the data and the main variables. In Section 4, we estimate the impact of loan trading on bond yield spreads. In Section 5, we provide indirect evidence for insider trading in the bond market by examining the holding changes of affiliated asset managers. In section 6, we provide more direct evidence by studying bond lending demand in the short-selling market and bond market liquidity. A brief conclusion follows.

2. Hypotheses

We start with some stylized facts. First, lending generates information asymmetry between lenders and other market participants (e.g. Diamond, 1984, see Boot, 2000, for a survey). This inside information is shared among the members of the lending syndicate and includes "timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions" (Standard and Poor's, 2007) [3]. As such, syndicate information constitutes material non-public information that may help lenders to identify the right firms to invest in at the right time.

Second, there is mounting empirical evidence suggesting that Chinese Walls within financial conglomerates are porous (e.g., Irvine et al., 2007, Ritter and Zhang, 2006, Massa and Rehman, 2008). Moreover, the loan market is increasingly populated by investors who simultaneously

[3] "Loan-market participants (LMP) have the contractual right to receive borrowers' private information, which may include material nonpublic information (MNPI) from or regarding a borrower. A borrower may also be an issuer of securities." (Handbook of Loan Syndications and Trading).

trade in other securities of the borrower and may be tempted to exploit inside information through proprietary tradingFor example, hedge funds increasingly participate in lending syndicates with the purpose of gaining access to inside information.[4]

Third, unlike other forms of debt securitization (e.g., ABS, MBS, CDOs), secondary loan market trading is based on a clear recognition of the identity of the underlying firm and therefore on the possibility to directly trade on its other assets. Indeed, a major characteristic of loan sales is that they require the sharing of private information about the underlying firm. Regardless of whether the loan is sold by the lead bank or by another syndicate member, once the loan is traded, market participants have a right to obtain access to this information. According to the Handbook of Loan Syndications and Trading, "LMPs [loan market participants] who participate in both the loan market and the securities market may obtain MNPI [material non-public information] as a result of their involvement in the loan market".[5] In this context, the Loan Syndications and Trading Association (LSTA), a self-regulatory body for the loan market, has enacted a set of rules which are meant to prevent the misuse of such information.[6]

Based on these stylized facts, we formulate two alternative hypotheses regarding the effect of loan trading on the bond market. Both hypotheses share the premise that lenders of corporate loans are privy to privileged information about the value of the firm. The first hypothesis – the

[4] "In 2000, hedge funds were just 10 percent of JPMorgan trading volume, while in 2005, they represented almost 30 percent of total trading volume, with a rate of growth of 75 percent per year since 2000" (Handbook of Loan Syndications and Trading).

[5] "The text on the Internet splash page, the page that precedes access to information on a Web-based document delivery system such as IntraLinks or SyndTrak, almost always contain a confidentiality undertaking and often contains a securities law compliance provision. These splash pages constitute binding contractual agreements in the same way that the other forms of documentary protection do. Before accessing a site, LMPs must click on "I Agree," or something similar, before proceeding. The act of clicking on the "agree" button creates a binding contract" (Handbook of Loan Syndications and Trading).

[6] "The bulwarks of segregating private information are embedded in five key documents that have widespread use and acceptance in the loan market: Master Confidentiality Agreements, trade confirmations, bank books (also known as confidential information memoranda), credit agreements, and splash pages […]" (Handbook of Loan Syndications and Trading).

moral hazard/adverse selection hypothesis – posits that lenders sell the loans on which they have bad information (adverse selection) and/or that lenders stop to monitor the borrower diligently (moral hazard). Bondholders thus perceive a loan sale to be a bad signal about the quality of the borrower and/or worry about the moral hazard implications for the lender (Pennacchi, 1988; Parlour and Plantin, 2008). Under this scenario, a loan sale will lead to an increase in bond yield spreads and should predict negative future performance.

The second hypothesis – the *information hypothesis* – posits that loan trading provides beneficial information and/or levels the playing field for bondholders. As argued previously, loan sales entail that information is widely shared among loan market participants. If this information effect outweighs the adverse selection and moral hazard concerns, loan sales should decrease the bond yield spread of the borrower. This effect should be stronger for less transparent and more risky firms, because for these firms the ex ante information asymmetry was particularly severe. Moreover, given that loan sales are not a way of dumping a "lemon loan", we expect that they are not predictive of future underperformance. In summary, we can formulate:

H1a (moral hazard/adverse selection hypothesis). Bond yield spreads rise when loans become tradable. Loan sales predict negative future performance of the loan.

H1b (information hypothesis). Bond yield spreads fall when loans become tradable. This effect is stronger for less transparent and more risky firms. Loan sales do not predict future performance of the loan.

Hypothesis 1, while important in its own right, allows us to set the stage for our analysis of the informational effects of loan trading – which we view as the central contribution of this paper.

We distinguish between *direct and indirect* informational benefits of loan sales. *Direct* benefits refer to the reduced uncertainty due to the information flow from the secondary loan market to the bond market. Such information flow results from the disclosure of material information from the lending syndicate to the loan market participants. *Indirect* information benefits, on the other hand, refer to a change in the *information asymmetry* in the bond market. These indirect benefits occur when loan trading reduces the concentration of loan market information.

The indirect information effects are important when Chinese Walls within financial conglomerates are not able to prevent information flows between the lending arm and the investment arm. When a loan becomes tradable, the members of the lending syndicate renounce to part of their informational advantage. Investors are aware of this and take the loan sale decision as a signal that the borrowing firm has become more transparent and that insider trading risk is reduced. Clearly, such a signal will be viewed even more favorably when the market perceives the ex-ante risk of insider trading to be large – e.g., when the lending syndacte contains an investment bank as opposed to a commercial bank with little proprietary trading activity. We also expect that loan sales lead to a larger drop in bond yield spreads when the lender's affiliated asset managers report larger bond holdings.

The indirect information effect has three specific testable predictions. The first is related to the affiliated asset managers' bond holdings. The affiliated asset managers lose their information advantage when the loan is sold, whereas other market participants see their information increase. Hence, if some investors were exploiting their information advantage before the loan sale, we expect them to reduce their holdings once the information advantage is diminished. This induces a portfolio rebalancing for bonds of sold borrowers away from the affiliated investors to the non-affiliated ones.

The second prediction is related to the short-selling demand for corporate bonds. The literature finds that short-sellers are informed. This may come from a prior informational advantage (Boehmer, Jones, and Zhang, 2008) and/or from their ability to better process information (Engelberg, Reed, and Ringgenberg, 2012). If loan trading reduces information asymmetry and insider trading in the bond market, we expect to see a reduction in short-selling activity and lower demand for lendable securities.

The third prediction relates to bond market liquidity. If loans sales indeed reduce information asymmetry in the bond market, we expect bond market liquidity to improve. In addition, if we decompose credit yield spreads into a default premium and a liquidity premium (following Longstaff et al., 2005; Beber et al., 2009), we expect the latter to be most affected by the loan sale. On the other hand, if the benefits of loan trading stem from direct information about the default risk of the borrower, we expect the default premium to be more affected. These considerations allow us to lay out our second hypothesis.

H2a (direct information only).

Loan sales affect bond yield spreads through a direct information flow and not through a change in the information asymmetry. Asset managers affiliated with the loan-selling lender do not behave differently from unaffiliated asset managers around the loan sale. Short-selling in the bond market is not affected by a loan sale. The part of the bond yield spread more affected by the loan sale is the default premium.

H2b (reduction in information asymmetry).

Loan sales affect bond yield spreads through a change in the information asymmetry. This effect is pronounced when the loan-selling lender is more susceptible to engage in insider trading. Asset managers affiliated with the loan-selling lender reduce their holdings of sold borrowers around the loan sale relative to unaffiliated asset managers. Short-selling activity decreases after the loan sale. Bond liquidity improves and the part of the bond yield spread more affected by the loan sale is the liquidity premium.

In the next section, we describe our sample and the construction of our variables.

3. The Data and the Main Variables

3.1 Bond yield spread sample

We use five main data sources for our analysis. The secondary loan market data come from the Loan Syndications & Trading Association (LSTA) file. Information on loan contracts is collected from the Loan Pricing Corporation (LPC) Dealscan database. Primary and secondary market data are merged using the loan identification number available on the LPC Dealscan disk. Firm information from Compustat (fundamentals annually) is added using the Compustat-LPC link kindly provided by Michael Roberts.[7]

Secondary bond market data is from the Trade Reporting and Compliance Engine (TRACE). The price of the last trading quotation in a month is taken to be the price for that month. For all the bonds in TRACE, bond characteristics such as face value and maturity are obtained from Mergent FISD. Auxiliary data for additional control variables include bond ratings taken from

[7] More information on this match can be found in Chava and Roberts (2008).

EMAXX, S&P 500 returns from CRSP, T-Bill yield and credit spread information from the Federal Reserve Bank of St-Louis' FRED database.[8] TRACE data start in 2002, whereas our LSTA loan trading data end in June 2007. The sample period for the analysis of bond yield spreads therefore covers the period 2002-2007.

Our main dependent variable is the change in bond yield spread (henceforth *BYS change*). We focus on yield spreads as opposed to bond prices because the former adjust for movements in the yield curve and should thus be a less noisy measure for the idiosyncratic component of bond value. Moreover, yield spreads can be decomposed into a credit risk and a liquidity component, a fact which we later use to investigate the specific channel through which loan sales matter for bond markets. Robustness checks based on bond prices deliver similar results.

We calculate the *BYS* of bond *j* in month *t* as the difference between the bond yield and the yield of a T-Bill with similar time to maturity *T*,

$$BYS_{j,t} = yield_{j,t,T} - TBill\ yield_{t,T}\,.$$

Given that loan sales should affect all the bonds from the same firm in a similar way, we conduct our analysis at the firm-level.[9] Following Bessembinder et al. (2009), we thus average the *BYS* for all transacted bonds of firm *i* in month *t*, weighted by the overall bond amount outstanding. Because bond yield spreads are highly persistent, we focus our analysis on bond yield spread changes:

$$BYS\ change_{i,t} = BYS_{i,t} - BYS_{i,t-1}\,.$$

[8] The FRED database is located at http://www.research.stlouisfed.org/fred2.
[9] Results at the bond-level are very similar and are available upon request.

We use the first price quotation in the LSTA data to infer the occurrence of the loan sale. A few comments are in order. First, it is not important for our purpose to know the identity of the member of the lending syndicate which sells the loan. This is because the very act of the loan sale reduces the informational advantage for all loan syndicate members. Second, we focus on the first loan quotation as this provides the latest possible moment in which information is fully available to loan market participants. It may be the case that the loan has had its first trade a few days before its first price quotation. To capture these prior information flows, we follow the literature on parallel market trading (e.g., Chowdry and Nanda, 1991, Biais, 1993, Doidge, Karolyi, and Stulz, 2004, 2007; Karolyi, 2004, 2006) and conduct our analysis at a relatively low (in our case monthly) frequency. We thus only require that the first loan quotation appears within one month of the loan sale.

The key independent variable in our firm-month analysis is a dummy that takes a value of one if a loan of firm *i* was sold in the secondary loan market in month *t* (*loan sale dummy*). In all specifications, we control for the change in loan amount outstanding (*loan log amount change*).[10] We calculate the total bond dollar trading volume for firm *i* by aggregating transactions of all bonds outstanding by firm i in month t. In our regressions, we use the logarithm of monthly changes in this variable (*bond log volume change*).[11] We define *bond maturity* as the average of bond maturities of a firm's outstanding bonds. We define an enhancement dummy that takes the value of one if the bond issue enjoys a guarantee from the lender (*bond enhanced dummy)*. In

[10] More precisely, to mitigate the skewness of this variable, we use log of loan amount outstanding. Using a new loan issuance dummy gives the same results.
[11] Given that bond volume information is truncated in TRACE to 1 million and 5 million USD per trade for speculative grade and investment grade borrowers, respectively, our proxy for bond volume is a lower bound of the actual trading volume.

selecting other control variables, we follow Collin-Dufresne et al. (2001) and include changes in the level and slope of the T-Bill yield curve (*T-Bill level change* and *T-Bill slope change*), changes in leverage, changes in firm size (as measured by changes in the logarithm of sales), S&P 500 returns, and changes to expected market volatility (VIX). For each firm *i* in month *t*, we take the lowest bond rating provided by one of the three major rating agencies as a proxy for the credit risk of the firm. We also construct two dummies (*rating_up* and *rating_down*) that indicate whether firm *i* was upgraded or downgraded in month *t*.

