Relationship bank behavior during borrower distress*

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ABSTRACT

This paper provides a comprehensive examination of the time series behavior of relationship banks around and during borrower distress. Prior to distress, banks offer preferential contract terms in the form of lower interest rates and less collateral requirement to their relationship borrowers. After the onset of distress, relationship banks and outside banks offer similar interest rates. However, there is some evidence that suggests that relationship banks give significantly lower collateral requirement relative to outside banks even during distress. Relationship banks reduce the discount in loan rate (relative to the outside banks) two years prior to distress and continue this behavior for two years after distress.

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ABSTRACT

This paper provides a comprehensive examination of the time series behavior of relationship banks around and during borrower distress. Prior to distress, banks offer preferential contract terms in the form of lower interest rates and less collateral requirement to their relationship borrowers. After the onset of distress, relationship banks and outside banks offer similar interest rates. However, there is some evidence that suggests that relationship banks give significantly lower collateral requirement relative to outside banks even during distress. Relationship banks reduce the discount in loan rate (relative to the outside banks) two years prior to distress and continue this behavior for two years after distress.

1. Introduction

There is a large theoretical literature in relationship lending which suggests that long run relationships between borrowers and banks can lead to significant benefits to borrowing firms in terms of better loan contract terms (Boot and Thakor (1994), Berlin and Mester (1999)). Empirical tests of these benefits have focused on banks and borrowers when borrowers are performing well financially.[1] Little work has focused on the impact of lending relationships when borrowing firms undergo financial distress. This paper seeks to fill this relatively unstudied, but important, gap in the literature.

External financing is not easily available to a borrowing firm when it experiences distress. The incentive of a relationship bank to continue offering preferential terms to its borrower during distress may be reduced because of hold-up problems (Sharpe (1990), Rajan (1992)), desire on part of the bank to develop a reputation for being tough with borrowers (Armendariz (1990)), or a reduced likelihood of repeat business due to the onset of distress (Bharath, Dahiya, Saunders, and Srinivasan (2007)).

However, the relationship bank also has incentives in the opposite direction. This may arise because of the bank's desire to protect its reputation with other borrowers (Boot, Greenbaum, and Thakor (1993)), to protect its outstanding loans (Dewatripont and Maskin (1995)), the borrower's threat to strategically default (Anderson and Sundaresan (1996)), governmental pressure to help distressed borrowers (Peek and Rosengren (2005)), or loan originating officers being reluctant to recognize losses (Hertzberg, Liberti, and Paravisini (2010)).

Motivated by the above, we first examine the behavior of relationship banks during borrower distress using a large cross-sectional time series loan data to publicly traded firms in the US from the LPC Dealscan database. Subsequently, we also examine the time series pattern of relationship lending, both before and after distress.

[1] See for example, Peterson and Rajan (1994) and Berger and Udell (1995). Degryse, Kim, and Ongena (2009) provides a survey of this literature.

Specifically, we examine the impact of borrower distress on the loan rate and the likelihood of requirement of collateral (henceforth, collateral requirement), focusing on the differences in relationship bank behavior across normal and distressed conditions. First, consistent with prior literature, we document a significant benefit of relationship lending in normal times, in terms of lower loan rates and collateral requirement. However, after the onset of distress, loan rates on relationship and outside bank loans become comparable. In contrast, collateral requirement continues to be significantly lower for relationship bank loans relative to outside bank loans. In fact, when the bank and the borrower have had a strong relationship, collateral requirement becomes even lower in distress relative to normal times.

We also find extremely interesting patters of relationship bank behavior around distress using a two-year window around the distress period. Loan rates increase two years prior to distress and continue to remain high two years after the end of distress. Depending on the specification, collateral requirement may increase one year prior to distress to one year after the end of distress. These patterns are observed both in relationship and outside bank loans. Second, the discount in loan rate given by relationship banks in normal times becomes insignificant two years prior to distress and continues to be insignificant two years after distress. The collateral requirement during distress continues to be lower with relationship lenders. For borrowers with a strong relationship, there is a lower collateral requirement in the year of distress and one year subsequent to distress. We are among the first to study and identify this interesting pattern of lending by relationship banks around borrower distress.

Next, we analyze the possible effects of endogeneity on the results that we obtain. The baseline empirical specification includes firm fixed effects that should account for time invariant borrower heterogeneity. To further account for this, we employ propensity score matching and instrumental variables. We also employ a matching method along the lines of Ioannidou and Ongena (2010) to account for lender heterogeneity. Lastly, we employ

a Heckman selection model to account for the impact of the future option of filing for bankruptcy on the terms of lending during distress. Our results are generally consistent with that in the panel regression analysis, although, with some estimation methods, we find that both loan rates and collateral for outside loans and relationship loans are comparable in distress.

We also analyze the robustness of our results to alternative proxies of distress. The main specifications use a distress measure based on Merton's distance to default. We use accounting- measures of distress - the Altman's Z score as well as a simple proxy of distress based on negative cash flow. We also use alternative measures of relationship lending. We find similar results with all of these alternatives.

Lastly, we examine alternative benefits of relationship lending - in terms of fraction of lending by relationship banks to total bank lending, likelihood of filing for bankruptcy conditional on distress, and the number of covenants present in relationship loans in distress. For each of these potential alternatives, the results do not indicate any benefits of relationship lending in distress. Relationship banks shrink their lending with the onset of distress; relationship lending in distress is not associated with a lower likelihood of future bankruptcy; and relationship loans in distress do not have lower number of covenants relative to outside loans.

Our study makes two main contributions. We are the first to examine the time series behavior of loan contract terms (price and collateral requirement) by relationship banks during and around borrower distress to publicly traded firms in a market-based economy such as the US. In contrast to the papers by Elsas and Krahnen (1998) and Peek and Rosengren (2005), who find that German and Japanese banks tend to help their borrowers in distress, we find that degree of help, if any, provided by US banks to their borrowers is limited to a lower collateral requirement. Institutional differences between the US versus Germany or Japan, such as whether or not an economy is bank-dominated may account for this difference. Inter-temporal risk sharing may be more feasible in bank-dominated

economies as suggested in Allen and Gale (1997).

Second, we document an interesting inter-temporal variation in the benefits of relationship lending, with price and non-price benefits in normal times and only non-price benefits during distress. Some studies such as Berger and Udell (1995) and Peterson and Rajan (1994) debate whether the benefits of relationship lending to borrowers accrue mainly on the price or non-price dimension, where the non-price dimension studied is the quantity of the loan. Adding to this debate, we document evidence of variation in the price benefits as well as non-price benefits (here, the collateral requirement) across time for the same borrower.

The rest of paper proceeds as follows. In Section 2, we survey related literature. In Section 3, we describe the construction of the data set and various variables used for empirical tests. In Section 4, we conduct the univariate analysis and multivariate tests. In Section 5, we present our conclusions.

2. Related Literature

Modern financial intermediation theory, starting with the seminal paper of Diamond (1984), posits a central role for the specialness of the banks. Boot and Thakor (1994) theoretically show that long standing relationships between borrowers and their lenders can result in better loan contract terms. Likewise, Berlin and Mester (1999) build a model where banks insure borrowers from aggregate credit risk shocks. In several of these theoretical models, bank behavior during distress is of central importance. For example, in the models by Rajan (1992) and Chemmanur and Fulghieri (1994), the bank makes better liquidation and continuation decisions relative to arm's length financing. Thus, a careful study of relationship bank behavior during distress is of interest theoretically.

There is also a large empirical literature that supports the notion that relationships are valuable to borrowers. Indirect evidence of benefits of relationship lending has been

documented in several studies.[2] Further, benefits of relationship lending in the form of lower interest rates and/or less collateral and/or loan availability have been documented in Peterson and Rajan (1994), Berger and Udell (1995) and Bharath, Dahiya, Saunders, and Srinivasan (2011). However, these studies do not specifically focus on borrower distress.

Similarly, there are several empirical studies that examine the resolution of financial distress (Wruck (1990), Asquith, Gertner, and Scharstein (1994)) as well as the role of bank versus public debt in this resolution (James (1995)). However, there is relatively little that focuses on the differences in the behavior of relationship banks and non-relationship banks during distress, which is the key focus of this study.

There are a few studies on relationship lending during using non-US data. Specifically, Hoshi, Kashyap, and Scharfstein (1990) examine the role of banks in reducing financial distress, however, they focus more on investment efficiency. Elsas and Krahnen (1998) study and Peek and Rosengren (2005) study bank behavior during borrower distress in Japan and Germany, however, their focus is on the quantity or the likelihood of relationship lending, not so much on the loan rate and collateral. Further, there are important institutional differences between these economies and the US. The richness of our data set allows us analyze the time series pattern of the behavior of relationship banks as well as carefully analyze several layers of endogeneity including that the impact of future DIP lending in bankruptcy. Another paper using US data, Dahiya, Saunders, and Srinivasan (2003), focuses on the impact of borrower distress on relationship bank stock return, whereas our focus is on the impact of borrower distress on contract terms offered by the relationship bank.

We focus on studying the behavior of relationship lending during firm distress prior to bankruptcy. The reason for focusing on distress (and not bankruptcy) is that existing literature such as Dahiya, John, Puri, and Ramırez (2003) and Chatterjee, Dhillon, and

[2]See James (1987), Lummer and McConnell (1989), Billett, Flannery, and Garfinkel (1995) and Puri (1996).

Ramırez (2004) study DIP lending during bankruptcy.[3]

3. Data Sample Construction

3.1. Data source

The data set used for the empirical analysis is a cross-sectional time series loan sample that comes from the Dealscan database maintained by the Loan Pricing Corporation (henceforth, LPC), merged to the CRSP/COMPUSTAT Merged 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. Borrowers in the LPC database are manually matched with the merged CRSP and Compustat database, after excluding financial service companies and real estate companies. The loan data starts in 1986 and ends in 2006.

