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# Lender Exposure and Effort in the Syndicated Loan Market

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# Lender Exposure and Effort in the Syndicated Loan Market

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**Abstract**

This paper tests for agency problems between the lead arranger and syndicate participants in the syndicated loan market. One problem comes from adverse selection, whereby the lead arranger has a private informational advantage over participants. A second problem comes from moral hazard, whereby the lead arranger puts less effort in monitoring when it retains a smaller loan portion. Applying an instrumental variables strategy, I find that borrowers' performance is influenced by the lead's share. Dynamic tests extract active contributions made by the lead, supporting a monitoring interpretation. Loan covenants serve as a mechanism to induce the lead arranger to monitor.

**Keywords**: syndicated loans, asymmetric information, monitoring, covenants

**JEL Classification**: D82, G21, G32

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# 1 Introduction

Financial innovations that have supported credit risk sharing markets have arguably helped to make financial intermediaries better diversified and improved welfare. Reductions in committed capital and a greater flexibility in reallocating this limited capital are reflected in greater access to credit and lower financial transaction costs for borrowers (IMF, 2006; Rajan, 2005).

But credit risk sharing results in agency problems between informed lenders and outside investors. One asymmetric information problem comes from hidden information via adverse selection. An informed lender has an incentive to offload loans that it privately knows are poor quality. A second problem comes from hidden action via moral hazard in effort. A lender with a lower portion of a loan will have a dampened incentive to carry out due diligence and monitor the borrower over time. To curb these problems, economic theory shows that the lender should invest its scarce capital into the loan. In the case of adverse selection, this provides a credible and positive signal by an informed party to outsiders (Leland and Pyle, 1977). Similarly and in the case of moral hazard, this exposes the delegated monitor to losses if it fails to sufficiently monitor the borrower. The credibility the lender gains from retaining exposure to the borrower encourages other participants to provide funds, relying on the monitoring effort of the delegated monitor (Diamond, 1984; Gorton and Pennacchi, 1995; Holmstrom and Tirole, 1997).

To assess whether and how an informed lender or a delegated monitor can mitigate the problems associated with asymmetric information, this paper examines the syndicated loan market. Syndicated loans are loans where a group of two or more lenders extend credit to a borrower, governed by one loan contract. Syndicated lending shares properties of both traditional relationship lending and market-based lending. Borrowers repeatedly access the market, and often engage the same lenders. These "lead arrangers" – typically commercial or investment banks – are responsible for arranging the loan, taking a share, drafting an information memorandum, and inviting participant lenders. A priori, therefore, the lenders are not equally informed; and in practice, participant lenders also rely on the monitoring efforts of the lead arrangers after the loan is syndicated.

There are a number of advantages to using data on syndicated loans. The set-up lends itself to agency problems, because asymmetric information can potentially exist at two points in the syndication process: When the loan is closed, the lead arranger may have private information that participants do not; and over the course of the loan, the lead arranger learns more about the borrower if it is incentivized to monitor well. In the latter

view, the lead takes actions to prevent risk-shifting and opportunistic behavior by the borrower, and it makes flexible refinancing decisions. This theoretical motivation can be mapped into available empirical measures: the share of the loan retained by the lead arranger can be observed by the researcher, and the dynamic nature of the syndicated loan market can be exploited to unearth whether monitoring is the important source of the problem. An additional advantage of using syndicated loan data is that there is considerable variation in the exposure that lead arrangers have to borrowers. Moreover, firms of varying credit quality and information opacity access this market (Sufi, 2007; Dennis and Mullineaux, 2000; S&P, 2006).

Like other credit risk sharing markets, syndicated lending rapidly expanded over the past two decades and sharply contracted with the onset of the 2007-2009 financial crisis. For example, annual syndicated loan issuance by U.S. borrowers increased from $130 billion in 1987 to close to $2 trillion in 2006, before falling to roughly $900 billion in 2008. Concurrent with this decline was a jump in problematic syndicated loans and an overhang of legacy loans with weak underwriting standards as reported in the annual Shared National Credits review.[1] A number of related trends characterized syndicated lending in the period before the 2007-2009 crisis. First, there was a rise in the prevalence of nonbanks, and particularly as participant lenders on funded term loans (as compared with credit lines). Nonbanks include finance companies, hedge funds, insurance companies, pension funds, and sponsors of structured products like collateralized loan obligations (CLOs). A related trend was the rise in leveraged loans many of which were funded by nonbanks; leveraged loans are defined as loans priced at 125 basis points or more above LIBOR (Ivashina and Sun, 2010; S&P, 2006). A third trend was the growth of the secondary loan market in which some syndicated loans, among other loans, trade after they have been closed and allocated. The U.S. secondary loan market volume reached $240 billion in 2006 (Drucker and Puri, 2009).

This study identifies evidence of asymmetric information problems in the syndicated loan market, by relating a borrower's longer run performance after syndication to the lead arranger's share of the loan. The hypothesis is that when the lead retains a greater share, problems of information asymmetry are moderated and should be reflected in improved later performance by the borrower. I follow a two-pronged empirical approach by controlling for a wide range of observable characteristics at the time of syndication (loan contract, borrower, industry, and lender characteristics), and by applying an instrumental vari-

[1] See http://www.federalreserve.gov/releases/snc/.

ables research design similar to Ivashina (2009).[2] This approach is important because an unconditional correlation could be due to reverse causality, in that the lead arranger may hold more of a good quality loan, and it is *publicly* observed to be good quality at the time of syndication. At the same time, the correlation could go against identifying an asymmetric information effect if the lead holds more of a poor or opaque quality loan because it is forced to do so by participants concerned about shirking by the lead (as theoretically motivated by Holmstrom and Tirole, 1997; Greenbaum and Thakor, 1987; and empirically supported by Sufi, 2007 among others).

The distinct contribution of this study is in identifying that moral hazard in monitoring is the empirically relevant problem. The existing literature largely stops on evidence of information asymmetry, and lumps together adverse selection and moral hazard explanations. To this end, I isolate measures that are expected to be more valuable from a monitoring interpretation. In this view, the lead arranger makes an active contribution to the borrower's performance when it is sufficiently induced to monitor the project and influence management decisions over time. In practice, monitoring includes ongoing communication with management, determining the frequency of cash flow inspections, observing deposit history, managing credit line availability and drawdowns, and monitoring compliance with loan covenants. Many of these tests are motivated by the dynamic relationship between borrowers and lead arrangers, where it is possible to observe whether the lead can make flexible refinancing decisions as it learns about the borrower. Having an actively informed lender is also shown to be most valuable for borrowers in times of tight market liquidity when constrained borrowers can turn to their lenders for backstop liquidity.

A matching contribution of this paper is in showing that loan covenants are an important mechanism through which the lead arranger is induced to monitor. These terms and conditions in the loan contract are designed to mitigate agency problems at some future point in time. I find that the sensitivity of a borrower's performance to the lead arranger's share is greater when a loan has more covenant constraints. Applying an instrumental variables strategy, I also find that loan covenants go together with a greater lead share. In this way they are not substitutes but serve as "tripwires" for the delegated monitor, as predicted by the theory developed by Rajan and Winton (1995).

The rest of this paper is organized as follow: Section 2 briefly reviews the associated

[2] Valid instruments should affect the lead's demand but should not be correlated with the degree of adverse selection or moral hazard in the syndicate. The instruments have a lending limit interpretation, in that lenders vary in their organization's internal risk limits. The instruments are constructed using information on the lender's previous syndicated loans as well as its exposure in a separate market, that for mortgage securitizations and sales.

theory and empirical literature. What follows is a discussion of the data and method applied in Sections 3 and 4. The results are laid out in Sections 5 and 6. Section 7 offers some concluding thoughts.

# 2 A Review of the Related Theory and Evidence

It has long been recognized that problems of asymmetric information are common in credit markets. For example, Schumpeter (1939, page 116) states that "...the banker must not only know what the transaction is which he is asked to finance and how it is likely to turn out but he must also know the customer, his business and even his private habits, and get, by frequently 'talking things over with him', a clear picture of the situation."

Banks developed naturally as delegated monitors; by holding loans and being fully exposed to the credit risk, and monitoring the loans on behalf of their many investors (or depositors). Recognizing that the moral hazard problem is one step removed when banks serve as delegated monitors, Diamond (1984) was the first to resolve the problem of who monitors the monitor. Monitoring the delegated monitor is not necessary as long as the monitor is adequately large and diversified. Scale economies in monitoring (e.g., a fixed cost), small investors relative to the size of the investment project, and low costs of delegation are among the sources of comparative advantage for the bank. In Diamond's framework, loans are perfectly illiquid both because costly monitoring has to be incurred again by the loan buyer and because there is an adverse selection in the type of loan that the bank chooses to sell.

Recognizing that outside investors, however, also lend directly to the borrower and that loans are at least partly liquid – partly because of high costs of intermediary capital – Gorton and Pennacchi (1995) and Holmstrom and Tirole (1997) derive the incentive compatible return that an intermediary should get in order to be a credible monitor.[3] Uninformed investors undertake no monitoring themselves and their returns are entirely determined by the intermediary's monitoring effort. Once they know the bank is monitoring and has invested sufficient capital, then they too invest in the project.

[3]These papers focus on monitoring. Other papers like Greenbaum and Thakor (1987) and Parlour and Plantin (2008) look at the feasibility of loan sales and securitizations in the presence of adverse selection.

## 2.1 Evidence of Information Asymmetry in Credit Risk Sharing Markets

A number of papers provide empirical support for the theory on asymmetric information problems. To cite a few, Dennis and Mullineaux (2000), Jones et al (2005) and Sufi (2007) find that lead arrangers retain a larger share and the syndicate is more concentrated when borrowers are opaque or risky. They also find that the lead arranger's reputation helps to partly mitigate asymmetric information problems. Lead arrangers' reputation is not static, however, and suffers when its borrowers do poorly (Gopalan et al, 2009). Reciprocity between lenders on a syndicated loan also alleviates agency problems (Cai, 2009).

Does a more concentrated syndicate structure translate into better outcomes? A large part of the existing literature has focused on pricing and short-run market reactions. With respect to loan pricing, Gorton and Pennacchi (1995), Focarelli et al (2008), Ashcraft and Santos (2009) and Ivashina (2009) find a negative relation between the informed lender's share and loan spreads; Ivashina's contribution is that she instrument's the lead's share using exogenous shifts unique to the credit risk of the lead's loan portfolio.[4] Short-run equity market reactions are also negative when the lead arranger retains less exposure (Focarelli et al (2008) in the case of syndicated loans, and Dahiya et al (2003) in the case of loan sales).

An under-explored area in the empirical literature is whether a greater lead exposure shows up in a material improvement in the borrower's performance, and if so, through what mechanism.[5] The closest study addressing this question is that by Dahiya et al (2003) that finds that the negative certification at the time of a secondary loan sale is borne out in later poor borrower performance. Many of the firms file for bankruptcy within three years of the loan sale, even though they are not the weakest firms at the time of sale. More recently, Berndt and Gupta (2009) track syndicated loans sold in the secondary market and find that they have lower risk-adjusted returns over the three year period following the sale. There remains, however, much scope for more analysis in this area. First, the source of information asymmetry has not been identified in these studies (Dahiya et al implicitly attribute their finding to a negative signal but it is equally consistent with less monitoring). Second, loan sales are not instrumented, so their interpretation is susceptible to reverse causality. Third, the syndicated loan sales data do not indicate actual trades, only quotations (Drucker and Puri, 2009). Therefore, it is difficult to assess if the poor

[4] In the case of Ashcraft and Santos (2009), the relationship is between the loan spread and the lead's ease of hedging the borrower's credit risk (as proxied by the introduction of a credit default swap on the borrower).

[5] I limit this discussion to corporate borrowers. There has been a recent proliferation of papers on the certification effect in the mortgage securitizations market (e.g., Keys et al, 2010).

performance was expected by the market and properly priced in at the time of the loan sale.

# 3 Data

Data on individual syndicated loan facilities for U.S. corporate borrowers were collected from Loan Pricing Corporation's (LPC) Dealscan database (December 2008 extract from Dealscan's online LoanConnector service). LPC gets the majority of this data from loan agreements and commitments in filings with the SEC as well as from loan originators, borrowers and other contacts within the credit market. Lenders have an interest in maintaining their rankings in LPC's league tables, and therefore voluntarily report their loans, which are then confirmed. As noted in a number of previous studies, syndicated loans in Dealscan cover a majority of the value of commercial loans in the U.S. The unit of observation in Dealscan is a loan, also known as a facility or a tranche. A borrower may issue more than one loan on the same date, and often these are grouped together into packages or deals. In the analysis that follows, the unit of observation is a loan.[6]

Descriptive statistics on syndicated loans to U.S. borrowers are shown in Table 1, and variable definitions follow in the appendix. Summary statistics are presented for the sample of loans issued in the period from 1990 to 2006, which coincides with the regression sample.[7]

Dealscan data is used for the following categories: loan contract characteristics, syndicate group characteristics, some of the borrower characteristics, as well as a number of instruments (see Section 4 for how the instruments were constructed). The key variable of interest is the share retained by the lead arranger. The average share held by the lead is roughly one-third of the loan, with considerable variation (25% standard deviation). The dynamic nature of the Dealscan database can be seen in the way borrowers repeatedly access the market, and often establish relationships with the same lead arrangers. For example, the average borrower has taken out four loans previously, and 65% of the sample has at least one lead arranger that was also the lead arranger on a previous loan taken by

[6] As noted by Carey and Nini (2007), it is not straightforward to analyze deals because loans do not always have the same set of lenders. There can also be differences in loan purpose and more importantly in loan type. A representative deal often combines a line of credit and a term loan, and these have different implications for riskiness, such as liquidity risk, as well as for the necessary monitoring effort (see Section 5).

