Lending Relationships and Loan Contract Terms: Does Size Matter?

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Abstract

While existing literature has documented the benefits of relationship banking for small privately held businesses, there is little empirical work that examines whether lending relationships provide significant (if any) benefits to *larger* borrowers. Our paper addresses this question. Unlike earlier studies we analyze the effects of borrowing from relationship lenders for large borrowers who have access to public capital markets. We find that, on average, borrowing from a relationship lender translates into a 5 to 15 basis point lowering of interest rates for a large borrower and that these benefits are significantly larger for borrowers facing higher information asymmetries. We also examine other non-price features of large borrowers' loan facilities, such as maturity and collateral. Importantly, our's is the first paper to estimate the impact of these variables using a simultaneous equations approach which recognizes the joint determination of price and non-price terms. Our results show that large borrowers have a significantly lower probability of having to pledge collateral if the loan is from a relationship lender. Furthermore, relationship borrowers appear to enjoy access to larger debt financing and are therefore less credit constrained than non-relationship borrowers.

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1 Introduction

Do *"Large"* firms that have access to multiple sources of financing (both public and private) derive any benefits from establishing strong relationships with their lender(s)?[1] This question is largely unanswered in the existing literature, which is surprising given that a significant proportion (approximately 60%) of the total debt for large US corporations continues to be from banks.[2] This gap in the empirical literature is also remarkable since much of the evidence on the benefits of relationship borrowing is based on the samples of small, privately owned firms which are most likely to find relationships beneficial.

There is an extensive literature that provides theoretical support as to the benefits of bank relationships for borrowers. Typically, the lender in a strong borrower-lending relationship obtains borrower-specific information that is proprietary and is not easily or credibly conveyed to others. This information production role of private lenders (especially relationship lenders) helps resolve moral hazard and adverse selection problems in borrower-lender contracting and can provide significant benefits to a borrower. A borrower can benefit from a strong relationship with its lender in a number of ways. These include sharing confidential information such as details of R&D (Bhattacharya and Chiesa, 1995); loan contracts that allow renegotiability (Berlin and Mester, 1992), Boot, Greenbuam, and Thakor, 1993); allowing monitoring access to collateral (Rajan and Winton, 1995); and the ability to smooth out loan pricing over multiple loans (Berlin and Mester, 1998). However, these benefits can be reduced or completely offset by the potential costs that a borrower incurs when it chooses to borrow from a relationship lender. Such costs can include distortions in investment incentives (Rajan, 1992) and a higher cost of borrowing resulting from information monopolies (Sharpe, 1990). Thus, the *net effect* of borrowing from a relationship lender need not always be beneficial.

The existing empirical literature, examining the benefits of lending relationships for borrowers, has used (lower) cost and (better) availability of credit as proxies for a borrower's benefits from establishing strong relationships with its lenders.[3] These include Petersen and

[1] We define large firms as those that are covered by Compustat database, listed on a major exchange and required to file regulatory disclosure filings to SEC.

[2] Houston and James 1996 report mean (median) bank debt to total debt ratio at the end of 1990 of 0.59 (0.66) for 250 publicly traded firms. Hadlock and James (2002) expand the original 250 firms sample to 500 firms and report mean (median) bankdebt/total debt ratio of 0.71 (0.88).

[3] A related set of studies has examined the impact of establishing (terminating) of such lending relationships on the value of the borrower. (See for example James (1987); Slovin et al. (1993); Lummer and

Rajan (1994), Berger and Udell (1995), Cole (1998) and Degryse and Van Cayselee (2000). The evidence from these studies is mixed. Petersen and Rajan (1994) find that while relationships do increase *availability* of credit, the interest charged for loans is not significantly lower. Berger and Udell (1995) however focus specifically on lines of credit, arguing that it is for these loans that relationships are most important and report that strong relationships lower both the interest charged as well as collateral requirements. Cole (1998) reports that while *the duration of a relationship* did not affect the availability of credit, increasing *the scope of a relationship* as proxied by the purchase of multiple information-sensitive products (such as checking accounts) from a bank, did increase the probability of getting loans from that bank. Degryse and Van Cayselee (2000) find similar results. More importantly, all of these papers focus exclusively on small, privately-held firms where relationships are likely to have the greatest effect.[4]

Our paper differs from the above cited studies in one critical dimension, in that we estimate the benefits of relationships to *large borrowers*, which we define as firms that are listed on the major exchanges (NYSE/NASDAQ/AMEX) and thus have access to public capital markets. This is in contrast to the studies mentioned above which focus primarily on privately owned (S-corporation, Partnership or Sole Proprietorship) firms whose financing sources are limited to banks and trade credit. The differences between Petersen and Rajan (1994) and Berger and Udell (1995) and our samples is best illustrated by comparing some key characteristics. While the median size of book assets for their studies is $ 0.13 million, for our sample it is $ 361 million. Also, a typical borrower in our sample is a publicly owned firm (i.e. has shares listed on NYSE/AMEX/NASDAQ) with access to multiple sources of financing, while a typical borrower in the earlier studies is a privately owned (S-corporation, Partnership or Sole Proprietorship) whose financing sources are limited to banks and trade credit. An important question is how valuable these lending relationships are for larger borrowers that have a much wider choice of external financing sources and are less likely to be credit-constrained. Surprisingly, we know relatively little about the benefits (if any) to larger

McConnell (1989); and Dahiya et al. (2003). James and Smith (2000) summarize this literature "Overall these recent studies confirm the earlier finding of a positive market response to announcements of bank loans . . . ". These findings can be interpreted as indirect evidence of strong bank-borrower relationship being associated with higher value of the borrower.

[4]Petersen and Rajan and Berger and Udell use data from the Federal Reserve Board's 1987 National Survey of Small Business Finances (NSSBF), Cole uses data from the Federal Reserve Board's 1993 NSSBF. Degryse and Van Cayselee employ a sample of loans to Belgian borrowers which are primarily small businesses (over 80% are sole proprietorships).

borrowers from establishing strong bank relationships.[5] To the best of our knowledge, this paper is the first study to examine how lending relationships impact the cost and availability of credit for *large borrowers*.

The major results of our paper are that the cost of borrowing for large firms is on average 5 to 15 basis points *lower* if the loan is provided by a relationship lender rather than a non-relationship lender. Furthermore, we find that this benefit of relationship lending is strongest for those large borrowers who suffer from the highest degree of information opacity. For example, a firm with a high market to book ratio is typically considered to have significant growth options. These intangible growth options are harder to value compared to assets in place, thus such firms face higher information asymmetry in contracting with lenders. Furthermore, since these options require discretionary investment in the future to generate cash flow, it can lead to ex-ante agency costs when such firms borrow (Myers, 1977). Such firms can mitigate these agency costs as well as reduce their information opacity by borrowing from an informed lender. We find evidence consistent with this interpretation. We partition our sample of large borrowers into two sub-groups: High MTB (market to book) and Low MTB borrowers. High MTB sub-sample consists of borrowers that have a market to book ratio higher than the sample median and Low MTB group has market to book ratio lower than the sample median. If relationships provide greatest benefits for firms with high information asymmetries, we should expect to find that past relationships provide the highest benefits for the High MTB sub-sample. Our results provide support for this: borrowing from a relationship lender is approximately 19 basis points lower compared to borrowing from a non-relationship lender in High MTB group. In sharp contrast, the difference in spreads charged for relationship versus non-relationship loans for Low MTB borrowers is not significant. We report similar results for alternative proxies for information opacity of borrowers.

While the importance of non-price terms in debt contracts has been recognized in previous studies (e.g. Melnik and Plaut, 1986) the empirical evidence has often been limited by a focus on a single contract feature.[6] We add to this literature by documenting the patterns of maturity and collateral requirements for large US corporate borrowers and examine how

[5] Hadlock and James (2002) argue that "... large firms that borrow frequently in the public markets may find the monitoring benefits of bank borrowing to be quite small ..."

[6] Other studies include: Berger et al. (2005) and Guedes and Opler (1996) examine the maturity of new loans while Leeth and Scott (1989), Berger and Udell (1995) Jiménez, Salas and Saurina (2005) focus on the collateral requirements.

these features differ across relationship and non-relationship loans. We find that relationship loans are significantly less likely to require collateral but on average the maturity of loans is not significantly different for relationship and non-relationship loans.

While our results on non-priced terms are broadly consistent with earlier work, they need to be interpreted with caution as the methodology employed in most studies treats each of these contract features (e.g. maturity, collateral requirements etc.) as exogeneous and independent of each other. In reality, all the contract terms are likely to be interdependent. We address the econometric issues that arise if the price and non-price terms are determined simultaneously. Dennis, Nandy and Sharpe (2000) is one of the first papers to address the interrelationship between the price and non-price terms of a loan contract. They limit their analysis to revolving lines of credit. Their focus is on two set of relationships - first is the relationship between maturity and collateral and the second is between interest rate and commitment fee. Our results extend this analysis using a simultaneous equations model in which the price, collateral and maturity are all determined jointly. Additionally we include all loan facilities in our tests rather than just revolving lines of credit.

Finally, we examine whether access to bank debt financing is related to borrower-lender relationships. Using the size of a loan facility (scaled by either the borrower's assets or the borrower's total debt) as a proxy for access to debt we find that a firm borrowing from its relationship lender is able to get a loan approximately two to three percent larger than a similar firm borrowing from a non-relationship lender. These results suggest that even larger borrowers benefit in terms of better credit availability when they borrow from relationship lenders. Our paper thus adds to similar evidence for small borrowers reported by Petersen and Rajan (1994).

The remainder of the paper is organized as follows. We describe our main hypotheses in Section 2. Section 3 describes the data and sample selection process. The methodology and major results are presented in Section 4. We conclude in Section 5.

2 Theoretical Predictions and Test Hypotheses

Financial intermediation theory (LeLand and Pyle (1977) and Diamond (1984)) emphasizes the information production role of banks. If this information is costly to produce, is proprietary to the lender(s) and is reusable, the cost of providing future loans (and arguably other information sensitive services such as securities underwriting) should be lower for a relationship lender. The relationship lender may choose to share or pass on these savings to its borrower in a number of ways such as a lower cost of borrowing, more flexible loan contract terms or a combination of both. If the lender shares its lower cost benefit with its relationship borrower, the cost of borrowing would be lower for a borrower that borrows from its relationship lender. Boot and Thakor (1994) argue that rates charged for loans would decrease as a borrower-lender relationship matures.

While relationship lending has been portrayed as beneficial to both lenders and their borrowers, its cost to borrowers has also received considerable attention. Sharpe (1990) develops a theoretical model in which lender-borrower relationships arise simply because the borrowers have been "informationally captured". High quality borrowers are forced to accept a higher interest rate from their existing lender as it is difficult for them to convey information about their quality to other banks. Similarly, if a borrower's current project succeeds, Rajan (1992) shows that a relationship lender can extract rents from future projects by demanding a high return. This holdup possibility can distort the investment decisions of an entrepreneur. Thus, borrowers who anticipate a sequence of profitable projects (e.g. firms with good future prospects) would prefer arms-length financing or multiple banking relationships.[7]

Thus, theory offers conflicting predictions about the impact of lending relationships on the prices charged for future loans and services. On one hand, the information production of the lender can translate into lower loan prices for the borrower. On the the other hand, a relationship lender's ability to acquire private information over the course of a relationship can allow it to use this information to extract (monopoly) rents from borrowers by charging higher rates and fees on future loans and services. To the extent that these "lock-in" effects are present and dominant, such relationships would be associated with a higher cost of relationship loans.

This is formalized in hypothesis 1:

Hypothesis 1 (H1) *If a relationship lender exploits its monopoly power, the stronger the bank-borrower relationship, the higher is the All-in-Spread Drawn (AISD)*[8] *charged on future relationship loans. Alternatively, if the benefits of relationship lending are shared with the*

[7]Houston and James (1996) find that borrowers with high future growth opportunities rely less on bank financing if they have a single banking relationship. They argue this is consistent with hold-up problems associated with strong lending relationships.

[8]All-in-Spread Drawn (AISD) measures the interest rate spread on a loan (over LIBOR) plus any associated fees in originating the loan. Thus AISD is an all inclusive measure of loan price and removes the need to consider specific fees separately.

borrower, a stronger bank-borrower relationship would be associated with a lower All-in-Spread Drawn (AISD) on future loans.