Following Drucker and Puri (2005), we use the LPC reported "All-in-Spread-Drawn" (hereafter *Fee*) as the measure of interest rate for a loan. *Fee* is the coupon spread over LIBOR assuming the loan is fully drawn plus the annual fee. If a loan is classified as secured in the LPC database, collateral takes a value of 1. If not, it takes a value of 0. Lower values of both of these variables will be used as evidence for benefits to borrowers from relationship lending.

For several empirical tests, we need accounting information from the Compustat database. We use the most recent accounting information that is publicly available on the date that the loan facility's starting date. To be conservative, we assume that a firm's accounting information is available 6 months after it's fiscal year ending month. Although not the focus of our study, for some ancillary tests, we also require the year and the identities of firms filing for bankruptcy. We obtain these by combining the CRSP database and the UCLA-LoPucki Bankruptcy Research Database.

[3]In an earlier version of the paper, we include DIP loans in bankruptcy. We document that DIP loans by relationship banks have lower fees and collateral consistent with the above paper's results.

3.2. Relationship measures

3.2.1. Definition of lead bank

Several loans in the LPC database are syndicated loans where many banks are retained in several different roles. Hence, before defining the relationship measures, it is important to identify the banks that play a lead role. We follow the methods used in Sufi (2007) and Bharath, Dahiya, Saunders, and Srinivasan (2011) to classify banks into the lead role.

In particular, a bank is defined as playing a lead role in a given loan facility if any one of the following conditions were met - (1) The bank is given a lead arranger credit for the given loan facility or (2) the bank was retained in any of the following roles: (a) Agent, (b) Arranger, (3) Administrative Agent, (4) Lead bank, and (5) Sole lender. The rationale for this selection is that banks retained in these roles typically retained a large fraction of syndicated loans (over 25% on average), and for the last role, the given loan is not syndicated at all. Consequently, it is reasonable to assume that banks retained in these roles are truly one of the lead lenders in the given loan facility. All measures of relationship lending are constructed only using lenders retained in a lead role as defined above.

3.2.2. Definition of relationship

Next, we elaborate on the construction of relationship measures. For each loan, we have a look back period of 5 years from the starting date of the loan. A given loan is classified as a relationship loan (*Relloan* =1) if any of the lead lenders retained in the given loan facility was retained as the lead lender in any loan taken by the same borrower over the last 5 years.

As an additional measure of lending relationships, we define a firm and a lender as maintaining a strong relationship if more than 50% loans (using the number of loans) in the last 5 years came from the same bank.[4] A dummy variable (*Strongrelloan*) takes a value of 1 if a strong relationship lender is retained for the current loan and 0 otherwise.

[4]This is similar to the underwriter loyalty variable constructed in Burch, Nanda, and Warther (2005).

For borrowers where there was no loan in the past 5 years, neither of these variables are defined. A detailed description of the construction of relationship measures is given in Appendix B.

Construction of relationship measures is complicated by the fact that the sample period was one where several banks merged with one another. We collect data on such mergers using the SDC merger database and news searches on the bank mergers in our sample. In case of a merger, we assume that all lending relationships of both the merging banks carry over to the new merged bank. In all merger cases, the effective date of the merger is used for computing relationships of the new merged bank. In cases where we cannot identify the exact effective date, we use the end of the year in which the merger is effective. Also, there are several subsidiaries of the same bank that may be present in the loan sample. To identify subsidiaries of the same ultimate parent, we search the web sites of the bank and we use the National Information Center of the Board of Governors of the Federal Reserve System (http://www.ffiec.gov/nicpubweb/nicweb/nichome.aspx) to identify the ultimate parent. We also search in the Company profiles within the Hoover's database which is a part of Lexis Nexis. Our search procedure is conservative in that we assign subsidiaries to the same parent only if we can identify with a high degree of certainty that a given bank is indeed the subsidiary of a given parent.

3.3. Definition of distress

Our principal measure of distress is based on the option pricing model developed by Merton (1974). This method is being used by the KMV corporation (a subsidiary of Moody's) and forms the basis of the market price based measures of bankruptcy prediction.[5] For each year and each month, we compute the expected default frequency (EDF, henceforth) as implied by the KMV-Merton model for all firms in the merged CRSP-Compustat database.

[5]Shumway (2001) and Hillegeist, Keating, Cram, and Lundstedt (2004) provide evidence that market based measures of financial distress provide better prediction of bankruptcy than the earlier accounting based measures such as the Altman score and the Zmijewski score. The exact methodology for computation is detailed in Appendix A. In robustness tests, we use several alternate measures for distress.

Subsequently, for each calendar year, we sum up the months where the EDF of each borrowing firm in LPC database lies in the top 10% of the unconditional EDF distribution for all firms for all years and all months.[6] If this sum is equal to or greater than 6, we classify the given firm year as one where the borrowing firm is distressed. At the end of this process, each firm year when the firm has sufficient trading and accounting data available is either classified as distressed (*Distress*=1) or not distressed (*Distress*=0). Given the above classification of firm years, the classification of loans into normal times and distress is relatively straightforward. A loan facility with a starting date in a normal year is classified as a normal loan, and one made during a distress year is classified as a distressed loan.

As mentioned earlier, we need bankruptcy data for some empirical tests. We use the filing year of bankruptcy as the year of bankruptcy. For firms which file for bankruptcy after delisting, we use the year of delisting as the year of bankruptcy (Chava and Jarrow (2004)).

4. Empirical Analysis

4.1. Summary statistics

The total sample size, after matching the LPC Dealscan database with CRSP and COMPUSTAT, consists of 16519 loan facilities with 1113 distressed loans and the remaining 15406 loans made in normal times. We exclude all DIP loans as this is not the focus of this study.

Panel A of Table 1 provides firm characteristics for firms classified as normal or distressed. The difference in firm characteristics in these categories provides an independent justification for the distress measure, as it is constructed based solely on the price dynamics of the firm's stock price, the total assets and total debt of the firm. For example, the log of

[6]Note that the distribution of EDF's for the entire universe of CRSP-Compustat merged firms is used in computation of this percentile.

the coverage ratio, defined as $1+\frac{EBITDA}{Interest\ Expenses}$ is 2.67 for the distressed sample whereas it is 28.76 during normal times. Likewise, the profitability of firms in normal times is 16% while it is 9% in distressed times. Further, firms classified as distressed also have a lower current ratio. This suggests that the measure of distress is reasonable when evaluated using the firm's accounting variables that measure firm performance or liquidity.

Panel B of this table reports differences in loan characteristics (fee, collateral, maturity and size) across firms in these two sub-samples. As expected, there is a large increase in the fee as a firm goes from a normal condition to a distressed condition. The mean fee during distress is 342 basis point spread, relative to a mean value of 173 basis point spread in normal times. Likewise, the percentage of collateralized loans is 43% in normal times while it is 72% in distressed times. The size of the loan and its maturity also decrease in distress. Thus, loan contract terms also reflect the onset of distress. This provides a further confirmation that the distress measure does indeed reflect an increasing level of credit risk.

Table 1 Panel C presents summary statistics for the number of relationship banks retained per facility. The median number of relationship banks is 1 in both types of financial conditions. A definition of all variables used in the empirical analysis is provided in Appendix C.

4.2. Univariate tests

In this subsection, we present univariate comparisons of fees charged and the percentage of collateralized loans. In Table 2 panel A, we use the relationship loan dummy to stratify the sample and in Panel B, we use the strong relationship loan dummy to stratify the sample. In both cases, relationship loans have much lower fees and collateral requirement in normal times. The magnitudes of the differences are quite significant. For example, a relationship loan in normal times has a 51 basis point lower fee relative to a non-relationship loan in normal times. Likewise, the probability that a non-relationship loan in normal times

is collateralized is 53% whereas the probability that a relationship loan in normal times is collateralized is 39%.

In contrast, for the distress sub-sample, the differences in fees are insignificant. However, collateral requirement between relationship and outside loans continues to differ by around 12%. The pattern is similar if one were to examine differences between loans made by lenders with a strong relationship and those made by lenders without a strong relationship (Table 2, Panel B). The results in Table 2 provide support for the reduced incentives for banks to help their borrower in distress in terms of less preferential loan terms. However, there appears to be difference in the way relationship banks behave after the onset of distress in terms of fees and collateral requirement.

Since several of these results could be impacted by differences in firm characteristics as well as loan characteristics across the sub-sample of relationship and outside borrowers, we investigate whether these results hold after controlling for these differences in the next section.

4.3. Loan contract terms during distress

This subsection examines the impact of relationships after the onset of distress using a multivariate regression of the following form:

$$FEE_{i,j} = \beta_0 + \beta_1 Relationship_{i,j} + \beta_2 Distress*Relationship_{i,j} + \sum \beta_k Control_{k,i,j} + Firm_i$$

$$Collateral_{i,t} = \beta_0 + \beta_1 Relationship_{i,j} + \beta_2 Distress*Relationship_{i,j} + \sum \beta_k Control_{k,i,j} + Firm_i$$

where *'i'* is the suffix for firm and *'j'* is the suffix for the loan. Firm and year fixed effects are included to account for unobservable firm and year variation of the dependent variables. The fee regression is estimated using panel regression with firm fixed effects and standard errors clustered at the firm level, and the collateral regression is estimated using

the logistic model, similarly with firm fixed effects and standard errors clustered at the firm level.

