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. Relationship and outside loans have similar interest rates during distress, and even two years prior to distress. Relative to outside loans in distress, relationship loans in distress have lower maturity. The fraction of bank lending given by relationship banks reduces during borrower distress. Overall, borrowers in distress do not derive benefits from relationship banks. These findings are inconsistent with models that suggest banks have an implicit commitment to help their borrowers in distress due to reputation concerns.

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Keywords : Relationship Banking, Distress, Loan Pricing, Collateral

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1. Introduction

Financial distress has been the topic of extensive research in finance due to its importance in determining a variety of corporate financial policies. The estimated costs of financial distress on firm value are also large (Andrade and Kaplan, 1998; Almeida and Philippon, 2007). Given the large impact of financial distress, borrowing firms should seek mechanisms to avoid the potential costs of distress. Is maintaining a banking relationship a potential solution for firms to mitigate the effect of distress?

There are strong arguments that maintaining a banking relationship should minimize the effects of distress. First, repeated transactions with the same bank should generate inside knowledge of the firm's prospects, mitigating informational frictions in the bank's decision to continue financing a firm in distress (Sharpe, 1990; Diamond, 1991). Second, Berlin and Mester (1999) and Bolton et al. (2016) suggest that banks have incentives to smooth out the interest charged on loans in the presence of an aggregate economy wide shock. Third, implicit contracting incentives should induce banks to continue giving preferential treatment to a relationship borrower, even if it falls into distress (Boot et al., 1993; Dinc, 2000). All of the above suggest that borrowers should continue to derive benefits from relationship banks during distress. In fact, borrowers may even derive greater benefits from relationship lending in distress relative to a normal period, as they can hold up their banks by threatening to strategically file for bankruptcy (Anderson and Sundaresan, 1996; Davydenko and Strebulaev, 2007).

A second possibility is that potential relationship termination, due to the increased likelihood of bankruptcy, may lead to a reduction of the benefits of relationship lending as the relationship bank sees little benefit in continuing relationship in future due to lower likelihood of business from the same borrower (Bharath et al., 2007). This suggests loan terms in distress may become similar for relationship and outside loans, and borrowing firms do not derive any benefits or pay any costs from relationship lending in distress. Additionally, banks may have incentives to develop a reputation for optimal liquidation and continuation decisions for firms in distress (Chemmanur and Fulghieri, 1994), and not give any concessional terms for loans in distress.

A third possibility is that the banks may hold up the borrowers. Outside banks may be reluctant to finance a firm due to an informational disadvantage relative to relationship banks (Rajan,

1992). This may enable relationship banks to hold up borrowers by charging higher interest rates in distress, thus exacerbating the impact of financial distress (Gorton and Kahn, 2000). These arguments imply that the contract terms in distress may even be worse for relationship loans relative to outside loans.

Despite ample theoretical literature on this topic, there is little empirical work testing the behavior of relationship banks during borrower distress. Do relationship banks mitigate the effect of borrower distress, exacerbate it, or become irrelevant after distress? This is the question that we study in detail - by comparing the time series behaviour of contract terms of loans by relationship banks and outside banks, as a firm falls into distress and comes out of it. We test the above three sets of arguments (insurance, irrelevance, and hold-up) by measuring the net effect of relationships on loan rates and the likelihood of collateral. Lower values of these will be interpreted as benefits for borrowers. We also examine the volume of relationship lending and maturity of loans in distress. A greater maturity or lending volume will be a significant benefit for borrowers, as refinancing during distress is likely to be difficult.

As a firm falls into distress, we find that the special nature of relationship loans diminishes. Even two years prior to distress, the interest rates charged on relationships and outside loans become similar. This continues for two years after distress. Our results on collateral requirement are rather mixed - the only reliable conclusion that can be drawn is that collateral requirement for inside and outside bank loans are also similar during distress. This suggests that relationship banks do reduce the benefits from the borrowers perspective.

Next, we turn our attention to non-price benefits of relationship loans in distress. First, we examine volume of lending, as Petersen and Rajan (1994) suggest that relationship banking benefits may operate more in quantities rather than prices. We use the fraction of bank financing, provided by relationship banks as a measure of the quantity benefit. We find that the fraction of financing from relationship banks reduces from around 62% in a normal period to around 42% in distress. Second, we examine differences in number of covenants (Demiroglu and James, 2010) and covenant strictness (Murfin, 2012) and do not find any differences between relationship and non-relationship loans. Third, we find that the reductions of maturity of loan in distress is longer for relationship loans relative to outside loans. Thus, the non-price results continue to support the hypotheses that relationship lending benefits diminish during distress.

Lastly, we examine the impact of relationship lending in distress and the future likelihood of bankruptcy. One potential benefit of such lending is that firms may be able to avoid bankruptcy due to mitigation of financial constraints of raising new capital in distress. Further, the refinancing decision of relationship lenders may also certify the quality of the borrowers to other claimholders, such as trade creditors and outside banks, which may enable the firm to also raise more external financing, and thereby avoid bankruptcy. In contrast to the expected sign, there is no effect of relationship lending on likelihood of bankruptcy for the full sample. Further, conditional on distress, banks that obtain loans from their relationship borrowers have a higher likelihood of filing for bankruptcy. This evidence is consistent with Demiroglu and James, 2015 who find that the likelihood of an out of court restructuring was lower for relationship loans in the US.[1]

We conduct a variety of tests to account for the possibility that unobservable borrower or lender characteristics cause the results. We use propensity score matching (Drucker and Puri, 2005), an instrumental variable estimation using distance between the borrower and lender (Petersen and Rajan, 2002), lender heterogeneity (Ioannidou and Ongena, 2010) and firm-year fixed effects. We also use alternative measures of distress, based on cash flow, and different time horizon to measure relationships, and find that our main results hold for these measures as well.

As a separate robustness test, we use a different measure of the loan interest rate, which is the total cost of borrowing defined by Berg et al. (2016), and find that the net effect of relationships in distress continues to be insignificant for this alternative measure of fees. We also investigate if our results differ across loan type (term loan versus line of credit) and find that the effects are larger for lines of credit. We ensure that the results are not due to technical defaults prior to distress (Roberts and Sufi, 2009). We also do not find differences between systemically important banks and other banks.

Overall, our results do not support the argument that relationship banking is a remedy for borrowing firm's distress.[2] Our results contrast sharply with the loan level study of Elsas and Krahnen (1998) in Germany, who find the provision of liquidity insurance in distress. Using a more detailed data set from Armenia (a bank dominated economy), Schäfer (2017) finds that relationship banks charge higher spreads in a normal period and provide liquidity insurance in distress. We

[1] Their sample consists mainly of defaulted firms, which is different from our sample.

[2] In fact, the evidence of increased bankruptcy likelihood and reduction in financing is very different from the demonstrated benefits of relationship lending after bankruptcy by Dahiya et al. (2003).

find that relationship banks provide lower spreads in a normal period, and no liquidity insurance in distress. Likewise, our results differ significantly from that for Japanese firms as in Hoshi et al. (1990) and Peek and Rosengren (2005). We discuss possible reasons for the differences in our results from the above papers in detail in Section 5. Our main conjecture for the difference is that the provision of inter-temporal insurance from banks Allen and Gale (1997), is less feasible in the US due to competition from markets. Further research using cross-country data on individual borrowers would be needed to validate such differences.

We make contributions to the four different streams of literature. First, our evidence is inconsistent on the response of implicit contracts due to reputation concerns for helping a distressed borrower (Boot et al., 1993; Dinc, 2000). This suggests that reputation to help a borrower in distress may not be the metric for borrowing firms to evaluate their banks. Instead, as Berlin and Mester (1999) find, the insurance provided by banks against aggregate shocks to their borrowers may be more observable, and this may be the main metric for reputation of the bank from borrowing firms perspective, as a given borrower's financial distress may not be observable to other firms in the industry.

Second, empirical work on bank hold-up (Santos and Winton, 2008; Ioannidou and Ongena, 2010) demonstrates strategic actions of banks in holding up bank dependent borrowers. Despite a lower availability of external financing during distress, we find little evidence for bank hold-up, suggesting that this is relevant only for borrowers without access to alternate funding sources. Similarly, strategic capital structure models (Anderson and Sundaresan, 1996; Hackbarth et al., 2007) suggest greater hold-up of banks by borrowers in distress, due to greater potential losses in arising from a protracted bankruptcy process. We find that relationship banks lower their lending volume share to borrowers in distress and pricing becomes similar for outside lenders. This is not consistent with borrower hold-up. It also supports the findings in Davydenko and Strebulaev (2007), who find economically small effects of borrower hold-up.

Third, we document an inter-temporal variation in the benefits of relationship lending, with price and non-price benefits in normal times and no benefits during distress. Some studies such as Berger and Udell (1995) and Petersen 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 across time for the same borrower. This suggests that further theoretical development is needed in this area.[3]

Lastly, we contribute to the bankruptcy prediction literature. It is well known that Merton type models can be improved on (Bharath and Shumway, 2008; Duffie et al., 2007; Duan et al., 2012). However, neither structural nor reduced form models suggest a differential role for inside bank debt versus outside bank debt.[4] In fact, we show that this distinction is highly significant, albeit only in distress, suggesting a non-linear effect of debt capital structure on bankruptcy prediction. This finding provides a further direction for theoretical development in this area, where formal modeling of different incentives of inside versus outside banks may result in credit risk models that have a better prediction power.

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, multivariate tests, and robustness tests. In Section 5, we provide a detailed comparison of our results and those obtained in other empirical studies of relationship lending in distress in bank dominated economies. In Section 6, we present our conclusions.

2. Related theoretical literature

In this section, we elaborate on the four hypotheses on the impact of relationship banking in distress - insurance, irrelevance, hold-up by banks, and hold-up by borrowers. We focus on the theoretical side to motivate our empirical tests. We defer a detailed comparison of related empirical work to Section 5.

2.1. Insurance hypothesis

There are strong arguments that maintaining a banking relationship should minimize the effects of distress (the insurance hypothesis). Inter-temporal implicit contracting plays a central role in

[3]For example, Boot and Thakor (2000) and Hauswald and Marquez (2006) do not consider collateral in their models of relationship banking. While Inderst and Mueller (2007) consider collateral, their focus is on the effect of competition on the information rents of local lenders.

