

Price Discovery and Dissemination of Private Information by Loan Syndicate Participants

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Abstract

Exploiting the fact that syndicated loan deals depend on borrowers providing lenders with confidential information, we investigate price discovery in the secondary syndicated loan market and in the equity market for firms with syndicated loans outstanding. First, we isolate determinants of price discovery in the syndicated loan market to gain insight into the timing of private information dissemination by borrowers to lenders. Next, we investigate whether price discovery in the equity market is timelier for firms with syndicate structures and loan terms associated with a relatively early private information dissemination to lenders than it is for firms with a relatively late dissemination of private information. Of particular interest is whether the connection between the dissemination of private information in the loan market and price discovery in the equity market varies with the presence of institutional investors in the loan syndicate. Using measures of intra-period timeliness to measure the speed of price discovery, we document that the speed of price discovery in the secondary loan market varies with key characteristics of the loan syndicate and loan terms, such as relationship lending, reputations of the lead arranger and financial covenants. With respect to the equity prices of firms with syndicated loans, we provide evidence that these syndicate and loan characteristics associated with a timelier dissemination of private information to lenders are also associated with faster price discovery in the stock market, *but* only when institutional investors are involved in the firm's syndicated loans. This is consistent with institutional investors in the syndicated loan market exploiting their access to private information to trade in the equity market.

1. Introduction

In recent years the private loan market has been transformed by dramatic growth in loan syndication, the advent of secondary market trading in such loans, and significant entry of nonbank institutional investors into the syndicated loan market (see e.g., LSTA, 2007). While the lead arrangers of syndicated loans are typically banks, syndicate participants can include finance companies, loan participation mutual funds (prime funds), collateralized loan obligations (CLOs), pension funds and hedge funds. The origination and ongoing maintenance of syndicated loans depends crucially on borrowers providing lenders with confidential information. As a result, syndicate participants in the loans of publicly traded firms may have access to material non-public information before it is available to outside investors without privileged access. The prevalence of loan market participants with access to material non-public information raises important questions about the extent to which price discovery in capital markets is impacted by the dissemination of such private information, and about the channels through which this dissemination occurs. For example, a concern has been raised in recent years about the extent to which nonbank institutional investors (institutional investors thereafter) in the syndicate loan market exploit their access to private information to engage in insider trading in stock, bond and credit derivative markets (Sargent, 2005, Anderson, 2006, and Standard and Poor's, 2007).

In this paper, we investigate price discovery processes in both the secondary syndicated loan market and in the equity market for publicly traded firms that have outstanding syndicated loans. Our objective is twofold. First, we seek to exploit the secondary loan market trading to isolate the determinants of price discovery for traded syndicated loans. The syndicated loan market is unique in that traded loans are not considered securities and thus are not governed by the Securities Acts of 1933 and 1934, nor is this market generally subject to Regulation FD

(LSTA, 2007, Chapter 2). As private lenders, traders in this market, generally have access to private information about the borrower. Syndicate participants and potential loan purchasers may receive confidential information provided by the borrower under the credit agreement, including timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions (Standard and Poor's, 2007).

While the architecture of information distribution in loan syndicates is quite complex, syndicate participants in possession of syndicate confidential information can generally trade on such information in a manner consistent with the appropriate standards of professional integrity and fair dealing.¹ Thus, while information asymmetry across traders plays a role in the secondary loan market, the direct flow of confidential information to loan market participants is likely to dominate the price discovery process in this market.² As a result, price discovery in the loan market should be closely linked to the timing of private information reported by the borrower to syndicate participants. Thus, our first objective is to establish the determinants of the speed of price discovery in the syndicated loan market and thereby gain insight into the timing of private information dissemination by borrowers to lenders.³

Building on our analysis of the timeliness of private information dissemination by borrowers to lenders in the loan market, our second objective is to investigate the relation between the characteristics of firms' syndicated loans and price discovery in the equity market. Specifically, we investigate whether price discovery in the equity market is timelier for public

¹ By syndicate confidential information we mean nonpublic information which the borrower intends to disclose only to the syndicate and potential syndicate members. We discuss the information architecture of loan syndicates in more detail in Section 2. See also LSTA (2007), Chapters 2 and 4, and Standard and Poor's (2007).

² The persistence of information asymmetry in the loan market is supported by Wittenberg-Moerman (2008a), who explores how information asymmetry and the quality of financial reporting affect the trading spreads in this market.

³ While loan prices are observable for traded syndicated loans, for non-traded syndicated loans we cannot estimate the timing of private information reported by the borrower to syndicate participants. We conjecture that syndicate structures and loan terms of traded loans that are associated with a relatively faster dissemination of private information by borrowers to lenders also characterize the dissemination of private information for non-traded loans.

firms with syndicated loan characteristics associated with relatively early private information dissemination from borrowers to lenders than it is for firms with syndicated loans associated with a relatively late dissemination of private information. Of particular interest to us is whether the connection between the dissemination of private information in the loan markets and price discovery in the equity market varies with the presence of institutional investors in the loan syndicate. Evidence that earlier dissemination in the loan market is associated with faster price discovery in the equity markets when loan syndicates contain institutional investors would be consistent with the proposition that institutional investors exploit their access to private information in the loan market to engage in insider trading in the stock market.

We estimate the speed of price discovery in the loan and equity markets by calculating the intra-period timeliness statistic designed to capture the speed, or timeliness, with which information is impounded into prices. We focus on the period beginning 60 trading days before and ending two trading days after firms' quarterly earnings announcements (a total of 63 trading days). For a given portfolio of firms, the intra-period timeliness statistic estimates how quickly during this 63-day interval the cumulative abnormal returns for the entire period are realized.⁴ This approach enables us to statistically compare the portfolios of firms on the basis of the speed of price discovery in the loan or equity markets. Quarterly earnings releases provides a useful setting in which to study price discovery for loan and equity prices by enabling us to construct a large sample of time intervals culminating in an information release.

Using the measure of intra-period timeliness, we document that price discovery in the loan market is faster for firms whose syndicated loans possess certain key characteristics. More specifically, we find that loans syndicated by relationship-based lead arrangers or by highly

⁴ Intra-period timeliness measures have been used in prior research on accounting information and equity markets. See for example, Alford, Jones, Leftwich and Zmijewski (1993), Brown, Taylor and Walter (1999), Beekes and Brown (2006 and 2007), Beekes, Brown and Chin (2006), and Butler, Kraft and Weiss (2007).

reputable lead arrangers, and loans subject to financial covenants are characterized by more timely price discovery (see Appendix A for a detailed description of the variables). Each of these results is consistent with the early dissemination of syndicate information to loan participants. Relationship lenders have extensive knowledge of borrowers' operations and well developed channels of communication with firms' managers that facilitate the timely receipt of information from the borrower (Bharath et al., 2006, and Sufi, 2007). Highly reputable lead arrangers are large financial institutions with strong monitoring incentives, and extensive expertise and advanced technologies for monitoring and extracting pertinent information from borrowers in a timely fashion (Dennis and Mullineaux, 2000, Lee and Mullineaux, 2004, Jones et al., 2005, and Sufi, 2007). Further, when a loan contract imposes financial covenants, borrowers are required to provide to syndicate lenders timely covenant reports that may preempt information relevant to loan pricing in upcoming quarterly earnings releases (Allen, Guo and Weintrop, 2004).⁵

The existence of syndicated loans can impact price discovery in a firm's stock price through at least two channels. First, for traded syndicated loans, prices of these loans in the secondary market may transmit confidential information about the borrower to investors in other capital markets and so impact price discovery. Second, loan market participants may exploit their access to private information to engage in insider trading in stock markets (and other markets). It is important to note that stock markets are governed by the Securities Acts of 1933 and 1934 and that trading on material non-public information from any source, including from syndicated loan deals, is illegal. Our objective in the equity market analysis is to document the extent to which

⁵ We also find that price discovery in secondary loan prices is less timely for loans of firms reporting profits, for loans of high growth firms and when loan liquidity is low. Interestingly, the timeliness of price discovery in the secondary loan market is not impacted by the existence of equity analysts' coverage, analysts' forecast dispersion and earnings guidance disclosures in the pre-announcement period. Further, and in sharp contrast to what we find in the equity market, we find no evidence that price discovery is faster for loans involving institutional investors, consistent with institutional investors not having an informational advantage over other traders in this market.

price discovery in the equity market is associated with the characteristics of firms' syndicated loans, and to isolate the channels through which the heightened dissemination occurs.

Using a large sample of publicly traded firms with outstanding syndicated loans we find that price discovery in the equity market is faster for firms with syndicated loans that have a relationship-based lead arranger, a highly reputable lead arranger, and which are subject to financial covenants. But, this holds *only* for syndicated loans involving institutional investors! That is, the loan characteristics that we found earlier to be associated with a timelier dissemination of private information to lenders in the secondary loan market, are also associated with faster price discovery in the stock market, but only when institutional investors are involved in the firm's syndicated loans. In addition, this result holds whether or not the loan is traded, ruling out the possibility that secondary market prices are simply transmitting confidential information about the borrower to the equity market.

Bolstering an interpretation that these results are driven by institutions exploiting syndicate information, we find that institutional investors only increase stock price discovery when a firm's management does not announce earnings guidance for the current quarter within 60 days prior to the earnings announcement date. Earnings guidance is likely to preempt private information and significantly reduce institutional investors' ability to exploit it through trading activities. Further, institutional investors affect stock price discovery only for high credit risk firms, consistent with the more intensive demand for information by lenders on loans with higher default probabilities.

Our paper makes several substantive contributions. First, we extend the literature on the secondary market trading of syndicated loans by isolating specific characteristics of loans and

loan syndicates associated with timelier price discovery.⁶ We also complement and extend the literature investigating lead-lag relations between prices across various markets, and in particular Acharya and Johnson (2007) who explore insider trading in the CDS market. Rather than asking if one market leads another, we establish the determinants of the speed of price discovery in the syndicated loan market, allowing us to partition firms based on the extent to which their loan syndicate members are likely to have early access to private information. We then document that it is firms with “early” information flows in the loan market that exhibit timely price discovery in the stock market, allowing us to establish cross-market relations in price discovery without resort to lead-lag relations. Finally, we complement recent papers by Ivashina and Sun (2007) and Massa and Rehman (2005) that approach the issue of insider trading by directly measuring the trading decisions of informed institutions.

The remainder of the paper is organized as follows. Section 2 discusses in more detail the structure of information distribution in the loan market. Section 3 discusses prior literature. Section 4 presents the research design. Section 5 describes the data and sample. Section 6 presents our empirical evidence on price discovery in both the loan and equity markets. Section 7 offers concluding remarks.

2. Structure of Information Distribution in the Syndicated Loan Market⁷

Syndicated loans are private debt contracts and as such, lenders require private information regarding a borrower before making a lending decision and also require periodic reporting of private information after a loan has been made. Confidentiality with respect to such private information has always been a central feature of single lender bank loans. However, with the

⁶ The extent literature on secondary loan trading includes Allen, Guo and Weintrop (2004), Altman, Gande and Saunders (2008) and Wittenberg-Moerman (2008a), among others.

⁷ The discussion in this section relies heavily on LSTA (2007, Chapter 4) and Standard and Poor’s (2007).

advent of secondary market trading and the influx of non-bank investors into the loan market, the situation has become considerably more complex. Complexities arise both from lenders' desire to keep sensitive information confidential, as well as issues involving insider trading by loan market participants based on private information received from borrowers.