Following Duffee (1998), in order to mitigate the influence of data errors, we drop bonds with a price lower than 25% and higher than 300% of par value, as well as the bonds with a yield to maturity higher than 300%. We further exclude convertible bonds and bonds issued by financial institutions, which might be fundamentally different. We delete a handful of observations for which the rating indicated that the firm was in or close to default (rating CC or lower). Some firms could not be merged with LPC or did not appear to have loans outstanding in LPC. As we do not know whether these firms have loans outstanding that could potentially be sold, we exclude these firms from the analysis. After employing these filters, we are left with 18,319 firm-months observations from 880 firms. We observe 229 loan sales in our sample period, involving 138 different firms. We winsorize all the continuous variables at the 1%-level.

Summary statistics are provided in Table 1. Panel 1.A shows that the average *BYS change* is positive and very close to zero. In Panel B, we look into bond and loan trading activity for investment grade and speculative grade borrowers separately. We see that investment grade firms are larger, have more loans outstanding, and higher bond trading volume than speculative grade firms. Secondary loan market trading is more pronounced for speculative grade borrowers, in line with Drucker and Puri (2009). In Panel C, we compare the characteristics of firms with and without loan trading. It emerges that firms with loan trading are riskier (as indicated by higher *BYS* and higher leverage). Interestingly, firms with loan trading also have a more liquid bond market (as indicated by a larger bond trading volume), despite being riskier. This is consistent with our argument that loan trading lowers information asymmetry in the bond market.

3.2 Bond holdings sample

Bond holdings by institutional investors are from EMAXX. This database contains detailed fixed-income holdings for nearly 20,000 entities including U.S. and European insurance firms; U.S., Canadian, and European mutual funds; leading U.S. banks and public pension funds. It provides information on quarterly ownership of more than 40,000 fixed-income issuers, with $5.4 trillion in total face value. EMAXX aggregates holding reports obtained from regulatory disclosure to the National Association of Insurers Commissioners (NAIC) for insurance companies, the Securities and Exchange Commission (SEC) for mutual funds, asset managers and public pension funds, and from voluntary disclosures for major private pension funds. More than half of the institutional ownership of corporate bonds is represented by insurance companies and over a quarter by mutual funds.

Both insurance companies and mutual funds are often part of a larger financial conglomerate which includes a lending division. We name-match the investment groups available in EMAXX with lenders in LPC. Specifically, we proceed as follows. We start by gathering a list of all the lead lenders of firms that have bonds outstanding. This includes all the lenders who engage in loan sales. We obtain the name of the ultimate parent for each lender and match it with the list of financial group names from EMAXX. If we cannot match the name of the ultimate parent with sufficient security, we assess whether there is a reliable name-match for one of the lenders belonging to that ultimate parent. This link is then used for the ultimate parent. When we are in doubt regarding the quality of a match, we manually query the web to verify that the lender and the investment group belong to the same entity.

Table 2 lists the 30 largest financial conglomerates in terms of syndicated loan market participation – i.e., the sum of face values of all syndicated loans in which the lending arm of the conglomerate acted as a lead arranger. We also document the sum of face value of all syndicated loans with secondary market trading, the number of loan sales, the number of affiliated funds in EMAXX and the total value of bond holdings reported by these funds. We see, for example, that J.P. Morgan, the largest loan market participant in our sample, is involved in syndicated loans totaling more than 1.2 trillion USD in face value[12] of which 151 billion of face value also traded in the secondary loan market at some point in time. Based on our match between lenders and financial groups in EMAXX, J.P. Morgan has up to 44 affiliated funds, which together hold as much as 7 billion USD worth of corporate bonds. Table 2 shows that for the majority of loan market participants the presence of affiliated asset managers is the rule rather than the exception.

Using information on loan start and end dates, we create a list of lender-firm-quarter tuples which indicate an active lending relationship between a firm and a lender for that quarter. Finally,

[12] Two facts explain this relatively high figure. First, many banks participate in an average loan syndicate and thus each bank's individual share may be a lot smaller than the face value of the loan. Second, loan renewals enter the LPC data as new deals. To the extent that they replace an older loan agreement, there may be some double-counting which we have not accounted for.

using our link between lenders and bond market funds, we arrive at a list of fund-firm-quarter observations. Descriptive statistics at the fund-level are provided below. Since both LSTA and EMAXX are available as of 1998, our sample spans ten years of data (1998 to 2007) for our bond holdings analysis.

3.3 The Predictive Power of Loan Sales

We start by providing some preliminary evidence on whether loan sales are driven by considerations about the borrowing firm's future prospects. To this end, we investigate the long-term performance of the loans that are sold. If the lenders use loan sales to "dump" loans for which they have received negative information, we expect these loans to perform poorly in the future, especially when the loan sale is accompanied by simultaneous bond holding reductions from affiliated asset managers.

To investigate this issue, we average the loan prices of the firm in the secondary market. We then regress the *relative loan price change* – i.e., the change in the loan price relative to the price at the time of the loan sale – on *holding decrease at loan sale*, a dummy flagging loan sales with simultaneous holding reductions from affiliated asset managers. As controls, we include firm-characteristics and yield curve characteristics at the time of the loan sale. The standard errors are robust to heteroskedasticity and clustered at the firm-level.

The results, reported in Table 3, do not provide evidence of predictability, regardless of the forecast horizon. Although the firms whose loans and bonds are simultaneously sold by some of its lenders see their credit value somewhat deteriorate – for instance, three years after the loan sale, loan prices are on average 5.5% lower when the bonds were simultaneously sold (column 3) – this decline is not statistically significant at any horizon.

Additional (unreported) evidence shows that loan sales have no predictive power for future loan price changes, firm cash flows or stock returns. Overall, we conclude that loan sales do not appear to be motivated by adverse selection on the part of the loan-selling lender.

4. The Effect of Loan Trading on the Bond Market: Is it Information?

In this section, we assess the overall impact of loan trading on the bond market (*H1*), including both the short-term price reaction and the long-term performance of bonds issued by sold borrowers.

4.1 The Overall Evidence

We first analyze the impact of the initiation of loan trading on changes in bond yield spreads. Our key variable of interest is the *loan sale dummy*.[13]

Following Collin-Dufresne et al. (2001), we control for market characteristics (*T-Bill level change*, *T-Bill slope change*, *S&P return*, and *VIX return*), firm characteristics (*firm size change*, *firm leverage change*, *firm rating change*, and *firm rating dummies*) and average bond characteristics (*bond volume change*, *bond maturity*, *bond enhanced* and *bond covenants*). Prior work suggests that firms allow their loans to be sold for a reason – e.g., if they want to raise private debt capital for specific purposes such as a restructuring or acquisition. To control for these confounding effects, we both include a series of control variables and provide sample splits

[13] We note that the results are not affected when we limit the sample to only those firms that have loan trading at some point in time (7,322 obs). Furthermore, even a univariate analysis of bond yield spread changes around loan sale events indicates a significant decrease in yield spreads of 12.5 basis points (t-statistics 2.05).

that allow us to sharpen our analysis. For instance, we control for changes in the firm's outstanding loan amount (*loan log amount change*), defined as the monthly difference in the logarithm of total loan face value, as loan sales often appear around new loan issuances (Drucker and Puri, 2009). In another specification, we directly control for CDS spreads as a precise proxy for a firm's credit risk, even if this reduces our sample size. Standard errors are adjusted for heteroskedasticity and clustered at the firm-level (or firm- and month-level).

We report our baseline results in Table 4, Panel A. In column (1), we see that loan sales reduce the average firm bond yield spread by 16 basis points, representing approximately 8% of the average bond yield spread. Thus, the effect is both statistically and economically significant. In columns (2) and (3), we subsequently add industry and time fixed effects, without affecting the result.[14] In column (4), we cluster the standard errors along the firm and time dimension. Both the coefficients and the t-statistics remain similar in magnitude. Finally, in columns (5) and (6), we present the results for monthly Fama-McBeth regressions.[15] In column (6), we allow for autocorrelation up to 3 lags. The results are again very similar in magnitude, confirming the robustness of the effect.

In Panel B, we repeat our estimation using changes in CDS spreads as a sharper proxy for the underlying credit risk of the borrower. Despite a lower sample size due to the limited availability of CDS data, loan sales continue to have a significant negative effect on bond yield spreads.

[14] In this paper, we report results for the SIC 2-digit industry classification. Results do not change if we use the SIC 3-digit industry classification instead.
[15] We restrict the Fama-McBeth regressions to months where there are at least 5 loan sales in order to have a robust estimate of this effect in each cross-section.

In Panel C, we confirm that our results do not depend on the particular choice of our performance metric: when we replace bond yield spreads with bond returns (in %) as our dependent variable, the results are qualitatively and quantitatively similar to the ones based on yield spreads, confirming that loan sales increase bond value.

In unreported analyses, we also differentiate between the first loan sale for a given firm and subsequent loan sales (of different loans for the same firm). We find that both the first and subsequent loan sales similarly reduce bond yield spreads. Indeed, the theoretical arguments are ambiguous about which of these loan sales should have a larger effect. As we argue in the text, the overall effect of a loan sale is generally a mixture of negative (adverse selection and moral hazard – H1a) and positive effects (relaxation of financial constraints and reduction in information asymmetry – H1b). There is no clear reason why the balance of these effects should be predictably different for first and subsequent loan sales.

In sum, we find that a firm's bond yield spreads fall when its loans become tradable. In other words, the benefits of loan trading (H1b) prevail over the potential concerns of adverse selection and moral hazard (H1a).

4.2 Sample Splits

We have argued that the positive effect of secondary loan market trading stems from information. To shed a first light on this conjecture, we split our sample according to three dimensions that relate to a firm's information environment.

We start with a firm's credit rating. Given that firms rated below investment-grade are presumably characterized by higher uncertainty, we expect the informational benefits of loan trading to be stronger for these firms. Table 5 columns (1) and (2) show that the effect of loan trading on yield spreads is indeed larger for speculative-grade borrowers. In fact, for investment-grade bonds, the effect of loan sales on bond yield spreads is indistinguishable from zero and the difference between the rating categories is not statistically significant (p-value of 0.20).

Next, we split the sample by firm size (equity market value). Consistent with the intuition that small firms are less transparent, we find that the impact of loan trading is more pronounced for small firms. A loan sale for these firms leads to a sizable reduction in bond yield spreads of 19 basis points, whereas for larger firms loan sales do not significantly affect yield spreads. This difference is marginally significant (p-value of 0.09).

The third dimension concerns credit protections at the bond-issue level.[16] Specifically, we split the bond-level sample by whether the bond enjoys a credit enhancement (e.g., a letter of credit). This occurs for roughly 18% of our bond-level sample. As columns (5) and (6) report, loan sales matter less for protected bonds. While loan sales lead to a significant drop in yield spreads of 12 basis points for unprotected bonds, the same event has no effect for protected bonds. This difference is significant (p-value of 0.05).

Overall, this evidence shows that loan sales are appreciated by the bond market. In particular, there is no evidence that lenders sell "lemon loans" or that market participants fear that loan sales undermine monitoring incentives. Instead, there seem to be informational benefits from loan trading, consistent with our information hypothesis (*H1b*). In the next section, we provide

[16] This analysis is conducted at the bond-level rather than the firm-level as before, explaining the increase in the number of observations.

additional evidence for this information channel by analyzing the bond holdings of institutional investors affiliated with the loan-selling lender.

