

Price Discovery and Dissemination of Private Information by Loan Syndicate Participants

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Received 3 July 2009; accepted 6 June 2010

ABSTRACT

We delineate key channels through which flows of confidential information to loan syndicate participants impact the dynamics of information arrival in prices. We isolate the timing of private information flows by estimating the speed of price discovery over quarterly earnings cycles in both secondary syndicated loan and equity markets. We identify borrowers disseminating private information to lenders relatively early in the cycle with firms exhibiting relatively early price discovery in the secondary loan market, documenting that

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price discovery is faster for loans subject to financial covenants, particularly earnings-based covenants; for borrowers who experience covenant violations; for borrowers with high credit risk; and for loans syndicated by relationship-based lenders or highly reputable lead arrangers. We then ask whether early access to private information in the loan market accelerates the speed of information arrival in stock prices. We document that the stock returns of firms identified with earlier private information dissemination to lenders indeed exhibit faster price discovery in the stock market, *but only* when institutional investors are involved in the firm's syndicated loans. Further, the positive relation between institutional lending and the speed of stock price discovery is more pronounced in relatively weak public disclosure environments. These results are consistent with institutional lenders systematically exploiting confidential syndicate information via trading in the equity market.

1. Introduction

A central issue in accounting and finance research is the channels through which information is impounded in securities prices. Prior evidence suggests that the prices of traded securities impound information from many public and private sources, including accounting reports, firms' voluntary disclosures, financial analysts, the popular press, traders' private information gathering activities, and insider trading, among others.¹ We take a novel approach to this issue by investigating the extent to which firms' private debt financing arrangements directly influence the flow of information into prices of their traded loans and equity securities.

Historically, private lending has fallen under the purview of banks. However, private lending practices have evolved dramatically with the explosive growth of primary and secondary syndicated loan markets.² While lead arrangers of syndicated loans are typically banks, syndicate participants now encompass a range of nonbank institutional investors, including hedge funds, among others. The current demographics of syndicate participation together with the fact that lenders in syndicated loan deals are privy to private information provided confidentially by borrowers has potentially significant and unexplored implications for how private information flows into prices.

In this paper, we seek to delineate key channels through which flows of confidential information to syndicate participants directly impact the dynamics of information arrival in prices. To do so, we must overcome the empirical challenge of being unable to directly observe the flows of confidential information to syndicate participants. To overcome this hurdle, our

¹ There is a vast empirical literature in accounting and finance that addresses channels through which information flows into prices. See, for example, Ball and Brown [1968], Ball and Kothari [1991], Kim and Verrecchia [1994], McNichols and Trueman [1994], Skinner [1994], Womack [1996], Ball [2001], Core [2001], Healy and Palepu [2001], Kothari [2001], Verrecchia [2001], Francis, Schipper, and Vincent, [2002], Piotroski and Roulstone [2004], Leuz and Wysocki [2006], and Anilowski, Feng, and Skinner [2007].

² Loans are originated in the primary syndicated loan market, while the secondary loan market allows originating lenders to sell off portions of their loans.

empirical design builds on two main insights. First, given that private information is provided on a confidential basis to syndicate participants who, in turn, are allowed to trade on this information in the secondary loan market, a borrower's dissemination of confidential information to syndicate participants is likely to dominate the price discovery process in the secondary market for the borrower's traded loans.³ Hence, we posit that relatively fast versus slow loan price discovery primarily reflects the relatively early versus late dissemination of confidential information to syndicate participants. Second, prior research and institutional knowledge about syndicated lending practices naturally lead to powerful predictions about how borrowers' credit risk and characteristics of their private lending arrangements affect the timing of confidential information dissemination to lenders. We use borrowers' credit risk and these lending agreements' characteristics to partition firms into portfolios with expected early versus late dissemination of confidential information, and test whether the early dissemination portfolio exhibits significantly faster price discovery in the secondary loan market.

Finding support for these predictions, we then exploit the same early versus late partitioning variables to test whether the relatively early dissemination of information to syndicate participants, as identified by each partitioning variable, is associated with faster price discovery in borrowers' stock. For this equity market analysis, we are able to employ an expanded sample of firms with both traded and nontraded syndicated loans. Hence, our empirical strategy involves sequential, interconnected analyses where we first examine factors associated with price discovery in the secondary loan market, and then incorporate results from this analysis to isolate connections between private information flows to syndicated lenders and price discovery in the equity market. In each market, we estimate the speed of price discovery at the portfolio level using an intraperiod timeliness (IPT) metric that captures the timeliness with which information is impounded into prices over the span of quarterly earnings cycles.⁴

We use three variables tied to covenants in syndicated loan contracts to partition firms on the basis of early versus late dissemination of private information to syndicate participants, including the prevalence of financial covenants, earnings-based (vs. other, nonearnings-based) financial covenants, and violations of financial covenants. Financial covenants often obligate borrowers to provide timely covenant reports to lenders that are likely to preempt public disclosures in upcoming quarterly earnings releases. Further, financial covenants are set fairly tightly relative to the underlying financial variables, enabling lenders to perform efficient monitoring of the borrower, thereby assisting in timely information acquisition. We

³ 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].

⁴ Our estimation of intraperiod price discovery is discussed in detail in section 4.1. Intraperiod timeliness measures have been used in prior research on accounting information and equity markets. See, for example, Alford, Leftwich, and Zmijewski [1993], Brown, Taylor and, Walter [1999], Beekes and Brown [2006, 2007], Beekes, Brown, and Chin [2006], and Butler, Kraft, and Weiss [2007].

expect earnings-based covenants (i.e., covenants based on flow variables revealing recent profitability and/or cash flow performance) to accelerate the dissemination of private information more than other financial covenants (e.g., current ratio) since relatively volatile and value-relevant earnings-related performance information likely plays a central role in covenant reports and lenders' information acquisition activities, more fully preempting upcoming earnings releases than other financial covenants. We also expect violations of financial covenants to trigger immediate and extensive private communications with lenders.

We also use the credit risk of the borrower as a partitioning variable. We expect high credit risk to accelerate the flow of private information to lenders because the payment of interest and principal and the violation of financial covenants are more sensitive to changes in performance and financial position if the borrower has a high credit risk, increasing the relevance of timely information. Lastly, we use relationship lending and lead arranger reputation as partitioning variables. Prior research suggests that in relationship lending, borrowers are inclined to reveal more information and lenders have stronger incentives to invest in information production (Greenbaum and Thakor [1995], Boot [2000], Bharath et al. [2008]). Hence, we expect that in relationship lending arrangements, the lead arranger's extensive knowledge of borrower's operations and well-developed channels of communication with the borrower's managers will facilitate a timely dissemination of information to syndicate participants. Prior research also suggests that the lead arranger's reputation reflects its ability and commitment to monitor borrowers (e.g., Diamond [1991], Boot, Greenbaum, and Thakor [1993], Dennis and Mullineaux [2000], Jones, Lang, and Nigro [2005], Sufi [2007]). Hence, we expect strong monitoring incentives and the extensive expertise of reputable lead arrangers to assist in the timely acquisition of pertinent information from borrowers.

In the secondary loan market, we find that price discovery is significantly faster for the portfolios classified as having early information dissemination according to each of the partitioning variables—financial covenants, covenant violations, high credit risk, relationship lenders, and highly reputable lead arrangers. Further, the faster price discovery for portfolios with financial covenants is driven primarily by financial covenants tied to earnings-based variables as opposed to other financial variables. These results are robust to controlling for a variety of potential omitted correlated variables, including loan and firm size and asset tangibility, analyst coverage, analyst forecast dispersion, press coverage, the number of prior syndicated loan deals, firms' voluntary disclosure as measured by management forecasts and the number of firm-initiated press releases, and loan liquidity.⁵ Potential concerns about omitted correlated variables are further mitigated by the fact that our covenant-related and credit risk variables

⁵ Some press releases are required by NYSE. Nevertheless, we expect press releases to be heavily influenced by voluntary disclosure decisions. For ease of exposition, we refer to firm-initiated press releases as "voluntary."

are *negatively* correlated with our measures of the public information transparency, while our other partitioning variables are *positively* correlated with these control variables.

These loan market results are interesting in their own right, providing new evidence of how the speed of price discovery in the secondary loan market varies with covenant-related factors, default risk, relationship lending, and lead arranger reputation. In addition, these results support the use of these factors in our equity market analysis to partition firms into portfolios on the basis of relatively early versus late dissemination of private information to syndicate participants.

In the equity market, we find that the speed of price discovery increases significantly across all of our partitioning variables, but *only* for the subsample with institutional lenders! These results suggest that firms with early dissemination of confidential information to syndicate participants exhibit earlier stock price discovery if, and only if, institutional investors belong to the loan syndicate. This finding is of particular interest because significant concerns have been raised about the extent to which nonbank institutional investors exploit their confidential syndicate information to engage in illegal insider trading in stock, bond, and credit derivative markets, either directly or through related parties (Sargent [2005], Anderson [2006], Standard and Poor's [2007]). Further, the absence of a relation between our partitioning variables and the speed of stock price discovery without institutional lenders indicate that our partitioning variables are not capturing public information transparency.

Our equity market results are robust to the exclusion of firms with traded loans,⁶ and to all of our controls for potential omitted correlated variables related to the public information environment. Two additional findings further bolster the interpretation that our equity market results reflect the misuse of confidential syndicate information by nonbank institutions. First, in contrast to our equity market results, institutional lenders are not associated with more rapid price discovery in the secondary loan market. The discrepancy between the results on institutional lending in the two markets is likely because institutional lenders possess (and exploit) privileged information relative to other investors in the equity market, but do not have an obvious information advantage relative to other syndicate participants in the loan market. And second, the positive relation between the speed of stock price discovery and institutional lending is more pronounced in relatively weak voluntary disclosure environments, as expected if our results are driven by institutions' misuse of *private* information in the equity market.

Our large-sample price discovery results extend and complement a recent literature that investigates insider trading by informed institutions in small-sample settings. In particular, Ivashina and Sun [2009] find that

⁶ We examine the robustness of results to the exclusion of traded loans to rule out the possibility that our results are driven by lenders' private information being conveyed to equity investors by the prices of loans in the secondary market.

institutional lenders profit from equity trades based on syndicate information received during loan renegotiations, earning abnormal equity returns in the month following the loan renegotiations, while Massoud et al. [2009] document increased short selling in the equity market prior to public announcements of loan originations and loan renegotiations for borrowers with syndicates that specifically include hedge fund lenders. Our paper shows that insider trading by institutional lenders is sufficiently pervasive to significantly affect the speed of stock price discovery during regular earnings cycles.

Our paper also contributes to the literature on relations between earnings and returns (e.g., Ball and Shivakumar [2008]) by isolating a new channel, private syndicate information, through which stock prices anticipate earnings information, and documenting how this private syndicate information varies in predictable ways with characteristics of firms and their lending arrangements. By documenting differences in the speed of price discovery across different financial covenants, our paper also adds to the literature on the implication of covenants for debt contracting (Nini, Sufi, and Smith [2009], Roberts and Sufi [2009]). Our analyses also extend the literature on the secondary trading of syndicated loans by establishing specific characteristics of loans, loan syndicates, and borrowers associated with timelier price discovery (Allen, Guo, and Weintrop [2008], Wittenberg-Moerman [2008], Altman, Gande, and Saunders [2010]) and the emerging literature comparing the informational efficiency of prices across capital markets (e.g., Hotchkiss and Ronen [2002], Allen and Gottesman [2006], Acharya and Johnson [2007]). Finally, we contribute to the literature on the involvement of institutional investors in the syndicated loan market (Nandy and Shao [2008], Nini [2008], Gatev and Strahan [2009], Jiang, Li, and Shao [2009]).

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

2. *The Structure of Information Distribution in the Syndicated Loan Market*⁷

Private debt contracts rely on the flow of confidential information between lenders and borrowers (e.g., Diamond [1984], Fama [1985]). Syndicated loans are private debt contracts, and as such the origination and ongoing maintenance of syndicated loans depends crucially on borrowers providing lenders with confidential information (e.g., Dennis and

⁷ The discussion in this section relies heavily on LSTA [2007, chapter 4] and Standard and Poor's [2007].

Mullineaux [2000], Sufi [2007]). This confidential information typically includes timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions (Standard and Poor's [2007]). The advent of secondary syndicated loan market trading along with the influx of nonbank investors into the loan market creates considerable challenges with respect to the confidentiality of borrowers' private information. Syndicated loan contracts require lenders to sign formal confidentiality provisions; for borrowers with tradable securities outstanding, it is generally believed that such confidentiality provisions make the distribution of private information to loan market participants Regulation Fair Disclosure compliant.

Traded loans are not securities and thus are not governed by the Securities Acts of 1933 and 1934. However, the borrower of a syndicated loan often has outstanding public securities that are subject to prohibitions on insider trading. This is a significant issue for syndicate lenders who want to retain an option to trade a borrower's public securities while simultaneously receiving material nonpublic information provided by the borrower under the credit agreement.⁸

Loan market participants have adopted two strategies for dealing with the conflict between the public and private sides of the information wall. In the first, institutions set up their trading desks on the public side of the wall where so-called "Chinese walls" are constructed so that traders, salespeople, and analysts do not receive private information, even if somewhere else in the institution private data are available. Investors sometimes create softer versions of "Chinese walls" by adopting written procedures meant to preclude trading on private information received from the loan market. An alternative strategy is to voluntarily keep the whole institution on the public side by agreeing not to receive any material nonpublic information provided by the firm. Lenders who identify themselves as public side participants have access only to loan documents that the arranger deems appropriate for public investors (Sargent [2005]).

