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Hold-Up and the Use of Performance-Sensitive Debt

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Abstract

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Keywords: Performance-sensitive debt, relationship lending, hold-up, holdout, syndicated debt, covenants

JEL-Classification: G21, G31, G32

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Abstract

We examine whether performance-sensitive debt (PSD) is used to reduce hold-up problems in long-term lending relationships. We find that the use of PSD is more common in the presence of a long-term lending relationship and if the borrower has fewer financing alternatives available. In syndicated deals, however, the presence of a relationship lead arranger reduces the use of PSD, which is consistent with hold-up being of lesser concern in such cases. Further, supporting our hypothesis that hold-up concerns motivate the use of PSD, we find a substitution effect between the use of PSD and the tightness of financial covenants.

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1. Introduction

Since the early 1990s, many bank loans contain performance pricing provisions, which stipulate that the coupon paid rises if the firm's financial performance deteriorates and/or vice versa. Financial performance is measured either by the borrower's credit rating or a financial ratio such as leverage. The theoretical literature has linked the use of performance-sensitive debt (PSD) to debt renegotiation costs, signaling, and asset substitution considerations. Asquith et al. (2005) argue that PSD reduces debt renegotiation costs due to adverse selection, moral hazard, or unanticipated changes in the borrower's credit risk. Manso et al. (2010) demonstrate that PSD can be used as a signaling device for a firm's credit quality in a setting with adverse selection. Finally, Koziol and Lawrenz (2010) show that PSD can mitigate risk-shifting incentives, but Bhanot and Mello (2006) argue that PSD is an inefficient method to reduce incentives for asset substitution.

In this paper we explore a new explanation for the use of PSD. We hypothesize that PSD can be used to mitigate hold-up problems, which, for example, can arise in long-term lending relationships. Sharpe (1990) and Rajan (1992) show that a cost of relationship lending is the potential for hold-up by the lender. The potential for hold-up arises from the information advantage, which the lender acquires in the course of the lending relationship. This information advantage makes it difficult for the borrower to switch to another, less well informed, lender due to adverse selection, which is especially relevant for opaque borrowers with fewer financing alternatives. If the borrower is "locked in", the bank could exploit the situation by charging higher interest rates or by denying interest rate reductions when the borrower's performance improves. Schmidt (2006) argues that the use of covenants, which is common in private debt contracts, further exacerbates the hold-up problem because covenants shift bargaining power from borrowers to lenders. Von Thadden (1995) shows that a solution to this hold-up problem is to pre-specify contract terms ex ante, thereby limiting the discretion of the lender. Indeed, one can view PSD contracts as limiting the discretion of the lender because making the coupon of a loan contingent on the borrower's performance avoids debt renegotiations in these states. For example, rather than renegotiate a loan after a covenant violation, the performance-pricing provision specifies the outcome of such renegotiation ex ante and thus avoids the situation of a technical default.[1]

In syndicated deals, the presence of a relationship lead-arranger is likely to reduce the use of PSD. In the decision to hold-up a client a lender needs to weigh the short-term gains from hold-up against the long-term costs of jeopardizing the relationship. In a syndicated deal, the short-terms gains from hold-up would be shared by all syndicate members, while the long-term costs of jeopardizing the relationship would be borne mostly by the relationship lender. Thus, a relationship lead-arranger is more likely to favor to continue the relationship and benefit from its information advantage relative to other lenders rather than to hold-up

[1] While PSD is common place in private debt markets, PSD is rare in public bond markets. This is consistent with our hypothesis, as hold-up problems are of little concern in public debt. Using keyword searches on both Bloomberg and EDGAR Pro we are able to identify only 115 performance-sensitive bond issues from 74 distinct companies between 1989 and 2012.

a client.

Our paper is the first to explicitly analyze the link between the hold-up problem in repeated lending relationships and the use of PSD contracts. A particular advantage of focusing on lending relationships is that it allows us to differentiate the hold-up from the signaling motivation. This is because signaling is less important in lending relationships, as the relationship lender already has an information advantage (see for example Menkhoff et al. (2006)), while the potential for hold-up rises in lending relationships. Using a large sample of private debt contracts issued by non-financial U.S. borrowers between 1993 and 2011, we show that *accounting-based* PSD contracts, i.e., PSD based on a financial ratio, are about 25% more likely to be used in repeated lending relationships after we control for the endogeneity of the lending relationship. Following Bharath et al. (2011), we use the spherical distance between the borrower's and the lender's headquarters as an instrument for relationship strength. In contrast, we find that the use of *rating-based* PSD is negatively related to the presence of a repeated lending relationship. Thus, these initial results suggest that accounting-based PSD are used to address hold-up while rating-based PSD is used for signaling.

We further analyze whether the use of PSD varies systematically across different types of borrowers because the potential for hold-up is also a function of borrower characteristics. For example, Santos and Winton (2008) argue that the costs of relationship lending are higher for companies, which do not have access to other financing sources (e.g., bond market access). In line with this argument, we find that accounting-based PSD contracts are more common in relationship lending arrangements with smaller firms, firms that do not have a long-term issuer credit rating at the time of the loan origination, and firms with lower analyst coverage. If a loan is syndicated, performance pricing provisions are more likely, which is consistent with the renegotiation cost argument by Asquith et al. (2005). However, the presence of a lending relationship between the borrower and the lead arranger reduces the use of PSD. This is consistent with the argument that in a syndicate the lead arranger cannot capture all rents from hold-up, causing hold-up to be a less attractive strategy for the lead arranger than preserving the relationship with the client.

Next, we examine the structure of covenants in PSD because if performance pricing provisions are used to mitigate hold-up problems, then there should be a substitution effect between the pricing grid of rate-increasing PSD[2] and covenant tightness. Covenants should be less tight compared to covenants of regular debt.[3] This is what we find. Firstly, the majority of PSD have covenants on the same performance measure as the one used in the performance-pricing provision, with covenant thresholds typically set directly at the end of the pricing grid. Secondly, Debt-to-EBITDA covenants, the most common covenant type in our loan sample, are less tight in PSD contracts that also use Debt-to-EBITDA as a measure

[2] PSD that allows for interest rate increases only.

[3] Small deteriorations in a borrower's performance, which would otherwise trigger a technical default now automatically lead to interest rate increases as determined by the pricing grid.

of the borrower's performance compared with non-PSD debt contracts. Consistent with the substitution hypothesis, this effect exists only for interest-increasing PSD contracts.[4]

Finally, we examine the evolution of the borrower's credit rating and the borrower's leverage ratio up to 2 years following the issue of PSD, to differentiate hold-up from the possibility that PSD is used to signal credit quality, as proposed by Manso et al. (2010). Under the signaling hypothesis, the firm's performance should improve following a PSD issue, while the hold-up hypothesis makes no prediction about the firm's post-issue performance. We find that borrowers' credit ratings tend to improve and leverage ratios decline 1-2 years following the issue of *rating-based* PSD, but not for *accounting-based* PSD. These results further support our conclusion that accounting-based PSD is used to address hold-up problems in repeated lending relationships, while rating-based PSD is more likely used to signal credit quality.

We make two contributions to the literature. Firstly, we offer a new explanation for the use of PSD, namely that PSD reduces potential hold-up problems in repeated lending relationships. In contrast, Manso et al. (2010) argue that borrowers use PSD to signal their credit quality, while Koziol and Lawrenz (2010) argue that PSD reduces moral hazard. The study that is closest to our own is Asquith et al. (2005), who argue that the use of PSD reduces debt renegotiation costs. In contrast to renegotiation costs, however, hold-up does

[4] Nikolaev (2012) shows that PSD contracts are less likely to be renegotiated than regular debt, which is also consistent with the substitution hypothesis.

not arise in all situations and implies a wealth transfer between borrower and lender.

Secondly, we add to the literature on hold-up in repeated lending relationships. Several authors find evidence that is consistent with the presence of hold-up. Saunders and Steffen (2011) find that private firms pay higher loan spreads than public firms if borrowing from a relationship bank. Hale and Santos (2009) show that banks reduce the interest rates on loans after a client successfully issued its first public bond. Santos and Winton (2008) find that (all else equal) loan spreads of bank-dependent borrowers rise more during recessions than loan spreads of borrowers who have access to public debt markets. Mattes et al. (2012) find that capital-constrained (European) banks charge borrowers with high switching costs higher loan spreads than well-capitalized banks. This effect prevails only during recessions. Degryse and Cayseele (2000) find evidence for a deterioration of contract terms over the duration of the lending relationship for a sample of European firms.[5] As argued by Boot (2000), maintaining multiple bank relationships can be one potential solution for this problem.[6] However, Ongena and Smith (2000) show that this may reduce the availability of credit,

[5] There is also considerable evidence of the benefits of lending relationships. Petersen and Rajan (1994) find that the duration of a bank-firm relationship does not influence the contracted loan rate, but Berger and Udell (1995) document that rates on lines of credit and collateral requirements decrease with the duration of the bank-firm relationship. Bharath et al. (2011) find that repeated borrowing from the same lender translates into a 10-17 bps lowering of loan spreads, and that relationships are especially valuable when borrower transparency is low. See Boot and Thakor (2000), Elsas and Krahnen (1998), Freudenberg et al. (2013), Berlin and Mester (1998), Bharath et al. (2007), Bharath et al. (2011), and Schenone (2010) for further empirical evidence on the benefits of lending relationships.