However the absolute amount of such a benefit would depend on the relationship lender's potential to generate *proprietary* incremental information. We use four proxies to capture the relative degree of information opacity of a borrower (thus serving as a proxy for the potential to generate proprietary information). The first proxy we employ is the borrower size as measured by the book value of a borrower's total assets (even though borrowers in our sample are publicly traded, there is considerable cross-sectional variation in size, e.g. for the size ranked sample the cut-off for the 25^{th}percentile is \$ 93.7 million in assets while that for the 75^{th} percentile is \$ 1626.9 million). The second proxy is a dummy variable that equals one if the borrower has an S&P Long Term Domestic Issuer Credit Rating (existence of such rating is usually taken as evidence of access to public bond market). Our other two proxies for information opacity are the Tangibility ratio (NPPE divided by total assets), and the Market to Book ratio (Market value is calculated as book value of assets minus book value of equity plus market value of equity).[9] Very large firms or firms that have public debt outstanding as well as equity (supported by a debt rating) are widely monitored by institutional investors in public debt markets as well as credit rating agencies. Consequently, a relationship bank may not be able to produce much incremental information that is proprietary. In such a case a relationship may provide little benefit to the borrower. This suggests the following hypothesis which allows us to examine whether information asymmetries faced by large borrowers influence the cost of their relationship loans:

Hypothesis 2 (H2) *The higher the information asymmetry faced by a large borrower, the greater the benefits of a relationship on its cost of borrowing.*

Next, we focus on how non-price terms are affected by lending relationships. Collateral and duration (maturity) of a loan are considered key loan contract features.We discuss collateral first. The use of collateral in debt contracts has been justified by two arguments: Adverse selection and moral hazard. While both arguments rely on information asymmetry, they provide opposite predictions of what type of borrowers would post collateral. The adverse selection models (Bester, 1985, Chan and Kanatas, 1985 and Besanko and Thakor,

[9]These proxies has been used in a number of existing studies e.g. borrower size by Cantillo and Wright (2000), existence of debt rating by Faulkender and Petersen (2006), Tangibility by Barclay, Marx and Smith (2003) and Market to book by Barclay and Smith (1995).

1987) argue that when true quality of borrowers is unknown, willingness to provide collateral would serve as a credible signal of borrower quality. These models predict that better quality (i.e. low credit risk) borrowers would post collateral and obtain lower costs for the loans. These models suggest that collateral and interest rate are substitute mechanism (good quality firms offer collateral and get a lower interest rate). Moral Hazard models (Stultz and Johnson, 1985 and Boot et al.. 1991) stress the ex-ante incentives for asset-substitution when firms take on risky debt. These incentives are strongest for the low quality (high credit risk) borrowers. In equilibrium such borrowers can credibly commit to lower asset-substitution by providing collateral. Thus these models predict that the lowest quality borrowers are more likely to be required to provide collateral. Since borrowing from a relationship bank would lower the information asymmetries, Boot (2000) and Boot and Thakor (2002) argue that stronger relationship can reduce moral hazard. In a similar vein Rajan and Winton (1995) argue that collateral provides incentives for monitoring, if strong relationships reduce information problems, the motivation for requiring collateral would be lower when such relationships exist. Thus, these models predict that loans from relationship lenders are less likely to be collateralized. If a strong borrower-lender relationship mitigates the moral hazard problem, a relationship loan would be less likely to require collateral (See Boot and Thakor, 1994 and Berger and Udell, 1995). This yields our next hypothesis:

Hypothesis 3 (H3) *The probability of using collateral as a loan contract non-price term decreases if the loan is provided by a relationship lender.*

Myers (1977) describes how risky debt is associated with the asset substitution and the underinvestment problems. These problems are especially relevant to firms with considerable growth options. The relatively harder to value growth options make such borrowers informationally opaque. These debt-agency costs can be mitigated by reducing the maturity of debt. Thus, Myers (1977) predicts that borrowers with significant growth options are likely to use shorter maturity debt.[10] Relationships help resolve asymmetric information (agency costs of debt) and are thus an alternative mechanism for reducing debt agency costs. To the extent that maturity and relationships are substitute mechanisms, borrowers should be able to obtain longer maturity loans from relationship banks compared to loans from non-relationship banks. Intuitively, a relationship lender with its superior information needs to

[10]Barclay and Smith (1995) provide empirical support for agency-cost explanation for debt maturity. They find that firms with more growth options (i.e. firms that are likely to face greater debt agency costs) use less long-term debt.

rely less on shorter maturity of loans to monitor borrower behavior. This motivates our next hypothesis:

Hypothesis 4 (H4) *A borrower would be able to get longer maturity loans from it relationship lender compared to borrowing from non-relationship lender.*

We also examine the issues of the simultaneity of various loan contract terms in evaluating H3 and H4. Arguably, the interest rate (plus fees for AISD), collateral and maturity are determined simultaneously. For example, collateral and maturity can be thought as substitute mechanisms - increasing the maturity may be acceptable provided more collateral is offered. Most studies on debt contract terms have not directly considered simultaneity issues. We re-estimate the relationship between the price and non-price terms of loans using a simultaneous equations framework.

A number of studies have documented the positive association between the length of banking relationship and availability of credit to a relationship borrower (Petersen and Rajan, 1994 and Degryse and Van Cayseele, 2000). Hoshi et al. (1990) report that for a sample of financially distressed Japanese firms, those with strong bank relationships were less likely to be credit constrained (proxied by lower investment levels) compared to the borrowers lacking strong banking relationships.[11] These empirical findings provide support to the argument that strong banking relationship is likely to increase the access to financing for a borrower. We employ the size of loan facility (which we scale by either the borrower's assets or its existing debt) as a proxy for the access to financing. We formalize this benefit in our next hypothesis:

Hypothesis 5 (H5) *A borrower with a prior relationship with its lender would be able to obtain a larger loan amount compared to a similar borrower that does not have a prior relationship with its lender.*

3 Data and Sample Selection

The data on individual loan facilities is obtained from the Dealscan database maintained by the Loan Pricing Corporation (henceforth, LPC).[12] LPC has been collecting information on

[11] In a recent study, Faulkender and Petersen (2006) report that even large publicly listed firms face credit constraints - less transparent firms (defined as firms lacking public debt rating) have leverage levels almost 30% lower compared to more transparent borrowers.

[12] LPC Dealscan database collects the data on loans made to large (mostly publicly traded) us firms. It has been widely employed to study private debt market. See for example, Drucker and Puri (2005) and

loans to large US corporations primarily through self reporting by lenders, SEC filings and its staff reporters. Strahan (1999) provides a good description of the LPC Dealscan database. While the LPC database provides comprehensive information on loan contract terms (LIBOR spread, maturity, collateral, etc.) it does not provide much information on borrowers. We manually match the borrowers in the LPC database with the merged CRSP and Compustat database following the procedure outlined in Bharath et al. (2005). We then use Compustat to extract data on accounting variables for the given company. We also extract the primary SIC code for the borrowers from Compustat and exclude all financial services firms (SIC codes between 6000 and 6999). To ensure that we only use accounting information that is publicly available at the time of a loan we employed the following procedure: for those loans made in calendar year t, if the loan activation date is 6 months or later than the fiscal year ending month in calendar year t we use the data of that fiscal year. If the loan activation date is less than 6 months after the fiscal year ending month, we use the data from the fiscal year ending in calendar year t-1.

Our sample period is from 1986 to 2003. Over this period there was extensive mergers and acquisitions activity in the US banking sector. To construct a chronology of banking mergers/acquisitions, we used the Federal Reserve's National Information Center database and complemented it by hand matching the data from the SDC mergers and acquisition database, Lexis-Nexis, and the Hoover's corporate histories database. This allows us to trace lending relationships through time even if the original relationship lender disappears due to a merger or an acquisition.

To examine the impact that prior lending relationships have on the price and other terms of loan, we need to segregate our loans into those that are provided by a relationship lender and those which are provided by a non-relationship lender. Following Dahiya et al. (2003), Schenone (2004) and Yasuda (2005), we construct the relationship measures for a particular loan i by searching all the previous loans (over different look-back windows as described later) of that borrower recorded in the LPC database. We note the identity of all the lead banks on these prior loans and if at least one of the lead banks for loan i had been a lead lender in the past we classify loan i as a relationship loan. The identification of the "lead" bank (or banks) for a particular loan facility is based on LPC's description of the lender's role.[13]

Schenone (2004)

[13] LPC does not have a uniform and consistent methodology to classify which bank is the lead bank. It

Specifically, for every facility, we construct three alternative measures of relationship strength by looking back and searching the past borrowing record of the borrower. We search the previous 5 years by starting from the activation date of that loan facility. The relationship variable is denoted by **REL(M)**, where M is one of the three alternatives measures. We describe the process of constructing the relationship variable using a set of loans obtained by Owens Corning, one of the borrowers in our sample.

In June 1997, Owens Corning borrowed \$ 2 billion from a syndicate of banks. This syndicate had a number of lead banks and we shall focus on four to illustrate our methodology. Three of the lead banks; Credit Suisse, Bank of Nova Scotia, Bank of New York had been lead banks on previous loans to Owens Corning. The fourth lead lender, Mellon Bank (and a number of other banks) had never been lead banks on previous bank loans of Owens Corning. To estimate REL(M) for this \$ 2 billion loan, we *look-back* on the previous 5 years of borrowing history of Owens Corning up until the date of this loan to see if any of the four lead banks of the current facility had provided loans in the past 5 years. LPC reported three loans taken by Ownes Corning over this 5 year look-back period. In September 1993, it borrowed \$475 million from a syndicate led by Credit Suisse, Bank of Nova Scotia and Bank of New York. It borrowed another \$110 million from a syndicate led by Bank of New York and First Chicago in May 1994. Then in December 1995 it borrowed \$99.6 million with Credit Suisse as the lead bank. Thus, looking back from the point of the June 1997 loan, Owens Corning contracted three loans totaling \$684.6 million (475+110+99.6) in teh 5 year look-back period. Next, we describe the construction of various relationship measures for the June 1997 loan.

The first relationship strength variable is a binary measure of relationship and is designed to pickup the existence of prior lending by the same lender in the past. For a particular bank m it is denoted by - $\mathbf{REL(Dummy)}_m$. Thus in our example, **REL(Dummy)** would equal 1 for Credit Suisse, Bank of Nova Scotia, Bank of New York and 0 for Mellon Bank. We pick the highest value of **REL(Dummy)** for all the lead banks and assign it to the loan. In our example, the June 1997 loan has **REL(Dummy)** =1.

includes a number of descriptions such as "arranger", " administrative agent", "agent", or "lead manager" that roughly correspond to the lead bank status of the lender. To ensure that we do not mislabel the lead bank we follow a simple rule. Any bank(s) that is (are) *not* described as a "participant" is (are) treated as a lead bank. This approach ensures that we do not include banks that play a limited information production role. Indeed, Madan et al. (1999) define participant as "the lowest title given to a bank in a syndication" and describe its role as little more than taking the allocated share of the loan.

The other two measures of relationship strength are continuous. The first continuous measure of relationship strength is **REL(Amount)**. For bank m lending to borrower i, it is calculated as

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

Again, this measure is calculated for each of lead bank and the highest value across all banks is used in our analysis. Thus, in case of June 1997 loan to Owens Corning $\mathbf{REL(Amount)}_{Credit\ Suisse}$ is 0.84 ($\frac{475+99.6}{874.6}$). Similarly **REL(Amount)** for Bank of Nova Scotia, Bank of New York and Mellon Bank are 0.69. 0.85 and 0.00 respectively. We take the maximum of these four values, i.e. 0.85 and assign that as the **REL(Amount)** for the June 1997 loan.

The second continuous measure of relationship strength is **REL(Number)**. For bank m lending to borrower i it is calculated as

$$REL(Number)_m = \frac{\text{Number of loans by bank } m \text{ to borrower } i \text{ in last 5 years}}{\text{Total Number of loans by borrower } i \text{ in in last 5 years}} \tag{2}$$

In our example, **REL(Number)** would be 0.67 (calculated by dividing 2 by 3) for Credit Suisse and Bank of New York, 0.33 for Bank of Nova Scotia and 0 for Mellon Bank. Again the highest value across these four banks (0.67) is assigned as **REL(Number)** to the June 1997 loan.