The desire of borrowers to protect their confidential information is typically evidenced by a confidentiality provision contained in the credit agreement. It is also the case that for borrowers with tradable securities outstanding (i.e., securities subject to Securities Acts of 1933 and 1934), it is generally believed that such confidentiality provisions make the distribution of private information to loan market participants Regulation FD compliant.

As noted in the introduction to this paper, traded loans are not considered securities, and thus are not governed by the Securities Acts of 1933 and 1934. However, the borrower of a syndicated loan can also have outstanding public securities that are subject to U.S. securities laws and regulations. A substantial body of U.S. laws and regulations imposes significant prohibitions on insider trading. The centerpiece of the U.S. insider trading law is Rule 10b-5 under the Exchange Act. Rule 10b-5 prohibits the purchase or sale of a security on the basis of material nonpublic information about that security or its issuer, in breach of a duty of trust or confidence that is owed directly, indirectly, or derivatively to the issuer of that security, its shareholders, or any other person who is the source of the information.⁸ This is a significant issue for syndicated loan market participants who may want to retain an option to trade a borrower's public securities while simultaneously receiving potential material non-public information

⁸ Information has been defined as "material" for purposes of U.S. securities laws in circumstances where: (i) there is a "substantial likelihood" that a "reasonable investor" would consider the information important in making an investment decision; (ii) the disclosure of the information would be "viewed by the reasonable investor as having significantly altered the 'total mix' of information made available;" or (iii) the disclosure of the information is "reasonably certain to have a substantial effect on the market price of the security." See LSTA (2007) for further discussion of material non-public information.

provided by the borrower under the credit agreement. These loan market participants are in a position to breach the wall between public and private information.

Loan market participants have adopted two distinct strategies for dealing with the conflict between the public and private sides of the information wall. In the first strategy, dealers and buy side firms set up their trading desks on the public side of the wall. In these cases, so-called “Chinese walls” are constructed so that traders, salespeople, and analysts do not receive private information even if somewhere else in the institution the private data are available. In theory, these firms operate so that the groups on the private side receive all confidential materials and agree not to trade in public securities of the issuers for which they get private information and not to share this information with the public side of the firm. Large institutional investors sometimes create softer versions of Chinese walls by adopting written procedures meant to preclude trading on private information received from the loan markets. The extent to which there is leakage between the public and private sides, despite these precautions, is an open question (see also Sargent, 2005, and Ivashina and Sun, 2007, on this point).

Another strategy for dealing with the conflict between the public and private sides is simply to voluntarily keep the whole firm on the public side by agreeing not to receive any material non-public information provided by the borrower.⁹ Arrangers facilitate this structure in primary syndications by preparing a separate, public version of loan information memoranda that are scrubbed of private information to be distributed to accounts that are on the public side of the wall. For example, some information providers for loan deals now require lenders to self-declare as public or private investors before they gain access to any loan documents. Fund managers who

⁹ It is generally up to the borrower to designate which information constitutes material non-public information. Loan market participants then rely on this designation. In some cases, borrowers will provide written comfort to the arranger and other lenders that designated materials do not contain material non-public information.

identify themselves as on the public side have access only to loan documents that the agent bank deems appropriate for public investors (Sargent, 2005).¹⁰

The existence of private, confidential information complicates trading in the secondary loan market. In general, market participants in possession of syndicate confidential information can trade on such information in a manner consistent with the appropriate standards of professional integrity and fair dealing. Generally, an informed participant would be expected to offer to reveal syndicate confidential information to a counterparty who has not chosen to be on the “public” side, unless the informed participant reasonably believes that the counterparty has already been informed or the counterparty is sophisticated and understands the nature and importance of syndicate confidential information. Potential syndicate members can receive syndicate confidential information upon compliance with applicable confidentiality requirements. To facilitate this process, there exists what is called a Master Confidentiality Agreement that is entered into between frequent loan trading partners. This document allows the seller of a loan to share with a potential buyer information that the borrower has provided to the seller under the credit agreement.

To conclude this section, it is clear that trading in the secondary syndicated loan market is carried out by very well informed participants. As such, it is plausible that that price discovery in the loan market is heavily dominated by the dissemination of private information from borrowers to lenders and potential lenders. While great care is taken by loan market participants to deal with the conflict between the public and private sides of the information wall, the overall

¹⁰ In addition, public side loan market participants are asked to attend a public version of bank meetings and distribute to these accounts only scrubbed financial information. However, this structure introduces problems of its own. For one, when a significant number of lenders chose to be public, agent banks and borrowers may find it difficult to secure the requisite number of approvals on credit amendments. While simple credit amendments require approval from a simple majority of a company's lenders, those that involve serious changes to a loan's terms require approval from all investors. Asking lenders to vote on significant changes without access to all the underlying information can be problematic. Also, given ambiguity surrounding terms like material, it is still possible that public side lenders receive private information with valuation consequences.

effectiveness of the system in preventing insider trading in other markets is an open question. In this paper, we bring large sample evidence to bear on this important issue.

3. Related Literature

Our study complements and extends an emerging literature focused on the cross-market exploitation of private information by market participants. One important line of research approaches this issue by examining lead-lag relations between prices across markets. A pertinent paper for our study is Acharya and Johnson (2007), who provide evidence consistent with the trading desks of banks and other financial institutions exploiting private information gleaned from clients to inside trade in the credit default swap (CDS) market.¹¹ They document circumstances where innovations in firms' CDS prices lead their stock prices, indicative of informed trading in the CDS market ahead of the information arriving in the equity market. In particular, they find that the extent of insider trading increases with the number of potential insider traders, measured as the number of banks that have ongoing syndicated lending relationships with a given firm, and with the credit risk of the firm. Beyond the fact that we focus on syndicated loans while Acharya and Johnson (2007) focus on the CDS market, our empirical strategy is very different from theirs, allowing us to establish cross-market relations in price discovery even if one market does not lead or lag the other.

Rather than asking if one market leads another (e.g., if loan prices move before equity prices), we instead establish the determinants of the speed of price discovery in the syndicated loan market in order to isolate firms characterized by the relatively early dissemination of private

¹¹ Other papers that examine cross-market lead lag relations include Allen and Gottesman (2006), Altman, Gande and Saunders (2008), Blanco, Brennan and Marsh (2005), Hotchkiss & Ronen (2002), Longstaff, Mithal and Neis (2003), and Norden and Weber (2004).

information from borrowers to lenders.¹² This allows us to partition firms based on the extent to which their loan syndicate members actually have early access to private information that can be exploited in the equity market. The power of our design comes from our ability to document that it is firms with “early” information flows in the loan market that exhibit timely price discovery in the stock market. Our basis for interpreting our results as insider trading by institutional investors is then that the connection between price discovery in the loan market and the equity market only exists for firms with institutional syndicate members. That is, it is not just the early availability of information to loan market participants that matters, but also which type of loan market participants have the information.

Our study also complements research by Ivashina and Sun (2007) that addresses the issue of whether institutional investors use private information received in the loan market to trade in public securities by directly examining the stock trading of institutional investors that also hold syndicated loans in their portfolio.¹³ Ivashina and Sun (2007) collect the SEC filings of loan amendments and attempt to identify institutional investors that had access to private information disclosed by the borrower during loan renegotiations. They document that institutional managers who participate in loan renegotiations trade in the stock of the same company and outperform other managers in the month following the loan renegotiation. The benefit of the Ivashina and Sun (2007) study lies in its ability to identify institutions with access to private information disclosed during loan renegotiations and in examining the trading behavior of those specific

¹² As we argued earlier, the direct flow of confidential information to loan market participants is likely to dominate price discovery in the loan market, implying that timelier price discovery in the loan market follows directly from timelier dissemination by borrowers of syndicate information to loan market participants.

¹³ In a somewhat related study, Massa and Rehman (2005) investigate the flow of information within financial conglomerates by focusing on the effect that the lending behavior of affiliated banks has on the portfolio choice of the mutual funds belonging to the same conglomerate. They find that in the period following the deal, the mutual funds of the conglomerate adjust their stakes in the firms that borrow from the affiliated banks. Funds increase (decrease) their portfolio weights in those borrowing stocks which subsequently provide positive (negative) abnormal returns, suggesting that they exploit inside information not available to the market.

institutions. But the cost is that they only have a small sample of loan amendments available. In contrast, while we cannot look at the actual trading behavior of institutional investors, we are able to examine a much larger sample of firms and to investigate the price discovery processes of those firms in both the loan market and the stock market.

4. Research design

Our empirical strategy involves two sequential but connected analyses. First, we study price discovery in the secondary loan market. The main objective of this analysis is to establish the determinants of the speed of price discovery in the loan market and to link this to the timing of private information dissemination by borrowers to lenders. Secondly, we investigate price discovery in the equity market for firms that have outstanding syndicated loans, whether traded or not. In this analysis, our objective is to determine whether price discovery in the equity market is relatively timelier when firms' syndicated loan structures encourage relatively earlier private information flow to lenders. Our research design strategy is summarized in Figure 1.

4.1. Price discovery in the secondary loan market

We focus on three key characteristics that potentially influence the timing of private information dissemination from borrowers to syndicate participants.

Relationship lending

We hypothesize that the dissemination of syndicate confidential information from a borrowing firm to a syndicate should be faster when the firm's loans are issued by relationship lenders. The relationship lender has extensive knowledge of borrowers' operations and well developed channels of communication with firms' managers that facilitate the timely receipt of

information from the borrower.¹⁴ There is also lower information asymmetry between the borrower and its relationship-based lead arranger who has obtained private information through prior transactions with a borrower (Sufi, 2007, and Wittenberg-Moerman, 2008b).¹⁵

To classify loans as issued by relationship lenders, we identify loans syndicated by lead arrangers with prior lending relationships with a borrower.¹⁶ Following Bharath et al. (2006), for each sample loan we construct a lending relationship measure by searching all of the firm's previous loans over the five years preceding the loan's issuance date. Then, for every previous loan, we identify the arrangers in the syndication. If at least one of the loan's arrangers had been an arranger of loans previously issued to the firm, we classify the loan as being issued by a relationship lender.

Reputation of the arranger of syndication

We expect that the speed of price discovery in the secondary loan market will be higher for loans syndicated by highly reputable arrangers. The arranger negotiates the loan agreement, coordinates the documentation process, recruits loan participants and performs the primary monitoring and enforcement responsibilities in the syndicate (Dennis and Mullineaux, 2000; Lee and Mullineaux, 2004). The syndicate participants typically rely on information provided by the arranger (Jones et al., 2005). Highly reputable lead arrangers are large financial institutions with strong monitoring incentives, and extensive expertise and advanced technologies for monitoring

¹⁴ While most of the relationship lending literature focuses on small private borrowers (see e.g., Petersen and Rajan, 1994, and Berger and Udell, 1995), Bharath et al. (2006) emphasize the importance of relationship lending for large public borrowers in the syndicated loan market.

¹⁵ Financial intermediation theory that highlights the unique monitoring functions of banks include LeLand and Pyle (1977), Diamond (1984 and 1991), Ramakrishnan and Thakor (1984), and Fama (1985). Lummer and McConnell (1989) document that stock price reactions to loan announcements is higher for renewals of loan agreements compared to new loans, suggesting that the information production role of private lenders is especially strong for relationship lenders. Gande and Saunders (2007) demonstrate that banks continue to perform a monitoring function even in the presence of a secondary market for bank loans.