The net effect of relationships in normal times is measured by β_1, and the net effect of relationships during distress is measured by the sum of β_1 and β_2. In addition, several control variables (defined in Appendix C) motivated by prior studies such as Berger and Udell (1990) and Berger and Udell (1995) are used to control for the effect of time varying loan and company characteristics on the loan rate and collateral requirement. In addition, dummy variables for the rating of the borrower, loan type and distribution method are added to further control for cross-sectional differences in these variables that may impact the fee and collateral requirement.

The results of this analysis are presented in Table 3. Both *Relloan* and *Strongrelloan* are significantly negative for regressions in the non distress sample, which indicates that in normal times, lending relationship/strong lending relationship provides benefits to the borrower both in terms of lower fees and lower likelihood of collateral. In contrast, during distress, the net effect of relationships ($\beta_1 + \beta_2$) becomes insignificant on the fee charged in distress.[7]

However, the effect of relationships continues to be significantly negative on the collateral requirement. Using strong relationships, the results are materially similar. In fact, when a borrower and lender have a strong relationship, there is an additional incremental reduction of collateral requirement in distress. Thus, once firms enter distress, relationship and non-relationship loans are similar in price terms, but borrowers appear to continue having non-price benefits in terms of lower collateral requirement. Other variables have expected signs consistent with prior literature.

[7]The last row of Table 3 presents the relevant statistics, F or χ^2, for the fee and collateral regressions respectively.

4.4. Time series behavior of relationship banking

The previous sub-section examined the behavior of relationship banks in the distress year. Next, we examine the time series of evolution of the loan rate as the borrower approaches distress and emerges from it. To implement this approach, we construct a time event dummy for each firm distress observation. Specifically, we create dummy variables for two years prior to distress (T-2), one year prior to distress (T-1), and similarly for one (T+1) and two (T+2) years subsequent to distress. Further, we add interaction terms for the relationship variable with each of these dummy variables to examine the time series behavior of relationship banking prior to and subsequent to distress.

One complication that arises when constructing these time event dummies is that we need to explicitly account for adjoining distress events and overlaps of the time event dummies across two distress events of the same firm. For the first case, when a firm is distressed for two or more years consecutively, we treat the entire time period as a single distress observation. Thus, for a firm that is in distress in 1995 and 1996, both years would be treated as the distress year. Further, loans in 1993 and 1994 would be treated as observations in T-2 and T-1 respectively for this firm distress event, and loans in 1997 and 1998 would be treated as observations in T+1 and T+2 respectively.

In the second case, when the distress events do not occur in consecutive years, but the time windows surrounding the distress events overlap, which would happen if two firm distress years are separately by less than 4 years, we adopt the following procedure. For two distress events separated by exactly one year, we assign the intermediate year to exactly one of the distress events randomly. Thus, if a firm is in distress in 1995 and 1997, all loan observations in 1996 are randomly assigned either to year T-1 for the 1997 distress observation, or to year T+1 for the 1995 distress observation, but not both. Note that loans in the distress year are always assigned to the distress dummy only. Thus, even though the loan observations for 1995 would be the T-2 year observations for the distress event in 1997, they are only assigned to the distress event dummy. For distress events separated

by 2 years, we again randomly assign each of the intervening year loan observations to one of the two distress events, but not both. We adopt a similar procedure for distress events separated by 3 years for the one year where the time windows overlap. This procedure ensures that any given loan observation is not double counted in the regression.[8]

4.4.1. Univariate analysis of time series behavior

First, we examine the pattern of fees around the distress event dummy in Figure 1. Even by year T-2, there is a sharp increase in the fees for loans made both by relationship and by outside banks, relative to all other loans made outside of this time window. This pattern continues till the end of the time window. An interesting observation is that difference in the fees between relationship and outside loans in T-2 is around 40 basis points, which is the roughly the same difference between relationship and outside loans outside of the event window. The same holds true for collateral. However, in T-1, this difference in fees essentially shrinks to zero and this continues in the distress year as well.

Similar to the fees, there is a dramatic increase in the collateral requirement two years prior to distress. As with the fees, the difference in collateral requirement of relationship and outside loans in year T-2 is around 8%, similar to the difference of relationship and outside bank collateral requirements for all other loan observations. However, in the distress year, and year T+1, the difference between relationship and outside collateral requirement widens. It is interesting that bank loan contracts react to the onset of distress even prior to distress event. To test if banks are able to anticipate oncoming distress, we examine the pattern of EDF for the distressed firms prior to the distress year. This pattern mirrors that of the loan contract terms suggesting that banks react to increasing default probabilities by increase the loan rate and collateral requirement.

Overall, the time series pattern of relationship lending around distress reveals an interesting dichotomy in the behavior of relationship banks. On one hand, there is a convergence

[8] As a robustness test, we also excluded all the overlapping observations from the estimation and obtain similar results.

of the price of relationship and outside bank loans, while at the same time, there is a divergence in the collateral requirement. While other studies, for example, Peterson and Rajan (1994) suggest that the benefits of relationship lending may be reflected to a greater extent in non-price terms, this paper documents that the benefits may vary depending on the financial condition of the borrower.

4.4.2. Multivariate Analysis of time series behavior

Next, we examine the extent to which the above intuition is valid using a multivariate regression adding the distress and time event dummies, as well as their interaction with the two relationship proxies to the regression specification in Table 3. The results of this regression are provided in Table 4. First, the pattern of the event year dummies follows a strong inverse U pattern with the fee peaking in the distress year. The increase in likelihood of collateral follows a similar pattern, although the increase is significant only in the distress year and one year subsequent to distress. Further, when we examine interactions of relationship variables with the event year dummies, we find an extremely interesting pattern. In particular, the net effect of relationships on the fee becomes insignificant *two years prior to distress* and continues to be so *two years subsequent to distress*.[9]

In contrast to the fee results, relationship loans have a significantly lower likelihood of collateral in the year of distress using Relloan, and both in the distress year and in year T+1, using Strongrelloan. Thus, while relationship banks react to distress by adjusting the fees, they continue to give benefits to their clients in non-price terms. This also confirms the intuition we graphically saw in Figure 1. We believe that this is the first paper that documents this interesting time pattern of relationship bank behavior prior to distress.

Prior literature, for example, Peterson and Rajan (1994) argues that relationship lending benefits to borrowers are primarily concentrated in non-price terms such as greater loan size. However, Berger and Udell (1995), using a sub-sample of lines of credit, find both evidence for price benefits as well in terms of lower loan rates. Our paper adds a third

[9]In one specification, the relationship effect on fees is negative in the year prior to distress.

dimension to this debate. In particular, we document an inter-temporal variation in the benefits of relationship lending based on the financial condition of the borrower, something not studied earlier.

4.5. Endogeneity of relationship bank financing

One concern here is that the decision to form a relationship may be endogenous. In particular, banks may select to form relationships only with firms that have lower credit risk. On the other hand, the reverse may also be true. Firms that form relationships could have a higher degree of credit risk. In this case, the relationship dummy simply proxies for a higher degree of credit risk.

The firm fixed effects, that are included in the main empirical specification, should control for unobservable firm specific factors that are time invariant and impact the dependent variable. To additionally test for time varying factors specific to the borrower that may impact impact formation of relationships and at the same time impact the loan rate and/or collateral, we use two popular methods suggested in the literature - propensity score matching and instrumental variables.

4.5.1. Propensity Score Matching

Heckman, Ichimura, and Todd (1997) propose the Propensity Score Matching method (PSM) as a method for treatment evaluation where the selection into the treatment is based on observables. This methodology has been used by Drucker and Puri (2005) in the context of bundling of loans and underwriting. In our case, the relevant treatment variable is the relationship dummy. We follow the procedure for the implementation of the PSM method as in Drucker and Puri (2005).

To implement this, each relationship/strong relationship loan in distress is matched with another loan in distress, that had approximately the same probability of having been a relationship or strong relationship loan, but in fact was not. Once the matching is done,

average fees and collateral requirement are calculated for each group of loans.[10] Table 5 shows results from propensity score matching. The results show the differences are insignificant for both fee and collateral.

4.5.2. Instrumental Variables Approach

Next, we use an instrumental variables approach (IV) to control for the potential endogeneity that unobservable borrower characteristics may simultaneously impact relationship formation and loan contract terms. In the first stage regression, the likelihood of forming relationships is modeled. We use geographic distance between the borrowing firm's headquarter city and its relationship bank's headquarter city as an instrument to predict the likelihood of the relationship formation.[11] Distance has been shown to be correlated with the likelihood of relationship formation (Petersen and Rajan (2002) and Degryse and Ongena (2005)) but should not affect the fees or collateral directly. In the second stage, the fitted likelihood of relationship is used in place of the relationship dummy for testing the impact of relationships on fees and collateral.

Table 6 shows results from the IV approach for loans given in distress.[12] After controlling for the potential endogeneity of relationships, the result that outside loans and relationship loans are identical to each other after the onset of distress continues to hold.

4.5.3. Unobservable lender heterogeneity

The previous sub-sections tested whether time varying borrower heterogeneity was a potential cause of the insignificance of relationships during distress. Next, to account for unobservable lender heterogeneity, we use a matched sample approach followed in Ioannidou

[10] For determining the likelihood of a given loan being from a relationship bank, we use the sub-sample of distressed loans. Specifically, we run a logistic regression for the probability of getting a relationship loan using the same set of control variables as that used in Table 3. However, firm fixed effects are not used.

[11] For cases where the relationship lender was a bank headquartered outside of the US, we tried to ascertain the headquarters of the bank's US subsidiary. In most cases, the headquarters was either New York or San Francisco. In cases where we were not able to unambiguously assign the headquarters for the US subsidiary, we assumed that the headquarter city was New York.