[4]While the model by Gorton and Kahn (2000) does suggest that risk shifting incentives can increase the likelihood of distress, conditional on obtaining a relationship loan, they also predict that such loans should have a higher interest rates relative to outside loans, which we do not find.

the provision of such insurance. In a highly influential paper, Boot (2000) states, '*Relationship lending leaves room for flexibility and discretion in contracts that permits the utilization of subtle, non-contractable information, thereby facilitating implicit long term contracting.*' In the context of relationship banking, there are several dimensions of implicit contracts between a bank and a firm.[5]

The notion of implicit contracting most relevant to what we study in this paper is modeled in Boot et al. (1993). They suggest that banks would want to develop a reputation for giving credit even when borrowers have material adverse changes in their financial condition, in order to develop a reputation with other borrowers for helping their relationship borrowers in distress. Dinc (2000) also studies a similar topic and finds that relationship banks will finance their borrowers in distress. Also relevant for our study, he argues that reputational incentives will strengthen due to competition from bond markets, or from other banks who engage in transaction lending. The intuition is that these types of competition decrease the returns to arm length lending, which makes the bank focus more on relationship lending.[6]

Berlin and Mester (1999) develop a model where banks with greater reliance on core deposits insure in terms of price of lending their borrowers against aggregate shocks in the economy. They also find empirical evidence consistent with this model. Bolton et al. (2016) develop a model where banks can engage both in relationship and transaction lending. They predict that relationship loans will carry a higher spread in a normal period, but a lower spread in distress, and relationship loans should be associated with a lower risk of default. They find evidence consistent with this for Italian firms.

All of the above suggest that relationship banks should continue to lend to borrowers in distress at favorable terms to allow them to recover from the distress. To the extent that outside financing is more difficult, the loan volume by relationship banks as a percentage of the total loan volume should also increase. In fact, a greater volume may be an important part of the relationship lending

[5]For example, in Bhattacharya and Chiesa (1995), the firm shares inside information with the bank on the understanding that this will not be given to its competitors. In Sharpe (1990), the implicit contract is for the bank to not exploit its information monopoly to the fullest extent due to reputation concerns. In Petersen and Rajan (1994), the implicit commitment problem is for a young firm to commit not to switch banks as it becomes mature.

[6]In contrast, as argued by Allen and Gale (1997), competition from the markets reduces the incentive for banks to engage in inter-temporal smoothing. Likewise, Petersen and Rajan (1995) argue that competition in the lending market will reduce the likelihood of relationship lending. However, both of the above papers do not specifically model borrower distress.

implicit contract (Elsas and Krahnen, 1998; Schäfer, 2017).

2.2. Irrelevance hypothesis

Bharath et al. (2007) document that an important benefit of lending relationships from the bank's perspective is the likelihood of repeat business from borrowers. The potential for relationship termination due to an increased likelihood of bankruptcy for a firm in distress may lead relationship banks to reduce any benefits of relationship lending. This suggests loan terms may become similar for relationship and outside loans, and borrowing firms do not derive any benefits from or pay any costs for relationship lending in distress. Further, from a risk management perspective, this suggests that loan volume from relationship banks should reduce relative to a normal period.

An alternate reason for the similarity of relationship and outside loan is that relationship banks have incentives to develop a reputation for optimal liquidation and continuation decisions for firms in distress (Chemmanur and Fulghieri, 1994), i.e., no special treatment for borrowers in distress.

2.3. Hold-up by banks hypothesis

A third possibility is that the banks may hold up the borrowers. Outside banks may be reluctant to finance a firm due to an informational disadvantage relative to relationship banks (Rajan, 1992; von Thadden, 2004). Gorton and Kahn (2000) find that in the event of extreme distress, the relationship bank will not give any concession to their borrowers, instead, will charge the highest possible interest rate in a renegotiation. This will lead to asset substitution by the firm which results in an increase in firm risk.

These arguments imply that the contract terms in distress may even be worse for relationship loans relative to outside loans. The implication of bank hold-up on loan volume is less straightforward. Borrower hold-up may provide a bank with a greater expected return, which should lead to an increase in loan volume. This needs to be balanced against the higher risk of default and policies at the bank level, which may lead the bank to limit exposure to an obligor in distress, notwithstanding the higher profitability of such loans.

2.4. Hold-up by borrowers hypothesis

Borrowers may even derive greater benefits in distress from relationship lending, as they can hold up their banks by threatening to strategically file for bankruptcy (Anderson and Sundaresan,

1996; Davydenko and Strebulaev, 2007). This is also the implication of Dewatripont and Maskin (1995) who argue that banks may throw good money after bad. At its extreme, this manifests as zombie lending as documented in Peek and Rosengren (2005) and Caballero et al. (2008) for Japan. Empirically, this has similar implications to the inter-temporal insurance provided by banks, except that it would suggest an interest rate in distress that is even lower than what the borrower would be charged in a normal period. Lending volume should also increase, as outside banks are not subject to this hold-up.

3. Sample construction

3.1. Data source

The data set used for empirical analysis is a cross-sectional time series loan sample that comes from the DealScan database maintained by Thomson Financial (henceforth, LPC).[7] Borrowers in the LPC database are matched with the merged CRSP-Compustat database using the link file provided by Chava and Roberts (2008), after excluding financial service companies and real estate companies. The loan data starts in 1986 and ends in 2011.

Following Drucker and Puri (2005), we use the LPC reported "All-in-drawn spread" (hereafter *Fee*) as the measure of the interest rate for a loan. *Fee* is the coupon spread over the London Interbank Offered Rates (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.

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 starting date of loan facility. To be conservative, we assume that a firm's accounting information is available six months after its fiscal year-end month. 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.

[7]This database was originally maintained by the Loan Pricing Corporation, hence the acronym LPC has often been used in finance research papers. We follow this convention.

3.2. Relationship measures

3.2.1. Definition of lead bank

Most of the loans in the LPC database are syndicated loans where many banks are retained in several different roles. Hence, before defining relationship measures, it is important to identify those banks that play a lead role. We follow the methods used in Bharath et al. (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 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 lead lenders in the given loan facility. All measures of relationship lending are constructed using only 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 five 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 five years. As additional variables, we include relationship strength between the borrower and the bank, based on the number (*Relloannum*) and dollar value (*Relloandol*) of loans, where a given bank is retained relative to the total number and dollar values of the firm in the five year period (Schenone, 2010). For borrowers where there was no loan in the past five years, neither of these variables are defined. A detailed description of the construction of relationship measures is given in Appendix A.

3.3. Definition of distress

The first step in the construction of the firm-specific distress dummy is to compute the Expected Default Frequency (EDF) as developed by Merton (1974). The implementation for computing EDF follows the method used by Bharath and Shumway (2008). The exact methodology for

computation is explained in Appendix B.[8] For each month, we compute the EDF as implied by the Merton model for all firms in the merged CRSP-Compustat database. Subsequently, for each calendar year, we count the number of months where the EDF of each borrowing firm in the LPC database lies in the top 10% of the unconditional EDF distribution for all firms for all years and all months.[9] If this number is equal to or greater than six, 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 classified as either distressed (*Distress*=1) or not distressed (*Distress*=0). Given the above classification of firm-years, the classification of normal loan and distress loan 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 distressed year is classified as a distressed loan. We use the filing year of bankruptcy as the year of bankruptcy. For firms that filed for bankruptcy after delisting, we use the year of delisting as the year of bankruptcy (Chava and Jarrow, 2004).

One possibility is that this procedure creates a look ahead bias, that is, a bank that makes a loan in an earlier part of the year does not have the complete information about distress. This biases against finding significant differences between loans made in normal period and distress. At the same time, in a robustness check, we also define distress using rolling windows one year prior to the actual month of the loan and find similar results.

4. Empirical analysis

4.1. Univariate analysis

The total sample size consists of 27,394 loan facilities with 1,970 distressed loans (991 unique firms) and the remaining 25,424 loans (5177 unique firms) made during a normal period. We exclude all debtor-in-possession (DIP) loans as this is not the focus of this study.[10] A definition of all variables used in the empirical analysis is provided in Appendix C.

[8] Shumway (2001) and Hillegeist et al. (2004) provide evidence that market-based measures of financial distress provide better predictive power for bankruptcy relative to accounting-based measures, such as the Altman score and the Zmijewski score.

[9] Note that the distribution of EDFs for the entire universe of CRSP-Compustat merged firms is used in the computation of this percentile.

[10] The reason for focusing on distress (and not bankruptcy) is that existing literature such as Dahiya et al. (2003) and Li and Wang (2016) study DIP lending during bankruptcy. In an earlier version of the paper, we included DIP loans in bankruptcy. We found that DIP loans by relationship banks have lower fees and collateral consistent with the above paper's results.

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 dynamics of the firm's stock price, the total assets and total debt of the firm. For example, the log of the coverage ratio, defined as $1+\frac{EBITDA}{Interest\ Expenses}$ is 4.92 for the distressed sample whereas it is 31.7 during the normal sample. Likewise, the profitability of firms for the normal period sample is 12% while it is 3.3% in the distressed period. Further, firms classified as distressed also have a lower current ratio. The summary statistics above 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 363 basis points, whereas it is 198 basis point in a normal condition. Likewise, the percentage of collateralized loans is 52% in a normal condition while it is 80% in a distressed condition. The size of the loan and its maturity also decrease in distress. Thus, loan contract terms also reflect the onset of distress. This provides further confirmation that the distress measure does indeed reflect an increasing level of credit risk.

Panel C of this table presents results on the volume of relationship lending and the likelihood of relationship lending in distress as compared to a normal period. The likelihood of a relationship bank making a loan in a normal period is 63% while it is 44% in distress. Similarly, the fraction of lending coming from relationship banks is 61% in a normal period, while it is 42% in a distressed period.

In panel A of Table 2, we compare differences in fees and collateral across relationship and non-relationship loans. Relationship loans have much lower fees and collateral requirement in a normal period. The magnitudes of the differences are quite significant. For example, in a normal period, a relationship loan has a 60 basis point lower fee relative to a non-relationship loan. Likewise, in a normal period, the probability that a non-relationship loan is collateralized is 61% whereas the probability that a relationship loan is collateralized is 47%.

In contrast, for the distress sample, the differences in fees are insignificant. However, the collateral requirement between relationship and outside loans continues to differ by around 11%,

which is lower than the difference in a normal period. 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.

Panel B of Table 2 presents a comparison of firm characteristics of relationship and non-relationship firms in distress. As expected, there are several significant differences in firm characteristics which implies that these have to be carefully controlled for in our multivariate tests. However, do note that our classification of firms in distress is based on the likelihood of default, thus, these two sets of firms do have approximately the same probability of default, when default is measured by the Merton model.

4.2. Multivariate regression analysis of loan contract terms

This sub-section examines the impact of relationships after the onset of distress using the fee and collateral as dependent variables. The fee equation is estimated using panel ordinary least squares (OLS) with standard errors clustered at the firm level, and the collateral equation is estimated using the logistic model. Firm and year fixed effects are included to account for unobservable firm and year variation of the dependent variables.