In general, market participants in possession of syndicate confidential information trade on such information in the secondary loan market. An informed participant would be expected to reveal syndicate confidential information to a counterparty that has not chosen to be on the "public" side, unless the informed participant reasonably believes that the counterparty is already informed or that the counterparty is sophisticated and understands the importance of syndicate confidential information. Potential syndicate

⁸ Information has been defined as "material" for purposes of U.S. securities laws in circumstances where: (1) there is a "substantial likelihood" that a "reasonable investor" would consider the information important in making an investment decision, (2) the disclosure of the information would be "viewed by the reasonable investor as having significantly altered the 'total mix' of information made available," or (3) 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.

members can receive syndicate confidential information upon compliance with applicable confidentiality requirements. Thus, secondary market loan trading is carried out by privately informed participants. It is this fact that supports our empirical approach in which we infer the timing of private information dissemination by the borrower to lenders based on the speed of price discovery in the loan market.

Finally, while care is taken to deal with conflicts between the public and private aspects of information, the overall effectiveness of the system in preventing insider trading in other markets is an open question. Anecdotal evidence suggests that insider trading does indeed occur. Standard and Poor's [2007, pp. 11–12] notes growing concern among issuers, lenders, and regulators that the existence of private information in public hands “might breach confidentiality agreements between lenders and issuers and, more importantly, could lead to illegal trading.” Further, Standard and Poor's [2007] documents that “mark-to-market pricing services often report significant movement in a loan price without any corresponding news.” A recent article in *The New York Times* directly addresses insider trading by syndicate lenders, describing the case of Movie Gallery, in which the company's stock price dropped by 25% in the two days following a confidential conference call with lenders, despite the absence of any public news releases, raising the specter of insider trading (Anderson [2006]). The institutional press raises concerns regarding the growing role of hedge funds in the syndicated loan market (Sargent [2005], Anderson [2006], Hemel [2009]). These articles note that hedge funds tend to purchase very small amounts of loan syndications and suggest that this trading behavior implies that hedge funds purchase loans primarily to get access to a borrower's confidential information.⁹ In this paper, we bring large-sample evidence to bear on this important issue.

3. *Related Literature*

Two recent papers directly examine the issue of insider trading by institutional syndicate lenders. Ivashina and Sun [2009] directly examine the stock trading of specific institutional investors that also hold syndicated loans in their portfolio at the time of loan renegotiations. They document that institutional managers who participate in loan renegotiations trade in the same company's stock and outperform other managers in the month following the loan renegotiation. Massoud et al. [2009] focus specifically on short-selling activity for firms with hedge fund involvement in their loan syndicates. They document that the short selling of a borrower's equity prior to loan origination date is significantly larger for borrowers using

⁹ The U.K. Financial Services Authority (FSA) is currently performing an investigation on whether U.K. hedge funds obtained price-sensitive information from buying bank loans, and then used this inside information illegally to trade public securities such as bonds and shares (Pettifer [2008]).

hedge funds compared to that of a matched borrower that uses banks. Also, similar to Ivashina and Sun [2009], Massoud et al. [2009] focus on loan amendments and document that average abnormal short selling is positive and significant prior to loan amendment date announcements for firms with hedge fund lenders, and its mean difference from firms with only bank lenders is positive and significant.

Our study complements and extends these two important studies. The main benefit of the research designs in these studies is that they directly examine trading activity in the borrower's stock. Ivashina and Sun [2009] examine trading activity of specific institutions with access to private information disclosed during loan renegotiations, while Massoud et al. [2009] examine short selling in borrowers' stock around potential leakage of private information and explicitly analyze participation by hedge funds. While we do not specifically examine lenders' trading decisions, by exploiting predictable variation in the timing of confidential information flows to loan syndicate participants during quarterly earnings cycles, our design enables a much larger sample of firms. Specifically, estimating price discovery in the secondary loan market allows us to partition firms based on the extent to which their institutional lenders have early access to private information that can be exploited in the equity market, without the need to directly identify insider trading. In addition, our design, in principle, captures the misuse of private syndicate information in the equity market by institutional lenders, whether they trade directly or forward confidential information to other related investors.¹⁰ Finally, our research design allows us to address the important question of whether insider trading on private syndicate information is sufficiently pervasive to significantly affect price discovery processes in the equity market over regular earnings cycles.

Another related line of research examines short-term lead-lag relations between prices across markets. Allen and Gottesman [2006] explore lead-lag relations between weekly returns on stocks and syndicated loans of the same firms, and find that loan returns "Granger cause" equity returns and vice versa (respectively), leading the authors to conclude that information flows freely between equity and loan markets. In a related paper, Allen, Guo, and Weintrop [2008] investigate whether and when loan prices reflect information in quarterly earnings. While they do not detect a loan price reaction to quarterly earnings announcements, they find that earnings information is reflected in loan prices about a month before earnings announcements when proprietary covenant reports are likely to be received by syndicate participants, preempting information in earnings announcements. Also pertinent is Acharya and Johnson [2007], who provide

¹⁰ Moving information to related parties by institutional lenders makes insider trading difficult to detect. Massa and Rehman [2008] find that mutual funds make profitable equity trades based on private information about borrowers received from affiliated lead banks in the period following new loan deals. The U.K. FSA has also suggested that some of the trading activity of informed lenders is performed via related parties (Pettifer [2008]).

evidence consistent with trading desks of banks and other financial institutions exploiting private information gleaned from clients to inside trade in the credit default swap (CDS) market. They document circumstances where innovations in firms' CDS prices lead their stock prices, indicative of informed trading. 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.¹¹

In contrast to Allen and Gottesman [2006] and related lead-lag studies, our approach allows us to establish cross-market relations in price discovery even if one market does not lead or lag the other. The power of our design is its ability to establish 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 then is 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 the type of loan market participants that have the information.

4. *Research Design*

In this section, we explicate the components of our empirical approach, which involves sequential, interconnected analyses that, taken together, provide robust evidence of information transmission from privately informed lenders to equity prices. Section 4.1 details our approach to estimating the speed of price discovery in both the loan and stock markets. Section 4.2 develops our hypotheses that four fundamental characteristics drive the faster dissemination of private information to lenders: greater use of financial covenants, higher firm credit risk, relationship lending, and higher arranger reputation. While we believe that the inclusion of all four characteristics provides insights into the robustness of our results, we focus considerable attention on financial covenants, in particular, drilling down to distinguish financial covenants written on earnings-based variables from those written on other financial variables and investigating the impact of covenant violations on the speed of price discovery. Section 4.3 discusses the portfolio sorting strategy and the control variables. Section 4.4 describes our strategy for building on our loan market price discovery results to establish equity market consequences of early private information flows from borrowers to lenders.

¹¹ Other papers that examine cross-market lead lag relations include Hotchkiss and Ronen [2002], Longstaff, Mithal, and Neis [2003], Norden and Weber [2004], Blanco, Brennan, and Marsh [2005], and Altman, Gande, and Saunders [2010].

4.1 ESTIMATING THE SPEED OF PRICE DISCOVERY

As researchers, we cannot directly observe when information is disseminated from borrowers to lenders. Instead, by estimating measures of intra-period price discovery in the secondary loan and equity markets, we infer the timing of private information dissemination to lenders and the arrival of private information in stock returns, respectively. Price discovery is the process whereby information becomes impounded in publicly observable market price, where speed of intraperiod price discovery refers to how quickly all available information is reflected in price over a given time period.

For both loan and equity markets, we focus on the 63-trading day period beginning 60 trading days before and ending 2 trading days after firms' quarterly earnings announcements. Our focus on quarterly earnings cycles generates a large sample of standardized time intervals that capture the total flow of earnings information into price in the period following a quarterly earnings announcement up to and including the subsequent announcement. Beginning with Ball and Brown [1968], a vast literature documents a significant positive price-earnings relation in the equity market (see Lev [1989] and Kothari [2001] for reviews of this literature), while Easton, Monahan, and Vasvari [2009] and Allen, Guo, and Weintrop [2008] show that earnings contain value-relevant information for corporate debt.¹²

IPT measures have a long tradition in accounting research. For example, variations of IPT measures have been used by Ball and Brown [1968], Alford, Leftwich, and Zmijewski [1993], and Butler, Kraft, and Weiss [2007] to examine the timeliness of accounting earnings information; by Brown, Taylor, and Walter [1999] to examine price discovery regardless of the nature of the information that is priced; and by Beekes and Brown [2006] and Beekes, Brown, and Chin [2006] to consider price discovery as a function of corporate governance. Our basic mechanical approach to price discovery most closely follows McNichols [1984], Alford, Leftwich, and Zmijewski [1993], and Butler, Kraft, and Weiss [2007], sharing a comparative portfolio approach for discerning differences in price discovery across experimental partitions and the use of an area-under-the-curve metric to measure the speed of price discovery. The use of portfolio-level analysis instead of regression analysis is crucial to average away the random news arrivals that render firm-period measures extremely noisy, while area-under-the-curve metrics are intuitive and have been widely used in many fields to directly compare two curves (e.g., Braun and Alonzo [2008]).

Our first step in measuring IPT for a portfolio of firm-quarter observations is to construct a curve that plots, for each day in an earnings cycle, the

¹² While there is debate about the relative importance of the surprise content of earnings announcements in providing new information to the stock market (e.g., Ball and Shivakumar [2008]), there is little controversy concerning the information content of earnings with respect to equity values over longer windows.

cumulative buy-and-hold abnormal portfolio return up to that day, scaled by the cumulative buy-and-hold abnormal return for the entire 63-day period. That is, each point on the curve captures the proportion of the entire period's abnormal return realized up to and including a particular day. On the last day of the period, the value of the function must be one, as by definition all of the period's abnormal returns must be realized by the end of the period. Our main measure of *IPT* is the estimated area-under-the-curve for a given portfolio. In essence, the area-under-the-curve metric is an overall measure of price discovery that incorporates the entire trajectory of a portfolio's abnormal return realizations over the earnings cycle, where greater areas are consistent with timelier price discovery.

Formally, we construct a curve for a given portfolio over the earnings cycle, where a point on the curve is generated for each day in the cycle by computing the cumulative buy-and-hold abnormal returns from 60 trading days prior to the earnings announcement up to and including a given day m , BH_m , divided by the buy-and-hold cumulative abnormal return for the entire earnings cycle, BH_2 . This curve, which is based on 63 distinct values for BH_m , one for each day from $m = -60$ to $m = 2$, reflects the sequencing of a portfolio's abnormal return realizations for the portfolio over the earnings cycles. Then, from this curve, we compute the area-under-the-curve as $IPT = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + \frac{1}{2}$.¹³ The *IPT-loan-return* measure is computed using daily buy-and-hold abnormal loan returns, while *IPT-stock-return* is computed using daily buy-and-hold abnormal stock returns.

Portfolio *IPT* measures are constructed using equal weighted returns from pooling all firm-quarter observations included in a portfolio.¹⁴ Appendix A provides details of how *IPT-loan-return* and *IPT-stock-return* are estimated. Our research approach partitions firm-quarter observations into portfolios on the basis of specific characteristics and then compares the speed of price discovery across these portfolios. We estimate *IPT* for each of the two portfolios, and compute a test statistic equal to the difference in *IPT* across portfolios, ΔIPT . We use a permutation analysis to test whether the test statistic, ΔIPT , is statistically different from zero. Appendix B describes our statistical tests of differences in *IPT* between portfolios. Section 6.1 below provides a descriptive analysis of the *IPT-loan-return* and *IPT-stock-return* measures that supports their validity as measures of the speed of price discovery.

¹³ It is straightforward to show that this formula represents the calculation of the area under a given curve as the sum of the areas of the series of trapezoids computed for each daily time interval.

¹⁴ For robustness, we also constructed portfolios by presorting firm-quarter observations on the sign of their unexpected earnings surprise for the quarter, and separately examining portfolios with positive and negative surprises. Results are robust.

4.2 HYPOTHEZED DETERMINANTS OF THE TIMING OF PRIVATE INFORMATION DISSEMINATION FROM BORROWERS TO LENDERS

We expect four characteristics to affect the timing of private information dissemination from borrowers to lenders. Details underlying the construction of all variables are included in appendix A. Each hypothesized determinant of private information dissemination is used to partition the sample into portfolios with early versus late dissemination of confidential information to syndicate participants.