Table 1 provides the descriptive statistics for our data and segregates relationship and non-relationship loans (i.e. loans from a bank that did not have a past relationship with the borrower). Panel A provides the calendar-time distribution of the loan sample. The low number of observations in the early years is largely due to improvement in coverage in the LPC database over time. Also our methodology for constructing relationship measures ensures that for the very first loan reported in LPC we do not have any historical information on past borrowing. We treat these loans as non-relationship loans. Panel B illustrates the one digit SIC classification of the borrowers. There is a strong concentration of loans in the manufacturing sector (SIC codes between 2000-3999). Panel C lists the primary purpose of the loan facility contracted, with loans for corporate purposes and debt repayment the most frequently reported purposes.

Hypotheses 1 and 2 require a measure of the price charged for a loan. Following Carey et al. (1998) and Drucker and Puri (2005), we use the LPC reported "All-in-Spread-Drawn" (hereafter AISD) as the measure of interest rate for a loan. AISD is the coupon spread over

LIBOR on the drawn amount plus the annual fee. Since the interest charged for a loan is affected by various loan specific characteristics (maturity, loans size, etc.) and borrower specific characteristics (borrower size, profitability, leverage, etc.), we obtain these variables from LPC and COMPUSTAT respectively.

Table 2 reports the various sample summary statistics. The data is winsorized at the one percent and 99 percent level to address the problem of extreme outliers. The median AISD is 212.5 bps. The median loan facility is $50 million. The median book value of assets for our sample of borrowers is $361 million. The high fraction of syndicated loans (79%) reflects the historical focus of LPC on collecting data on large syndicated loans. The average maturity for loan facilities is 43 months (median 36 months).

4 Methodology and Results

4.1 Univariate Tests of H1

To examine (H1), that large borrowers benefit from lending relationships, we first examine key loan features to see if these are significantly different for relationship based vs. non-relationship based loans to the borrowers.

In Panel A of table 3, we segregate the entire sample based on the existence of prior relationships to test if the cost of borrowing reflects prior lending relationships. In the first column, we report key loan terms for loans taken from non-relationship lenders. The second column provides the same information for relationship loans. These loan terms include loan price variables: all-in-spread-drawn (AISD), all-in-spread-undrawn (AISU), upfront fee, and annual fee.[14] Other loan specific features reported include loan facility size, maturity, and percent secured (a measure of collateral backing). The last column reports the differences in mean (median) loan characteristics for relationship and non-relationship loans. The results of univariate tests of differences in means and medians provide strong evidence that large borrowers' relationship loans enjoy significantly better terms on the direct cost of borrowing as well as on other non-price terms such as size and collateral requirement. Comparing AISD (the most comprehensive measure of borrowing cost) for a company borrowing from a relationship lender, we find that on average AISD is 65 basis points lower compared to a borrower that does not have a prior relationship with the lender. This difference is significant

[14] AISU is the spread paid on the *undrawn* loan amount.

at the one percent level. AISU, up-front fees, and annual fees are all lower for relationship borrowers and the difference is significant at the one percent level. Results for non-price loan terms show similar effects. Typically, loans to relationship borrowers are less likely to be secured and are larger on average. Again these differences are significant at the one percent level and economically large.

While the univariate tests provide support for the argument that borrowers derive significant benefits from having strong relationships with their lenders, these results do not take into account potentially significant differences in borrower characteristics between the relationship borrower and non-relationship borrower groups. It is likely that the relationship borrowers have fundamentally different characteristics. For example, banks may prefer to maintain relationships with borrowers with a track record of strong financial performance. Thus, it is possible that the types of borrowers that enjoy better loan terms are also the types that have strong banking relationships. To determine if borrowers using relationship lenders obtain better loan terms, we must first test whether two groups (relationship and non-relationship borrowers) are different and whether this difference explains the difference observed in loan features across these two groups. We compare the borrower characteristics in two groups. The results are reported in panel B of table 3. The average size (as measured by book value of assets) of a relationship borrower ($ 4,200 million) is more than three times the average size of a non-relationship borrower ($ 1,328 million). This difference in size is significant at the one percent level. Firms borrowing from relationship banks also differ from those borrowing from non-relationship banks across most measures of leverage and profitability. For example, firms borrowing from relationship lenders have higher EBITDA to sales ratio (16% versus 12%), higher debt to assets ratio (27% versus 21%), and lower current ratios (1.9 versus 2.3). The higher leverage and current ratio of relationship borrowers suggest that these borrowers have better access to bank loans. On average, fewer relationship borrowers lack an S&P rating (61%) compared non-relationship borrowers (85%). These differences between the two borrower groups are statistically significant at the one percent level. Tests for difference in median provides qualitatively similar results.

While the results of univariate tests suggest that large US corporations benefit significantly by borrowing from relationship banks, these results also show that some of the key borrower characteristics that influence the cost of loans are systematically different across the relationship and non-relationship borrowers. Consequently, to better distinguish between relationship and performance effects on borrowing costs we employ multivariate tests as described in the next section.

4.2 Multivariate Tests H1

Since the cost of borrowing is likely to depend on various loan specific features such as loan size, maturity etc., as well as on a borrower's historical performance, we use a regression model of the following form.

$$\begin{aligned} AISD &= \beta_0 + \beta_1(REL(M)) + \sum \beta_i(Loan\_Char_i) \\ &\quad + \sum \beta_j(Borrower\_Char_j) + \sum \beta_k(Control_k). \end{aligned} \tag{3}$$

The variables are defined below:

- AISD: The dependent variable is 'All In Spread-Drawn" (AISD),which equals the coupon spread over LIBOR on the drawn amount plus the annual fee.

- REL(M): This is the measure of relationship strength constructed by looking back and searching the past borrowing record of the borrower. As discussed earlier (described in appendix A), we construct 3 different specifications for this variable.

- $Loan\_Char_i$: Various characteristics of loan facility as described below :

  - LOG(MATURITY): Natural log of maturity of loan facility in months.
  - LOAN AMOUNT: The loan facility amount.
  - SYNDICATE: A dummy variable that equals 1 if the loan facility was syndicated and 0 otherwise.
  - COLLATERAL: A dummy variable that equals 1 if the loan facility was secured and 0 otherwise.

- $Borrower\_Char_j$: Various characteristics of the borrower as described below:

  - LOG(ASSET): Natural log of the book value of the assets of the borrower. This controls for cross-sectional variation in borrower size in our sample.
  - LEVERAGE: Ratio of book value of total debt to book value of assets.

- COVERAGE: Calculated as natural log of ratio $(1+\frac{EBITDA}{Interest\ Expenses})$.
- PROFITABILITY: Ratio of EBITDA to Sales.
- TANGIBILITY: Ratio of Property, Plant and Equipment (PPE) to total assets.
- CURRENT RATIO: Ratio of current assets to current liabilities.
- MARKET TO BOOK: Calculated as ratio of (book value of assets-book value of equity + market value of equity) to book value of assets.
- NOT RATED: Dummy variable that equals 1 if the borrower is not rated by S&P and 0 otherwise
- INVESTMENT GRADE: A dummy variable that equals 1 if the borrower is rated BBB or above by S&P and 0 otherwise.

- $Control_k$: These are other control variables and include dummy variables for the year of the loan facility and the industry of the borrower (SIC codes).

Results of this regression (equation 3) using **REL(M)** as the relationship measure are reported in Table 4. The first three columns use the entire loan sample. Regardless of which measure is used, the coefficient on the relationship variable is negative and significant at the five percent level. Holding everything else constant, the cost of borrowing from a relationship lender is lower by 4.9 to 6.0 basis points (bps) compared to borrowing from a non-relationship lender. Given our univariate tests that show an approximately 65 basis point difference between relationship and non-relationship borrowers, the multivariate result imply that relationship variable alone accounts roughly 10% of that difference. While these results are statistically significant, the economic significance is somewhat low since a saving of six basis points on a median AISD of 212.5 bps works out to less than three percent savings on the price paid for a relationship loan versus a non-relationship loan. As foreshadowed in our univariate results, the cross-sectional differences in borrower characteristics (relationship versus non-relationship) explains much of the variation observed in spreads charged by lenders. For example, holding all else constant a borrower at the 75^{th} percentile of size (as measured by book value of assets) would on average pay approximately 70 bps lower on similar loan compared to a borrower at the 25^{th} percentile of size. As expected lower leverage, higher profitability, higher tangibility are associated with significantly lower spreads charged on loans. Interestingly, the negative (and significant) coefficient for maturity and positive (significant) coefficient for collateral are inconsistent with the notion that these non-price terms can be used as trade-off features for price terms. These results are however consistent with those reported by Berger and Udell (1990) and Angbazo, Mei and Saunders (1998) who also find that borrowers paying higher spreads are also more likely to to be required to post collateral. Such results could partly be driven, however, by the endogenity of the price and non-price terms. As we describe later, when we employ a simultaneous equations estimation framework to overcome the joint determination of loan contract terms we obtain results that suggest that these terms are indeed substitutes.

In the columns 4 through 6, we report results for the sub-sample of those borrowers which had a rating from S&P at the time the loan was made. This reduces our sample size by more than 60% but it allows us to examine lending relationships in a new and interesting light. Arguably, this set of borrowers had access to public debt markets when they borrowed from banks (private debt market). For example, Faulkender and Petersen, 2006, argue that the existence of a borrower rating is almost always associated with public debt outstanding.[15] Given the access to an alternate source of debt financing these borrowers are likely to be in a stronger position to demand that the benefits of relationship be shared more favorably. Indeed our results are consistent with this argument, as the coefficient for REL(M) is almost twice as high when the sample is restricted to S&P rated firms only. On average, for a firm with access to public debt markets, the benefits of borrowing from a relationship lender are 10.0 to 13.0 bps. As expected, higher rating is strongly associated with lower price of loans. On average, an investment grade borrower pays 50 bps lower on its bank loans compared to a borrower with a non-investment grade rating. The multivariate results show that even after controlling for various loan and borrower-specific characteristics, borrowing from relationship lenders is associated with significantly lower price of credit.

4.3 Multivariate Tests H2

The multivariate tests in the previous section suggest that the benefits of relationships vary systematically across different types of large borrowers. Given the rich literature on the information production role of private lenders (especially relationship lenders) it is natural to test if the information opacity of a large borrower is related to the benefits provided

[15] Cantillo and Wright (2000) report that fraction of firms that *had* a bond rating but *did not* have public debt was less than one percent.

by borrowing from a relationship bank. Information based theories (Boot, Greenbaum and Thakor, 1993) suggest that a major source of relationship benefits comes from proprietary information generated by the lender and the reusability of this information over repeated transactions. For large firms suffering from information asymmetry, borrowing from a relationship lender can overcome asset substitution and moral hazard problems and concerns of bankers(See H2). To test this, we propose the following model

$$\begin{aligned} AISD &= \beta_0 + \beta_1(REL(M)) + \beta_2(Borrower\ Information\ Opacity) \\ &+ \beta_3(REL(M)) \times (Borrower\ Information\ Opacity) \\ &+ \sum \beta_i(Loan\_Char_i) + \sum \beta_j(Borrower\_Char_j) + \sum \beta_k(Control_k). \end{aligned} \tag{4}$$

The regression model (4) is similar to equation (3) in the sense that we are still controlling for various loan and borrower characteristics that may influence the spread charged. However we also include an interaction term multiplying the relationship variable with the Borrower Information Opacity measure. If relationships are significantly more important for borrowers with higher information asymmetries we should expect to see β_3 to be significant and negative for borrowers faced with higher information asymmetries. Based on previous studies, we employ four different proxies to measure the information opacity of a borrower. These are borrower size, borrower's access to the public debt market as evidenced in existence of credit rating, borrower's tangibility ratio, and borrower's market to book ratio.

The results are reported in Table 5. The coefficient for REL(Dummy)$\times$Log(Assets) is 5.48 and is significant at the one percent level. The economic significance of this result is best illustrated by considering two hypothetical borrowers, both of whom borrow from relationship lenders. Assuming both have similar characteristics except size,with the first borrower small at the 25^{th} percentile of sample and the second borrower large (at the 75^{th} percentile). The difference in size (Log(93.7 million)-Log(1626.9 million)) multiplied by coefficient for the interaction term (5.48) implies that on average the smaller (thus informationally more opaque) borrower would receive a 15 bps *lower* spread on its loan *conditional on it being provided by a relationship lender.* This result shows that borrowing from a relationship lender is especially attractive for informationally opaque borrowers. As expected, smaller size by itself has an adverse effect on loan rate charged (Coefficient for Log(Assets) is negative and significant at the one percent level). Thus while smaller firms pay higher loan rates on average, using a relationship bank lowers the cost of those loans disproportionately for relatively smaller borrowers.