Our main tests focus on the net effect of relationships in distress. The key independent variables of interest are proxies for relationships (*Relloan, Relloandol and Relloannum*) and the interaction of these measures with distress. The net effect of relationships during distress is measured by the sum of the coefficients of *Relloan* (*Relloandol* or *Relloannum*) and *Distress*Relloan* (*Distress*Relloandol* or *Distress*Relloannum*). Its significance is measured by a F-test or Chi-square test. If there is a net benefit of relationships in distress, the sum will be negative. Under bank hold-up, this will be positive. If loans made by relationship and outside banks are similar, the net effect will be zero. Under borrower hold-up, the sum should be negative as well, however, in addition, the interaction of relationship and distress show the negative as well and the discount should be longer in distress.

In addition, several control variables (defined in Appendix C) motivated by prior studies are used to control for the effect of time-varying loan and borrower characteristics on the fee and collateral requirement. Also, 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. All three relationship measures have a significantly negative effect in the non-distress sample, both on fees and likelihood of collateral. In contrast, the net effect of relationships becomes insignificant on the fee charged in distress.[11] However, the effect of relationships continues to be significantly negative on the collateral requirement. 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.

4.3. Time series behaviour

The previous sub-section examined the behaviour 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-year in distress observation. Specifically, we create dummy variables indicating 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.[12]

In Figure 1, we examine the pattern of fees around the distress event dummy. As early as by year T-2, there is a sharp increase in the fee 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. By year T-1, the difference in fees for the relationship and non-relationship loans shrinks to zero, and this continues in the distress year as well.

Similar to the fee, there is a dramatic increase in the likelihood of collateral two years prior to distress. Although the difference in collateral between relationship and non-relationship loans narrows in year T-1, it widens again in the distress year and year T+1, and then it narrows again in year T+2. Thus, the pattern for collateral does not change in constant manner in the time window around distress.

It is interesting that bank loan contracts react to the onset of distress well prior to the distress event. To test if banks can 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,

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

[12] Appendix D explains how we treat adjoining distress observations as well as overlaps of time event dummies of two distress events.

suggesting that banks react to increasing default probabilities by increasing the loan rate and collateral requirement.

Overall, the time series pattern of relationship lending around distress reveals an interesting dichotomy in the behaviour of relationship banks. On one hand, there is a convergence of the price of relationship and outside bank loans. On the other hand, there is a divergence in the collateral requirement.

Next, we examine the extent to which the above intuition from Figure 1 is valid using a multivariate regression adding the distress and time event dummies, as well as their interaction with *Relloan* 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 inverted-U pattern, with the fee peaking in the distress year. The increase in the 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 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.*

In contrast to the fee results, relationship loans have a significantly lower likelihood of collateral in the year of distress. However, when using alternative measures of relationship, based on dollar value and number of loans, the collateral differences also become insignificant, i.e., net effect of relationships in distress for collateral requirement is also zero. Thus, this result also confirms that the graphical pattern in Figure 1 is also statistically significant. We believe that this is the first paper that documents this interesting time pattern of relationship bank behaviour prior to and after distress.

Prior literature, such as Petersen and Rajan (1994) argue 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 evidence for price benefits in terms of lower loan rates. Our paper adds a third dimension to this debate. In particular, we document an intertemporal variation in the benefits of relationship lending based on the financial condition of the borrower, which is not studied earlier.

4.4. 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 four other dimensions that may benefit borrowing firms.[13]

First, we examine the likelihood of relationship lending in a given year and the fraction of lending by relationship banks based on number of loans and dollar amount relative to lending by all banks 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 5 Panel A, actually show the opposite. Both the likelihood of a relationship loan and the fraction of lending by relationship banks, decrease in the year of distress. The magnitude of the reduction is also significant - relative to the unconditional average of 0.61 in a normal period, there is a reduction of 0.043, or about 7% reduction relative to the normal lending fraction, in a distressed period.

Second, we examine the maturity of loans made during distress. Since distressed firms are likely to be facing refinancing problems, a longer maturity loan may help in alleviating this issue. However, we find that relationship loans in distress are shorter in duration (Panel B of Table 5).

Third, 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 covenant index imply more restrictive covenants. We estimate the impact of lending relationships on the covenant intensity index (Table 5 panel C). We do not observe any strong pattern of lower covenants by relationship banks during distress, in fact, in one specification, relationship loans have a greater number of covenants.

[13]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. We only report variables of interest in this table. Other control variables are included in the regressions, but not reported, as they are not the focus of this study.

Last, we construct the covenant strictness index following Murfin (2012). Specifically, we calculate the probability that the lender will receive contingent control via a covenant violation, which is the distance between the borrower's accounting numbers at the time the contract is written and what is allowable under the covenants specified. Holding the number of covenants fixed, covenants that are set closer to the borrower's current levels will be triggered more often, giving the lender an option to renegotiate in more states of the world. In Panel D of Table 5, we do not find any difference between relationship and non-relationship loans in covenant strictness.

Overall, above results show that relationship banks do not provide preferential treatment to the distressed firms in these non-price dimensions- fraction of relationship lending, maturity of loans and number and strictness of covenants.

4.5. Future Likelihood of Bankruptcy

Another potential benefit of relationship lending is the financing obtained from relationship banks during distress may enable a borrower to avoid potentially costly bankruptcy. This can happen through two channels. First, inside banks should have better information about a borrower's prospects. To the extent that they make better liquidation and continuation decisions, a relationship bank's financing decision should be negatively related to a borrower's quality (even if this is unobservable). Second, observing a relationship bank's financing decision in distress, outside financiers should be more willing to finance the firm due to a positive signal.[14] On the other hand, if a relationship bank is captured by the firm and lends in the hope of resurrection (throwing good money after bad as in Dewatripont and Maskin (1995)) or the relationship bank charges higher fees for lending and induces risk shifting (Gorton and Kahn, 2000), the opposite may be true.

To test this, we run a model of prediction of bankruptcy using a logistic model. Consistent with the strong univariate results, we find a *positive* impact of relationship lending in distress on the probability of bankruptcy (Table 6, Panel A). To be conservative, we include distress and EDF as control variables to the bankruptcy prediction model, to account for a potential non-linear effect of EDF on the bankruptcy likelihood. Other control variables that are used but not reported are leverage, profitability, market to book and tangibility. The positive effect of relationship loans in distress on bankruptcy likelihood continues for all three relationship measures (Relloan, Relloannum

[14]Recall that our univariate results (Table 2) suggested the reverse.

and Relloansum). In further unreported results, we re-estimate the same model for the distress sub-sample, and continue to find the same results.

To further investigate this result, we use the probabilities of default based on the model Duan et al. (2012). They demonstrate that their estimate of the probability of default outperforms most extant models, such as Duffie et al. (2007) over a one-year horizon of prediction. Our results continue to hold after this addition. Table 6, Panel B presents the results of this estimation. The probability of default computed using the measure suggested by Duan et al. (2012) has a much larger marginal impact on default relative to EDF. The interaction of relationships with distress has a similar positive effect. In additional robustness checks, we also interact relationships with EDF (instead of distress) and find similar results.

Notwithstanding the above result of an increase in bankruptcy likelihood, the other results - increase of fee and collateral to a similar level to an outside loan, reduction of lending volume - do not suggest a bank hold-up by borrowers. Thus, viewed in entirety, most of the results suggest that banks behave keeping in view the possibility that the relationship may end, rather than being held up by borrowers.

4.6. 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 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.

4.6.1. Propensity score matching

Heckman et al. (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 loan in distress is matched with another loan in distress, that had approximately the same probability of having been a relationship loan, but in fact was not. Once the matching is done, average fees and collateral requirement are calculated for each group of loans.[15] Table 7 shows results from propensity score matching. The results show the differences are insignificant for fee. However, for collateral, we find a lower likelihood during distress. Recall however that the collateral results presented a mixed picture earlier as well, with significantly lower collateral in some cases, and insignificant results in other cases.

4.6.2. 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.[16] Distance has been shown to be correlated with the likelihood of relationship formation (Petersen and Rajan, 2002; 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.

Specifically, we use the log of minimum distance between lead lenders and firms as the IV for the presence of a lending relationship. Since we have interaction term between relationship and distress, this term is endogenous as well and we use distance multiplied by distress as the second IV. Table 8 shows results from the IV approach for loans given in distress.[17] Column 1, 2, 4, and 5 are the results for first stage regressions and Column 3 and 6 are second stage regressions.

[15] 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.

[16] 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.

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

Distance and Distance*Distress are all statistically significant and the F-values are very large in the first stage regressions, indicating that the distance measure is a strong IV. 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, for both fees and collateral.

4.7. Robustness tests

In this section, we conduct a variety of robustness tests of our results. The set of robustness tests that we conduct are as follows - (1) Using the total cost of borrowing, as opposed to the fees alone (Berg et al., 2016). (2) Using rolling past 12 monthly EDF to define distress status. (3) Different types of distress measure, relationship measure, and heterogeneity among borrowers on distress response. (4) Heterogeneity in the types of loan given in distress (term loan versus line of credit). (5) Heterogeneity in the types of banks (Systemically Important Banks). (6) Using technical default to explain the time pattern of fees (Roberts and Sufi, 2009). (7) Using firm-year fixed effect model. (8) Heterogeneity in response to borrower distress due to differences in lenders (Ioannidou and Ongena, 2010).

Table 9 reports the summary of the results, where for each of these tests, the degree of significance for fees, collateral, and lending volume are given. All the actual figures along with details on the implementation are given in the Appendix E. Broadly, the fee results are similar to the earlier results. Collateral results are inconclusive, with a negative effect in some specifications, positive in one, and insignificant in some tests. Thus, our main results are robust to a large variety of alternative specifications.

5. Differences from bank dominated economies

Overall, our results do not support the argument that relationship banking is a remedy for borrowing firm's distress. This contrasts sharply with the results in other countries. Here we elaborate on some potential reasons for the differing results. Hoshi et al. (1990) study the impact of a main bank relationship on investment by distressed firms in Japan and find that firms with a main bank do not cut investment as much as firms without a main bank. We, instead, study loan rates and find no benefits in distress. Weinstein and Yafeh (1998) find that wealth gains of industrial firms in Japan with a main bank are lower relative to those without a main bank, and

suggest that this is partly due to higher interest rates and due to sub-optimal bank financed inputs. Thus, the support during distress seems to have a cost in a normal period. [18]

Elsas and Krahnen (1998) and Elsas and Krahnen (2002) use a sample of German firms to answer questions similar to ours. Using a sample of 200 German firms, with about 75 in potential distress, Elsas and Krahnen (1998) find that housebanks provide liquidity insurance for moderate levels of borrower distress. They do not find any pricing effects in distress. Using the same data set, Elsas and Krahnen (2002) find that relationship loans are more likely to be collateralized, and that relationship banks are more likely to engage in workouts for borrowers in distress. The borrowers in our sample, while in distress, have not formally defaulted on their debt, and hence, our results are not directly comparable on this dimension.[19] At the same time, they do find that extreme distress events (movement of two or more rating classes) does result in termination of liquidity insurance, which is similar to our results. This suggests that there are limits to the implicit contracting insurance even in bank dominated economies.