4.2.1. Financial Covenants. We posit that loans subject to financial covenants are associated with the early dissemination of confidential information relative to loans without financial covenants. Financial covenants play an important role in our analysis, as they provide a clear and intuitive channel through which information flows privately to lenders. Financial covenants in private loan agreements typically are maintenance based, meaning that the borrower must be in compliance with the covenant on a regular basis, typically every fiscal quarter (Nini, Sufi, and Smith [2009]). This generally requires borrowers to confidentially provide lenders with timely covenant reports that may preempt information disclosed in upcoming quarterly earnings releases (Allen, Guo, and Weintrop [2008]). Further, tightly set financial covenants can serve as “trip wires” that, when violated, allow lenders to intervene and extract timely private information regarding the borrower’s current circumstances (Dichev and Skinner [2002]). Consistent with this idea, Nini, Sufi, and Smith [2009] show that 40% of their sample firms violate a financial covenant during their sample period (1997 to 2007) and provide evidence that liquidation or bankruptcy is not the primary outcome for firms that violate covenants. Lenders also are more likely to impose covenants on informationally opaque firms (Bradley and Roberts [2004], Standard and Poor’s [2007]), consistent with covenants playing a key role in the timely dissemination of private information to lenders.

We consider three measures of financial covenants in syndicated loan contracts. First, *Covenant*, treats all financial covenants as a homogeneous group. Second, we partition the sample with financial covenants into two nonoverlapping subsamples based on whether the financial covenants include earnings-based measures, generating two new measures, *Earnings-based covenant* and *Non-earnings-based covenant*. We classify the following covenants as earnings-based: debt to EBITDA, senior debt to EBITDA, cash interest coverage, debt service coverage, EBITDA, fixed charge coverage, and interest coverage. The motivation for partitioning the sample in this way is that earnings-based covenants are arguably more likely to generate timely private information to lenders about upcoming earnings news.¹⁵

Further, we predict that covenant violations are associated with the more timely dissemination of private information to lenders. Violation of

¹⁵ We thank an anonymous referee for suggesting this approach.

a covenant is an event of default, giving creditors the right to demand immediate repayment of the loan. In practice, creditors rarely accelerate the loan, instead using the right of repayment to force renegotiation of the loan (Roberts and Sufi [2009]). Such private renegotiations likely involve intense, timely confidential information dissemination from borrowers to lenders. Importantly here, firms do not generally publicly disclose covenant violations at the time of the violation. Disclosure of covenant violations by publicly traded firms is covered by SEC Regulation S-X, Rule 4.08(c), which requires that “any breach of covenant of a related indenture or agreement, which default or breach existed at the date of the most recent balance sheet being filed and which has not been subsequently cured, shall be stated in the notes to the financial statements.” As a result, covenant violations occurring during an earnings cycle are not disclosed until the next 10Q or 10K filing. We use this fact to argue that to the extent we observe faster price discovery during the quarter for firms that violate covenants, this price discovery is most likely the result of private information dissemination to lenders, and not the result of public disclosure of covenant violations.

4.2.2. Credit Risk of the Borrower. We predict that high credit risk accelerates the flow of confidential information to syndicate participants. A borrower with high probability of default on its loan faces a strong demand from lenders for timely information about changes in the borrower’s situation, where lenders would generally be less concerned with immediacy of information transmission for less risky borrowers. Consistent with our argument, Acharya and Johnson [2007] provide evidence of insider trading in the CDS market, documenting that insider trading is concentrated in subsamples of borrowers that experience credit deterioration during the period, and whose credit risk is high. Further, Easton, Monahan, and Vasvari [2009] document that the value relevance of earnings in the bond market increases with a borrower’s credit risk, supporting the importance of earnings information to the debt holders of risky firms.

Our primary measure (the one tabulated in the tables) is *Credit rating*, which represents the numerical equivalent of the borrower’s senior debt rating as of a given quarter, with higher numerical values associated with lower credit ratings. Because corporate credit ratings frequently lag behind changes in a firm’s credit quality (Hite and Warga [1997], Beaver, Shakespeare, and Soliman [2006], De Franco, Vasvari, and Wittenberg-Moerman [2009]), we examine an alternative default risk measure, DLI, a default likelihood indicator estimated following Vassalou and Xing [2004] (see appendix A for details).

4.2.3. Relationship Lending. We predict that relationship lending accelerates the flow of private information to syndicate participants. Banks generate information about borrowers through screening at loan origination (Ramakrishnan and Thakor [1984], Diamond [1991]) and subsequent monitoring (Diamond [1984], Winton [1995]). Relationship lending

involves repeated interactions between a lender and a borrower, creating an extensive information flow between lender and borrower. Borrowers are expected to reveal more information in relationship lending relative to transaction-oriented lending (Boot [2000], Bharath et al. [2008]). Relationship lenders have relatively strong incentives to invest in information production. Given the fixed costs of information production, a long relationship with the borrower leads to a lower cost of information production, which encourages lenders to monitor (Greenbaum and Thakor [1995], Boot [2000]). Lummer and McConnell [1989] document higher stock price reactions to loan announcements for renewals than for new loans, consistent with the monitoring role being especially strong for relationship lenders. Specific to syndicated loans, Bharath et al. [2008, 2009] show that relationship lending is most valuable to informationally opaque borrowers.

To summarize, prior literature suggests that relationship lenders have extensive knowledge of firms' operations and well-developed channels of communication with firms' managers that facilitate the timely flow of information from borrowers, motivating the hypothesis that the dissemination of confidential information to lenders is faster when loans are issued by a relationship arranger. We identify relationship loans as loans syndicated by lead arrangers who have prior lending relationships with a borrower; we follow the strategy suggested by Bharath et al. [2009] to perform this identification.¹⁶

4.2.4. Reputation of the Arranger of Syndication. We predict that reputable lead arrangers accelerate the flow of private information to syndicate participants. Diamond [1989, 1991], Boot, Greenbaum, and Thakor [1993], and Chemmanur and Fulghieri [1994] argue that a lender's reputation reflects its ability and commitment to screen and monitor borrowers. Lender reputation is especially important in the syndicated loan market where repeat interactions occur between the arranger and syndicate participants. The arranger performs the primary monitoring of the borrower on which syndicate participants rely. Dennis and Mullineaux [2000], Lee and Mullineaux [2004], and Sufi [2007] find 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. Gopalan, Nanda, and Yerramilli [2009] show that defaults by the arranger's borrowers adversely affect its subsequent lending activity, further motivating the importance of reputation. Following prior literature, we view reputable arrangers as lenders with a strong monitoring ability and incentives and we expect them to have extensive expertise and advanced technologies for extracting pertinent information from borrowers

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.

in a timely fashion. 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 loan market.

4.3 CONTROL VARIABLES REFLECTING BORROWERS' PUBLIC INFORMATION TRANSPARENCY

It is important to address the extent to which the relation between the speed of price discovery and each of our private information dissemination variables in section 4.2 is robust to controls for firms' public information transparency. This section motivates the control variables we use to classify firm-quarter observations on the basis of high versus low public information transparency. Specifically, we construct portfolios based on two-way sorts of each of our dissemination measures with variables reflecting firms' public information transparency. We then estimate speed of price discovery for these portfolios and ask whether the higher timeliness of price discovery that we attribute to financial covenants, default risk, relationship lending, and arranger reputation can be explained by a borrower's information transparency characteristics.

Our first control variable is loan size, which prior research suggests is positively related to a borrower's transparency.¹⁷ According to Jones, Lang, and Nigro [2005], larger loans are more transparent as fixed costs associated with obtaining information about a firm are less of an obstacle for large loans. Larger loans are also typically issued to bigger borrowers and these borrowers are less informationally opaque relative to smaller borrowers (Bharath et al. [2008]). We then control for firms' asset tangibility, as a high proportion of intangible assets is associated with lower transparency and higher information asymmetry (Smith and Watts [1992], Barth, Kasznik, and McNichols [2001]).

We control for equity analyst coverage and dispersion in analysts' earnings forecasts. By gathering and interpreting information, analysts increase the speed of information dissemination to investors (Lang and Lundholm [1996], Beaver [1998], Hong, Lim, and Stein [2000], Frankel, Kothari, and Weber [2006]). Studies show that analysts reduce information asymmetry. Brennan and Subrahmanyam [1995] find that greater analyst coverage causes smaller adverse selection costs, and Yohn [1998] finds that greater analyst coverage reduces information asymmetry around earnings announcements. With respect to dispersion in analysts' earnings forecast, we expect high dispersion to be associated with less timely price discovery. High dispersion reflects a firm's low information transparency, in general, and investor uncertainty about a firm's upcoming earnings, in particular (Heflin, Subrahmanyam, and Zhang [2003], Athanassakos and Kalimipalli [2008], Ramnath, Rock, and Shane [2008]).

¹⁷ The results are unchanged when we control for firm size instead of loan size.

We control for the number of media articles covering the firm. Dyck and Zingales [2002] argue that the media is an important information intermediary, while Fang and Press [2009] find that the media alleviates informational frictions and plays an important role in disseminating information. Further, Bushee et al. [2010] demonstrate that the media shapes firms' information environments by packaging and disseminating information, as well as by creating new information. In particular, Bushee et al. [2010] find that press coverage reduces information asymmetry regarding the firm around earnings announcements.

We also control for the number of syndicated loan deals for the firm over the previous five-year time period. The number of previous deals captures the extent of borrower information available to loan market participants (Sufi [2007]). We expect more previous deals to reflect lower information asymmetry and thus quicker price discovery. Also, because firms with more previous loan deals are more likely to have loans issued by relationship lenders, it is important to verify that the effect of relationship lending on price discovery is not attributed to the intensity of borrowers' overall lending activity.

Finally, we consider firms' voluntary disclosures via management forecasts and firm-initiated press releases. Management earnings forecasts at least partially preempt information in earnings announcements and should increase the speed of information dissemination (King, Pownall, and Waymire [1990]). And Soltes [2010] demonstrates that firm-initiated press releases lower costs of information acquisition to investors and decrease information asymmetry regarding the firm.

4.4 ESTABLISHING EQUITY MARKET CONSEQUENCES OF EARLY PRIVATE INFORMATION FLOWS TO LENDERS

While loan prices are observable for traded syndicated loans, for nontraded syndicated loans we cannot estimate the timing of private information reported by the borrower to syndicate participants. We conjecture that characteristics of traded loans associated with relatively faster dissemination of private information also characterize faster information dissemination for nontraded loans. Exploiting our loan market analysis, we partition firm-quarter observations into portfolios 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 partition firms based on whether their outstanding syndicated loans are subject to financial covenants, issued by risky borrowers, or syndicated by a relationship-based arranger or a highly reputable lead arranger. We then investigate the extent to which the 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.

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 United States. 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 United States 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 data from COMPUSTAT and CRSP, respectively. Firms' senior debt ratings at the firm level are retrieved from the S&P historical database and Mergent Fixed Income Securities Database (FISD). We obtain data on management earnings forecasts from First Call. Analyst-related data come from IBES. Covenant violation data are from Nini, Sufi, and Smith [2009], and data on firm-initiated press releases and press articles are from Factiva.

Panel A of table 1 reports the selection process of the traded loans sample. By matching LTD and DealScan, we identify 7,350 traded loans from June 1998 to December 2006. We then eliminate loans to non-U.S. firms or not issued in U.S. dollars, observations with price quotes reported by only one market maker, observations with missing data, and facilities of firms for which an earnings announcement date is not available or for which management earnings forecasts for the upcoming quarters are announced within five trading days around the earnings announcement date.¹⁸ The final sample contains 2,215 facilities related to 499 firms and 4,781 firm-quarters ("Loan Sample" hereafter). Panel B of table 1 describes the selection of the syndicated loan sample used in our analysis of stock price discovery. For 1999 to 2006, DealScan reports 64,920 facilities outstanding to U.S. firms and issued in U.S. dollars. Merging this data with COMPUSTAT/CRSP allows us to identify 33,536 facilities issued to public firms. We then drop loans to firms with missing earnings announcement dates

¹⁸ In the syndicated loan market, a loan is referred to 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.

TABLE 1
Sample Selection Process

Filters	Facilities	
	Number	Percent
Panel A: Loan Sample		
Total trading facilities	8,778	100.0
Intersection with the DealScan database	7,350	83.7
After 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
After elimination of facilities without daily price quotes*	3,865	44.0
After elimination of facilities with price quotes reported by one market maker	2,612	29.8
After elimination of facilities of firms missing earnings announcement date	2,504	28.5
After elimination of facilities of firms with management earnings forecasts announcements around the earnings announcement date	2,243	25.6
After elimination of facilities with missing data 2,215 facilities represent 499 firms and 4,781 firm-quarters	2,215	25.2
Panel B: Equity Sample		
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
After elimination of facilities of firms missing returns and/or earnings announcement date	26,363	40.6
After elimination of facilities of firms with management earnings forecasts announcements around the earnings announcement date	25,886	39.9
After elimination of facilities with missing data 25,832 facilities represent 4,358 firms and 54,557 firm-quarters	25,832	39.8

*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. 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 biweekly basis.

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" hereafter).

5.2 DESCRIPTIVE STATISTICS

Panels A and B of table 2 describe our Loan and Equity samples, respectively, while panels C and D present correlation statistics for the Loan and Equity samples, respectively.