[6] Houston and James (1996) find that firms with a single bank relationship use less bank debt, as growth opportunities are higher. Farinha and Santos (2002) find that firms with higher growth opportunities or greater bank dependence are more likely to switch to multiple bank relationships. All of the above-mentioned evidence is consistent with the notion that multiple bank relationships reduce the hold-up problems.

because increased competition reduces the value of information acquisition and hence the incentive to lend to "young" firms.[7] We extend this literature by linking the use of PSD to the hold-up problem in repeated lending relationships.

The remainder of the paper proceeds as follows. Section 2 presents our hypotheses. Section 3 describes the sample selection process, outlines the construction of variables, and presents some descriptive findings. Section 4 contains the main empirical analysis, which demonstrates a link between relationship lending and the use of performance pricing provisions. Section 5 explores alternative explanations, and Section 6 concludes.

2. Hypothesis development

Sharpe (1990) and Rajan (1992) show that a long-term lending relationship creates an information asymmetry between the relationship lender and other potential lenders, which can be costly for the borrower. Adverse selection can make it difficult for the borrower to switch to another lender. In this case the relationship lender could take advantage of its information monopoly and extract some rents from the borrower, especially in the event of covenant violations, when much bargaining power rests with the lender (see Chava and Roberts (2008)). Von Thadden (1995) argues that one way of reducing this hold-up problem is to limit the

[7] The availability of funds to young firms without a track record is one potential benefit of relationship lending as shown by Petersen and Rajan (1995). Banks can "subsidize" borrowers in earlier periods in return for higher rents in future periods when the banks have an information monopoly.

discretion of the lender by using pre-specified contract terms. PSD can be interpreted as such a pre-specification of contract terms. PSD contracts specify higher (lower) interest payments if the borrower's performance deteriorates (improves) in the future. A performance deterioration could trigger a covenant violation, which would subject the borrower to hold-up. In the case of PSD, however, there would be no technical default situation since interest rate increases have been negotiated ex ante in the case of performance deteriorations. Similarly, a performance improvement could cause the borrower to request improved loan terms. A relationship lender may hold-up the borrower and deny any changes to the loan terms knowing that the borrower is locked in the relationship. In the case of PSD, however, there would be an automatic adjustment to the loan terms if the borrower's performance changes. Thus, a PSD contract limits the discretion of the lender and therefore can reduce hold-up in long-term lending relationships.[8] This gives rise to our first hypothesis:

Hypothesis 1a *Relationship loans are more likely to include performance-pricing provisions than non-relationship loans.*

In contrast, Manso et al. (2010) argue that PSD is used to signal a firm's credit quality. Relationship lending provides an excellent setting to disentangle the two hypotheses because hold-up is more likely in repeated relationship lending, while the need for signaling is less likely. There is little need to signal if the lender possesses an information advantage

[8] A performance pricing provision can also be valuable for a lender who is trying to attract high quality borrowers because PSD is a commitment device not to expropriate the borrower ex post.

already (see Menkhoff et al. (2006)). Thus, if the use for PSD is motivated by signaling considerations, we expect a negative relation between relationship lending and the use of PSD.

Hypothesis 1b *Relationship loans are less likely to include performance-pricing provisions than non-relationship loans.*

Santos and Winton (2008) argue that the severity of the hold-up problem can vary systematically across different types of borrowers. For example, the degree to which a borrower is "locked-in" in a lending relationship depends on the availability of other financing sources, such as public bond market access, and the opaqueness of the borrower. This gives rise to our second hypothesis:

Hypothesis 2 *Firms with fewer outside financing alternatives, which borrow from a relationship lender are more likely to use performance-sensitive debt.*

When renegotiating a loan, a relationship lender must weigh the short-term benefits of holding-up the borrower against the long-term benefits of maintaining the relationship. In syndicated deals the lead arranger must share the benefits of hold-up with the rest of the syndicate, while the benefits of the relationship accrue mostly to the relationship lender. Therefore, a relationship lead arranger in a syndicate should be less likely to hold-up a borrower, so that the use of performance-pricing provisions should be less likely compared to non-relationship loans. We therefore expect that

Hypothesis 3 *Syndicated relationship loans are less likely to include performance-pricing provisions than syndicated non-relationship loans.*

Covenants especially present an opportunity for hold-up, because after covenant violations, lenders have much bargaining power vis-a-vis their borrowers. The most common consequence of covenant violations is that the coupon the borrower has to pay is revised upward. To eliminate hold-up in these situations, the coupon increases could be pre-contracted using performance-pricing provisions. The threshold at which a covenant ultimately kicks in would then have to be set higher than in the absence of a performance-pricing provision. Thus, there is a substitution effect between the use of a pricing grid and the tightness of the respective covenant. Figure 1 illustrates this graphically.

[Figure 1 here]

We therefore test the following hypothesis.

Hypothesis 4 *Interest-increasing performance-sensitive loans have less tight covenants on the same performance measure, which is also used in the pricing grid.*

Manso et al. (2010) argue that PSD is used to signal a firm's credit quality. If so, a firm's credit quality should improve on average following the issuance of PSD. In contrast, the hold-up hypothesis makes no prediction with respect to the borrower's post issue performance. We therefore test the following hypothesis.

Hypothesis 5 *The issuer's performance improves (does not improve) following the issue of PSD.*

3. Data description

We obtain our loan sample from the Thomson Reuters Loan Pricing Corporation Dealscan (LPC's Dealscan) database, which contains detailed information on corporate loan issues. We restrict our sample to loans issued by U.S. non-financial borrowers between 1993 and 2011.[9] Consistent with the prior literature (e.g., Berg et al. (2013), Bharath et al. (2007)), we conduct our analysis on the facility (tranche) level. We obtain information on loan characteristics such as maturity, the loan amount (scaled by total assets), number of covenants, as well as the loan purpose and loan type. In addition, we record whether a loan is secured or not. We then merge our loan data with borrower-specific information obtained from Standard and Poor's Compustat North America database, such as firm size, market-to-book etc., from the last available fiscal quarter before the loan issue.[10] The Appendix contains the definitions of all variables used in our analysis.

[9] Prior to 1993, virtually no contracts include a performance-pricing provision according to Dealscan. As PSD clearly existed prior to 1993, we conclude that Dealscan's data quality with respect to PSD is insufficient prior to 1993.

[10] We use Michael Robert's Dealscan-Compustat Linking Database to merge Dealscan with Compustat (see Chava and Roberts (2008)).

3.1. Performance-sensitive debt contracts

The most common performance measure used in PSD contracts is the Debt-to-EBITDA ratio ($\sim$ 48% of all PSD loans issued by U.S. borrowers) followed by the issuer's senior debt rating ($\sim$ 26%). Dealscan also reports the exact pricing grid, i.e., the function, which links the coupon payments to the performance measure. Figure 2 shows the pricing grid of a loan issued by Urban Outfitters Inc. in September 2007. The spread paid by Urban Outfitters increases with its Debt-to-EBITDA ratio (an accounting-based PSD). Urban Outfitter's Debt-to-EBITDA ratio at the time of the issue was 4, implying that this loan is an example of a rate-increasing contract. Figure 3 shows the pricing grid of a loan issued by IBM in March 2004. In this contract, the loan spread changes with IBM's senior debt rating (a rating-based PSD). Since IBM's senior debt rating at the time of the issue was A+, this loan is an example of a rate-increasing and rate-decreasing contract.

[Figures 2 & 3 here]

3.2. Measuring relationship strength

We follow Bharath et al. (2011) and construct three proxies for the strength of the lending relationship between borrower and lender. To construct these proxies, we first need to identify the lead lender(s) for each loan contract. As in Sufi (2007), we classify a lender as the lead lender if the variable "Lead Arranger Credit" (provided by LPC's Dealscan) takes on the value "Yes", or if the lender is the only lender specified in the loan contract. Next, we search the borrowing record of the borrower over the past five years. The first proxy for the strength of the lending relationship, *Rel(Dummy)*, is a dummy variable, which equals one if the firm borrowed from the same lead lender in the previous five years and zero otherwise.[11] If there are multiple lead lenders in a loan, we calculate the proxy separately for each lender and assign the highest value to the loan. The second proxy, *Rel(Number)*, measures the relative number of loans obtained from the relationship lender. For bank m lending to borrower i, it is calculated as follows.

$$Rel(Number)_m = \frac{\text{Number of loans by bank } m \text{ to borrower } i \text{ in the last 5 years}}{\text{Total number of loans by borrower } i \text{ in the last 5 years}} \tag{1}$$

Again, the highest value is assigned to a loan if there are multiple lead lenders. The third proxy, *Rel(Amount)*, measures the relative loan amounts obtained from the relationship lender. For bank m lending to borrower i, it is calculated as follows.

$$Rel(Amount)_m = \frac{\text{Loan amount by bank } m \text{ to borrower } i \text{ in the last 5 years (\$)}}{\text{Total amount of loans by borrower } i \text{ in the last 5 years (\$)}} \tag{2}$$

[11] Dealscan often classifies borrowers at the subsidiary level, e.g., General Electric Capital Canada and General Electric Capital Corp of Puerto Rico are two distinct borrowers in Dealscan. By using the Michael Robert's Dealscan-Compustat Linking Database, all wholly-owned subsidiaries are effectively aggregated under the ultimate parent. We apply the same procedure to lenders. This procedure is important to ensure that, e.g., a switch from Lehman Brothers Inc [Frankfurt] to Lehman Brothers Asia is not classified as an actual lender switch. Not aggregating the borrowers and lenders under the ultimate parent, however, does not affect our results qualitatively.