Next, we use the Not Rated dummy variable as a proxy for information opacity of the borrower. Not Rated equals one if the firm does not have a public debt rating and zero otherwise. Non-rated firms are considered to have higher information asymmetries as they are not monitored by credit rating agencies. For such firms, borrowing from relationship lenders should be especially beneficial. The results reported in the second column of Table 5 provide evidence in support of this argument. The coefficient for the interaction term (REL(Dummy)×Not Rated) is -10.73 (significant at the five percent level). Thus, on average, a relationship loan carries an interest rate 8 bps lower (obtained by summing the coefficients of relationship and interaction terms) for a informationally opaque (i.e. lacking debt rating) firm compared to a similar borrower that has a higher degree of public information (proxied by existence of public debt rating). Again, as expected, not having a rating exerts an independent effect on loan spreads (coefficient for Not Rated is positive and significant at the one percent level). While not rated borrowers do pay higher spreads over all, the benefits of borrowing from relationship lender are especially strong for these borrowers.

The results reported in Columns 3 and 4 provide further support for the argument that borrowing from relationship lenders is especially beneficial for informationally opaque borrowers. We calculate the tangibility ratio ($\frac{NPPE}{Total\ Assets}$) for all firms and define High Tangibility as a dummy variable that equals 1 if the borrower has a tangibility ratio higher than the sample median and 0 otherwise. Arguably, High Tangibility borrowers face lower information asymmetry and on average would pay lower spreads on their loans. However, increased informational transparency also implies that such firms would gain little by borrowing from a relationship bank since there is relatively less private information that a relationship bank can generate. The results reported in column 3, support this line of reasoning. The interaction term REL(Dummy)× High Tangibilty has a positive coefficient and is significant at the five percent level. On average, a Low Tangibility borrower would receive 7.8 bps lower spread by borrowing from relationship banks compared to borrowing from non-relationship lender. In contrast, an otherwise similar but high tangibility borrower would gain only 2 bps lower spread (sum of relationship and interaction term coefficients) by borrowing from a relationship lender versus borrowing from a non-relationship lender. Again, this implies that relationship borrowing benefits are larger for informationally opaque firms.

Our final proxy for information asymmetry between a borrower and its lender is the

Market to Book ratio of the borrower. Firms with high market to book ratio are typically expected to have a better investment opportunity set (Barclay and Smith, 1995) than low market to book ratio firms. This makes asset substitution risk especially relevant for such firms (Myers, 1977). We calculate Market to Book ratio for all firms in our sample and create a dummy variable (High Market to Book) which equals 1 if the firm's market to book ratio is higher than the sample median and 0 otherwise. As reported in Column 4, the interaction term REL× High Market to Book has a coefficient of -19.04 (significant at the one percent level). This implies that high market to book borrowers would pay 15 bps (sum of REL coefficient and interaction term coefficient) lower spread on borrowing from relationship bank compared to borrowing from non-relationship lender. For low market to book ratio firms there is no significant difference in spread charged for relationship versus non-relationship loans. Taken together, the results in Table 5 provide strong evidence to support H2.

4.4 Multivariate Tests H3

While the previous two hypotheses (H1 and H2) highlighted the impact of past relationships on the *price* of future loans (as proxied by AISD), the next two focus on two specific *non-price* terms of loan contracts: collateral requirements and loan maturity. First, we present our findings on how strong relationships and collateral requirement are inter-related. As described in H3, if borrower-lender relationships help address the moral hazard problem via information collection, we should expect that relationship loans are less likely to require collateral. To test H3 we estimate the following logit model:

$$\begin{aligned} Collateral &= \beta_0 + \beta_1(REL(M)) + \beta_2(Loan\ Amount) + \beta_3(Leverage) + \beta_4(Tangibility) \\ &+ \beta_5(Market\ to\ Book) + \beta_6(Loan\ Concentration) + \beta_7(Log(Maturity)) \\ &+ \beta_8(Not\ Rated) + \sum \beta_k(Control_k). \end{aligned} \tag{5}$$

Collateral is a dummy variable that equals 1 if the loan was secured and 0 otherwise. For nearly one-third of our loan sample LPC does not report whether the loans were secured by collateral or not. We first categorized such loans as unsecured. We also ran our tests by excluding all observations for which this data was missing.

We control for leverage, tangibility of assets, market-to-book, loan concentration (measured as the fraction of the loan size to the sum of existing debt plus the loan size), and default risk. We use loan concentration ($\frac{Loan\ Amount}{Existing\ Debt+Loan\ Amount}$) because if a particular loan facility is a significant portion of the firm's debt, it is more likely to be secured (Berger and Udell (1990); Boot, Thakor, and Udell (1991); Dennis, Nandy, and Sharpe (2000)).

Our results are reported in Table 6. The first three columns include the loans with missing data on secured status (such loans are coded as unsecured). Regardless of which measure of relationship we employ, the coefficient is negative and significant at the one percent level. Thus, a loan from a relationship lender is significantly less likely to require collateral. This is true even for large borrowers with access to public securities markets. These findings are consistent with the arguments that relationship lenders enjoy superior information and are thus less likely to insist on collateral. As reported in prior studies, we also find that loan facilities that are relatively large compared to existing debt are more likely to be granted on a secured basis. The coefficient for Loan Concentration is positive and significant at the one percent level. In the last column, we re-estimate our model but exclude all firms for which data on secured status was missing. This reduces our sample size by one-third. The results are very similar in magnitude and significance. These results suggest that past borrowing relationships reduce the requirement for posting collateral for future loans.

4.5 Multivariate Tests H4

In this section, we examine how past borrowing relationships affect (if at all) the maturity of the loan. We estimate the following model

$$
\begin{aligned}
Log(Maturity) &= \beta_0 + \beta_1(REL(M)) + \beta_2(Short\ Term\ LOC) \\
&+ \beta_3(REL(M)) \times (Short\ Term\ LOC) \\
&+ \beta_4(Long\ Term\ LOC) + \beta_5(REL(M)) \times (Long\ Term\ LOC) \\
&+ \beta_6(Term\ Loan) + \beta_7(REL(M)) \times (Term\ Loan) + \beta_8(Loan\ Amount) \\
&+ \beta_9(Log(Assets)) + \beta_{10}(Leverage) + \beta_{11}(Market\ to\ Book) \\
&+ \beta_{12}(Log(Asset\ Maturity)) + \beta_{13}(Collateral) \\
&+ \beta_{14}(Not\ Rated) + \sum \beta_k(Control_k). \qquad (6)
\end{aligned}
$$

The dependant variable Log(Maturity) is the natural log of the stated maturity of the loan facility (measured as length in months between facility activation date and maturity date). We model the relationship between debt maturity and past banking relationships after controlling for variables that are known determinants for debt maturity (see Barclay and Smith (1995); Barclay, Marx, and Smith (2003)). We control for firm size, leverage, market-to-book, and two additional variables that are unique to the maturity regressions. We use a measure of asset maturity which is defined as the weighted average of maturity of current assets and Net PPE (Appendix A provides more details). The intuition behind this variable is that firms match their debt maturity to asset maturity.

As a second measure of debt maturity, we include a dummy variable for regulated industries following Barclay and Smith (1995). This is because the higher regulatory oversight for these firms should result in lower agency costs of debt, which in turn, should result in greater use of longer maturity debt. In addition, we also control for default risk using the credit rating and include year dummies and dummies for debt type and debt purpose. The maturity of a loan facility also depends to a large extent on the type of loan facility offered; for example, term loans are typically of longer maturity than lines of credit. We control for the loan facility type and also include interaction terms in which we multiply the REL(M) with the loan facility type. Revolving Lines of Credit (LOC) and Term Loans represent almost 80% of our sample. The LOCs can be further divided in short term (less than 1 year) and long term (greater than 1 year). We control for these three types explicitly by including them as regressors.

The results of these regressions are presented in Table 7. The negative and significant coefficient for REL implies that relationship loans are associated with shorter maturity. The positive and significant coefficient on the interaction terms for LOCs and Term Loans, however, suggests that for bulk of loan facilities the association between past relationship and current loan maturity is insignificant (coefficients for REL and interaction terms are of similar magnitude but of opposite signs). The negative coefficient for REL is not consistent with maturity and relationship being alternative mechanisms for controlling debt induced agency costs.

Finally, an alternative explanation for this result could be in the choice of our econometric methodology which treats maturity (as well as other contract features) as independently determined. In reality, price charged, maturity, and collateral requirements are likely to be interdependent. To address this issue, we next employ a simultaneous equation framework, which is described in more detail in the next section.

4.6 Simultaneous estimation of price and non-price features of loan facilities

Previous empirical studies have largely ignored the potential interaction and trade-offs among the price and non-price terms of loans. To the extent that they are jointly determined, the true effects of relationships on these variables may be obscured. Melnik and Plaut (1986) model bank loans as a package of n contract terms that cannot be split and traded separately. Banks then offer an n-dimensional array of bundles from which to choose their contracts and borrowers tradeoff contract terms in determining their optimal choice. This approach indicates that price, maturity and collateral terms of a bank loan contract are interrelated. Consequently, we re-estimate the model specifications above for the price and non-price terms of loans using a simultaneous equation framework. We describe the simultaneous equation approach in detail below. We assume a unidirectional relationship between price (AISD) term and non-price (Collateral requirement and Maturity) terms. IN particular, we assume that collateral and maturity requirements of the loan contract act as inputs to the final loan price that is determined. At the same time, the relationship between Collateral and Maturity is assumed to be bidirectional (i.e.) the collateralization of the loan depends upon its maturity and vice versa. These assumptions are similar to those made by Dennis et al. (2000). The three equation structural model can be described as:

$$\left\{ \begin{array}{l} y_1 = \gamma_{12} y_2 + X_1 \beta_1 + \epsilon_1 \\ y_2 = \gamma_{21} y_1 + X_2 \beta_2 + \epsilon_2 \\ y_3 = \gamma_{31} y_1 + \gamma_{32} y_2 + X_3 \beta_3 + \epsilon_3 \end{array} \right\}$$

The endogenous variable Log(maturity), Collateral and AISD are denoted by y_1 , y_2, and y_3 and where X_1, X_2, and X_3 are the matrices of explanatory (exogenous) variables for each of the equations respectively. The structural parameters γ and β need to be estimated. We can be rewrite the structural model in compact form as:

$$Y\Gamma + XB = E \tag{7}$$

where Y is a $n \times 3$ matrix (n is the number of observations), X is a $n \times k$ matrix (k is the total number of exogenous variables), Γ is a 3×3 matrix of γ coefficients, B is a $k \times 3$ matrix of β coefficients and E is a $n \times 3$ matrix of error terms.

The common assumptions about E, the error matrix, written as

$$\left\{ \begin{array}{l} \tilde{E} = vec(E) = (\epsilon_{11}..\epsilon_{n1}, \epsilon_{12}..\epsilon_{n2}, \epsilon_{13}..\epsilon_{n3})' \;\; are \\ E(\tilde{E}) = 0 \;\; and \;\; E(\tilde{E}\tilde{E}') = \Sigma \otimes I_n \end{array} \right\}$$

where Σ is the variance covariance matrix of ϵ.