[7] Because a number of variables such as previous relationships and previous lender exposures are constructed using loan information over the previous three years, it makes sense to begin the sample in 1990. This allows information on loans from the beginning of the Dealscan data set in 1987 to be captured. 2006 serves as a natural end of the sample, both because it is before the 2007-2009 financial crisis, and because it allows a sufficient window to observe borrower performance in the years following the loan syndication.

the borrower. It is also true that lead arrangers repeatedly interact with a certain group of participant lenders.

The main dependent variable in the study is an indicator recording defaults by issuer, obtained from Moody's Default Risk Service Database (2008 extract).[8] Moody's issuer identifiers were cross-checked and hand-matched to Compustat. This led to 894 identifiable unique borrower defaults of the 1200 U.S. issuers recording a default; 630 matched to syndicated borrowers in Dealscan associated with about 6000 loans. The Moody's default database was also used to calculate measures of industry default probabilities based on outstanding bonds in a 2-digit industry transitioning into default status.

The remaining controls are borrower and lender characteristics. Most of the borrower characteristics are obtained from Compustat and CRSP, such as profitability, size, leverage, and equity volatility.[9] Lenders were first assigned a financial institution identifier and then aggregated to the parent company, following Sufi (2007) and others. In the event of mergers & acquisitions, the target financial institution was aggregated to its acquirer at the merger completion quarterly date.[10] The acquiring firm also inherits the relationships of the target financial firm once a merger is completed. This ensures that previous relationships are accounted for (both between the borrower and the lead arranger, and between the lead and other participant lenders). The lender matching exercise ultimately led to roughly 3000 unique parent company lenders (whether lead arranger or participant lender) over the full 1987-2008 sample. Considerably fewer served as lead arrangers; these turn out to be 1055 lenders. The top 100 lead arrangers represent most deals; in my sample they are on 93% of loans, similar to Sufi (2007) and others. Finally, data from balance sheet and income statements were included for the subset (a majority) of lead arrangers that can be matched to U.S. bank holding companies.

[8] As noted in the Moody's documentation, these are not just bankruptcies but include strategic defaults on some securities like bonds (e.g., in a distressed exchange, or missed interest payments, but these are not "technical defaults" on account of covenant violations). Empirically, roughly 75% of issuers defaulting on bonds also default on other debt including loans.

[9] Dealscan data was matched to Compustat company identifiers and was carefully manually checked. I also benefited from the Dealscan-Compustat link data kindly provided by Michael Roberts (Chava and Roberts, 2008).

[10] Using Dealscan information on the lender's (and lender parent's) name, country, state, and type, financial institutions were identified using: Federal Reserve filings (FR Y-9C and Call Reports), the FFIEC's National Information Center, Federal Reserve Bank of New York pro forma holding company data set, SNL Financial, and Dow Jones Factiva. SNL Financial served as the main source of information about mergers & acquisitions between financial institutions in the U.S. Victoria Ivashina and Amir Sufi also kindly sent me their merger information, and this was used as a supplement and cross-check. The merger information used in my study is available upon request.

# 4 Method

This section describes the empirical method, which is to first test whether a borrower's outcome is improved when its lead arranger had retained a larger share of the syndicated loan. Second, and if so, is the information asymmetry at the point of syndication when the lead may have an informational advantage over other syndicate participants, or is it developing over time if the contract induces the lead arranger to monitor the borrower and affect decisions by enforcing covenants and making flexible refinancing decisions? That is, is the estimated effect due to a signal by an informed lead arranger to participants or is the effect due to greater effort by a lead in its role as a delegated monitor?

While simple in theory, the empirical implementation must overcome several potential problems. First, there is the possibility of reverse causality if a borrower that performs well in the future was publicly anticipated to do so by all lenders. In this case, the lead arranger may passively have chosen to hold a larger portion of such high quality loans. In this case, the lead arranger has no informational advantage over participant lenders when the loan is closed, and thus there is no adverse selection problem. Moreover, it would be wrong in this case to attribute an unconditionally estimated relationship to hidden action by the lead, as there is no moral hazard problem either. A second result that would also not be particularly interesting would be if the estimated correlation went in the opposite direction. That is, lead arrangers hold a greater portion of low quality loans because they are forced to do so by participants concerned about shirking, and these loans perform poorly. In this case, any possible asymmetric information effect would be washed over by such a correlation. This issue is a concern because, this is precisely what other studies have found; lead arrangers hold a larger share of the loans of riskier and more opaque borrowers (Dennis and Mullineaux, 2000; Jones et al, 2005; Sufi, 2007).[11]

To overcome the two confounding problems described, I apply a two-pronged empirical research design. First, I control for a wide range of loan, borrower, and lender covariates, which should collectively minimize endogeneity problems. Arguably, however, there can be some known risk characteristics that are observable to participants but that are not controlled for in the empirical specification because they are not observed by the researcher. The resulting endogeneity would be reflected in the coefficient on the lead arranger's share.

[11] These findings are also consistent with the theory proposed by Greenbaum and Thakor (1987) that higher-quality assets will be securitized while lower quality assets that are sensitive to asymmetric information will be funded with deposits. Likewise, if the lead arranger were to hold little or none of a loan to a borrower requiring intensive monitoring, then participant lenders correctly expect such shirking by the lead arranger and would seek to reduce their holdings (Gorton and Pennacchi, 1995; Holmstrom and Tirole, 1997).

To address this concern, the second part of the strategy is to instrument the lead's share with variables affecting the lead's demand decision but that are not correlated with the extent of adverse selection or moral hazard in the syndicate.

Therefore the baseline specification – before distinguishing the source of information asymmetry – that I estimate is:

$$Default_{ijt} = \alpha + \beta(Lead\ Arranger\ Share_i) + \gamma X_i + \theta Y_j + \sum_{s=1990}^{2006} Z_s + \epsilon_{ijt}, \quad (1)$$

where the coefficient of interest is $\beta$, which is expected to be negative under the null of asymmetric information: the greater the lead's share on loan $i$ to borrower $j$ at time of syndication $s$, the less likely that the borrower will subsequently default. I control for a wide range of loan (contract and syndicate) characteristics, $X_i$; for borrower characteristics at the time of syndication (including the borrower's industry characteristics), $Y_j$; and for syndication year dummies, $Z_s$. I also control for lead bank characteristics in an extension for the sample of loans arranged by U.S. banks. Standard errors are heteroskedasticity robust, where the individual loan error terms are allowed to be correlated for all loans of the same borrower. I estimate equation (1) using ordinary least squares and linear IV.

The main set of instruments that I use are measures of the lead arranger's lending limits. There are regulatory constraints on how concentrated a bank's exposure can be to any one borrower. Banks also have internal lending limits, and often these bind before the regulatory restriction is breached. There can be considerable cross-sectional variation in lending limits across banks, which are expected to influence its demand decision. As these internal limits are not observed, I follow Ivashina (2009) in backing these out from the lead's previous syndicated loans. I use the 75th percentile dollar size of the lead arranger's share on its loans in the previous three years in the Dealscan syndicated sample. The 75th percentile is merely meant to measure an upper threshold for the lender's risk tolerance, and the instrument is also time-varying. I also construct a closely related instrument, which is the lending limit on loans where the lead arranger previously served as a participant lender, and was not a lead arranger. As expected, these limits are smaller in magnitude but I also expect these to be positively correlated with the lead arranger's share on a loan.[12]

[12]Ivashina (2009) also used an instrument meant to capture the loan's contribution to the idiosyncratic credit risk of the lead's loan portfolio, where the portfolio is made up of the lead's previous loans to various industry sectors. Reasoning that the lead arranger wishes to hold a more diversified portfolio, loans that cause the default variance of the lead's portfolio to go up, are expected to reduce the lead's demand, all else fixed. I did not find this instrument to be significantly correlated with the lead's share, and the correlation

Lending limits can also be inferred from the lead's exposure in another market, that for mortgage securitizations and sales. Insofar as lending limits and credit risk exposure are determined by the internal organization of the lender, then its exposure to mortgage securitizations should be highly correlated with its retained share of a syndicated loan but not correlated with the error term of a syndicated borrower's performance. I construct this instrument for the subset of loans whose lead arranger is a U.S. bank, as this information is reported in the regulatory filings of the bank holding company.[13] The limitations with this instrument are that it is only available for loans with U.S. bank lead arrangers, and that it has been only reported since 2001. Therefore, I test the validity of this instrument in an extension to the baseline results when focusing on characteristics of the lead bank.

The key contribution of this study is to distinguish the source of information asymmetry in the syndicated loan market. Methodologically, this entails singling out measures that are expected to facilitate monitoring. The dynamic nature of the Dealscan data is exploited as borrowers return to the syndicated loan market, often with the same lead arranger. As a result, I expect a greater sensitivity between refinancing decisions and future performance when the lead arranger was induced by a previous contract to monitor. In practice, this can be when the lead arranger was a previous lead; and conditional on that, when it previously held on to a larger stake. Borrowers are better able to access the liquidity they need when they run into difficulties and are with an informed bank, but in return for rights over surplus (e.g., Rajan, 1992). This access to backstop liquidity is also expected to be most valuable for borrowers in episodes of market stress. I also explore the role of loan covenants and whether they serve as a mechanism to get the lead arranger to monitor (Rajan and Winton, 1995). There are a number of competing views on what purpose covenants serve that I will take up in greater detail in Section 6.1.

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was against the diversification prior. I constructed industry default correlations using Moody's Default Risk Service database and they largely match those reported by De Servigny and Renault of S&P (2003), cited in Ivashina (2009). To make sure that this was not a methodological issue, I also constructed a simpler instrument, which is the share of loans originated by the lead in the borrower's 2-digit SIC industry, and also found this instrument to be positively correlated with the lead's retained share. These results are not necessarily puzzling, however, because there is a countervailing motive: Financial intermediaries invest in sector-specific expertise to gain "local" advantages. For example, Winton (1999) shows that the adverse effect from greater downside risk when a bank diversifies into unfamiliar sectors can offset the potential benefits of diversification.

[13] Schedule HC-S of regulatory form Y-9C reports the maximum amount of credit exposure arising from recourse or other seller-provided credit enhancements provided to securitizations and assets sold. From this, I create a bank's credit exposure to one-to-four family residential loans sold and securitized.

# 5 Information Asymmetry and Subsequent Borrower Default

## 5.1 Results Overview

In the baseline results presented in Table 2, I examine the relationship between the share retained by the lead arranger and the likelihood that the borrower subsequently defaults. In addition to the variable of interest, I control for standard covariates in all regressions: loan contract characteristics, borrower characteristics, and syndicate group characteristics. Not reported in Table 2, but also controlled for, are industry and year dummies. The first column shows the results of ordinary least squares. While the coefficient on the lead's share is negative, it has a small effect and it is not statistically significant. This is suggestive evidence that any asymmetric information effect (should it be present) or a spurious link between observably superior quality and a higher lead share are offset by leads retaining a greater fraction of loans extended to weak borrowers that are prone to fail.

The next two columns of Table 2 show the results of the instrumental variables regression that identifies the conditional effect. Tests of the endogenous regressor reveal that the null of exogeneity can be rejected, and the lead share should therefore be treated as endogenous. The first stage results are in column (2) followed by the results of the IV strategy in column (3). I instrument for the lead arranger share using two instruments discussed in the previous section: lending limits measured over loans on which the lead previously served as a lead arranger and over loans on which it previously served as a participant lender, respectively. The IV-estimated coefficient on the lead arranger's share of the loan is negative, larger in magnitude and statistically significant, supporting asymmetric information in the syndicate. The estimated coefficient is equal to -0.0018 (0.0008 standard error) and implies that a one standard deviation increase in the lead arranger's share yields a 4.5 percent fall in the probability of default.

Various tests of the instruments confirm that they are valid instruments. The lending limit measures enter positively and are jointly significant in explaining the lead's retained share, consistent with their economic interpretation and Ivashina's (2009) findings. The variables also meet the conditions for suitable instruments: they should neither be weak instruments nor be correlated with the error term. First, they are well correlated with the endogenous variable; the F-statistic for the joint significance of the coefficients on the two instruments is equal to 70.3, well above the value of ten, which has become a benchmark for whether weak instruments can cause a bias problem in the second stage estimates (see

for example, Stock and Yogo, 2005). Second, the instruments are exogenous. Because there is more than one instrument, I can test overidentifying restrictions. The p-values on the test statistics range from 0.20 to 0.30, consistent with the null that the instruments and the model are correctly specified.

The remaining variables in the first stage regression are correlated with the lead arranger's share in many ways previously documented in the syndicate structure literature (e.g. Dennis and Mullineaux, 2000; Sufi, 2007; Cai, 2009) and Ivashina's first stage results. Therefore, this discussion will be very brief. For example, the lead retains a smaller share of the loan when the loan amount and maturity are higher and the loan is secured. Leads also hold a smaller share of loans that are revolving credit lines compared with term loans; probably because credit lines expose the lender to greater liquidity risk (Gatev and Strahan, 2009). Loans with financial covenants also appear to be associated with the lead holding a smaller exposure. I take up this issue in Section 6.1 in order to better understand the role of covenants, beyond this correlation. If the lead arranger previously served as a lead, then it holds less (controlling for the number of loans previously syndicated by the borrower; these also enter negatively). Higher reputational measures are also associated with a lower retained share, and these range from the lead's market share, to repeat interactions and reciprocity between the lead arranger and participants, to when the syndicate lead is a commercial bank.