Again, the highest value is assigned to a loan if there are multiple lead lenders.

3.3. Measuring the tightness of covenants

As noted by Demiroglu and James (2010), covenant slack, i.e., the difference between the covenant variable at the initiation of the loan agreement and the covenant threshold, is an intuitive measure of covenant tightness. However, the degree of tightness also depends on the volatility of the covenant variable and is thus firm-specific. We therefore follow Dichev and Skinner (2002) and define covenant tightness as the difference between the covenant variable at the initiation of the loan agreement and the covenant threshold, normalized by the standard deviation of the covenant variable over the previous 8 years.[12] Since various definitions of leverage and liquidity ratios are used in practice, we restrict our analysis to covenants on the Debt-to-EBITDA ratio, which, as Dichev and Skinner (2002) note, has the most consistently used definition.

[12] The tightness of covenants can also be measured by a covenant intensity index that ranges from zero to six, with higher values indicating stricter covenants as proposed by Bradley and Roberts (2003). The index is constructed by summing indicator variables on dividend restrictions, equity sweep, asset sweep, debt sweep, securitization and a binary variable that equals one if the contract includes two or more financial covenants. Murfin (2012) further considers covariation between the different covenant variables when measuring contract strictness. We do not use these indices because we are interested in the tightness of a particular covenant rather than general covenant tightness.

3.4. Descriptive statistics

Table 1 presents descriptive statistics for our sample consisting of 25,900 loan tranches issued by 4,958 distinct borrowers between 1993 and 2011. Following Bharath et al. (2011), the data are winsorized at the 1% and 99% levels to remove outliers. Panel A reports loan characteristics, which are consistent with prior studies (e.g. Sufi (2007)). For example, the mean/median tranche amounts in our sample are $314/$110 million, which is large given the mean/median book value of assets of $3,287/$657 million and an average leverage ratio of 29%. The average all-in-drawn spread is 204 basis points, and the average maturity is 3.75 years. 74% of loan tranches are credit lines. Consistent with Manso et al. (2010), roughly 47% of loans include a performance-pricing provision. Panel B reports borrower characteristics. In 55% of cases, borrowers do not have a credit rating, but if a rating exists it tends to be around the investment grade threshold. Panel C reports descriptive statistics on the three relationship lending proxies. A lending relationship exists in 62% of all loan contracts. On average, 42% of the total capital raised over the course of 5 years was raised from the same lead lender.

[Table 1 here]

Table 2 shows the various performance measures used in PSD contracts. The most common performance measure is the Debt-to-EBITDA ratio (48%), followed by the senior debt rating (26%). The remaining performance measures are mostly other leverage ratios. In at least 4% of cases, multiple performance measures are used. We define PSD as accounting-based PSD whenever a financial ratio is used as a measure of firm performance. Rating-based PSD comprise all PSD contracts, which use the borrower's credit rating as a performance measure.

[Table 2 here]

4. Results

4.1. Lending relationships and the use of performance-sensitive debt

We begin by analyzing the interaction between lending relationships and the choice between PSD and straight debt. As noted in Section II, we distinguish between accounting-based and rating-based PSD. We therefore estimate a multinomial logistic regression.

$$PSD_{it} = \alpha + \alpha_{Ind} + \alpha_t + \alpha_{Rat} + \beta * Rel(M)_{it} + \gamma * X_{it} + \epsilon_{it} \quad (3)$$

The dependent variable, PSD, is a discrete variable, which equals one if the loan contract contains a performance pricing provision on an accounting measure, two if the loan contract includes a performance pricing provision on the borrower's credit rating, and zero in the case of straight debt (control group). $Rel(M)$ represents one of our three measures of relationship strength, and X are control variables to control for heterogeneity in borrower and loan characteristics. We use firm size, measured by the log of total assets, the market-to-book ratio of assets, leverage, tangibility, profitability, the current ratio, the loan amount (scaled by total assets), the deal maturity, and an indicator variable for secured loans as control variables. We also include loan purpose and loan type indicators, time fixed effects, industry fixed effects, and dummy variables for each rating level. We cluster the standard errors at the firm level to account for non-independent observations within firms. Table 3 reports the regression results.

[Table 3 here]

Consistent with Hypotheses 1a and 1b, we find that relationship strength is positively and significantly correlated with the use of accounting-based PSD and negatively related to the use of rating-based PSD. These results suggest that accounting-based PSD may be used to address hold-up, while rating-based PSD may be used for signaling. This conclusion is intuitive on two accounts. Firstly, there are virtually no covenants on a borrower's credit rating, while covenants on accounting ratios are common. Since covenant violations are a cause for hold-up, any PSD that is to reduce the potential for hold-up should be accounting-based rather than rating-based. Secondly, if rating-based PSD is used for signaling then it follows from Hypothesis 1b that it is used less frequently in the presence of lending relationships because the relationship lender already possesses an information advantage, which reduces the need for further signals.[13]

Consistent with the existing literature on PSD (e.g., Tchistyi et al. (2011)), larger loan amounts are more likely to include a performance-pricing provision. Loan maturity is positively correlated with the use of accounting-based PSD, which is consistent with Asquith et al. (2005)'s hypothesis that performance-pricing provisions are used in contracts with a higher renegotiation likelihood. Loan contracts are more likely to be renegotiated the longer the maturity. Larger borrowers are less likely to include an accounting-based performance-pricing provision in the loan contract, possibly because large borrowers have more financing alternatives and therefore are less subject to hold-up. These initial results show that it is accounting-based PSD contracts, which may be motivated by hold-up due to lending relationships, while rating-based PSD are unlikely to be motivated by hold-up considerations. In the following analysis, we therefore exclude rating-based PSD and return to the issue of signaling in Section IV.

The analysis so far presents mostly cross-sectional evidence. However, our control variables may not fully capture all differences between relationship and non-relationship borrowers. If unobservable differences between borrower types are correlated with the use of PSD, our estimates are biased. We therefore include firm-fixed effects to control for unobserv-

[13] When further distinguishing between interest-increasing, interest-decreasing, and mixed PSD, we find that all three types of accounting-based PSD are positively correlated with relationship strength. These results are available from the authors upon request.

able time-invariant differences across firms, and analyze the use of PSD across loans *within* firms. The results of linear probability models relating the use of accounting-based PSD to measures of relationship strength are reported in Table 4.[14]

[Table 4 here]

Confirming our previous findings, relationship strength is positively and significantly correlated with the use of accounting-based PSD, even after controlling for time-invariant differences across firms. The economic magnitude is slightly lower when compared to the cross-sectional results. We include firm-fixed effects in all of the remaining analysis. However, all results remain qualitatively similar if we exclude firm-fixed effects and focus purely on the cross-sectional differences.

The decision to form and stay in a lending relationship is clearly an endogenous choice, which has been recognized in a number of recent studies, e.g. Agarwal and Hauswald (2010), Bharath et al. (2011), Coval and Moskowitz (2001), Dass and Massa (2011), Degryse and Ongena (2005), Norden and Weber (2010), and Petersen and Rajan (2002). We follow this literature and use the geographic distance between the borrower and the lead lender as an instrument for relationship strength. This instrument is likely to be correlated with the decision to form a lending relationship but unlikely to be correlated with the decision to

[14] We use linear probability models because of the large number of fixed effects. However, all results reported in this paper remain virtually unchanged if we use logit models.

include a performance-pricing provision in the loan contract. Lenders that are physically closer to a borrower are more likely to have better information about a borrower, and are hence more likely to become a relationship lender. We match the location of the borrowers' and lenders' headquarters, provided by Dealscan, to the MaxMind World Cities Database to obtain information on the longitude and latitude.[15] We are always able to identify the lender and the borrower location in MaxMind if the information on the location is provided by Dealscan. We treat observations as missing if the exact location of the lender or the borrower is not specified in Dealscan, which reduces the sample by 2,804 observations. We calculate the distance in miles between the borrower and the lead lender for each deal.[16] We follow Petersen and Rajan (2002) and address skewness in the distance measure by using $ln(1 + Distance)$ in the regressions.