¹⁶ Consistent with prior research, we base this analysis on the borrower's prior relationship with the arranger of syndication and not with the syndicate participants because the arranger performs the main monitoring of the borrower and the participants typically rely on the information the arranger provides.

and extracting pertinent information from borrowers in a timely fashion. The importance of the arranger's reputation in monitoring the borrower and in extracting timely information is further motivated by the evidence that more reputable arrangers are more likely to syndicate loans and are able to sell off a larger portion of a loan to the participants (Dennis and Mullineaux, 2000, and Sufi, 2007).¹⁷

We consider a loan to be issued by a reputable arranger if the loan is syndicated by one of the top three arrangers, based on the arranger's average market share in the primary syndicated loan market. The market share is measured by the ratio of the amount of loans that the financial intermediary syndicated as a lead arranger to the total amount of loans syndicated on the primary loan market over the research sample period from 1999 to 2006.

Covenants

We also hypothesize that loans subject to financial covenants are associated with early dissemination of syndicate confidential information to syndicate participants. When a loan contract imposes financial covenants, borrowers are required to provide to syndicate lenders timely covenant reports that may preempt information relevant to loan pricing in upcoming quarterly earnings releases (Allen, Guo and Weintrop, 2004). In addition, lenders are more likely to impose covenants on more informationally opaque firms (Standard & Poor's, 2007, Bradley and Roberts, 2004, Chava et al., 2004). This finding further supports the importance of covenants in the timely dissemination of private information from borrowers to syndicate participants.¹⁸

¹⁷ Prior literature suggests that the arranger does not exploit its information advantage to distribute lower-quality loans to syndicate participants. A number of studies find that the arranger holds larger proportions of informationally problematic and riskier loans in its own portfolio (Simons, 1993; Lee and Mullineaux, 2004, Jones et al., 2005, and Sufi, 2007a). In addition, the arranger has been found to syndicate a larger proportion of a loan that is subsequently upgraded (Panyagometh and Roberts, 2002).

¹⁸ The efficiency of the post-sale monitoring is also influenced by the financial covenants imposed by the loan contract. Dichev and Skinner (2002) show that syndicate lenders set debt covenants fairly tightly relative to the underlying financial variables and use them as "trip wires" for borrowers.

4.2. Price discovery in the equity market

Our equity market analysis begins with an investigation of whether the speed of equity price discovery is associated with the timing of private information dissemination from borrowers to syndicate participants. Exploiting results from our loan market analysis, we partition firms by the extent to which their loan syndicate has early access to private information that can potentially be exploited in the equity market. More specifically, we partitioned the firms based on whether their outstanding syndicated loans are syndicated by a relationship-based lead arranger or a highly reputable lead arranger or if they are subject to financial covenants. We then investigate the extent to which firms with these “early” information flows in the loan market exhibit timely price discovery in the stock market.

We are also keenly interested in whether there exists evidence consistent with the proposition that institutional investors exploit their access to private information in the loan market to engage in insider trading in stock markets. In this spirit, we explore whether the link between the dissemination of private information in the loan markets and price discovery in the equity market is driven by institutional investors in the loan syndicate.

When exploring the price discovery in the equity market, we differentiate between traded and non-traded syndicated loans. This design is motivated by our expectation that the prices of syndicated loans traded on the secondary loan market may transmit information about the borrower to investors in the equity markets and so impact price discovery.

4.3 Measuring Speed of Price Discovery

Given that we cannot directly observe the timing when syndicate confidential information is provided to syndicate participants, we examine the speed of price discovery in the secondary loan market and in the equity market. Our main analyses involve comparing the speed of price

discovery between the portfolios of firms, where price discovery is estimated using measures of intra-period timeliness. We use the same basic measure for both the secondary loan market and equity market analyses. We focus on the 63-trading-day time period that begins 60 trading days before and ends two trading days after firms' quarterly earnings announcements. Quarterly earnings provides a useful setting in which to study price discovery for loan and equity prices as it enables us to construct a large sample of time intervals representing complete earnings information cycles.

Intra-period timeliness for a portfolio can be conceptualized as a curve constructed by plotting for each of the 63 trading days in the period the cumulative buy-and-hold abnormal return up to that day, scaled by the cumulative buy-and-hold abnormal return for the whole period. That is, each point on the curve represents the proportion of the entire period's abnormal return realized up to and including a given day. Our main measure of intra-period timeliness (*IPT*) represents the total area under the curve for a given portfolio.¹⁹ Greater areas are interpreted as timelier price discovery.

Specifically, *IPT* is computed as the sum of the buy-and-hold abnormal returns from 60 trading days prior to the earnings announcement through day m (BH_m), divided by the buy-and-hold abnormal return from 60 trading days prior to the earnings announcement date to two trading days after the earnings announcement date (BH_2), for each day m from -60 to 1, plus 0.5,

or
$$IPT = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$
²⁰ The *IPT-loan-return* measure is

computed at the firm level using the daily buy-and-hold abnormal loan returns, while the *IPT-stock-return* measure is computed using the daily buy-and-hold abnormal stock returns. Portfolio

¹⁹ Our timeliness measure is patterned after McNichols (1984) and Butler, Kraft, and Weiss (2007).

²⁰ This formula follows from estimating the area under any given curve as the sum of the areas of the series of trapezoids computed for each daily time interval.

IPT measures are then constructed as the equal weighted return of all firm-quarter observations included in a portfolio. Our emphasis on portfolio-level analyses is designed to average away random news arrivals that make the *IPT* measures at the firm-quarter level extremely noisy. Appendix A provides a detailed description of how the *IPT-loan-return* and *IPT-stock-return* measures are specifically estimated. Appendix B describes the nature of our statistical tests of differences in intra-period timeliness between portfolios.

5. Data

5.1. Data sources and sample selection

We use data from the Loan Trade Database (LTD) and the DealScan database, provided by the Loan Pricing Corporation (LPC). Starting in 1998, LTD provides the indicative loan bid and ask price quotes on syndicated loans traded on the secondary loan market and, according to LPC, covers 80% of the trading volume of the secondary loan market in the U.S. The price quotes are reported to LPC by trading desks at institutions that make a market in these loans. Bid and ask prices are quoted as a percent of par and are aggregated across market makers. In addition to price coverage, the database provides the quote date and the number of market makers reporting indicative price quotes to LPC. DealScan covers a majority of the syndicated loan issues in the U.S. and provides a wide range of loan characteristics, such as interest rate, amount, maturity, seniority, purpose, covenants and syndicate structure.

We obtain firm characteristics and stock trading data from COMPUSTAT and CRSP respectively. Firms' senior debt ratings, Watchlist additions and outlook changes (at the firm level) are retrieved from the S&P historical database. If the S&P historical database does not cover a particular firm, we retrieve Moody's, Fitch or DPR senior debt rating from Mergent

Fixed Income Securities Database (FISD). We obtain data on management earnings forecasts from First Call Historical Database. Analyst-related data comes from IBES.

Panel A of Table 1 summarizes the sample selection process of the traded syndicated loans employed in analyzing the speed of price discovery in the secondary loan market. By matching the LTD and the DealScan databases, we identify 7,350 traded loans over the period from June 1998 to December 2006. From this sample we eliminate loans to non-U.S. firms or not issued in U.S. dollars. We subsequently match the sample borrowers with the CRSP and COMPUSTAT databases. Firstly, we merge the databases by tickers available on DealScan. To improve the identification, we manually match the rest of the sample firms with COMPUSTAT/CRSP by name, industry and state location.

From this sample of loans to U.S. public firm, we exclude loans without daily price quotes; the majority of these quotes represent trading for the period from June to December 1998 when price quotes have been reported to LPC on a weekly or bi-weekly basis. We also restrict the sample to loans with price quotes reported by more than one market maker, because of a concern that price quotes may not be timely when a single institution makes a market in a loan. Further, we exclude facilities²¹ of firms for which an earnings announcement date is not available and for which management earnings forecasts for the upcoming quarters is announced within 5 trading days around the earnings announcement date. Finally, we eliminate facilities that lack sufficient loan and firm-specific data. The remaining sample contains 2,215 facilities related to 499 firms and 4,781 firm-quarters (“Loan Sample” thereafter).

Panel B of Table 1 describes the selection of the total syndicated loans sample used in our analysis of the speed of price discovery in the equity market. For the period from 1999 to 2006,

²¹ In the syndicated loan market, a loan is referred as a “facility”. Usually, a number of facilities with different maturities, interest rate spreads and repayment schedules are structured and syndicated as one transaction (deal) with a borrower.

DealScan reports 64,920 facilities outstanding to U.S. firms and issued in U.S. dollars. Merging with COMPUSTAT/CRSP allows us to identify 33,536 facilities issued to public borrowers. We then drop loans to firms with missing earnings announcement dates or return data and firms with management earnings forecasts announced around the earnings announcement date. Further excluding facilities with insufficient loan and firm characteristics results in a sample of 25,832 facilities related to 4,358 firms and 54,557 firm-quarters (“Equity Sample” thereafter).

5.2. Descriptive Statistics

As discussed earlier, we focus on three key informational features of the lending arrangement that may affect the timing of private information dissemination from borrowers to syndicate participants. Panel A of Table 2 reveals that 54% of the firm-quarter observations in the Loan Sample are related to loans syndicated by relationship lenders, 57% are related to loans syndicated by reputable arrangers and 89% are related to loans subject to financial covenants. The majority of the sample loans are institutional. These statistics are consistent with the statistics reported in Wittenberg-Moerman (2008a), who examines a large sample of syndicated loans traded on the secondary market.

Firms in the Loan Sample are risky, with the mean and median credit rating of BB-. The mean value of the default likelihood indicator (DLI), estimated according to Vassalou and Xing’s (2004) model, is 13.9%. Further, 65% of firm-quarter observations are related to firms that report positive income before extraordinary items. The majority of the sample firms are covered by equity analysts and 11% of the firm-quarter observations are related to firms that have provided earnings guidance before earnings announcement.

Panel B presents summary statistics for the Equity Sample. We classify 12% of the firm-quarter observations as institutional. Our estimation of the *Institutional* variable relies on the

original syndicate structure on the primary loan market and does not capture the fact that institutional investors can enter syndicates through secondary market trades. We are unable with our data to identify changes in the syndicate following original syndication. However, while the majority of institutional loans are traded after origination, only 10% of banking term loans and 5% of revolving facilities become available for secondary loan trading (Wittenberg-Moerman, 2008a). Therefore, by purchasing loans on the secondary market, institutional investors primarily enter into syndicates where institutional investors are already involved in loan origination.²²

We classify 38% of the firm-quarter observations of the Equity Sample as related to firms with loans syndicated by relationship lenders and 33% as related to firms with loans issued by reputable arrangers. The majority of the sample observations are related to firms whose syndicated loan contracts impose financial covenants. 9% of the firm-quarter observations are associated with firms with loans traded on the secondary loan market.

The general syndicated loans population reflects lower default probabilities than those of traded loans, consistent with the fact that leveraged loans represent the majority of loans traded on the secondary loan market (LSTA, 2007, and Wittenberg-Moerman, 2008a).²³ The majority of the firms in the Equity Sample are profitable and are covered by equity analysts. 6% of firm-quarter observations are related to firms that have provided earnings guidance.

Panel C presents correlation statistics for the three key informational features of the lending arrangement (*Relationship-lending*, *Reputable-arranger* and *Covenant*) for the Loan Sample and for the *Institutional* variable for the Equity Sample.