Returning to the second stage results, most controls enter with the expected sign. Borrowers that are ex ante riskier validate expectations at origination and experience more defaults (e.g., loans with higher interest rate spreads, low rated and unrated borrowers, less profitable and leveraged companies). Borrowers in industries that later experience higher default rates also default more. Two reputational factors stand out as helping to mitigate defaults: lead arrangers as commercial banks and when the interaction between the lead arranger and a participant lender is a reciprocal one. The latter finding supports Cai (2009). Recent stylized facts support the former; for example the Shared National Credit review found that a disproportionate share of problem syndicated loans are held by nonbanks (and this is consistent both with the lower reputations of these institutions, as well as with their inferior in-house credit assessment and monitoring capacities; Dennis and Mullineaux, 2000; S&P, 2006).

### 5.1.1 Robustness Checks

The upshot is that retention of credit risk by the lead arranger has a causal and material impact in reducing the borrower's subsequent default. This estimated effect withstands

a multivariate specification with an extensive set of controls. Robustness checks with additional loan and borrower covariates are shown in Table A.1. Results of a number of other robustness checks are not reported in the interest of space, but are also briefly discussed below and are available upon request.

The sensitivity of default to the lead arranger's share is robust to additional loan and borrower covariates. Some of these controls are expected to help reduce the level of information asymmetry, such as whether there are other significant stakeholders in the borrower, and whether there are resale constraints on the loan. However, these alleviating factors do not fully eliminate agency problems and the coefficient on the lead share is largely unchanged. Loans that have a guarantor (that promises to assume the borrower's debt in the event of default) or a sponsor (a private equity sponsor that typically invests in companies with leveraged capital structures) are associated with a lower lead share, and with a significantly lower likelihood of default in the case of guaranteed loans. In a similar way, resale constraints, in particular those requiring the consent of the agent (lead arranger) and those on the minimum amount that can be sold, are associated with more diffuse lending syndicates. With respect to borrower outcome, agent consent, though negative, is not statistically significant. However, minimum resale amounts are significant at the 10% level, indicating a possible benefit from ensuring that fewer lenders hold the loan in the presence of a secondary market.[14]

The result is also robust to controlling for the business cycle as proxied by year-on-year real GDP growth in the quarter of syndication. One concern may be that loans originated during downturns are to good quality borrowers that are less likely to default, and lead arrangers also retain more of a loan during downturns. Lead arrangers may retain more in downturns to satisfy an incentive compatibility constraint if monitoring costs go up; or to close the syndication if the willingness to lend by participant lenders is reduced, all else fixed (e.g. Rajan, 1994).[15] I find evidence in support of the lead retaining more in times

[14]One possible concern about inference from this and other studies that use information on how the syndicated loan is structured at origination is that such information may be immaterial in the presence of a secondary loan market. Several pieces of evidence, however, confirm the relevance of using information from this primary market. For example, Ivashina (2009) reports that less than 5% of loans originated between 2000 and 2004 were quoted in the secondary market, and an even smaller share was quoted in earlier years. Loans that are sold are more likely to be institutional term loans compared with credit lines (Drucker and Puri, 2009). Most loans are sold by participant nonbank lenders to similar nonbanks, while the lead arrangers are found to retain their shares following origination (Ivashina and Sun, 2010). Anecdotal evidence also indicates that lead arrangers do not sell their loans to avoid damaging their relationship with the borrower and other syndicate members (Esty and Megginson, 2003).

[15]Stylized evidence from the recent financial crisis shows that lead arrangers appreciably increased their share of syndicated loans. For example, the average lead share jumped from one-third in the period before the financial crisis to 45% for the period from 2007Q3 to 2008Q4. This stronger effect is also reflected in a

of weak activity, but it is not responsible for the effect of the lead arranger share, which remains virtually unchanged.

A battery of other tests were run. The central result is robust to controlling for other measures of a borrower's riskiness and opacity, including the borrower's Altman z-score – a more wide-ranging measure of a borrower's creditworthiness than profitability – and equity volatility, bid-ask spread, and illiquidity. Moreover, and as predicted by the theory, asymmetric information problems (both adverse selection and moral hazard) should be more acute when the borrower is opaque. The results in Table A.2. collectively support this. The lead retaining a greater portion of the loan is critical for these borrowers, such as borrowers with leveraged loans, higher equity volatility, and borrowers that are in relatively less familiar industries (the latter is proxied by the fraction of public firms that are in the borrower's 2-digit SIC industry at the time of syndication). Note that the borrowers in this study are public, and therefore the lead arranger's interest would be expected to be more valuable for companies that are privately held.[16]

Changes in model specification and estimation produce consistent results. Instrumental variable results are comparable when the lead share is replaced with the log of the lead's dollar amount exposure. Results of probit IV are also similar to the linear IV estimates reported.[17] Results are also similar when the model is estimated on the sample of borrowers deemed by Dealscan to be rated at the close of the loan. I also find that the sensitivity of outcome to lead share is greater on loans that are credit lines (revolver loans) than it is on term loans that are funded at origination. This finding hints that the source of asymmetric information lies in moral hazard in monitoring and not private information at the time of loan origination. Credit lines require more intensive monitoring because a borrower's

greater and significant coefficient on GDP growth in the first stage regression shown in Table A.1. when it is extended to 2008. These results echo recent findings by Ivashina and Scharfstein (2010).

[16] In other robustness checks shown in Table A.3., I look at alternative performance measures that are less extreme indicators of a borrower's condition than actual default, but should also be related to a borrower's creditworthiness. These are the borrower's profitability (ROA) three years after syndication as well as its Altman z-score and equity volatility, controlling for the respective industry median outcome. While the lead's share does not appear to have a significant uniform effect on a borrower's future profitability, for example, it is valuable for improving the profitability of poorly performing and opaque borrowers. For example and using the summary statistics in Table 1, a one standard deviation increase in the lead's share improves the profitability of a borrower starting at the 10th ROA percentile by 0.018 more than a borrower starting at the 90th percentile.

[17] Probit IV can be estimated in two alternative ways; the first is maximum likelihood estimation which is more efficient and produces direct estimates of the marginal effects but has a computational drawback and can run into problems with the iterations not converging. The alternative is the two-step estimator, which is easier to implement. For the latter, I follow the procedure described in Wooldridge (2002, chapter 15, page 475) to derive the marginal effects from the estimated parameters. The marginal effect from the lead's share is found to equal -0.0016 (MLE IV probit) and -0.0011 (two-step IV probit).

decision to draw down the line depends on how its performance evolves (Drucker and Puri, 2009; Sufi, 2009). Section 6 will evaluate a number of other tests to help tease out the source of information asymmetry.

## 5.2 Lead Bank Characteristics and Subsequent Borrower Default

Before turning to core tests of moral hazard, this section takes a look at whether the attributes of the lead arranger shape the syndicate and influence the borrower's outcome. The motivating theory – underexplored in the extant empirical literature that has largely focused on borrower drivers – is the opportunity cost view. In this view, the opportunity cost of holding a loan in a lender's portfolio compared with off-loading it will depend on the alternative opportunities available to the lender. For example Gorton and Pennacchi (1995) show that a lender will sell a greater share of the loan in order to alleviate its capital constraints and when it has a higher cost of internal funds. A similar idea occurs in Parlour and Plantin (2008), where a pooling equilibrium is more likely to be sustained in the presence of adverse selection (and therefore the loan market will be liquid) when lenders are likely to be hit by capital and liquidity shocks.

Empirically, I approximate the opportunity cost of retaining the loan by the lender's capital constraint, by how likely it is to experience liquidity shocks (that is, if it holds a low share of liquid assets or if it has extended a lot of unused commitments that could be drawn down unexpectedly), and by its funding interest rate (deposit and wholesale) relative to its lending rate. Lastly, a bank's size and profitability are controlled for as measures of a bank's reputation.

Table 3 presents the findings for the largest subset of loans, those whose lead arranger is a U.S. commercial bank (recall that these characteristics are taken from the regulatory filings of domestically chartered bank holding companies, as outlined in Section 4). The results of the first stage regression in column (1) of Table 3 are mostly in line with theoretical priors. I find that capital-constrained banks are more likely to syndicate more of the loan (consistent with the findings of Dennis and Mullineaux, 2000, and Jones et al, 2005). Likewise, a bank with a high internal cost of funds as measured by its deposit rate (relative to its loan rate) is also found to retain a smaller share of the loan.[18] However, a bank's wholesale funding cost is not associated with it holding a smaller share of the loan. This may be because of an offsetting reputational effect: a bank facing funding problems,

[18] Similar results are found when using instead a bank's deposits to total asset ratio. Banks that rely more on deposits also retain more of a loan. To the extent that deposit funding is overall a cheaper source of funds than other liabilities and equity issuance, then these banks can afford to hold more loans in portfolio.

due to reputational concerns, is also forced by participant lenders to retain a larger share of the loan. There also does not appear to be support for liquidity-related opportunity cost motives: banks more susceptible to liquidity shocks hold more of the loan and not the opposite, possibly also because of reputational effects.

While the bank characteristics shape the syndicate structure, they mostly have no direct influence on the borrower's outcome, at least conditional on this subset of bank lenders and controlling for the other covariates (column (2) of Table 3). This hints that information asymmetry is not present at the close of the loan but develops over time from monitoring. For example, adverse selection implies that a capital-constrained bank would be more likely to sell a higher quality loan than a bank that is not capital-constrained, and this should later show up in the second stage regression results. In contrast, moral hazard implies that a capital-constrained bank should be associated with a worse borrower outcome, but only indirectly through its effect on the lead retaining a smaller portion of the loan.[19]

The final two columns of Table 3 show the results of a complementary IV estimation approach, where I instrument the lead arranger share with the two lending limit instruments plus a new instrument, which is the lead bank's credit risk exposure in the mortgage securitization and sales market (only available from 2001; see Section 4). The sign on this instrument's coefficient is consistent with its economic motivation. Banks that retain a greater credit exposure to mortgage loans originated and securitized also retain a greater share on syndicated loans. The effect is not statistically significant in the presence of the other lead bank controls, although the latter are also not precisely estimated in this reduced sample of loans.

# 6 Dynamic Tests of Moral Hazard in Monitoring

The core interest of this study is to uncover the empirically relevant source of information asymmetry, which has gone, by and large, unaddressed in the previous literature. There is little concrete evidence, even for credit markets more generally, because identifying the source of information asymmetry is not easy. One novel study runs a field experiment in a South African consumer credit setting to separate hidden information effects due to selection from hidden action effects due to moral hazard in effort that are induced by the contract terms (Karlan and Zinman, 2009). They find strong evidence in support of moral

[19] The only variable that is significantly associated with subsequent borrower default is the bank's wholesale interest rate. This indicates that the wholesale market is sensitive to the bank's (expected) riskiness when the market offers costly wholesale funding to such banks.

hazard, and specifically via a dynamic incentive. Analogously, this paper isolates measures that are expected to be especially valuable from a monitoring interpretation.

A number of dynamic tests should help identify at what point in the syndication process information asymmetry is more likely to be present. Adverse selection – characterized by an informational advantage of the lead arranger over syndicate participants – would exist when the loan is closed and is a static problem. In contrast, moral hazard in monitoring means that the lead arranger makes an active contribution to the borrower's performance when it is sufficiently induced to monitor the project. This will be especially true as the lead monitors the borrower over the duration of the loan and takes active decisions to reduce the private benefits enjoyed by borrower. At the same time, as the lead learns about the borrower, the lead becomes in a better position to make informed and flexible refinancing decisions when the borrower is in need of liquidity. If the lead arranger is monitoring well, it should be able to prevent the early liquidation of a borrower's viable projects.[20]

There are two dimensions to the first set of dynamic tests, and these are informed by previous relationships between the lead arranger and the borrower. First, I expect that loans where the lead arranger was a previous lead should exhibit a greater sensitivity between the lead's share and borrower outcome than loans where the lead was not a previous lead. Second, and conditional on refinancing with the same lead, a larger previous lead share should contribute a greater information content about the borrower's future performance.

The results of these two tests are presented in the first three columns of Table 4. They back the moral hazard view. First, performance is more sensitive to the lead share when the lead was in a previous lead relationship with the borrower (-0.0020 standard error 0.0009, compared with -0.0002 standard error 0.0017 in the case of a new lead arranger). Second, the result in column (3) shows that within the subset of loans having a previous lead relationship, a higher previous share is associated with significantly fewer defaults (-0.0055 standard error 0.0021).

A third test is whether informed lenders offer a flexible source of refinancing during times of market stress when borrowers need it most. Banks are expected to be valuable liquidity backstops when market liquidity dries up. Banks benefit from deposit inflows when market liquidity is squeezed, and these inflows have been shown to enable them to naturally hedge loan demand shocks (Gatev and Strahan, 2006). Gatev and Strahan approximate market liquidity shocks with the commercial paper spread for highly rated

[20] The theory on the benefits of bank (inside) debt posits that borrowers are better able to access the liquidity they need when they run into difficulties and are in an informed bank relationship (although this flexibility comes at the cost of control rights; e.g., Rajan, 1992).

nonfinancial borrowers. The relationship between the share retained by the lead and subsequent performance is tighter in periods of high commercial paper spreads than in periods of low spreads (columns (4) and (5) of Table 4). This relationship is greater and statistically significant when market liquidity is tight and the lead arranger was also a previous lead, as shown in the last two columns (the effect is -0.0033 standard error 0.0018).