5. Do loan sales reduce information asymmetry? Evidence from Affiliated Asset Managers' Trades

As argued above, the informational benefits of loan trading could be *direct* and *indirect*. Loan quotations, transaction volumes and information spillovers among loan traders provide direct information about the borrower, hence we call this the *direct* information effect. There can also be an *indirect* effect when the increased circulation of loan market information leads to a reduction in information asymmetry in the bond market. This indirect effect will be particularly important when lenders – and specifically their affiliated asset managers – were exploiting their inside information before the loan sale. To see whether this is the case, we study the bond holdings of affiliated asset managers before and after the loan sale. If these investors indeed had access to the private information collected by their affiliated lenders, we expect them to have larger average bond holdings in the borrower before the loan sale and to reduce these holdings when they lose their information advantage after the loan sale.

5.1 Trading behavior of affiliated asset managers

We first analyze how affiliated asset managers change their holdings in sold borrowers as compared to their holdings in other firms. We start from the list of all affiliated fund-quarters described in Section 3. To limit the set of potential securities, we only consider bonds that the fund has held at some point in time over the sample period.[17] We drop funds with total net assets of less than one million. We aggregate different bond issues of the same firm to obtain the total bond holdings of fund *j* in firm *i* reported for quarter *t*. We define *holding fraction* as the fraction of fund *j*'s portfolio invested in bonds of firm *i* in quarter *t*,

$$holding\ \ fraction_{i,j,t} = \frac{holdings_{i,j,t}}{total\ net\ assets_{j,t}}.$$

Our first dependent variable is the difference in holding fraction between two quarters (*holding fraction change*). Given that *holding fraction change* is often zero, we follow Kacperczyck and Seru (2007) and also define a second dependent variable, *relative holding change*, as the relative change in bond holdings of fund *j* between two quarters,

$$relative\ holding\ change_{i,j,t} = \frac{holdings_{i,j,t} - holdings_{i,j,t-1}}{holdings_{i,j,t-1}}.$$[18]

We report descriptive statistics for the portfolio holdings of affiliated funds in Table 6, Panel A. On average, an affiliated fund invests 1.1% of his portfolio in any given firm. The average change in holding fraction over the whole sample is close to zero, whereas the average increase in relative holdings is 5%, indicating that the average fund has grown over time.

Our key variable is *loan sale dummy*, a dummy that equals one if a lender affiliated with fund *j* sold a loan of firm *i* in quarter *t*. To distinguish holding changes in sold borrowers from affiliated funds' trades in other firms, we further include a dummy variable that flags all the

[17] The alternative would be to consider every fund-firm pair, meaning that every fund can hold every firm. This is neither feasible (for data size reasons) nor desirable (as the overwhelming fraction of observations in such a dataset would indicate zero holdings).
[18] Given that we want to include cases where a fund invested into firms in which it had no previous holdings, we follow Kacperczyck and Seru (2007) and set *relative holding change* to one (representing an increase of 100%) in this case. Like them, we also winsorize *relative holding change* at 300%.

holding changes of affiliated funds in a loan sale quarter (*fund family sells dummy*). Because sold borrowers might be different from other firms, we also include a dummy to flag those firms (*firm sold dummy*).

It may be that financial conglomerates have an overall exposure limit vis-a-vis a borrower's credit risk. When this is the case, affiliated funds may want to reduce their holdings when a new loan is granted, which often occurs around the time of a loan sale (Drucker and Puri, 2009). To control for this possibility, we include a *new loan dummy* that is equal to one if a lender affiliated with fund *j* issued a new loan to firm *i* in quarter *t*. We add firm-characteristics from Compustat where available. Given that Compustat data is not available for all the firms that issue bonds, we report our results for two subsamples: the "total sample" without firm controls and the "Compustat sample" with firm controls. Because bond mutual funds comprise a large array of different fund classes with different holding constraints and benchmarks, we conduct our analysis at the fund level while controlling for fund-class fixed effects. We cluster the standard errors at the firm-fund family pair, thus allowing for an arbitrary correlation between the holdings of all funds of the same family in the same firm.

The results are reported in Table 6, Panel B. Columns (1) and (2) contain our results for the total sample without firm-controls; columns (3) to (4) show the results for the "Compustat" sample with firm-controls. We find that affiliated funds significantly reduce their bond holdings in sold borrowers *in the quarter of the loan sale*. This reduction represents 3% of the affiliated fund's average bond holdings.

Few other variables are significant, with the exception of log TNA change, firm size change and firm leverage change. Growing funds may not only scale up their existing positions but presumably also add new ones, which reduces the average holding fraction. Similarly, high leverage (larger) firms may issue more public debt, explaining why the average fund will have larger holdings in these firms.

In Table 6, Panel C, we report our regressions results for the *relative holding change* variable. Again, we find evidence that affiliated funds reduce their bond holdings in sold borrowers in the very quarter of the loan sale. For the total sample, the results are significant and indicate relative holding reductions of 8%. For the "Compustat sample", the reduction in relative holdings is around 9% and also statistically significant. Compared to the holding change regressions from above, the statistical fit of the relative holding regressions is improved, as evidenced by the increased adjusted R^2 statistic. For this reason, we henceforth focus on this dependent variable.

We posit that affiliated asset managers see their information advantage reduced when the loan is sold and consequently reduce their exposure to these firms. However, there is an obvious alternative: financial groups might simultaneously sell both the loans and the bonds of firms for which they have received negative information (H1a). Two considerations help us address this possibility. First, as documented in Table 3, we do not find evidence of long-term underperformance of loans when bonds and loans are simultaneously sold. Second, if bond selling were indeed motivated by information about bad future performance, funds would try to secretly reduce their positions *before* the loan is sold. Instead, in unreported results, we find no evidence of increased selling pressure in the quarters before the loan sale.

5.2 Comparing the trading behavior of affiliated and non-affiliated asset managers

In this subsection, we compare the trading behavior of the affiliated funds in sold borrowers with the trading behavior of the non-affiliated ones in the same firm. We proceed as follows. We start from the list of borrowers whose loans are sold at some point in time. We keep track of all bond holdings by affiliated mutual funds in these firms. As a control group, we select three non-affiliated mutual funds for each affiliated fund. The control funds are similar in terms of size – i.e., they belong to the same total net asset decile – and are of the same type – i.e., they share the same EMAXX fund classification (e.g., corporate pension fund, union pension fund, variable annuity fund).

It is important to note that affiliates are defined at the fund-borrower pair, depending on whether there is an active lending relationship between the borrower and the fund's parent. Hence, a fund belonging to a financial conglomerate may constitute an affiliated fund for one borrower and a non-affiliated fund for another borrower. When we compare the trading of the affiliated asset managers to that of the non-affiliated ones, we are in fact comparing how trading in firms for which there may be access to inside information differs from trading in firms for which there is no access to inside information.

Unconditional descriptive statistics for our bond holding variables are provided in Table 7, Panel A. In Panel B, we compare the average bond holdings of affiliated and non-affiliated asset managers. We see that the holding fraction of the affiliated asset managers is significantly larger than the holding fraction of the non-affiliated ones (by approximately 14%). This supports the view that information flows within financial conglomerates despite the existence of Chinese walls. If there were no informational flows, funds would have no reason to overweigh firms which have borrowed from their parents. In fact, absent information flows, risk management concerns should lead affiliated funds to underweigh these firms.

Next, we estimate a panel regression where the dependent variable is the relative holding change as defined above. The specification is similar to the one in Table 6, except that we replace the fund family sells dummy with an affiliation dummy that flags all fund-borrower pairs for which there exists an ongoing lending relation.[19] As above, we include a dummy for whether firm *i*'s loan was sold in quarter *t* (*firm sold dummy*). Our key variable is still the *loan sale dummy*, which marks fund-firm-quarters in which fund *j*'s family is selling firm *i* in quarter *t*. This is essentially the interaction between the *affiliation dummy* and the *firm sold dummy*.

The results are reported in Table 7, Panel C. We find that funds affiliated with the loan-selling fund-family sell between 6-8% of their holdings in the sold borrowers. This change is highly statistically significant and in contrast to the trading behavior of unaffiliated asset managers who do not appear to change their holdings (indicated by the insignificant coefficient estimate for the firm sold dummy). These results suggest that the affiliated asset managers are aware that their informational advantage decreases with the emergence of loan trading and thus reduce their holdings in these firms.

One concern is that banks may have an exposure limit for the credit risk of a particular firm. If the lender wishes to originate a new loan to the borrower, it may thus shed some exposure by

[19] In Table 6, we focused on affiliated funds and analyzed their holding changes in sold borrowers compared to holding changes in other bonds. There, the fund family sells dummy was an important control to ensure that the loan sale dummy captured the effect over and above the funds' other holding changes in the quarter of the loan sale. Instead, in Table 7, we focus on the holdings in sold borrowers only, but now compare holding changes between affiliated and non-affiliated funds.

selling the loan and/or requiring its affiliated funds to reduce their bond holdings. However, we actually control for new loan issuances in our analysis ("new loan dummy" in Tables 6 and 7). A substitution effect between loans and bonds would manifest itself in the estimation coefficient for this control variable, but not in the estimation coefficient for the "loan sale dummy" – our variable of interest. Moreover, it is unclear whether bilateral credit exposure limits, if present, would pertain not only to the credit exposure of the lender (and its in-house proprietary trading desk), but also to the *affiliated* mutual funds and institutional asset managers. After all, we find that affiliated funds have larger average holdings compared to unaffiliated ones, inconsistent with the presence of credit exposure limits.

6. "Informed" Trading in the Bond Market

In this section, we provide more direct evidence for informed trading in the bond market. We start by analyzing the demand for lendable bonds which are required to engage in short-selling. Since we expect fewer opportunities for informed trading after the loan sale, we should see a decrease in the demand for lendable bonds around the loan sale. We then check whether the impact of loan sales on bond yield spreads is related to informed trading by the loan-selling banks and investigate bond market liquidity.

6.1 Short Selling Demand

We obtain data on bond lending from DataExplorers, the leading provider of financial benchmarking information to the securities lending industry and short-side intelligence to the investment management community. DataExplorers collects data from custodians and prime brokers that lend and borrow securities. Our data starts in May 2002 and comprises information about the amount of lendable securities, the current amount on loan and the lending fee at monthly frequency.

Table 8, Panel A provides descriptive statistics for the supplied quantity of lendable bonds (*short supply quantity*), the quantity of borrowed bonds (*short supply used*), the fraction of borrowed bonds from all lendable bonds (*short fraction used*) and the average borrowing fee (*short average fee*). We show these statistics separately for bonds at times when their loans are traded and at times when they are not. This split reveals that there is a significantly smaller supply of lendable bonds for firms whose loans are trading. At the same time, less of this supply is used (even though the fraction used is higher). We conclude that there is evidence for a reduction in short-selling supply, but this evidence is not inconsistent with a simultaneous reduction in short-selling demand.

Next, we analyze whether loan sales lead to a demand reduction in the demand for lendable bonds for short-selling. Following Cohen et al. (2007), we identify a demand reduction as situations in which both the lending quantity and the lending fee decrease from one month to the next. We then test whether such demand reductions are more likely to occur in the month following a loan sale. Our key dependent variable, *next DIN*, is a dummy flagging demand reductions (i.e., simultaneous reductions in borrowing quantities and fees) in the bond lending market between months t and $t+1$.[20] The explanatory variables are our dummy indicating loan

[20] We also check whether loan sales have a significant effect on supply-side market movements – analogously defined as indicators for months in which the borrowing quantity increased (decreased) while the borrowing fee decreased (increased). We do not find such an effect (results available upon request).

sales in month *t* and the same set of control variables that we employed in our yield spread regressions of Section 4.

The results in Table 8, Panel B show that there is a significantly higher probability of a demand reduction for lendable bonds in the month after a loan sale. The effect is economically sizable and statistically significant across all specifications (linear probability model with fixed effects, Logit or Fama-MacBeth). A demand reduction (DIN) is 8-10 percentage points more likely in the month following a loan sale, which represents a 40-50% increase over its unconditional probability. This suggests that there is less short-selling activity after the loan sale, presumably because of less information asymmetry.