²² We explicitly detail the four steps involved in constructing our institutional variable in Appendix A.

²³ Leveraged loans are loans rated below BBB- or Baa3 or unrated and priced at the spread equal or higher than 150 basis points above LIBOR.

6. Empirical Analysis

6.1. Speed of price discovery in the secondary loan market

6.1.1. Determinants of the inter-period timeliness in the secondary loan market

We begin by examining the speed of price discovery in the secondary loan market for portfolios that differ with respect to the three factors that are expected to increase the flow of private information about the borrower to loan participants. Figures 2, 3 and 4 present the plots of the percentage of the 63-day cumulative loan portfolio return for each day during the 63-day period from 60 trading days before the earnings announcement date to two trading days after the announcement for portfolios constructed based on the *Relationship-lending*, *Reputable-arranger* and *Covenant* variables, respectively.

Figure 2 demonstrates that the measure of intra-period timeliness (*IPT-loan-return*), estimated as the total area under the curve for a given portfolio, is higher for the *Relationship-lending* portfolio than it is for the *Non-Relationship-lending* portfolio, suggesting that the flow of private information to loan participants is enhanced if the firm has a long-term relationship with the lead arranger. As reported in Table 3, the difference in the *IPT-loan-return* values of these portfolios is 11.60 and is statistically significant (based on the percentile value of ΔIPT relative to the sample distribution generated under the null hypothesis, see Appendix B)

Figure 3 and Table 3 present analogous results for the *Reputable-arranger* and *Non-Reputable-arranger* portfolios, suggesting that the curves for these two portfolios are statistically different from each other in a way that is consistent with a more timely price discovery for the *Reputable-arranger* portfolio (29.78 vs. 25.23). Figure 4 suggests that, consistent with expectations, financial covenants accelerate price discovery in the secondary loan market; this result is statistically significant according to the test statistic reported in Table 3. Interestingly,

covenants enhance the timing of private information dissemination from borrowers to syndicate participants primarily starting from day -27 before the earnings announcement. This result is consistent with Allen, Guo and Weintrop (2004) who find the significant price movements in the secondary loan market approximately four weeks prior to earnings announcement dates, around the time of the monthly covenant reports to members of the syndicate.

It is important to note that we find that inter-period timeliness does not vary significantly with the *Institutional* variable. This “non-result” is consistent with institutional investors not having an informational advantage over other traders in the secondary loan market. The results reported in Table 3 also suggest that the flow of information to loan participants increases with default risk, as measured by both the credit rating and by the DLI measure.²⁴ There is likely a more intensive demand by lenders for information on loans with higher default probabilities, which explains this result. We also test but do not find that the speed of price discovery increases when a firm experiences an increase in its default likelihood over the 3 month period preceding an earnings announcement.

We also explore the relation between *IPT-loan-return* and the measures of a firm’s information transparency, as suggested by prior research. First, we find that *IPT-loan-return* is higher for larger loans, consistent with better disclosure on the part of and lower information uncertainty regarding big borrowers (Diamond and Verrecchia, 1991, Jones et al., 2005, and Bharath et al., 2007). Second, we explore whether the speed of price discovery is higher for firms reporting profits versus firms reporting losses. On one hand, the information environment of profitable firms is associated with lower information uncertainty (Ertimur, 2004, Sadka and Sadka, 2004, and Verrecchia and Weber, 2007). Lang and Lundholm (1993) also demonstrate

²⁴Prior studies suggest that corporate credit ratings frequently lag behind recent changes in a firm’s credit quality (Hite and Warga, 1997, Beaver et al., 2006, and De Franco et al., 2008). Therefore, we incorporate an alternative default risk measure, DLI, which is not subject to this criticism.

that profitable firms provide more information to market participants than firms experiencing losses. On the other hand, litigation risk may encourage firms to provide more timely disclosure if negative earnings are anticipated by management (Skinner, 1997). Consistent with the later argument, we find that price discovery is more timely for firms experiencing losses. We do not find that analyst coverage, dispersion in analysts' earnings forecasts and management earnings guidance influence the intra-period timeliness in the secondary loan market.

Further, we examine whether the inter-period timeliness is higher for negative earnings surprises, because Allen, Guo and Weintrop (2004) find that the information content in syndicated loan prices is most pronounced for borrowers that experience declining earnings. However, we find that the difference in *IPT-loan-return* values across *SUE*-based portfolios is not significant. Further, we document that the speed of price discovery is lower for high-growth firms, which is consistent with greater growth options being associated with larger information asymmetry about the borrower (Smith and Watts, 1992). We also find that the speed of price discovery increases with secondary loan market liquidity, which is expected to facilitate the price discovery process. Thus, the speed of price discovery increases with the number of market makers in a firm's loans and decreases with the bid-ask spread in the secondary loan trade.²⁵

6.1.2. Controlling for potential confounding factors

While the results presented in Table 3 are consistent with the prediction that the flow of private information to loan participants is enhanced when a firm has a long-term relationship with the lead arranger, has a reputable lead arranger and when its loans are subject to financial covenants, these results are univariate and do not control for potential confounding factors. In

²⁵We also examine whether the speed of price discovery in the secondary loan market is affected by the number of equity analysts covering the firm, the age of the firm and whether a firm is on the S&P Watch List or Outlook. We do not find significant differences in the *IPT* values between pairs of portfolios based on these characteristics.

Table 4, we attempt to control for omitted correlated variables that may affect the univariate relation between the *IPT-loan-return* and the three features of lending arrangements that are posited to increase the flow of private information to lenders. Of the entire set of variables reported in Table 3, Table 4 includes only the subset of variables that are either significantly positively correlated with both *IPT-loan-return* and a given variable of interest (i.e. *Relationship-lending*, *Reputable-arranger*, or *Covenant*) or significantly negatively correlated with both *IPT-loan-return* and the variable of interest (see Table 2, Panel C for correlation statistics). This selection technique for inclusion of variables in Table 4 is intended to identify the omitted correlated variables of greatest concern while avoiding the “information overload” that would result from including the entire set of variables reported in Table 3.

The results of our two-way sorts in Table 4 are largely consistent with our key univariate findings. *IPT-loan-return* is higher for *Relationship-lending* portfolios even after controlling for *Size* and *Tangibility*. Controlling for *Size* also does not affect the higher values of *IPT-loan-return* for *Reputable-arranger* portfolios. With respect to the two-way sort on *Reputable-arranger* and *Number-of-market-makers*, *IPT-loan-return* is higher for the *Reputable-arranger* portfolio when the number of market makers is above the sample median. So, price discovery in the secondary loan market is faster when traded loans have highly reputable arrangers and when these loans are relatively liquid. However, we do not find that loans syndicated by reputable arrangers experience a higher *IPT-loan-return* when the loans’ secondary market liquidity is low.

Regarding financial covenants, we examine whether the accelerated price discovery associated with loans subject to financial covenants is potentially explained by the higher default risk of these loans. We find that *IPT-loan-return* is significantly higher for *Covenant* portfolios than it is for *Non-Covenant* portfolios for high default risk loans, when the default risk is

measured by both credit rating and DLI. Therefore, our results indicate that timely covenant reports to syndicate lenders about high default risk loans increase the speed of price discovery in the secondary loan market. At the same time, we do not find that financial covenants affect price discovery for low default-risk loans, which is potentially explained by the low “value relevance” of covenant reports when loans’ default risk is not material.

We also repeat all the univariate and two-way sort tests using the alternative test statistic suggested by McNichols (1984) and Butler et al. (2007). This statistic is based on the percentile value of the maximum cumulative difference between the areas under the return curves relative to the sample distribution (see Appendix B for a detailed description of this statistic). The results of these tests are qualitatively similar to those reported in Tables 3 and 4. In summary, univariate and two-way sort tests support the prediction that price discovery in the secondary loan market is faster when a firm’s traded loans are syndicated by relationship lead arranger, by highly reputable lead arrangers and when loans are subject to financial covenants.

6.2. Speed of price discovery in the equity market

Our equity market analysis begins with an investigation of whether the speed of price discovery in the equity market (*IPT-stock-return*) increases with an increase in the flow of syndicated confidential information to syndicate participants. We perform this analysis by focusing on the *total* sample of firm-quarters with outstanding syndicated loans, whether or not the syndicated loans are traded on a secondary market and/or held by institutional investors. In contrast to our finding in the secondary loan market, we do not find that relationship lending, reputation of the lead arranger or financial covenants affect the speed of price discovery in the equity market (Table 5). More specifically, we find insignificant differences in the *IPT-stock-return* values across portfolios formed based on the *Relationship-lending*, *Reputable-arranger*,

and *Covenant* variables. These results indicate that for the majority of syndicated loans “Chinese walls” and other procedures implemented by syndicate participants successfully prevent leakage between the public and private sides of the information wall.

This conclusion, however, may not generalize for the sample of loans in which institutional investors are involved. *IPT-stock-return* is significantly higher for *Institutional* portfolio than for *Non-Institutional* portfolio (see Table 5 and Figure 5). This result suggests that equity price discovery is more rapid in firm-quarters characterized by the presence of institutional lenders who are likely to exploit syndicate confidential information in the equity market.

In order to provide more direct evidence on whether lenders’ private information is transmitted into equity prices by institutional investors, we examine the interactive effect of the *Institutional* variable and the informational features of lending arrangements associated with a more rapid flow of information to syndicate participants. To examine these interactions, we estimate the *IPT-stock-return* for portfolios formed based on the *Relationship-lending*, *Reputable-arranger* and *Covenant* variables for the subsample of firm-quarters characterized by the presence of institutional investors in the syndicate (Table 6, Panel A). In contrast to the results for the total sample of syndicated loans, for the institutional subsample we find that *IPT-stock-return* is significantly higher when the majority of a borrower’s loans have a relationship lead arranger, highly reputable lead arrangers and are subject to financial covenants. Therefore, institutional investors increase the speed of price discovery in the equity market primarily when they have access to timely private information disseminated to syndicate participants.

While these results are consistent with institutional investors trading on syndicate confidential information, we have not ruled out the possibility that secondary loan market prices are simply transmitting confidential information about the borrower to the equity market. The

speed of price discovery in the equity market is higher when a firm's loans are traded on a secondary loan market, as suggested by the significantly higher *IPT-stock-return* value for *Loan-trading* portfolio than for *Non-Loan-trading* portfolio (39.85 versus 24.77, Table 5). Because 40.7% of the firm-quarter observations in the institutional subsample are related to borrowers with loans traded on a secondary loan market, it is possible that secondary loan market prices are driving a higher *IPT-stock-return* for the *Institutional* portfolio.