These results – together with scattered evidence in the previous section – begin to build a case for the moral hazard view. There were three pieces of evidence discussed in Section 5 that were also compatible with the monitoring interpretation. First, the share retained by the lead was more important for credit lines than for term loans. Credit lines are expected to require more intensive monitoring (Drucker and Puri, 2009; Sufi, 2009). Second, banks with a high opportunity cost of holding loans in portfolio (such as capital-constrained banks) were not found to syndicate good loans (nor bad loans, for that matter). But capital-constrained banks did hold a smaller share of a loan, and the latter channel had an indirect effect on the borrower's outcome. Third, lead arrangers were found to keep a smaller portion of the loan when they had been previously engaged as lead arrangers by the borrower. In contrast, they would be expected to retain a larger share under the alternative selection and signaling view.[21]

## 6.1 Covenants

If the lead arranger takes actions to influence the borrower's outcome, as the results indicate, there is little evidence on *how* it does so. Loan covenants (terms and conditions in the loan contract) may be a means by which the lead exerts influence. Covenants are plausible candidates because they are designed to mitigate agency problems at some point in the future.

There are a number of competing views on the function of covenants and these are well articulated in a review by Gorton and Winton (2003). These views are not, however, mutually exclusive because different covenants can serve different complementary functions. In the traditional view (Smith and Warner, 1979), covenants protect debtholders by limiting risk-shifting behavior by the borrower (such as asset-substitution by shareholders) and by curbing managerial rent-seeking (such as shirking by the management and investment in private benefit ventures).

[21] This last point was also raised by Sufi (2007). He reasoned that if information asymmetry is because of moral hazard in monitoring, then a lead that was previously involved with a borrower can form more diffuse syndicates because it monitored the firm and in doing so, learnt about it. If, on the other hand, information asymmetry is because of private information that the lead has but the participant lenders lack, then the lead arranger would be forced by participants to retain more on future loans.

The modern view sees covenants in a more dynamic way. Lenders take actions. Covenants are a mechanism through which an informed lender can influence the borrower's business decisions and financial structure by threatening default and renegotiating. Within this view, covenants provide an incentive to the delegated monitor to regularly collect and process information about the borrower. In this way, they serve as "tripwires" (Rajan and Winton, 1995).[22] This makes a loan's effective maturity contingent on monitoring by the lender. Without monitoring the borrower's condition based on information only available to the public at a cost, the bank would not be able to take action to show that the covenant has been violated. Rajan and Winton support this view with legal evidence. Courts do not support a lender's claim to enforce a covenant if previous inaction implicitly meant that the covenant had been waived.

The third view – nested within this modern view – is that covenants define how control rights are allocated after a covenant has been violated (known as a technical default) (Aghion and Bolton, 1992). Both modern interpretations are about the lender taking action but the key operative distinction is in the timing: whether the lender gets control rights ex post or whether the lender's power to influence the borrower is dependent on it monitoring and gathering information in the first place.

There is existing empirical support for all three interpretations.[23] For example, covenant protection has been shown to be increasing in the borrower's growth opportunities and leverage, which are more likely to be associated with risk-shifting behavior by shareholders (Billett et al, 2007). Loans with more stringent covenants result in a higher recovery rate (upon default) for the lender, also consistent with covenants allaying value reduction activities by shareholders (Zhang, 2010). A number of papers analyze state-contingent transfer of control rights to creditors (e.g., Chava and Roberts, 2008; Roberts and Sufi, 2009). The former study finds that a borrower's investment is reduced following a covenant violation. Besides the anecdotal evidence, Sufi (2009) provides evidence of active monitoring to maintain financing, which is closest to Rajan and Winton (1995). Using repeated SEC filings on firms' credit lines and drawn amounts, he shows that lines of credit

[22] For example, S&P (2006) discuss the exchange of confidential information that goes on after the credit agreement has been signed. These include financial disclosures at frequent intervals, covenant compliance information, waiver requests, and financial projections and plans.

[23] Moreover, different covenants can serve different purposes. Falling under the traditional view are restrictions on dividend payments, on new debt issuance, on changes in business focus, and on "sweeps" covenants that ensure that proceeds from asset sales go to the reduction of debt. Alternatively and consistent with the modern view, financial covenants such as net worth and interest coverage, make sure that the borrower stays financially sound (or likewise determine the conditions under which control rights are transferred to the debtholders).

are not fully committed liquidity insurance, but are contingent on the borrower maintaining a healthy cash flow condition – as laid out in the cash flow based financial covenants.

### 6.1.1 Tests of Covenants as Monitoring Mechanisms

To the extent that covenants incentivize the lead arranger to monitor, I expect a tighter relationship with outcomes in loans with more covenant restrictions. The results in Table 5, provide overall support for this hypothesis. Panel A shows results for a covenant split according to contemporaneous covenant characteristics, while Panel B shows results for a covenant split according to the covenants on a borrower's previous loans. The latter test is closer to the dynamic view of covenants.

Jointly, the findings support moral hazard in monitoring.[24] The results show that there is a tighter negative relationship between the lead's share and subsequent default on loans with a financial covenant compared with loans that have no financial covenants (the coefficient is equal to -0.0020 standard error 0.0009, compared with -0.0009 standard error 0.0016 on loans with no financial covenants). A similar statistically significant relationship is found for borrowers whose previous loans had financial covenants. Similar results also hold when running a comparison according to the number of covenants (these and the slack measure are calculated in the same way as Drucker and Puri, 2009; see the appendix). A third measure of covenant constraints can be approximated by how much slack a borrower has on a given covenant. For example, net worth covenant slack is measured as the difference between the borrower's actual net worth and the minimum level defined in the covenant and normalized by the borrower's assets. The evidence is somewhat mixed for this measure. The impact of the lead's share is greater for borrowers with a previously tight net worth covenant than for those with a previously loose net worth covenant (Panel B). But the contemporaneous results do not support the null: the magnitude of the coefficient is slightly larger and statistically significant on loans with more slack.

If loan covenants help to induce the lead arranger to continuously monitor the borrower, as the results indicate, it is important to understand how loan covenants are set in the contract. The degree of covenant rigor will be endogenously chosen along with other loan terms, and in particular, the lead arranger's retained share of the loan. The null hypothesis consistent with Rajan and Winton (1995) is that covenants are set in the contract precisely

[24] The lead's exposure may also influence how seriously creditor control rights are put into action after a covenant violation. For example, Chava and Roberts (2008) find that covenant violations in loans with a single lender lead to a much larger investment decline compared with violations in loans with more diffuse syndicates. This finding is consistent with the lead arranger having more of an incentive to restructure (and therefore significantly alter investment behavior) when it retains more of the loan.

to induce the delegated monitor to monitor because it will have less incentive to do so when there are other claimants on the borrower. On the other hand, covenants could substitute for delegated monitoring. That is, they could serve as a "public monitoring device", as articulated by Drucker and Puri (2009). In their view, loans with greater covenant restrictions facilitate loan sales. Dispersed investors can use them as a benchmark against which to compare the borrower's performance. As a result, covenants protect uninformed investors, thus helping to maintain a liquid secondary loan market. To distinguish between these two views on who is the relevant monitor, I take advantage of the IV strategy to estimate the relationship between covenants and the lead's share.

Loan covenants also depend on the business cycle and are characterized by common trends, such as the proliferation of "covenant-lite" loans in the period before the 2007-2009 financial crisis. Lenders partly ceded renegotiation control by agreeing to such loans. While these loans may require that a borrower comply with a covenant when the borrower takes an action such as an acquisition, the borrower would not have to comply with the covenant for quarterly maintenance purposes (S&P, 2006). The evolution of covenants over time is traced out in Table 6. Coverage of covenants in Dealscan is limited before the mid-1990s (Chava and Roberts, 2008). In the decade from 1996 to 2006, covenant restrictions eased, and in particular in the last part of the sample. For example, the number of covenants in 2006 was on average one compared with 1.8 over the sample; the slack in the net worth covenant reached 0.13 compared with 0.09 over the sample. Unfortunately, this sample does not cover many business cycles, but there is evidence of cyclicality in that covenants also eased in 2000. The effect of cyclicality will be explored in more detail in Table 7, where quarterly GDP growth is one of the covariates.[25]

The results of the relationship between covenant constraints and the lead arranger's share are shown in Table 7. These models control for the business cycle and the borrower's previous covenant characteristics. All the standard covariates included in Table 2 are also controlled for. Columns (1), (3), and (5) show the results of ordinary least squares for the financial covenant indicator, the number of covenants, and the net worth covenant slack measure, respectively. Columns (2), (4), and (6) repeat the analysis with IV estimation

[25] I do not have data on covenants from 2007, but recent evidence suggests that these have considerably tightened with the financial crisis. For example, the 2009 Shared National Credit review documented that underwriting standards on new loans were more stringent than on legacy loans. That covenants may be countercyclical is compatible with Rajan (1994). In his model, rational but short-termist bank managers partly care about their market perception. To the extent that market perception of the bank's ability is affected by the bank's current earnings and the bank's performance relative to its peers, the manager chooses to maintain a lax credit policy and to loosen covenants as long as his peers are doing well. Banks then coordinate on adverse shocks to tighten credit policies.

(using the lending limit instruments).

The striking result is that the OLS relationship between covenant intensity and lead exposure is a negative one, but the IV-estimated relationship is a positive one. That is, covenants appear to be substitutes for delegated monitoring but the true relationship is one where covenants go hand in hand with monitoring by the lead arranger. The OLS effect is probably swamped by reverse causality – in that tighter covenants then allow the lead to retain a smaller share as participant lenders are persuaded to increase their exposure. The estimates imply that a one standard deviation increase in the lead arranger's share yields a 4 percent increase in the probability that the loan has a financial covenant, compared with a 0.6 percent decrease based on the least squares estimate. Similarly, a one standard deviation in the lead's share is associated with a 0.35 increase in the number of covenants (while the OLS results suggest a 0.07 fall). A similar direction is also present when looking at the slack in the net worth covenant (though it is not statistically significant).[26]

Taken together, the results shown in Tables 5 and 7 offer compelling support for the view that covenants provide an incentive for the delegated lead arranger to monitor, closest to Rajan and Winton (1995). It is useful to contrast these results with recent findings by Drucker and Puri (2009). The latter study showed that loans that are sold have more restrictive covenants, and the authors concluded that covenants substitute for delegated monitoring. Their results are compatible with my least squares result that covenants appear to be associated with more diffuse lending syndicates. In the absence of an instrument for loan sales in their study, it is inconclusive. It may also be the case that while secondary market loan sales and syndications in the primary market share common features, there may remain significant differences. This topic deserves further investigation.[27]

One last set of comments concerns the relationship of covenants with the other covariates. Covenants are countercyclical (at least in their incidence and number, not in the slack of the net worth measure): there are more restrictions during downturns as evidenced by the negative coefficient on GDP growth. These findings echo those in Bradley and Roberts (2004) and Zhang (2010), and also support Rajan (1994). I also find that covenant

[26]That tighter covenants are associated with a greater lead share is also true for the tangible net worth covenant, the interest coverage covenant, and the debt to net worth covenant. I focus on the net worth covenant in the analysis because Drucker and Puri (2009) point out that it is typically associated with technical default, and is also easier to measure. Other measures such as what is the relevant debt value are more difficult to measure unambiguously.

[27]In practice, both Rajan and Winton's take and Drucker and Puri's take are compatible. Some covenants can be publicly monitored at little or no cost, while other covenants may require more effort by a delegated monitor to observe whether a violation has occurred. For example, Diamond (1984) conjectures that contingent covenants are costly to monitor, such as determining that the borrower's working capital not fall below some level unless necessary for expansion of inventory.

constraints are greater for more leveraged borrowers and for loans with a longer maturity, compatible with the findings by Billett et al (2007) who look at bond covenants.

# 7 Conclusion

This study has uncovered evidence of asymmetric information in the syndicated loan market, in a manner consistent with the related theory. An important contribution of this study is in clarifying the blurred grouping of adverse selection and moral hazard. Both are important sources of asymmetric information. But they have different policy implications. The syndication process itself does not affect the adverse selection problem – whether the lead has an informational advantage over syndicate participants at the close of the loan. In contrast, moral hazard is endogenous to the process of syndication. My results indicate that moral hazard is the greater problem, and that loan covenants are a valuable mechanism to induce the lead arranger to monitor.

While the adverse effects of credit sharing have taken center stage in this paper, this does not necessarily imply that credit risk sharing reduces welfare. Such markets provide a valuable form of insurance for lenders as they free up capital and enable credit expansion. The results in this paper showed that banks retain a lower portion of loans when the opportunity cost of holding loans in portfolio is high. Moreover, there is evidence that firms whose loans are sold maintain lending relationships and have increased access to loans (Drucker and Puri, 2009). This may also be why borrowers are willing to pay for the intermediary's asymmetric information problem in the form of higher loan interest rate spreads (e.g., Ivashina, 2009). In addition, the shift from a relationship-based banking system to arm's length finance is endogenous and has been made possible by technical, regulatory and institutional change (Rajan, 2005; Parlour and Plantin, 2008). While relationship lending may offer more flexible liquidity, it comes at the cost of hold-up problems by informed lenders exploiting their monopoly advantage.

The tension between insurance and incentives has yet to be resolved. We may have to wait until the dust settles from foreclosed houses to appreciate what direction financial intermediation takes. A paper by Cerasi and Rochet (2008) speaks to the optimal design of bank capital regulation in the presence of credit risk transfer activities. This diversification should allow banks to decrease their value at risk, and with that their regulatory capital. But a decrease in regulatory capital fails to consider monitoring incentives. The optimal capital ratio should be increasing in the severity of the bank's moral hazard problem.

# References


[1] Aghion, Philippe, and Patrick Bolton. 1992. "An incomplete contracts approach to financial contracting," *Review of Economic Studies*, 59(3), 473-494.