6.2 Impact of Loan Sales and Informed Trading Propensity

We now return to our analysis of bond yield spreads and ask whether the documented loan sale effect is pronounced when the loan-selling lender is more likely to engage in informed trading. In Table 9, we report results for sample splits along three dimensions proxying for lender's informed trading propensity.

We start with bond holdings by affiliated asset managers. Given prior evidence of information flows within financial conglomerates, we suspect that larger bond holdings are associated with larger information asymmetry in the bond market. Hence, loan sales should matter more for firms whose lenders' affiliated asset managers report positive bond holdings in them. We find that this is the case for approximately 20% of firm-month observations in our sample. Columns (1) and (2) confirm our hypothesis. While loan sales lead to a 41 basis points decrease in yield spreads for firms whose lenders are also informed traders in the bond market, loan sales hardly matter if lenders are not among the bondholders. The difference in the effect of the loan sales between the subsamples is economically large and marginally statistically significant (p-value 0.09).

Next, we split our sample according to whether the lead lender selling the loan is a commercial bank or an "investment bank".[21] This is the case in roughly 40% of the firm-months observations. Using this proxy for lender type, we find that the reduction in yield spreads is concentrated in the subsample of loan sales by investment bank lenders (columns 3 and 4). When an investment bank sells a loan, the yield spread of its borrower goes down by 45 basis points, which corresponds to approximately 22% of the average yield spread. The difference with respect to the subsample of commercial bank lenders is strongly statistically significant (p-value of 0.00). This result is consistent with the notion that investment banks trade more on inside information.

Finally, we look at the loan sale policy of the lender. We group lenders by the fraction of loans they sell in the secondary loan market out of all the loans they have granted.[22] The intuition is that when a lender has already sold many loans of different firms, his informational advantage is reduced to the few firms whose loans he has not already sold. As such, he might be even more tempted to trade on his information about these firms. A loan sale by one of these remaining firms will then allay insider trading concerns even more strongly. We report the results for this sample split in columns (5) and (6). As expected, the effect of loan trading on bond yield spreads

[21] We use the term "investment bank" loosely. More precisely, these non-commercial banks (non deposit-receiving institutions) comprise investment banks and hedge funds. We also checked separately for "foreign lenders". There are very few foreign lenders in our sample. Whether we classify these foreign lenders as commercial or investment banks does not affect our results.
[22] Note that for this grouping, we also count loan sales of firms that do not have bonds outstanding.

is concentrated in firms whose lenders have already sold a large fraction of their loan portfolio, although the difference between the two subsamples is not statistically significant (p-value 0.24).

These sample splits show that the loan sale effect is pronounced in situations where we expect it to be stronger according to the information asymmetry channel. They provide evidence for *indirect* informational benefits of loan trading (H2b) – i.e., a reduction in information asymmetry.

6.3 Bond market liquidity and liquidity risk

Drawing on the recent literature on credit default swaps (CDS) and the CDS-bond basis, we conduct a more refined test to distinguish between direct and indirect informational effects of loan trading. Specifically, we decompose bond yield spreads into a default risk component – the *CDS spread* – and a residual component orthogonal to the borrower’s credit risk – the *CDS-bond basis*. The literature finds that the latter is strongly related to a bond’s liquidity risk, whereas the *CDS spread only* captures the borrower’s credit risk (e.g., Longstaff et al., 2005; Beber et al., 2009, Bai and Collin-Dufresne, 2011). This decomposition therefore allows us to further test our hypothesis. Indeed, the *CDS spread* should be most affected from the loan sale if loan trading provides direct information and thus reduces the uncertainty about a borrower. If, on the other hand, loan trading matters more as an information-redistributing event that lowers information asymmetry, the *CDS-bond basis* should be more affected via the liquidity risk channel.

The premise of the yield spread decomposition is that bonds carry a liquidity premium because they are in limited supply, whereas the CDS of the same firm do not because they are traded over-the-counter with the underwriter. We gather monthly CDS data from Thompson

Datastream for different maturities. We estimate the CDS-bond basis employing the CDS-par equivalent methodology introduced in Elisade et al. (2009) and detailed in Mahanti et al. (2011) and Bai and Collin-Dufresne (2011). The CDS-bond basis is the difference between the observed 5-year CDS spread and the corresponding theoretical CDS spread ("PECDS") implied by bond default intensities and the risk-free LIBOR-swap benchmark,

$$CDS\,bond\,basis_{i,t} = CDS_{i,t} - PECDS_{i,t}\,.$$

The CDS-bond basis decreases in the liquidity risk of the underlying bonds (Longstaff et al, 2005; Mahanti et al., 2011). Thus, if loan sales lower liquidity risk through the reduction of information asymmetry, the CDS-bond basis should increase around the loan sale.

To study the differential effect of loan sales on default risk and liquidity risk, we regress changes in *CDS spreads* and *CDS-bond basis* on our loan sale dummy and the set of control variables from our baseline specification (see Table 4). As Table 10 shows, loan sales do not affect *CDS spreads* (columns 1-3), whereas they lead to a significant increase in the *CDS-bond basis*, suggesting that they reduce the liquidity premium required in the bond market. In terms of economic magnitude, a loan sale leads to an increase in the bond basis of 14 to 19 basis points, representing 16%-21% of its standard deviation. Given the paucity of CDS data, the positive significant effect on the *CDS-bond basis* is remarkable and leads us to conclude that loan sales benefit bondholders primarily through a reduction in information asymmetry (*H2b*).

Finally, according to the information hypothesis, we expect bond market liquidity to improve after the loan sale. Our last test therefore concerns the effect of loan sales on the Amihud (2002) illiquidity measure, which has proven to be a reliable proxy for illiquidity (Hasbrouck, 2003;

Goyenko et al., 2009). To calculate the Amihud measure, we construct daily ratios of absolute return over trading volume and then form an average of these ratios in each quarter.[23] We use both the *Amihud* measure and its natural logarithm (*log Amihud*) as dependent variables.

Table 11, Panel A shows in a univariate setting that illiquidity is 14% lower when there is loan trading. This difference is significant. In Panel B, we test for changes in the Amihud measure in a multivariate setting, where we also control for other determinants of liquidity. Given that trends in liquidity are slow and persistent, we also add lagged values of the Amihud measure to our regressions. We estimate these lagged dependent variable specifications with the Fama-McBeth procedure.[24] Columns (1)-(3) and (4)-(6) report results for the specifications based on changes in *Amihud* and change in *log Amihud*, respectively. Rating fixed effects and Newey-West corrections for auto-correlation (allowing for 3 lags) are sequentially added.

Regardless of the specification, loan sales reduce the Amihud illiquidity measure. For example, column (1) indicates that the price impact is on average 1.4 percentage points (20%) lower in the quarter after the loan sale. These results indicate an improvement in liquidity consistent with hypothesis *H2b*.

Conclusion

We study the implications of secondary loan market trading for the bond market. |The corporate loan market is an ideal arena to study what happens when an informed investor – the lender – renounces to some of his informational advantage by making a loan tradable and sharing

[23] The results at the month-level are weaker, suggesting that the effect of loan sales on bond liquidity takes time to materialize.
[24] This approach circumvents the bias of OLS in a dynamic panel data setting.

sensitive information about the borrower with the market. We argue that loan sales raise the information available to market participants and reduce information asymmetry in the corporate bond market.

Using data on the U.S. loan trading market over the period 1998-2007, we first show that the initiation of loan trading leads to a reduction in bond yield spreads. This suggests that potential concerns of adverse selection or moral hazard are outweighed by benefits of loan trading. We then provide evidence that these benefits are, at least in part, informational in nature. First, loan trading increases the information available to bondholders directly. Second, loan trading benefits bond market investors indirectly by reducing the information asymmetry about the borrower. Prior to the loan sale, information about the borrower is both limited and concentrated, allowing a few informed parties – such as asset managers affiliated with the lending syndicates – to reap profits from trading in the bond market. By spreading information to more investors, loan sales alleviate this informed trading risk in the bond market. Consistent with this interpretation, we show that affiliated asset managers reduce their stakes in the borrower around loan sales; i.e., when they lose their informational advantage. Moreover, the probability of a demand reduction for lendable bonds – a proxy for short-selling activity – significantly increases in the month after a loan sale, indicating that there is less information asymmetry to be exploited. Finally, loan sales affect mostly the liquidity risk premium of bond yield spreads and lead to an improvement in bond market liquidity.

Our results have important normative implications for the debate on transparency and disclosure of information. Indeed, they show that the very market participants endowed with superior inside information – the lenders – are willing to share part of this information in order to access the benefits of risk sharing provided by the existence of the secondary loan market. This is a sort of “market-based” solution to information asymmetry problems complementary to traditional disclosure rules imposed by regulators.

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Table 1: Descriptive Statistics for Bond Sample

PANEL A – Overall Sample

	mean	median	standard dev	min	p25	p75	max
Level variables							
BYS	2.0646	1.3047	2.4350	0.0000	0.7721	2.5463	24.2255
loan log amount	7.3382	7.4024	1.2299	3.7136	6.6194	8.2298	10.0810
T-Bill level	3.5359	3.9500	1.4793	0.8300	2.4400	4.8900	5.1900
T-Bill slope	0.5916	0.3500	0.8326	-0.5200	-0.0300	0.9356	3.1622
bond log volume	17.2686	17.3989	1.8887	6.9088	16.2043	18.5678	21.1363
firm size	7.1121	7.2353	1.3828	2.3205	6.1772	8.0546	11.5037
firm leverage	0.2967	0.2599	0.1760	0.0278	0.1792	0.3678	1.0923
Change variables							
BYS change	-0.0057	-0.0040	0.7060	-3.0522	-0.2343	0.2108	3.1513
loan log amount change	0.0099	0.0000	0.1565	-3.4148	0.0000	0.0000	2.5248
T-Bill level change	0.0094	0.0113	0.0239	-0.1100	-0.0112	0.0255	0.0864
T-Bill slope change	0.0080	-0.0287	0.1585	-0.2914	-0.0823	0.0890	0.4798
bond log volume change	0.0362	-0.0112	1.2123	-8.5521	-0.5039	0.5105	11.2465
firm size change	0.0066	0.0000	0.1158	-2.2596	0.0000	0.0000	2.1594
firm leverage change	-0.0002	0.0000	0.0313	-0.5674	0.0000	0.0000	0.6201
N	18319						

PANEL B – loan tradability by rating category

	Speculative Grade	Investment Grade	Total	Difference	t-stats of Difference
bond log volume	17.01	17.48	17.27	0.475***	(17.07)
	(1.532)	(2.115)	(1.889)		
firm size	6.352	7.739	7.112	1.387***	(78.00)
	(1.274)	(1.132)	(1.383)		
firm leverage	0.376	0.232	0.297	-0.144***	(-60.37)
	(0.204)	(0.113)	(0.176)		
loan amount	2562.2	3234.6	2930.7	672.4***	(12.56)
	(3574.8)	(3633.3)	(3622.4)		
loan amount traded	502.6	201.5	337.6	-301.1***	(-22.45)
	(1026.2)	(787.8)	(915.7)		
loan fraction traded	0.140	0.0392	0.0846	-0.100***	(-37.71)
	(0.222)	(0.134)	(0.186)		
N	8280	10039	18319		

PANEL C – firm characteristics by loan tradability

	Loan Not Traded	Loan Traded	Total	Difference	t-stats of Difference
BYS	1.721	3.062	2.065	-1.341***	(33.52)
	(2.021)	(3.154)	(2.435)		
bond log volume	17.13	17.68	17.27	0.550***	(17.34)
	(1.952)	(1.623)	(1.889)		
firm size	7.142	7.026	7.112	-0.115***	(-4.94)
	(1.366)	(1.426)	(1.383)		
firm leverage	0.268	0.380	0.297	0.112***	(39.05)
	(0.161)	(0.191)	(0.176)		
N	13624	4695	18319		