Table 5 reports the results of the IV-estimation using linear probability models in computing 2SLS estimates and correcting the standard errors for heteroskedasticity.[17] Consistent with Bharath et al. (2011), we find that $ln(1+Distance)$ is significantly negatively correlated to all three proxies for lending relationship strength, confirming the validity of the inclusion restriction. The results of the second stage regressions confirm our previous results that

[15] The MaxMind database contains geographical information for about 3 million places in 234 countries and is publicly available at http://www.maxmind.com/app/worldcities.

[16] We use the same estimation formula as in Dass and Massa (2011). We assign the minimum distance to the deal in case of multiple lead lenders. See the Appendix for further details.

[17] Angrist and Pischke (2009) argue that this procedure yields consistent estimates. Several studies find that linear probability models produce results similar to partial effects from more precise models (see e.g., Angrist and Pischke (2009) and Katz et al. (2001)). However, our results are not sensitive to the question of whether we use linear probability models or bivariate probit models as advocated by Heckman (1978).

PSD contracts are more likely to be used in the presence of bank lending relationships. In fact, PSD contracts are about 25% more likely to be used in repeated lending relationships after we control for the endogeneity of the lending relationship, which is statistically and economically highly significant.[18]

[Table 5 here]

Our results so far show that relationship lending is positively correlated with the use of accounting-based PSD. To establish whether this positive correlation is due to hold-up, we make use of the fact that the severity of the hold-up problem is likely to vary systematically across different types of borrowers. For example, more opaque borrowers have fewer financing alternatives, so that these borrowers are more subject to hold-up. Following Bharath et al. (2011), we use firm size as well as a dummy variable which equals one if the borrower does not have a S&P rating (and zero otherwise) as proxies for firm opacity. Another proxy for opacity is the number of analysts following the firm. Larger firms, rated firms, and firms with larger analyst coverage are more likely to have multiple financing alternatives, and are thus less "locked-in" in a bank lending relationship.

[18] As in other studies that use instruments in relationship lending settings, the economic significance strongly increases in the IV-estimation. For example, Bharath et al. (2011) use IV regressions to examine the impact of lending relationships on loan spreads and find that the effect is more than 5 times stronger when using the distance between borrower and lender as an instrument for relationship lending. Berger et al. (2005) use IV regressions to examine the relationship between bank size and the exclusivity of bank-borrower relationships. Instrumenting bank size, they show a large increase in economic importance of bank size when compared to the OLS estimates.

To test for the cross-sectional variation in the severity of the hold-up problem induced by lending relationships, we estimate the following model.

$$\begin{aligned} PSD_{it} = \alpha_i + \alpha_t + \alpha_{Rat} + \beta_1 * Rel(M)_{it} + \beta_2 * BorrowerOpacity_{it} \\ + \beta_3 * Rel(M)_{it} * BorrowerOpacity_{it} + \gamma * X_{it} + \epsilon_{it} \end{aligned} \tag{4}$$

BorrowerOpacity stands for the above-mentioned proxies for borrower opacity. We include interaction variables of relationship strength and *BorrowerOpacity* to test for the joint effect of these two variables. Due to the high correlation of the interaction variables, we include one variable at a time in the regressions. The results are reported in Table 6.

[Table 6 here]

The coefficients of all interaction variables of borrower opacity are negative and statistically significant, which supports our hypothesis that opacity in the presence of a lending relationship increases the severity of hold-up, and hence the likelihood of using PSD.[19]

A significant portion of our sample consists of syndicated loans. Asquith et al. (2005) argues that the use of PSD should be more likely in syndicated loans because their renegotiation costs are higher. As reported in Table 6, we find the use of performance-pricing provisions is indeed more likely in syndicated deals. According to *Hypothesis 3*, a relationship

[19] Our results are robust to using our other measures of relationship strength and to excluding all syndicated loans from the sample. These results are available from the authors upon request.

lead arranger should find it less beneficial to hold-up a borrower compared to a single lender because the gains from hold-up would have to be shared with the rest of the syndicate. As a result, the use of performance-pricing provisions should be less likely if the lead arranger is a relationship bank. The results reported in Table 6 confirm this hypothesis. The coefficient on *Rel(Dummy)*Syndication* is indeed negative and statistically highly significant.

A potential concern is that the syndication results are driven by the largest banks in the syndicated loan market. The market for syndication is dominated by three large banks (see Ross (2010)). Performance-sensitive debt should be less frequently used if the lending relationship is with one of these banks, because the top 3 banks are mostly transaction-oriented, so that hold-up problems are less severe in relationships with these lenders. We find that our results still hold if we exclude all loans made by the top 3 banks from our sample.[20]

4.2. Performance-sensitive debt and covenants

In this section, we investigate whether there is a substitution effect between the use of performance pricing grids and the tightness of financial covenants. In particular, *Hypothesis 4* states that PSD contracts should have less tight covenants because the pricing grid pre-specifies the consequences of small changes in a borrower's performance.

[20] These results are available from the authors upon request.

[Table 7 here]

Table 7 compares the covenant threshold levels used in PSD and non-PSD contracts. We find that PSD contracts have leverage and liquidity covenants with lower default thresholds than non-PSD contracts. For example, the median Debt-to-EBITDA covenant level for PSD contracts is 3.55, and 4 for non-PSD contracts. This appears not to be supportive of *Hypothesis 4*. However, PSD and non-PSD are not unconditionally comparable, since borrower characteristics differ. A multivariate analysis is called for.

Furthermore, we now need to distinguish between interest-increasing and interest-decreasing PSD, because only interest-increasing PSD contracts should have an effect on covenant tightness. Interest-decreasing performance-pricing provisions matter only if a borrower's performance improves. To ensure that covenants and a loan's performance-pricing grid are based on the same variable, we restrict our analysis to covenants on the Debt-to-EBITDA ratio, which is the most frequently used performance measure in our sample.

Following Dichev and Skinner (2002), we calculate the covenant tightness as the absolute difference between the Debt-to-EBITDA ratio at the initiation of the loan agreement and the Debt-to-EBITDA covenant threshold, normalized by the standard deviation of the borrower's Debt-to-EBITDA ratio over the previous 8 years.[21] A lower ratio indicates a tighter covenant.

[21] We lose observations because we require 8 years before the loan issue with non-missing observations on the Debt-to-EBITDA ratio to calculate the Debt-to-EBITDA standard deviation.

We then estimate the following regression by OLS.

$$\begin{aligned} Tightness_{it} = \alpha_i + \alpha_t + \alpha_{Rat} + \beta_1 * IncreasingPSD_{it} \\ + \beta_2 * MixedPSD_{it} + \beta_3 * DecreasingPSD_{it} + \gamma * X_{it} + \epsilon_{it} \end{aligned} \tag{5}$$

The dependent variable, $Tightness$, is the tightness of the Debt-to-EBITDA covenant as defined above. X represents loan and borrower characteristics. As before, we control for firm, time, loan purpose, loan type, and rating fixed effects. $IncreasingPSD$ is a dummy variable which equals one if the loan contains a pricing grid on Debt-to-EBITDA that only allows for interest rate increases. $DecreasingPSD$ is a dummy variable which equals one if the loan contains a pricing grid on Debt-to-EBITDA that allows for interest rate decreases only, and $MixedPSD$ is a dummy variable which equals one if the loan contains a pricing grid on Debt-to-EBITDA that allows for both interest rate increases and decreases.

[Table 8 here]

As shown in Table 8, we find that interest-increasing PSD contracts have significantly less tight Debt-to-EBITDA covenants than straight debt. This is consistent with our hypothesis that performance-pricing affects covenant tightness: small changes in the credit risk of the borrower are regulated by performance-pricing provisions and not by tight covenants. We further find that more highly levered borrowers have tighter Debt-to-EBITDA covenants.

Borrowers with more growth opportunities have less tight covenants.[22]

5. Robustness: hold-up vs. signaling

Manso et al. (2010) show that PSD can be used as a signaling device to signal a firm's credit quality. Only borrowers who expect their credit ratings not to deteriorate are willing to enter into contracts that stipulate interest rate increases should the firm's credit rating decline. To test whether signaling explains the use of PSD, Manso et al. (2010) analyze the post-issue credit rating development for firms that issue PSD vs. firms that issue straight debt. We use a similar methodology and further analyze the post-issue development of the firm's leverage ratio. We use the Debt-to-EBITDA ratio to measure leverage as this is the most common performance measure used in accounting-based PSD contracts. We distinguish between accounting-based and rating-based PSD in all specifications, because our results in Table 3 suggest that the signaling hypothesis should predominantly apply to rating-based PSD, while the hold-up hypothesis predominantly applies to accounting-based PSD. In particular, we estimate the following regression.

$$\begin{aligned} \Delta Performance_{it+1} = \alpha_i + \alpha_t + \beta_1 * PSD(Rating)_{it} + \beta_2 * PSD(Accounting)_{it} \\ + \gamma * X_{it} + \epsilon_{it} \end{aligned} \tag{6}$$

[22] The accuracy and coverage of covenants reported in the Dealscan database has improved over time. However, our results are not sensitive to this issue and remain virtually unchanged if we restrict the sample to loans issued after 2000. These results are available upon request.