[2] Ashcraft, Adam B, and Joao A C Santos. 2009. "Has the CDS market lowered the cost of corporate debt?" *Journal of Monetary Economics*, 56(4), 514-523.

[3] Berndt, Antje, and Anurag Gupta. 2009. "Moral hazard and adverse selection in the originate-to-distribute model of bank credit," *Journal of Monetary Economics*, 56(5), 725-743.

[4] Billett, Matthew T, Tao-Hsien Dolly King and David C Mauer. 2007. "Growth opportunities and the choice of leverage, debt maturity, and covenants," *Journal of Finance*, 62(2), 697-730.

[5] Bradley, Michael, and Michael R Roberts. 2004. "The structure and pricing of corporate debt covenants," Working Paper, Duke University.

[6] Cai, Jian. 2009. "Competition or collaboration? The reciprocity effect in loan syndication," Working Paper, Federal Reserve Bank of Cleveland.

[7] Carey, Mark, and Greg Nini. 2007. "Is the corporate loan market globally integrated? A pricing puzzle," *Journal of Finance*, 62(6), 2969-3007.

[8] Cerasi, Vittoria, and Jean-Charles Rochet. 2008. "Solvency regulation and credit risk transfer," Working Paper, Paolo Baffi Centre.

[9] Chava, Sudheer, and Michael R Roberts. 2008. "How does financing impact investment? The role of debt covenants," *Journal of Finance*, 63(5), 2085-2121.

[10] Dahiya, Sandeep, Manju Puri and Anthony Saunders. 2003. "Bank borrowers and loan sales: New evidence on the uniqueness of bank loans," *Journal of Business*, 76(4), 563-582.

[11] De Servigny, Arnaud, and Olivier Renault. 2003. "Correlation evidence," *Risk*, July.

[12] Dennis, Steven A, and Donald J Mullineaux. 2000. "Syndicated loans," *Journal of Financial Intermediation*, 9(4), 404-426.

[13] Diamond, Douglas W. 1984. "Financial intermediation and delegated monitoring," *Review of Economic Studies*, 51(3), 393-414.

[14] Drucker, Steven, and Manju Puri. 2009. "On loan sales, loan contracting, and lending relationships," *Review of Financial Studies*, 22(7), 2835-2872.

[15] Esty, Benjamin C, and William L Megginson. 2003. "Creditor rights, enforcement, and debt ownership structure: Evidence from the global syndicated loan market," *Journal of Financial and Quantitative Analysis*, 38(1), 37-59.

[16] Focarelli, Dario, Alberto Franco Pozzolo and Luca Casolaro. 2008. "The pricing effect of certification on syndicated loans," *Journal of Monetary Economics*, 55(2), 335-349.

[17] Gatev, Evan, and Philip E Strahan. 2006. "Banks' advantage in hedging liquidity risk:Theory and evidence from the commercial paper market," *Journal of Finance*, 61(2), 867-892.

[18] Gatev, Evan, and Philip E Strahan. 2009. "Liquidity risk and syndicate structure," *Journal of Financial Economics*, 93(3), 490-504.

[19] Gopalan, Radhakrishnan, Vikram Nanda and Vijay Yerramilli. 2009. "Does poor performance damage the reputation of financial intermediaries? Evidence from the loan syndication market," Working Paper, Washington University.

[20] Gorton, Gary B, and George C Pennacchi. 1995. "Banks and loan sales: Marketing nonmarketable assets," *Journal of Monetary Economics*, 35(3), 389-411.

[21] Gorton, Gary B, and Andrew Winton. 2003. "Financial intermediation," in George M Constantinides, Milton Harris, and Rene Stulz, eds.: *Handbook of the Economics of Finance, Volume 1A: Corporate Finance* (Elsevier, Amsterdam).

[22] Greenbaum, Stuart I, and Anjan V Thakor. 1987. "Bank funding modes: Securitization versus deposits," *Journal of Banking and Finance*, 11(3), 379-401.

[23] Holmstrom, Bengt, and Jean Tirole. 1997. "Financial Intermediation, loanable funds, and the real sector," *Quarterly Journal of Economics*, 112(3), 663-691.

[24] International Monetary Fund. 2006. *Global Financial Stability Report*, April.

[25] Ivashina, Victoria. 2009. "Asymmetric information effects on loan spreads," *Journal of Financial Economics*, 92(2), 300-319.

[26] Ivashina, Victoria, and David Scharfstein. 2010. "Loan syndication and credit cycles," *American Economic Review*, 100(2), 57-61.

[27] Ivashina, Victoria, and Zheng Sun, 2010. "Institutional demand pressure and the cost of corporate loans," Working Paper, Harvard Business School.

[28] Jones, Jonathan D, William W Lang, Peter J Nigro. 2005. "Agent bank behavior in bank loan syndications," *Journal of Financial Research*, 28(3), 385-402.

[29] Karlan, Dean, and Jonathan Zinman. 2009. "Observing unobservables: Identifying information asymmetries with a consumer credit field experiment," *Econometrica*, 77(6), 1993-2008.

[30] Keys, Benjamin L, Tanmoy Mukherjee, Amit Seru, and Vikrant Vig. 2010. "Did securitization lead to lax screening? Evidence from subprime loans," *Quarterly Journal of Economics*, 125(1), 307-362.

[31] Leland, Hayne E, and David H Pyle. 1977. "Informational asymmetries, financial structure, and financial intermediation," *Journal of Finance*, 32(2), 371-387.

[32] Parlour, Christine A, and Guillaume Plantin. 2008. "Loan sales and relationship banking," *Journal of Finance*, 63(3), 1291-1314.

[33] Rajan, Raghuram G. 1992. "Insiders and outsiders: The choice between informed and arm's-length debt," *Journal of Finance*, 47(4), 1367-1400.

[34] Rajan, Raghuram G. 1994. "Why bank credit policies fluctuate: A theory and some evidence," *Quarterly Journal of Economics*, 109(2), 399-441.

[35] Rajan, Raghuram G. 2005. "Has financial development made the world riskier?" in *The Greenspan Era: Lessons for the Future*, a symposium sponsored by the Federal Reserve Bank of Kansas City, August 25-27.

[36] Rajan, Raghuram G, and Andrew Winton. 1995. "Covenants and collateral as incentives to monitor," *Journal of Finance*, 50(4), 1113-1146.

[37] Roberts, Michael R, and Amir Sufi. 2009. "Control rights and capital structure: An empirical investigation," *Journal of Finance*, 64(4), 1657-1695.

[38] S&P. 2006. *A Guide to the Loan Market*. The McGraw-Hill Companies, Inc, New York, NY.

[39] Schumpeter, Joseph. 1939. *Business Cycles*. New York: McGraw-Hill.

[40] Smith, Clifford, and Jerold Warner. 1979. "On financial contracting: An analysis of bond covenants," *Journal of Financial Economics*, 7(2), 117-161.

[41] Stock, James H, and Motohiro Yogo. 2005. "Testing for weak instruments in linear IV regression," in D.K Andrews and J.H. Stock, eds. *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*. Cambridge: Cambridge University Press, 80-108.

[42] Sufi, Amir. 2007. "Information asymmetry and financing arrangements: Evidence from syndicated loans," *Journal of Finance*, 62(2), 629-668.

[43] Sufi, Amir. 2009. "Bank lines of credit in corporate finance: An empirical analysis," *Review of Financial Studies*, 22(3), 1057-1088.

[44] Winton, Andrew. 1999. "Don't put all your eggs in one basket? Diversification and specialization in lending," Working Paper, University of Minnesota.

[45] Wooldridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge and London: MIT Press.

[46] Zhang, Zhipeng. 2010. "Recovery rates and macroeconomic conditions: The role of loan covenants," Working Paper, Boston College.

**Table 1. Summary statistics**
**Syndicated loan facilities for US borrowers, 1990 - 2006, Sample observations = 8996**

| | Mean | Standard Deviation | 10th Percentile | Median | 90th Percentile |
|---|---|---|---|---|---|
| *Main Dependent variable* | | | | | |
| Borrower default | 0.077 | 0.266 | 0.000 | 0.000 | 0.000 |
| | | | | | |
| *Instruments* | | | | | |
| Lead lending limit, as lead (US$ million) | 61.775 | 49.520 | 26.668 | 46.000 | 120.750 |
| Lead lending limit, as participant (US$ million) | 46.752 | 28.281 | 22.115 | 39.985 | 91.651 |
| Lead exposure to mortgage securitization | 0.141 | 0.244 | 0.008 | 0.057 | 0.467 |
| | | | | | |
| *Contract characteristics* | | | | | |
| Lead share (%) | 31.939 | 25.013 | 8.240 | 24.000 | 66.670 |
| Number of lead arrangers | 1.162 | 0.386 | 1.000 | 1.000 | 2.000 |
| Total number of lenders | 10.440 | 10.077 | 2.000 | 7.000 | 22.000 |
| All-in-spread drawn (%) | 1.541 | 1.175 | 0.325 | 1.250 | 3.000 |
| Facility amount (US$ million) | 329.655 | 800.596 | 20.000 | 125.000 | 750.000 |
| Log(Facility amount) | 18.620 | 1.438 | 16.811 | 18.644 | 20.436 |
| Maturity (months) | 43.918 | 24.028 | 12.000 | 41.000 | 72.000 |
| Secured | 0.470 | 0.499 | 0.000 | 0.000 | 1.000 |
| Secured missing | 0.236 | 0.425 | 0.000 | 0.000 | 1.000 |
| Revolver | 0.799 | 0.401 | 0.000 | 1.000 | 1.000 |
| Financial covenant | 0.693 | 0.461 | 0.000 | 1.000 | 1.000 |
| Financial ratio | 0.066 | 0.249 | 0.000 | 0.000 | 0.000 |
| Number of covenants | 2.971 | 2.573 | 0.000 | 3.000 | 7.000 |
| Covenant slack net worth | 0.102 | 0.144 | -0.013 | 0.094 | 0.274 |
| Purpose: corporate | 0.416 | 0.493 | 0.000 | 0.000 | 1.000 |
| Purpose: acquisition | 0.117 | 0.321 | 0.000 | 0.000 | 1.000 |
| Purpose: refinancing | 0.281 | 0.449 | 0.000 | 0.000 | 1.000 |
| Purpose: backupline | 0.148 | 0.355 | 0.000 | 0.000 | 1.000 |
| Purpose: other | 0.038 | 0.192 | 0.000 | 0.000 | 0.000 |
| Guaranteed | 0.062 | 0.242 | 0.000 | 0.000 | 0.000 |
| Sponsored | 0.072 | 0.259 | 0.000 | 0.000 | 0.000 |
| Borrower consent | 0.728 | 0.445 | 0.000 | 1.000 | 1.000 |
| Agent consent | 0.740 | 0.439 | 0.000 | 1.000 | 1.000 |
| Min assignment (US$ million) | 5.001 | 4.663 | 0.000 | 5.000 | 10.000 |
| Leveraged loan | 0.534 | 0.499 | 0.000 | 1.000 | 1.000 |
| | | | | | |
| *Borrower characteristics* | | | | | |
| Rated | 0.514 | 0.500 | 0.000 | 1.000 | 1.000 |
| Rating AAA | 0.006 | 0.074 | 0.000 | 0.000 | 0.000 |
| Rating AA | 0.017 | 0.131 | 0.000 | 0.000 | 0.000 |
| Rating A | 0.088 | 0.284 | 0.000 | 0.000 | 0.000 |
| Rating BBB | 0.172 | 0.377 | 0.000 | 0.000 | 1.000 |
| Rating BB | 0.112 | 0.315 | 0.000 | 0.000 | 1.000 |
| Rating B | 0.104 | 0.305 | 0.000 | 0.000 | 1.000 |
| Rating CCC | 0.011 | 0.105 | 0.000 | 0.000 | 0.000 |
| Rating CC and below | 0.003 | 0.059 | 0.000 | 0.000 | 0.000 |
| Opaque | 0.447 | 0.497 | 0.000 | 0.000 | 1.000 |
| Profitability (ROA) | 0.126 | 0.089 | 0.041 | 0.123 | 0.226 |
| Leverage | 0.356 | 0.225 | 0.075 | 0.333 | 0.658 |
| Size ( log(assets)) | 6.931 | 1.798 | 4.838 | 6.713 | 9.479 |
| Altman z-score | 3.173 | 1.933 | 1.098 | 2.860 | 5.877 |
| Equity volatility | 0.026 | 0.015 | 0.012 | 0.023 | 0.044 |
| Equity bid-ask spread | 0.754 | 0.669 | 0.245 | 0.616 | 1.364 |
| Equity amihud illiquidity | 0.763 | 1.079 | 0.103 | 0.386 | 1.818 |
| Industry default probability | 0.011 | 0.020 | 0.000 | 0.004 | 0.028 |
| Firms in same industry | 0.030 | 0.028 | 0.005 | 0.019 | 0.062 |
| Previous loans | 3.878 | 4.622 | 0.000 | 2.000 | 9.000 |
| | | | | | |
| *Syndicate group characteristics* | | | | | |
| Previous lead | 0.652 | 0.476 | 0.000 | 1.000 | 1.000 |
| Lead fraction banks | 0.913 | 0.270 | 0.500 | 1.000 | 1.000 |
| Lead country US | 0.922 | 0.268 | 1.000 | 1.000 | 1.000 |
| Lead market share | 0.097 | 0.115 | 0.002 | 0.052 | 0.270 |
| Repeat interactions lead to participant | 1.632 | 4.187 | 0.054 | 0.914 | 4.038 |
| Reciprocal | 0.930 | 0.255 | 1.000 | 1.000 | 1.000 |
| | | | | | |
| *Lead bank characteristics* | | | | | |
| Size ( log(assets)) | 19.203 | 1.181 | 17.691 | 19.340 | 20.773 |
| Capital | 0.074 | 0.013 | 0.059 | 0.074 | 0.091 |
| Liquidity | 0.177 | 0.075 | 0.106 | 0.158 | 0.274 |
| Ununsed commitments | 0.403 | 0.094 | 0.306 | 0.394 | 0.506 |
| Income | 0.010 | 0.004 | 0.006 | 0.011 | 0.014 |
| Loan interest rate | 0.075 | 0.017 | 0.054 | 0.075 | 0.100 |
| Deposit interest rate | 0.037 | 0.014 | 0.016 | 0.039 | 0.057 |
| Wholesale interest rate | 0.043 | 0.019 | 0.017 | 0.046 | 0.061 |
| | | | | | |
| *Aggregate characteristics* | | | | | |
| GDP growth | 0.032 | 0.012 | 0.015 | 0.034 | 0.046 |
| Commercial paper spread (%) | 0.235 | 0.162 | 0.060 | 0.210 | 0.440 |

Note:
See Appendix A for variable definitions.