Panel A of table 2 reveals that 89% of firm-quarter observations are related to loans subject to financial covenants; the majority of these covenants are earnings based. Eight percent of firm-quarter observations with financial covenants are also characterized by covenant violations; the proportion

TABLE 2
Descriptive Statistics

Panel A: Loan Sample		Number of Observations	Mean	SD	Distribution		
Loan and Firm Characteristics					25%	50%	75%
Information dissemination from a borrower to the syndicate							
<i>Covenant</i>		4,781	0.89				
<i>Earnings-based-covenant</i>		4,781	0.80				
<i>Covenant-violation</i>		3,986	0.08				
<i>Credit-rating</i>		4,339	13.08	2.81	12.00	13.00	
<i>Relationship-lending</i>		4,781	0.54				
<i>Reputable-arranger</i>		4,781	0.57				
Information transparency							
<i>Loan-size (in millions)</i>		4,781	288.3	839.5	154.9	259.8	
<i>Tangibility</i>		4,665	0.35	0.23	0.15	0.33	
<i>Analyst-coverage</i>		4,781	0.86				
<i>Analyst-dispersion</i>		3,797	0.24	0.62	0.03	0.08	
<i>Number-articles</i>		4,781	3.11	7.08	1	1.57	
<i>Number-prior-deals</i>		4,781	13.87	19.4	3.00	8.00	
Voluntary disclosure							
<i>Management-forecast</i>		4,781	0.11				
<i>Number-press-releases</i>		2,172	7.95	7.79	3.00	6.00	
Earnings surprise							
<i>SUE</i>		3,531	−0.13	4.23	−0.60	0.03	
Institutional Lending							
<i>Institutional</i>		4,781	0.56				
Loan Liquidity							
<i>Number-of-market-makers</i>		4,781	3.37	1.91	2.00	3.00	
<i>Loan-bid-ask-spread</i>		4,781	0.93	0.86	0.50	0.65	
(Continued)							

(Continued)

TABLE 2—Continued

Panel B: Equity Sample		Number of Observations	Mean	SD	Distribution		
Loan and Firm Characteristics	Information dissemination from a borrower to the syndicate				25%	50%	75%
<i>Covenant</i>		54,557	0.72				
<i>Earnings-based-covenant</i>		54,557	0.60				
<i>Covenant-violation</i>		35,394	0.09				
<i>Credit-rating</i>		24,609	11.02	3.80	8.00	11.00	14.00
<i>Relationship-lending</i>		54,557	0.38				
<i>Reputable-arranger</i>		54,557	0.33				
<i>Information transparency</i>							
<i>Firm-size (in millions)</i>		54,557	2,727	8,179	87.12	391.4	1,502
<i>Tangibility</i>		50,860	0.31	0.25	0.10	0.24	0.47
<i>Analyst-coverage</i>		54,557	0.74				
<i>Analyst-dispersion</i>		33,008	0.21	0.64	0.03	0.07	0.17
<i>Number-articles</i>		54,557	2.16	8.67	0.00	1.00	1.63
<i>Number-prior-deals</i>		54,557	5.10	8.96	1	2	6
<i>Voluntary disclosure</i>							
<i>Management-forecast</i>		54,557	0.06				
<i>Number-press-releases</i>		18,493	4.21	4.17	1	3	5
<i>Earnings surprise</i>							
<i>SUE</i>		44,644	−0.18	3.21	−0.71	0.01	0.72
<i>Institutional Lending</i>							
<i>Institutional</i>		54,557	0.12				
<i>Secondary trading</i>							
<i>Loan-trading</i>		54,557	0.09				
<i>Stock Liquidity</i>							
<i>Stock-bid-ask-spread</i>		54,476	0.03	0.02	0.01	0.02	0.03

(Continued)

TABLE 2 —Continued

Panel C: Correlation Statistics—Loan Sample

Loan and Firm Characteristics	Covenant			Earnings-based Covenant			Covenant-violation			Credit-rating			Relationship-lending			Reputable-arranger		
	Pearson	Spearman	Information dissemination from a borrower to the syndicate	Pearson	Spearman	Covenant	Pearson	Spearman	Covenant-violation	Pearson	Spearman	Credit-rating	Pearson	Spearman	Relationship-lending	Pearson	Spearman	
Covenant	1			1			1			1			1			1		
Earnings-based-covenant	0.67***		0.56***	1			−0.04**		−	0.04*		0.05***	−0.03*		−0.05***	0.00		0.00
Covenant-violation	−		−0.03**	−0.04**		1	1		−0.03**	−0.03**		0.01	−0.02		−0.01	−0.03*		−0.03**
Credit-rating	0.04**		0.05***	−0.03**		0.01	0.20***		0.16***	1		1	−0.05**		−0.07***	−0.18***		−0.20***
Relationship-lending	−0.03*		−0.05**	−0.02		−0.01	0.00		0.00	−0.05***		−0.07***	1		1	0.01		0.02
Reputable-arranger	0.00		0.00	−0.03*		−0.03**	−0.03*		−0.03**	−0.18***		−0.20***	0.01		0.02	1		1
Information transparency																		
Loan-size	−0.07**		−0.07***	−0.18**		−0.18***	−0.04***		−0.03**	−0.29***		−0.32**	0.06***		0.06***	0.23***		0.24***
Tangibility	−0.04**		−0.03*	−0.13***		−0.14***	0.06		0.06	0.18***		0.14***	0.07***		0.09***	−0.13***		−0.11***
Analyst-coverage	0.00		0.02	0.02		0.01	−0.14***		−0.14***	−0.30***		−0.24***	0.02		0.02	0.00		0.00
Analyst-dispersion	0.01		−0.04**	−0.04**		−0.13**	0.07***		0.12***	0.14***		0.31***	−0.01		−0.05***	−0.04**		−0.02
Number-articles	−0.09***		0.00	−0.12***		−0.03**	0.02		0.06	−0.13***		−0.07***	0.08**		0.06***	0.12***		0.10***
Number-prior-deals	−0.16***		−0.14***	−0.22***		−0.17***	0.06		0.04	0.01*		−0.02	0.21***		0.35***	0.06***		−0.02
Voluntary disclosure																		
Management-forecast	0.04***		0.06***	0.07***		0.07***	−0.05***		−0.05***	−0.11***		−0.12***	0.05***		0.04***	0.00		0.00
Number-press-releases	−0.12***		−0.11***	−0.07***		−0.07***	0.01		0.01	−0.09***		−0.03	0.04*		0.06***	0.02*		0.02*
Earnings surprise																		
SUE	−0.01		0.01	−0.01		0.05**	0.00		−0.11*	0.05***		−0.04**	−0.01		−0.03**	0.01		0.02
Institutional Lending																		
Institutional	−0.01		−0.01	0.06**		0.07**	−0.01		0.00	0.14***		0.17***	0.02		0.04**	0.08***		0.06***
Loan liquidity																		
Number-of-market-makers	−0.03*		−0.01	−0.09***		−0.07***	0.00		0.01	0.01		0.03**	0.01		0.06	0.11**		0.16***
Loan-bid-ask-spread	0.06***		0.07***	−0.01		−0.01	0.21***		0.16***	0.35***		0.33***	0.05***		0.01	−0.03*		−0.00

(Continued)

(Continued)

TABLE 2 —Continued

Panel D: Correlation Statistics—Equity Sample											
Loan and Firm Characteristics	Covenant			Earnings-based Covenant			Covenant-violation		Credit-rating		Institutional
	Pearson	Spearman	from a borrower to the syndicate	Pearson	Spearman	from a borrower to the syndicate	Pearson	Spearman	Pearson	Spearman	
Information dissemination from a borrower to the syndicate											
<i>Covenant</i>	1	1	0.68***	0.64***	—	—	—	—	0.14**	0.12***	—
<i>Earnings-based-covenant</i>	0.68***	0.64***	1	1	0.05***	0.05***	0.05***	0.05***	0.13***	0.15***	—0.08***
<i>Covenant-violation</i>	—	—	0.05*	0.05*	1	1	1	1	0.19***	0.19***	—0.04***
<i>Credit-rating</i>	0.14***	0.12***	0.13***	0.15***	0.19***	0.19***	0.19***	0.19***	1	1	—0.07***
<i>Relationship-lending</i>	—0.07***	—0.12***	0.00	0.00	—0.04***	—0.04***	—0.04***	—0.04***	—0.12***	—0.11***	—0.30***
<i>Reputable-arranger</i>	—0.04***	—0.08***	0.00	—0.01**	—0.07***	—0.07***	—0.07***	—0.07***	1	1	0.17***
Information transparency											
<i>Firm-size</i>	—0.22***	—0.22***	—0.15***	—0.14***	—0.24***	—0.24***	—0.24***	—0.24***	—0.67***	—0.67***	0.25***
<i>Tangibility</i>	—0.03**	—0.04**	0.02	0.03	—0.04***	—0.04***	—0.04***	—0.04***	0.06***	0.06***	0.05***
<i>Analyst-coverage</i>	—0.06***	—0.07***	—0.01**	—0.01**	—0.13***	—0.13***	—0.13***	—0.13***	—0.22***	—0.20***	0.14***
<i>Analyst-dispersion</i>	0.00	0.02***	0.01	0.02**	0.09***	0.08***	0.08***	0.08***	0.15***	0.33***	—0.01*
<i>Number-articles</i>	—0.15***	—0.17***	—0.12***	—0.10***	—0.04**	—0.08***	—0.08***	—0.08***	—0.17***	—0.21***	0.05***
<i>Number-prior-deals</i>	—0.15***	—0.22***	—0.05***	—0.02***	—0.03***	—0.04***	—0.04***	—0.04***	0.03**	0.05***	0.27***
Voluntary disclosure											
<i>Management-forecast</i>	0.00	0.00	0.00	0.00	—0.02***	—0.02***	—0.02***	—0.02***	—0.07***	—0.06***	0.03***
<i>Number-pres-releases</i>	—0.11***	—0.13***	—0.04***	—0.05***	—0.03***	—0.04***	—0.04***	—0.04***	—0.04***	—0.04***	0.12***
Earnings surprise											
<i>SUE</i>	0.00	0.01**	0.00	0.00	0.00	—0.03**	—0.03**	—0.03**	0.01	—0.03**	0.01*
Institutional Lending											
<i>Institutional</i>	0.03	—0.01**	0.16***	0.16**	0.01	0.01	0.01	0.01	0.32***	0.37***	0.07***
Secondary trading											
<i>Loan-trading</i>	—0.01***	—0.05***	0.12***	0.12***	—0.01**	—0.01**	—0.01**	—0.01**	0.28***	0.32***	0.09***
Stock liquidity											
<i>Stock-bid-ask-spread</i>	0.11***	0.14***	0.06**	0.14***	0.24***	0.22***	0.22***	0.22***	0.42***	0.40***	—0.16***

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 measures of information dissemination from a borrower to the syndicate (*Covenant*, *Earnings-based-covenant*, *Covenant-violation*, *Credit-rating*, *Relationship-lending* and *Reputable-arranger*) for the Loan Sample. Panel D presents correlation statistics for the measures of information dissemination from a borrower to the syndicate (*Covenant*, *Earnings-based-covenant*, *Covenant-violation*, *Credit-rating*, *Relationship-lending* and *Reputable-arranger*) and the *Institutional* variable for the Equity Sample. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Variables are defined in appendix A.

of covenant violations in our sample is similar to that reported by Nini, Sufi, and Smith [2009] and Roberts and Sufi [2009]. Fifty-four percent of firm-quarter observations are syndicated by relationship lenders, and 57% are arranged by reputable arrangers. Sample firms have mean and median credit rating of BB– (numerical rating = 13). Sample loans have an average value of 288M, while sample firms have an average tangibility of 35%. Eighty-six percent of the observations reflect coverage by equity analysts. For voluntary disclosure, 11% of firm-quarter observations are characterized by management earnings forecast for the current quarter and by an average of 7.95 firm-initiated press releases within 60 days of the earnings announcement date.

The majority of sample loans are institutional. Because our data do not allow identification of changes in syndicate structure following original syndication, the *Institutional* variable relies on original syndicate structure and does not capture shifts in syndicate structure via secondary market trades. However, we note that institutional investors who buy loans on the secondary market primarily enter into syndicates where institutional investors were involved at loan origination. This follows as the majority of institutional loans are traded after origination, but only 10% of banking term loans and 5% of revolving facilities become available for secondary trading (Wittenberg-Moerman [2008]).¹⁹

Panel B presents summary statistics for the Equity Sample. Seventy-two percent of the observations reflect financial covenants and, similar to the loan sample, the majority of these covenants are earnings based. Nine percent of firm-quarter observations with financial covenants are associated with covenant violations. Thirty-eight percent of firm-quarter observations are related to firms with loans syndicated by relationship lenders, while 33% are related to loans issued by reputable arrangers. The equity sample reflects lower average credit risk than that of traded loans, with mean and median credit rating of BB+ (numerical value = 11). Relative to the loan sample, firms in the equity sample have on average a smaller number of media articles, previous syndicated loan deals, and firm initiated press releases; they also less often issue management earnings guidance. We classify 12% of the firm-quarter observations as institutional. Nine percent of the firm-quarter observations are associated with firms with loans traded on the secondary loan market.