[12] Due to computational problems, we did not include firm fixed effects in this estimation.

and Ongena (2010).[13]

The matching strategy is as follows. First, we do match each relationship loan to a non-relationship loan. We require both loans to have the same lender, same distress status, same collateralization status, and a maturity difference of less than 1 year. Second, we calculate the difference between the loan fees on each relationship loan and the matched non-relationship loan, $fee_{Rel} - fee_{non-rel}$. Third, we regress the spreads on a constant, distress status and a list of *differences* of firm characteristics between the matched sample observations as controls. A negative and statistically significant constant term suggests that the loan fees on relationship loans are, on average, lower than the fees on comparable non-relationship loans. For testing the difference between relationship and outside loans in distress, we test whether the sum of the constant term and distress dummy is statistically significant different from zero or not.

Panel A in Table 7 reports the the results for testing the spread difference between the relationship and matched non-relationship loans. The result shows that there is a significant difference of fee between relationship and non-relationship loans in the normal period. In contrast, there is no significant difference of fee between relationship and non-relationship loans in the distress period.

Panel B reports the regression result after controlling for the differences in firm characteristics across the matched loans. Model 3 in Table 7, Panel B uses the entire matched sample. In this specification, the constant term reflects the difference in the loan rate for relationship and outside loans. The difference of about 10 basis points is consistent with the difference of approximately 8 basis points from Table 3. The overall difference in distress (which is the sum of the distress dummy and constant) is insignificant suggesting that relationship and non-relationship loans have similar fees after the onset of distress. If we split the sample into two (based on distress and normal times, models 1 and 2), we obtain similar results.

[13] We thank an anonymous referee for this excellent suggestion.

Lastly, in panel C, we repeat the process of matching, for examining differences in collateral. Here, we follow a similar procedure of matching a relationship loan to a non-relationship loan, based on the same lender, with a maturity of within one year for the two loans, and lastly, where the loan rates do not differ by more than 100 basis points.[14] After this matching, the difference in collateral for the two matched samples is tabulated. A difference of -1 in this table implies that the relationship loan was not collateralized whereas the matched loan was, a difference of zero implies both the relationship and the non-relationship loan had the same collateral status and a difference of 1 implies that the relationship loan was collateralized while the matched loan was not. We use the sign test to examine the equality of matched pairs of observations. The null hypothesis is that the median of the difference between the matched pairs is zero and no further assumptions are made about the distribution. This test suggests that the differences in collateral are significantly negative in normal times, but not in distress. Thus, at least based on this matched sample, both the fee and collateral discounts given by relationship banks during normal times are not given in distress.[15]

4.6. Sample selection bias of loans in distress

The previous sub-section considered the possibility that common factors may impact formation of relationships as well result in an increase in loan rates or collateral. However, we have not explicitly considered the impact of a potential future bankruptcy filing on loan contract terms in distress. A firm may strategically file for bankruptcy if it believes that it can get significantly better terms in terms of DIP financing as well as debt reductions on its existing debt. Alternately, the relationship lender may deliberately refuse to offer a loan in distress, so as to force the firm into bankruptcy where it can make super-priority DIP loans with relatively low credit risk. Its informational advantage may give it a strong

[14] We use this fairly large range of 100 basis points for the loan rates as the sample size for the matched loans reduces dramatically with smaller range of fees for the matched loans.

[15] Due to the small number of observations, we do not perform a multivariate regression for the collateral requirement.

incentive for providing such DIP loans (Dahiya, John, Puri, and Ramirez (2003)).[16] Under either scenario, the set of loans that are observed in distress are those where neither the bank nor the borrowing firm exercised these options.[17]

We use two approaches to examine the impact of this potential sample selection bias on loan contract terms during distress. First, we identify a sub-sample where we believe this problem is not so severe and examine the results for this sub-sample. Second, we use a Heckman selection model to more formally test the impact of such selection on loan contract terms in distress.

To justify the first approach, we argue that loan contract terms for firms with low asset tangibility, defined as the ratio of total property, plant and equipment to total assets, will be less severely impacted by the above problem relative to firms with high tangibility. There are two reasons that justify this statement. First, indirect evidence presented in Gilson, John, and Lang (1990) shows that firms with low tangibility are more likely to choose out of court restructuring relative to formal bankruptcy, evidence that *they interpret* as being consistent with costs of bankruptcy being higher for low tangibility firms. Second, Alderson and Betker (1995) and Alderson and Betker (1996), using direct estimates of liquidation costs, show that there is a statistically significant and robust negative relation between asset tangibility and liquidation costs. Thus, firms with low tangibility are unlikely to exercise the bankruptcy option due to a large value loss in bankruptcy. Similarly, the relationship banks of these firms are also unlikely to force the firm into bankruptcy as this would result in a large loss on their existing loans.

While we do not have any direct measure of liquidation costs, we test the implication of the above on the likelihood of filing for bankruptcy. In particular, conditional on distress, low (high) tangibility firms should be less (more) likely to choose the formal bankruptcy procedure, relative to staying in distress. To test this, we first run a bankruptcy prediction

[16] Theoretically, Brown, Ciochetti, and Riddiough (2006) model a problem of this type and find results in terms of time in bankruptcy consistent with their model, using a set of real estate foreclosures.

[17] We thank an anonymous referee for directing our attention this bias.

model for the entire universe of Compustat firms where each firm year is treated as a unit of observation. The results are presented in Table 8. We find a strong positive relation of asset tangibility on likelihood of filing for bankruptcy, after adjusting for other variables that are likely to impact this likelihood.[18] In model 2, we use a sub-sample of distressed firms from the entire Compustat. In model 3, we repeat this exercise for all firm years in the LPC data set. Lastly, in model 4, we use the sub-sample of firms in distress in the LPC data set. In all cases, we find a robust and positive effect of tangibility on the likelihood of filing for bankruptcy, both conditional on distress and unconditionally. This suggests that the results in prior literature should continue to hold for our sample.

Next, we rerun the specifications in Table 3 for the low tangibility sample, where we posit that the relationship banks are less likely to refuse credit in distress solely in the expectation of securing future DIP loans. We create two low tangibility dummy variables to operationalize this test. The first dummy variable takes a value of 1 if the tangibility of the firm is below the median of all the firms in the same year and zero otherwise. The second dummy variable takes a value of 1 if tangibility is less than 0.5 and zero otherwise. In Table 9, for both measures, the results indicate that relationship and non-relationship loans have similar fees after the onset of distress. Similar to the results in Table 3, relationship loans in distress have a lower collateral requirement.

As a second approach, we use the Heckman selection model where tangibility is used to identify the likelihood of being in the treatment group (here, obtaining the loan in distress instead of filing for bankruptcy). In the first stage, we model the likelihood that the firm will *not file for bankruptcy and obtain a loan in distress*, i.e., will be observed in the treatment group.[19] The first stage regressions are presented in Table 10, Panel A. The second stage regressions for the fee and collateral are shown in panels B and C. For both

[18] We do not include the Altman Z score in this regression as the computation of the Z score uses asset tangibility as an input variable.

[19] Note that the choice modeled here is the different from that in Table 8 where the probability of filing for bankruptcy is modeled. Hence, the expected effect of the asset tangibility on the dependent variable is opposite to that in Table 8.

specifications, we continue to use firm fixed effects.

The first two models in panel B show a significant coefficient for the Heckman's λ, suggesting that sample selection does affect the likelihood of obtaining loans in distress. We find that relationships do not impact the fees in distress, which is consistent with our earlier results.

To examine the robustness of our results, we propose an alternative instrument for the future likelihood of filing for bankruptcy. A recent paper by Bharath, Panchapegesan, and Werner (2010) shows that there have been significant changes in the Chapter 11 process and further, in the post-2000 period, the likelihood of management turnover inside of Chapter 11 is significantly higher relative to earlier time periods. Further, they also show that the process has become significantly more creditor friendly in this period. To the extent that the management in the firm has a first order effect in the bankruptcy filing decision, this implies that they are less likely to exercise a strategic bankruptcy option in the post-2000 period. In models 3-4, the first stage selection regression shows exactly this result. With this alternate instrument, the results on fee continue to hold. In models 5 and 6, we use both instruments together and find similar effects.

In Panel C, we examine the results for collateral using a model similar to Table 3. Note that due to the use of firm fixed effects, the number of observations falls dramatically, as only firms with both collateralized and non-collateralized loans in distress can be used. As with the panel regression, we continue to find a lower collateral requirement for relationship loans. However, this result is not found for the strong relationship measure.

4.7. Further robustness tests

To check the robustness of our empirical results, we use different measures for distress and relationship to do the same analysis using the same specification in Table 3. We use different cutoff points for the EDF percentiles (using top 30%), define distress as the Altman Z score being below 1.8, or using negative cash flow to identify distress. With all

these three different measures, the results are essentially unchanged (Table 11). Similarly, using relationship measures based on 3 year window, we get consistent results. We also add additional controls in terms of syndicate structure and find similar results. For collateral, in most cases, the result is also consistent with the panel regression in Table 3.

4.8. Other potential benefits of relationship lending in distress

So far, we have focused on the fee and collateral as the main benefits of relationship lending to the borrowing firm. Here we examine other contractual and non-contractual benefits that may offset some of the documented lack of price benefits during distress. Specifically, we examine three other dimensions that may benefit borrowing firms.