**Table 2. Lead Arranger Syndicate Exposure and Subsequent Borrower Default**

| | (1) OLS | (2) 2SLS 1st Stage | (3) 2nd Stage |
|---|---|---|---|
| *Instruments* | | | |
| Lead lending limit, as lead | | 0.0694*** | |
| | | (0.0270) | |
| Lead lending limit, as participant | | 0.1061*** | |
| | | (0.0311) | |
| *Contract characteristics* | | | |
| Lead share | -0.00005 | | -0.0018** |
| | (0.0002) | | (0.0008) |
| All-in-spread drawn | 0.0066 | 1.0926** | 0.0094* |
| | (0.0053) | (0.4458) | (0.0057) |
| Log (facility amount) | -0.0021 | -5.8910*** | -0.0121* |
| | (0.0048) | (0.3563) | (0.0067) |
| Log (maturity) | -0.0033 | -2.2440*** | -0.0072 |
| | (0.0053) | (0.3808) | (0.0058) |
| Secured | 0.0174 | -1.1635* | 0.0146 |
| | (0.0109) | (0.7011) | (0.0111) |
| Revolver | -0.0049 | -1.3426* | -0.0084 |
| | (0.0082) | (0.7018) | (0.0084) |
| Financial covenant | 0.0076 | -1.4559** | 0.0043 |
| | (0.0110) | (0.7371) | (0.0110) |
| Financial ratio | -0.0362** | 1.7718 | -0.0307* |
| | (0.0165) | (1.2579) | (0.0169) |
| Purpose: corporate | 0.0169 | 2.4502* | 0.0210 |
| | (0.0175) | (1.4437) | (0.0179) |
| Purpose: acquisition | 0.0019 | 1.5578 | 0.0079 |
| | (0.0224) | (1.5529) | (0.0227) |
| Purpose: refinancing | 0.0239 | 2.0185 | 0.0314 |
| | (0.0189) | (1.4150) | (0.0193) |
| Purpose: backupline | 0.0133 | 0.1771 | 0.0149 |
| | (0.0183) | (1.4894) | (0.0186) |
| *Borrower characteristics* | | | |
| Rated | -0.0785*** | 1.0042 | -0.0717** |
| | (0.0270) | (2.8474) | (0.0283) |
| Rating AA | 0.0100 | 1.1151 | 0.0076 |
| | (0.0203) | (2.9557) | (0.0220) |
| Rating A | 0.0292 | -0.4616 | 0.0256 |
| | (0.0212) | (2.7552) | (0.0228) |
| Rating BBB | 0.0751*** | -3.6876 | 0.0651*** |
| | (0.0230) | (2.7603) | (0.0242) |
| Rating BB | 0.1014*** | -3.8434 | 0.0846*** |
| | (0.0267) | (2.8583) | (0.0277) |
| Rating B | 0.1592*** | -2.1812 | 0.1468*** |
| | (0.0318) | (2.9859) | (0.0327) |
| Rating CCC | 0.3753*** | -3.3991 | 0.3749*** |
| | (0.0727) | (4.2335) | (0.0723) |
| Rating CC and below | 0.7368*** | -7.0096** | 0.7184*** |
| | (0.0914) | (3.5484) | (0.0908) |
| Profitability (ROA) | -0.0929* | -7.3545** | -0.1049** |
| | (0.0528) | (3.2246) | (0.0531) |
| Leverage | 0.1093*** | -4.1785*** | 0.1038*** |
| | (0.0287) | (1.3542) | (0.0289) |
| Size ( log(assets)) | 0.0159*** | -2.3207*** | 0.0130** |
| | (0.0055) | (0.3239) | (0.0056) |
| Industry default probability | -0.0424 | 10.8446 | 0.0453 |
| | (0.2293) | (16.6559) | (0.2655) |
| Industry default probability, lead 3 | 0.8264** | 8.2606 | 0.8313** |
| years | (0.3938) | (20.8794) | (0.3959) |
| Log (1+ previous loans) | -0.0001 | -1.1883** | -0.0025 |
| | (0.0092) | (0.4866) | (0.0094) |
| *Syndicate characteristics* | | | |
| Previous lead | -0.0115 | -1.5541** | -0.0122 |
| | (0.0101) | (0.6114) | (0.0105) |
| Lead fraction banks | -0.0304* | -2.9633** | -0.0371** |
| | (0.0171) | (1.1804) | (0.0178) |
| Lead country US | -0.0300 | 3.6614*** | -0.0269 |
| | (0.0218) | (0.9689) | (0.0221) |
| Lead market share | 0.0312 | -22.1775*** | 0.0303 |
| | (0.0393) | (3.7003) | (0.0389) |
| Repeat interactions lead to participant | -0.0010 | -0.3528 | -0.0017 |
| | (0.0008) | (0.2568) | (0.0013) |
| Reciprocal | -0.0102 | -29.3464*** | -0.0605** |
| | (0.0172) | (1.5078) | (0.0303) |
| Observations | 9160 | 8996 | 8996 |
| $R^2$ | 0.13 | 0.50 | 0.12 |

Notes:
All regressions include year and industry dummies. 'Other purpose' is the omitted loan purpose type and a AAA rating is the omitted rating dummy.
Standard errors are clustered at the firm level and are reported in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Table 3. Lead Bank Characteristics and Subsequent Borrower Default**

| | (1) 2SLS 1st Stage | (2) 2nd Stage | (3) 2SLS 1st Stage | (4) 2nd Stage |
|---|---|---|---|---|
| *Instruments* | | | | |
| Lead lending limit, as lead | 0.1187*** | | 0.0833*** | |
| | (0.0190) | | (0.0305) | |
| Lead lending limit, as participant | 0.0853*** | | 0.0946*** | |
| | (0.0258) | | (0.0357) | |
| Lead exposure to mortgage securitization | | | 2.8034 | |
| | | | (2.6634) | |
| *Contract characteristics* | | | | |
| Lead share | | -0.0025*** | | -0.0016** |
| | | (0.0009) | | (0.0007) |
| All-in-spread drawn | 1.5612*** | 0.0100 | -0.0714 | 0.0103 |
| | (0.4695) | (0.0068) | (0.8321) | (0.0110) |
| Log (facility amount) | -4.4161*** | -0.0137** | -3.5836*** | -0.0140** |
| | (0.3951) | (0.0067) | (0.8014) | (0.0061) |
| Log (maturity) | -1.9967*** | -0.0118* | -2.2822*** | -0.0061 |
| | (0.3909) | (0.0061) | (0.6344) | (0.0040) |
| Secured | -1.2830* | 0.0069 | 2.3289* | -0.0085 |
| | (0.7249) | (0.0121) | (1.3239) | (0.0067) |
| Revolver | -2.0844*** | -0.0149 | -8.3328*** | 0.0086 |
| | (0.7505) | (0.0095) | (1.7246) | (0.0086) |
| Financial covenant | -0.5094 | 0.0011 | -1.0492 | -0.0032 |
| | (0.7836) | (0.0119) | (1.1766) | (0.0046) |
| Financial ratio | 1.7671 | -0.0280 | 1.5299 | -0.0174* |
| | (1.2356) | (0.0181) | (1.8802) | (0.0097) |
| *Borrower characteristics* | | | | |
| Rated | -1.0108 | -0.0662** | -8.0959 | -0.0294 |
| | (4.8297) | (0.0322) | (5.9380) | (0.0288) |
| Rating AA | 5.0512 | 0.0233 | 10.3441* | 0.0382 |
| | (4.9106) | (0.0284) | (5.7712) | (0.0280) |
| Rating A | 2.5514 | 0.0407 | 10.2071* | 0.0399 |
| | (4.8194) | (0.0288) | (5.6999) | (0.0279) |
| Rating BBB | -1.4463 | 0.0668** | 6.2599 | 0.0329 |
| | (4.8166) | (0.0299) | (5.7670) | (0.0275) |
| Rating BB | -1.5221 | 0.0825** | 5.3879 | 0.0346 |
| | (4.8430) | (0.0328) | (5.9079) | (0.0292) |
| Rating B | -0.2842 | 0.1489*** | 10.5444* | 0.0579 |
| | (4.9874) | (0.0382) | (6.2566) | (0.0380) |
| Rating CCC | -4.5526 | 0.3516*** | 6.5931 | 0.1835* |
| | (5.6718) | (0.0807) | (7.8482) | (0.1023) |
| Rating CC and below | -5.0781 | 0.7596*** | -0.5959 | 0.2324 |
| | (5.6450) | (0.1173) | (11.2301) | (0.2346) |
| Profitability (ROA) | -5.2274 | -0.0479 | -5.0647 | -0.0763 |
| | (3.4893) | (0.0598) | (6.4810) | (0.0472) |
| Leverage | -2.7834** | 0.0966*** | 3.1593 | 0.0820*** |
| | (1.4220) | (0.0312) | (2.5334) | (0.0272) |
| Size ( log(assets)) | -1.7528*** | 0.0130** | -1.6067*** | -0.0005 |
| | (0.3384) | (0.0060) | (0.5715) | (0.0035) |
| Industry default probability | 12.1134 | 0.0583 | 16.8730 | 0.0035 |
| | (16.2786) | (0.2739) | (35.2382) | (0.2093) |
| Industry default probability, lead 3 years | 10.3361 | 1.0894** | 20.1861 | 0.5553 |
| | (20.8877) | (0.4302) | (32.3582) | (0.3872) |
| Log (1+ previous loans) | -1.3799*** | -0.0063 | -0.0591 | -0.0005 |
| | (0.5097) | (0.0095) | (0.7475) | (0.0041) |
| *Syndicate characteristics* | | | | |
| Previous lead | -1.2390* | -0.0139 | -1.4570 | -0.0222** |
| | (0.6633) | (0.0111) | (1.3415) | (0.0097) |
| Lead fraction banks | -4.3064** | -0.0723** | -1.8488 | -0.0232 |
| | (1.7000) | (0.0290) | (1.8833) | (0.0200) |
| Lead country US | 3.1432 | -0.0228 | 4.7760 | 0.0060 |
| | (2.9507) | (0.0636) | (11.1958) | (0.0191) |
| Lead market share | -12.6108*** | 0.0338 | -4.0876 | 0.0805* |
| | (4.0850) | (0.0560) | (8.0910) | (0.0419) |
| Repeat interactions lead to participant | -2.6275*** | -0.0156*** | -3.324*** | -0.0032 |
| | (0.2659) | (0.0044) | (0.7001) | (0.0026) |
| Reciprocal | -28.1551*** | -0.0718** | -32.0023*** | -0.0182 |
| | (1.7479) | (0.0335) | (3.3117) | (0.0205) |
| *Lead bank characteristics* | | | | |
| Size ( log(assets)) | -1.4503*** | 0.0025 | -1.1478 | -0.0090 |
| | (0.4514) | (0.0066) | (0.9053) | (0.0070) |
| Capital | 131.2453*** | -0.0511 | 98.5284 | 0.1438 |
| | (31.5308) | (0.6178) | (80.7272) | (0.5169) |
| Liquidity | -14.5211*** | -0.0875 | -5.5563 | -0.0520 |
| | (4.6519) | (0.0782) | (12.4362) | (0.0690) |
| Ununsed commitments | 0.6493 | -0.0760 | -15.2320 | -0.0067 |
| | (3.7520) | (0.0714) | (13.8145) | (0.0951) |
| Income | -126.8831 | -0.4877 | -48.1845 | -1.0764 |
| | (82.1370) | (1.1904) | (179.7099) | (1.0242) |
| Loan interest rate | 50.9980 | -0.2141 | 168.5281 | 2.7770** |
| | (33.7951) | (0.5919) | (165.1516) | (1.1663) |
| Deposit interest rate | -132.1667** | 0.8450 | -211.8000 | -2.3736 |
| | (54.5425) | (1.0889) | (281.6545) | (2.6276) |
| Wholesale interest rate | 54.9795* | 1.0773* | 121.0007 | 1.8785* |
| | (32.4544) | (0.5778) | (125.7786) | (1.1311) |
| Observations | 7354 | 7354 | 2539 | 2539 |
| $R^2$ | 0.54 | 0.11 | 0.50 | 0.02 |

Notes:
All regressions include year, industry, and loan purpose dummies.
The AAA rating is the omitted rating dummy in the regressions.
Standard errors are clustered at the firm level and are reported in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