Table 2, panel C, presents correlations of *Covenant*, *Earnings-based-covenant*, *Covenant-violation*, *Credit-rating*, *Relationship-lending*, and

¹⁹ Term loans B, C, and D are considered institutional loans. Institutional investors are attracted to term loans B, C, and D because of high credit spreads, combined with historically low return volatility and low delinquency rates. Institutional investors' demand for term loans B, C, and D is also explained by the fact that, relative to high yield bonds, these loans have a more attractive risk-return profile and are senior and generally secured (Yago and McCarthy [2004]). We explicitly detail the four steps involved in constructing our institutional variable in appendix A.

Reputable-arranger, with a wide range of variables reflecting the borrowers' information environment, among others. We see that *Covenant*, *Earnings-based covenant*, and *Covenant-violation* are mostly negatively related to information transparency variables. *Covenant* and *Earnings-based-covenant* are negatively and significantly correlated with *Loan-size*, *Tangibility*, *Number-articles*, *Number-prior-deals*, and *Number-press-releases*. *Covenant-violation* is negatively and significantly correlated with *Loan-size*, *Analyst-coverage*, and *Management-forecast*. Similarly, there is a negative relation between credit risk and information transparency. *Credit-rating* is negatively and significantly correlated with *Loan-size*, *Analyst-coverage*, *Number-articles*, *Management-forecast*, and *Number-press-releases*. The positive correlation between *Credit-rating* and *Analyst-dispersion* also reflects an inverse relation between credit risk and transparency. In contrast, *Relationship-lending* and *Reputable-arranger* are positively and significantly correlated with a number of information transparency variables, including *Loan-size*, *Number-articles*, and *Number-prior-deals*. These positive correlations, although relatively low, imply that care must be taken to rule out the possibility that the observed timeliness of price discovery for loans issued by relationship lenders or reputable arrangers is actually driven by these information transparency variables.

There is a key point to take away from panel C. Firms with financial covenants and high credit risk tend to be negatively related to transparency variables, while in contrast, *Relationship-lending* and *Reputable-arranger* tend to be positively correlated with the transparency variables. Thus, while we show below in section 6 that all four measures are associated with more timely price discovery, these contrasting correlations make it unlikely that this faster price discovery is driven by borrowers' information transparency.

Finally, panel D presents correlation statistics for the Equity Sample. The correlation structure for *Covenant*, *Earnings-based-covenant*, *Covenant-violation*, *Credit-rating*, *Relationship-lending*, and *Reputable-arranger* is similar to that for the Loan Sample. The *Institutional* variable is positively correlated with a number of information transparency measures, suggesting that it is crucial to control for these measures when analyzing the timeliness of price discovery associated with the existence of institutional investor in the syndicate. Consistent with institutional loans representing the majority of traded loans, there is a high positive correlation (0.62) between *Institutional* and *Loan-trading*.

6. Empirical Analysis

In section 6.1, we present descriptive analyses of price discovery in the loan and equity markets designed to elucidate the properties of our empirical measures of price discovery. Section 6.2 presents our main analysis of the loan market, where we both establish the characteristics of firms associated with faster private information dissemination from borrowers to lenders, and control for correlated omitted variables. Finally, section 6.3

presents our main empirical analysis of the impact of information dissemination from borrowers to lenders on speed of price discovery in the equity market.

6.1 THE DETERMINANTS OF THE SPEED OF PRICE DISCOVERY IN THE LOAN AND EQUITY MARKETS

6.1.1. IPT in the Secondary Loan Market: Descriptive Analysis. Table 3, panel A, compares speed of price discovery in the loan market across portfolios partitioned by measures of firms' public information transparency. We find that *IPT-loan-return* is higher for larger loans, where the difference in *IPT-loan-return* values of the *Loan-size above median* portfolio (portfolio 1) and *Loan size below median* portfolio (portfolio 2) is 6.92 and statistically significant (based on the percentile value of ΔIPT relative to the sample distribution generated under the null hypothesis; see appendix B). In line with prior evidence that firms with higher tangibility are more transparent, we find that higher tangibility is associated with more timely price discovery (*IPT-loan-return* of 34.41 for portfolio 1 vs. *IPT-loan-return* of 24.97 for portfolio 2). We also find that *IPT-loan-return* values are higher when more information is available to loan market participants, as proxied by the higher number of a borrower's previous syndicated loan deals. In terms of voluntary disclosure, IPT in the loan market increases with the number of firm initiated press releases, but not with management forecasts.

Interestingly, timeliness of price discovery in the loan market does not vary significantly with the *Institutional* variable. This "nonresult" is not surprising, as institutional investors have no obvious information advantage over other traders in the secondary loan market. We also find that the speed of price discovery increases with secondary loan market liquidity as measured by both a large number of market makers in a firm's loans and a smaller bid-ask spread in the secondary loan trade.

6.1.2. IPT in the Equity Market: Descriptive Analysis. Panel B of table 3 reports *IPT-stock-return* values. For portfolios partitioned on public information transparency, we find in general that price discovery is faster for more transparent firms. In particular, we find timelier price discovery for firms with higher asset tangibility and with lower analyst forecast dispersion, and for firms that voluntarily disclose via management forecasts and a relatively large number of firm-initiated press releases.

Further, we find that *IPT-stock-return* is significantly higher for the *Institutional* portfolio than for the *Noninstitutional* portfolio (38.07 vs. 23.32), indicating that stock price discovery is more rapid in firm-quarters characterized by the presence of institutional lenders. This finding provides preliminary evidence supporting our proposition that institutional investors are likely to exploit syndicate confidential information in the equity market. Finally, the speed of price discovery is higher for firms with traded loans with a significantly higher *IPT-stock-return* value for the *Loan-trading* relative to the *Nonloan-trading* portfolio. In section 6.2 below, we rule out

TABLE 3

IPT-Loan-Return and IPT-Stock-Return Measures for Portfolios Based on Firm and Loan Characteristics

Panel A: Loan Portfolios				
	<i>IPT-loan-return</i>			
	Portfolio 1	Portfolio 2	Difference	Percentile ΔIPT
	(1)	(2)	(3)	(4)
Information transparency				
<i>Loan-size</i>	33.57 (2,388)	26.65 (2,393)	6.92**	97.46
<i>Tangibility</i>	34.41 (2,333)	24.97 (2,332)	9.44**	96.74
<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>Number-articles</i>	28.77 (2,404)	26.90 (2,377)	1.87	40.64
<i>Number-prior-deals</i>	30.07 (2,517)	23.55 (2,264)	6.52**	95.47
Voluntary disclosure				
<i>Management-forecast</i>	30.82 (526)	27.88 (4,255)	2.94	58.76
<i>Number-press-releases</i>	30.93 (1,191)	26.79 (981)	4.14*	90.80
Earnings surprise				
<i>SUE</i>	24.09 (2,445)	26.47 (1,920)	-2.38	48.91
Institutional Lending				
<i>Institutional</i>	29.69 (2,685)	27.28 (2,096)	2.41	54.82
Loan liquidity				
<i>Number-of-market-makers</i>	33.71 (2,485)	23.90 (2,296)	9.81**	97.29
<i>Loan-bid-ask-spread</i>	28.62 (2,390)	34.95 (2,391)	-6.33**	95.16
Panel B: Equity Portfolios				
	<i>IPT-stock-return</i>			
	Portfolio 1	Portfolio 2	Difference	Percentile ΔIPT
	(1)	(2)	(3)	(4)
Information transparency				
<i>Size</i>	26.87 (27,279)	28.16 (27,278)	1.29	28.60
<i>Tangibility</i>	31.90 (25,429)	25.54 (25,431)	6.36*	90.79
<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>Number-articles</i>	30.32 (36,433)	26.58 (18,124)	3.74	72.61
<i>Number-prior-deals</i>	27.84 (31,095)	25.00 (23,462)	2.84	51.50

(Continued)

TABLE 3—Continued

Panel B: Equity Portfolios				
<i>IPT-stock-return</i>				
	Portfolio 1	Portfolio 2	Difference	Percentile ΔIPT
	(1)	(2)	(3)	(4)
Voluntary disclosure				
<i>Management-forecast</i>	31.87	23.27	8.60**	95.10
	(3,332)	(51,225)		
<i>Number-press-releases</i>	30.76	24.39	6.37**	95.19
	(11,208)	(7,285)		
Earnings surprise				
<i>SUE</i>	22.02	24.32	−2.30	51.13
	(31,074)	(23,483)		
Institutional Lending				
<i>Institutional</i>	38.07	23.32	14.75**	98.43
	(6,604)	(47,953)		
Secondary trading				
<i>Loan-trading</i>	39.85	24.77	15.08***	99.15
	(4,781)	(49,776)		
Stock liquidity				
<i>Stock-bid-ask-spread</i>	28.50	31.75	−3.25	66.39
	(27,238)	(27,238)		

This table provides *IPT* values for portfolios based on firm- and loan-specific characteristics. Panel A presents the results for the loan sample.

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

Panel B presents the results for the equity sample.

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

A firm-quarter observation is allocated to a portfolio as follows. For the *Analyst-coverage*, *Management-forecast*, *SUE*, *Institutional* and *Loan-trading* 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 equal to or above the sample median. Otherwise, a firm-quarter observation is allocated to portfolio 2. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* or *IPT-equity-return* values across two portfolios is statistically significant. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Variables are defined in appendix A. See appendix B for test statistic details.

the possibility that our results are driven by secondary loan market prices transmitting private information about the borrower to equity investors.

6.2 ISOLATING EARLY INFORMATION DISSEMINATION FROM BORROWERS TO LENDERS IN THE LOAN MARKET

6.2.1. *Portfolios Based on Partitioning Variables for Early Versus Late Private Information Dissemination to Syndicate Participants.* We turn now to our primary loan market analysis and establish the characteristics of firms associated with faster private information dissemination from borrowers to lenders.

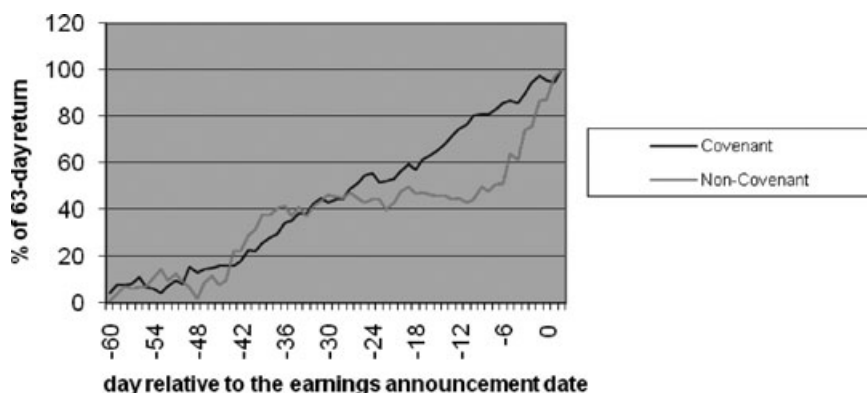


FIG. 1.—Plot of the *IPT*-loan-return measure for *Covenant* and *Noncovenant* portfolios. This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during the 63-day period from 60 trading days before the earnings announcement date to 2 trading days after it. The area under the graph is:

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

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.

We present a graphical analysis in figures 1–4 and formal statistical analysis in table 4, panel A. Figures 1–4 graph the trajectory of cumulative loan portfolio abnormal returns over the 63-day earnings cycle for portfolios constructed based on the *Covenant*, *Credit-Rating*, *Relationship-lending*, and *Reputable-arranger* variables, respectively.²⁰

Results reported in table 4, panel A, and figure 1 show that financial covenants are associated with faster price discovery in the secondary loan market. *IPT*-loan-return is 28.26 for the *Covenant* portfolio and 23.45 for the *Noncovenant* portfolio and the difference between the two of 4.81 is statistically significant. Importantly, the relation between financial covenants and speed of loan price discovery is more pronounced for covenants tied to earnings than for covenants tied to other financial measures. *IPT*-loan-return of 31.48 for the *Earning-based covenant* portfolio exceeds *IPT*-loan-return for the *Noncovenant* portfolio by 8.03, while *IPT*-loan-return of 27.07 for the *Nonearnings-based covenant* portfolio exceeds *IPT*-loan-return for the *Non-covenant* portfolio by only 3.62. Further, we directly compare the *Earning-based covenant* portfolio to the *Non-earning-based covenant* portfolio and find that the difference of 4.41 in their *IPT*-loan-return values is statistically significant (percentile $\Delta IPT = 95.24$). Thus, the significant relation between

²⁰ As discussed earlier, each point on the graph represents the percentage of the total 63-day cumulative loan portfolio return realized by the end of each day during the 63-day period from 60 trading days before the earnings announcement date to two trading days after it.