Table 2: Largest Financial Conglomerates by Syndicated Loan Participation

Table 2 lists the 30 largest financial conglomerates in terms of syndicated loan market participation (as a lead bank). Column 3 counts the number of loan sale months (i.e., months in which there is at least one loan sale) that this financial conglomerate is involved in. Column 4 contains the average loan market participation over the sample period in terms of the face value of the syndicated loans. Similarly, column 5 contains the average secondary loan market participation over the sample period in terms of the face value of syndication loans with secondary market trading. Column 6 contains the maximum number of affiliated funds for each financial conglomerate. Column 7 contains the average amount of total bond holdings over the over the sample period.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rank	Financial Conglomerate Name	# of loan sales	Participated loans (face value in mn$)	Participated and traded loans (face value in mn$)	# of affiliated funds	Bond holdings of affiliated funds (mn$)
1	JP Morgan	59	1226379.0	150869.8	44	6967.4
2	Bank of America Merrill Lynch	58	552264.3	58130.9	102	5928.8
3	Citi Group	51	410486.3	54425.5	79	9553.1
4	Deutsche Bank AG	53	168775.9	38147.9	13	2595.5
5	Wells Fargo & Co	48	156831.6	12458.8	20	1697.8
6	Credit Suisse	52	109309.4	21056.6		
7	Royal Bank of Scotland	28	95531.3	16842.1	1	810.4
8	Toronto Dominion Bank	15	58796.3	4852.6		
9	Barclays Bank Plc	16	50297.3	4290.5	8	2900.9
10	CIBC World Markets	12	46460.0	1716.6	1	1367.7
11	BNP Paribas SA	26	45191.7	5273.9	1	120.4
12	Bank of New York Mellon	4	38905.0	1908.0	45	2402.5
13	Scotia Capital	11	37832.9	4084.6		
14	RBC Capital Markets	5	37708.3	218.0		
15	UBS AG	26	37572.4	5871.5	15	2237.7
16	Lehman Brothers Inc	35	32831.1	6710.3	1	1506.4
17	Goldman Sachs & Co	31	31136.2	7116.6	18	2965.9
18	HSBC Banking Group	11	30419.6	4249.9	1	52.2
19	Mitsubishi UFJ Financial Group	6	30217.5	1903.5	1	113.9
20	General Electric Capital Corp	28	30021.5	3265.9	1	6484.5
21	Commerzbank AG	17	29432.4	5298.3	3	56.4
22	Morgan Stanley	20	27950.7	6499.0	51	9001.0
23	Societe Generale	17	27529.6	2875.4	5	493.5
24	BMO Capital Markets Financing Inc	3	24667.0	430.6	10	3827.0
25	SunTrust Bank	5	23138.6	559.2	7	1833.6
26	PNC Bank	9	23095.8	1321.4	84	11813.4
27	Calyon Corporate & Investment Bank	9	22418.6	3182.3		
28	Mizuho Financial Group Inc	1	21294.3	15.3	14	550.4
29	Sumitomo Mitsui Financial Group Inc	1	16597.7	15.3	24	231.1
30	KeyBank	7	13236.0	742.4	8	1408.9

Table 3: Long-term performance of sold loans

Table 5 contains cross-sectional OLS regressions where the dependent variable is the relative change in the average loan price of firm *i* between quarter *t+z* and the quarter of the loan sale *t* (*relative loan price change*). Each column contains the cross-sectional regression for different *z*. The key independent variable is a dummy for whether affiliated asset managers decreased their bond holdings in firm *i* in the quarter of the loan sale (*holding decrease at loan sale*). Control variables include the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), natural logarithm of sales (*firm size*), leverage ratio (*firm leverage ratio*) and book-to-market ratio (*firm book-to-market ratio*). Standard errors are robust to heteroskedasticity and clustered at the firm level. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependant variable: *relative loan price change*

	(1)	(2)	(3)	(4)
time after loan sale	1 year	2 years	3 years	4 years
holding decrease at loan sale	-0.0014	-0.0050	-0.0555	-0.0141
	(-0.08)	(-0.16)	(-1.30)	(-0.21)
T-Bill level change	0.1350	-0.7750**	-0.6515	-0.8093
	(0.34)	(-2.50)	(-0.88)	(-0.58)
T-Bill slope change	-1.2392**	-3.4870***	-3.2645***	-3.9193*
	(-2.09)	(-4.83)	(-3.00)	(-1.79)
firm book-to-market ratio	0.0000	-0.0000***	-0.0000***	-0.0000***
	(0.69)	(-3.38)	(-4.10)	(-3.63)
firm size	-0.0005	0.0021	0.0144	0.0212
	(-0.18)	(0.40)	(1.04)	(1.12)
firm leverage ratio	-0.025	-0.0365	-0.0283	-0.0013
	(-1.39)	(-1.01)	(-0.52)	(-0.02)
Constant	0.0064	-0.0146	-0.0986	-0.1474
	(0.32)	(-0.33)	(-1.06)	(-1.17)
Observations	392	287	198	149
Adjusted R^2	0.04	0.13	0.19	0.16

Table 4: Bond yield spreads and loan sales

PANEL A – base effect

Table 3, panel A, columns 1-4, report results for panel OLS regression. Columns 5-6 report results for monthly Fama-McBeth regressions. The dependent variable is the average change of bond yield spreads of firm *i* in month *t* (*BYS change*). The key variable is a dummy that indicates the start of trading for an outstanding loan of firm *i* in month *t* (*loan sale dummy*). Controls include the change in the loan amount outstanding in firm *i* (*loan log amount change*), the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), monthly S&P 500 return (*S&P total return*), monthly VIX return (*VIX return*), change in the natural logarithm of aggregated bond volume (*bond log volume change*), change in leverage ratio from previous quarter (*firm leverage ratio change*), change in log of sales from previous quarter (*firm size change*), rating dummies (*AAA*, *AA*, *A*, *BBB*, *BB*, *B*) are included but not reported for brevity. In columns 1-4, standard errors are clustered at the firm-level, except for column 4 where they are clustered at the firm-month level. In columns 5-6, standard errors are estimated from the time series of cross-sectional coefficients. In column 6, autocorrelation of up to 3 lags is allowed. For better visibility, the dependent variable as well as T-Bill level and T-Bill slope are given in percentages (i.e. 1% = 1). The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable: BYS change

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	FMB	FMB
loan sale dummy	-0.1581**	-0.1573**	-0.1509**	-0.1581**	-0.1442**	-0.1442**
	(-2.53)	(-2.50)	(-2.40)	(-2.56)	(-2.55)	(-2.29)
loan log amount change	-0.0052	-0.0089	-0.0222	-0.0052	-0.0383	-0.0383
	(-0.18)	(-0.30)	(-0.75)	(-0.16)	(-0.44)	(-0.40)
T-Bill level change	-0.2384***	-0.2429***		-0.2384**		
	(-5.80)	(-6.01)		(-2.32)		
T-Bill slope change	-0.1633***	-0.1674***		-0.1633**		
	(-4.45)	(-4.61)		(-1.99)		
S&P total return	-4.6810***	-4.6976***		-4.6810***		
	(-9.88)	(-9.89)		(-4.40)		
VIX return	0.0157	0.0122		0.0157		
	(0.31)	(0.24)		(0.12)		
bond log volume change	-0.0065	-0.0066	-0.0081	-0.0065	0.0016	0.0016
	(-1.19)	(-1.20)	(-1.47)	(-1.31)	(0.10)	(0.11)
firm leverage ratio change	0.4619**	0.4598**	0.2714	0.4619*	0.0567	0.0567
	(2.20)	(2.18)	(1.26)	(1.87)	(0.59)	(0.68)
firm size change	0.0178	0.0179	0.0244	0.0178	0.0290	0.0290
	(0.26)	(0.26)	(0.37)	(0.31)	(0.88)	(1.04)
rating gone up	-0.0874	-0.0841	-0.0884	-0.0874	-0.0498	-0.0498
	(-1.14)	(-1.10)	(-1.23)	(-1.52)	(-1.16)	(-1.20)
rating gone down	0.1857***	0.1843***	0.1889***	0.1857**	0.0521*	0.0521*
	(2.69)	(2.65)	(2.73)	(1.98)	(1.69)	(1.68)
Constant	-0.0013	0.0733*	0.0566	-0.0013	-0.1446*	-0.1446
	(-0.06)	(1.81)	(1.24)	(-0.03)	(-1.71)	(-1.59)
Observations	18319	18319	18319	18319	52	52
Adjusted R^2	0.05	0.05	0.06	0.05	0.05	0.05
Clustering	Firm	Firm	Firm	Firm&Month	N	N
Rating Dummies	Y	Y	Y	Y	Y	Y
Industry FE	N	Y	Y	N	N	N
Month FE	N	N	Y	N	N	N
Newey (3 lags)	N	N	N	N	N	Y

PANEL B – controlling for CDS spreads

Panel B, columns 1-4, report results for panel OLS regression. Columns 5-6 report results for monthly Fama-McBeth regressions. The dependent variable is the average change of bond yield spreads of firm *i* in month *t* (*BYS change*). The key variable is a dummy that indicates the start of trading for an outstanding loan of firm *i* in month *t* (*loan sale dummy*). Controls include the change in the 5-year CDS spread (*CDS change*), the change in the loan amount outstanding in firm *i* (*loan log amount change*), the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), monthly S&P 500 return (*S&P total return*), monthly VIX return (*VIX return*), change in the natural logarithm of aggregated bond volume (*bond log volume change*), change in leverage ratio from previous quarter (*firm leverage ratio change*), change in log of sales from previous quarter (*firm size change*), rating dummies (*AAA*, *AA*, *A*, *BBB*, *BB*, *B*) are included but not reported for brevity. In columns 1-4, standard errors are clustered at the firm-level, except for column 4 where they are clustered both at the firm and month level. In columns 5-6, standard errors are estimated from the time series of cross-sectional coefficients. For better visibility, the dependent variable, CDS change, T-Bill level and T-Bill slope are given in percentages (i.e. 1% = 1). In column 6, autocorrelation of up to 3 lags is allowed. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable: BYS change

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) FMB	(6) FMB
loan sale dummy	-0.1766**	-0.1810**	-0.1906**	-0.1766**	-0.1819**	-0.1819**
	(-2.49)	(-2.52)	(-2.57)	(-2.15)	(-2.08)	(-2.22)
loan log amount change	-0.0110	-0.0107	-0.0299	-0.0110	-0.0618	-0.0618
	(-0.37)	(-0.36)	(-1.00)	(-0.29)	(-0.53)	(-0.69)
CDS change	0.1696***	0.1682***	0.1594***	0.1696***	0.0375	0.0375*
	(6.03)	(6.02)	(6.33)	(4.76)	(1.43)	(1.86)
T-Bill level change	-0.1498***	-0.1535***		-0.1498		
	(-3.37)	(-3.48)		(-1.47)		
T-Bill slope change	-0.0857*	-0.0927**		-0.0857		
	(-1.96)	(-2.14)		(-0.90)		
S&P total return	-3.7973***	-3.8136***		-3.7973***		
	(-6.29)	(-6.29)		(-3.48)		
VIX return	0.0399	0.0349		0.0399		
	(0.73)	(0.64)		(0.38)		
bond log volume change	0.0117**	0.0118**	0.0119*	0.0117*	0.0167	0.0167
	(1.98)	(2.00)	(1.97)	(1.83)	(0.90)	(1.19)
firm leverage ratio change	-0.1081	-0.1062	-0.2617	-0.1081	-0.2217	-0.2217
	(-0.36)	(-0.36)	(-0.84)	(-0.45)	(-1.10)	(-1.18)
firm size change	-0.0759	-0.0740	-0.0632	-0.0759	0.0091	0.0091
	(-1.15)	(-1.11)	(-0.95)	(-1.57)	(0.36)	(0.42)
rating gone up	0.0718	0.0757	0.0586	0.0718**	0.0035	0.0035
	(1.21)	(1.28)	(0.99)	(1.97)	(0.17)	(0.16)
rating gone down	0.0967	0.0988	0.0888	0.0967	0.0279*	0.0279*
	(1.41)	(1.43)	(1.30)	(1.54)	(1.89)	(1.88)
Constant	-0.0390	0.0197	0.0010	-0.0390	-0.1205	-0.1205
	(-1.07)	(0.38)	(0.02)	(-0.53)	(-0.94)	(-0.91)
Observations	10334	10334	10334	10334	46	46
Adjusted R^2	0.05	0.05	0.09	0.05	0.09	0.09
Clustering	Firm	Firm	Firm	Firm&Month	N	N
Rating Dummies	Y	Y	Y	Y	Y	Y
Industry FE	N	Y	Y	N	N	N
Month FE	N	N	Y	N	N	N
Newey (3 lags)	N	N	N	N	N	Y