**Table 4. Dynamic Tests of Moral Hazard: Previous Lead Relationship and Subsequent Borrower Default**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | Previous lead | | Conditional on previous lead = 1<br>Previous | Commerical paper spread | | Conditional on previous lead = 1<br>Commerical paper spread | |
| | Yes | No | lead share | High | Low | High | Low |
| Lead share | -0.0020** | -0.0002 | -0.0055*** | -0.0015 | -0.0008 | -0.0033* | -0.0012 |
| | (0.0009) | (0.0017) | (0.0021) | (0.0019) | (0.0007) | (0.0018) | (0.0007) |
| Observations | 5862 | 3134 | 9349 | 4103 | 4893 | 2550 | 3312 |
| $R^2$ | 0.12 | 0.16 | 0.02 | 0.13 | 0.14 | 0.12 | 0.16 |

Notes:
All regressions include the covariates in baseline regression, Table 2 col (3). The regressions in col (4) to (7) also include the non-financial commercial paper spread, which does not enter significantly.
Low refers to below the median, while High refers to above the median of the variable of interest. See Table 1 for summary statistics.
Standard errors are clustered at the firm level and are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Table 5. Dynamic Tests of Moral Hazard: Covenants and Subsequent Borrower Default**

**Panel A.**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Financial covenant | | Number of covenants | | Covenant slack net worth | |
| | Yes | No | High | Low | Tight | Loose |
| Lead share | -0.0020** | -0.0009 | -0.0024** | -0.0016 | -0.0027 | -0.0038* |
| | (0.0009) | (0.0016) | (0.0011) | (0.0012) | (0.0017) | (0.0021) |
| Covenant slack net worth | | | | | -0.0561 | 0.2454 |
| | | | | | (0.1109) | (0.1576) |
| Observations | 6234 | 2762 | 3531 | 5465 | 805 | 797 |
| $R^2$ | 0.13 | 0.11 | 0.14 | 0.10 | 0.27 | 0.18 |

**Panel B.**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Previous financial covenant | | Previous number of covenants | | Previous covenant slack net worth | |
| | Yes | No | High | Low | Tight | Loose |
| Lead share | -0.0019** | -0.0021 | -0.0030** | -0.0014 | -0.0041** | 0.0037 |
| | (0.0009) | (0.0015) | (0.0011) | (0.0012) | (0.0018) | (0.0029) |
| Previous covenant slack net worth | | | | | 0.0465 | 0.0861 |
| | | | | | (0.1285) | (0.1309) |
| Observations | 4389 | 2855 | 1351 | 5893 | 681 | 795 |
| $R^2$ | 0.16 | 0.13 | 0.21 | 0.13 | 0.26 | 0.24 |

Notes:
All regressions include the covariates in baseline regression, Table 2 col (3). Also included in the regressions in columns (3), (4), (5) and (6) are the number of covenants, and number of previous covenants. These measures are not statistically significant.
High and Low for the number of covenants refer to above and below median number of covenants (3 covenants).
Tight covenant refers to below median slack, while loose covenant refers to above median slack. See Table 1 for summary statistics.
Standard errors are clustered at the firm level and are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Table 6. The Evolution of Covenants on Syndicated Loans**

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Financial covenant | 0.450 | 0.427 | 0.482 | 0.444 | 0.403 | 0.451 | 0.474 | 0.477 | 0.491 | 0.403 | 0.318 |
| Number of covenants | 2.300 | 2.213 | 2.549 | 2.322 | 1.710 | 1.704 | 1.784 | 1.826 | 1.524 | 1.359 | 1.039 |
| Covenant slack net worth | 0.087 | 0.086 | 0.065 | 0.079 | 0.089 | 0.067 | 0.073 | 0.115 | 0.112 | 0.146 | 0.128 |

Notes:
See Appendix A for variable definitions. These figures are equally-weighted averages of loans syndicated in a given year.
The figures reported for 'financial covenant' are the fraction of loans that have financial covenants.

**Table 7. The Relationship Between Covenants and Lead Exposure**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Financial covenant | | Number of covenants | | Covenant slack net worth | |
| | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| *Variables of interest* | | | | | | |
| Lead share | -0.00023 | 0.0015* | -0.0026* | 0.0137** | 0.0002 | -0.0002 |
| | (0.00019) | (0.0009) | (0.0015) | (0.0060) | (0.0002) | (0.0011) |
| Cyclicality GDP growth | -2.7947 | -2.7418*** | -17.3356*** | -17.0290*** | -0.5626 | -0.6572 |
| | (0.6632) | (0.6710) | (4.4595) | (4.5393) | (0.8076) | (0.8602) |
| *Previous covenant characteristics* | | | | | | |
| Previous financial covenant | 0.0978*** | 0.0976*** | -0.1205 | -0.1390 | 0.0111 | 0.0078 |
| | (0.0177) | (0.0177) | (0.0922) | (0.0927) | (0.0137) | (0.0132) |
| Previous financial ratio | -0.0074 | -0.0065 | 0.0324 | 0.0187 | 0.0215 | 0.0201 |
| | (0.0130) | (0.0130) | (0.0965) | (0.0979) | (0.0147) | (0.0148) |
| Previous number of covenants | 0.0046* | 0.0047* | 0.2898*** | 0.2931*** | -0.0046 | -0.0041 |
| | (0.0026) | (0.0026) | (0.0234) | (0.0237) | (0.0032) | (0.0032) |
| *Other contract characteristics* | | | | | | |
| All-in-spread drawn | -0.0005 | -0.0017 | 0.1404*** | 0.1472*** | -0.0051 | -0.0035 |
| | (0.0049) | (0.0055) | (0.0378) | (0.0410) | (0.0082) | (0.0083) |
| Log (facility amount) | -0.0022 | 0.0068 | -0.0021 | 0.0854** | -0.0106 | -0.0130 |
| | (0.0052) | (0.0068) | (0.0321) | (0.0425) | (0.0076) | (0.0101) |
| Log (maturity) | 0.0167*** | 0.0203*** | 0.3321*** | 0.3619*** | 0.0066 | 0.0051 |
| | (0.0063) | (0.0066) | (0.0393) | (0.0413) | (0.0063) | (0.0061) |
| Secured | -0.0421*** | -0.0405*** | 0.7272*** | 0.7322*** | 0.0021 | -0.0005 |
| | (0.0119) | (0.0121) | (0.0775) | (0.0799) | (0.0113) | (0.0112) |
| Revolver | 0.0227*** | 0.0265*** | -0.5548*** | -0.5138*** | 0.0123 | 0.0131 |
| | (0.0089) | (0.0095) | (0.0619) | (0.0649) | (0.0092) | (0.0089) |
| Purpose: corporate | 0.0277 | 0.0359 | 0.3163* | 0.3454* | 0.0883* | 0.0876* |
| | (0.0287) | (0.0295) | (0.1896) | (0.1926) | (0.0487) | (0.0483) |
| Purpose: acquisition | 0.0832*** | 0.0897*** | 1.1467*** | 1.1579*** | 0.1046** | 0.1028** |
| | (0.0307) | (0.0315) | (0.2080) | (0.2098) | (0.0500) | (0.0498) |
| Purpose: refinancing | 0.0977*** | 0.1038*** | 0.5213*** | 0.5425 | 0.0885* | 0.0866* |
| | (0.0290) | (0.0297) | (0.1937) | (0.1957) | (0.0489) | (0.0485) |
| Purpose: backupline | 0.0310 | 0.0400 | 0.3156 | 0.3635* | 0.1099** | 0.1069** |
| | (0.0306) | (0.0315) | (0.1980) | (0.2011) | (0.0494) | (0.0492) |
| *Borrower characteristics* | | | | | | |
| Rated | 0.0624 | 0.0608 | -0.8537*** | -0.8465*** | 0.0448* | 0.0529** |
| | (0.1274) | (0.1303) | (0.2280) | (0.2245) | (0.0272) | (0.0268) |
| Rating AA | -0.2169 | -0.2188 | 0.2312 | 0.2129 | -0.0987** | -0.1008** |
| | (0.1323) | (0.1349) | (0.2495) | (0.2416) | (0.0470) | (0.0461) |
| Rating A | -0.0700 | -0.0682 | 0.4103* | 0.4087** | -0.0699** | -0.0754*** |
| | (0.1292) | (0.1321) | (0.2114) | (0.2072) | (0.0294) | (0.0291) |
| Rating BBB | -0.00004 | 0.0048 | 0.8598*** | 0.9044*** | -0.0774*** | -0.0830*** |
| | (0.1277) | (0.1306) | (0.2095) | (0.2059) | (0.0205) | (0.0220) |
| Rating BB | -0.0058 | -0.0009 | 1.2790*** | 1.3218*** | -0.0687*** | -0.0739*** |
| | (0.1278) | (0.1307) | (0.2246) | (0.2217) | (0.0254) | (0.0250) |
| Rating B | -0.0091 | -0.0125 | 1.3537*** | 1.3240*** | -0.0752*** | -0.0797*** |
| | (0.1290) | (0.1320) | (0.2447) | (0.2421) | (0.0288) | (0.0295) |
| Rating CCC | -0.0320 | -0.0236 | 0.6005* | 0.6825** | -0.0603* | -0.0677* |
| | (0.1318) | (0.1349) | (0.3350) | (0.3419) | (0.0311) | (0.0383) |
| Rating CC and below | 0.0430 | 0.0582 | 0.8702 | 0.9527 | -0.0248 | -0.0294 |
| | (0.1397) | (0.1420) | (0.7540) | (0.7577) | (0.0402) | (0.0435) |
| Profitability (ROA) | 0.0328 | 0.0502 | 0.3146 | 0.4346 | 0.4358*** | 0.4352*** |
| | (0.0642) | (0.0637) | (0.3740) | (0.3820) | (0.0864) | (0.0850) |
| Leverage | -0.0561** | -0.0510** | 0.3145** | 0.3543** | -0.2306*** | -0.2349*** |
| | (0.0238) | (0.0243) | (0.1565) | (0.1609) | (0.0352) | (0.0348) |
| Size ( log(assets)) | -0.0215*** | -0.0182 | -0.1924*** | -0.1676*** | 0.0306*** | 0.0299*** |
| | (0.0055) | (0.0058) | (0.0316) | (0.0339) | (0.0097) | (0.0096) |
| Industry default probability | 0.0399 | 0.0525 | -1.5126 | -1.5883 | 0.2486 | 0.2334 |
| | (0.1626) | (0.1635) | (1.3684) | (1.3686) | (0.1965) | (0.1939) |
| Log (1+ previous loans) | -0.0107 | -0.0098 | 0.0609 | 0.0680 | -0.0370*** | -0.0351*** |
| | (0.0100) | (0.0100) | (0.0638) | (0.0644) | (0.0118) | (0.0121) |
| *Syndicate characteristics* | | | | | | |
| Previous lead | -0.0132 | -0.0115 | 0.0167 | 0.0304 | -0.0021 | -0.0036 |
| | (0.0102) | (0.0108) | (0.0721) | (0.0748) | (0.0117) | (0.0116) |
| Lead fraction banks | -0.0150 | -0.0056 | 0.2700** | 0.3615*** | 0.0082 | 0.0056 |
| | (0.0137) | (0.0148) | (0.1250) | (0.1366) | (0.0193) | (0.0193) |
| Lead country US | -0.0001 | -0.0010 | 0.0035 | -0.0306 | -0.0396** | -0.0302* |
| | (0.0147) | (0.0149) | (0.1353) | (0.1370) | (0.0192) | (0.0176) |
| Lead market share | 0.1470*** | 0.1429*** | -0.0694 | -0.1318 | 0.0672 | 0.0716 |
| | (0.0432) | (0.0436) | (0.2489) | (0.2540) | (0.0539) | (0.0528) |
| Repeat interactions lead to | -0.0011 | -0.0005 | -0.0018 | 0.0041 | -0.0008*** | -0.0009* |
| participant | (0.0013) | (0.0017) | (0.0058) | (0.0102) | (0.0003) | (0.0005) |
| Reciprocal | -0.0032 | 0.0407 | 0.2791* | 0.7189*** | -0.0159 | -0.0179 |
| | (0.0170) | (0.0322) | (0.1465) | (0.2459) | (0.0201) | (0.0337) |
| Observations | 7951 | 7855 | 7951 | 7855 | 1438 | 1425 |
| $R^2$ | 0.58 | 0.58 | 0.56 | 0.54 | 0.31 | 0.31 |