Schafer (2016) studies Armenia, which is also a bank dominated economy, and finds liquidity insurance effects. Relationship loans to the same firm are 70% more likely to become delinquent, yet, relationship banks compensate by charging over 1.5% higher spread in a normal period. Thus, she finds that banks change to a higher interest rate in a normal period to compensate for a higher payment flexibility in distress. In contrast, we find that relationship banks give discount in a normal period, and no discount in distress. One important difference of our study from hers is that the borrowing firms we study are much larger. Thus, they have sources to alternate forms of financing, which makes inter-temporal liquidity insurance more difficult. This is also consistent with the findings of Bolton et al. (2016) for Italy.

Another primary difference of our study relative to the three studies in Germany and Armenia, is that our sample is based in the US, where competition among banks as well as between banks and markets is quite high relative to both of the above countries. As Allen and Gale (1995) point out, close relationships that banks share with their borrowers in bank dominated economies may facilitate greater monitoring and lower borrower switching when conditions improve, which allows

[18]The phenomenon of zombie lending in Japan, encouraged by the Japanese Government, documented in Peek and Rosengren (2005) and Caballero et al. (2008) , was definitely not the case in the US for the time period of our study.

[19]In contrast, Demiroglu and James, 2015 find that the likelihood of an out of court restructuring was lower for relationship loans in the US, consistent with our findings. Their sample consists mainly of defaulted firms, which is different from our sample.

provision of inter-temporal liquidity insurance. We conjecture that this is one important reason for the difference of our results.

6. Conclusion

Previous literature has documented significant benefits of lending relationships to borrowing firms. Few studies focus on the relationship lending during distress. Prior studies, which are based on bank dominated economies, tend to find the provision of liquidity insurance as well as some pricing forbearance, by relationship banks during borrower distress. In contrast, we find lower pricing in a normal period and no liquidity insurance or pricing benefits in a distressed period. The most important reason that could drive these differences is the lack of inter-temporal smoothing by banks as theoretically suggested in (Allen and Gale, 1997). We suggest potential extensions for their model, as their finding is for bank depositors, whereas we find that this insight is also present for the lending market.

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 for firms in distress, is not found in our data sample. Thus, reputation for helping customers in distress, as envisaged in Boot et al. (1993), is not valid for the US lending market. Reputation for insuring borrowers against system-wide interest rate shocks, as found in Berlin and Mester (1999) may be the more relevant metric for bank reputation, since it is more easily observable by borrowing firms.

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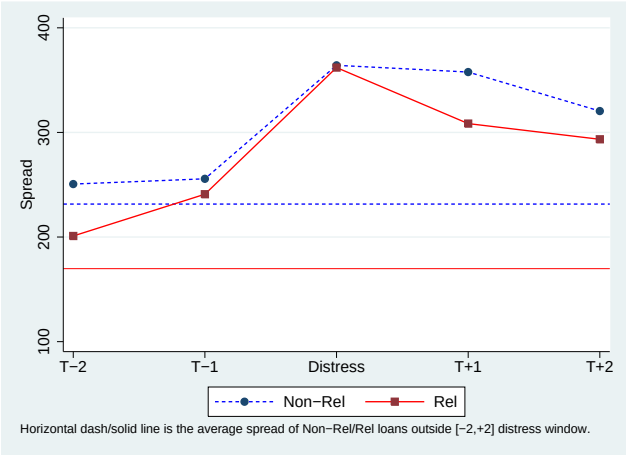
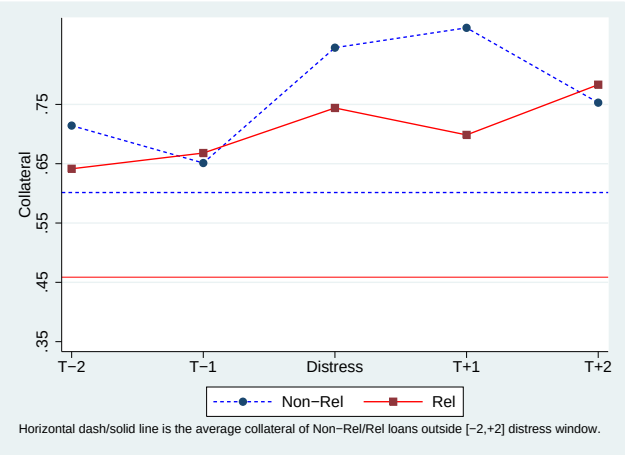
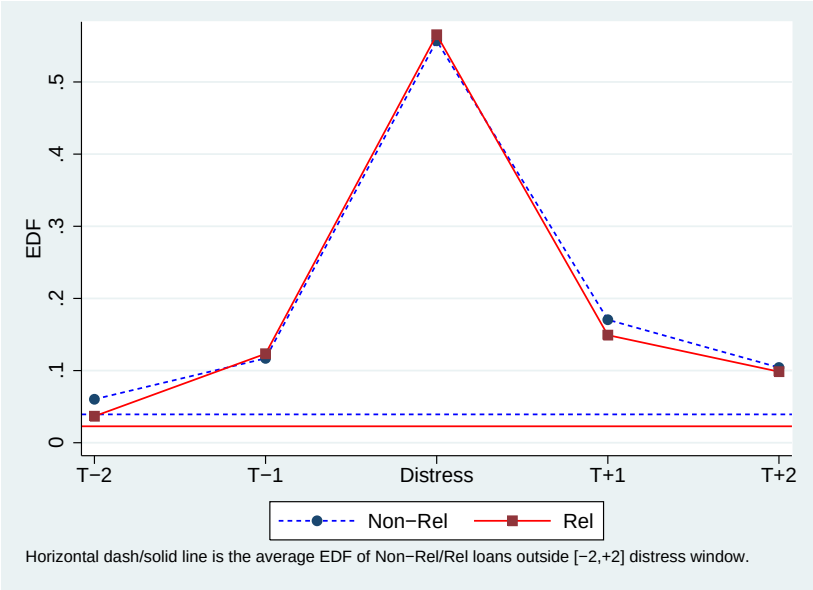


(a) Average Loan Fee



(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 equaling 1 if the loan is issued during a 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. The sample period is from 1986 to 2011. 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. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in 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. Maturity is the duration (in months) between facility activation date and maturity date. 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)	Mean_diff (t-value)	Median_diff (z-value)
Coverage	31.7 (6.19)	4.92 (1.85)	-1.81	-30.33***
Current Ratio	2.11 (1.69)	1.82 (1.54)	-2.47*	-5.86***
Leverage	0.28 (0.27)	0.41 (0.40)	22.3***	20.47***
Market-to-Book Ratio	1.75 (1.36)	1.43 (1.05)	-4.94***	-19.22***
Profitability	0.12 (0.13)	0.033 (0.073)	-16.3***	-24.84***
Tangibility	0.34 (0.28)	0.30 (0.23)	-5.25***	-5.82***
Total Asset	3252.0 (478.7)	1249.9 (183.0)	-6.73***	-16.28***
Number of observation	15747	1158		

Panel B: Loan characteristics

	Normal Times	Distress		
	Mean (Median)	Mean (Median)	Mean_diff (t-value)	Median_diff (z-value)
Fees (basis point)	197.7 (175)	363.2 (350)	41.6***	45.23***
Collateral	0.52 (1)	0.80 (1)	20.6***	23.5***
Maturity (month)	45.7 (48)	38.9 (36)	-9.43***	-12.35***
Facility Amount	295.4 (100)	103.5 (25.4)	-9.42***	-25.39***
Number of loans	25424	1970		

Panel C: Other benefits - volume and likelihood of relationship lending

	Normal Times	Distress		
	Mean (Median)	Mean (Median)	Mean_diff (t-value)	Median_diff (z-value)
Relloan	0.63(1)	0.44(0)	-12.47***	-12.42***
Relloandol	0.61(1)	0.42(0)	-12.94***	-12.71***
Relloannum	0.60(1)	0.42(0)	-12.79***	-12.69***

Table 2: Effects of lending relationships: univariate results

This table presents univariate statistics of the effects of lending relationship. The sample period is from 1986 to 2011. 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 if the loan is classified as "secured" in the database and 0 otherwise. Maturity is the duration (in months) between facility activation date and maturity date. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value (number) of loans taken by the borrower, in the five-year window prior to the current loan date. Filing takes a value of 1 if the borrower files for bankruptcy in the next year and zero otherwise. See Appendix C for a detailed definition of all variables used in this table.

Panel A: Loan characteristics						
	Variable	N	Non-relationship	Relationship	Mean different (t-value)	Median different (z-value)
			Mean (Median)	Mean (Median)		
Normal	Fee	25424	234.1 (225)	174.4 (150)	-34.28***	-33.96***
	Collateral	25424	0.61 (1)	0.47 (0)	-21.46***	-21.27***
	Maturity	25424	44.66 (37)	46.31(52)	4.89***	7.88***
Distress	Fee	1970	364.2 (350)	362.0 (337.5)	-0.29	-0.40
	Collateral	1970	0.85 (1)	0.74 (1)	-5.65***	-5.61***
	Maturity	1970	39.19(36)	38.5(36)	-0.59	0.44
Panel B: Firm characteristics						
	Variable	N	Non-relationship	Relationship	Mean different (t-value)	Median different (z-value)
			Mean (Median)	Mean (Median)		
Normal	Coverage	15747	35.3 (5.5)	29.8 (6.5)	-1.25	10.01***
	Current Ratio	15747	2.41 (1.88)	1.94 (1.59)	-7.11***	-17.2***
	Leverage	15747	0.25 (0.24)	0.3 (0.29)	14.63***	15.7***
	Market-to-Book Ratio	15747	1.85 (1.34)	1.69 (1.37)	-4.39***	3.11***
	Profitability	15747	0.095 (0.12)	0.14 (0.13)	14.5***	14.7***
	Tangibility	15747	0.32 (0.26)	0.36 (0.3)	9.58***	9.51***
	Total Asset	15747	1239.1 (150.5)	4439.7 (910.3)	19.3***	51***
Distress	Coverage	1158	5.51 (1.56)	4.51 (2.15)	-0.3	4.64***
	Current Ratio	1158	1.92 (1.59)	1.71 (1.46)	-2.53*	-2.33**
	Leverage	1158	0.39 (0.38)	0.44 (0.43)	3.51***	3.68***
	Market-to-Book Ratio	1158	1.51 (1.05)	1.34 (1.05)	-1.6	0.6
	Profitability	1158	0.0082 (0.059)	0.063 (0.088)	4.31***	5.41***
	Tangibility	1158	0.29 (0.21)	0.32 (0.26)	2.52*	3.09***
	Total Asset	1158	440.4 (88.1)	2255.6 (396.7)	6.65***	14.3***