The reduced form of the above equations is

$$\left\{ \begin{array}{l} Y = X\Pi + V \quad where \\ \Pi = -B\Gamma^{-1} \;\; and \;\; V = -E\Gamma^{-1} \;\; and \\ the \;\; error \;\; vector \;\; \tilde{V} = vec(V) \;\; satisfies \;\; E(\tilde{V}) = 0 \;\; and \;\; E(\tilde{V}\tilde{V}') = \Omega \otimes I_n \;\; where \\ \Omega \;\; is \;\; given \;\; by \;\; \Sigma = \Gamma'\Omega\Gamma \end{array} \right\}$$

The crucial issue in the above simultaneous equation estimation is one of identification. That is, given X and Y, can we identify Γ, B and Σ? One can estimate the values of Π and Ω = ($\hat{\Pi}$, $\hat{\Omega}$) using the reduced from equation outlined above. The identification issue then is to uniquely back out Γ, B and Σ from the estimates of Π and Ω. From the reduced form set up, we know

$$\left\{ \begin{array}{l} \Pi = -B\Gamma^{-1} \;\; and \\ \Omega = \Gamma'^{-1}\Sigma\Gamma^{-1} \end{array} \right\}$$

By counting the number of known elements on the left and right hand side of the above equations, we examine identification of the structural form equations. Since we have 3 endogenous variables, there are a maximum of 3k elements in Π (assuming the entire set of k exogenous variables appear in all equations) and six elements in Ω (which is a 3x3 symmetric matrix). Thus, we have a total of 3k+6 known elements. The number of unknown elements are nine elements in Γ (which is a 3x3 matrix), six elements in Σ (which is a 3x3 symmetric matrix) and 3k elements in B. The total number of unknown elements are 3k+15. Thus, we are nine elements (3^2, where three is the number of endogenous variables) shy of identifying the structural parameters. In other words, there is more than one set of structural parameters that are consistent with the reduced form and the model is under identified. By setting γ_{ii} = -1, for i = 1 to 3, in Γ for all the three equations, we can achieve scaling normalization of the three endogenous variables. This still leaves us with six more restrictions necessary to determine the structural parameters from the reduced form parameters.

Rewriting the i^{th} equation from $\Pi = -B\Gamma^{-1}$ in matrix form we obtain,

$$\begin{bmatrix} \Pi & I_k \end{bmatrix} \begin{bmatrix} \Gamma_i \\ B_i \end{bmatrix} = 0$$

or

$$\begin{bmatrix} \Pi & I_k \end{bmatrix} \Delta_i = 0$$

where Γ_i and B_i represent the i^{th} columns of Γ and B respectively and defined compactly as Δ_i. Since the rank of $\begin{bmatrix} \Pi & I_k \end{bmatrix}$ is k, the above equation represents a system of k equations in k-2 unknowns. In order to achieve identification for this equation, we have to introduce linear restrictions as follows:

$$R_i \Delta_i = 0$$

where R_i is the matrix of exclusion restrictions to be imposed. Putting both of these equations together gives

$$\begin{bmatrix} \Pi \ \vdots \ I_k \\ R_i \end{bmatrix} \Delta_i = 0$$

It is clear that the exclusion restriction R_i for the i^{th} equation must provide at least two new pieces of information (i.e.) each equation in the system must have two exclusions or $Rank(R_i)$ must be at least two. In other words, for each endogenous variable on the right hand side of the structural equation, at least one exogenous variable must be excluded from this equation. This is the order condition which is necessary but not sufficient for identification. Further from the above equation it is also clear that $Rank(R_i\Delta)$ must be two for identification. This is the 'rank condition' which is a necessary and sufficient condition for identification. If $Rank(R_i)$ is greater than two, (i.e.) it provides more than two pieces of information the i^{th} equation is over identified.

Economically, in order to identify the simultaneous equation system, we use current ratio as a solvency variable that affects AISD but not debt maturity and collateralization. (The ratio of current assets to current liabilities is commonly used by lenders to assess the adequacy of cash flows and credit worthiness of a borrower). We use asset maturity, and a regulated industry dummy as variables that affect debt maturity (following the evidence in Barclay and Smith (1995)) but not AISD and collateralization. Asset Maturity is defined as a weighted average of current assets divided by cost of goods sold and Net PPE divided by depreciation and amortization. We follow the definition provided by Barclay, Marx, and Smith (2003) and estimate Asset Maturity = $\frac{CA}{(CA+NPPE)} \times \frac{CA}{COGS} + \frac{NPPE}{(CA+NPPE)} \times \frac{NPPE}{Depreciation}$. Finally, loan concentration is employed as a variable that affects collateralization of the debt but not AISD and debt maturity. This is based on the evidence in Berger and Udell (1990) who report that the greater the borrowing in the current deal relative to the size of the total debt, the greater is the likelihood of a lender asking for collateral. Following Berger and Udell (1990), we estimate Loan Concentration = $\frac{Loan\ Amount}{(Existing\ Debt+Loan\ Amount)}$. Thus based on the above discussion for each equation the $Rank(R_i)$ is greater than two and $Rank(R_i\Delta)$ is two. Thus equation by equation our system is overidentified.

The estimation of the system is complicated by the fact that while interest rate and maturity are continuous variables, the collateral is a discrete choice variable. We follow the approach suggested by Angrist (2001) and estimate a probit equation for the discrete choice variable and use the fitted value in the simultaneous system leads to consistent estimates of the coefficients.[16] We then use the three stage least squares (TSLS) method of estimation to exploit the correlation of the disturbances across equations which is described below.

We begin by writing the i^{th} equation in the reduced form system as

$$Y\Gamma_i + XB_i = \epsilon_i$$
$$y_i = Y_i\gamma_i + Y_i^*\gamma_i^* + X_i\beta_i + X_i^*\beta_i^* + \epsilon_i$$

where Y_i represents the vector of endogenous variables (other than y_i) in the i^{th} equation, Y_i^* represents the vector of endogenous variables excluded from the i^{th} equation, and similarly for X. Therefore γ_i^* and β_i^* are both equal to zero so that

$$y_i = Y_i\gamma_i + X_i\beta_i + \epsilon_i$$

[16]Brav et al. (2006) also employ a similar approach.

$$= \left[\begin{array}{cc} Y_i & X_i \end{array} \right] \left[\begin{array}{c} \gamma_i \\ \beta_i \end{array} \right] + \epsilon_i = Z_i \delta_i + \epsilon_i$$

Thus the system of equations can be written as

$$y = \tilde{Z}\delta + \epsilon \ and \ E(\epsilon\epsilon') = \Sigma \otimes I_n$$

From Zellner and Theil (1962), a fully efficient estimator is

$$\hat{\delta} = (\tilde{W}'(\Sigma^{-1} \otimes I)\tilde{Z})^{-1}(\tilde{W}'(\Sigma^{-1} \otimes I)y)$$

where $\tilde{W}'$ indicates an instrumental variable matrix in the form of $\tilde{Z}$. Zellner and Theil (1962) suggest the following three stage procedure for estimating δ.

Stage 1: Calculate $\hat{Y}_i$ for each equation (i=1,2,3) using OLS and the reduced form.
Stage 2: Use $\hat{Y}_i$ and X_i denoted compactly as $\hat{Z}_i = (\hat{Y}_i, X_i)$ and calculate

$$\hat{\delta}_i^{2SLS} = (\hat{Z}_i{}'\hat{Z}_i)^{-1}(\hat{Z}_i{}'y_i) \ \ and$$

$$\hat{\sigma}_{ii} = \frac{1}{N}(y_i - Z_i y_i \hat{\delta}_i^{2SLS})'(y_i - Z_i \hat{\delta}_i^{2SLS})$$

Stage 3: Calculate the IV-GLS estimator

$$\hat{\delta}^{3SLS} = (\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)\hat{Z})^{-1}(\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)y)$$

The asymptotic variance-covariance matrix can be estimated by

$$est.asy.var(\hat{\delta}^{3SLS}) = (\hat{Z}'(\hat{\Sigma}^{-1} \otimes I)\hat{Z})^{-1})$$

The results of the simultaneous equations are presented in Table 8. Column 1 reports the effect of past relationships on loan spreads controlling for joint determination of maturity and collateral. The change of econometric specification has a large impact on measured benefit of relationship on loan prices. The coefficient for REL(Dummy) in Column 1 is -14.75. This is almost three times as large as the coefficient in simple OLS specification (reported in column 1 of table 4). Once we control for endogenity of various loan contract terms, our results show that borrowing from a relationship lender can reduce the cost of borrowing by up to 15 bps. These results are statistically as well as economically significant as this represents an almost six percent savings on a median AISD of 212.5 bps. Table 8 shows that the measured inter-relationship between price and non-price terms is highly sensitive to econometric estimation methodology. Column 1 shows that the sign for both Maturity and Collateral switch when compared to results reported in Table 4. Maturity has a positive and significant (at the one percent level) coefficient - this is economically intuitive, longer maturity loans should carry higher interest rate as the asset substitution risk higher for longer maturity loans (Myers, 1977). Similarly the coefficient for Collateral is negative and significant. These results make economic sense, implying that borrowers can trade-off for lower price loans by offering collateral. This result is in sharp contrast to existing reported results (including those reported in Table 4 of this paper) which have documented *positive* relationship between loan rate and collateral requirement.[17] Since these results were obtained by regressing loan price on collateral, they implicitly assume collateral requirement is exogenous. We offer new evidence that such tests may be flawed and could result in biased estimates. The signs for other variables that may affect AISD are as expected and similar to those obtained in simple OLS regressions.

The coefficient of Log(maturity) and Collateral in columns 2 and 3 are positive and significant at the one percent level. This provides strong evidence that these terms are inter-related. The signs are similar to those obtained in single OLS regressions reported in Tables 5 and 6. These results confirm the prediction 4 of Boot, Thakor and Udell (1991) which implies that longer maturity loans are more likely to be collateralized. [18] The coefficient for Asset Maturity, our exogenous variable for Maturity regression is positive and significant at the one percent level, implying that firms try to match loan maturity to asset maturity. The coefficient for Regulated industry dummy however is negative, this is opposite of results obtained by Barclay and Smith (1995). This difference is probably due to the fact that we focus on bank loans while they examine public bond yields. Arguably, regulated firms borrow longer term from public markets and shorter term from banks. The last column provides results that highlight the relationship between collateral and relationship. Again as expected probability of having to post collateral is significantly lower (at the one percent

[17]A number of studies including Leeth and Scott (1986), Berger and Udell (1990) have reported such positive relationships between collateral and loan price.

[18]Boot, Thakor and Udell (1991) argue that *"dissipative costs"* i.e. likely loss in value of collateral, are higher for a longer maturity loan. Thus, they predict that longer maturity loans would be characterized by a higher level of collateral.

level) for borrowers who obtain loans from their relationship lenders. While all other variables enter with predicted signs. Loan Concentration, our exogenous measure of Collateral requirement has a positive and significant coefficient suggesting that it is an appropriate instrument. in sum, the evidence presented in Table 8 suggests that simple OLS regression of interest rates charged on other loan terms such as collateral or maturity (controlling for firm characteristics) may suffer from some endogenity bias.

4.7 Multivariate Tests H5

Under H5 we hypothesize that an additional benefit for a relationship borrower is increased access to financing. Faulkender and Petersen (2006) provide empirical evidence that a number of firms may be constrained in their ability to obtain debt financing. Furthermore, this constraint may be more binding for firms lacking strong borrowing relationships. Our univariate tests (Panel B, Table 3) provide partial evidence for this when we compared the leverage ratios of firms borrowing from their relationship lender versus those borrowing from non-relationship lenders. The relationship borrowers are 22% more leveraged than non-relationship borrowers. However, these univariate tests do not control for various other loan and borrower characteristics. To better understand how past relationships are associated with availability of bank loans we use multivariate test. Since credit availability cannot be observed directly, we construct a proxy that attempts to measure the incremental loan amount available for borrowing. This is estimated as the ratio of loan amount being borrowed to the total assets of the borrower. To test if this ratio is related to the strength of relationships, we estimate a multivariate model of the following form.

$$\begin{aligned} \frac{Loan\ Amt}{Assets} &= \beta_0 + \beta_1(REL(M)) + \sum \beta_i(Loan\_Char_i) \\ &+ \sum \beta_j(Borrower\_Char_j) + \sum \beta_k(Control_k). \end{aligned} \tag{8}$$

The dependent variable $\frac{Loan\ Amt}{Asset}$ is the ratio of dollar amount of loan facility to the total assets of the borrower. This ratio is the marginal amount of loan financing available to a borrower of a given size. A higher ratio implies better credit availability. The first three columns of Table 9 (Panel A) report the effect of prior relationships on credit availability. We use multiple specifications for the relationship variable: REL(Dummy), REL(Amount), and REL(Number). The coefficient for all specifications are postive and significant at the one percent level. The coefficient for REL(Dummy) is 0.02 - this implies that on average, borrowing from a relationship lender would be associated with a two percent larger loan availability (as percent of assets) compared to borrowing from a non-relationship lender. In the last column we include an interaction term to examine whether the benefit is stronger for informationally opaque firms. The positive and significant coefficient of REL(Dummy)× High Market to Book implies that for firms facing high information asymmetries, borrowing from relationship lenders is associated with larger loans. In addition the coefficients for Profitability and Market to Book ratio are positive and significant at the one percent level for all specifications. Thus, better access to bank loans is positively associated with the borrower profitability and future prospects.