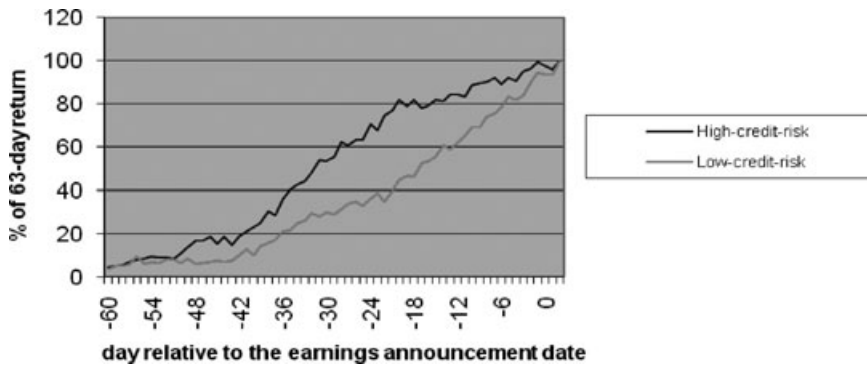


FIG. 2.—Plot of the *IPT-loan-return* measure for *High credit risk* and *Low credit risk* portfolios. This figure plots the percentage of the 63-day cumulative stock portfolio return for each day during the 63-day period from 60 trading days before the earnings announcement date to 2 trading days after it. The area under the graph is:

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

A firm-quarter observation is allocated to a portfolio based on whether a firm's credit rating is equal or above the sample median. Variables are defined in appendix A.

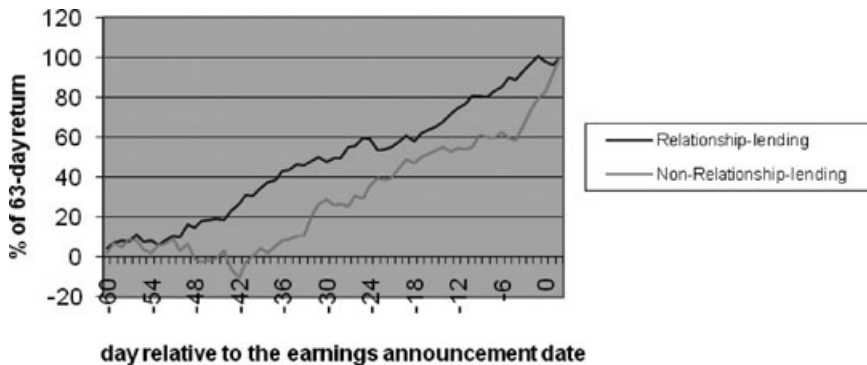


FIG. 3.—Plot of the *IPT-loan-return* measure for *Relationship-lending* and *Nonrelationship-lending* portfolios. This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during the 63-day period from 60 trading days before the earnings announcement date to 2 trading days after it. The area under the graph is:

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

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.

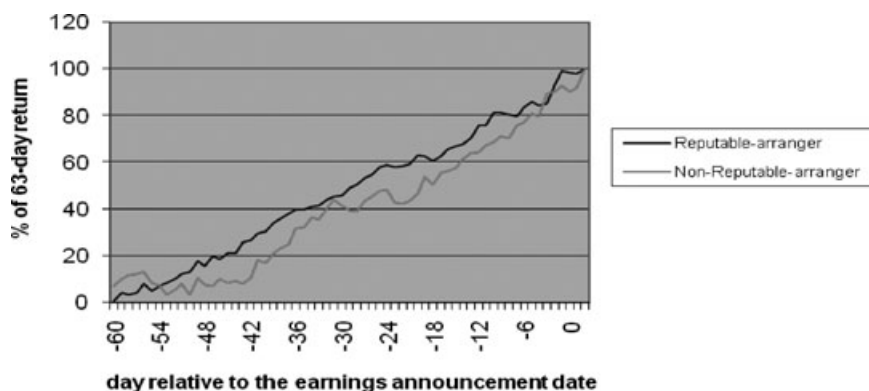


FIG. 4.—Plot of the *IPT*-loan-return measure for *Reputable-arranger* and *nonreputable-arranger* portfolios. This figure plots the percentage of the 63-day cumulative loan portfolio return for each day during the 63-day period from 60 trading days before the earnings announcement date to 2 trading days after it. The area under the graph is:

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

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.

financial covenants and the speed of loan price discovery is driven primarily by the earnings-based financial covenants.

The results in table 4, panel A, also suggest that covenant violations are associated with faster loan price discovery. *IPT*-loan-return for the *Covenant-violation* portfolio is 33.54 compared to 27.78 for the *Noncovenant-violation* portfolio.²¹ Because covenant violations are more frequent for high credit risk firms, we also verify that the relation between covenant violations and *IPT*-loan-return is not subsumed by the *Credit-rating* variable. When we restrict firm-quarter observations with covenant violations to borrowers with credit rating above the sample median (i.e., high credit risk), we find that the *IPT*-loan-return on the *Covenant-violation* portfolio is 35.89 compared to the *IPT*-loan-return of 32.46 for the *Noncovenant-violation* portfolio and the difference between the two is significant at 10% level (percentile $\Delta IPT = 90.64$).

Next, we find that higher credit risk loans have faster price discovery in the loan market (table 4, panel A, and figure 2). *IPT*-loan-return is 33.26 for the *Credit-rating above median* portfolio and 22.94 for the *Credit-rating below*

²¹ It is important to note that, as explained by Nini, Sufi, and Smith [2009], many covenant violations reported in SEC filings are violations that are waived before the reporting period ends. Because in these cases financial covenants would have been in violation had the waiver not been obtained, we expect lenders to require very timely disclosure of syndicate confidential information, as when actual violation occurs.

TABLE 4
The Impact of the Information Dissemination from a Borrower to the Syndicate on the Speed of Price
Discovery in the Secondary Loan Market

	IPT-loan-return			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
Panel A: IPT-loan-return for portfolios based on the measures of information dissemination from a borrower to the syndicate				
Information dissemination from a borrower to the syndicate				
<i>Covenant</i>	28.26 (4,240)	23.45 (541)	4.81**	96.18
<i>Earnings-based covenant</i>	31.48 (3,826)	23.45 (541)	8.03**	97.81
<i>Non-earnings-based covenant</i>	27.07 (414)	23.45 (541)	3.62*	90.44
<i>Covenant-violation</i>	33.54 (338)	27.78 (3,648)	5.76**	95.23
<i>Credit-rating</i>	33.26 (2,598)	22.94 (1,741)	10.32**	96.25
<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
Panel B: The effect of information dissemination from a borrower to the syndicate, controlling for a borrower's information transparency				
<i>Relationship-lending</i>				
<i>Loan-size</i> above median	36.21 (1,384)	23.22 (1,004)	12.99**	95.98
<i>Loan-size</i> below median	32.25 (1,219)	21.66 (1,174)	10.59**	95.21
<i>Tangibility</i> above median	36.69 (1,342)	24.32 (991)	12.37**	96.25
<i>Tangibility</i> below median	28.77 (1,207)	19.86 (1,125)	8.91**	95.13
<i>Number-prior-deals</i> above median	35.28 (1,613)	23.81 (904)	11.47**	98.04
<i>Number-prior-deals</i> below median	27.69 (990)	20.28 (1,274)	7.41**	95.97
<i>Number-press-releases</i> above median	34.00 (718)	26.88 (473)	7.12**	95.13
<i>Number-press-releases</i> below median	27.16 (537)	23.17 (444)	3.99*	91.34
<i>Reputable-arranger</i>				
<i>Loan-size</i> above median	33.16 (1,623)	26.36 (765)	6.80**	97.68
<i>Loan-size</i> below median	27.78 (1,089)	22.87 (1,304)	4.91*	93.54
<i>Number-prior-deals</i> above median	31.29 (1,383)	27.26 (1,134)	4.03**	95.49
<i>Number-prior-deals</i> below median	26.81 (1,329)	21.16 (935)	5.65**	96.36

(Continued)

TABLE 4—Continued

	IPT-loan-return			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	Percentile ΔIPT (4)
<i>Number-press-releases</i> above median	31.74 (672)	27.32 (519)	4.42*	92.64
<i>Number-press-releases</i> below median	28.17 (542)	22.82 (439)	5.35**	96.23
<i>Credit-rating</i>				
<i>Tangibility</i> above median	36.62 (1,403)	27.36 (747)	9.26**	98.12
<i>Tangibility</i> below median	29.41 (1,158)	21.35 (936)	8.06**	95.79
<i>Number-prior-deals</i> above median	36.38 (1,410)	24.32 (956)	12.06**	97.33
<i>Number-prior-deals</i> below median	26.76 (1,188)	22.37 (785)	4.39	88.80

This table provides *IPT-loan-return* values for portfolios based on the measures of information dissemination from a borrower to the syndicate. Panel A presents *IPT-loan-return* values for portfolios based on the following characteristics: *Covenant*, *Earnings-based-covenant*, *Non-earnings-based-covenant*, *Covenant-violation*, *Credit-rating*, *Relationship-lending*, and *Reputable-arranger*. Panel B presents *IPT-loan-return* values for the portfolios based on the above characteristics and the measures of a borrower's information transparency. A firm-quarter observation is allocated to a portfolio as follows. For the *Covenant*, *Relationship-lending*, and *Reputable-arranger* variables, 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 *Earnings-based-covenant* and *Non-earnings-based covenant* variables, a firm-quarter observation is allocated to portfolio 1 if the respective covenant characteristic is equal to one. A firm-quarter observation without covenants is allocated to portfolio 2. For the *Covenant-violation* variable, a firm-quarter observation is allocated to portfolio 1 if any of the financial covenants is subject to violation. A firm-quarter observation with financial covenants not subject to violation is allocated to Portfolio 2 (firm-quarter observations without financial covenants are excluded from the covenant violation analysis). For the *Credit-rating* variable, a firm-quarter observation is allocated to portfolio 1 if the credit rating is equal to or above the sample median. Otherwise, a firm-quarter observation is allocated to portfolio 2.

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

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

median portfolio. In untabulated analysis, we also examine an alternative default risk measure, DLI, a default likelihood indicator estimated according to Vassalou and Xing's [2004] model. We find that *IPT-loan-return* is significantly higher for the *DLI above median* portfolio relative to the *DLI below median* portfolio (34.32 versus 25.52, percentile Δ*IPT* = 95.64), supporting the credit-rating results.

Figure 3 shows that the trajectory of cumulative portfolio abnormal returns for the *Relationship-lending* portfolio is above the trajectory for the *Nonrelationship-lending* portfolio, suggesting faster speed of price discovery for relationship lending. Table 4, panel A, reports that the difference in the areas under the two curves is 11.60 and is statistically significant. Figure 4 and panel A present analogous results for the *Reputable-arranger* and

Nonreputable-arranger portfolios, suggesting faster price discovery for reputable arrangers (29.78 vs. 25.23).

6.2.2. Controlling for Potential Omitted Correlated Variables. The primary focus of our omitted correlated variable analysis (table 4, panel B) is the subset of public transparency variables that are reported to be significantly positively correlated with *IPT-loan-return* in table 3, panel A—*Loan-size*, *Tangibility*, *Number-prior-deals*, and *Number-press-releases*. We form portfolios based on two-way sorts using our information dissemination variables (e.g., *Relationship-lending*) and public transparency control variables (e.g., *Loan-size*). For parsimony, for each of our partitioning information-dissemination variables, we tabulate results only for the subset of these four control variables with which the partitioning variable exhibits a significant positive correlation in table 2, panel C. For example, *Relationship-lending* is significantly positively correlated with *Loan-size* (table 2, panel C) and *Loan-size* is significantly positively associated *IPT-loan-return* (table 3, panel A). Therefore, by constructing portfolios based on the two-way sort on *Relationship-lending* and *Loan-size*, we rule out the possibility that the faster price discovery for the *Relationship-lending* portfolio reported in table 4, panel A, is driven by the larger size of relationship loans.

Table 4, panel B, shows that *IPT-loan-return* is still higher for *Relationship-lending* portfolios after controlling for the information transparency variables. Analogously, for *Reputable-arranger*, we consider *Loan-size*, *Number-prior-deals*, and *Number-press-releases* characteristics. Controlling for these characteristics does not affect the higher values of *IPT-loan-return* for *Reputable-arranger* portfolios. We do not tabulate sorts on *Tangibility* because this variable is negatively correlated with *Reputable-arranger* (table 2, panel C), suggesting that tangibility cannot explain higher information timeliness for loans issued by reputable arrangers.

While there is generally a negative relation between credit risk and information transparency, *Credit-rating* is positively correlated with *Tangibility* and *Number-prior-deals*. Table 4, panel B, shows that speed of price discovery is generally higher for riskier firms, after controlling for tangibility and number of previous loan deals. As we discussed in section 5.2, *Covenant* and *Earnings-based-covenant* are negatively related to the majority of information transparency variables, including *Loan-size*, *Tangibility*, *Number-prior-deals*, and *Number-press-releases*. Thus, because faster price discovery for loans with financial covenants and earnings-based financial covenants cannot be attributed to higher information transparency, we do not tabulate sorts on the *Covenant* and *Earnings-based-covenant* variables. Analogously, because the *Covenant-violation* variable is associated with lower information transparency, we do not tabulate sorts on this variable.

To enhance our results, in untabulated analysis, we also examine the two-way sorts on all the information dissemination variables and the information transparency variables that are reported in panel A of table 3, but not included in the omitted correlated variable analysis (table 4, panel B).

Controlling for these variables does not affect our main findings. In addition, in untabulated analysis, we rule out the possibility that loan liquidity affects our findings for *Covenant*, *Earnings-based-covenant*, and *Reputable-arranger* as loans with these characteristics tend to be more liquid (table 2, panel C).