First, we examine the likelihood of relationship lending in a given year (Relyear) and the fraction of lending by relationship banks relative to the total dollar amount lent by all banks (Relyearratio) in the year of distress. An increase in the likelihood of lending or an increase in the fraction of relationship lending is a benefit of having a relationship as a distressed firm may find itself rationed by outside banks. The results, presented in Table 12 Panel A, actually show the opposite. Both the likelihood of a relationship loan and the fraction of lending by the relationship bank, decrease in the year of distress as well as the year following distress. Other control variables are included, but not reported, as they are not the focus of this study.[20]

Next, we examine the total number of covenants in the loan, an alternative non-price loan contract term, to examine whether relationship banks provide loans that have lower covenants. To test this, we adopt the empirical model of covenants from Demiroglu and James (2010). We construct a covenant intensity index which is defined as the sum of six covenant indicators: collateral, dividend restriction, more than two financial covenants, asset sales sweep, equity issuance sweep, and debt issuance sweep. Higher values of this

[20]Specifically, we control for total asset, market to book ratio, coverage ratio, leverage, operating margin, tangibility, current ratio, number of outstanding loans, number of outstanding banks, market share of relationship banks, rating dummy, year fixed effect and firm fixed effect. A detailed definition of these variable can be found in Appendix C.

covenant index imply more restrictive covenants. We estimate the impact of lending relationships on the covenant intensity index (Table 12 panel B). We do not observe any strong pattern of lower covenants by relationship banks during distress, in fact, in one specification, there are more covenants.[21]

Lastly, an alternate benefit of lending by relationship banks may be a lower likelihood of filing for bankruptcy. We examine the impact of relationship lending in the current year (using Relyear and Relyearratio) on the probability of bankruptcy in the next year. The results, presented in Table 12, Panel C, do not show any effect.

5. Conclusion

Previous literature has documented significant benefits of lending relationships to borrowing firms. Few studies focus on the relationship lending during distress. The two studies that we are aware of (Elsas and Krahnen (1998) and Peek and Rosengren (2005)) focus on borrowers in Germany and Japan, both of which are bank-dominated economies. Our results show that relationship lending in the US is significantly different from that in Germany or in Japan. Differences between the US and Germany and Japan such as the degree of importance of banks (Allen and Gale (1997)), government pressure (Peek and Rosengren (2005)) and bank holdings of equity may account for the difference in bank behavior. The results in this paper suggest that the notion of 'implicit contracting' that exists in the relationship banking literature needs to be refined, as one important dimension of the implicit contract, loan rate smoothing by relationship banks, is not found in our data sample. In contrast, some of our evidence suggests that there is continued benefits of lower collateral requirement during distress, which is an interesting dichotomy in the behavior of relationship banks. Future research would focus on reasons for this dichotomy in this dimension.

[21] As with Panel A, we only present the coefficients of interest.

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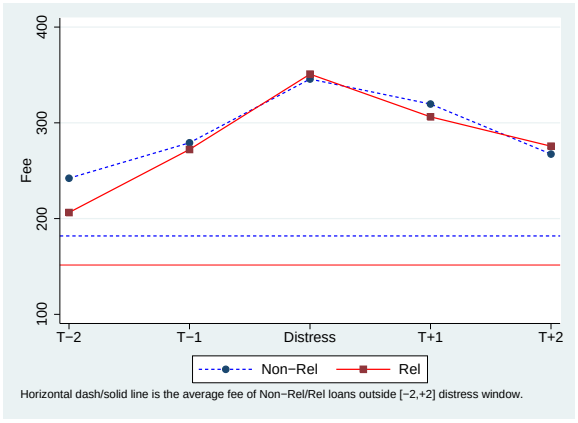
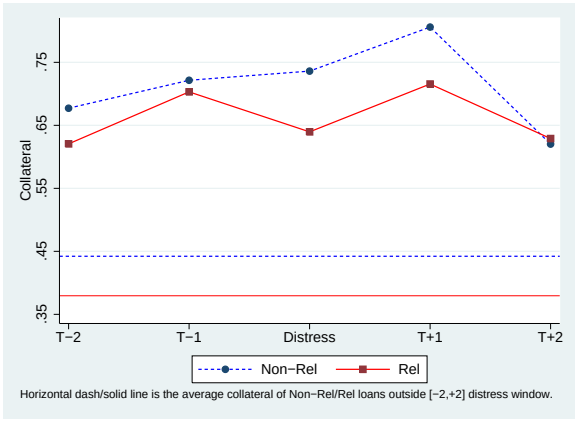
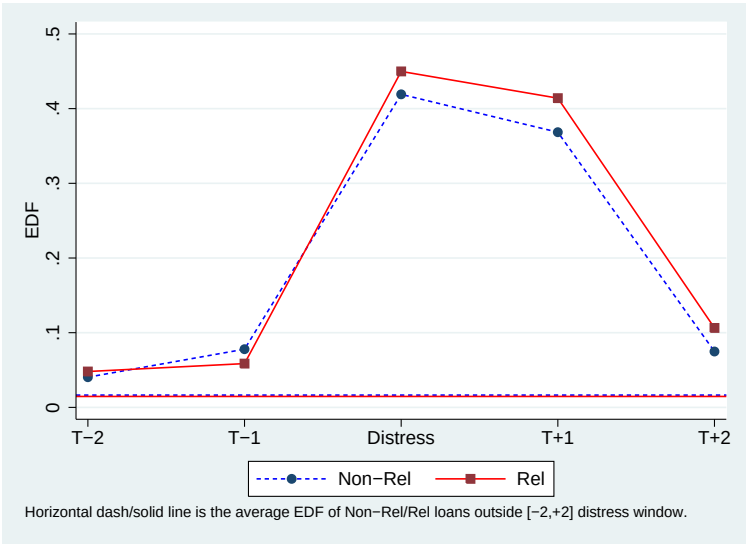


(a) Average Loan Fee



(b) Average Collateral



(c) Average Expected Default Frequency

Figure 1: Time Pattern of Loan Fee, Collateral, and Expected Default Frequency (EDF)

This figure shows the average loan fee, average likelihood of requirement of collateral, and average EDF for relationship and non-relationship loan around borrower distress. Fee is the All in Drawn spread from the LPC database. Collateral is a dummy variable that takes a value of 1 if the loan is classified as secured in the LPC database and 0 otherwise. Distress is a dummy variable equals 1 if the loan is issued during the an year the firm is in distress. T-1 (T-2) is an indicator variable for 1 (2) year(s) before distress. T+1 (T+2) is an indicator variable for 1 (2) year(s) after distress. The horizontal line is the average fee, collateral, and EDF for the loans outside [-2,+2] distress window. See Appendix C for a detailed definition of all variables.

Table 1: Summary statistics

This table shows the summary statistics for firm and loan characteristics. Panel A provides firm characteristics for firms classified as normal or distressed. Panel B reports differences in loan characteristics (fee, collateral, maturity and size) across firms in two conditions. Panel C reports the relationship bank characteristics. See Appendix C for a detailed definition of all variables used in this table. All variables are adjusted for inflation.

Panel A: Firm Characteristics

	Normal Times		Distress	
	Mean	Median	Mean	Median
Coverage	28.76	5.46	2.67	1.59
Current Ratio	1.94	1.62	1.58	1.4
Leverage	0.28	0.26	0.34	0.34
Market to Book Ratio	1.79	1.42	1.18	1.02
Profitability	0.16	0.13	0.09	0.06
Tangibility	0.35	0.29	0.31	0.26
Total Asset	2514.3	422.68	1393.27	160.47

Panel B: Loan Characteristics

	Normal Times		Distress	
	Mean	Median	Mean	Median
Collateral	0.43	0	0.72	1
Facility Amount	183.6	67.04	81.46	24.99
Fees (basis point)	172.95	150	341.89	305
Maturity(month)	43.02	37	38.05	36
Number of Relationship Banks	1.62	1	1.58	1
Number of Strong Relationship Banks	1.05	1	1.04	1

Panel C: Number of relationship banks

	Normal Times		Distress	
	Mean	Median	Mean	Median
Number of Relationship Banks	1.62	1	1.58	1
Number of Strong Relationship Banks	1.05	1	1.04	1

Table 2: Effects of Lending Relationship on Fees and Collateral: Univariate Results

This table presents univariate tests of effect of lending relationship on fees and collateral. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. A relationship loan is one where a lead bank on the given loan was also the lead bank in a prior loan taken by the firm in the 5 years prior to the start date of the loan facility. A strong relationship loan is one where the lead bank retained in the loan was retained as a lead bank in 50% or more of the loans in the 5 years prior to the start date of the loan facility. See Appendix C for a detailed definition of all variables used in this table.

Panel A: The Impact of Lending Relationships on Fees and Collateral

	Variable	N	Non Relationship Loan Mean (Std. Dev)	Relationship Loan Mean (Std. Dev)	p-value
Normal Times	Fee	13414	209.82 (140.44)	158.54 (117.58)	<0.0001*
	Collateral	15406	0.53 (0.50)	0.39 (0.49)	<0.0001*
Distress	Fee	943	348.67 (178.11)	337.94 (148.08)	0.3436
	Collateral	1113	0.80 (0.40)	0.68 (0.47)	<0.0001*

Panel B: The Impact of Strong Lending Relationships on Fees and Collateral

	Variable	N	Non Strong Relationship Loan Mean (Std. Dev)	Strong Relationship Loan Mean (Std. Dev)	p-value
Normal Times	Fee	13414	192.35 (137.06)	157.55 (115.23)	<0.0001*
	Collateral	15406	0.47 (0.50)	0.39 (0.49)	<0.0001*
Distress	Fee	943	340.22 (171.46)	343.58 (147.15)	0.7468
	Collateral	1113	0.75 (0.43)	0.69 (0.46)	0.0191*