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. The sample period is from 1986 to 2011. 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 if the loan is classified as "secured" in the database and 0 otherwise. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value (number) of loans taken by the borrower, also in the five-year window prior to the current loan date. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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	Fee	Fee	Collateral	Collateral	Collateral
Distress	63.5***	64.1***	64.1***	0.67***	0.67***	0.69***
	(8.58)	(8.38)	(8.33)	(0.16)	(0.16)	(0.15)
Relloan	-9.73***			-0.30***		
	(2.09)			(0.054)		
Distress * Relloan	16.7			-0.099		
	(10.8)			(0.20)		
Relloandol		-11.3***			-0.45***	
		(2.26)			(0.058)	
Distress*Relloandol		18.7			-0.15	
		(12.0)			(0.22)	
Relloannum			-10.8***			-0.39***
			(2.30)			(0.059)
Distress*Relloannum			19.1			-0.20
			(12.1)			(0.22)
Collateral	33.4***	33.3***	33.4***			
	(2.58)	(2.58)	(2.58)			
log(Maturity)	-18.6***	-18.6***	-18.6***	0.21***	0.25***	0.25***
	(1.74)	(1.74)	(1.74)	(0.040)	(0.034)	(0.034)
Covenant	0.16	0.15	0.13	0.31***	0.32***	0.32***
	(0.34)	(0.33)	(0.33)	(0.0081)	(0.0078)	(0.0078)
Leverage	39.1***	38.7***	38.6***	0.16	0.042	0.042
	(9.81)	(9.80)	(9.82)	(0.21)	(0.21)	(0.21)
Market-to-Book	-4.87***	-4.85***	-4.86***	-0.088***	-0.089***	-0.090***
	(1.67)	(1.66)	(1.66)	(0.034)	(0.034)	(0.034)
Tangibility	-23.0*	-22.9*	-23.0*	-0.30	-0.32	-0.33
	(12.9)	(12.9)	(12.9)	(0.32)	(0.32)	(0.32)
Profitability	-45.5**	-45.4**	-45.4**	-0.81*	-0.79*	-0.80*
	(19.7)	(19.7)	(19.7)	(0.45)	(0.45)	(0.45)
Log(Total Asset)	-19.4***	-19.3***	-19.4***	-0.62***	-0.63***	-0.64***
	(2.10)	(2.09)	(2.09)	(0.047)	(0.047)	(0.047)
Current Ratio	-1.12*	-1.13*	-1.13*	-0.034*	-0.033*	-0.034*
	(0.61)	(0.62)	(0.62)	(0.019)	(0.019)	(0.019)
Coverage Ratio	-14.0***	-14.0***	-14.0***	-0.26***	-0.25***	-0.25***
	(2.10)	(2.10)	(2.10)	(0.041)	(0.041)	(0.041)
Constant	327.6***	330.1***	331.2***			
	(16.5)	(16.4)	(16.4)			
N	27394	27394	27394	16148	16148	16148
adj. R^2	0.287	0.287	0.287			
pseudo R^2				0.232	0.229	0.227
F-test (Chi-square test) for net effect of relationships in distress	0.42	0.39	0.49	4.16*	8.00**	7.65**

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 if the loan is classified as "secured" in the database and 0 otherwise. 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 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. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All firm characteristics as those in Table 3 are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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	0.34	-0.11
	(10.1)	(0.28)
T-1	26.1**	0.32
	(12.8)	(0.30)
Distress	73.0***	0.87***
	(8.97)	(0.17)
T+1	48.5**	0.89**
	(24.7)	(0.43)
T+2	30.2*	0.61
	(17.1)	(0.44)
Relloan	-10.0***	-0.32***
	(2.07)	(0.056)
T-2 * Relloan	0.79	0.11
	(12.5)	(0.35)
T-1 * Relloan	-12.3	0.58
	(15.3)	(0.36)
Distress* Relloan	17.0	-0.084
	(10.9)	(0.20)
T+1 * Relloan	1.95	-0.39
	(25.7)	(0.47)
T+2 * Relloan	18.9	0.48
	(23.8)	(0.53)
adj. R^2	0.29	
pseudo R^2		0.25
N	27394	16148
F-test (Chi-square test) for net effect of		
Relationship in T-2	0.55	0.37
Relationship in T-1	2.18	0.54
Relationship in Distress	0.41	4.11**
Relationship in T+1	0.098	2.26
Relationship in T+2	0.14	0.089

Table 4 Continued—Panel B: Alternative measures of relationship loan

	Fee	Collateral	Fee	Collateral
T-2	-3.46	-0.16	-8.44	-0.16
	(13.5)	(0.42)	(13.6)	(0.41)
T-1	20.1	0.98**	19.3	0.92**
	(15.0)	(0.40)	(15.0)	(0.40)
Distress	81.6***	1.39***	80.3***	1.43***
	(12.9)	(0.26)	(12.8)	(0.25)
T+1	46.5*	1.32***	42.1	1.30***
	(26.7)	(0.45)	(27.0)	(0.44)
T+2	68.7**	3.23***	56.4*	3.44***
	(34.1)	(0.66)	(31.3)	(0.68)
Relloandol	-16.5***	-.41564***		
	(3.43)	(.085)		
T-2 * Relloandol	6.53	0.12		
	(16.8)	(0.54)		
T-1* Relloandol	-10.4	-0.0059		
	(19.3)	(0.53)		
Distress * Relloandol	10.0	-0.70**		
	(15.8)	(0.31)		
T+1 * Relloandol	2.13	-0.98*		
	(30.9)	(0.55)		
T+2 * Relloandol	-45.6	-3.06***		
	(39.0)	(0.83)		
Relloannum			-16.76***	-.33***
			(3.52)	(0.087)
T-2 * Relloannum			14.7	0.11
			(18.3)	(0.55)
T-1* Relloannum			-9.41	0.069
			(19.5)	(0.54)
Distress * Relloannum			12.4	-0.78**
			(15.9)	(0.31)
T+1 * Relloannum			9.62	-0.94*
			(31.4)	(0.55)
T+2 * Relloannum			-23.8	-3.38***
			(35.9)	(0.87)
Constant	324.1***		324.6***	
	(23.6)		(23.6)	
adj. R^2	0.31		0.31	
pseudo R^2		0.29		0.29
N	20986	11935	20986	11935
F-test (Chi-square test) for net effect of				
Relationship in T-2	0.36	0.30	0.013	0.17
Relationship in T-1	1.99	0.66	1.84	0.24
Relationship in Distress	0.17	14.0	0.080	13.8
Relationship in T+1	0.22	6.46	0.052	5.39
Relationship in T+2	2.55	17.8	1.28	18.2

Table 5: Other potential benefits of relationship lending

This table reports multivariate regression results of the impact of distress on the other potential benefits of relationship lending. All firm characteristics as those in Table 3 are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, and year. 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	Relyeardol	Relyearnum
Distress	-0.21*	-0.043**	-0.043**
	(0.12)	(0.022)	(0.021)
N	11126	16905	16905
adj. R^2 (pseudo R^2)	0.154	0.117	0.117

Panel B: Maturity

	Log(Maturity)	Log(Maturity)	Log(Maturity)
Relloan	-0.0047		
	(0.011)		
Distress*Relloan	-0.16***		
	(0.037)		
Relloandol		-0.012	
		(0.011)	
Distress*Relloandol		-0.15***	
		(0.043)	
Relloannum			-0.015
			(0.011)
Distress*Relloannum			-0.15***
			(0.043)
Distress	-0.012	-0.029	-0.033
	(0.029)	(0.029)	(0.029)
F-test for net effect	21.4***	15.2***	14.5***

Panel C: Number of covenants

	Log(1+Covenants)	Log(1+Covenants)	Log(1+Covenants)
Relloan	0.061***		
	(0.017)		
Distress*Relloan	0.042		
	(0.057)		
Relloandol		0.064**	
		(0.025)	
Distress*Relloandol		0.063	
		(0.082)	
Relloannum			0.040
			(0.026)
Distress*Relloannum			0.090
			(0.082)
Distress	-0.087**	-0.10*	-0.12*
	(0.043)	(0.062)	(0.061)
F-test for net effect	3.42*	2.51	2.57

Panel D: Covenant strictness

	Covenant Strictness	Covenant Strictness	Covenant Strictness
Relloan	0.79		
	(1.14)		
Distress*Relloan	4.37		
	(6.68)		
Relloandol		2.70*	
		(1.61)	
Distress*Relloandol		5.25	
		(8.73)	
Relloannum			2.78*
			(1.67)
Distress*Relloannum			5.34
			(9.22)
Distress	-0.99	-1.02	-1.18
	(5.05)	(5.86)	(6.22)
F-test for net effect of relationships in distress	0.61	0.83	0.78

Table 6: Relationship banking and bankruptcy filing

This table reports logit regression results of the impact of relationship banking on bankruptcy filing. The dependent variable is a dummy variable *Filing* that takes a value of 1 if the borrower files for bankruptcy in the next year and zero otherwise. Relyear is an indicator that takes a value of 1 if at least 1 loan in the given year comes from a relationship bank. Relyeardol 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. Relyearnum is the ratio of the total number of relationship loans in the given year to the total number loans by the borrower in the same year. Distress is a dummy variable equaling 1 if the loan is issued during a year the firm is in distress. We use RMI probabilities of default, as computed by Duan et al. (2012) from the Risk Management Institute default database. EDF is computed using the Moody's-KMV implementation of Merton's model. See Appendix C for a detailed definition of all variables. The models are estimated using logistic model, controling for firm fixed effect. All firm characteristics as that in table 3 are included in the empirical estimation but not reported to conserve space. 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: Dummy and volume measure of relationship

	Filing	Filing	Filing
Distress	0.078	0.077	0.083
	(0.51)	(0.50)	(0.50)
Relyear	0.22		
	(0.29)		
Distress * Relyear	1.07**		
	(0.48)		
Relyeardol		0.23	
		(0.29)	
Distress * Relyeardol		1.11**	
		(0.48)	
Relyearnum			0.22
			(0.29)
Distress* Relyearnum			1.10**
			(0.48)
EDF	2.58***	2.58***	2.58***
	(0.52)	(0.52)	(0.52)
Z-score	0.0083	0.0084	0.0084
	(0.019)	(0.019)	(0.019)
Constant	-6.00***	-5.99***	-5.99***
	(0.36)	(0.36)	(0.36)
F Test for net effect of relationships in Distress	11.0***	11.9***	11.6***

Panel B: RMI probability of default

	Filing	Filing	Filing	Filing	Filing
Distress	1.44***	1.12**	0.063	0.25	
	(0.38)	(0.48)	(0.45)	(0.57)	
Relyear	0.32	0.12	0.38	0.18	0.087
	(0.28)	(0.35)	(0.28)	(0.35)	(0.36)
Distress*Relyear	1.01**	1.12**	1.01**	1.11**	
	(0.43)	(0.54)	(0.43)	(0.53)	
RMI probability of default		7.49***		5.24***	4.43***
		(1.46)		(1.61)	(1.61)
EDF			2.81***	2.04***	2.15***
			(0.51)	(0.77)	(0.74)
Relyear*EDF					1.69**
					(0.78)
Chi-square test	15.2***	8.83***	16.8***	9.74***	8.67***
N	15855	10288	15855	10288	10288
pseudo R^2	0.15	0.18	0.16	0.19	0.18

Table 7: Propensity score matching

This table reports the results of borrower matching. The sample period is from 1986 to 2011. It reports the result for matching each loan in distress where a relationship bank was retained 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 et al. (1997). The actual implementation follows Drucker and Puri (2005). 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 if the loan is classified as "secured" in the database and 0 otherwise. See Appendix C for a detailed definition of all variables. 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	
	Fee	*Collateral*
Mean	2.55	-0.04*
Std. Dev.	11.29	0.023
95% Conf. Interval	[-19.86,24.96]	[-0.080.008]

Table 8: Impact 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 if the loan is classified as "secured" in the database and 0 otherwise. Distance is the log of distance between borrower and lender. 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 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. 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. The models are estimated using OLS for Fee and Collateral. All regressions use fixed effects for ratings, loan type, loan distribution method and year. 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).