Panel B of Table 6 reports *IPT-stock-return* values for portfolios formed based on *Relationship-lending*, *Reputable-arranger* and *Covenant* variables after excluding from the institutional subsample firm-quarters with traded loans. In this analysis, *IPT-stock-return* values continue to be significantly higher when loans are characterized by the relationship lead arranger, by highly reputable lead arrangers and by financial covenants. The magnitude of the differences in the *IPT-stock-return* values for the portfolios formed on these characteristics are similar to those reported in Panel A. Therefore, higher *IPT-stock-return* of *Institutional* portfolio cannot be attributed only to firms with loans traded on the secondary market.²⁶

To provide further assurance that our results can be interpreted as evidence of insider trading by institutional lenders, we examine whether the *Institutional* variable is picking up an effect of potential omitted correlated variables. As reported in Table 5, *IPT-stock-return* is significantly higher for firms with high default risk, low dispersion in analysts' earnings forecasts, low growth options, low stock return volatility and for firms that provide earnings guidance. Simultaneously, firms with institutional syndicated loans typically have high default risk and high tangibility (Table 2, Panel C), which raises a concern that the more timely price discovery for *Institutional* portfolio may be attributed, at least partially, to these firm

²⁶As a robustness test, we also exclude from the institutional subsample loans traded on the secondary loan market whose price quotes are reported to LPC by only one market-maker (previously classified as non-traded). We repeat the analysis reported in Table 6, Panel B for this sample and find qualitatively similar results.

characteristics. In an attempt to address this concern, we estimate *IPT-stock-return* for portfolios formed based on the high versus low values of *Credit-rating*, *DLI* and *Tangibility* (Table 7). We find that *IPT-stock-return* values are higher for *Institutional* portfolios even when we restrict the analysis to high default risk firms. *Institutional* portfolios' *IPT-stock-return* values are also unaffected by controlling for tangibility. To summarize, our empirical findings are consistent with more rapid equity price discovery in firm-quarters characterized by both relatively strong private information flows to lenders *and* by the presence of institutional lenders who exploit this private information when trading the equity of the borrowing firm.

In addition, two useful insights emerge from Table 7. First, the speed of equity price discovery for firms in the *Non-Institutional* portfolios is not affected by default risk. *IPT-stock-return values* for high versus low default risk portfolios are not significantly different from each other when institutional investors are not involved in loan syndicates (23.53 versus 25.67 for *Credit-risk* sort and 25.22 versus 25.33 for *DLI* sort).

Second, institutional investors affect stock price discovery only for high default risk firms. The difference in the *IPT-stock-return* between *Institutional* and *Non-Institutional* portfolios is not significant for low default risk firms. Further, for the two way sort on *Institutional* and *Credit-rating*, an *IPT-stock-return* of 37.58 for the high *Credit-rating* subset is significantly higher than an *IPT-stock-return* of 23.17 for the low *Credit-rating* subset (percentile ΔIPT of 96.75). With regard to *Institutional* and *DLI* sort, an *IPT-stock-return* of 38.35 for the high *DLI* subset is significantly higher than an *IPT-stock-return* of 31.65 for the low *DLI* subset (percentile ΔIPT of 90.85). Recall that we find that price discovery in the secondary loan market is faster for high default risk firms, suggesting a more intensive demand by lenders for information on loans with higher default probabilities. Moreover, we show that

financial covenants increase loan price discovery only for high default risk loans. Hence, the pronounced effect of institutional lending on the speed of equity price discovery of high default risk firms is consistent with our interpretation that institutional investors exploit the enhanced information set available to syndicate participants.

Finally, we examine the potential interactive effects on *IPT-stock-return* between *Institutional* and the information transparency variables that affect the timeliness of price discovery in the equity market. The univariate results in Table 5 indicate that *IPT-stock-return* is significantly higher for firm-quarters with low analysts' forecast dispersion and with management earnings guidance. The question naturally arises as to whether the effect of *Institutional* on *IPT-stock-return* is mitigated in a more transparent information environment. To address this question, we estimate the *IPT-stock-return* for firm quarters with institutional loans for portfolios formed on the *Analyst-dispersion* and *Management-forecast* variables.

When we sort firm-quarters into two portfolios based on *Analyst-dispersion* below versus above the sample median, we find that the values of *IPT-stock-return* are not significantly different for these portfolios (35.03 versus 38.47, percentile ΔIPT of 45.44). However, when we sort firm-quarters into two portfolios based on whether they are with or without *Management-forecast*, we find a significantly higher *IPT-stock-return* for firms-quarters without management earnings guidance (28.84 versus 40.65, percentile ΔIPT of 95.44). This result is consistent with institutional investors affecting the price discovery in the equity market primarily when management forecast guidance is not available. Therefore, publicly disclosed management earnings forecasts “level the playing field” with regard to information about near-term quarterly earnings between institutional lenders and other equity market participants.²⁷

²⁷We have repeated all the tests reported in this section using the maximum cumulative difference test statistic. The results of these tests are similar to those reported in Tables 5, 6 and 7.

7. Concluding Remarks

In this paper, we investigate price discovery processes in the secondary loan market and in the equity market for publicly traded firms with outstanding syndicated loans. Examining price discovery in these two markets provides us with a powerful setting in which to better understand the relation between information flows and the price discovery process in capital markets.

First, we exploit the existence of secondary loan market trading to isolate the determinants of price discovery in the secondary loan market. We find that price discovery is timelier for relationship loans, loans syndicated by a reputable arranger and loans subject to financial covenants. These characteristics of syndicated loans have been widely studied in the context of optimal loan contract design, and now we show that they are also deeply intertwined with the timing of private information flows from borrowers to syndicate participants. By isolating the fundamental characteristics of loans and loan syndicates associated with more timely price discovery, we extend the literature on the secondary market trading of syndicated loans.

Second, we investigate whether price discovery in the equity market is timelier for public firms with syndicated loan characteristics associated with relatively early private information dissemination from borrowers to lenders. We show that the loan characteristics that we found to be associated with the timelier dissemination of private information to lenders in the loan market are also associated with faster price discovery in the stock market, but only when institutional investors are involved in the firm's syndicated loans. In this respect, we complement and extend the literature investigating lead-lag relations between prices across capital markets. We also contribute to the literature that explores the possibility that private information received in the loan market is exploited by syndicate participants for insider trading in other markets.

Appendix A: Variable Definitions

Variables	Description
Analyst-coverage	An indicator variable taking a value of 1 if a firm has equity analyst coverage, zero otherwise.
Analyst-dispersion	Dispersion in analysts' earnings forecasts. Dispersion is estimated as a ratio of a standard deviation of analysts' earnings forecasts to a mean value of earnings forecasts.
Covenant (Loan Sample)	An indicator variable taking the value of 1 if the majority (>=50%) of a firm's traded syndicated loans are subject to financial covenants, zero otherwise.
Covenant (Equity sample)	An indicator variable taking the value of 1 if the majority (>=50%) of a firm's outstanding syndicated loans are subject to financial covenants, zero otherwise.
Credit-rating	The numerical equivalent of senior debt rating. It is set as equal to one if the S&P senior debt rating is AAA, through 25 when the S&P senior debt rating is D. For firms not rated by S&P, we assign the Moody's senior debt rating, converted to an equivalent S&P rating. For firms not rated by S&P or Moody's, we assign the Fitch or DPR senior debt rating, converted to an equivalent S&P rating.
DLI	<p>Default risk probability measure of Vassalou and Xing (2004). The default likelihood indicator (DLI) is calculated using contingent claim methodology of Black and Scholes (1973) and Merton (1974). The calculation is based on a firm's equity data and is a nonlinear function of a firm's default probability: $DLI = N\left(-\frac{\ln(V_{A,t} / X_t) + (\mu - 0.5\sigma_A^2)T}{\sigma_A\sqrt{T}}\right)$, where N is the cumulative density function of the standard normal distribution, V_A is the firm's assets value, X is the book value of the debt, μ is a drift, σ_A is a firm's assets volatility and T is debt maturity. σ_A is calculated by an iterative procedure. For a more detailed description of the DLI estimation see Vassalou and Xing (2004).</p>
DLI-increase	An indicator variable taking the value of 1 if a firm has experiences an increase in the DLI measure over the 3 month period preceding an earnings announcement date, zero otherwise.
Firm-size	A logarithm of the firm's total assets.
Income-positive	An indicator variable taking the value of 1 if a firm's income before extraordinary items is positive, zero otherwise.
Institutional	<p>The institutional variable captures whether private information is disseminated to institutional investors. This variable takes the value of 1 if any of a firm's syndicated loans outstanding over a 60 trading day period prior to the earnings announcement date has been syndicated by at least one institutional investor, zero otherwise. The institutional variable is estimated by the following steps. 1. For each of a firm's facilities outstanding around the earnings announcement date we identify a facility's type. Term loans B, C and D are considered as institutional loans and term loans A and revolving facilities are considered as banking loans. 2. For each outstanding facility, we retrieve all syndicate participants and assign participants involved in institutional loans to the institutional investor category. 3. For each outstanding facility, we identify the lead arranger/arrangers of the syndicate and verify that they have not been classified as institutional investors in the prior step. 4. For each lender classified as institutional investor after the first three steps, we test whether the lender also issues banking loans. We exclude lenders that are also involved in banking loans from the institutional investor category.</p> <p>This estimation of the institutional variable relies on the original syndicate structure on the primary loan market and does not account for the fact that institutional investors may and do join syndicates through secondary market trades. Because LTD does not allow identification of the institutions involved in the secondary loan trade, we cannot identify the change in the syndicate participants following the original syndication. However, it is important to emphasize that while the majority of institutional loans are traded after origination, only 10% of banking term loans and 5% of revolving facilities become available for secondary loan trading (Wittenberg-Moerman, 2008a). Therefore, by</p>

IPT-loan-return	<p>purchasing loans on the secondary market, institutional investors primarily join syndicates where institutional investors have been already involved in the original syndication.</p> <p>IPT-loan-return is a measure designed to capture the speed, or timeliness, with which the information related to the firm is impounded into loan prices. A firm's IPT-loan-return measure is calculated as the sum of the firm's loan buy-and-hold abnormal return from 60 trading days prior to the earnings announcement date through day m (BH_m), divided by the buy-and-hold loan abnormal return from 60 trading days prior to earnings announcement date to two trading days after the earnings announcement date (BH_2), for each of day m from -60 to 1, plus 0.5:</p> $IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$ <p>A firm's loan buy-and-hold abnormal return is estimated in two steps. First, we estimate an individual loan abnormal return by subtracting the market index from a loan's return. We estimate the market index as the average daily return of all loans traded on a secondary loan market on a specified trading day, which quotes are reported to LPC by at least two market makers. Second, we average loan abnormal returns across all of the firm's loans traded on a specified trading day. The portfolio IPT measure is estimated based on the equal weighted return of all firm-quarter observations included in a portfolio.</p>
IPT-stock-return	<p>IPT-stock-return is a measure designed to capture the speed, or timeliness, with which the information related to the firm is impounded into stock prices. A firm's IPT-stock-return measure is calculated as the sum of the firm's stock buy-and-hold size adjusted abnormal return from 60 trading days prior to earnings announcement date through day m (BH_m), divided by the buy-and-hold stock abnormal return from 60 days prior to earnings announcement date to two trading days after the earnings announcement date (BH_2), for each day m from -60 to 1, plus 0.5:</p> $IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} / BH_m) / BH_{12} = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$ <p>The portfolio IPT measure is estimated based on the equal weighted return of all firm-quarter observations included in a portfolio.</p>
Loan-bid-ask-spread	<p>The loan bid-ask spread is estimated based on bid and ask loan price quotes aggregated across dealers. Bid and ask prices are quoted as a percent of par (or cents on the dollar of par value). The bid-ask spread is measured as the average bid-ask spread of a firm's loans over the period from 60 trading days prior to the earnings announcement date to two trading days after this date.</p>
Loan-return-volatility	<p>A volatility of a firm's loan buy-and-hold abnormal return over a period from 60 trading days prior to earnings announcement date to two trading days after the earnings announcement date.</p>
Loan-size	<p>A logarithm of a loan's amount.</p>
Loan-trading	<p>An indicator variable taking the value of 1 if a firm's loans are traded on the secondary loan market and their quotes are reported to LPC by at least two market makers; zero otherwise.</p>
Management-forecast	<p>An indicator variable taking the value of 1 if a firm's management has announced earnings forecast for the current quarter within a period from 60 trading days prior to the earnings announcement date to two trading days prior to this day, zero otherwise.</p>
Market-book	<p>The ratio of the firm's market value to book value of common equity, estimated at the end of the previous fiscal quarter.</p>
Number-of-market-makers	<p>A number of market makers that provide a loan's bid and ask prices quotes to LPC; the variable is averaged across the firm's traded loans over the period from 60 trading days prior to the earnings announcement date to two trading days after this date.</p>
Relationship-lending (Loan Sample)	<p>An indicator variable taking the value of 1 if the majority ($\geq 50\%$) of a firm's traded syndicated loans are syndicated by a relationship lender, zero otherwise. A loan is considered to be issued by a relationship lender if at least one of the loan's lead arrangers had been a lead arranger of the borrower's previous loans over the 5 year period preceding the loan's issuance date.</p>
Relationship-lending (Equity Sample)	<p>An indicator variable taking the value of 1 if the majority ($\geq 50\%$) of a firm's outstanding syndicated loans are syndicated by a relationship lender, zero otherwise. A loan is considered to be issued by a</p>