Table 3: Relationship lending during Distress: Fee and Collateral

This table reports multivariate regression results of the impact of lending relationships on fees and collateral. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. See Appendix C for a detailed definition of all variables used in this table. Numbers in parentheses are standard errors clustered at the firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Fee	Collateral	Fee	Collateral
Relloan	-8.10***	-0.25***		
	(2.94)	(0.078)		
Relloan*Distress	13.5	-0.27		
	(18.1)	(0.31)		
Strong Relloan			-8.14***	-0.23***
			(2.69)	(0.076)
Strong Relloan*Distress			8.78	-0.55*
			(17.1)	(0.29)
Distress	63.9***	0.77***	68.2***	0.88***
	(15.8)	(0.26)	(13.9)	(0.22)
Collateral	35.1***		35.0***	
	(3.35)		(3.32)	
Log(Loan Amount)	-12.9***	-0.24***	-13.0***	-0.24***
	(1.64)	(0.050)	(1.64)	(0.050)
Log(Maturity)	-11.1***	0.11**	-11.1***	0.11**
	(2.28)	(0.055)	(2.28)	(0.055)
Log(Total Asset)	-13.6***		-13.6***	
	(3.74)		(3.75)	
Market to Book Ratio	-2.04	-0.14***	-2.03	-0.14***
	(2.13)	(0.049)	(2.13)	(0.049)
Coverage	-17.9***		-17.9***	
	(2.79)		(2.79)	
Leverage	29.2**	2.08***	28.5*	2.04***
	(14.6)	(0.38)	(14.6)	(0.38)
Profitability	-128.4***		-127.1***	
	(34.2)		(34.2)	
Tangibility	2.42	0.13	1.43	0.11
	(20.4)	(0.50)	(20.5)	(0.50)
Current Ratio	-3.66*		-3.67*	
	(2.01)		(2.02)	
Loan Concentration		1.45***		1.42***
		(0.27)		(0.27)
Constant	623.3***		622.5***	
	(42.8)		(42.8)	
Firm Fixed effect	Yes	Yes	Yes	Yes
Rating Dummies	Yes	Yes	Yes	Yes
Distribution Method Dummies	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
N	11492	6896	11492	6896
adj. R^2	0.285		0.285	
pseudo R^2		0.108		0.108
Test Relloan+Relloan*Distress=0 (F/χ^2)	0.09	3.03*	0.01	7.76***

Table 4: Time Pattern of Relationship Lending around distress

This table reports the time pattern of relationship lending around the distress. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. T-1 (T-2) is an indicator variable for 1 (2) year(s) before the distress. T+1 (T+2) is an indicator variable for 1 (2) year(s) after distress. See Appendix C for a detailed definition of all variables. All firm characteristics in Table 3 are included in the empirical estimation but not reported to conserve space. Numbers in parentheses are standard errors clustered at the firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

Panel A: Relationship Loan

	Fee	Collateral
T-2	16.2	-0.014
	(14.1)	(0.38)
T-1	49.0***	0.51
	(15.9)	(0.31)
Distress	97.8***	1.49***
	(16.7)	(0.31)
T+1	73.1***	1.63***
	(27.3)	(0.43)
T+2	41.1**	0.68
	(16.0)	(0.60)
Relloan	-7.12**	-0.24***
	(2.98)	(0.083)
Relloan*T-2	3.38	0.29
	(15.8)	(0.42)
Relloan*T-1	-8.72	0.32
	(17.7)	(0.34)
Relloan*Distress	17.3	-0.59*
	(19.9)	(0.34)
Relloan*T+1	-3.51	-0.48
	(30.9)	(0.49)
Relloan*T+2	18.8	0.20
	(21.7)	(0.67)
Firm Characteristics	Yes	Yes
Firm Fixed effect	Yes	Yes
Rating Dummies	Yes	Yes
Distribution Method Dummies	Yes	Yes
Loan Type Dummies	Yes	Yes
Year Dummies	Yes	Yes
N	11492	6896
adj. R^2	0.297	
pseudo R^2		0.115
Test Relloan+Relloan*T-2=0 (F/χ^2)	0.06	0.02
Test Relloan+Relloan*T-1=0 (F/χ^2)	0.83	0.27
Test Relloan+Relloan*Distress=0 (F/χ^2)	0.27	6.25**
Test Relloan+Relloan*T+1=0 (F/χ^2)	0.12	2.23
Test Relloan+Relloan*T+2=0 (F/χ^2)	0.29	0.00

Table 4 Continued—Panel B: Strong relationship loan

	Fee	Collateral
T-2	19.9*	-0.073
	(12.1)	(0.29)
T-1	45.0***	0.52**
	(10.8)	(0.25)
Distress	106.4***	1.52***
	(14.3)	(0.26)
T+1	78.3***	1.82***
	(21.3)	(0.35)
T+2	53.9***	0.71*
	(18.8)	(0.42)
Strong Relloan	-5.84**	-0.21***
	(2.66)	(0.081)
Strong Relloan*T-2	-2.75	0.48
	(13.6)	(0.37)
Strong Relloan*T-1	-4.87	0.42
	(14.1)	(0.31)
Strong Relloan*Distress	5.03	-0.80***
	(18.4)	(0.31)
Strong Relloan*T+1	-17.4	-1.08**
	(23.5)	(0.46)
Strong Relloan*T+2	0.25	0.27
	(23.4)	(0.58)
Firm Characteristics	Yes	Yes
Firm Fixed effect	Yes	Yes
Rating Dummies	Yes	Yes
Distribution Method Dummies	Yes	Yes
Loan Type Dummies	Yes	Yes
Year Dummies	Yes	Yes
N	11492	6896
adj. R^2	0.297	
pseudo R^2		0.117
Test Strong Relloan+Strong Relloan*T-2=0 (F/χ^2)	0.41	0.54
Test Strong Relloan+Strong Relloan*T-1=0 (F/χ^2)	0.59	0.46
Test Strong Relloan+Strong Relloan*Distress=0 (F/χ^2)	0.00	11.32***
Test Strong Relloan+Strong Relloan*T+1=0 (F/χ^2)	0.98	8.01***
Test Strong Relloan+Strong Relloan*T+2=0 (F/χ^2)	0.06	0.01

Table 5: Impact of borrower heterogeneity: Propensity Score Matching

This table reports the results of matching each loan in distress where a relationship bank was retained is matched to another loan in distress where a relationship bank was equally likely to have been retained, but in fact, was not. The method used for matching is the propensity score matching method proposed by Heckman, Ichimura, and Todd (1997). The actual implementation follows Drucker and Puri (2005). Numbers in parentheses are standard errors corrected for heteroscedasticity and clustering at the firm level (***significant at the 1% level, **significant at the 5% level,*significant at the 10% level).

	Difference between Relationship Loans and non Relationship Loans		Difference between Strong Relationship Loans and non Strong Relationship Loans	
	Fee	*Collateral*	*Fee*	*Collateral*
Mean	-31.67	-0.09	24.23	-0.06
Std. Dev.	37.34	0.07	28.06	0.07
Min	-101.99	-0.24	-51.42	-0.21
Max	63.66	0.08	80.75	0.08
95% Conf. Interval	[-101.97,48.09]	[-0.23,0.06]	[-36.78,76.00]	[-0.05,0.08]

Table 6: Imapact of borrower heterogeneity:2SLS

This table reports the result for loan contract term regression using two stage least squares. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. Estimation is done using two stage least squares. The results of the first stage are not presented to conserve space. In the first stage, the likelihood of a relationship bank being retained is modeled using distance between the bank and the borrowing firm as the instrument for relationship formation. See Appendix C for a detailed definition of all variables. Firm characteristics used follow the same empirical specification in Table 3. Numbers in parentheses are standard errors corrected for heteroscedasticity and clustered at the firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Fee	Collateral	Fee	Collateral
Relloan	75.49	-0.89		
	(61.28)	(0.82)		
Strong Relloan			53.98	0.14
			(66.50)	(1.07)
Firm Characteristics	Yes	Yes	Yes	Yes
Rating Dummies	Yes	Yes	Yes	Yes
Distribution Method Dummies	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes
Loan Purpose Dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Observations	315	324	315	324
p-value from Durbin-Wu-Hausman test	0.2184		0.3623	
p-value from Wald test		0.4468		0.7064
Is relationship endogenous?	No	No	No	No

Table 7: Impact of lender heterogeneity: Matched sample approach

This table reports the result for loan contract terms using matching method. We match each relationship loan to a non relationship loans by same lender with the same distress status, same collateralization status/similar loan fee, and a maturity difference of less than 1 year for loan fee sample/collateral sample. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Panel A reports the means test for the matched sample. Panel B reports regression of the difference of loan fee between relationship loan and non-relationship loan on the difference of firm characteristics between matched sample. Panel C reports the sign test for the matched sample equality in the collateral requirement. See Appendix C for definitions of all variables used in this table. Numbers in parentheses are standard errors clustered at firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

Panel A: Mean test loan fee difference=$Fee_{Rel} - Fee_{Non-Rel}$

Fee diff	Observation	Mean(Std.)	t-test
Non-Distress	2707	-41.48(147.56)	-14.63***
Distress	109	26.12(214.20)	1.27

Panel B: Loan fee regression for the matched sample

	Distress sample	Non-Distress sample	Full sample
Loan Size diff	-6.32	-11.9***	-12.3***
	(33.9)	(3.08)	(3.46)
Book to Market diff	27.3	34.0***	33.1***
	(21.8)	(5.79)	(4.65)
Leverage diff	-111.1	85.1***	74.4***
	(158.0)	(21.7)	(21.8)
Firm Size diff	-102.0	13.6	-4.84
	(65.8)	(22.8)	(17.4)
Tangibility diff	-142.1	8.13	-1.22
	(148.0)	(11.8)	(12.3)
Profitability diff	-745.0	53.3	-79.6
	(653.8)	(148.1)	(123.7)
Coverage diff	50.7	-27.7	-10.2
	(43.3)	(20.8)	(14.1)
Current Ratio diff	-13.5	2.84	2.23
	(31.8)	(1.88)	(1.99)
Distress			15.9
			(33.6)
Constant	-5.70	-10.7*	-10.6*
	(19.2)	(5.53)	(5.90)
N	97	2206	2303
adj. R^2	0.250	0.212	0.202
Test Distress+Constant=0			0.03