Overall, this section establishes that documented connections between financial covenants, high credit risk, relationship lending and reputable lead arrangers, and faster price discovery are robust to a wide range of potential correlated omitted variables. This supports our use of these partitioning variables in the equity market analysis to capture early versus late dissemination of confidential information to syndicate participants.

6.3 THE IMPACT OF PRIVATE INFORMATION DISSEMINATION TO LENDERS ON EQUITY PRICE DISCOVERY

6.3.1. The Role of Institutional Lenders in Equity Price Discovery. Table 5 presents tests of whether price discovery in the equity market (*IPT-stock-return*) is faster with relatively early dissemination of confidential information to syndicate participants. We first employ the *total* sample of firm-quarters with outstanding syndicated loans, whether or not the syndicated loans are held by institutional investors (table 5, panel A). In contrast to our results in the loan market (where all of the partitioning variables are significantly positively related to the speed of price discovery), the results in table 5, panel A, indicate that none of the partitioning variables, with the exception of *Credit-rating*, are significantly related to the speed of price discovery in the equity market.

In table 5, panel B, we repeat the analysis from panel A, but only for the subsample of firms with institutional loans. The results of table 5, panel B, contrast starkly to those in panel A. Restricting the analysis to the institutional subsample, we now see that firms with loans subject to financial covenants experience significantly higher speed of stock price discovery. This loan covenant result is attributed solely to covenants based on earnings numbers. *IPT-stock-return* for the *Earnings-based-covenant* portfolio is 45.53 versus *IPT-stock-return* of 24.96 for the *Noncovenant* portfolio, while the difference in the speed of price discovery between the *Non-earnings-based-covenant* and *Noncovenant* portfolios is not significant. The comparison between the *Earnings-based-covenant* portfolio and the *Non-earnings-based-covenant* portfolio reveals that the difference of 17.09 in their *IPT-stock-return* values is significant (percentile $\Delta IPT = 97.60$). We also find that the speed of price discovery is higher for the *Covenant-violation* portfolio, although this result is significant at the 10% level. We further show that riskier borrowers experience faster stock price discovery. Lastly, *IPT-stock-return* is significantly higher for loans syndicated by a relationship lead arranger or a highly reputable lead arranger. These findings indicate that early dissemination of confidential information to the loan syndicate results in relatively fast price discovery in the equity market when nonbank institutions belong to the loan syndicate.

TABLE 5
The Impact of the Information Dissemination from a Borrower to the Syndicate on the Speed of Price Discovery in the Stock Market

	IPT-stock-return			
	Portfolio 1 (1)	Portfolio 2 (2)	Difference (3)	PercentileΔIPT (4)
Panel A: IPT-stock-return for portfolios based on the measures of information dissemination from a borrower to the syndicate				
Information dissemination from a borrower to the syndicate				
Covenant	27.58 (39,327)	25.17 (15,230)	2.41	38.15
Earnings-based covenant	28.27 (32,863)	25.17 (15,230)	3.10	56.80
Non-earnings-based covenant	26.98 (6,464)	25.17 (15,230)	1.81	41.16
Covenant-violation	29.98 (3,150)	27.65 (32,244)	2.33	44.36
Credit-rating	34.71 (13,007)	24.89 (11,602)	9.82**	97.60
Relationship-lending	28.51 (20,962)	26.89 (33,595)	1.62	46.29
Reputable-arranger	32.56 (18,182)	27.32 (36,375)	5.24	76.19
Panel B: IPT-stock-return for portfolios based on the measures of information dissemination from a borrower to the syndicate: institutional portfolios				
Covenant	43.14 (5,222)	24.96 (1,382)	18.18***	99.20
Earnings-based covenant	45.53 (4,731)	24.96 (1,382)	20.57**	98.39
Non-earnings-based covenant	28.44 (491)	24.96 (1,382)	3.48	54.30
Covenant-violation	46.98 (441)	42.83 (4,359)	4.15*	91.34
Credit-rating	37.58 (4,288)	23.17 (696)	14.41**	96.75
Relationship-lending	42.84 (3,166)	31.04 (3,438)	11.80**	95.79
Reputable-arranger	44.35 (2,532)	32.38 (4,072)	11.97**	97.09
Panel C: IPT-stock-return for portfolios based on the measures of information dissemination from a borrower to the syndicate: institutional portfolios, excluding loans traded on the secondary loan market				
Covenant	41.24 (2,815)	25.44 (1,104)	15.80**	95.28
Earnings-based covenant	40.72 (2,561)	25.44 (1,104)	15.28**	96.02
Non-earnings-based covenant	28.25 (254)	25.44 (1,104)	2.81	31.25
Covenant-violation	45.37 (234)	41.33 (2,382)	4.04*	90.13
Credit-rating	35.16 (2,036)	24.83 (353)	10.33**	97.06

(Continued)

TABLE 5—Continued

	IPT-stock-return			
	Portfolio 1	Portfolio 2	Difference	PercentileΔIPT
	(1)	(2)	(3)	(4)
Relationship-lending	41.13 (1,646)	29.54 (2,273)	11.59**	95.11
Reputable-arranger	45.68 (1,005)	29.99 (2,914)	15.69**	97.91

Panel D: IPT-stock-return for portfolios based on the measures of information dissemination from a borrower to the syndicate: noninstitutional portfolios

Covenant	25.03 (34,105)	24.54 (13,848)	0.49	7.28
Earnings-based covenant	25.82 (28,132)	24.54 (13,848)	1.28	18.11
Non-earnings-based covenant	26.19 (5,973)	24.54 (13,848)	1.65	26.67
Covenant-violation	27.07 (2,709)	24.87 (27,885)	2.20	28.54
Credit-rating	23.53 (8,719)	25.67 (10,906)	−2.14	39.76
Relationship-lending	26.49 (17,796)	25.47 (30,157)	1.02	15.31
Reputable-arranger	29.78 (15,650)	25.94 (32,303)	3.84	60.15

This table provides IPT-stock-return values for portfolios based on the measure of information dissemination from a borrower to the syndicate.

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

Panel A presents the results for the total equity sample. Panel B presents the results for the institutional portfolios (portfolios of firm-quarters with institutional investors involved in a firm's syndicated loans). Panel C presents the results for institutional portfolios, excluding loans traded on the secondary loan market. Panel D presents the results for the noninstitutional portfolios (portfolios of firm-quarters with no institutional investors involved in a firm's syndicated loans). A firm-quarter observation is allocated to a portfolio as follows. For the *Covenant*, *Relationship-lending* and *Reputable-arranger* variables, 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 *Earnings-based-covenant* and *Non-earnings-based covenant* variables, a firm-quarter observation is allocated to portfolio 1 if the respective covenant characteristic is equal to one. A firm-quarter observation without covenants is allocated to portfolio 2. For the *Covenant-violation* variable, a firm-quarter observation is allocated to portfolio 1 if any of the financial covenants is subject to violation. A firm-quarter observation with financial covenants not subject to violation is allocated to portfolio 2 (firm-quarter observations without financial covenants are excluded from the covenant violation analysis). For *Credit rating* variable, a firm-quarter observation is allocated to portfolio 1 if the credit rating is equal to or above the sample median. Otherwise, a firm-quarter observation is allocated to portfolio 2. Percentile ΔIPT indicates whether the difference in IPT-equity-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.

While the evidence in table 5, panel B, is consistent with institutional investors trading on confidential information, we have not ruled out the possibility that the existence of secondary loan market prices is driving a higher IPT-stock-return for the *Institutional* portfolio. A total of 40.7% of the firm-quarter observations in the institutional subsample are related to borrowers with traded loans and therefore secondary market prices can be

TABLE 6
Additional Analyses of IPT-Stock-Return for Institutional and Noninstitutional Portfolios

Panel A: IPT-stock-return for institutional and noninstitutional portfolios, controlling for potential omitted correlated variables				
	IPT-stock-return			
	Portfolio 1	Portfolio 2	Difference	Percentile ΔIPT
	(1)	(2)	(3)	(4)
Institutional				
<i>Tangibility</i> above median	41.37	27.53	13.84*	93.19
	(3,528)	(21,901)		
<i>Tangibility</i> below median	35.96	21.65	14.31**	96.52
	(2,844)	(22,587)		
<i>Number-press-releases</i> above median	34.22	27.33	6.89*	91.09
	(1,927)	(9,281)		
<i>Number-press-releases</i> below median	41.17	22.82	18.35**	98.03
	(757)	(6,528)		
Panel B: IPT-stock-return for institutional portfolios, controlling for a firm's voluntary disclosure				
	IPT-stock-return		IPT-stock-return	
Firm disclosure				
With <i>Management-forecast</i>	28.84	<i>Number-press-releases</i>	34.22	
	(400)	above median	(1,927)	
Without <i>Management-forecast</i>	40.65	<i>Number-press-releases</i>	41.17	
	(6,204)	below median	(757)	
Difference	-11.81**	Difference	-6.95*	
Percentile	95.44	Percentile	92.40	

Panel A reports *IPT-stock-return* values for portfolios based on firm and loan characteristics that are likely to affect price discovery in the stock market and on whether a firm's loans are held by institutional investors.

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

Portfolio 1 represents institutional portfolios; portfolio 2 represents noninstitutional portfolios. Panel B provides *IPT-stock-return* values for the institutional portfolio across our measures of voluntary disclosure. Percentile ΔIPT indicates whether the difference in *IPT-loan-return* values across two portfolios is statistically significant. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Variables are defined in appendix A. See appendix B for test statistic details.

simply transmitting confidential information to the equity market. However, the results in panel C of table 6 reveal that this is not the case, documenting that *IPT-stock-return* continues to be significantly higher for all information dissemination measures after excluding traded loans from the sample.²²

In table 5, panel D, we analyze the noninstitutional subsample only, finding that the speed of stock price discovery is not significantly related

²² As 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 nontraded). We repeat the analysis reported in table 6, panel C, for this sample and find similar results.

to any of our proxies for early versus late private information dissemination to lenders. This result holds also for *Credit-risk*, suggesting that the higher *IPT-stock-return* for more risky firms reported in panel A is driven solely by firms with institutional lenders. Further, when we compare *IPT-stock-return* for portfolio 1 in panel B versus portfolio 1 in panel D, we find that *IPT-stock return* is significantly higher for the institutional sample than the noninstitutional sample for *Covenant*, *Earnings-based-covenants*, *Covenant-violations*, *Credit-rating*, *Relationship-lending*, and *Reputable-arranger* partitions (untabulated). The absence of a relation between our partitioning variables and speed of stock price discovery for noninstitutional loans makes it unlikely that our partitioning variables inadvertently capture positive effects of public transparency on price discovery.

To summarize, our empirical findings are consistent with more rapid equity price discovery in firm-quarters characterized by the combination of relatively early private information flows to lenders *and* by the presence of institutional lenders who exploit this private information when trading the borrowing firms' stocks. For loans without institutional lender involvement, we find no evidence that "Chinese walls" and other procedures implemented by syndicate participants to prevent leakage between the public and private sides of the information wall are ineffective.

6.3.2. Additional Analysis of Institutional Portfolios. We examine whether the *Institutional* variable is picking up an effect of potential omitted correlated variables. As reported in table 3, panel B, *IPT-stock-return* is significantly higher for firms with a high tangibility, low dispersion in analysts' earnings forecasts, and for firms that provide earnings guidance and have a high number of firm-initiated press releases. Simultaneously, firms with institutional lenders have high asset tangibility and a high number of press releases (table 2, panel D). For these two information transparency measures, we construct portfolios based on two-way sorts on the transparency measure and the *Institutional* variable. Results reported in panel A of table 6 show that *IPT-stock-return* is still higher for *Institutional* portfolios after controlling for firm tangibility and the number of press releases, with results somewhat dampened in the subsample with a *high* (vs. low) number of press releases.

Results in table 6, panel B, compare the speed of stock price discovery for institutional portfolios with high versus low voluntary public disclosure. The results indicate that for the subsample with institutional lenders, *IPT-stock-return* is significantly *higher* for firm-quarters with relatively *weak* voluntary disclosure as measured by no management forecasts and relatively few firm-initiated press releases. Further, in untabulated results, we find a powerful positive relation between institutional lending and *IPT-stock-return* in the subsample without management forecasts, and not in the subsample with management forecasts. That is, institutional lenders are

only associated with faster stock price discovery when private information received in the loan market is not preempted by management earnings forecasts.

Finally, we perform a number of robustness tests. In untabulated analysis, we estimate *IPT-stock-return* for the two-way sorts on *Institutional* and all variables reported in panel B of table 3, but not included in the omitted correlated variable analysis (table 6, panel A). Controlling for these variables does not affect the significantly higher *IPT-stock-return* value for the *Institutional* portfolio. We also repeat the tests based on the *Credit-rating* variable using the *DLI* measure instead. This untabulated analysis provides results similar to our primary specifications. In addition, we repeat the analysis in table 6 excluding from the *Institutional* portfolio firm-quarter observations associated with traded loans; the results are unchanged (untabulated).