$\Delta Performance_i$ is a dummy variable that equals 1 if the borrower's credit rating improves in the first k quarters after the loan issue and 0 otherwise ($k = 4$, 8). In an alternative specification, $\Delta Performance_i$ is the difference between the firm's Debt-to-EBITDA ratio k quarters after the loan issue and the firm's Debt-to-EBITDA ratio at the time of the loan issue ($k = 4$, 8). $PSD(Rating)$ is a dummy variable, which equals one if the loan contains a pricing grid on the borrower's credit rating, while $PSD(Accounting)_i$ is a dummy variable which equals one if the loan contains a pricing grid on an accounting measure. The regression results are reported in Table 9.

[Table 9 here]

Consistent with the results reported by Manso et al. (2010), we find that firms are more likely to experience a rating improvement up to two years after issuing rating-based PSD relative to borrowers who issued regular debt. Furthermore, firms that issue rating-based PSD see their leverage ratios decline by more than borrowers who issue straight debt. However, these results do not hold for accounting-based PSD. Neither credit ratings nor leverage ratios vary systematically after firms had issued accounting-based PSD. Accounting-based PSD contracts are thus unlikely to be motivated by signaling considerations.

6. Conclusion

Von Thadden (1995) argues that pre-specifying loan contract terms can be an efficient way to mitigate hold-up problems in long-term lending relationships. An example is performance-sensitive debt (PSD), which pre-specifies loan contract terms in events that would otherwise trigger debt renegotiations. In this paper, we test the hypothesis that PSD is used to reduce potential hold-up problems in bank lending relationships.

Consistent with this hypothesis, we find that accounting-based PSD contracts are 25% more likely to be used in relationship lending arrangements, after controlling for the endogeneity of the lending relationship. This is especially the case if the borrower is opaque and/or has fewer financing alternatives, both of which imply a greater potential for hold-up. Syndicated deals are more likely to include performance-pricing provisions, which is consistent with the renegotiation cost argument by Asquith et al. (2005). However, relationship lenders as lead arrangers should find it less beneficial to hold-up a borrower as the gains from hold-up would have to be shared with the other syndicate members. This reduces the need for PSD. Indeed, we find that in syndicated relationship lending the use of PSD is less likely.

We also find a substitution effect between the pricing grid and the tightness of covenants. The Debt-to-EBITDA covenants of interest rate increasing PSD contracts are less tight than the covenants of non-PSD contracts. This substitution effect is consistent with the recommendation by Von Thadden (1995) to pre-specify contract terms to mitigate hold-up.

In contrast to accounting-based PSD, we find no evidence that the use of rating-based PSD is motivated by hold-up considerations. In fact, several results are consistent with rating-based PSD used for signaling. Therefore we conclude that hold-up is likely an important determinant in the decision to issue accounting-based PSD, while signaling motivates the decision to issue rating-based PSD.

Figure 1: Covenant Thresholds of PSD and non-PSD Contracts

This figure shows the Debt-to-EBITDA covenant threshold of debt with a performance-pricing provision (at the end of the pricing grid) and the expected Debt-to-EBITDA covenant threshold of debt without a performance pricing provision. All else equal the covenant of regular debt is tighter than the covenant of PSD.

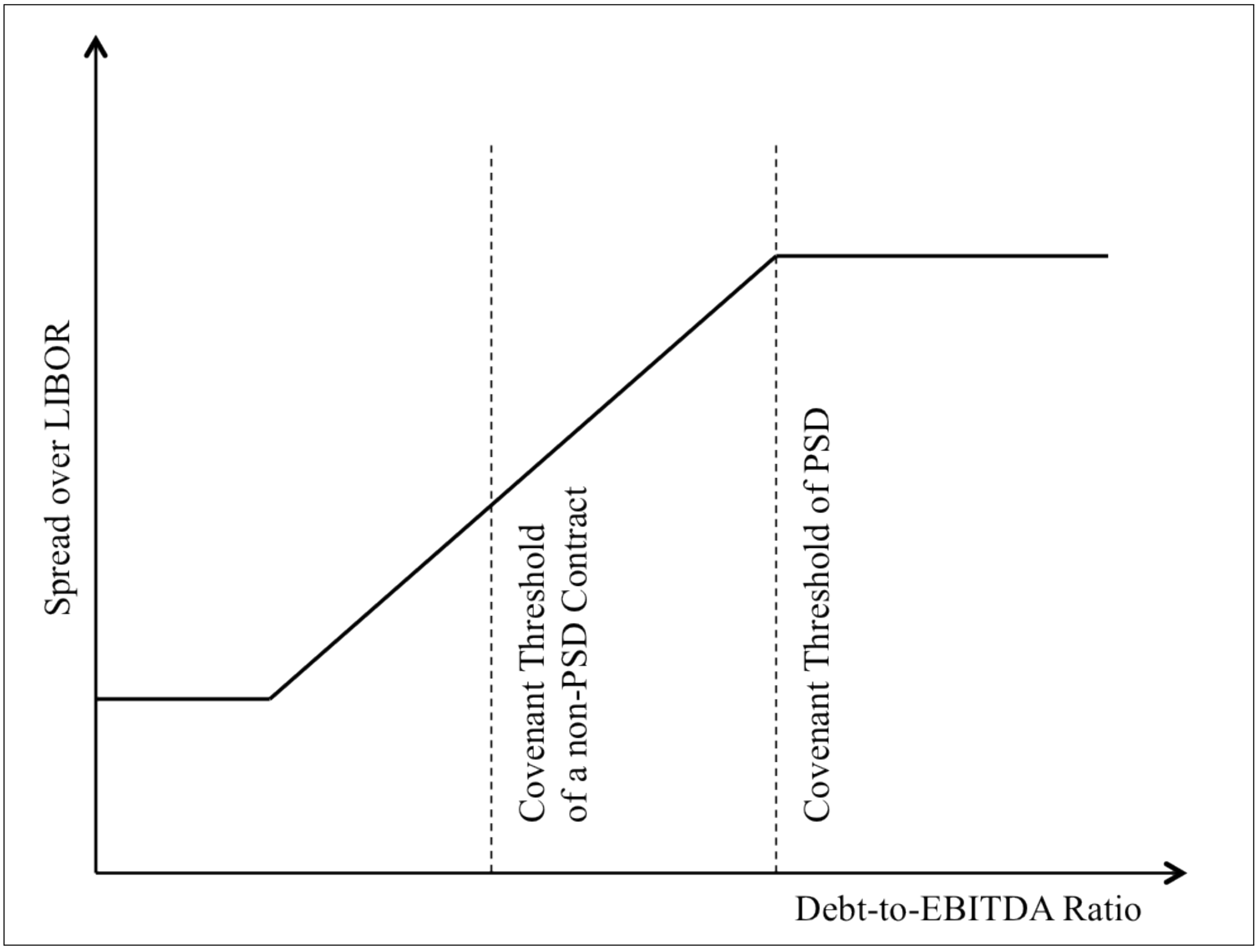

Figure 2: Accounting-Based PSD

This figure shows the pricing grid of a loan issued by Urban Outfitters Inc in 2007. The spread is contingent on the issuer's Debt-to-EBITDA ratio. The Debt-to-EBITDA ratio at the time of loan issue was 4. The initial spread paid was LIBOR + 150bp.

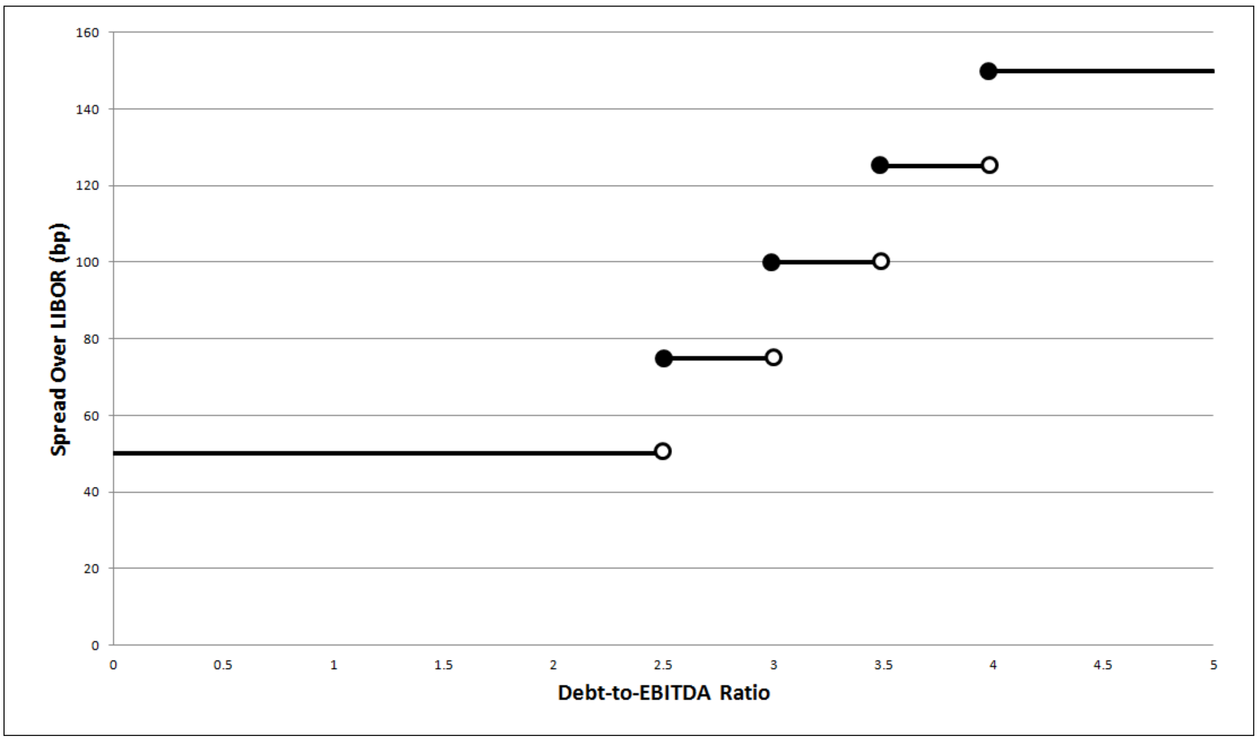

Figure 3: Rating-Based PSD

This figure shows the pricing grid of a loan issued by IBM in March 2004. The loan spread is a function of IBM's S&P senior debt rating. IBM's senior debt rating at the time of loan issue was A+. The initial spread paid was LIBOR + 12bp.