	Relloan	Relloan*Distance	Fee	Relloan	Relloan*Distance	Collateral
Distance	-0.031***	0.0039***		-0.031***	0.0039***	
	(0.0025)	(0.00076)		(0.0025)	(0.00076)	
Distance*Distress	0.033***	-0.021***		0.033***	-0.021***	
	(0.0092)	(0.0028)		(0.0092)	(0.0028)	
Relloan		0.078***	-122.0***		0.078***	-0.43***
		(0.0019)	(23.9)		(0.0019)	(0.087)
Distress	-0.69***	0.63***	-85.3	-0.70***	0.63***	0.14
	(0.067)	(0.020)	(64.2)	(0.067)	(0.020)	(0.24)
Distress*Relloan	0.84***		344.6**	0.84***		-0.11
	(0.020)		(134.8)	(0.020)		(0.50)
Collateral	-0.050***	-0.0017	54.7***			
	(0.0066)	(0.0020)	(2.50)			
log(Maturity)	0.0026	-0.0047***	-21.9***	0.0024	-0.0047***	0.0036
	(0.0049)	(0.0015)	(1.53)	(0.0050)	(0.0015)	(0.0057)
Covenant	0.010***	0.0012***	0.76	0.0082***	0.0011***	0.046***
	(0.00084)	(0.00026)	(0.50)	(0.00080)	(0.00024)	(0.0016)
Leverage	0.20***	-0.0053	73.4***	0.19***	-0.0054	0.14***
	(0.017)	(0.0052)	(7.24)	(0.017)	(0.0052)	(0.026)
Market-to-Book	0.0052***	0.00048	-2.93***	0.0057***	0.00049	-0.0068***
	(0.0016)	(0.00049)	(0.49)	(0.0016)	(0.00049)	(0.0018)
Tangibility	-0.039***	-0.00015	-18.2***	-0.037***	-0.000092	-0.052***
	(0.012)	(0.0036)	(3.44)	(0.012)	(0.0036)	(0.013)
Profitability	0.11***	0.0072	-44.3***	0.12***	0.0074	-0.060**
	(0.020)	(0.0062)	(7.07)	(0.020)	(0.0062)	(0.027)
Log(Total Asset)	0.064***	0.00057	-16.1***	0.068***	0.00072	-0.061***
	(0.0018)	(0.00055)	(2.05)	(0.0016)	(0.00052)	(0.0081)
Current Ratio	-0.00014	0.00017	-0.14	-0.000086	0.00017	-0.0011**
	(0.00047)	(0.00014)	(0.13)	(0.00047)	(0.00014)	(0.00050)
Coverage Ratio	0.010***	0.0016	-15.1***	0.013***	0.0017*	-0.047***
	(0.0033)	(0.0010)	(1.05)	(0.0033)	(0.00100)	(0.0041)
Constant	0.053	-0.0067	407.4***	0.048	-0.0069	0.13
	(0.30)	(0.090)	(82.0)	(0.30)	(0.090)	(0.31)
adj. R^2	0.27	0.51	0.36	0.27	0.51	0.24
N	25281	25281	25281	25281	25281	25281
F-value for first stage	190.7	536.2		193.0	547.4	
Chi2 Test for Relationship in Distress (Net)			2.48			1.07

Table 9: Summary of robustness tests

This table summarizes the robustness tests results. Here we only report the statistical significance of net effect of relationship banking on the distress loan. All firm characteristics as that in table 3 are included in the empirical estimation of Fee and Collateral. As defined in Berg et al. (2016), Total Cost of Borrowing incorporates the price options embedded in loan contracts as well as screen borrowers on their likelihood of exercising these options. Specifically, it is estimated as follow: $TCB = UpfrontFee/ExpectedLoanMaturityinYears + (1 - PDD) \times (FacilityFee + CommitmentFee) + PDD \times (FacilityFee + Spread) + PDD \times Prob(Utilization > UtilizationThreshhold|Usage > 0) \times UtilizationFee + Prob(Cancellation) \times CancellationFee$, where PDD, the probability of drawdown, is the ex-ante probability that the credit facility is going to be drawn down. The spread, the facility fee, the commitment fee, and the utilization fee are annual cost measures as well, while the upfront and the cancellation fees are one-time fees and need to be annualized. The procedure to categorize a firm as being in distress in a given month using rolling window is as follows: For each month in the year, the EDF of the firm is computed using the Moody's-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 is in the top decile of default probabilities is greater than or equal to six in the past 12 months, we classify the firm as being distress in the given month. A loan facility with a starting date in a distress month is classified as a distressed loan. See Appendix E for a detail discussion of the procedures and see Appendix C for a detailed definition of all variables. 0 denotes that the net effect is statistically insignificant. + denotes that the net effect is significantly positive. − denotes that the net effect is significantly negative.

Test ID	Appendix Table Number	Robustness tests	Fee	Collateral
1	A1	Using Total Borrowing Cost as defined in Berg et al. (2016)	0	-
2	A2	Using rolling past 12 monthly EDF to define distress status	0	-
3	A3	Using EDF 70th percentile as cutoff-point to define distress status	0	-
4	A3	Using negative cash flow to define distress status	0	-
5	A3	Using 3-year window to define relationship banks	0	0
6	A3	Adding syndicate structure variables as controls	0	-
7	A3	Using firm ever experience distressed as subsample	0	-
8	A4	Credit Line subsample	0	0
9	A4	Term Loan subsample	0	-
10	A5	Systemically Important Banks subsample	0	0
11	A6	Excluding technical default firms as subsample (Roberts and Sufi, 2009)	0	0
12	A7	Using firm-year fixed effect model	0	+
13	A8	Lender matching as that in Ioannidou and Ongena (2010)	+	0

Appendices

A. Construction of relationship measures

Assume that the current loan facility of firm abc has a start date of 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 five year period. Let us assume that firm abc obtained one loan from bank X, two loans from bank Y, and five loans from bank Z (bank X, Y and Z are all lead lenders in the syndicated loans) during this five-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 abc's loans during the last five years are from bank Z. If the lead lender of the current loan facility is either bank X, Y or Z, then the current loan facility is a relationship loan to firm abc and *Relloan* dummy takes the value of 1. If the lead lender of the current loan facility is neither X nor Y nor Z, then the current loan facility is a non-relationship loan to firm abc and the *Relloan* dummy takes the value of 0. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value (number) of loans taken by the borrower, also in the five-year window prior to the current loan date. For facilities where there are multiple relationship banks retained, we use the maximum value of these variables over all relationship banks. If a firm has no loans in the past five years, all these measures are set to missing.

Relyear is a dummy variable that measures relationships on a firm year basis. 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 is equal to 1. If firm abc in 1995 received loans but none of them is from a relationship bank (which is X, Y or Z), the *Relyear* dummy is equal to 0. *Relyeardol*(*Relyearnum*) measure the total dollar value (total number) of relationship loans in the given year relative to the total dollar value (total number) of loans taken by the borrower in the given year. If a firm had no loans in the given year, then this measure is set to missing.

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 Securities Data Company (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.

B. Calculate the expected default frequency (EDF) from Merton's 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 firm's assets with a strike price equal to the face value of the firm's 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 firm's equity, F is the face value of the firm's 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 Merton's 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 the 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.

C. Definitions of variables

- *Distress*: A dummy variable that takes a value of 1 if the firm is in distress in the given year and 0 otherwise. The procedure to categorize a firm as 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 Moody's-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 is in the top decile of default probabilities is greater than or equal to six, we classify the firm as being distressed in the given year. 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. 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*: A dummy variable that takes a value of 1 if the firm files for bankruptcy in the next year. If a firm delists and files for bankruptcy in a later year, we use the year of delisting as the year of bankruptcy, following Chava and Jarrow (2004).

- *T-2*: A dummy variable which takes a value of 1 two years prior to the distress year.

- *T-1*: A dummy variable which takes a value of 1 one year prior to the distress year.

- *T+1*: A dummy variable which takes a value of 1 one year subsequent to the distress year.

- *T+2*: A dummy variable which takes a value of 1 two years subsequent to the distress year.

- *Relloan*: A dummy variable, which takes a value of 1 if the 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 five years. If there were no loans taken by the borrower in the past five years, it is set to missing.

- *Relloannum*: The fraction of loans (using the number of loans) in the last five years of a given borrower that went to the relationship lender retained in the current loan. If no relationship lender is retained in the current loan, this is set to 0. If multiple relationship lenders are retained, it is set to the maximum value across all relationship lenders. If there were no loans taken by the borrower in the past five years, it is set to missing.

- *Relloandol*: The fraction of loans (in dollar value terms) in the last five years of a given borrower that went to the relationship lender retained in the current loan. If no relationship lender is retained in the current loan, this is set to 0. If multiple relationship lenders are retained, it is set to the maximum value across all relationship lenders. If there were no loans taken by the borrower in the last five years, it is set to missing.

- *Relyear*: 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.

- *Relyeardol*: 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 same year.

- *Relyearnum*: The ratio of the total number of relationship loans taken by a given borrower in a given year to the total number of loans taken by the same borrower in the same year.

- *Fee*: 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*: 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.

- *Covenant Strictness*: The probability that the lender will receive contingent control via a covenant violation as that in Murfin (2012).

- *Loan Amount*: 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)*: The natural log of the maturity of loan facility measured in months.