PANEL C – bond returns

Panel C, columns 1-4, report results for panel OLS regression. Columns 5-6 report results for monthly Fama-McBeth regressions. The dependent variable is the average bond return of firm *i* in month *t* (*bond return*). The key variable is a dummy that indicates the start of trading for an outstanding loan of firm *i* in month *t* (*loan sale dummy*). Controls include the change in the 5-year CDS spread (*CDS change*), the change in the loan amount outstanding in firm *i* (*loan log amount change*), the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), monthly S&P 500 return (*S&P total return*), monthly VIX return (*VIX return*), change in the natural logarithm of aggregated bond volume (*bond log volume change*), change in leverage ratio from previous quarter (*firm leverage ratio change*), change in log of sales from previous quarter (*firm size change*), rating dummies (*AAA*, *AA*, *A*, *BBB*, *BB*, *B*) are included but not reported for brevity. In columns 1-4, standard errors are clustered both at the firm and month level, except for column 4 where they are clustered at the firm-month level. In columns 5-6, standard errors are estimated from the time series of cross-sectional coefficients. In column 6, autocorrelation of up to 3 lags is allowed. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable: Bond Return

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	FMB	FMB
loan sale dummy	0.0091**	0.0095**	0.0088**	0.0091**	0.0060*	0.0060**
	(2.00)	(2.05)	(2.04)	(2.14)	(1.93)	(2.20)
loan log amount change	-0.0047**	-0.0048**	-0.0047**	-0.0047**	-0.0048	-0.0048
	(-2.14)	(-2.17)	(-2.03)	(-2.00)	(-0.83)	(-1.00)
CDS change	-0.7906***	-0.7848***	-0.7695***	-0.7906***	-0.3133**	-0.3133**
	(-6.05)	(-6.11)	(-5.40)	(-5.04)	(-2.56)	(-2.69)
T-Bill level change	-2.1133***	-2.1017***		-2.1133***		
	(-6.49)	(-6.43)		(-2.82)		
T-Bill slope change	-3.2737***	-3.2617***		-3.2737***		
	(-11.09)	(-11.05)		(-6.11)		
S&P total return	0.0917***	0.0923***		0.0917		
	(2.71)	(2.72)		(1.27)		
VIX return	0.0039	0.0040		0.0039		
	(0.94)	(0.96)		(0.41)		
bond log volume change	-0.0009*	-0.0009*	-0.0009*	-0.0009	-0.0008	-0.0008
	(-1.91)	(-1.93)	(-1.67)	(-1.45)	(-0.86)	(-1.04)
firm leverage ratio change	-0.0030	-0.0032	0.0028	-0.0030	0.0042	0.0042
	(-0.20)	(-0.21)	(0.17)	(-0.20)	(0.43)	(0.42)
firm size change	0.0055	0.0054	0.0025	0.0055	-0.0016	-0.0016
	(1.42)	(1.38)	(0.60)	(1.03)	(-0.72)	(-0.68)
rating gone up	0.0026	0.0024	0.0045	0.0026	0.0016*	0.0016*
	(0.59)	(0.53)	(1.05)	(0.59)	(1.82)	(2.00)
rating gone down	-0.0080**	-0.0080**	-0.0059	-0.0080*	-0.0005	-0.0005
	(-2.26)	(-2.25)	(-1.62)	(-1.83)	(-0.52)	(-0.59)
Constant	0.0037***	0.0032	0.0014	0.0037	-0.0002	-0.0002
	(2.78)	(1.38)	(0.42)	(1.21)	(-0.09)	(-0.09)
Observations	10332	10332	10332	10332	46	46
Adjusted R^2	0.02	0.02	0.06	0.02	0.04	0.04
Clustering	Firm	Firm	Firm	Firm&Month	N	N
Rating Dummies	Y	Y	Y	Y	Y	Y
Industry FE	N	Y	Y	N	N	N
Month FE	N	N	Y	N	N	N
Newey (3 lags)	N	N	N	N	N	Y

Table 5: Bond yield spreads and loan sales – evidence for the information hypothesis

Table 4 reports results for a pooled OLS regression where the dependent variable is the average change of bond yield spreads of firm *i* in month *t* (*BYS change*). All variables are the same as in Table 3. Columns 1 and split the sample by whether firm *i*'s worst bond rating is investment-grade or not. Columns 3 and 4 split the sample by firm size. Firm size is considered low when the firm is in below median when sorted by equity market value. Columns 5 and 6 present results at the bond-level. The sample is split for whether the specific bond issue enjoys an enhancement (e.g. letter of credit) from the lender. Standard errors are clustered at the firm-level. For better visibility, the dependent variable as well as T-Bill level and T-Bill slope are given in percentages (i.e. 1% = 1). The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable: BYS change

	Firm Rating		Firm Size		Bond enhanced	
	(1)	(2)	(3)	(4)	(5)	(6)
	Investment Grade	Speculative Grade	High	Low	Yes	No
loan sale dummy	-0.0786	-0.1722**	-0.0677	-0.1885**	0.0210	-0.1232***
	(-1.00)	(-2.40)	(-1.18)	(-2.42)	(0.31)	(-3.08)
loan log amount change	-0.0084	0.0206	0.0465	-0.0640	-0.0820**	0.0271
	(-0.27)	(0.32)	(1.49)	(-1.08)	(-2.48)	(1.64)
T-Bill level change	-0.0635*	-0.4271***	-0.0869**	-0.3686***	-0.3297***	-0.1316***
	(-1.68)	(-6.15)	(-2.24)	(-5.77)	(-6.05)	(-6.03)
T-Bill slope change	0.0254	-0.3072***	-0.0174	-0.2860***	-0.2408***	-0.0753***
	(0.63)	(-4.48)	(-0.44)	(-4.33)	(-4.92)	(-3.59)
S&P total return	-1.1407***	-10.1688***	-2.0320***	-7.6154***	-5.2903***	-2.1406***
	(-4.35)	(-18.42)	(-7.56)	(-15.30)	(-7.58)	(-8.87)
VIX return	0.0040	-0.0940	-0.0143	-0.0062	-0.0094	-0.0049
	(0.10)	(-1.21)	(-0.34)	(-0.09)	(-1.61)	(-0.19)
bond log volume change	-0.0163***	0.0079	0.0003	-0.0124*	-0.0031	-0.0101***
	(-4.32)	(0.89)	(0.08)	(-1.80)	(-0.25)	(-6.59)
firm leverage ratio change	0.1170	0.5251**	0.1769	0.5408**	0.8551**	0.8520***
	(0.49)	(2.21)	(0.79)	(2.31)	(2.39)	(3.68)
firm size change	0.0345	0.0176	0.1133**	-0.0230	-0.6083***	-0.1938**
	(0.77)	(0.22)	(2.01)	(-0.35)	(-4.77)	(-2.23)
rating gone up	-0.0188	-0.1406	0.0245	-0.1295	-0.1602*	0.0163
	(-0.23)	(-1.09)	(0.28)	(-1.09)	(-1.75)	(0.31)
rating gone down	0.0377	0.2624***	0.0012	0.3202***	0.0542	0.1468***
	(0.55)	(3.31)	(0.02)	(3.66)	(0.76)	(3.30)
Constant	0.0158**	0.1020***	0.0409	0.0212	0.0417*	-0.0145
	(2.46)	(8.28)	(0.92)	(0.81)	(1.91)	(-0.36)
Chi2-Test for equality of loan sale dummy						
Chi2 statistic (p-value)	1.1	(0.29)	2.9*	(0.09)	3.9**	(0.05)
Observations	10039	8280	9279	9040	11143	52011
Adjusted R^2	0.01	0.07	0.01	0.05	0.06	0.02
Clustering	Firm	Firm	Firm	Firm	Firm	Firm

Table 6: Bond holdings of funds affiliated with loan-selling bank

Table 6 looks at changes in the overall portfolio holdings of funds affiliated with a securitizing bank. ***holding fraction*** is the fraction of the portfolio of fund *j* invested in bonds of firm *i* in quarter *t*. ***total net assets*** is the total dollar amount in the portfolio of fund *j* in quarter *t*. ***holding fraction change*** is the difference between *holding fraction* in quarter *t* and *t-1*. ***relative holding change*** is the relative holding change in % of previous quarter holdings. When holdings in quarter *t* are positive and previous quarter *t-1* holdings are zero, *relative holding change* is set to 100%. For better visibility, *holding fraction* and *holding fraction change* are given in percentages (i.e. 1% = 1).

PANEL A – Descriptive statistics

	mean	median	Stand.deviation	min	p25	p75	max
Level variables							
holding fraction	1.1768	0.2643	6.0431	0.0000	0.0707	0.6979	100
total net assets	1887599	297795	4864678.6	3060	84394	991638	25183762
Change variables							
holding fraction change	0.0008	0.0000	2.4238	-100.0000	-0.0154	0.0176	100
total net assets change	14146.66	0	187416.48	-738825	-7932	15106	890880
relative holding change	0.0494	0.0000	0.5663	-1.0000	0.0000	0.0000	3.0000
N	3549784						

PANEL B – Holding fraction change

This Panel contains pooled OLS regressions where the dependent variable is the change in the fraction of the fund portfolio invested in firm *i* between quarters *t* and *t-1* (*holding fraction change*). The panel is at the fund-firm-quarter level. Fund-type fixed effects and rating dummies are included. The key independent variable is a dummy that marks the fund-firm-quarter in which the parent of the fund sold a loan of firm *i* (*loan sale dummy*). Control variables include a dummy for whether the parent of the fund granted a new loan to firm *i* in quarter *t* (*new loan dummy*), a dummy for whether there was a loan sale in a given fund-family-quarter (*fund family sells*), a dummy for whether a loan of the firm is sold at some point in time (*firm sold*), the change in the logarithm of fund's total net assets (*log TNA change*) and firm-characteristics: dummies for whether firm rating went down or up between quarter *t* and *t-1* (*rating gone up*, *rating gone down*), change in the natural logarithm of sales (*firm size change*), change in leverage ratio (*firm leverage ratio change*) and change in book-to-market ratio (*firm BM ratio change*). Standard errors are clustered at fund-family firm pairs. For better visibility, the dependent variable given in percentages (i.e. 1% = 1). The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependant variable: *holding fraction change*

	(1)	(2)	(3)	(4)
loan sale dummy	-0.0318**	-0.0319**	-0.03101**	-0.03031**
	(-2.18)	(-2.20)	(-2.03)	(-1.98)
new loan dummy	0.0261*	0.0261	0.0321	0.0318
	(1.66)	(1.62)	(1.64)	(1.63)
fund family sells dummy	-0.0001	-0.0000	-0.0001	-0.0001
	(-0.32)	(-0.07)	(-0.93)	(-0.77)
firm sold dummy	-0.0012	-0.0011	-0.0032***	-0.0033***
	(-0.86)	(-0.85)	(-2.69)	(-2.73)
log TNA change	-0.0262***	-0.0250***	-0.0242***	-0.0241***
	(-3.82)	(-3.77)	(-3.12)	(-3.10)
rating gone up	0.0041	0.0040	0.0142	0.0128
	(0.79)	(0.86)	(1.43)	(1.44)
rating gone down	0.0082***	0.0073**	0.0091**	0.0084*
	(2.71)	(2.43)	(2.34)	(1.90)
firm size change			0.0151***	0.0168***
			(3.39)	(3.63)
firm leverage ratio change			0.0860***	0.0851***
			(4.70)	(4.41)
firm BM ratio change			0.0079	0.0080
			(1.29)	(1.20)
Constant	0.0031**	0.0066*	0.0063**	0.0160**
	(2.37)	(1.93)	(2.20)	(2.19)
Observations	3549835	3549835	1426069	1426069
Adjusted R^2	0.01	0.01	0.01	0.01
Clustering	Cy-Family	Cy-Family	Cy-Family	Cy-Family
Rating Dummies	Y	Y	Y	Y
Fundclass FE	Y	Y	Y	Y
Quarter FE	N	Y	N	Y