In Panel B we re-estimate our model using a different proxy for credit availability. We scale the loan amount by existing total long term debt of the borrower. The results are essentially unchanged. Thus, we find that not only are relationship loans marked by better spreads, longer maturity and lower collateral, they also tend to be associated with greater credit availbility.

5 Conclusion

Our paper seeks to measure the direct benefits that a bank-borrower relationship generates for large, widely owned public borrowers. We also examine the channels through which any such benefits are shared between borrower and lender. We find significant and measurable estimates of some of these benefits for the borrower. For a firm that borrows from a bank with which it has had a past relationship this translates into a significant lowering of costs that range from 5 to 10 basis points. We also find that as the information opacity of a borrower increases, the observed reduction in the cost of borrowing due to a relationship becomes greater. Indeed, such savings may exceed 15 bps for borrowers suffering from large information asymmetries. Our results provide evidence that hypothesized economies in information production due to repeated interaction between the same lender and borrower are at least partly reflected in the price of loans. We also find that relationship loans are significantly less likely to be secured by collateral. Our results are robust to estimation methodology which allows loan spread, collateral requirement and loan maturity to be determined jointly in a simultaneous system. The relationship borrowers also obtain larger loans (scaled by the borrower's asset size) compared to non-relationship borrowers. In sum, we report significant benefits of borrowing from relationship lenders even for *large publicly traded* firms.

APPENDIX A

Description of Main Variables

The table below describes the main variables used in this study.

Variable	Definition
AISD	All-in-Drawn Spread charged by the bank over LIBOR for the drawn portion of the loan facility obtained from the LPC database
Asset Maturity	Weighted average of current assets divided by cost of goods sold, and Net PPE divided by depreciation and amortization - as defined in Barclay, Marx, and Smith (2003). Asset Maturity = $\frac{CA}{(CA+NPPE)} \times \frac{CA}{COGS} + \frac{NPPE}{(CA+NPPE)} \times \frac{NPPE}{Depreciation}$
Collateral	Dummy variable that equals one if loan facility is secured with collateral and zero otherwise, Taken from LPC Database.
Current Ratio	Current Assets (Compustat data item 4) divided by Current Liabilities (Compustat data item 5)
Dummy for Regulated Industry	Dummy variable that equals one for firms in the Utilities industry under the Fama-French industry classification and zero otherwise
Investment Grade	Dummy variable that equals one if the borrower is rated by S&P AND the rating is above investment grade.
Leverage	Long-Term Debt (Compustat data item 9) divided by Total Assets (Compustat data item 6)
Loan Concentration	Dollar amount of the loan divided by (existing debt of the firm+dollar amount of the loan)
Log(Interest Coverage)	Log of (1+ interest coverage), where interest coverage is EBITDA (Compustat data item 13) divided by interest expense (Compustat data 15)
Log(Maturity)	Log of the maturity period (in months) of the bank loan obtained from the LPC database
Log(Assets)	Natural log of book value of total assets (Compustat data item 6)
Loan Amount	The loan facility amount obtained from the LPC database
Market-to-Book	Book value of assets minus book value of equity plus market value of equity (Compustat data item 6-Compustat data item 60+Compustat data item 24 × Compustat data item 25) divided by book value of assets (Compustat data item 6)
Not Rated	Dummy variable that equals one if the borrower is not rated (Compustat item 280) and zero otherwise
Profitability	EBITDA (Compustat data 13) divided by Total Assets (Compustat data 6)
Purpose Dummies	Dummy variable for each debt purpose, including Debt repayment, Corporate Purposes, Working Capital taken from LPC database.
REL(Dummy)	Measure of Relationship for a particular loan. If any of the lead bank on that facility has provided at least one loan in the previous 5 years, REL (Dummy)=1
REL(Amount)	Measure of Relationship for a particular loan. For all the lead lenders for that facility we calculate the fraction of dollar amount of loans in the previous 5 years that were provided by the lead lenders. REL (Amount) is the maximum value across all lead banks for that facility.
REL(Number)	Measure of Relationship for a particular loan. For all the lead lenders for that facility we calculate the fraction of number of loans in the previous 5 years that were provided by the lead lenders. REL (Number) is the maximum value across all lead banks for that facility.
Tangibility	Net PP&E (Compustat data item 8) divided by Total Assets (Compustat data item 6)
Year Dummies	Dummy variable for each year in the sample period.

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TABLE 1

Descriptive Statistics of Loan Facilities

The table below provides the descriptive statistics for the sample of loan facilities. The statistics are reported separately for loans from relationship lenders **REL(Dummy)** =1 and loans from non-relationship lenders **REL(Dummy)** =0. For any particular loan facility **REL(Dummy)** equals one if any of the lead lenders for that loan facility had been a lead lender on any loans to that borrower in the 5 years preceding the loan facility.

Panel A :Calendar Time Distribution of Loans

Year of Loan Sanction	No Relationship REL(Dummy) = 0	Relationship REL(Dummy) = 1	Total
1986	58	3	61
1987	535	52	587
1988	1,028	223	1,251
1989	878	325	1,203
1990	767	412	1,179
1991	665	469	1,134
1992	856	606	1,462
1993	1,001	805	1,806
1994	968	987	1,955
1995	870	1,092	1,962
1996	1,350	1,244	2,594
1997	1,390	1,623	3,013
1998	1,157	1,532	2,689
1999	1,102	1,423	2,525
2000	761	1,625	2,386
2001	717	1,447	2,164
2002	639	1,267	1,906
2003	430	1,232	1,662
Total	15,172	16,368	31,539

TABLE 1(Continued)

Panel B: Industry Classification of Borrowers			
One Digit SIC Code	No Relationship REL(Dummy) = 0	Relationship REL(Dummy) = 1	Total
0	46	59	105
1	653	996	1,649
2	1,686	2,450	4,136
3	3,373	3,657	7,030
4	1,095	2,029	3,124
5	1,602	2,098	3,700
7	1,222	1,482	2,704
8	496	582	1,078
9	58	48	106
Total	10,231	13,401	23,632

Panel C: Loan Purpose			
Year of Loan Sanction	No Relationship REL(Dummy) = 0	Relationship REL(Dummy) = 1	Total
Acquisition line	634	713	1,347
Corporate purposes	4,541	4,362	8,903
CP backup	282	1,587	1,869
Debt Repayment	3,300	4,249	7,549
Debtor-in-possession	131	207	338
LBO/MBO	730	374	1,104
Recapitalization	465	340	805
Takeover	1,385	1,900	3,285
Working Capital	2,780	1,964	4,744
Other	918	668	1,586
Total	15,166	16,365	31,530

TABLE 2

Summary Statistics for Key Loan and Borrower Characteristics

The table below provides summary statistics of various loan and borrower characteristics. Panel A reports key characteristics of the Loan Facilities and Panel B reports the same for borrower characteristics. AISD is the "All In Spread-Drawn", which is the all-inclusive cost of a drawn loan to the borrower. This equals the coupon spread over LIBOR on the drawn amount plus the annual fee and is reported in basis points. Loan Facility Size is the dollar amount of loan facility in millions. AISU is the fee charged on the undrawn loan amounts. AISD, AISU and Annual Fee are reported in basis points. Maturity is length in months between facility activation date and maturity date. Syndicate, Collateral, and Investment Grade are percent of facilities that have the stated attribute. To be classified as Investment Grade the loan has to be rated BBB or above by S&P and zero otherwise. Asset is the book value of assets of the borrower as reported in the COMPUSTAT. Leverage is the ratio of book value of total debt to book value of total assets. Coverage is the ratio of EBITDA to interest expenses. Profitability is the ratio of EBITDA to Sales. Tangibility is the ratio of NPPE to Total Assets. Current Ratio is the ratio of Current Assets to Current Liabilities. Market to book is the ratio of (Book value of assets - Book value of equity + market value of equity) divided by book value of assets.

Variable	N	**Mean**	**Std. Dev.**	**Min**	**25^{th} Pctile**	**Median**	**75^{th} Pctile**	**Max**
Panel A: Loan Characteristics								
AISD (Basis Points)	27,048	216.53	139.90	17.50	100.00	212.50	300.00	630.00
AISU (Basis Points)	15,313	33.36	23.43	4.00	15.00	30.00	50.00	121.43
Fee Upfront (Basis Points)	9,003	66.42	72.92	2.50	20.00	50.00	100.00	312.50
Fees Annual (Basis Points)	6,661	19.53	25.62	1.25	7.50	12.50	24.70	100.00
Loan Facility Amount ($ Millions)	31,536	190.0	500.0	0.5	13.0	50.0	180.0	2000.0
Maturity of Loan (Months)	28,454	43.2	28.45	3	17	36	60	120
Collateral	19,876	0.82	0.39	0.0	1.0	1.0	1.0	1.0
Syndicate	31,539	0.79	0.41	0.0	1.0	1.0	1.0	1.0
Panel B: Borrower Characteristics								
Borrower Assets ($ Millions)	23,794	2,953.1	11,287.0	6.6	93.7	361.0	1,626.9	38,750.0
Coverage	22,717	40.02	729.69	0	2.4	4.83	10.03	308.63
Leverage	23,605	0.25	0.19	0	0.08	0.23	0.37	0.82
Profitability	23,953	0.14	0.13	0	0.06	0.12	0.19	0.61
Tangibility	23,711	0.34	0.23	0.02	0.16	0.29	0.50	0.90
Current Ratio	22,684	2.08	2.50	0.32	1.14	1.66	2.41	8.86
Market to Book	23,577	1.75	1.45	0.66	1.09	1.36	1.90	7.22
Investment Grade	8,645	0.50	0.50	0.0	0.0	0.0	1.0	1.0
Not Rated	31,539	0.73	0.45	0.0	0.0	1.0	1.0	1.0

TABLE 3
Key Price and Non-Price Loan Contract Terms - Relationship versus Non-Relationship Loans

Panel A segregates the entire sample in non-relationship (**REL(Dummy)**=0) and relationship (**REL(Dummy)**=1) loans. The first two columns report the mean (medians in parentheses) values for various price and non-price terms of loan contract. Panel B provides similar details for borrower specific characteristics. The last column provide *t*-statistic for difference in means (*z*-statistic for Wilcoxan Rank sum test).

Panel A: Loan Characteristics			
	No Relationship REL(Dummy) = 0 (A)	Relationship REL(Dummy) = 1 (B)	*t*- statistic (A)-(B) (*z*- statistic for Wilcoxan Sum Test)
AISD in basis points	250.19	186.64	38.29***
	(250.00)	(175.00)	(23.28***)
AISU in basis points	37.51	30.32	18.97***
	(37.50)	(25.00)	(23.28***)
Upfront fee in basis points	75.99	53.58	14.59***
	(50.00)	(33.33)	(18.05***)
Annual fee in basis points	23.83	16.99	10.60***
	(13.00)	(12.50)	(8.46***)
Facility Size ($ millions)	93.40	274.00	-32.88***
	(23.50)	(105.00)	(-70.28***)
Maturity (months)	43.43	42.99	1.31
	(36.00)	(37.00)	(-0.73)
Percent Secured	0.87	0.76	19.56***
	(1.00)	(1.00)	(12.10***)
Syndicate	0.67	0.91	-53.50***
	(1.00)	(1.00)	(-51.23***)
Panel B: Borrower Characteristics			
Total assets ($ millions)	1327.71	4200.12	-19.61***
	(141.33)	(756.77)	(-59.53***)
Coverage=(EBITDA/Interest)	42.18	38.41	0.39
	(4.51)	(5.07)	(-10.17***)
Leverage=LT Debt/Total Assets	0.21	0.27	-24.93***
	(0.18)	(0.26)	(-27.56***)
Profitability=EBITDA/Sales	0.12	0.16	-21.72***
	(0.10)	(0.13)	(-26.55***)
Tangibility=NPPE/Total Assets	0.32	0.36	-10.30***
	(0.27)	(0.30)	(-10.80***)
Current Ratio=CA/CL	2.34	1.88	13.85***
	(1.79)	(1.57)	(17.92***)
Market to Book	1.76	1.74	1.45
	(1.32)	(1.39)	(-8.55***)
Investment Grade	0.46	0.51	-3.68***
	0.00	1.00	(-3.68)***
Not Rated	0.85	0.61	49.91***
	1.00	1.00	(48.05)***

TABLE 4
Effect of lending relationships on cost of borrowing.