	relationship lender if at least one of the loan's lead arrangers had been a lead arranger of the borrower's previous loans over the 5 year period preceding the loan's issuance date.
Reputable-arranger (Loan sample)	An indicator variable taking the value of 1 if the majority ($\geq 50\%$) of a firm's traded syndicated loans are syndicated by a reputable arranger; zero otherwise. A loan is considered to be issued by a reputable arranger if the loan is syndicated by one of the top three arrangers, based on the arranger's average market share in the primary loan market. The market share is measured by the ratio of the amount of loans that the financial intermediary syndicated as a lead arranger to the total amount of loans syndicated on the primary loan market over the period from 1999 to 2006. In the case of multiple arrangers, we consider the highest market share across the arrangers involved in the loan transaction.
Reputable arranger (Equity sample)	An indicator variable taking the value of 1 if majority ($\geq 50\%$) of a firm's outstanding syndicated loans are syndicated by a reputable arranger; zero otherwise. A loan is considered to be issued by a reputable arranger if the loan is syndicated by one of the top three arrangers, based on the arranger's average market share in the primary loan market. The market share is measured by the ratio of the amount of loans that the financial intermediary syndicated as a lead arranger to the total amount of loans syndicated on the primary loan market over the period from 1999 to 2006. In the case of the multiple arrangers, we consider the highest market share across the arrangers involved in the loan transaction.
Stock-bid-ask-spread	The relative quoted bid-ask spread estimated as the difference between the ask and bid prices divided by the average of these prices. The bid-ask spread is measured as the average bid-ask spread over the period from 60 trading days prior to the earnings announcement date to two trading days after this date.
Stock-return-volatility	A volatility of a firm's stock buy-and-hold abnormal return over a period from 60 trading days prior to earnings announcement date to 2 trading days after to earnings announcement date.
SUE	An indicator variable taking the value of 1 if a firm's SUE is positive; zero otherwise. SUE is a measure of unexpected earnings from a seasonal random walk model with trend, scaled by their standard deviation within the trend estimation period (8 previous quarters). SUE is estimated as the seasonal change in earnings before extraordinary items minus the mean unexpected earnings before extraordinary items over the previous 8 quarters, scaled by the standard deviation of this measure of unexpected earnings over the same period.
Tangibility	The ratio of net PPE to total assets, estimated at the end of the previous fiscal quarter.

Appendix B: Statistical Tests of Differences in Intra-period Timeliness

Our main analyses involve comparing the speed of price discovery between two portfolios of firms, where price discovery is estimated using measures of intra-period timeliness. As discussed in the text, intra-period timeliness for a portfolio is conceptualized as a curve constructed by plotting for each of the 63 trading days in the period the cumulative buy-and-hold abnormal return up to that day, scaled by the cumulative buy-and-hold abnormal return for the whole period. That is, each point on the curve represents the proportion of the entire period's abnormal return realized up to and including a given day. The idea of the statistical tests is to establish whether the curves for two portfolios are statistically different from each other in a way that is consistent with differential price discovery.

Now, the notion of price discovery, or the timeliness of information arrival, is that if information arrives earlier for one portfolio relative to another, then a higher proportion of the total cumulative abnormal return for that portfolio will occur earlier in the period for the “fast” price discovery portfolio relative to the “slow” price discovery portfolio. That is, the order of arrival of the observed returns is crucial, because information would arrive relatively earlier for the timely portfolio and relatively later for the less timely one. Thus, our null hypothesis is that the order of arrival of the returns does not matter because there is no difference in the timing of the information arrival for one portfolio relative to the other.

We use a permutation analysis to test the null hypothesis that the order of arrival of the returns does not matter. To compute the distribution of our test statistics (described below) under the null, we randomly scramble the ordering of the 63 return pairs (one return for each portfolio for each day) 1000 times, computing the test statistic for each iteration, essentially constructing

the distribution of the test statistic under the null that the ordering of return arrivals does not matter.

Our first test statistic is computed as the difference in total areas under the two curves. In section 4.3 above, we defined the variable IPT , which represents an estimate of the total area under the curve for a given portfolio. IPT is computed as the sum of the firm's buy-and-hold abnormal return from 60 trading days prior to the earnings announcement date through day m (BH_m), divided by the buy-and-hold abnormal return from 60 trading days prior to the earnings announcement date to two trading days after the earnings announcement date (BH_2), for each day m from -60 to 1, plus 0.5:
$$IPT = \frac{1}{2} \sum_{m=-60}^1 (BH_{m-1} / BH_m) / BH_{12} = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$$
. Thus, we compute the IPT for each of the two portfolios and take the difference, ΔIPT . These steps are iterated 1,000 times, yielding a sampling distribution for ΔIPT . The sampling distribution of ΔIPT is then used to indicate the likelihood of observing the sample statistic $\hat{\Delta IPT}$ under the null hypothesis that there is no difference in the timing or order of the abnormal return pairs.

Our second test statistic (see McNichols, 1984, and Butler et al., 2007), $M(t)$, is computed as the cumulative difference between the areas under the return curves for the two portfolios for day t . This yields 63 $M(t)$ s (one for each day), from which the maximum value, M^* , is selected. That is, we compare the difference in areas between the two cumulative distribution curves for each of the 63 distinct days for which we are measuring returns, and take the maximum difference. These steps are iterated 1,000 times, yielding a sampling distribution for M^* . The sampling distribution of the test statistic M^* is then used to indicate the likelihood of observing the sample statistic \hat{M}^* under the null hypothesis that there is no difference in the timing or order of the abnormal return pairs.

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Figure 1: Information flows in the secondary loan and stock markets

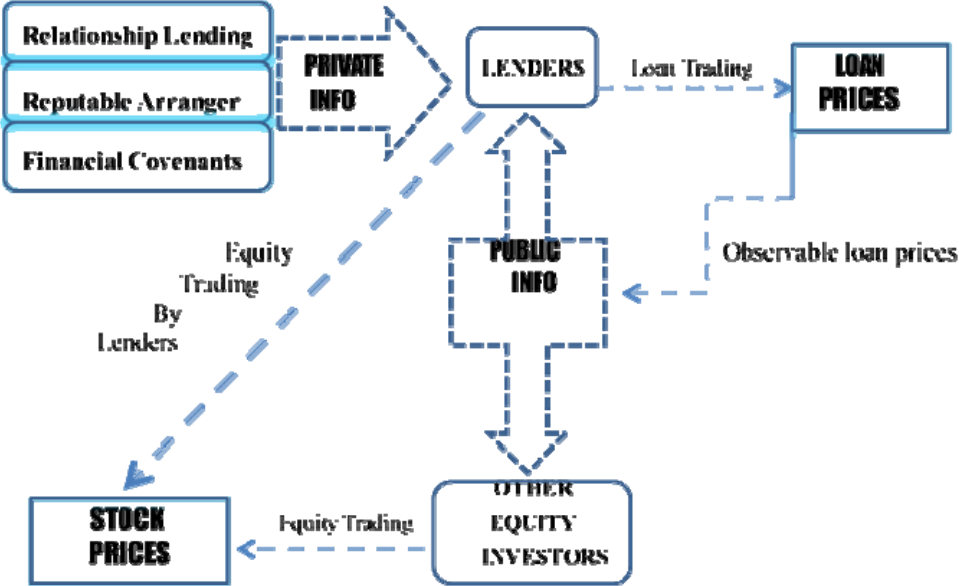


Figure 2: Plot of IPT-loan-return measure for *Relationship-lending* and *Non-Relationship-lending* portfolios

This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during 63-day period from 60 trading days before the earnings announcement date to two trading days after the announcement. The area under the graph is:

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$

A firm-quarter observation is allocated to a portfolio based on whether the majority of a firm's traded loans are syndicated by a relationship lender. Variables are defined in Appendix A.

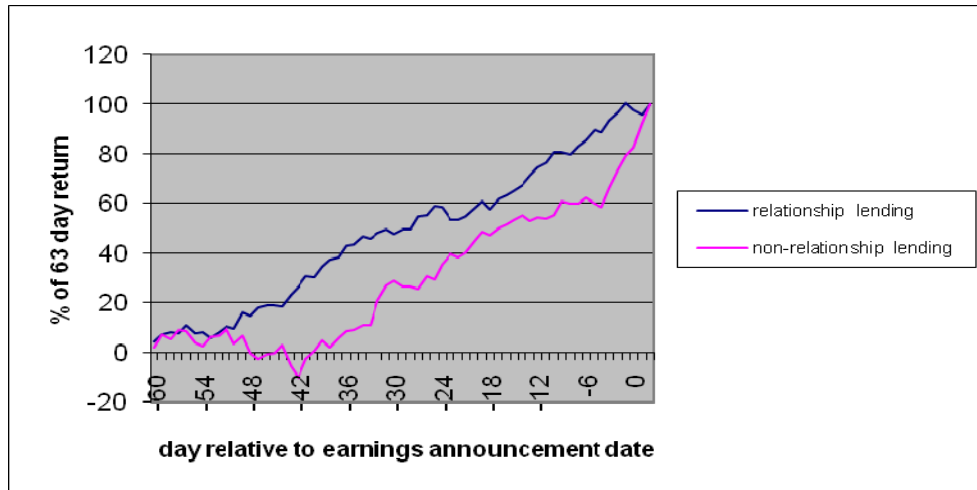


Figure 3: Plot of IPT-loan-return measure for *Reputable-arranger* and *Non-Reputable-arranger* portfolios

This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during 63-day period from 60 trading days before the earnings announcement date to two trading days after the announcement. The area under the graph is:

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$

A firm-quarter observation is allocated to a portfolio based on whether the majority of a firm's traded loans are syndicated by a reputable arranger. Variables are defined in Appendix A.