PANEL C – Relative holding change

Table 6, Panel C contains pooled OLS regressions where the dependent variable is the relative change in % of previous quarter holdings in firm *i* between quarters *t* and *t-1* (*relative holding change*). When holdings in quarter *t* are positive and previous quarter *t-1* holdings are zero, *relative holding change* is set to 100%. The panel is at the fund-firm-quarter level. Fund-type fixed effects and rating dummies are included. The key independent variable is a dummy that marks the fund-firm-quarter in which the parent of the fund sold a loan of firm *i* (*loan sale dummy*). Control variables include a dummy for whether the parent of the fund granted a new loan to firm *i* in quarter *t* (*new loan dummy*), a dummy for whether there was a loan sale in a given fund-family-quarter (*fund family sells*), a dummy for whether a loan of the firm is sold at some point in time (*firm sold*), the change in the logarithm of fund's total net assets (*log TNA change*) and firm-characteristics: dummies for whether firm rating went down or up between quarter *t* and *t-1* (*rating gone up*, *rating gone down*), change in the natural logarithm of sales (*firm size change*), change in leverage ratio (*firm leverage ratio change*) and change in book-to-market ratio (*firm BM ratio change*). Standard errors are clustered at fund-family firm pairs. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependant variable: *relative holdings change*

	(1)	(2)	(3)	(4)
loan sale dummy	-0.08008**	-0.08439**	-0.09764**	-0.09435**
	(-2.09)	(-2.19)	(-2.34)	(-2.21)
new loan dummy	0.03414	0.03379	0.03611	0.03672
	(0.99)	(1.00)	(0.91)	(0.95)
fund family sells dummy	0.00100	-0.00036	0.00341	0.00105
	(0.54)	(-0.19)	(1.14)	(0.34)
firm sold dummy	0.01328***	0.01256***	0.00378	0.00130
	(5.95)	(5.50)	(1.33)	(0.44)
log TNA change	0.32021***	0.31966***	0.33126***	0.33115***
	(109.54)	(109.69)	(66.97)	(67.57)
rating gone up	-0.01956***	-0.02297***	0.00458	-0.00119
	(-2.96)	(-3.45)	(0.43)	(-0.11)
rating gone down	0.01607***	0.00956*	0.01456*	0.00416
	(3.31)	(1.94)	(1.87)	(0.52)
firm size change			0.06085***	0.07095***
			(7.14)	(8.26)
firm leverage ratio change			0.29595***	0.31165***
			(8.78)	(9.08)
firm BM ratio change			-0.03491***	-0.03360***
			(-3.77)	(-3.38)
Constant	0.04624***	0.01037	0.05153***	0.02163*
	(23.14)	(1.55)	(16.48)	(1.91)
Observations	1246855	1246855	501103	501103
Adjusted R^2	0.05	0.05	0.04	0.05
Clustering	Cy-Family	Cy-Family	Cy-Family	Cy-Family
Rating Dummies	Y	Y	Y	Y
Fundclass FE	Y	Y	Y	Y
Quarter FE	N	Y	N	Y

Table 7: Bond holdings in sold borrowers

Table 7 looks at changes in the holdings of bonds from firms whose loans are tradable at some point in time. Holdings of funds affiliated with a securitizing bank can thus be compared with holdings of other funds. For each affiliated fund, 3 control funds in the same fund class and total net assets decile are randomly selected. *total net assets* is the total dollar amount in the portfolio of fund *j* in quarter *t*. *relative holding change* is the relative holding change in % of previous quarter holdings. When holdings in quarter *t* are positive and previous quarter *t-1* holdings are zero, *relative holding change* is set to 100%. For better visibility, *holding fraction* and *holding fraction change* are given in percentages (i.e. 1% = 1).

PANEL A – Descriptive statistics

	mean	median	standard deviation	min	p25	p75	max
Level variables							
holding fraction	0.8927	0.3528	3.1464	0.0000	0.1016	0.8823	100
total net assets	1918124	325465	5113309	1003	85857	1270943	95456352
Change variables							
holding fraction change	0.0030	0.0000	1.5166	-100.0000	-0.0233	0.0182	100
total net assets change	34566	28	256956	-903660	-5310	18489	1618536
relative holding change	0.0570	0.0000	0.5614	-1.0000	0.0000	0.0000	3.0000
N	137501						

PANEL B – Difference in holdings between affiliated and non-affiliated asset managers

	Not affiliated	Affiliated	Total	Difference	t-stats of Difference
holding fraction	0.8469	0.9712	0.8931	0.1230***	(7.13)
	(0.0228)	(0.0424)	(0.0315)		

PANEL C – Relative holding change

Table 7, Panel C contains pooled OLS regressions where the dependent variable is the relative change in % of previous quarter holdings in firm *i* between quarters *t* and *t-1* (*relative holding change*). When holdings in quarter *t* are positive and previous quarter *t-1* holdings are zero, *relative holding change* is set to 100%. The panel is at the fund-firm-quarter level. Fund-type fixed effects and rating dummies are included. The key independent variable is a dummy that marks the fund-firm-quarter in which the parent of the fund sold a loan of firm *i* (*loan sale dummy*). Control variables include a dummy for whether the parent of the fund granted a new loan to firm *i* in quarter *t* (*new loan dummy*), a dummy for whether the fund family is a current lender of the firm (*affiliated dummy*), a dummy for whether a loan of the firm is sold in quarter *t* (*firm sold*), the change in the logarithm of fund's total net assets (*log TNA change*) and firm-characteristics: dummies for whether firm rating went down or up between quarter *t* and *t-1* (*rating gone up*, *rating gone down*), change in the natural logarithm of sales (*firm size change*), change in leverage ratio (*firm leverage ratio change*) and change in book-to-market ratio (*firm BM ratio change*). Standard errors are clustered at the fund-family level. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependant variable: *relative holding change*

	(1)	(2)	(3)	(4)
loan sale dummy	-0.07313**	-0.07707**	-0.06796**	-0.06320**
	(-2.30)	(-2.38)	(-2.15)	(-2.01)
new loan dummy	-0.00283	-0.01080	-0.01969	-0.02100
	(-0.14)	(-0.52)	(-0.79)	(-0.84)
affiliated dummy	0.00989**	0.01253***	0.00656	0.00941*
	(2.18)	(2.71)	(1.18)	(1.65)
firm sold dummy	0.00789	0.00747	0.01280	0.01200
	(0.95)	(0.88)	(1.19)	(1.12)
log TNA change	0.62178***	0.62515***	0.61187***	0.61431***
	(49.49)	(49.78)	(39.14)	(39.49)
rating gone up	-0.00714	-0.00751	-0.00258	-0.00911
	(-0.43)	(-0.44)	(-0.13)	(-0.44)
rating gone down	0.00907	-0.01291	0.00899	-0.00614
	(0.81)	(-1.14)	(0.67)	(-0.46)
firm size change			0.03252**	0.04128**
			(1.97)	(2.43)
firm leverage ratio change			0.35142***	0.31959***
			(4.96)	(4.35)
firm BM ratio change			-0.05484***	-0.05543***
			(-5.10)	(-4.74)
Constant	0.05185***	0.04587**	0.05379***	0.08801***
	(8.64)	(1.96)	(8.57)	(2.68)
Observations	137501	137501	95031	95031
Adjusted R^2	0.05	0.05	0.05	0.05
Clustering	Cy-Family	Cy-Family	Cy-Family	Cy-Family
Rating Dummies	Y	Y	Y	Y
Fundclass FE	Y	Y	Y	Y
Quarter FE	N	Y	N	Y

Table 8: Bond short-selling demand

Table 8 looks at changes in the demand for bond short-selling around loan sales. More specifically, we construct a firm-month panel that details information on the supply of lendable bonds (short supply quantity), the supply of bonds effectively borrowed (short supply used), the average borrowing fee (short average fee) and the fraction of shorting supply used, i.e. the ratio of supply used and overall supply (short fraction used). Following Cohen et al. (2007), we define category dummies for demand and supply shifts in the bond short-selling market. For example, we set the inward demand shift dummy for firm *i* in month *t+1* to one if the supply used and the average fee paid have decreased from time *t* to *t+1* (*nextDIN*). (Other demand shift dummies are constructed but tests for their probability of occurrence are not reported for brevity.)

PANEL A – Descriptive statistics

Panel A shows descriptive statistics for variables describing short-selling activity, while separating between firm-months in which a loan of the firm is not traded (column 1) and firm-months in which a loan is traded (column 2). Firms who never have a loan traded are not in this panel.

	Loan Not Tradable	Loan Tradable	Total	Difference	t-stats of Difference
short supply quantity	295.8	184.2	218.7	-111.6***	(-9.51)
	(527.2)	(356.8)	(420.2)		
short supply used	40.66	34.69	36.54	-5.963***	(-3.56)
	(70.07)	(65.51)	(67)		
short average fee	28.35	44.35	39.53	15.20***	(10.62)
	(49.68)	(72.83)	(67.1)		
short fraction used	0.217	0.292	0.269	0.0756***	(9.95)
	(0.244)	(0.31)	(0.294)		

PANEL B – Probability of demand reduction

Table 8, Panel B, columns 1-2 report results for Logit regressions (evaluated at the mean), columns 3-4 show panel OLS regression and columns 5-6 report results for monthly Fama-McBeth regressions. In each specification, the dependent variable is a dummy that takes the value one when short-selling demand decreased for firm *i* during month *t* and *t+1* (*nextDIN*). The key variable is a dummy that indicates the sale of a loan of firm *i* in month *t* (*loan sale dummy*). Controls include the change in the logarithm of loan amount outstanding in firm *i* (*loan log amount change*), the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), monthly S&P 500 return (*S&P total return*), monthly VIX return (*VIX return*), change in leverage ratio from previous quarter (*firm leverage ratio change*), change in log of sales from previous quarter (*firm size change*), rating dummies (*AAA*, *AA*, *A*, *BBB*, *BB*, *B*) are included but not reported for brevity. In columns 1-4, standard errors are clustered at the firm-level, except for column 4 where they are clustered at the firm-month level. In columns 5-6, standard errors are estimated from the time series of cross-sectional coefficients. In column 6, autocorrelation of up to 3 lags is allowed. The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependant variable: *nextDIN*

	(1) Logit	(2) Logit	(3) OLS	(4) OLS	(5) FMB	(6) FMB
loan sale dummy	0.0775***	0.0754***	0.1073***	0.0980***	0.0807***	0.0807***
	(3.07)	(2.99)	(3.15)	(3.20)	(3.23)	(2.91)
loan log amount change	-0.0212	-0.0214	-0.0292	-0.0210	-0.0323	-0.0323
	(-1.00)	(-1.01)	(-1.45)	(-0.86)	(-1.39)	(-1.21)
S&P total return	-0.3947**	-0.4144**		-0.3963		
	(-2.37)	(-2.50)		(-0.46)		
VIX return	-0.1296***	-0.1312***		-0.1276		
	(-4.91)	(-4.99)		(-1.00)		
firm leverage change	-0.0086	-0.0075	-0.0103	-0.0100	-0.6693	-0.6693
	(-0.07)	(-0.06)	(-0.07)	(-0.09)	(-1.20)	(-1.17)
firm size change	0.0049	0.0065	0.0220	0.0049	-0.0929	-0.0929
	(0.14)	(0.19)	(0.62)	(0.12)	(-0.88)	(-0.82)
rating gone up	-0.0514	-0.0482	-0.0335	-0.0441	-0.0089	-0.0089
	(-0.95)	(-0.90)	(-0.81)	(-1.05)	(-0.79)	(-0.81)
rating gone down	-0.0261	-0.0227	0.0047	-0.0270	-0.0050	-0.0050
	(-0.82)	(-0.71)	(0.15)	(-0.61)	(-0.68)	(-0.73)
Constant			0.2627**	0.2845**	0.1602***	0.1602**
			(2.51)	(2.41)	(2.72)	(2.57)
Observations	13419	13419	13419	13419	47	47
Adjusted R^2	0.01	0.02	0.13	0.01	0.01	0.01
Clustering	Firm	Firm	Firm	Firm&Month	N	N
Rating Dummies	Y	Y	Y	Y	Y	Y
Industry FE	N	Y	Y	N	N	N
Month FE	N	N	Y	N	N	N
Newey (3 lags)	N	N	N	N	N	Y