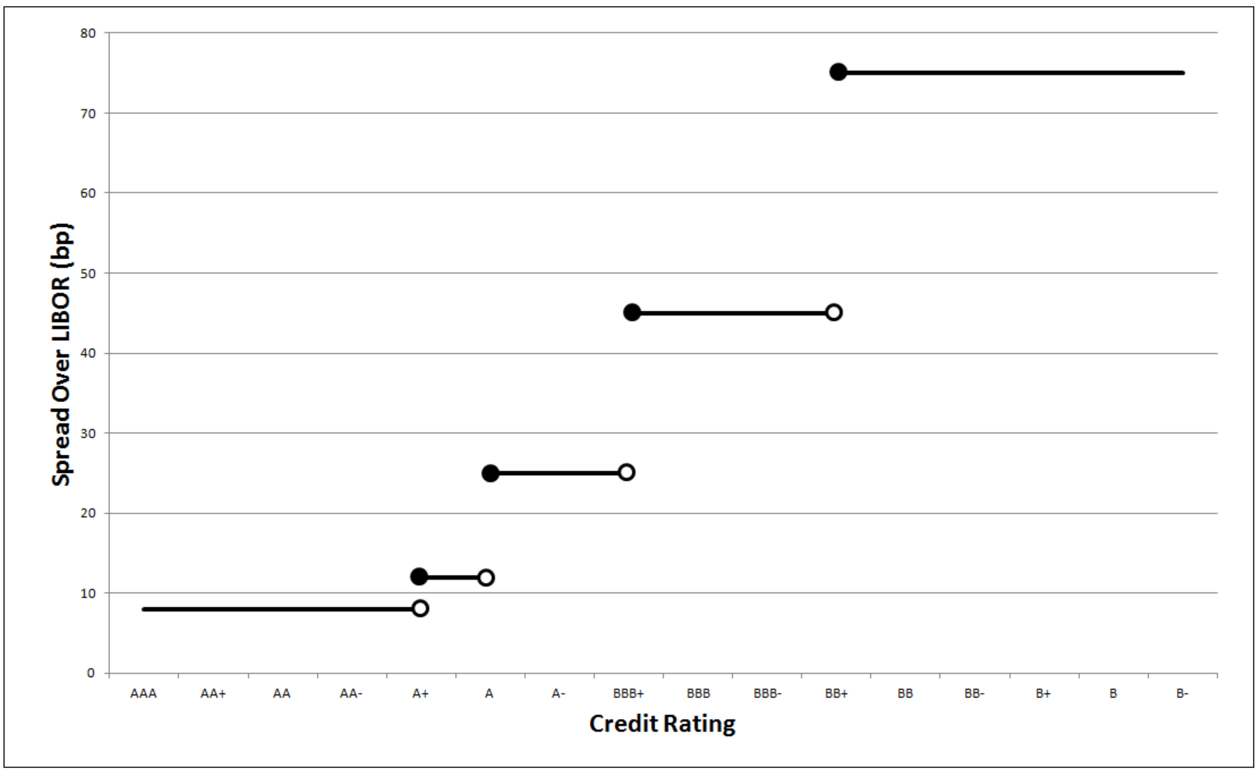

Table 1: Summary Statistics

This table reports summary statistics for a sample of 25,900 loan tranches issued by 4,958 non-financial firms between 1993 and 2011. All items are defined in the Appendix, Table A.I.

	Mean	Median	Std	Min	Max	N
PSD(Rating)	0.13	0.00	0.34	0.00	1.00	25900
PSD(Accounting)	0.34	0.00	0.47	0.00	1.00	25900
Facility Amount (mill. USD)	313.83	110.00	745.93	0.04	30000.00	25900
All-in-drawn Spread (bp)	203.66	175.00	147.55	2.70	1655.00	25900
Facility Maturity (months)	45.11	48.00	24.05	1.00	276.00	25900
Term Loan	0.26	0.00	0.44	0.00	1.00	25900
Secured	0.55	1.00	0.50	0.00	1.00	25900
Sole Lender	0.11	0.00	0.32	0.00	1.00	25900
Purpose: General	0.31	0.00	0.46	0.00	1.00	25900
Purpose: Refinance	0.20	0.00	0.40	0.00	1.00	25900
Purpose: Takeover	0.13	0.00	0.33	0.00	1.00	25900
Purpose: Working Capital	0.18	0.00	0.38	0.00	1.00	25900
Panel B: Borrower Characteristics						
Total Assets (mill. USD)	3287.02	657.20	6653.38	10.35	32009.00	25900
Leverage	0.29	0.26	0.23	0.00	4.35	25900
Market-to-Book	1.71	1.41	0.96	0.68	6.38	25900
Tangibility	0.34	0.28	0.24	0.00	0.91	25900
Profitability	0.14	0.13	0.20	-1.20	0.73	25900
Current Ratio	1.86	1.57	1.21	0.25	8.17	25900
# Analysts	4.38	0.00	6.65	0.00	42.00	25900
Rating AAA	0.00	0.00	0.06	0.00	1.00	25900
Rating AA	0.01	0.00	0.12	0.00	1.00	25900
Rating A	0.08	0.00	0.28	0.00	1.00	25900
Rating BBB	0.13	0.00	0.33	0.00	1.00	25900
Rating BB	0.13	0.00	0.34	0.00	1.00	25900
Rating B	0.09	0.00	0.28	0.00	1.00	25900
Rating C (or below)	0.01	0.00	0.08	0.00	1.00	25900
Rated	0.45	0.00	0.50	0.00	1.00	25900
Panel C: Relationship Lending Proxies						
Rel(Dummy)	0.62	1.00	0.49	0.00	1.00	25900
Rel(Number)	0.39	0.38	0.37	0.00	1.00	25900
Rel(Amount)	0.42	0.45	0.39	0.00	1.00	25900

Table 2: PSD Contract Types

This table reports the types and frequencies of performance-pricing provisions used in our sample of PSD.

	Frequency	Observations
Panel A: Accounting-Based PSD		
Debt-to-EBITDA	0.48	5859
User Condition	0.06	727
Multiple	0.04	518
Leverage	0.04	461
Senior Debt to Cash Flow	0.03	384
Fixed Charge Coverage	0.02	267
Other Accounting Measures	0.02	242
Outstandings	0.02	219
Debt-to-Tangible Net Worth	0.01	178
Interest Coverage	0.01	148
Panel B: Rating-Based PSD		
Senior Debt Rating	0.26	3094
Other Credit Rating	0.00	21
Total	1.00	12134