6.4 ADDITIONAL ROBUSTNESS TESTS

We examine whether our findings are robust to additional variables, such as the number of equity analysts covering the firm, age of the firm, market-to-book ratio, loan (stock) return volatility; whether a firm is profitable; and whether it is on the S&P Watch List or Outlook. All of our main findings and inferences are robust to these controls.

Allen, Gottesman, and Peng [2009] provide evidence on the importance of dual market makers for the Granger causality of loan returns for subsequent stock returns. While dual market makers represent a potential channel through which syndicate information may affect the liquidity and speed of equity price discovery, this channel is unlikely to explain our results. As documented in Allen, Gottesman, and Peng [2009], lead arrangers are more likely to be a market maker in the borrower's equity if equity volatility is high, market cap is large, and the loan is risky. The robustness of our results to controls for these factors, as well as controls for equity market liquidity (an effect of dual market maker status) cast doubt on a direct connection that explains our institutional effect.

Next, in untabulated analysis, we test whether loan prices transmit information to the equity markets when institutional investors are not involved in the syndicate. In particular, we estimate *IPT-stock-return* for the *Loan-trading* portfolio, excluding firm-quarters characterized by institutional lenders. We do not find that the existence of secondary loan prices increases the speed of equity price discovery for firms without institutional involvement in the syndicate. The relatively low informativeness of secondary loan prices can be potentially explained by the low credit risk of noninstitutional loans. Noninstitutional loans are issued to low default risk firms and, as we find, these firms exhibit relatively slow price discovery in the loan market.

Last, we find that results reported in tables 3–6 are robust to using an alternative test statistic used by McNichols [1984] and Butler, Kraft,

and Weiss [2007]; see appendix B for a detailed description of this statistic.

7. Concluding Remarks

We investigate how the speed of price discovery in the secondary loan and equity markets varies with private debt financing arrangements. We find that factors predicted to accelerate flows of confidential information to loan syndicate participants are positively related to the speed of price discovery in the secondary loan market. These factors include the prevalence of financial covenants in the traded syndicated loan contracts outstanding, the prevalence of earnings-based covenants, in particular; covenant violations during the quarter; high credit risk, a long-standing relation between lead arrangers and borrowers; and highly reputable lead arrangers. These results are robust to controls for public information transparency and loan market liquidity, providing compelling evidence in support of our joint hypothesis that lenders' access to privileged information from borrowers drives price discovery in the secondary loan market, and that each hypothesized factor (i.e., "partitioning variable") successfully isolates firm-quarters with early (vs. late) dissemination of confidential information to syndicate participants. Further, we find that the same partitioning (information dissemination) variables are positively related to the speed of price discovery in the equity market if, and only if, nonbank institutions belong to the loan syndicate, consistent with concerns that institutional lenders trade illegally in the equity market on the basis of confidential syndicate information. These results are upheld when we exclude firm-quarters with traded loans, ensuring that our results are not driven by syndicate information being conveyed to equity investors by the prices of loans in the secondary market.

A potential limitation of our study is the possibility that our control variables fall short of ruling out alternative explanations for our results. However, when considered in their entirety, results of our interconnected analyses in the two markets go a long way toward mitigating this concern. As predicted, *all* of the partitioning variables are *positively* related to the speed of price discovery in the loan market, and in the equity market if institutional investors belong to the syndicate, and yet the direction of their correlation with measures of public information transparency are *positive* for some partitioning variables (relationship lending and reputable arranger) and *negative* for others (covenant-related variables and credit rating). This casts doubt that all of our partitioning variables are inadvertently capturing public information transparency. Further, *none* of the partitioning variables are related to the speed of stock price discovery in the absence of (non-bank) institutional lenders. This is what would be expected if the partitioning variables capture flows of *private*, not public, information (and "Chinese walls" and other procedures implemented by noninstitutional lenders

(e.g., banks) to prevent leakage between the public and private sides of the information wall are effective).

The interpretation of our equity market results as evidence that institutional lenders trade on confidential syndicate information is further strengthened by comparing the documented relation between institutional lending and the speed of price discovery in the two markets. In the secondary loan market, where institutional lenders are not expected to have an information advantage, we detect no relation between the speed of price discovery and institutional lending. In contrast, in the equity market where confidential syndicate information gives institutional lenders a clear information advantage over equity investors who do not belong to the syndicate, there is a powerful connection between institutional lending and the speed of stock price discovery, and this connection is most pronounced when there is early (vs. late) access to confidential information from the borrower. Further the positive relation between institutional lending and the speed of stock price discovery is more pronounced in firms-quarters with relatively weak public disclosure by the borrower (i.e., no management forecasts and below-the-median number of firm-initiated press releases), as expected if our results are driven by institutional lenders' misuse of *private* information in the equity market.

Our paper extends recent papers by Ivashina and Sun [2009] and Masoud et al. [2009], suggesting that inside trading by institutional lenders is sufficiently pervasive to significantly affect the speed of stock price discovery over regular earnings cycles. Our paper also contributes to the vast literature on relations between earnings and stock returns (e.g., Ball and Shivakumar [2008]) by isolating a new channel, private syndicate information, through which stock prices anticipate earnings information, and by documenting how private syndicate information varies in a predictable way with the prevalence of financial covenants, earnings-based covenants, covenant violations, default risk, relationship lending, and the reputation of the lead arranger. Finally, we add to the literatures on secondary loan trading, the involvement of institutional investors in the syndicated loan market, informational efficiency of prices across capital markets, bank monitoring, and the debt contracting role of accounting. Of particular interest to accounting researchers, perhaps, is the connection uncovered here between the debt-contracting role of accounting information (e.g., earnings versus non-earnings-based financial covenants) and the speed of price discovery in the equity market, as well as the interaction between confidential syndicate information and firms' public disclosure in the formation of equity prices. Further investigation of these two connections represents promising new paths for accounting research.

APPENDIX A Variable Definition

Variables	Description
<i>Analyst-coverage</i>	An indicator variable taking a value of one if a firm has equity analyst coverage, zero otherwise.
<i>Analyst-dispersion</i>	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.
<i>Covenant (Loan sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's traded syndicated loans are subject to financial covenants, zero otherwise.
<i>Covenant (Equity sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's outstanding syndicated loans are subject to financial covenants, zero otherwise.
<i>Earnings-based-covenant (Loan sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's traded syndicated loans are subject to earnings-based financial covenants. We classify the following covenants as earnings-based: debt to EBITDA, senior debt to EBITDA, cash interest coverage, debt service coverage, EBITDA, fixed charge coverage, and interest coverage.
<i>Earnings-based-covenant (Equity sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's outstanding syndicated loans are subject to earnings-based financial covenants. We classify the following covenants as earnings-based: debt to EBITDA, senior debt to EBITDA, cash interest coverage, debt service coverage, EBITDA, fixed charge coverage, and interest coverage.
<i>Non-earnings-based-covenant (Loan sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's traded syndicated loans are not subject to earnings-based financial covenants. We classify the following covenants as earnings-based: debt to EBITDA, senior debt to EBITDA, cash interest coverage, debt service coverage, EBITDA, fixed charge coverage, and interest coverage.
<i>Non-earnings-based-covenant (Equity sample)</i>	An indicator variable taking the value of one if the majority ($\geq 50\%$) of a firm's outstanding syndicated loans are not subject to earnings-based financial covenants. We classify the following covenants as earnings-based: debt to EBITDA, senior debt to EBITDA, cash interest coverage, debt service coverage, EBITDA, fixed charge coverage, and interest coverage.
<i>Covenant-violation</i>	An indicator variable taking the value of one if a firm's syndicated loans are subject to financial covenant violation, zero otherwise; covenant violation data is from Nini et al. [2009].
<i>Credit-rating</i>	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.
<i>DLI</i>	Default risk probability measure of Vassalou and Xing [2004]. The default likelihood indicator (<i>DLI</i>) is calculated using contingent claim methodology of Black and Scholes [1973] and Merton [1974].

(Continued)

APPENDIX A—Continued

Variables	Description
<i>Firm-size</i> <i>Institutional</i>	<p>The calculation is based on a firm's equity data and is a nonlinear function of a firm's default probability:</p> $DLI = N\left(-\frac{\ln(V_{A,t}/X_t) + (\mu - 0.5\sigma_A^2)T}{\sigma_A\sqrt{T}}\right),$ <p>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> <p>Logarithm of the firm's total assets' estimate at the beginning of the quarter.</p> <p>The institutional variable captures whether private information is disseminated to institutional investors. This variable takes the value of one 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 institutional loans and term loans A and revolving facilities are considered 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 an institutional investor after the first three steps, we test whether the lender also issues banking loans. We exclude from the institutional investor category lenders that are also involved in banking loans.</p> <p><i>IPT-loan-return</i> is a measure designed to capture the speed, or timeliness, with which information is impounded into loan prices. <i>The IPT-loan-return</i> measure is calculated as the sum of the 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 the earnings announcement date to 2 trading days after the earnings announcement date (BH_2), for each of day m from -60 to 1, plus 0.5:</p> $IPT\text{-}loan\text{-}return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \frac{1}{2} \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$
<i>IPT-loan-return</i>	<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 the secondary loan market on a specified trading day, the quotes for which 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>

(Continued)

APPENDIX A—Continued

Variables	Description
<i>IPT-stock-return</i>	<i>IPT-stock-return</i> is a measure designed to capture the speed, or timeliness, with which the information is impounded into stock prices. The <i>IPT-stock-return</i> measure is calculated as the sum of the stock buy-and-hold size adjusted abnormal return from 60 trading days prior to the earnings announcement date through day m (BH_m), divided by the buy-and-hold stock abnormal return from 60 days prior to the earnings announcement date to 2 trading days after the earnings announcement date (BH_2), for each day m from -60 to 1 , plus 0.5 : $IPT\text{-}stock\text{-}return = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \frac{1}{2} \sum_{m=-60}^2 (BH_m / BH_2) + 0.5$
<i>Loan-bid-ask-spread</i>	The portfolio IPT measure is estimated based on the equal weighted return of all firm-quarter observations included in a portfolio. The loan bid-ask spread is estimated based on bid and ask loan price quotes aggregated across market makers. 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 2 trading days after this date. Logarithm of the average amount of a firm's traded loans.
<i>Loan-size</i>	An indicator variable taking the value of one 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.
<i>Loan-trading</i>	An indicator variable taking the value of one 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 2 trading days prior to this day, zero otherwise.
<i>Management-forecast</i>	The number of articles in <i>The Wall Street Journal</i> , <i>The New York Times</i> , <i>USA Today</i> , and <i>The Washington Post</i> that mention a firm's name.
<i>Number-articles</i>	The number of articles is estimated as the average number of articles in the calendar year of the relevant quarter. The data is from Factiva.
<i>Number of market makers</i>	The number of market makers that provide a loan's bid and ask price 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 2 trading days after this date.
<i>Number of press releases</i>	The number of firm-initiated press releases within a period from 60 trading days prior to the earnings announcement date to that date. Prior research defines press releases as articles issued on a press wire service. However, as discussed in Soltes [2010], not all press releases are necessarily initiated by the firm. See Soltes [2010] for a description of how firm-initiated press releases are isolated. The data is from Factiva.
<i>Number-prior-deals</i>	The number of the borrower's previous loans over the five-year period preceding the loan's issuance date.

(Continued)

APPENDIX A —Continued

Variables	Description
<i>Relationship-lending</i> (Loan Sample)	An indicator variable taking the value of one 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 five-year period preceding the loan's issuance date.
<i>Relationship-lending</i> (Equity Sample)	An indicator variable taking the value of one 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 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 five-year period preceding the loan's issuance date.
<i>Reputable-arranger</i> (Loan sample)	An indicator variable taking the value of one 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.
<i>Reputable arranger</i> (Equity sample)	An indicator variable taking the value of one if the 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.
<i>Stock-bid-ask-spread</i>	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 2 trading days after this date.
<i>SUE</i>	An indicator variable taking the value of one if a firm's <i>SUE</i> is positive; zero otherwise. <i>SUE</i> is a measure of unexpected earnings from a seasonal random walk model with trend, scaled by their standard deviation within the trend estimation period (eight previous quarters). <i>SUE</i> is estimated as the seasonal change in earnings before extraordinary items minus the mean unexpected earnings before extraordinary items over the previous eight quarters, scaled by the standard deviation of this measure of unexpected earnings over the same period.
<i>Tangibility</i>	The ratio of net PPE to total assets, estimated at the end of the previous fiscal quarter.

Unless indicated otherwise, the variables are measured during the quarter when the timeliness of price discovery is estimated.

APPENDIX B

Statistical Tests of Differences in IPT

Our main analyses involve comparing the speed of price discovery between two portfolios of firms, where price discovery is estimated using a measure of IPT. As discussed in the text, IPT 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 the 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) 1,000 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 primary test statistic is computed as the difference in the total areas under the two curves. In section 4.1, 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 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 2 trading days after the earnings announcement date (BH_2), for each day m from -60 to 1 , plus 0.5 : $IPT = \frac{1}{2} \sum_{m=-60}^2 (BH_{m-1} + BH_m) / BH_2 = \sum_{m=-60}^1 (BH_m / BH_2) + 0.5$. 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 alternative test statistic (see McNichols [1984] and Butler, Kraft, and Weiss [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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