This table provides the OLS estimates (corrected for heteroscedasticity) of the following equation.

$$AISD \quad = \quad \beta_0 + \beta_i(REL(M)) + \sum \beta_i(Loan\_Char_i) + \sum \beta_j(Borrower\_Charj) + \sum \beta_k(Control_k).$$

The dependant variable AISD is the the coupon spread over LIBOR on the drawn amount plus the annual fee. REL(M) is the measure of relationship strength, estimated in 3 different ways: REL(Dummy)(1 if there is a relationship with any of the lead banks in the last 5 years before the present loan and 0 otherwise), REL(Number)(ratio of number of deals with the lead bank(s) to total number of loans borrowed by the firm in the last 5 years before the current loan), and REL(Amount) (ratio of dollar value of deals with the lead bank(s) to total dollar value of loans borrowed by the firm in the last 5 years before the current loan). For a facility with multiple lead banks, the maximum REL(M) value among all the lead banks is used. Maturity is length in months between facility activation date and maturity date. Loan Amount is the loan facility size. Syndicate, Collateral, Revolver and Term loan are dummy variables that equal one if the facility has the stated attribute and zero otherwise. Not Rated Equals one if the borrower dose not have rating from S&P and zero otherwise. Investment Grade equals one if the loan is rated BBB or above by S&P and zero otherwise. Log(Assets) is the natural log of book value of assets of the borrower as reported in the COMPUSTAT. Leverage is the ratio of book value of total debt to book value of assets. Coverage is the ratio of EBITDA to interest expenses. Profitability is the ratio of EBITDA to Sales. Tangibility is the ratio of NPPE to Total Assets. Current Ratio is the ratio of Current Assets to Current Liabilities. Market to book is the ratio of (Book value of assets-book value of equity+market value of equity) divided by book value of assets. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors.(*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

Table 4 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	468.88***	469.42***	469.13***	284.00***	284.28***	283.64***
	(36.27)	(36.26)	(36.27)	(41.47)	(41.75)	(41.57)
Rel(Dummy)	-4.87**			-10.02**		
	(2.35)			(4.04)		
Rel(Number)		-6.00**			-13.02***	
		(2.62)			(4.27)	
Rel(Amount)			-5.96**			-12.88***
			(2.57)			(4.22)
Log(Maturity)	-12.31***	-12.30***	-12.31***	-.28	-.28	-.27
	(1.49)	(1.48)	(1.49)	(2.00)	(2.00)	(2.00)
Loan Amount	-.003	-.003	-.002	-.004**	-.004**	-.004**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Syndicate	-30.96***	-30.89***	-30.84***	-17.28*	-16.89*	-16.74*
	(3.82)	(3.81)	(3.81)	(9.87)	(9.82)	(9.82)
Log(Assets)	-21.54***	-21.61***	-21.57***	-9.62***	-9.74***	-9.62***
	(1.17)	(1.17)	(1.17)	(2.16)	(2.18)	(2.18)
Log(1+coverage)	-23.28***	-23.25***	-23.25***	-20.31***	-20.18***	-20.18***
	(1.46)	(1.46)	(1.46)	(3.42)	(3.42)	(3.42)
Leverage	50.15***	50.32***	50.36***	49.41***	50.07***	50.26***
	(8.49)	(8.45)	(8.47)	(16.41)	(16.38)	(16.41)
Profitability	-63.34***	-63.02***	-63.07***	-52.93***	-52.17***	-52.26***
	(14.32)	(14.34)	(14.34)	(19.76)	(19.72)	(19.70)
Tangibility	-18.48***	-18.53***	-18.54***	-13.04	-12.68	-12.81
	(6.52)	(6.53)	(6.53)	(9.60)	(9.66)	(9.66)
Current Ratio	-3.03***	-3.03***	-3.04***	-.34	-.31	-.33
	(.69)	(.69)	(.69)	(.70)	(.70)	(.69)
Market to Book	-2.46***	-2.44***	-2.44***	-1.70	-1.63	-1.67
	(.81)	(.81)	(.81)	(1.51)	(1.52)	(1.52)
Collateral	71.93***	71.85***	71.86***	77.62***	77.64***	77.66***
	(2.75)	(2.75)	(2.75)	(4.56)	(4.55)	(4.56)
Not Rated	8.31***	8.26***	8.28***			
	(3.19)	(3.20)	(3.20)			
Investment Grade				-50.37***	-50.00***	-50.07***
				(4.80)	(4.81)	(4.81)
Obs.	17469	17469	17469	6437	6437	6437
R^2	0.50	0.50	0.50	0.58	0.58	0.58

TABLE 5
Borrower Information Opacity and Benefits of Relationship

This table provides the OLS regression (corrected for heteroscedasticity) estimates of the following equation.

$$\begin{aligned} AISD &= \beta_0 + \beta_1(REL(M)) + \beta_2(Borrower\ Information\ Opacity) \\ &+ \beta_3(REL(M)) \times (Borrower\ Information\ Opacity) \\ &+ \sum \beta_i(Loan\_Char_i) + \sum \beta_j(Borrower\_Char_j) + \sum \beta_k(Control_k). \end{aligned}$$

The dependant variable AISD is the the coupon spread on the drawn amount plus the annual fee. REL(Dummy)equals 1 if there is a relationship with any of the lead banks in the last 5 years before the present loan and 0 otherwise. Maturity is length in months between facility activation date and maturity date. The Loan Amount is the loan facility size. Syndicate, Collateral, Revolver and Term loan are dummy variables that equal one if the facility has the stated attribute and zero otherwise. Not Rated Equals one if the borrower dose not have rating from S&P and zero otherwise. BORROWER INFORMATION OPACITY is measured by 4 different proxies: Borrower's Size (Log of Assets), if the borrower is rated (Not Rated Dummy), if the borrower has NPPE to Total Assets ratio higher than the sample median (High Tangibility), and if the borrower has Market to Book ratio higher than the sample median (High Market to Book).Log(Assets) is the natural log of book value of assets of the borrower as reported in the COMPUSTAT. Leverage is the ratio of book value of total debt to book value of assets. Coverage is the ratio of EBITDA to interest expenses. Profitability is the ratio of EBITDA to Sales. Tangibility is the ratio of NPPE to Total Assets. Current Ratio is the ratio of Current Assets to Current Liabilities. Market to book is the ratio of (Book value of assets-book value of equity+market value of equity) divided by book value of assets. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors.(*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

Table 5 (Continued)

	(1)	(2)	(3)	(4)
Constant	485.93***	462.41***	471.29***	467.67***
	(36.37)	(36.18)	(36.20)	(36.25)
Rel(Dummy)	-36.05***	2.67	-7.81***	4.67
	(7.99)	(4.07)	(2.93)	(2.89)
Rel(Dummy) × Log(Assets)	5.48***			
	(1.32)			
Rel(Dummy) × Not Rated		-10.73**		
		(4.83)		
Rel(Dummy) × Hi Tangibility			5.94*	
			(3.51)	
Rel(Dummy) × High Market to Book				-19.44***
				(2.89)
Log(Maturity)	-12.24***	-12.28***	-12.28***	-11.93***
	(1.49)	(1.48)	(1.49)	(1.48)
Loan Amount	-.004*	-.003	-.003	-.002
	(.002)	(.002)	(.002)	(.002)
Syndicate	-28.63***	-30.34***	-30.79***	-30.93***
	(3.79)	(3.80)	(3.81)	(3.81)
Log(Assets)	-24.62***	-21.51***	-21.59***	-21.83***
	(1.22)	(1.17)	(1.16)	(1.16)
Log(1+coverage)	-22.90***	-23.18***	-23.28***	-22.61***
	(1.46)	(1.46)	(1.46)	(1.46)
Leverage	51.44***	50.32***	50.17***	50.53***
	(8.51)	(8.48)	(8.49)	(8.46)
Profitability	-64.12***	-63.63***	-62.12***	-56.76***
	(14.26)	(14.30)	(14.32)	(14.28)
Tangibility	-18.06***	-18.26***	-25.01***	-21.29***
	(6.50)	(6.52)	(7.64)	(6.51)
Current Ratio	-2.99***	-3.03***	-3.06***	-3.20***
	(.69)	(.69)	(.69)	(.71)
Market to Book	-2.59***	-2.48***	-2.49***	-.81
	(.81)	(.81)	(.81)	(.82)
Collateral	71.91***	71.90***	71.85***	71.24***
	(2.73)	(2.75)	(2.74)	(2.72)
Not Rated	9.05***	15.52***	8.37***	7.55**
	(3.18)	(4.66)	(3.19)	(3.19)
Obs.	17469	17469	17469	17469
R^2	.5	.5	.5	.5

Table 6
Lending Relationships and Probability of Pledging Collateral

This table provides the logit regression estimates of the following equation.

$$
\begin{aligned}
COLLATERAL &= \beta_0 + \beta_1(REL(M)) + \beta_2(Loan\ Amount) + \beta_3(Leverage) + \beta_4(Tangibility) \\
&+ \beta_5(Market\ to\ Book) + \beta_6(Loan\ Concentration) \\
&+ \beta_7(Log(Maturity) + \beta_8(Not\ Rated) + \sum \beta_k(Control_k).
\end{aligned}
$$

The dependant variable COLLATERAL is a dummy variable that equals 1 if a loan facility is secured by collateral and 0 otherwise. REL(M) is the measure of relationship strength, estimated in 3 different ways: REL(Dummy)(1 if there is a relationship with any of the lead banks in the last 5 years before the present loan and 0 otherwise), REL(Number)(ratio of number of deals with the lead bank(s) to total number of loans borrowed by the firm in the last 5 years before the current loan), and REL(Amount) (ratio of dollar value of deals with the lead bank(s) to total dollar value of loans borrowed by the firm in the last 5 years before the current loan). For a facility with multiple lead banks, the maximum REL(M) value among all the lead banks is used. The Loan Amount is the loan facility size. Leverage is the ratio of book value of total debt to book value of assets. Tangibility is the ratio of NPPE to Total Assets. Market to book is the ratio of (Book value of assets-book value of equity+market value of equity) divided by book value of assets. Loan Concentration is the ratio of that loan facility amount to sum existing debt and the amount of loan facility. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors.(*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

Table 6 (Continued)

	(1)	(2)	(3)	(4)
Constant	-1.67*	-1.68*	-1.68*	1.06
	(.86)	(.87)	(.86)	(1.33)
Rel(Dummy)	-.46***			-.39***
	(.05)			(.07)
Rel(Number)		-.47***		
		(.05)		
Rel(Amount)			-.48***	
			(.05)	
Loan Amount	-.001***	-.001***	-.001***	-.001***
	(.0002)	(.0002)	(.0002)	(.0002)
Leverage	2.36***	2.38***	2.38***	3.55***
	(.20)	(.20)	(.20)	(.31)
Tangibility	-.58***	-.57***	-.57***	-.92***
	(.13)	(.13)	(.13)	(.19)
Market to Book	-.08***	-.08***	-.08***	-.09***
	(.02)	(.02)	(.02)	(.02)
Loan Concentration	1.07***	1.11***	1.11***	.92***
	(.11)	(.11)	(.11)	(.16)
Log(Maturity)	.08***	.08***	.08***	.19***
	(.03)	(.03)	(.03)	(.04)
Not Rated	.68***	.69***	.68***	.91***
	(.07)	(.07)	(.07)	(.09)
Obs.	21055	21055	21055	13731
Pseudo R^2	0.19	0.19	0.19	0.21

TABLE 7
Lending Relationships and Loan Maturity

This table provides the OLS regression (corrected for heteroscedasticity) estimates of the following equation.

$$
\begin{aligned}
Log(Maturity) &= \beta_0 + \beta_1(REL(M)) + \beta_2(Short\ Term\ LOC) + \beta_3(REL(M)) \times (Short\ Term\ LOC) + \beta_4(Long\ Term\ LOC) \\
&+ \beta_5(REL(M)) \times (Long\ Term\ LOC) + \beta_6(Term\ Loan) + \beta_7(REL(M)) \times (Term\ Loan) \\
&+ \beta_8(Loan\ Amount) + \beta_9(Log(Assets)) + \beta_{10}(Leverage) \\
&+ \beta_{11}(Market\ to\ Book) + \beta_{12}(Collateral) + \beta_{13}(Not\ Rated) + \sum \beta_k(Control_k).
\end{aligned}
$$