Table 3: Lending Relationships and the Use of Performance-Sensitive Debt

This table reports the marginal effects of multinominal logit regressions to evaluate the likelihoods of using rating-based or accounting-based PSD. The dependent variable equals one if the loan includes a performance pricing provision based on the credit rating of the borrower, two if the loan includes a performance pricing provision based on an accounting measure and zero for non performance-sensitive loan contracts. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. All items are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1)		(2)		(3)	
	PSD(Accounting)	PSD(Rating)	PSD(Accounting)	PSD(Rating)	PSD(Accounting)	PSD(Rating)
Rel(Dummy)	0.061***	-0.002				
	(0.009)	(0.002)				
Rel(Number)			0.078***	-0.007**		
			(0.011)	(0.003)		
Rel(Amount)					0.072***	-0.008***
					(0.011)	(0.003)
ln(Total Assets)	-0.022***	-0.003	-0.020***	-0.003	-0.020***	-0.003
	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)	(0.002)
Leverage	-0.086***	-0.016**	-0.078***	-0.017**	-0.078***	-0.017**
	(0.021)	(0.008)	(0.021)	(0.008)	(0.021)	(0.008)
Market-to-Book	0.003	0.003	0.003	0.003	0.003	0.003
	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)
Tangibility	-0.024	0.007	-0.025	0.007	-0.026	0.007
	(0.023)	(0.008)	(0.023)	(0.008)	(0.023)	(0.008)
Profitability	0.227***	0.027**	0.226***	0.027**	0.227***	0.027**
	(0.027)	(0.011)	(0.027)	(0.011)	(0.027)	(0.011)
Current Ratio	0.005	0.000	0.005	0.000	0.005	0.000
	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
ln(Facility Maturity)	0.175***	0.001	0.174***	0.001	0.175***	0.001
	(0.010)	(0.002)	(0.010)	(0.002)	(0.010)	(0.002)
ln(Facility Amount)	0.069***	0.017***	0.070***	0.017***	0.070***	0.017***
	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)
Secured	0.177***	-0.020***	0.178***	-0.020***	0.178***	-0.020***
	(0.010)	(0.003)	(0.010)	(0.003)	(0.010)	(0.003)
Obs.	25900		25900		25900	
Adj. R^2	0.33		0.33		0.33	
Industry Fixed Effects	Yes		Yes		Yes	
Time Fixed Effect	Yes		Yes		Yes	
Credit Rating Fixed Effects	Yes		Yes		Yes	
Loan Purpose Fixed Effects	Yes		Yes		Yes	
Loan Type Fixed Effects	Yes		Yes		Yes	

Table 4: Lending Relationships and the Use of Accounting-Based PSD - Borrower Fixed Effects

This table reports linear probability models to evaluate the likelihood of using accounting based PSD. The dependent variable equals one if the loan includes a performance pricing provision based on an accounting measure and zero for non performance-sensitive loan contracts. All items are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	PSD(Accounting)	PSD(Accounting)	PSD(Accounting)	PSD(Accounting)	PSD(Accounting)	PSD(Accounting)
Rel(Dummy)	0.056***	0.024**				
	(0.008)	(0.010)				
Rel(Number)			0.067***	0.025**		
			(0.010)	(0.013)		
Rel(Amount)					0.063***	0.025**
					(0.010)	(0.012)
ln(Total Assets)	-0.013***	0.008	-0.011**	0.009	-0.011**	0.009
	(0.005)	(0.011)	(0.005)	(0.011)	(0.005)	(0.011)
Leverage	-0.076***	-0.123***	-0.070***	-0.121***	-0.070***	-0.121***
	(0.018)	(0.031)	(0.018)	(0.031)	(0.018)	(0.031)
Market-to-Book	0.004	0.009	0.003	0.009	0.003	0.009
	(0.004)	(0.008)	(0.004)	(0.008)	(0.004)	(0.008)
Tangibility	-0.017	0.070	-0.018	0.069	-0.018	0.069
	(0.021)	(0.068)	(0.021)	(0.068)	(0.021)	(0.068)
Profitability	0.196***	0.133***	0.195***	0.133***	0.195***	0.133***
	(0.019)	(0.044)	(0.019)	(0.044)	(0.019)	(0.044)
Current Ratio	0.005	0.004	0.005	0.004	0.005	0.004
	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.006)
ln(Facility Maturity)	0.137***	0.101***	0.137***	0.101***	0.137***	0.101***
	(0.007)	(0.009)	(0.007)	(0.009)	(0.007)	(0.009)
ln(Facility Amount)	0.067***	0.048***	0.068***	0.048***	0.067***	0.048***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Secured	0.171***	0.221***	0.171***	0.221***	0.171***	0.221***
	(0.009)	(0.012)	(0.009)	(0.012)	(0.009)	(0.012)
Obs.	22519	22519	22519	22519	22519	22519
Adj. R^2	0.288	0.455	0.288	0.455	0.288	0.455
Firm Fixed Effects	No	Yes	No	Yes	No	Yes
Industry Fixed Effects	Yes	No	Yes	No	Yes	No
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: IV-Estimation: Lending Relationships and the Use of Accounting-Based PSD

This table reports the results of instrumental variable (IV) estimations, using *Distance* as an instrument for lending relationships. The sample consists of straight loans and accounting-based performance sensitive loans. The dependent variables in the first stage regressions (Columns (1a)-(3a)) are *Rel(Dummy)*, *Rel(Number)*, and *Rel(Amount)* respectively. The dependent variable in the second stage regression (Columns (1b)-(3b)) is a dummy, which equals one if the loan contract includes an accounting-based performance pricing provision and zero otherwise. All other variables are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1a)	(2a)	(3a)	(1b)	(2b)	(3b)
	First Stage Regressions			Second Stage Regressions		
	Rel(Dummy)	Rel(Number)	Rel(Amount)	PSD(Accounting)	PSD(Accounting)	PSD(Accounting)
ln(1+Distance)	-0.019***	-0.019***	-0.020***			
	(0.003)	(0.002)	(0.002)			
Rel(Dummy)				0.251*		
				(0.146)		
Rel(Number)					0.254*	
					(0.146)	
Rel(Amount)						0.235*
						(0.135)
ln(Total Assets)	0.065***	0.018***	0.024***	0.000	0.012	0.011
	(0.008)	(0.006)	(0.007)	(0.012)	(0.008)	(0.008)
Leverage	0.039	-0.043**	-0.046**	-0.142***	-0.121***	-0.121***
	(0.024)	(0.020)	(0.020)	(0.024)	(0.024)	(0.024)
Market-to-Book	-0.001	-0.002	-0.005	0.013**	0.013**	0.014**
	(0.006)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Tangibility	0.015	0.015	0.025	0.143***	0.143***	0.141***
	(0.051)	(0.041)	(0.042)	(0.049)	(0.049)	(0.049)
Profitability	0.091***	0.097***	0.082***	0.115***	0.113***	0.119***
	(0.035)	(0.028)	(0.030)	(0.037)	(0.037)	(0.035)
Current Ratio	-0.012**	-0.010***	-0.013***	0.010**	0.010**	0.010**
	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
ln(Facility Maturity)	-0.031***	-0.025***	-0.026***	0.111***	0.110***	0.110***
	(0.006)	(0.004)	(0.005)	(0.007)	(0.007)	(0.007)
ln(Facility Amount)	0.039***	0.015***	0.025***	0.027***	0.033***	0.031***
	(0.004)	(0.003)	(0.003)	(0.007)	(0.004)	(0.005)
Secured	-0.036***	-0.030***	-0.035***	0.228***	0.226***	0.227***
	(0.009)	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)
Obs.	19715	19715	19715	19715	19715	19715
Adj. R^2	0.376	0.313	0.314	0.144	0.160	0.163
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Borrower Opacity and Loan Syndication

This table reports linear probability models, relating the use of accounting-based PSD to measures of borrower opaqueness. The dependent variable is a dummy variable, which equals one if a loan includes an accounting-based performance pricing provision and zero otherwise. All items are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1) PSD(Accounting)	(2) PSD(Accounting)	(3) PSD(Accounting)	(4) PSD(Accounting)
Rel(Dummy)*ln(Total Assets)	-0.016***			
	(0.005)			
Rel(Dummy)*Rated		-0.039*		
		(0.020)		
Rel(Dummy)*#Analysts			-0.003*	
			(0.002)	
Rel(Dummy)*Syndication				-0.080***
				(0.026)
Rel(Dummy)	0.124***	0.042***	0.024**	0.093***
	(0.034)	(0.013)	(0.012)	(0.025)
ln(Total Assets)	0.016	0.004	0.001	0.006
	(0.011)	(0.011)	(0.011)	(0.010)
Rated		-0.016		
		(0.024)		
#Analysts			0.008***	
			(0.002)	
Syndication				0.140***
				(0.021)
Obs.	22519	22519	22519	22519
Adj. R^2	0.456	0.453	0.457	0.458
Firm Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes
Borrower Characteristics	Yes	Yes	Yes	Yes

Table 7: Covenant Thresholds in PSD vs. Non-PSD Contracts

This table reports summary statistics for the initial ratios of covenants types used in accounting-based PSD and non-PSD contracts between 1993 and 2011.