- *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.
- *Profitability*: The operating margin, calculated as ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to sales.
- *Coverage*: The natural log of ratio $(1+\frac{EBITDA}{Interest\ Expenses})$.
- *Leverage*: The ratio of book value of total debt to book value of assets.
- *Operating Margin*: The ratio of EBITDA to Sales.
- *Tangibility*: The ratio of property, plant, and equipment (PPE) to total assets.
- *Current Ratio*: The ratio of current assets to current liabilities.
- *EDF*: Expected default frequency is computed using the Moody's-KMV implementation of Merton's model. Details can be found in Appendix B.
- *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.

D. Treatment of overlapping distress observations

When constructing these time event dummies 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 separated by less than four 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 two 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 three 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. As a robustness test, we also excluded all the overlapping observations from the estimation and obtain similar results.

E. Online Appendix

E.1. Total Borrowing Cost

Berg et al. (2016) suggest that fees are an important part of corporate loan contracts and propose the Total Cost of Borrowing (TCB) as an alternative to the all-in-drawn-spread in future research exploring the cost of loans. As defined in their paper, Total Cost of Borrowing incorporates the price options embedded in loan contracts as well as screen borrowers on their likelihood of exercising these options. Specifically, it is estimated as follow: $TCB = UpfrontFee/ExpectedLoanMaturityinYears + (1 - PDD) \times (FacilityFee + CommitmentFee) + PDD \times (FacilityFee + Spread) + PDD \times Prob(Utilization > UtilizationThreshhold|Usage > 0) \times UtilizationFee + Prob(Cancellation) \times CancellationFee$, where PDD, the probability of drawdown, is the ex-ante probability that the credit facility is going to be drawn down. The spread, the facility fee, the commitment fee, and the utilization fee are annual cost measures as well, while the upfront and the cancellation fees are one-time fees and need to be annualized. We obtain the measure dataset directly from one of the author's website, http://www.tobias-berg.com/index.php/research/, in which it provides the TCB and the matching variable (facility ID) to the Dealscan. The TCB results are qualitatively the same to that in our main specification.

E.2. Rolling past 12 monthly EDF to define distress status

The procedure to categorize a firm as being in distress in a given month is as follows: For each month in the year, the EDF of the firm is computed using the Moody's-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 is in the top decile of default probabilities is greater than or equal to six in the past 12 months, we classify the firm as being distressed in the given month. A loan facility with a starting date in a distress month is classified as a distressed loan.

E.3. Alternative measures of firm distress and relationship banking

We use different measures for distress and relationship to do the same analysis using the same specification in Table 3. We use a different cutoff point for the EDF percentiles (using top 30%), or using negative cash flow to identify distress. With all these two different measures, the results are essentially unchanged (Table A3). 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. Lastly, we also use only the sub-sample of distressed firms as the base sample and find similar results.

E.4. Credit line and term loans

We investigate whether there is any difference between line of credit and term loans. Recent research documents increased corporate use of credit lines during financial crisis and credit line is important for corporate policy (Campello et al., 2011, 2010). This suggests that firms in distress or banks having relationship borrowers may behave differently when pricing term loans versus lines of credit. In particular, given the option of changes in borrower credit quality, the results may be driven by changes in the behavior of lines of credit. Motivated by the above, we investigate if our results differ for lines of credit and term loans in distress. The result holds for both the lines of credit and term loans. The result is reported in Table A4.

E.5. Systemically Important Banks

One possibility is that lender heterogeneity drives our results. While we will have a formal matching test for this later, here, we investigate informally by examining if our results differ for systemically important banks and other banks. It is possible that large systemically important banks may value relationships less, due to their high reputation in other markets. To test this, we hand-collect the systematically important banks list from the website of the Financial Stability Board[20] and track back the bank history based on the parent code of the bank. If the lead bank of the loan is a systematically important bank (SIB), then the loan is defined as a SIB loan.[21] The results are reported in Table A5. Relationship loans and outside loans in distress are similar, regardless whether the bank is a SIB or not.

[20] `http://www.financialstabilityboard.org/wp-content/uploads/r_111104bb.pdf?page_moved=1`

[21] Based on the Financial Stability Board web site, the following is the list of the systematically important banks as of 4 November, 2011: Bank of America; Bank of China; Bank of New York Mellon; Banque Populaire CdE; Barclays; BNP Paribas; Citigroup; Commerzbank; Credit Suisse; Deutsche Bank; Dexia; Goldman Sachs; Group Credit Agricole; HSBC; ING Bank; JP Morgan Chase; Lloyds Banking Group; Mitsubishi UFJ FG; Mizuho FG; Morgan Stanley; Nordea; Royal Bank of Scotland; Santander; Societe Generale; State Street; Sumitomo Mitsui FG; UBS; Unicredit Group; Wells Fargo.

E.6. Excluding technical default firms

We test whether the pattern in fees is a result of technical default prior to distress. We use the covenant violation (Roberts and Sufi, 2009) as the measure for technical default.[22] The sample period is from 1996 to 2011. We exclude those firms that experienced a technical default within the (-2,+2) year window relative to the distress period. The results are reported in Table A6. The results are qualitatively similar after excluding the violation sample.

E.7. Firm-year fixed effect

We report the result for estimation with firm-year fixed effects in Table A7. Since controlling firm-year fixed effects requires the firms to have more than one loan in a year, the sample size decreases dramatically. The fee results are unchanged, while the collateral requirement for relationship loans in distress increases with this specification. As mentioned before, we do not find fully consistent results for collateral - insignificant in some cases, and significantly negative in others. Here, we find an opposite results, further reinforcing the lack of a consistent pattern.

E.8. Unobservable lender heterogeneity

The previous sections on propensity score matching and instrumental variables focused on differences in borrower types of relationship and non-relationship loans in distress. Ioannidou and Ongena (2010) highlight that differences in loan contracts can also arise due to lender heterogeneity. To investigate if lender heterogeneity impacts our results, we employ a matching strategy similar to that employed by them. The matching strategy is as follows. First, we 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 one year. Second, we calculate the difference between the loan fee of each relationship loan and the matched non-relationship loan, $fee_{Rel} - fee_{non-rel}$. Third, we regress this difference of fees 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 of relationship loans are lower than the fees on comparable non-relationship loans. For examining the difference between relationship and outside loans in distress, we test whether the sum of the constant term and distress dummy is statistically significantly different from zero or not.

Panel A of Table A8 reports the regression result after controlling for the differences in firm characteristics across the matched loans. Model 1 shows that the difference in the normal period continues to be significant. Model 2 and Model 3 use the distress sub-sample and the entire sub-sample, respectively. Both models show a strong positive effect of the impact of the relationship on fees after the onset of distress - the magnitude of the difference is quite large - over 90 basis points in some cases. One factor that does limit the applicability of this analysis is that the set of loans that can be matched is much smaller than the total number. In particular, only 391 loans can be matched relative to the total number of 1970 loans in distress.

In Panel B of Table A8 , 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 a loan rates difference of less than 100 basis points.[23] 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 that 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. 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. As before, the total number of loans that can be matched is somewhat small.[24]

[22]The dataset is directly from Professor Michael R. Roberts' website. http://finance.wharton.upenn.edu/ mrrobert/styled-9/styled-11/index.html

[23]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 a smaller range of fees.

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

Table A1: Relationship lending during distress: Total Borrowing Cost

This table reports multivariate regression results of the impact of lending relationships on Total Borrowing Cost (TBC) as defined in Berg et al. (2016). Total cost of borrowing incorporates the price options embedded in loan contracts as well as screen borrowers on their likelihood of exercising these options. The sample period is from 1986 to 2011. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value (number) of loans taken by the borrower, also in the five-year window prior to the current loan date. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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).

	TBC	TBC	TBC
Relloan	-9.11***		
	(1.85)		
Distress * Relloan	18.5		
	(14.3)		
Relloandol		-10.4***	
		(1.98)	
Distress * Relloandol		13.6	
		(15.5)	
Relloannum			-10.6***
			(2.00)
Distress * Relloannum			12.3
			(15.6)
Distress	43.8***	48.3***	49.2***
	(12.1)	(11.8)	(11.7)
Covenant	1.71***	1.70***	1.69***
	(0.28)	(0.28)	(0.28)
Leverage	41.3***	40.8***	40.8***
	(9.28)	(9.25)	(9.25)
Market-to-Book	-4.43***	-4.40***	-4.41***
	(0.88)	(0.88)	(0.89)
Tangibility	-8.96	-9.20	-9.38
	(11.7)	(11.6)	(11.7)
Profitability	-54.1***	-53.9***	-54.0***
	(9.83)	(9.86)	(9.86)
Log(Total Asset)	-11.4***	-11.4***	-11.4***
	(1.76)	(1.76)	(1.76)
Current Ratio	-0.61	-0.62	-0.63
	(0.61)	(0.61)	(0.62)
Coverage Ratio	-9.33***	-9.22***	-9.20***
	(1.43)	(1.44)	(1.44)
Constant	376.2***	376.5***	376.7***
	(11.5)	(11.4)	(11.5)
N	18380	18380	18380
adj. R^2	0.552	0.552	0.552
F-test (Chi-square test) for net effect of relationships in distress	0.43	0.042	0.011

Table A2: Relationship lending during distress: rolling distress using past 12 monthly EDF

This table reports multivariate regression results of the impact of lending relationships on fees and collateral, using rolling past 12 monthly EDF to define distress status. The procedure to categorize a firm as being in distress in a given month using rolling window is as follows: For each month in the year, the EDF of the firm is computed using the Moody's-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 is in the top decile of default probabilities is greater than or equal to six in the past 12 months, we classify the firm as being distressed in the given month. A loan facility with a starting date in a distress month is classified as a distressed loan. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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).