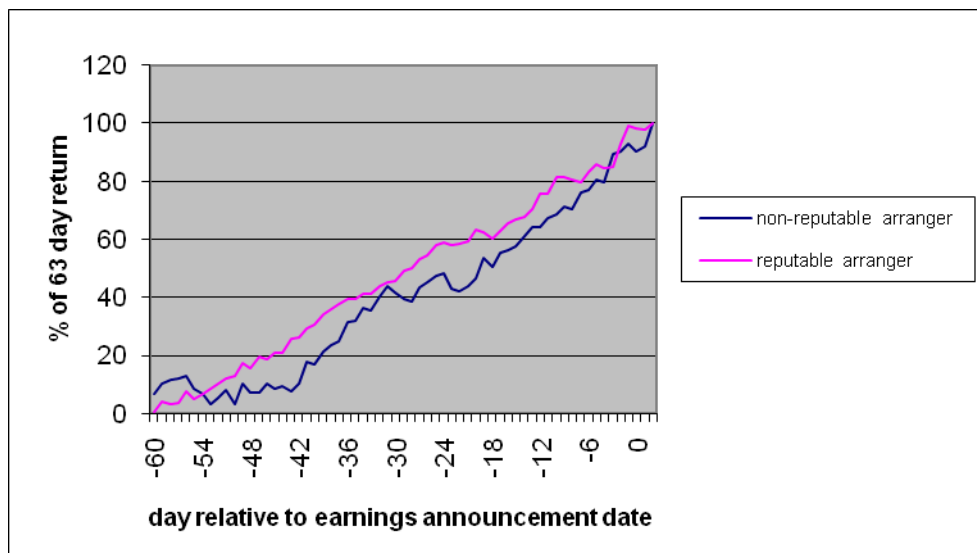


Figure 4: Plot of IPT-loan-return measure for *Covenant* and *Non-Covenant* portfolios

This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during 63-day period from 60 trading days before the earnings announcement date to two trading days after the announcement. The area under the graph is:

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$

A firm-quarter observation is allocated to a portfolio based on whether the majority of a firm's loans are subject to financial covenants. Variables are defined in Appendix A.

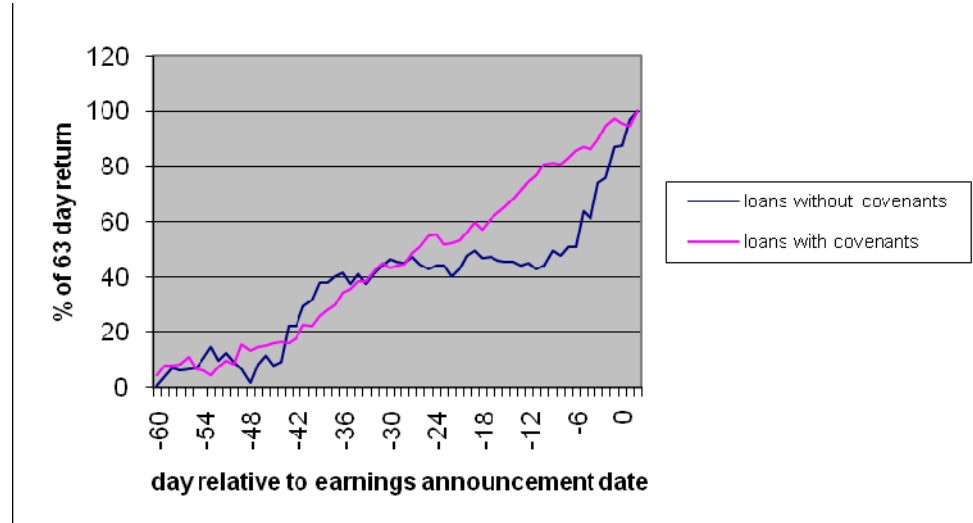


Figure 5: Plot of IPT-stock-return measure for *Institutional* and *Non-Institutional* portfolios

This figure plots the percentage of the 63-day cumulative stock portfolio return as for day during 63-day period from 60 trading days before the earnings announcement date to two trading days after the announcement. The area under the graph is:

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$

A firm-quarter observation is allocated to a portfolio based on whether a firm's syndicated loans outstanding over a 60 trading day period prior to the earnings announcement date have been syndicated by at least one institutional investor. Variables are defined in Appendix A.

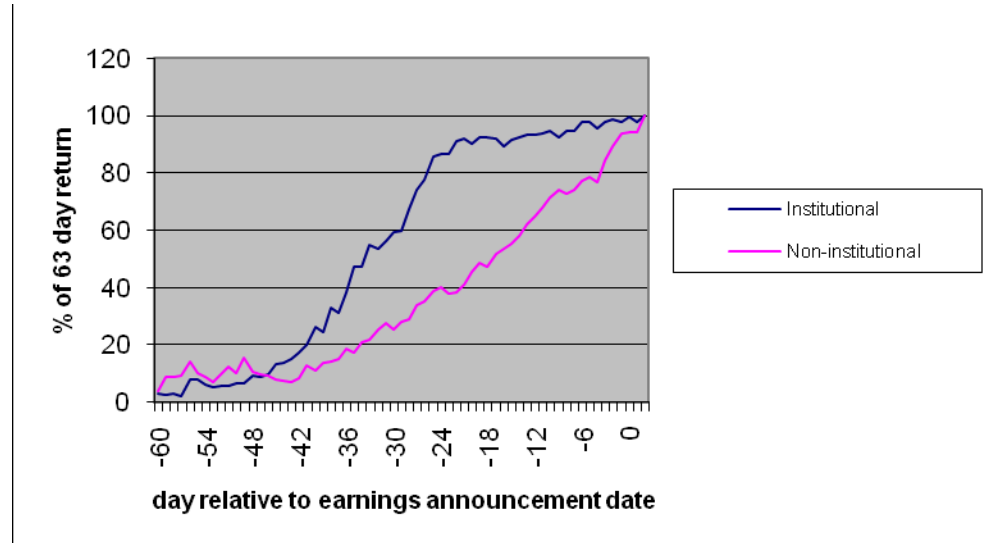


Table 1: Sample selection process

This table summarizes the sample selection process. Panel A presents the sample selection process of the Loan Sample. Panel B presents the sample selection process of the Equity Sample.

<i>Panel A: Loan Sample</i>		
Filters	Facilities	
	Number	Percent
Total trading facilities	8,778	100.0
Intersection with the DealScan database	7,350	83.7
Elimination of facilities to non-U.S. firms and/or facilities issued in foreign currencies	6,614	75.3
Intersection with COMPUSTAT/CRSP	3,937	44.9
Elimination of facilities without daily price quotes	3,865	44.0
Elimination of facilities with price quotes reported by one market maker	2,612	29.8
Elimination of facilities of firms missing earnings announcement date	2,504	28.5
Elimination of facilities of firms with management earnings forecasts announcements around the earnings announcement date	2,243	25.6
Elimination of facilities with missing data	2,215	25.2
2,215 facilities represent 499 firms and 4,781 firm-quarters		
<i>Panel B: Equity Sample</i>		
Filters	Facilities	
	Number	Percent
Syndicated loans to U.S. borrowers and issued in U.S. dollars outstanding over the period from 1999 to 2006	64,920	100.0
Intersection with COMPUSTAT/CRSP	33,536	51.7
Elimination of facilities of firms missing returns and/or earnings announcement date	26,363	40.6
Elimination of facilities of firms with management earnings forecasts announcements around the earnings announcement date	25,886	39.9
Elimination of facilities with missing data	25,832	39.8
25,832 facilities represent 4,358 firms and 54,557 firm-quarters		

Table 2: Descriptive statistics

This table provides descriptive statistics (see Table 1 for sample selection procedure). Panels A and B describe the characteristics of the Loan Sample and Equity Sample, respectively. Panel C presents correlation statistics for the *Relationship-lending*, *Reputable-arranger* and *Covenant* variables for the Loan Sample and for the *Institutional* variable for the Equity Sample. Variables are defined in Appendix A.

Panel A: Loan Sample

Loan and Firm Characteristics	Number of observations	Mean	SD	Distribution		
				25%	50%	75%
Institutional Lending						
Institutional	4,781	0.56				
Informational features of lending arrangement						
Relationship-lending	4,781	0.54				
Reputable-arranger	4,781	0.57				
Covenant	4,781	0.89				
Default Risk						
Credit-rating	4,339	13.08	2.81	12.00	13.00	14.00
DLI	3,946	13.90	29.32	0.00	0.00	4.35
DLI-increase	3,866	0.45				
Information transparency						
Loan-size (in millions)	4,781	288.3	839.5	154.9	259.8	451.7
Income-positive	4,781	0.65				
Analyst-coverage	4,781	0.86				
Analyst-dispersion	3,797	0.24	0.62	0.03	0.08	0.20
Management-forecast	4,781	0.11				
Earnings surprise						
SUE	3,531	-0.13	4.23	-0.60	0.03	0.70
Growth options						
Market-book	4,665	1.78	7.54	0.72	1.71	3.01
Tangibility	4,665	0.35	0.23	0.15	0.33	0.51
Loan Trading Features						
Number-of-market-makers	4,781	3.37	1.91	2.00	3.00	4.00
Loan-bid-ask-spread	4,781	0.93	0.86	0.50	0.65	0.98
Loan-return-volatility	4,781	0.002	0.003	0.001	0.001	0.002

Panel B: Equity Sample

Loan and Firm Characteristics	Number of observations	Mean	SD	Distribution		
				25%	50%	75%
Institutional Lending						
Institutional	54,557	0.12				
Trading on the secondary loan market						
Loan-trading	54,557	0.09				
Informational features of lending arrangement						
Relationship-lending	54,557	0.38				
Reputable-arranger	54,557	0.33				
Covenant	54,557	0.72				
Default Risk						
Credit-rating	24,609	11.02	3.80	8.00	11.00	14.00
DLI	47,222	7.84	21.75	0.00	0.00	0.24
DLI-increase	46,317	0.48				
Information transparency						
Firm-size (in millions)	54,557	2,727	8,179	87.12	391.4	1,502
Income-positive	54,557	0.72				
Analyst-coverage	54,557	0.74				
Analyst-dispersion	33,008	0.21	0.64	0.03	0.07	0.17
Management-forecast	54,557	0.06				
Earnings surprise						
SUE	44,644	-0.18	3.21	-0.71	0.01	0.72
Growth options						
Market-book	54,557	2.35	3.42	0.99	1.67	2.77
Tangibility	50,860	0.31	0.25	0.10	0.24	0.47
Equity Trading Features						
Stock-bid-ask-spread	54,476	0.03	0.02	0.01	0.02	0.03
Stock-return-volatility	54,551	0.04	0.03	0.02	0.03	0.04

Panel C: Correlation statistics

Loan and Firm Characteristics	Loan Sample Relationship-lending		Loan Sample Reputable-arranger		Loan Sample Covenant		Equity Sample Institutional	
	Pearson	Spearman	Pearson	Spearman	Pearson	Spearman	Pearson	Spearman
	Institutional	0.02	0.04**	0.08***	0.06***	-0.01	-0.01	1
Relationship-lending	1	1	0.01	0.02	-0.03*	-0.05**	0.07***	0.10***
Reputable-arranger	0.01	0.02	1	1	0.00	0.00	0.03***	0.06***
Covenant	-0.03*	-0.05***	0.00	0.00	1	1	0.03***	-0.01**
Credit-rating	-0.05***	-0.07***	-0.18***	-0.20**	0.04**	0.05**	0.32***	0.37***
DLI	0.01	-0.01	0.01	-0.01	0.04**	0.03**	0.13***	0.13***
DLI-increase	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00
Loan-size /Firm size	0.06***	0.06***	0.23***	0.24***	-0.07***	-0.07***	0.04**	0.05**
Income-positive	0.02	0.01	-0.01	-0.01	-0.01	0.01	-0.08***	-0.08***
Analyst-coverage	0.02	0.02	0.00	0.00	0.00	0.02	0.06***	0.06***
Analyst-dispersion	-0.01	-0.05***	-0.04**	-0.02	0.01	-0.04**	0.04***	0.07***
Management-forecast	0.05***	0.05***	0.00	0.00	0.04***	0.06**	0.00	0.00
SUE	-0.02	-0.03**	0.01	0.02	-0.01	0.01	0.00	-0.01***
Market-book	-0.01	0.01	-0.01	-0.03	0.01	0.02	0.00	-0.04
Tangibility	0.07***	0.09***	-0.13***	-0.11***	-0.04**	-0.03*	0.01***	0.04***
Number-of-market-makers	0.01	0.06	0.11***	0.16***	-0.03*	-0.01	-	-
Loan-bid-ask-spread	0.05***	0.01	-0.03*	0.00	0.06***	0.07***	-	-
Loan-return-volatility	-0.04**	-0.01	-0.01	0.00	-0.05**	-0.08**	-	-
Loan-trading	-	-	-	-	-	-	0.62***	0.62***
Stock-bid-ask-spread	-	-	-	-	-	-	-0.05***	-0.05***
Stock-return-volatility	-	-	-	-	-	-	-0.01	0.00

Table 3: IPT-loan-return measure for portfolios based on firm and loan characteristics

This table provides *IPT-loan-return* values for portfolios based on firm- and loan-specific characteristics.