	PSD(Accounting)				Non-PSD			
	Mean	Median	Std	N	Mean	Median	Std	N
Panel A: Leverage Covenants								
Max. Debt-to-Tangible Net Worth	2.32	2.00	1.66	495	2.57	1.60	5.15	1052
Max. Debt-to-EBITDA	3.98	3.55	1.54	5816	4.49	4.00	2.42	2316
Max. Senior Debt-to-EBITDA	3.38	3.25	1.34	1236	3.44	3.25	2.04	581
Max. Debt-to-Equity	1.36	1.00	0.91	40	3.08	1.57	4.84	68
Max. Senior Leverage	0.67	0.60	0.22	7	0.72	0.72	0.20	4
Max. Leverage	0.58	0.55	0.21	906	0.62	0.60	0.36	487
Max. Loan-to-Value	1.89	2.25	1.30	7	0.84	0.75	0.59	15
Panel B: Coverage Covenants								
Max. Cash Interest Coverage	2.02	1.75	0.89	113	1.72	1.40	0.75	69
Min. Debt Service Coverage	1.48	1.25	0.70	688	1.45	1.25	0.58	718
Min. Fixed Charge Coverage	1.37	1.25	0.52	4228	1.32	1.20	0.55	1876
Min. Interest Coverage	2.56	2.50	0.85	3487	2.40	2.25	1.27	1767
Panel C: Liquidity Covenants								
Min. Current Ratio	1.27	1.15	0.38	945	1.37	1.25	0.50	775
Min. Quick Ratio	1.09	1.00	0.52	145	1.29	1.25	0.50	316
Panel D: Other Covenants								
Max. Capex	57.79	20.00	144.89	2249	50.07	10.00	135.52	1672
Min. EBITDA	35.87	15.00	80.42	768	31.95	5.50	110.88	831

Table 8: Debt-to-EBITDA Covenant Tightness

This table presents OLS regressions relating Debt-to-EBITDA covenant tightness to the use of PSD. The sample includes contracts, only which have a covenant on the Debt-to-EBITDA ratio. We further require that all PSD contracts use the Debt-to-EBITDA ratio as a measure of the borrowers performance. All variables are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1)	(2)	(3)	(4)
	Covenant Tightness	Covenant Tightness	Covenant Tightness	Covenant Tightness
Increasing PSD	2.112***	1.581***	0.932**	0.742*
	(0.534)	(0.522)	(0.450)	(0.441)
Mixed PSD	-0.0249	-0.212	0.335	0.284
	(0.253)	(0.250)	(0.247)	(0.244)
Decreasing PSD	0.137	0.172	0.0604	0.0817
	(0.285)	(0.283)	(0.226)	(0.230)
Debt-to-EBITDA	-0.371***	-0.332***	-0.203***	-0.181***
	(0.0413)	(0.0390)	(0.0349)	(0.0312)
ln(Total Assets)		0.234		0.263
		(0.149)		(0.313)
Market-to-Book		0.890***		0.785***
		(0.182)		(0.278)
Tangibility		0.393		1.858
		(0.580)		(2.103)
Profitability		-0.491		1.161
		(1.036)		(1.487)
Current Ratio		0.266*		0.503*
		(0.142)		(0.273)
ln(Facility Amount)		0.179*		0.0547
		(0.103)		(0.0718)
ln(Facility Maturity)		0.247		0.229
		(0.227)		(0.164)
Secured		-0.812**		0.0266
		(0.318)		(0.291)
Obs.	4996	4996	4996	4996
Adj. R^2	0.200	0.226	0.778	0.784
Firm Fixed Effects	No	No	Yes	Yes
Industry Fixed Effect	Yes	Yes	No	No
Time Fixed Effect	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes

Table 9: Post Issue Performance

This table reports linear probability models to examine credit rating changes of the borrower after the issue of PSD. The dependent variable equals 1 if the borrower's credit rating improved in the first 4 or 8 quarters after the loan issue and zero otherwise. This table further reports OLS regressions to examine the change in the Debt-to-EBITDA 4 or 8 quarters after the issue of PSD. All variables are defined in the Appendix Table A.I. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *,**,*** Indicate statistical significance at the 10%, 5%, 1% level.

	(1) Rating Upgrade (+4)	(2) Rating Upgrade (+8)	(3) Δ Debt-to-EBITDA (+4)	(4) Δ Debt-to-EBITDA (+8)
PSD(Rating)	0.037***	0.026*	-0.134	-0.063
	(0.012)	(0.014)	(0.092)	(0.085)
PSD(Accounting)	0.008	0.011	0.071	0.029
	(0.016)	(0.020)	(0.087)	(0.091)
ln(Total Assets)	-0.006	-0.008	0.040	0.075
	(0.018)	(0.025)	(0.104)	(0.107)
Leverage	-0.183***	-0.174**	-0.972***	-0.998***
	(0.067)	(0.077)	(0.023)	(0.018)
Market-to-Book	0.096***	0.100***	-0.312***	0.002
	(0.012)	(0.013)	(0.057)	(0.074)
Tangibility	-0.062	-0.016	-0.037	-0.037
	(0.096)	(0.118)	(0.721)	(0.612)
Profitability	0.437***	0.339***	0.315	0.222
	(0.097)	(0.113)	(0.602)	(0.619)
Current Ratio	-0.003	-0.015	-0.028	0.045
	(0.010)	(0.012)	(0.070)	(0.058)
ln(Facility Maturity)	0.005	0.003	-0.007	0.000
	(0.010)	(0.012)	(0.071)	(0.066)
ln(Facility Amount)	0.012***	0.008	0.067**	0.097***
	(0.005)	(0.006)	(0.031)	(0.031)
Secured	-0.050***	-0.080***	0.422***	0.205**
	(0.015)	(0.018)	(0.088)	(0.082)
Obs.	11,057	9,707	24,459	21,839
Adj. R^2	0.308	0.406	0.729	0.758
Firm Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes

A Appendix

Table A.I: Variable Definitions

Variable Name	**Definition (Compustat Item #)**	**Source**
Loan characteristics		
PSD (Rating)	A dummy variable which equals one if the loan tranche includes a performance pricing provision based on the firm's credit rating.	Dealscan
PSD (Accounting)	A dummy variable which equals one if the loan tranche includes a performance pricing provision based on an accounting measure.	Dealscan
Increasing PSD	A dummy variable which equals one if the pricing grid allows for interest rate increases only.	Dealscan
Mixed PSD	A dummy variable which equals one if the pricing grid allows for both interest rate increases and interest rate decreases.	Dealscan
Decreasing PSD	A dummy variable which equals one if the pricing grid allows for interest rate decreases only.	Dealscan
Facility Amount	Facility amount in million USD.	Dealscan
All-in-drawn Spread	Initial all in drawn spread over LIBOR.	Dealscan
Facility Maturity	Time to maturity in Months.	Dealscan

Continued on next page

Table A.I – continued from previous page

Variable Name	Definition (Compustat Item #)	Source
Term Loan	A dummy variable which equals one if the type of the loan tranche is specified as "Term Loan", "Term Loan A ... H", or "Delay Draw Term Loan".	Dealscan
Secured	A dummy variable which equals one if the loan is secured.	Dealscan
Covenant Tightness	(Debt-to-EBITDA - Debt-to-EBITDA-Covenant-Threshold) divided by the standard deviation of Debt-to-EBITDA over the previous 8 years.	Dealscan & Compustat
Purpose: General	A dummy variable which equals one if the loan purpose is specified as "corporate purpose".	Dealscan
Purpose: Refinance	A dummy variable which equals one if the loan purpose is specified as "debt repayment".	Dealscan
Purpose: Takeover	A dummy variable which equals one if the loan purpose is specified as "takeover" of "acquisition".	Dealscan
Purpose: Working Capital	A dummy variable which equals one if the loan purpose is specified as "working capital".	Dealscan
Syndication	A dummy variable which equals one if the distribution method of the loan tranche is defined as "Syndication" according to Dealscan.	Dealscan
Sole Lender	A dummy variable which equals one if the loan tranche is not syndicated (Syndication = 0).	Dealscan

Continued on next page

Table A.I – continued from previous page

Variable Name	Definition (Compustat Item #)	Source
Distance	The spherical distance between the borrower's headquarter and the lender's headquarter in miles. The distance between bank i and borrower j is calculated as follows: $d_{i,j} = arc\ cos(deg_{latlon}) * r$, where: $r =$ the radius of Earth in miles, and $deg_{latlon} = cos(lat_i) * cos(lon_i) * cos(lat_j) * cos(lon_j)$ $+cos(lat_i) * sin(lon_i) * cos(lat_j) * sin(lon_j) + sin(lat_i) * sin(lat_j)$ *lat* and *lon* refer to the latitude and longitude in radians (converted from degrees by multiplying with $\pi/180$).	Dealscan & MaxMind
Borrower characteristics		
Total Assets	Firm's total assets in million USD.	Compustat
Leverage	Long-term debt divided by total assets.	Compustat
Market-to-Book	Market value of the firm divided by the book value of assets.	Compustat
Tangibility	Net property plant and equipment divided by total assets.	Compustat
Profitability	EBITDA divided by total assets.	Compustat
Current Ratio	Current assets divided by current liabilities.	Compustat
# Analysts	The number of analysts covering the borrower at the time of the loan origination.	I/B/E/S

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Table A.I – continued from previous page

Variable Name	Definition (Compustat Item #)	Source
Rating AAA ... C(or below)	A dummy variable which equals one if the borrower has an S&P rating of AAA ... C (or below) at the time of the loan issue.	Compustat
Rated	A dummy variable which equals one if the borrower has an S&P rating at the time of the loan issue.	Compustat
Debt-to-EBITDA	Total debt divided by EBITDA.	Compustat
Relationship Lending Proxies		
Rel(Dummy)	A dummy variable which equals one if the firm borrowed from at least one of the lead lenders in the five years before the present loan.	Dealscan
Rel(Number)	The number of loans from the same lead bank(s) over the total number of loans issued in the last five years before the present loan.	Dealscan
Rel(Amount)	The dollar value of loans from the same lead bank(s) over the total dollar value of all loans issued in the last five years before the present loan.	Dealscan

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