The dependant variable Log(Maturity) is the natural log of the stated maturity of the loan facility (Measured as length in months between facility activation date and maturity date). REL(M) is the measure of relationship strength, estimated in 3 different ways: REL(Dummy)(1 if there is a relationship with any of the lead banks in the last 5 years before the present loan and 0 otherwise), REL(Number)(ratio of number of deals with the lead bank(s) to total number of loans borrowed by the firm in the last 5 years before the current loan), and REL(Amount) (ratio of dollar value of deals with the lead bank(s) to total dollar value of loans borrowed by the firm in the last 5 years before the current loan). For a facility with multiple lead banks, the maximum REL(M) value among all the lead banks is used. Short Term LOC is dummy variable that is 1 if the loan facility is a line of credit with maturity less than 1 year and 0 otherwise. Long Term LOC is dummy variable that is 1 if the loan facility is a line of credit with maturity greater than 1 year and 0 otherwise. Term Loan is dummy variable that is 1 if the loan facility is a term loan and 0 otherwise. The Log(Assets) is the natural log of the book value of assets of the borrower. Loan Amount is the loan facility size. Leverage is the ratio of book value of total debt to book value of assets. Market to book is the ratio of (Book value of assets-book value of equity+market value of equity) divided by book value of assets. Asset Maturity is the weighted average of current assets divided by cost of goods sold, and Net PPE divided by depreciation and amortization - as defined in Barclay, Marx, and Smith (2003). Regulated Industry is a dummy variable that equals one for firms in the Utilities industry under the Fama-French industry classification and zero otherwise. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors. (*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

Table 7 (Continued)

	(1)	(2)	(3)
Constant	3.13***	3.11***	3.13***
	(.17)	(.17)	(.17)
Rel(Dummy)	-.29***		
	(.03)		
Rel(Number)		-.29***	
		(.03)	
Rel(Amount)			-.31***
			(.03)
Short Term LOC × Rel(Dummy)	.26***	.25***	.26***
	(.05)	(.06)	(.06)
Long Term LOC × Yr. * Rel(Dummy)	.38***	.39***	.40***
	(.03)	(.04)	(.04)
Term Loan × Rel(Dummy)	.29***	.29***	.30***
	(.04)	(.04)	(.04)
Loan Amount	-.0000403***	-.0000403***	-.0000383***
	(8.30e-06)	(8.73e-06)	(8.34e-06)
Log(Assets)	.05***	.05***	.05***
	(.005)	(.005)	(.005)
Leverage	.30***	.30***	.30***
	(.03)	(.03)	(.03)
Short Term LOC	-1.11***	-1.08***	-1.09***
	(.04)	(.04)	(.04)
Long Term LOC	.40***	.43***	.42***
	(.03)	(.03)	(.03)
Term Loan	.63***	.66***	.65***
	(.03)	(.03)	(.03)
Market to Book	.004	.004	.004
	(.004)	(.004)	(.004)
Log(Asset Maturity)	.03***	.03***	.03***
	(.008)	(.008)	(.008)
Regulated	-.43***	-.44***	-.44***
	(.04)	(.04)	(.04)
Collateral	.02	.02	.02
	(.01)	(.01)	(.01)
Not Rated	-.05***	-.05***	-.05***
	(.02)	(.02)	(.02)
Obs.	20934	20934	20934
R^2	.42	.42	.42

TABLE 8
Simultaneous Estimation of Loan Spread, Maturity and Collateral

This table provides estimations of simultaneous system of equations to estimate the impact of past relationships on Loan Spread, Maturity and Collateral.

$$\left\{ \begin{array}{l} y_1 = \gamma_{12} y_2 + X_1 \beta_1 + \epsilon_1 \\ y_2 = \gamma_{21} y_1 + X_2 \beta_2 + \epsilon_2 \\ y_3 = \gamma_{31} y_1 + \gamma_{32} y_2 + X_3 \beta_3 + \epsilon_3 \end{array} \right\}$$

Our endogenous variable Log(maturity), Collateral and AISD are denoted by y_1 , y_2, and y_3 and where X_1, X_2, and X_3 are the matrices of explanatory (exogenous) variables for each of the equations respectively. The structural parameters γ and β need to be estimated. AISD is the the coupon spread over LIBOR on the drawn amount plus the annual fee. Log(Maturity) is the natural log of the stated maturity of the loan facility (Measured as length in months between facility activation date and maturity date). Collateral is a dummy variable that equals 1 if the loan was secured and zero otherwise. REL(Dummy)(1 if there is a relationship with any of the lead banks in the last 5 years before the present loan and 0 otherwise). Short Term LOC is dummy variable that is 1 if the loan facility is a line of credit with maturity less than 1 year and 0 otherwise. Long Term LOC is dummy variable that is 1 if the loan facility is a line of credit with maturity greater than 1 year and 0 otherwise. Term Loan is dummy variable that is 1 if the loan facility is a term loan and 0 otherwise. The Log(Assets) is the natural log of the book value of assets of the borrower. Loan Amount is the loan facility size. Leverage is the ratio of book value of total debt to book value of assets. Market to book is the ratio of (Book value of assets-book value of equity+market value of equity) divided by book value of assets. Asset Maturity is the weighted average of current assets divided by cost of goods sold, and Net PPE divided by depreciation and amortization - as defined in Barclay, Marx, and Smith (2003). Regulated Industry is a dummy variable that equals one for firms in the Utilities industry under the Fama-French industry classification and zero otherwise. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors. (*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

	AISD	Log(Maturity)	Collateral
	(1)	(2)	(3)
Constant	465.61***	2.30***	0.13***
	(27.40)	(0.15)	(0.01)
REL(Dummy)	-14.75***	-0.11***	-0.11***
	(3.58)	(0.03)	(0.001)
Log(Maturity)	15.09***		0.01***
	(2.20)		(0.001)
Collateral	-74.70***	2.33***	
	(32.98)	(0.14)	
Syndicate	-34.10***		
	(2.90)		
Short Term LOC × REL(Dummy)		0.30***	
		(0.05)	
Long Term LOC × REL(Dummy)		0.41***	
		(0.02)	
Term Loan × REL(Dummy)		0.32***	
		(0.03)	
Short Term LOC		-1.05***	
		(0.04)	
Long Term LOC		0.36***	
		(0.02)	
Term Loan		0.67***	
		(0.02)	
Leverage	64.71***	-0.31***	0.44***
	(10.64)	(0.05)	(0.003)
Loan Amount	-0.008	0.0001***	-9.2E-05***
	(0.003)	(1.3E-05)	(8.4E-07)
Profitability	-58.62***		
	(9.09)		
Market-to-Book	-3.69***	0.03	-0.01***
	(0.79)	(.004)	(0.0003)
Not Rated	27.40***	-0.43***	0.17***
	(5.29)	(.02)	(0.001)
Log(Assets)	-28.39***	0.08***	
	(1.24)	(.005)	
Tangibility	-32.98***		-0.13***
	(6.09)		(0.002)
Log(1+coverage)	-28.25***		
	(0.89)		
Current Ratio	-3.33***		
	(0.48)		
Asset Maturity		0.087***	
		(.006)	
Regulated Industry		-0.40***	
		(.03)	
Loan Concentration			0.20***
			(0.002)
Obs.	17454	17454	17454
χ^2	13251	14421	299669

TABLE 9
Lending Relationships and Access to Loans.

Panel A of this table provides the OLS estimates (corrected for heteroscedasticity) of the following equation.

$$\frac{Loan\ Amount}{Assets} = \beta_0 + \beta_1(REL(M)) + \sum \beta_i(Loan\_Char_i) + \sum \beta_j(Borrower\_Char_j) + \sum \beta_k(Control_k).$$

Panel B is essentially the same specification but the dependent variable is $\frac{Loan\ Amount}{Long\ Term\ Debt}$. The dependent variable is the dollar amount of loan facility scaled by either the total assets of the borrower or the total long term debt of the borrower. REL(M) is the measure of relationship strength, estimated in 3 different ways (we report it only for REL(M) constructed over a 5-year look back window. In Panel A, we report results for these 3 different relationship measures- REL(Dummy)(1 if there is a relationship with the bank in the last 5 years before the present loan and 0 otherwise), REL(Number)(ratio of number of deals with the bank to total number of deals of the firm in the last 5 years before the current loan), and REL(Amount) (ratio of dollar value of deals with the bank to total dollar value of deals of the firm in the last 5 years before the current loan). For a facility with multiple lead banks, the maximum REL(M) value among all the lead banks is used. Syndicate is a dummy variables that equal one if the facility was syndicated and zero otherwise. Not Rated equals one if the borrower is in not rated by S&P and zero otherwise. Log(Assets) is the natural log of book value of assets of the borrower as reported in the COMPUSTAT. Profitability is the ratio of EBITDA to Sales. Tangibility is the ratio of PPE to Total Assets. Current Ratio is the ratio of Current Assets to Current Liabilities. Market to book is the ratio of (Book value of assets-Book value of equity+market value of equity) divided by book value of assets. In addition to the variables reported, the regression also includes industry dummies based on the one-digit SIC code of the borrower, dummies for stated purpose of the facility and calendar year dummies. Numbers in the parentheses are standard errors.(*** Significant at one percent level, ** Significant at five percent level ,* Significant at 10 percent level)

Table 9 (Continued)

Panel A

	(1)	(2)	(3)	(4)
Const.	.50***	.50***	.50***	.50***
	(.04)	(.04)	(.04)	(.04)
REL(Dummy)	.02***			.01***
	(.004)			(.004)
REL(Number)		.03***		
		(.004)		
REL(Amount)			.03***	
			(.004)	
REL(Dummy)× High Market to Book				.02***
				(.005)
Syndicate	.19***	.19***	.19***	.19***
	(.005)	(.005)	(.005)	(.005)
Log(Assets)	-.06***	-.06***	-.06***	-.06***
	(.002)	(.002)	(.002)	(.002)
Log(1+coverage)	.001	.001	.001	.0006
	(.002)	(.002)	(.002)	(.002)
Profitability	.14***	.13***	.13***	.13***
	(.02)	(.02)	(.02)	(.02)
Tangibility	-.03***	-.03***	-.03***	-.03**
	(.01)	(.01)	(.01)	(.01)
Current Ratio	.001	.001	.001	.001
	(.001)	(.001)	(.001)	(.001)
Market to Book	.01***	.01***	.01***	.01***
	(.002)	(.002)	(.002)	(.002)
Not Rated	-.01**	-.01**	-.01**	-.01**
	(.005)	(.005)	(.005)	(.005)
Obs.	20004	20004	20004	20004
R^2	.31	.31	.32	.32

Table 9 (Continued)

Panel B	(1)	(2)	(3)	(4)
Const.	.96***	.97***	.97***	.97***
	(.06)	(.06)	(.06)	(.06)
REL(Dummy)	.02***			-.0006
	(.006)			(.007)
REL(Number)		.03***		
		(.007)		
REL(Amount)			.04***	
			(.007)	
REL(Dummy)× High Market to Book				.04***
				(.008)
Syndicate	.18***	.18***	.18***	.18***
	(.01)	(.01)	(.01)	(.01)
Log(Assets)	-.09***	-.09***	-.09***	-.09***
	(.003)	(.003)	(.003)	(.003)
Log(1+coverage)	.12***	.12***	.12***	.12***
	(.004)	(.004)	(.004)	(.004)
Profitability	-.35***	-.35***	-.35***	-.36***
	(.04)	(.04)	(.04)	(.04)
Tangibility	-.16***	-.16***	-.16***	-.16***
	(.02)	(.02)	(.02)	(.02)
Current Ratio	-.0005	-.0004	-.0004	-.0002
	(.002)	(.002)	(.002)	(.002)
Market to Book	.02***	.02***	.02***	.01***
	(.003)	(.003)	(.003)	(.003)
Not Rated	.004	.005	.005	.005
	(.01)	(.01)	(.01)	(.01)
Obs.	19034	19034	19034	19034
R^2	.39	.39	.39	.39