	Spread	Spread	Spread	Collateral	Collateral	Collateral
Relloan	-11.1***			-0.28***		
	(2.15)			(0.055)		
Rolling_Distress * Relloan	19.8*			-0.42**		
	(11.0)			(0.21)		
Relloandol		-13.4***			-0.43***	
		(2.30)			(0.059)	
Rolling_Distress* Relloandol		24.5**			-0.46**	
		(11.8)			(0.22)	
Relloannum			-12.5***			-0.38***
			(2.34)			(0.060)
Rolling_Distress* Relloannum			25.0**			-0.51**
			(12.0)			(0.22)
Rolling_Distress	66.6***	66.1***	66.1***	0.71***	0.68***	0.70***
	(8.77)	(8.53)	(8.60)	(0.17)	(0.17)	(0.17)
Covenant	1.41***	1.39***	1.38***	0.31***	0.32***	0.32***
	(0.32)	(0.32)	(0.32)	(0.0081)	(0.0079)	(0.0079)
Leverage	27.0***	26.6***	26.4***	0.26	0.16	0.16
	(10.2)	(10.2)	(10.2)	(0.22)	(0.22)	(0.22)
Market-to-Book	-5.08***	-5.05***	-5.07***	-0.071**	-0.073**	-0.074**
	(1.47)	(1.47)	(1.47)	(0.033)	(0.034)	(0.034)
Tangibility	-36.7***	-36.8***	-36.9***	-0.42	-0.44	-0.45
	(13.6)	(13.6)	(13.6)	(0.32)	(0.32)	(0.32)
Profitability	-44.3**	-44.1**	-44.2**	-1.12**	-1.09**	-1.11**
	(19.0)	(19.0)	(19.0)	(0.47)	(0.47)	(0.47)
Log(Total Asset)	-21.9***	-21.9***	-22.0***	-0.63***	-0.65***	-0.66***
	(2.06)	(2.06)	(2.06)	(0.048)	(0.047)	(0.047)
Current Ratio	-1.28*	-1.30*	-1.30*	-0.037*	-0.037*	-0.037*
	(0.66)	(0.67)	(0.67)	(0.020)	(0.019)	(0.019)
Coverage Ratio	-15.7***	-15.6***	-15.7***	-0.24***	-0.23***	-0.23***
	(2.03)	(2.02)	(2.03)	(0.042)	(0.041)	(0.041)
Log(Maturity)				0.20***	0.24***	0.24***
				(0.041)	(0.035)	(0.035)
Constant	230.8***	232.8***	234.4***			
	(10.0)	(10.0)	(10.0)			
N	27022	27022	27022	15858	15858	15858
adj. R^2	0.271	0.271	0.271			
pseudo R^2				0.244	0.228	0.227
Ftest	0.63	0.91	1.11	12.1***	17.4***	16.8***

Table A3: Different measures of firm distress and relationship banking

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 if the loan is classified as "secured" in the database and 0 otherwise. 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 with the borrowing firm based on loans taken by the firm in the 5 years prior to the current loan. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All firm characteristics as those in Table 3 are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. In Panel A, column 1 & 2 use 70 percentile as the cutoff to define distress sample; column 3 & 4 use negative operating cash flow to define distress firms; column 5 & 6 use 3-year window to define the relationship banks. In Panel B, column 1 & 2 add syndicate structure (number of lead banks and number of lenders) as additional controls and column 3 &4 only use the set of firms experienced distress in our sample period. 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).

Panel A: Alternative measures of distress

	EDF 70th percentile cutoff-point		Negative Cash Flow	
	Fee	Collateral	Fee	Collateral
Distress	40.8***	0.51***	5.85	0.11
	(4.71)	(0.095)	(5.17)	(0.12)
Relloan	-11.6***	-0.32***	-10.3***	-0.30***
	(2.20)	(0.060)	(2.34)	(0.056)
Distress*Relloan	12.2**	0.051	7.67	-0.050
	(4.89)	(0.11)	(5.60)	(0.15)
F-test	0.018	7.39***	0.24	6.65***

Panel B: Alternative measures of relationship loan, additional controls, and subsample

	3-Year Relationship		Syndicate structure		Distressed sample	
	Fee	Collateral	Fee	Collateral	Fee	Collateral
Distress	66.7***	0.56***	63.8***	0.66***	60.1***	0.68***
	(7.72)	(0.15)	(8.62)	(0.16)	(8.70)	(0.18)
Relloan	-7.91***	-0.20***	-7.79***	-0.30***	-13.8**	-0.48***
	(1.84)	(0.051)	(2.06)	(0.055)	(5.79)	(0.12)
Distress*Relloan	12.9	0.11	16.3	-0.085	20.5*	-0.11
	(10.1)	(0.19)	(10.7)	(0.20)	(11.2)	(0.23)
F-test	0.24	0.24	0.62	3.77*	0.38	8.51***

Table A4: Relationship lending spread during distress: credit line vs. term loan

This table reports multivariate regression results of the impact of lending relationships on fees for credit line and term loan. The sample period is from 1986 to 2011. Fee is defined as the All-in-drawn spread from the LPC DealScan database. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value of loans taken by the borrower, also in the five-year window prior to the current loan date. The models are estimated using Panel OLS. All firm characteristics as those in Table 3 in the paper are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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).

	Credit Line		Term Loan	
	Fee	Collateral	Fee	Collateral
Relloan	-2.99*	-0.030***	-14.5***	-0.055***
	(1.74)	(0.0076)	(4.82)	(0.018)
Distress*Relloan	9.25	-0.0017	17.5	-0.034
	(9.30)	(0.028)	(19.8)	(0.051)
Distress	59.9***	0.067***	70.8***	0.10**
	(7.09)	(0.021)	(16.1)	(0.040)
N	17961	17961	9433	9433
adj./pseudo R^2	0.34	0.37	0.20	0.23
F-test for net effect of relationships in distress	0.46	1.37	0.023	3.41*

Table A5: Relationship lending during distress: Systemically Important Banks vs. others

This table reports multivariate regression results of the impact of lending relationships on fees for Systematically Important Banks (SIB). The sample period is from 1986 to 2011. Fee is defined as the All-in-drawn spread from the LPC DealScan database. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. *Relloandol* and *Relloannum* are computed using the dollar value (number) fraction of loans that go to a given lender relative to the total value of loans taken by the borrower, also in the five-year window prior to the current loan date. SIB list is from the website of the Financial Stability Board. If the lead bank of the loan is a SIB, then the loan is defined as a SIB loan. The models are estimated using Panel OLS. All firm characteristics as those in Table 3 in the paper are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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).

	SIB		Others	
	Fee	Collateral	Fee	Collateral
Relloan	-7.56**	-0.017*	-5.68**	-0.029***
	(3.43)	(0.0096)	(2.71)	(0.0084)
Distress*Relloan	-9.04	-0.032	2.71	0.037
	(27.5)	(0.040)	(13.9)	(0.028)
Distress	95.7***	0.098***	62.5***	0.063***
	(26.0)	(0.036)	(9.57)	(0.020)
N	12725	12725	14669	14669
adj./pseudo R^2	0.34	0.39	0.22	0.28
F-test for net effect of relationships in distress	0.37	1.57	0.046	0.078

Table A6: Time pattern of relationship lending around distress: excluding technical default sample

This table reports the time pattern of relationship lending around the distress. We exclude those sample that are experiencing technical default and distress at the same time or overlap within the (-2,+2) window. The sample period is from 1996 to 2011. 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 if the loan is classified as "secured" in the database and 0 otherwise. 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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. 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. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All firm characteristics as those in Table 3 in the paper are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. 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
Relloan	-8.15***	-0.22***
	(2.22)	(0.066)
Distress*Relloan	7.20	0.033
	(13.9)	(0.27)
Distress	74.3***	0.58**
	(12.6)	(0.23)
T+1	16.8	0.58
	(20.0)	(0.60)
T+2	56.1***	-0.28
	(17.9)	(0.68)
T-1	32.7*	0.058
	(18.5)	(0.36)
T-2	15.9	-0.16
	(15.3)	(0.36)
T+1*Relloan	26.6	-0.13
	(23.4)	(0.66)
T+2*Relloan	-1.84	1.23
	(23.8)	(0.78)
T-1*Relloan	-17.8	0.53
	(21.5)	(0.46)
T-2*Relloan	-1.61	-0.14
	(19.9)	(0.46)
N	20445	11287
adj. R^2	0.32	
pseudo R^2		0.22
F-test (Chi-square test) for net effect		
Relationship in T-2	0.24	0.60
Relationship in T-1	1.48	0.48
Relationship in Distress	0.0048	0.50
Relationship in T+1	0.63	0.28
Relationship in T+2	0.18	1.70

Table A7: Relationship lending during distress: firm-year fixed effect model

This table reports multivariate regression results of the impact of lending relationships on fees and collateral, controlling for firm-year fixed effect. The sample period is from 1986 to 2011. 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 if the loan is classified as "secured" in the database and 0 otherwise. *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 with the borrowing firm based on loans taken by the firm in the five years prior to the current loan. Distress is a dummy variable that equals 1 if the loan is issued during the year the firm is in distress. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All regressions use fixed effects for firm-year, ratings, loan type, loan distribution method. 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	Fee	Collateral	Collateral
Relloan	-14.2***	-14.5**	-0.023	-0.029
	(4.82)	(6.26)	(0.14)	(0.17)
Relloan*Distress	-21.8	-29.6	1.05*	1.49**
	(24.1)	(29.2)	(0.55)	(0.61)
Collateral	1.77	0.72		
	(6.50)	(8.50)		
Log (Maturity)	-13.6***	-14.1***	0.47***	0.57***
	(2.20)	(2.91)	(0.079)	(0.092)
Covenant	0.010	-0.36	0.30***	0.32***
	(0.79)	(0.95)	(0.023)	(0.027)
Leverage	14.5	31.4	3.31**	0.66
	(46.8)	(63.7)	(1.47)	(1.87)
Market-to-Book	-4.73	-5.10	0.27	-0.083
	(3.73)	(4.58)	(0.22)	(0.26)
TANG	-57.6	-31.3	-4.19**	-4.01
	(74.4)	(88.4)	(2.13)	(3.03)
PROFIT	-3.45	-49.5	-6.11*	-7.40
	(69.7)	(108.7)	(3.36)	(4.51)
SIZE	-5.13	0.97	-0.67	-1.38**
	(12.4)	(14.2)	(0.45)	(0.55)
CR	0.82	0.64	-0.092	-0.074
	(0.61)	(0.66)	(0.13)	(0.17)
Coverage	2.26	1.32	0.60*	0.89**
	(7.03)	(7.91)	(0.31)	(0.42)
Constants	318.8***	336.8***		
	(42.7)	(48.4)		
Number of loans in a year > 2	No	Yes	No	Yes
N	27394	8470	2834	2170
adj. R^2	0.084	0.094		
pseudo R^2			0.24	0.27
F-test (Chi-square test) for net effect of relationships in distress	2.33	2.36	3.80*	6.41**

Table A8: Lender matching

This table reports the results of lender matching. The sample period is from 1986 to 2011. 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 if the loan is classified as "secured" in the database and 0 otherwise. The models are estimated using Panel OLS for Fee and using the logistic model for Collateral. All firm characteristics as those in Table 3 are included in the empirical estimation but not reported to conserve space. All regressions use fixed effects for firms, ratings, loan type, loan distribution method and year. See Appendix C for a detailed definition of all variables. 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).

Panel A: Lender Matching- Dependent Variable $= Fee_{Rel} - Fee_{NonRel}$			
	Non-distress sample	Distress sample	Full sample
Distress			90.7***
			(8.05)
Constant	-3.31*	76.2***	-3.73**
	(1.70)	(11.3)	(1.74)
N	8329	391	8720
adj. R^2	0.098	0.04	0.094
F-test Distress+Constant=0			121.7***
Panel B: Sign Test of Collateral Status Difference=$Collateral_{Rel} - Collateral_{Non-Rel}$			
		Normal	Distress
	-1	1232	40
Collateral status difference	0	4845	105
	1	935	27
Number of observations		7012	172
Equality test of matched data		-6.380***	-1.58