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$$
 A firm-quarter observation is allocated to a portfolio as follows. For *Institutional*, *Relationship-lending*, *Reputable-arranger*, *Covenant*, *DLI-increase*, *Income-positive*, *Analyst-coverage*, *Management-forecast* and *SUE* characteristics, a firm-quarter observation is allocated to Portfolio 1 if the respective characteristic is equal to one. Otherwise, a firm-quarter observation is allocated to Portfolio 2. For the rest of the characteristics, a firm-quarter observation is allocated to Portfolio 1 if the value of the respective characteristic is above the sample median. Otherwise, a firm-quarter observation is allocated to Portfolio 2. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, ** and * denotes significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix A. See Appendix B for test statistic details.

	<i>IPT-loan-return</i>			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
Informational features of lending arrangement				
<i>Relationship-lending</i>	30.03 (2,603)	18.43 (2,178)	11.60**	98.42
<i>Reputable-arranger</i>	29.78 (2,712)	25.23 (2,069)	4.55**	95.02
<i>Covenant</i>	28.26 (4,240)	23.45 (541)	4.81**	96.18
Institutional Lending				
<i>Institutional</i>	29.69 (2,685)	27.28 (2,096)	2.41	54.82
Default risk				
<i>Credit-rating</i>	33.26 (1,620)	22.94 (2,719)	10.32**	96.25
<i>DLI</i>	34.32 (1,973)	25.52 (1,973)	8.80**	95.64
<i>DLI-increase</i>	34.30 (1,730)	29.23 (2,136)	5.07	84.18
Information transparency				
<i>Size</i>	33.57 (2,388)	26.65 (2,393)	6.92**	97.46
<i>Income-positive</i>	23.19 (3,093)	31.49 (1,688)	-8.30**	95.31
<i>Analyst-coverage</i>	31.05 (4,114)	28.79 (667)	2.26	56.80
<i>Analyst-dispersion</i>	27.58 (1,903)	31.00 (1,894)	-3.42	61.16
<i>Management-forecast</i>	30.82 (526)	27.88 (4,255)	2.94	58.76
Earnings surprise				
<i>SUE</i>	24.09 (2,445)	26.47 (1,920)	-2.38	48.91
Growth options				
<i>Market-book</i>	27.06 (2,332)	33.87 (2,333)	-6.81*	92.85
<i>Tangibility</i>	34.41 (2,333)	24.97 (2,332)	9.44**	96.74
Loan Trading Features				
<i>Number-of-market-makers</i>	33.71 (1,932)	23.90 (2,849)	9.81**	97.29
<i>Loan-bid-ask-spread</i>	28.62 (2,390)	34.95 (2,391)	-6.33**	95.16
<i>Loan-return-volatility</i>	29.04 (2,390)	31.28 (2,391)	-2.24	45.11

Table 4: The impact of the information features of lending arrangements, controlling for loan and firm characteristics

This table provides *IPT-loan-return* values for portfolios based on loan- and firm- characteristics and on whether a firm's loans have the following features of lending arrangements: *Relationship-lending*, *Reputable-arranger* and *Covenants*.
$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$$
 A firm-quarter observation is allocated to Portfolio 1 if the respective feature of lending arrangement is equal to one; otherwise, a firm-quarter observation is allocated to Portfolio 2. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, ** and * denotes significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix A. See Appendix B for test statistic details.

	<i>IPT-loan-return</i>			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
Relationship-lending				
<i>Size above median</i>	36.21 (1,384)	23.22 (1,004)	12.99**	95.98
<i>Size below median</i>	32.25 (1,219)	21.66 (1,174)	10.59**	95.21
<i>Tangibility above median</i>	36.69 (1,342)	24.32 (991)	12.37**	96.25
<i>Tangibility below median</i>	28.77 (1,261)	19.86 (1,187)	8.91**	95.13
Reputable-arranger				
<i>Size above median</i>	33.16 (1,623)	26.36 (765)	6.80**	97.68
<i>Size below median</i>	27.78 (1,089)	22.87 (1,304)	4.91*	93.54
<i>Number-of-market-makers above median</i>	35.21 (1,545)	29.08 (940)	6.13**	97.07
<i>Number-of-market-makers below median</i>	25.35 (1,167)	23.76 (1,129)	1.59	34.80
Covenant				
<i>Credit-rating above median</i>	35.93 (2,354)	31.38 (244)	4.55*	92.76
<i>Credit-rating below median</i>	24.31 (1,508)	20.13 (233)	4.18	84.75
<i>DLI above median</i>	36.53 (1,777)	31.18 (196)	5.35**	96.00
<i>DLI below median</i>	25.22 (1,731)	22.53 (242)	2.69	29.16

Table 5: IPT-stock-return measure for portfolios based on firm and loan characteristics

This table provides average *IPT-stock-return* values for portfolios based on firm- and loan-specific characteristics.

$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5.$$

A firm-quarter observation is allocated to a portfolio as follows. For *Institutional*, *Relationship-lending*, *Reputable-arranger*, *Covenant*, *DLI-increase*, *Income-positive*, *Analyst-coverage*, *Management-forecast* and *SUE* characteristic, a firm-quarter observation is allocated to Portfolio 1 if the respective characteristic is equal to one. Otherwise, a firm-quarter observation is allocated to Portfolio 2. For the rest of the characteristics, a firm-quarter observation is allocated to Portfolio 1 if a value of the respective characteristic is above the sample median. Otherwise, a firm is allocated to Portfolio 2. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, ** and * denotes significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix A. See Appendix B for test statistic details.

	<i>IPT-stock-return</i>			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
Informational features of lending arrangement				
<i>Relationship-lending</i>	28.51 (20,962)	26.89 (33,595)	1.62	46.29
<i>Reputable-arranger</i>	32.56 (18,182)	27.32 (36,375)	5.24	76.19
<i>Covenant</i>	27.58 (39,327)	25.17 (15,230)	2.41	38.15
Institutional Lending	38.07	23.32	14.75**	98.43
<i>Institutional</i>	(6,604)	(47,953)		
Trading on the secondary loan market				
<i>Loan-trading</i>	39.85 (4,781)	24.77 (49,776)	15.08***	99.15
Default risk				
<i>Credit-rating</i>	34.71 (11,328)	24.89 (13,281)	9.82**	97.60
<i>DLI</i>	33.06 (23,611)	28.36 (23,611)	5.70*	93.86
<i>DLI-increase</i>	29.09 (22,075)	25.95 (24,242)	3.14	64.39
Information transparency				
<i>Size</i>	26.87 (27,274)	28.16 (27,283)	1.29	28.60
<i>Income-positive</i>	22.13 (39,391)	25.70 (15,166)	-3.57	63.74
<i>Analyst-coverage</i>	31.07 (40,307)	29.32 (14,250)	1.75	53.48
<i>Analyst-dispersion</i>	25.86 (16,333)	34.62 (16,675)	-8.76**	96.25
<i>Management-forecast</i>	31.87 (3,332)	23.27 (51,225)	8.60**	95.10
Earnings surprise				
<i>SUE</i>	22.02 (31,074)	24.32 (23,483)	-2.30	51.13
Growth options				
<i>Market-book</i>	26.71 (27,278)	33.90 (27,279)	-7.19**	95.77
<i>Tangibility</i>	31.90 (25,429)	25.54 (25,431)	6.36*	90.79
Equity Trading Features				
<i>Stock-bid-ask-spread</i>	28.50 (27,238)	31.75 (27,238)	-3.25	66.39
<i>Stock-return-volatility</i>	21.66 (27,277)	28.99 (27,274)	-7.33*	91.26

Table 6: IPT-stock-return measure for institutional portfolio, controlling for the information features of lending arrangements

This table provides average *IPT-stock-return* values for institutional portfolio across informational features of lending arrangements.
$$IPT\text{-loan-return} = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$$
 Panel A presents the analysis of the total sample of institutional loans. Panel B presents the analysis of the sample of institutional loans, excluding loans traded on the secondary loan market. A firm-quarter observation is allocated to Portfolio 1 if the respective characteristic is equal to one; otherwise, a firm-quarter observation is allocated to Portfolio 2. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, ** and * denotes significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix A. See Appendix B for test statistic details.

Panel A: The total sample of institutional loans

	<i>IPT-stock-return</i>			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
<i>Relationship-lending</i>	42.84 (3,166)	31.04 (3,438)	11.80**	95.79
<i>Arranger-reputation</i>	44.35 (2,532)	32.38 (4,072)	11.97**	97.09
<i>Covenant</i>	43.14 (5,222)	24.96 (1,382)	18.18***	99.20

Panel B: The sample of institutional loans, excluding loans traded on the secondary loan market

	<i>IPT-stock-return</i>			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
<i>Relationship-lending</i>	41.13 (1,646)	29.54 (2,273)	11.59**	95.11
<i>Arranger-reputation</i>	45.68 (1,005)	29.99 (2,914)	15.69**	97.91
<i>Covenant</i>	41.24 (2,815)	25.44 (1,104)	15.80**	95.28

Table 7: IPT-stock-return measure for institutional and non-institutional portfolios, controlling for firm characteristics

This table provides average *IPT-stock-return* values for portfolios based on firm characteristics and on whether a firm's loans are held by institutional investors.
$$IPT - loan - return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5 \cdot$$

Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, ** and * denotes significance at the 1%, 5% and 10% levels, respectively. Variables are defined in Appendix A. See Appendix B for test statistic details.

	<i>IPT-stock-return</i>			
	Institutional (1)	Non-institutional (2)	Difference (3)	Percentile ΔIPT (4)
<i>Credit-rating above median</i>	37.58 (4,288)	23.53 (7,040)	14.05**	97.29
<i>Credit-rating below median</i>	23.17 (696)	25.67 (12,585)	-2.50	38.02
<i>DLI above median</i>	38.35 (3,831)	25.22 (19,780)	13.13**	95.09
<i>DLI below median</i>	31.65 (2,100)	25.33 (21,511)	6.32	87.74
<i>Tangibility above median</i>	41.37 (3,528)	27.53 (21,901)	13.84*	93.19
<i>Tangibility below median</i>	35.96 (2,844)	21.65 (22,587)	14.31**	96.52