Panel C: Sign test of collateral status difference=$Collateral_{Rel} - Collateral_{Non-Rel}$

		Normal	Distress
Collateral status difference	-1	423	11
	0	1566	57
	1	336	16
Number of observations		2325	84
Equality test of matched data		-3.158***	0.962

Table 8: Future Bankruptcy Filing: Effect of Tangibility

This table reports the results from logistic regressions with a dummy variable called 'Filing' that takes a value of 1 if the firm files for the bankruptcy in the next year and 0 otherwise. Model 1 uses the entire universe of Compustat firms for which data is available. Model 2 uses the sub-sample of distressed firms in Compustat. Model 3 uses the entire universe of firms in the LPC Dealscan database. Model 4 uses the sub-sample of firms classified as distressed in the LPC Dealscan database. See Appendix C for definitions of all variables used in this table. Numbers in parentheses are standard errors clustered at firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Filing	Filing	Filing	Filing
Tangibility	0.86***	0.98**	1.19**	3.22***
	(0.26)	(0.48)	(0.47)	(0.90)
Distress	1.03***		1.02***	
	(0.17)		(0.30)	
Profitability	-0.68**	-0.66	-1.03***	-0.66
	(0.29)	(0.43)	(0.34)	(0.87)
Market to Book Ratio	-0.36***	-0.60***	-0.26***	-0.55*
	(0.059)	(0.18)	(0.099)	(0.30)
Leverage	3.83***	2.81***	5.03***	4.93***
	(0.26)	(0.49)	(0.58)	(1.02)
Log (Total Asset)	0.22***	0.23***	0.19***	0.17*
	(0.028)	(0.046)	(0.055)	(0.10)
Constant	-9.59***	-7.57***	-10.3***	-9.71***
	(0.29)	(0.58)	(0.64)	(1.38)
Overall Sample	Compustat	Compustat	LPC	LPC
Only distress sample?	No	Yes	No	Yes
N	118316	7270	35400	1777
pseudo R^2	0.145	0.105	0.146	0.171

Table 9: Loan Contract Term Regression for Low Tangibility Subsample

This table reports the results for fees and collateral using a low tangibility subsample. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. Tangibility is defined as the ratio of property, plant and equipment to total assets. In the first two columns, we define low tangibility firms as those that have a value of tangibility less than 0.5. In the third and fourth column, we define low tangibility firms as those with a tangibility value less than the median for our sample. See Appendix C for a detailed definition of all variables. Numbers in parentheses are standard errors clustered at the firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

	Fee	Collateral	Fee	Collateral
Relloan	-7.45***	-0.35***	-10.4***	-0.35***
	(2.56)	(0.092)	(3.27)	(0.12)
Distress	62.9***	0.73**	64.1***	0.87**
	(8.23)	(0.31)	(10.9)	(0.40)
Relloan*Distress	9.17	-0.28	12.8	-0.42
	(9.44)	(0.35)	(12.6)	(0.45)
Firm Characteristics	Yes	Yes	Yes	Yes
Firm Fixed effect	Yes	Yes	Yes	Yes
Rating Dummies	Yes	Yes	Yes	Yes
Distribution Method Dummies	Yes	Yes	Yes	Yes
Loan Type Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
N	8634	5159	5709	3344
adj. R-sq	0.039		0.010	
pseudo R-sq		0.127		0.131
Test Relloan+Relloan*Distress=0 (F/χ^2)	0.01	4.03**	0.01	6.85***

Table 10: Heckman Selection Model for loans in distress

This table report the result for Heckman selection model for loans in distress. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. This table reports Heckman selection model for loan fee and collateral. The first stage regression models the likelihood of observing a loan in distress instead of filing for bankruptcy, using tangibility and the post-2000 dummy as instruments to identify the likelihood of observation of the loan in distress. See Appendix C for a detailed definition of all variables. Numbers in parentheses are standard errors clustered at firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

Panel A: First stage Regression						
Tangibility	-0.50*		-0.52*	-0.50*		-0.52*
	(0.27)		(0.29)	(0.27)		(0.29)
Post-2000		1.40***	1.41***		1.40***	1.41***
		(0.16)	(0.16)		(0.16)	(0.16)
Profitability	4.01***	4.17***	4.41***	4.01***	4.17***	4.41***
	(0.63)	(0.65)	(0.67)	(0.63)	(0.65)	(0.67)
Leverage	-4.28***	-5.05***	-4.98***	-4.28***	-5.05***	-4.98***
	(0.27)	(0.33)	(0.33)	(0.27)	(0.33)	(0.33)
Market to Book Ratio	-0.0094	0.0096	0.00067	-0.0094	0.0096	0.00067
	(0.034)	(0.036)	(0.037)	(0.034)	(0.036)	(0.037)
Constant	2.96***	2.83***	2.97***	2.96***	2.83***	2.97***
	(0.19)	(0.19)	(0.21)	(0.19)	(0.19)	(0.21)
N	1164	1164	1164	1164	1164	1164

Panel B: Second stage Regression: Fee						
	Fee	Fee	Fee	Fee	Fee	Fee
Relloan	-2.29	-3.91	-3.63			
	(11.3)	(11.3)	(11.3)			
Strong Relloan				2.07	3.98	1.98
				(10.7)	(10.7)	(10.7)
lambda	-100.4***	-102.4***	-89.8***	-89.4***	-100.9***	-101.9***
	(32.4)	(29.0)	(29.4)	(29.4)	(32.4)	(29.0)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	1024	1024	1027	1027	1024	1024

Panel C: Second stage Regression: Collateral						
	Collateral	Collateral	Collateral	Collateral	Collateral	Collateral
Relloan	-1.38*	-1.55*	-1.57**			
	(0.77)	(0.79)	(0.79)			
Strong Relloan				-0.82	-0.62	-0.64
				(0.65)	(0.65)	(0.65)
lambda	4.41	8.39**	8.34**	4.50	7.05*	6.88*
	(3.87)	(3.87)	(3.87)	(3.92)	(3.74)	(3.71)
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	145	145	145	145	145	145

Table 11: Robustness Tests

This table reports the results for different measures of distress and relationships. Fee is defined as the All-in-drawn spread from the LPC Dealscan database. Collateral is a dichotomous variable that takes a value of 1 of the loan is classified as 'secured' in the database and 0 otherwise. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. See Appendix C for a detailed definition of all variables. Numbers in parentheses are standard errors corrected for heteroscedasticity and clustered at the firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

		Fee	Collateral
Using 70% edf	Relloan	-8.21***	-0.185***
to define distress	Relloan*distress	2.109	-0.267***
	Total effect	-6.101	-0.452***
Using Z-score to define distress	Relloan	-9.18***	-0.152***
(Z-score less than 1.8)	Relloan*distress	1.97	-0.378***
	Total effect	-7.21	-0.53***
Using negative cash flow to define distress	Relloan	-8.643***	-0.192***
(cash flow less than 0)	Relloan*distress	5.961	-0.845***
	Total effect	-2.682	-1.037***
Using relationship measures	Relloan	-8.1***	-0.345***
based on past 3 year window	Relloan*distress	-3.279	-0.384***
	Total effect	-11.379	-0.729***
Adding syndicate	Relloan	-1.566***	-0.187***
structure controls	Relloan*distress	19.064	0.206
	Total effect	17.498	0.019
Sub-sample of firms for	Relloan	-22.424***	-0.042***
which distress events exist	Relloan*distress	20.807	-0.664***
	Total effect	-1.617	-0.706***

Table 12: Other benefits of relationship lending

This table examines other non-price benefits of relationship lending during distress. Specifically, we examine the likelihood of relationship lending and the fraction of relationship lending, total number of covenants, and future likelihood of bankruptcy. Relloan (Strong Relloan) is a dichotomous variable that takes a value of 1 if the lead bank in the given loan facility had a prior lending relationship (strong lending relationship) with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. T-1 (T-2) is an indicator variable for 1 (2) year(s) before the distress. T+1 (T+2) is an indicator variable for 1 (2) year(s) after distress. Relyear is an indicator that takes a value of 1 if at least 1 loan in the given year comes from a relationship bank. Relyearratio is the ratio of the sum of loan facility amounts of all relationship loans to the sum of facility amounts of all loans taken by the same borrower in a given year. Covenant is the number of total covenants as computed in Demiroglu and James (2010). Filing takes a value of 1 if the firm files for bankruptcy in the next year and 0 otherwise. See Appendix C for a detailed definition of all variables. Numbers in parentheses are standard errors clustered at firm level (*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level).