Table 9: Bond yield spreads and loan sales – evidence for the information asymmetry effect

Table 9 reports results for a pooled OLS regression where the dependent variable is the average change of bond yield spreads of firm *i* in month *t* (*BYS change*). All variables are the same as in Table 3. Columns 1 and 2 contain a sample split by the level of insider bond holdings for bonds outstanding by firm *i*. Insider holdings are holdings by funds affiliated with a current lender of the firm. Columns 3 and 4 contain a sample split by the identity of the lead lenders of firm *i*. A lender is identified as an investment bank when it does not report capital requirements with the FDIC (which all commercial banks have to do). Columns 5 and 6 split the sample by the average "loan sale policy" of the lending banks. Loan sale policy is counted as high when the lending banks make a higher fraction of their granted loans tradable than the median bank. Standard errors are clustered at the firm-level. For better visibility, the dependent variable as well as T-Bill level and T-Bill slope are given in percentages (i.e. 1% = 1). The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable: BYS change

	Bond Insider Holdings		Lender Identity		Bank Sale Policy	
	(1)	(2)	(3)	(4)	(5)	(6)
	High	Low	Investment	Commercial	High	Low
loan sale dummy	-0.4130**	-0.1323*	-0.4508***	0.0104	-0.1903**	-0.0920
	(-2.32)	(-1.89)	(-4.23)	(0.15)	(-2.49)	(-0.76)
loan log amount change	-0.1283	0.0139	-0.0736	0.0306	0.0096	-0.0341
	(-1.55)	(0.28)	(-1.43)	(0.85)	(0.30)	(-0.54)
T-Bill level change	-0.0379	-0.2651***	-0.2676***	-0.2229***	-0.1927***	-0.2497***
	(-0.33)	(-6.16)	(-3.53)	(-4.54)	(-3.81)	(-3.89)
T-Bill slope change	-0.2045	-0.1757***	-0.1658***	-0.1616***	-0.0563	-0.3062***
	(-1.47)	(-4.77)	(-2.95)	(-3.47)	(-1.30)	(-5.07)
S&P total return	-7.0198***	-4.416***	-4.1386***	-5.1021***	-3.4883***	-6.7649***
	(-5.72)	(-8.77)	(-6.59)	(-7.57)	(-7.61)	(-8.00)
VIX return	-0.1327	0.0361	0.0879	-0.0311	0.1523**	-0.1957**
	(-0.98)	(0.63)	(1.08)	(-0.49)	(2.34)	(-2.28)
bond log volume change	0.0160	-0.0883*	-0.0087	-0.0051	-0.0064	-0.0066
	(1.03)	(-1.81)	(-1.19)	(-0.63)	(-0.99)	(-0.66)
firm leverage ratio change	0.4463	0.4419*	0.5407	0.4479**	0.5535**	0.2327
	(0.78)	(1.94)	(1.32)	(1.99)	(2.00)	(0.84)
firm size change	0.4603*	-0.0582	-0.0557	0.0770	-0.0575	0.1210
	(1.78)	(-1.13)	(-0.76)	(0.75)	(-0.96)	(0.99)
rating gone up	-0.0810	-0.0931	0.0008	-0.1307	-0.0711	-0.1082
	(-0.84)	(-1.05)	(0.01)	(-1.31)	(-0.68)	(-1.07)
rating gone down	0.4013*	0.1652**	0.1422	0.2206***	0.1583*	0.2222*
	(1.67)	(2.19)	(1.15)	(2.78)	(1.95)	(1.93)
Constant	-0.0731	0.0148	0.0042	-0.0017	-0.0626**	0.0771*
	(-1.31)	(0.36)	(0.11)	(-0.06)	(-2.08)	(1.93)
Chi2-Test for equality of loan sale dummy						
Chi2 statistic (p-value)	2.8*	(0.09)	12.8***	(0.00)	1.4	(0.24)
Observations	3355	14964	7189	11130	11176	7143
Adjusted R^2	0.04	0.03	0.03	0.03	0.03	0.04
Clustering	Firm	Firm	Firm	Firm	Firm	Firm

Table 10: The effect of loan sales on credit risk and liquidity risk

Columns 1-3 report results where the dependent variable is the change in the 5-year CDS. Columns 4-6 report results where the dependent variable is the change in the CDS-bond basis (as estimated by the Par-Equivalent CDS methodology developed by J.P. Morgan, see Bai and Collin-Dufresne, 2011). Columns 1 and 4 show panel OLS regression where the standard errors are clustered at the firm-level. Columns 2-3 and 5-6 report results for monthly Fama-McBeth regressions where standard errors are estimated from the time series of cross-sectional coefficients. In columns 3 and 6, autocorrelation of up to 3 lags is allowed. The key variable is a dummy that indicates the start of trading for an outstanding loan of firm *i* in month *t* (*loan sale dummy*). Controls include the change in the 5-year CDS spread (*CDS change*), in the loan amount outstanding in firm *i* (*loan log amount change*), the change in the yield level of the 3-months T-Bill (*T-Bill level change*), the change in the yield difference between 10-years and 3-months T-Bills (*T-Bill slope change*), monthly S&P 500 return (*S&P total return*), monthly VIX return (*VIX return*), change in the natural logarithm of aggregated bond volume (*bond log volume change*), change in leverage ratio from previous quarter (*firm leverage ratio change*), change in log of sales from previous quarter (*firm size change*), rating dummies (*AAA*, *AA*, *A*, *BBB*, *BB*, *B*) are included but not reported for brevity. For better visibility, the dependent variables are given in percentages (i.e. 1% = 1). The symbols ***, ** and * denote significance at the 1%, 5% and 10% level.

Dependent variable:	CDS change			CDS Bond Basis		
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	FMB	FMB	OLS	FMB	FMB
loan sale dummy	-0.0584	0.0095	0.0095	0.1897*	0.1436**	0.1436**
	(-1.28)	(0.17)	(0.20)	(1.70)	(2.24)	(2.34)
loan log amount change	-0.0161	0.0287	0.0287	-0.0155	-0.0045	-0.0045
	(-0.91)	(0.61)	(0.63)	(-0.29)	(-0.08)	(-0.09)
bond log volume change	-0.0091	0.0758	0.0758	-0.0103	0.0814	0.0814
	(-1.44)	(1.02)	(1.04)	(-0.62)	(0.73)	(0.86)
firm leverage ratio change	0.3058	0.1071	0.1071	-0.3488	-0.1044	-0.1044
	(1.07)	(1.54)	(1.48)	(-1.30)	(-0.64)	(-0.63)
firm size change	0.0207	0.5694	0.5694	0.0996	0.0563	0.0563
	(0.19)	(0.97)	(0.99)	(1.37)	(1.20)	(1.30)
rating gone up	-0.0537	-0.0161*	-0.0161*	-0.1118	-0.0237	-0.0237
	(-1.03)	(-1.78)	(-1.94)	(-1.34)	(-1.34)	(-1.48)
rating gone down	0.1755*	0.0772**	0.0772**	0.0524	-0.0108	-0.0108
	(1.73)	(2.04)	(2.49)	(0.62)	(-0.31)	(-0.32)
Constant	-0.0146	-0.7095	-0.7095	-0.0771	-0.0194	-0.0194
	(-0.18)	(-1.08)	(-1.11)	(-0.41)	(-0.07)	(-0.10)
Observations	10334	40	40	4704	36	36
Adjusted R^2	0.06	0.18	0.18	0.02	0.08	0.08
Clustering	Firm	N	N	Firm	N	N
Rating Dummies	Y	Y	Y	Y	Y	Y
Industry FE	Y	N	N	Y	N	N
Month FE	Y	N	N	Y	N	N
Newey (3 lags)	N	N	Y	N	N	Y

Table 11: Bond liquidity

This table looks at changes in bond market liquidity as measured by the Amihud (2002) illiquidity measure (*Amihud*). To mitigate the skewness inherent in the Amihud measure, we also look at the natural logarithm of this measure plus one (*log Amihud*). Amihud measures are calculated for each firm over the quarter.

PANEL A – Descriptive statistics

	Loan Traded	Loan Not Traded	Total	Difference	t-stats of Difference
Amihud	0.0600	0.0516	0.0586	-0.00845**	(-3.08)
	(0.119)	(0.0796)	(0.113)		
log Amihud	0.0537	0.0479	0.0527	-0.00583**	(-2.82)
	(0.0889)	(0.0662)	(0.0855)		

PANEL B – Change in the Amihud (2002) Illiquidity Ratio

Panel B presents multivariate evidence. In columns 1-3, the dependent variable is the change in Amihud from quarter *t+1* to quarter *t* (*next Amihud change*). In columns 4-6, the dependent variable is the change in log of Amihud (*next log Amihud change*). To account for cross-sectional heterogeneity, the specifications include the level of (log) Amihud in quarter *t* as a control and are estimated with the Fama-McBeth approach. The key variable of interest is the loan sale dummy that flags loan sales in quarter *t*. Controls include firm size change, firm leverage ratio change, firm book-to-market (BM) ratio change and firm ROA change. Columns 2, 3, 5 and 6 account for autocorrelation of up to 3 lags. Columns 3 and 6 also add rating fixed effects.

Dependent variable:	Next Amihud change			Next Log Amihud change		
	(1)	(2)	(3)	(4)	(5)	(6)
	FMB	FMB	FMB	FMB	FMB	FMB
loan sale dummy	-0.0139***	-0.0139***	-0.0181***	-0.0112***	-0.0112***	-0.0153***
	(-3.44)	(-4.68)	(-6.87)	(-3.17)	(-4.33)	(-6.63)
Amihud	-0.7789***	-0.7789***	-0.7980***			
	(-38.27)	(-44.27)	(-43.23)			
lAmihud				-0.7413***	-0.7413***	-0.7671***
				(-43.05)	(-42.86)	(-43.11)
firm size change	0.0017	0.0017**	0.0001	0.0017	0.0017**	0.0003
	(1.67)	(2.71)	(0.09)	(1.66)	(2.54)	(0.45)
firm leverage ratio change	0.0043	0.0043	0.0011	0.0043	0.0043*	0.0024
	(1.04)	(1.18)	(0.15)	(1.41)	(1.84)	(0.47)
firm BM ratio change	0.0031	0.0031**	0.0044**	0.0024	0.0024*	0.0036**
	(1.47)	(2.18)	(2.29)	(1.46)	(2.14)	(2.24)
firm ROA change	-0.0182*	-0.0182**	-0.0185**	-0.0146	-0.0146**	-0.0151**
	(-1.77)	(-2.79)	(-2.76)	(-1.74)	(-2.69)	(-2.76)
Constant	0.0378***	0.0378***	0.0626***	0.0325***	0.0325***	0.0563***
	(18.16)	(27.24)	(3.27)	(18.41)	(25.24)	(3.50)
No of cross-sections	15	15	15	15	15	15
Average R^2	0.44	0.44	0.45	0.44	0.44	0.46
Rating Dummies	N	N	Y	N	N	Y
Newey (3 lags)	N	Y	Y	N	Y	Y