Panel A:Likelihood of relationship lending and relationship lending fraction during distress

	Relyear	Relyearratio
T-2	0.29	0.043
	(0.31)	(0.043)
T-1	-0.075	-0.020
	(0.30)	(0.041)
Distress	-0.52*	-0.082**
	(0.29)	(0.040)
T+1	-0.72**	-0.14***
	(0.32)	(0.049)
T+2	-0.20	-0.033
	(0.43)	(0.058)
Firm characteristics	Yes	Yes
Firm fixed effect	Yes	Yes
N	2410	5186
adj. R-sq		0.057

Panel B: Covenants

	Covenant	Covenant
Relloan	0.023	
	(0.015)	
Relloan*Distress	0.059	
	(0.049)	
Strong Relloan		0.012
		(0.015)
Strong Relloan*Distress		0.094**
		(0.047)
Distress	-0.080*	-0.091**
	(0.043)	(0.038)
Firm characteristics	Yes	Yes
Firm fixed effect	Yes	Yes
N	9820	9820
Test Relloan+Relloan*Distress=0 (chi2-value)	3.01*	
Test Strong Relloan+Strong Relloan*Distress=0 (χ^2)		5.44**

Table 12 continued—Panel C: Future likelihood of bankruptcy

	Filing	Filing
Relyear	-0.82	
	(0.71)	
Relyearratio		-0.80
		(0.72)
Distress	2.13**	2.12**
	(0.89)	(0.87)
Relyear*Distress	0.95	
	(0.94)	
Distress*Relyearratio		1.00
		(0.95)
Firm characteristics	Yes	Yes
N	4934	4934
pseudo R^2	0.247	0.247

Appendices

A. Calculate the Expected Default Frequency (EDF) from Merton Distance to Default Model

For each firm year in the sample, we calculate monthly Expected Default Frequency (EDF) from Merton's Distance to Default model following Bharath and Shumway (2008). The Merton type option pricing model assumes that the total value of a firm follows geometric Brownian motion:

$$dV = \mu V dt + \sigma_V V dW$$

V is the total value of the firm, μ is the expected continuously compounded return on V, σ_V is the volatility of firm value and dW is a standard Weiner process. The equity of the firm can be viewed as a European call option on the value of the firms assets with a strike price equal to the face value of the firms debt with time to maturity of T, which satisfies:

$$E = VN(d_1) - e^{-rT} FN(d_2)$$

E is the market value of the firms equity, F is the face value of the firms debt, r is the risk-free rate, $N(.)$ is the cumulative standard normal distribution function, d_1 is given by

$$d_1 = \frac{ln(\frac{V}{F}) + (r + 0.5\sigma_V^2)\, T}{\sigma_V \sqrt{T}} \tag{1}$$

and d_2 is given by

$$d_2 = d_1 - \sigma_V \sqrt{T}$$

Under Mertons assumptions the equity volatility and asset volatility are related through the leverage and the degree to which the option value to default is in the money:

$$\sigma_E = N(d_1)\sigma_V \frac{V}{E} \tag{2}$$

The market value of the firm's equity $E$is based on the closing price and shares outstanding at the end of each month. Face value of debt F is calculated following the KMV practice. KMV Corporation has done the empirical research and found that the default point is current liability plus half of long term loan. The forecast horizon T is set to be one year. Risk free rate r is the One Month Treasury Bill Rate from Fama/French Benchmark Factors. Volatility of equity σ_E is estimated from historical daily stock returns data over one year. To solve for σ_V and V, we follow the practice of KMV by implementing an iterative procedure. The starting values of σ_V and V are defined as:

$$V = E + F$$

$$\sigma_V = \sigma_E \frac{E}{E + F}$$

Once σ_V and V are obtained, the expected default frequency is calculated as:

$$EDF \;=\; N(-\frac{ln(\frac{V}{F}) + (\mu - 0.5\sigma_V^2)\,T}{\sigma_V\sqrt{T}})$$

The SAS code used to calculate the EDF is obtained from the working paper version of Bharath and Shumway (2008) and is available upon request.

B. Construction of Relationship Measures

Relationship measures are constructed based on the loan facility start date. Assume that the current loan facility of firm abc has a start date is 03 Feb 1995. We take loan history for firm abc from 03 Feb 1990 to 02 Feb 1995 and identify all lead lenders for loans given to firm abc during this 5 year period. Let us assume that firm abc got 1 loan from bank X, 2 loans from bank Y, and 5 loans from bank Z (bank X, Y and Z are all lead lenders in the syndicated loans) during this 5 year period. Bank X, bank Y, and bank Z are all relationship lenders. Bank Z is a strong relationship lender since more than 50% of firm abcs loans during the last 5 years are from bank Z. If the lead lender of current loan facility is any of bank X, Y or Z, then current loan facility is a relationship loan to firm abc and *Relloan* dummy takes the value of 1. If the lead lender of current loan facility is neither X nor Y nor Z, then current loan facility is a non relationship loan to firm abc and *Relloan* dummy takes the value of 0.

If the lead lender of current loan facility is bank Z, then current loan facility is defined as a strong relationship loan and *Strongrelloan* dummy takes the value of 1. If the lead lender of current loan facility is not bank Z, then current loan facility is defined as a non strong relationship loan and *Strongrelloan* dummy takes the value of 0. If the borrowing firm did not take any loans in the past 5 years, neither *Relloan* nor *Strongrelloan* is defined.

To measure the relative importance of relationship lending, we use two different proxies. The first measure is the *Relyear* dummy for the given firm year. Using the same example in the above, firm abc in year 1995 has three relationship banks X, Y and Z. During year 1995, if any of the three banks (X, Y and Z) has extended at least one loan to firm abc, then firm abc is defined as having a relationship loan in year 1995 and the *Relyear* dummy equals to 1. If firm abc in 1995 got loans but none of them is from a relationship bank (which is X, Y or Z), *Relyear* dummy equals to 0. If firm abc got no loan in 1995 , *Relyear* dummy is missing.

The other measure is a ratio that measures the fraction of loans in dollar value coming from relationship banks relative to outside banks. Using the same example, during 1995, assume that firm abc got 2 loans from bank Y with the total facility amount of 100, 1 loan from bank Z with the total facility amount of 200, and 2 loans from bank K with the total facility amount 100. Loans from both bank Y and Z are relationship loans, while loans from bank K are non relationship loans. *Relyearratio* is the ratio of sum of loan facility amounts of all relationship loans taken by a given borrower in a given year to the sum of facility amounts of all loans taken by the same borrower in the given year. In this example, *Relyearratio* equals 300/400=0.75.

C. Definitions of Variables

- *Distress*: A dummy variable that takes a value of 1 in the if the firm is in distress in the given year and 0 otherwise. The procedure to categorize a firm being in distress in a given year is as follows: For each month in the year, the EDF of the firm is computed using the Moodys-KMV implementation of Merton's model. We count the number of months that the firm's EDF lies in the top 10% of the EDF for all CRSP-Compustat firms for all years in our sample. If the number of months that the firm's EDF in the top decile of default probabilities is greater than or equal to six, we classify the firm to be distressed in the given year. A loan facility with starting date in normal year is classified as a normal loan, and one made during a distress year is classified as a distressed loan. A loan that is made in a year where the firm is in distress as well as files for bankruptcy is classified as a distressed loan unless it is explicitly classified as a DIP loan ("Debtor-in-possession").
- *Filing*: It is a dummy variable that takes a value of 1 if the firm files for bankruptcy in the next year.
- *T-2*: It is a dummy variable which takes a value of 1 two years prior to the distress year.
- *T-1*: It is a dummy variable which takes a value of 1 one year prior to the distress year.
- *T+1*: It is a dummy variable which takes a value of 1 one year subsequent to the distress year.
- *T+2*: It is a dummy variable which takes a value of 1 two years subsequent to the distress year.
- *Relloan*: It is a dummy variable, which takes a value of 1 if current loan is a relationship loan and 0 otherwise. A given loan is classified as a relationship loan if any of the lead lenders retained in the given loan facility were retained as the lead lenders in any loan taken by the same borrower over the last 5 years.
- *Relyear* It takes a value of 1 for firm years where the firm obtained at least one relationship loan as defined above, 0 for firm years with no relationship loan, and missing when there is no loan made to the borrowing firm in the given year or the firm.
- *Relyearratio*: It is the ratio of the sum of loan facility amounts of all relationship loans taken by a given borrower in a given year to the sum of facility amounts of all loans taken by the same borrower in the given year.
- *Strongrelloan*: It is a dummy variable, which takes a value of 1 if a strong relationship lender is retained for the current loan facility, where a strong relationship lender is defined as a bank that was retained in at least 50% of the loans by the borrowing firm in the past 5 years.
- *Fee*: It 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.
- *Collateral*: It is a dummy variable that equals 1 if the loan was secured and 0 otherwise.
- *Covenant*: The total number of financial and general covenants in the loan facility.
- *Loan Amount*: It is the dollar amount of the loan facility in millions, adjusted for inflation in year 1986 dollars.
- *Log(Loan Amount)*: The Natural log of loan facility amount adjusted for inflation in year 1986 dollars.
- *Maturity*: The duration (in months) between facility activation date and maturity date.
- *Log(Maturity)*: Natural log of the maturity of loan facility measured in months.
- *Log(Mean Distance)*: The Natural log of geographic distance between the borrowing firm's headquarter city and its relationship bank's headquarter city.
- *Altman Z score*: Calculated as Z = 1.2T1 + 1.4T2 + 3.3T3 + 0.6T4 + .999T5, where
  T1 = $\frac{\text{Working Capital}}{\text{Total Assets}}$, T2 = $\frac{\text{Retained Earnings}}{\text{Total Assets}}$, T3 = $\frac{\text{Earnings Before Interest and Taxes}}{\text{Total Assets}}$,

T4 $= \frac{\text{Market Value of Equity}}{\text{Total Liabilities}}$, and T5 $= \frac{Sales}{\text{Total Assets}}$.

- *Total Asset*: The book value of the assets of the borrower adjusted for inflation in year 1985 dollars.
- *Log(Total Asset)*: The natural log of the total asset of the borrower.
- *Market to Book Ratio*: The ratio of (book value of assets - book value of equity + market value of equity) to book value of assets.
- *Coverage*: The Natural log of ratio $(1+\frac{EBITDA}{Interest\ Expenses})$.
- *Leverage*: Ratio of book value of total debt to book value of assets.
- *Operating Margin*: Ratio of EBITDA to Sales.
- *Profitability*: The operating margin, calculated as 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.
- *Loan Concentration*: The ratio of the current loan's facility amount to the sum of existing debt and the current loan's facility amount.
- *Other controls*: Other control variables include dummy variables for the year of the loan facility, loan purpose, loan type, S&P senior unsecured debt rating with not rated firms considered as a separate group, and the industry of the borrower.