Notes:
All regressions include year and industry dummies. 'Other purpose' is the omitted loan purpose type, and a AAA rating is the omitted rating dummy.
Standard errors are clustered at the firm level and are reported in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Appendix A: Variable Definitions**

| Variables | Definition |
|---|---|
| *Main Dependent variable* | |
| Borrower default | Indicator of US borrower default on bonds as recorded in Moody's Default Risk Service Database, 2008 download. Of the 894 identifiable unique borrower (gvkey) defaults, 630 were matched to syndicated borrowers in Dealscan. |
| *Instruments* | |
| Lead lending limit, as lead | Lead arranger - specific variable defined as the 75th percentile of the dollar size of the lead arranger share on its syndicated loan facilities calculated over the 3 years previous to the loan. This is limited to loans on which it also served as a lead arranger. Note that all lenders are aggregated to their parent company and inherit the characteristics of the parent, as in Sufi (2007) |
| Lead lending limit, as participant | Lead arranger - specific variable defined as the 75th percentile of the dollar size of the lead arranger share on its syndicated loan facilities calculated over the 3 years previous to the loan. This is limited to loans on which the current lead arranger was only a participant on the previous loan, and not a lead arranger. |
| Lead exposure to mortgage securitization | Lead arranger-specific variable defined as the maximum credit exposure arising from recourse or other seller-provided credit enhancements as a share of securitizations and assets sold relating to 1-4 family residential loans, averaged over 3 years. Defined from Y-9C Schedule HC-S as (bhckb712+bhckc393+bhckc400+bhckb797)/(bhckb705+bhckb790). |
| *Contract characteristics* | |
| Lead share | The share of the loan retained by the lead bank(s). These are the lenders listed under the category "lead arranger". In the case of more than one lead arranger, the sum of the shares is taken. This also applies to the lead lending limit instruments. |
| Number of lead arrangers | The number of lead arrangers on a loan facility. |
| Total number of lenders | The total number of lenders (lead arrangers, other lenders in a lead role, and lenders in a participant role) on a loan facility. |
| All-in-spread drawn | This is the amount the borrower pays over LIBOR for each dollar drawn down. This is reported in Table 1 in %. |
| Log (facility amount) | Natural log of the facility (or tranche) amount in US$. This is reported in Table 1 in US $ million. |
| Log (maturity) | Natural log of the loan facility's tenor, which is reported in months. |
| Secured | Dummy = 1 indicating if the loan is secured, 0 otherwise. |
| Secured missing | Dummy = 1 indicating the secured status of a loan is missing, and 0 otherwise. |
| Revolver | Dummy = 1 indicating revolver (credit line) type loan facilities. It takes on a value of 1 if the specific tranche type is equal to "Revolver/Line < 1 Yr.", "Revolver/Line >= 1 Yr.", "364-Day Facility", or "Revolver/Term Loan". |
| Financial covenant | Dummy = 1 indicating the loan has financial covenants, and 0 otherwise. |
| Financial ratio | Dummy = 1 indicating the loan has financial ratios, and 0 otherwise. This is defined in Dealscan as loans that include financial covenants or measurements as they pertain to borrower or guarantor as a prerequisite to maintain credit availability. |
| Number of covenants | The number of financial covenants measured as in Puri and Drucker (2009). Specifically, this is the sum of the total number of financial covenants and sweep covenants (asset, equity, debt) plus one if the loan has a dividend restriction. |
| Covenant slack net worth | This measure of slack is defined for loans on which a net worth financial covenant is specified. Equal to (net worth - covenant minimum level)/book assets, where net worth is equal to total assets - total liabilities. (CMPST: AT - LT). Slack measure is winsorized at the 2.5 and 97.5 percentiles. |
| Purpose: corporate | Dummy = 1 if loan purpose type is corporate purposes, working capital, or capital expenditure, and 0 otherwise. |
| Purpose: acquisition | Dummy = 1 if loan purpose type is takeover, LBO, or LBO/MBO, and 0 otherwise. |
| Purpose: refinancing | Dummy = 1 if loan purpose type is debt repayment, or recapitalization, and 0 otherwise. |
| Purpose: backupline | Dummy = 1 if loan purpose type is commercial paper backup, or acquisition line, and 0 otherwise. |
| Purpose: other | Dummy = 1 if loan purpose type is other purpose. |
| Guaranteed | Dummy = 1 indicating that the loan has a Guarantor, a company that guarantees to assume all responsibilities associated with debt structured on behalf of the borrower in the event of default, and 0 otherwise. |
| Sponsored | Dummy = 1 indicating a loan in which a Sponsor (private equity investor with an equity ownership) controls at least 20%, as defined in Dealscan. These typically are loans financing private equity sponsored leveraged buyouts (LBOs). |
| Borrower consent | Dummy = 1 indicating a resale constraint, and 0 otherwise. Specifically, borrower consent is required for 'assignments'. This is a type of resale where the assignee becomes a direct signatory to the loan and receives interest and principal payments directly from the administrative agent. The other type of resale is a 'participation' which is an agreement between an existing lender and a new participant. The existing lender remains officially on the loan, and therefore consent is typically not required. |
| Agent consent | Dummy = 1 indicating agent consent is required for 'assignments'. See borrower consent for more information. |
| Log (min assignment) | Natural log of the assignment minimum amount in US$, and 0 otherwise. See borrower consent for more information. |
| Leveraged loan | Dummy = 1 indicating a 'leveraged loan', and 0 otherwise. This is a loan priced at 125 basis oints or more above LIBOR. See Ivashina and Sun (2007). |
| *Borrower characteristics* | |
| Rated | Dummy = 1 indicating the borrower's senior debt was rated by S&P or Moodys at the close of the loan. It is 0 if there is information indicating that the borrower is not rated, and it is missing in cases where the rating status by both S&P and Moody's is missing. This information is from Dealscan. |
| Rating AAA ... Rating CC and below | Dummies indicating the borrower's senior debt rating at the close of the loan, average of S&P and Moody's. See Rated for detail. |
| Opaque | Dummy = 1 indicating publicly traded borrowers without a debt rating, and 0 otherwise. This information is from Compustat. |
| Profitability (ROA) | EBITDA to total assets. (CMPST: OIBDP/AT). Winsorized at 2.5 and 97.5 percentiles. |
| Leverage | Book leverage ratio. (CMPST: (DLTT+DLC)/AT). Winsorized at 2.5 and 97.5 percentiles. |
| Size ( log(assets)) | Natural log of borrower's total assets. (CMPST: AT). |
| Altman z-score | Defined as Z = 1.2X(1) + 1.4X(2) + 3.3X(3) + 0.6X(4) + 1X(5), where X1 is working capital/total assets, X2 is retained earnings to total assets, X3 is EBIT/total assets, X4 is market value equity/book value of total liabilities, and X5 is sales/total assets. All X variables are winsorized at -4 and 8 (see Jiang et al, 2008). (CMPST: X1 = (ACT-LCT)/AT, X2= RE/AT, X3=OIBDP/AT, X4=PRCC_C*CSHO/LT, and X5=SALE/AT.) |
| Equity volatility | This is the standard deviation of the residuals from Fama-French 3 factor model estimated with daily stock return data over the year prior to syndication date. Borrower's equity return information is from CRSP, and Fama-French factors are available from the Kenneth French Data Library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html |
| Equity bid-ask spread | Average of daily bid-ask spread on a borrower's equity over the year prior to syndication date, using data from CRSP. |
| Equity amihud illiquidity | Yearly average of illiquidity using daily data from CRSP. Equal to 1000 times the square root of absolute value of return/volume. |
| Industry default probability | This is the 2-digit industry-level default probability calculated over the previous 3 years using data on bonds transitioning into default from Moody's Credit Risk Default Service Database. See De Servigny and Renault (2003). |
| Firms in same industry | This is the fraction of firms in Compustat that are in the borrower's 2-digit SIC in the year of the loan. |
| Log (1+ previous loans) | Tne number of previous syndicated loans by a borrower is calculated from Dealscan. This does not double-count cases of serveral loan facilities on the same previous date. |

**Appendix A: Variable Definitions, cont'd**

| Variables | Definition |
|---|---|
| *Syndicate group characteristics* | |
| Previous lead | Dummy = 1 indicating that the lead arranger(s) was a lead on a previous loan by the borrower. In the event of mergers between lenders, the acquiring financial firm inherits the relationships of the target financial firm at the merger completion date. For example, if Bank of America is a lead to a borrower in 2005, but Fleet was previously a lead to the borrower in 2000, then Bank of America would be considered a previous lead, as it acquired Fleet in 2004 and the loan date is after the merger date. Note also that all lenders are aggregated to their parent company and inherit the characteristics of the parent, as in Sufi (2007). |
| Lead fraction banks | Fraction of the lead arrangers that are "banks". These are lenders whose lender type is a "US bank" , "Western European bank", and so on. The approach follows Gatev and Strahan (2009). |
| Lead country US | Dummy = 1 if the lead arranger's country is in the US. This information is from Dealscan. |
| Lead market share | Market share of the lead arranger calculated over the 3 years previous to the loan. This is limited to syndicated loans and loans on which the lead was previously a lead. |
| Repeat interactions lead to participant | The number of links between the lead arranger and other members of the syndicate over the previous 3 years. This measure is scaled by the number of previous loan facilities arranged by the lead. As with the previous lead measure, acquiring firms inherit the relationships of their targets in the event of mergers. |
| Reciprocal | Dummy = 1 if the lead arranger was a participant in a syndicate led by one of the current participants. As with the repeat interaction and previous lead measures, acquiring firms inherit the relationships of their targets in the event of mergers. |
| *Lead bank characteristics* | Note: This is available for a subset of lenders that are US banks (using bank holding company reports FR Y-9C, 4th quarter) |
| Size ( log(assets)) | Natural log of lead assets. (bhck2170). |
| Capital | Capital ratio. (bhck3210/bhck2170). Winsorized at 2.5 and 97.5 percentiles. |
| Liquidity | Liquid assets as a share of assets. Cash (bhck0081+bhck0395+bhck0397) + Securities (bhck1754+bhck1773) + Federal funds sold & reverse repos (bhdmb987+bhckb989) net of federal funds bought & repos (bhdmb993+bhckb995). Note that other series were used to create backward-consistent time series, this information is available upon request. Winsorized at 2.5 and 97.5 percentiles. |
| Ununsed commitments | Unused commitments as a share of total unused commitments and gross loans, where unused commitments are defined as bhck3814 + bhck3816 + bhck3817 + bhck3818 + bhck6550 + bhck3411, and gross loans are bhck2122+bhck2123. |
| Income | Net income ratio to total assets, where net income is before extraordinary items: bhck4300/bhck2170. Winsorized at 2.5 and 97.5 percentiles. |
| Loan interest rate | Derived interest rate on loans, where numerator is equal to interest on loans bhck4010 and the denominator is the year-average of the quarterly average series: bhck3516. Note that other series were used to create backward-consistent time series for interest on loans, and this information is available upon request. This is also the case for interest on deposits below. Winsorized at 2.5 and 97.5 percentiles. |
| Deposit interest rate | Derived interest rate on deposits, where numerator is equal to interest on deposits bhcka517+bhcka518+ bhck6761+bhck4172, and the denominator is the year-average of the quarterly average series: bhck3517+bhck3404. Winsorized at 2.5 and 97.5 percentiles. |
| Wholesale interest rate | Proxied by the expense on federal funds purchased and repos sold to quarterly averages of federal funds purchased and securities sold under agreements to repurchase: bhck4180/bhck3353. Winsorized at 2.5 and 97.5 percentiles. |
| *Aggregate characteristics* | |
| GDP growth | Year-on-year real GDP growth in the quarter of syndication, (from St Louis FRED GDPC1) |
| Commercial paper spread | Spread between the 3-month CP rate for highly rated (AA) non-financial borrowers and the 3-month treasury bill rate in the week of syndication. (from Board of Governors, H.15 release) |

**Table A.1. Robustness Checks with Additional Loan Contract and Borrower Controls and Cyclicality**

| | (1) 2SLS 1st Stage | (2) 2nd Stage | (3) 2SLS 1st Stage | (4) 2nd Stage | (5) 2SLS 1st Stage | (6) 2nd Stage | (7) 2SLS 1st Stage | (8) 2nd Stage |
|---|---|---|---|---|---|---|---|---|
| *Instruments* | | | | | | | | |
| Lead lending limit, as lead | 0.0663** | | 0.07001** | | 0.0630** | | 0.0695** | |
| | (0.0260) | | (0.0337) | | (0.0294) | | (0.0270) | |
| Lead lending limit, as participant | 0.1108*** | | 0.1257*** | | 0.1130*** | | 0.1055*** | |
| | (0.0304) | | (0.0385) | | (0.0349) | | (0.0311) | |
| *Contract characteristics* | | | | | | | | |
| Lead share | | -0.0017** | | -0.0017* | | -0.0015* | | -0.0018** |
| | | (0.0009) | | (0.0009) | | (0.0009) | | (0.0008) |
| All-in-spread drawn | 0.9987** | 0.0096* | 1.0502** | 0.0126* | 1.2992** | 0.0010 | 1.0887** | 0.0094* |
| | (0.4373) | (0.0057) | (0.4825) | (0.0065) | (0.5243) | (0.0062) | (0.4460) | (0.0057) |
| Log (facility amount) | -5.6774*** | -0.0112* | -5.9966*** | -0.0073 | -6.1572*** | -0.0042 | -5.8960*** | -0.0123* |
| | (0.3549) | (0.0066) | (0.3762) | (0.0077) | (0.3867) | (0.0072) | (0.3561) | (0.0067) |
| Log (maturity) | -1.9445*** | -0.0064 | -2.4990*** | -0.0086 | -1.9500*** | -0.0072 | -2.2355*** | -0.0072 |
| | (0.3841) | (0.0056) | (0.4139) | (0.0066) | (0.4237) | (0.0061) | (0.3807) | (0.0058) |
| Secured | -1.1705* | 0.0153 | -0.9215 | 0.0103 | -1.1848 | 0.0101 | -1.1618* | 0.0146 |
| | (0.6963) | (0.0111) | (0.7956) | (0.0126) | (0.7876) | (0.0109) | (0.7013) | (0.0111) |
| Revolver | -1.5921** | -0.0094 | -0.6021 | -0.0101 | -1.7847** | -0.0113 | -1.3377* | -0.0084 |
| | (0.6959) | (0.0084) | (0.7782) | (0.0100) | (0.8492) | (0.0095) | (0.7019) | (0.0084) |
| Financial covenant | 0.7955 | 0.0112 | -1.1930 | 0.0056 | -1.4108* | -0.0080 | -1.5134** | 0.0037 |
| | (0.8098) | (0.0129) | (0.8402) | (0.0130) | (0.8150) | (0.0108) | (0.7368) | (0.0111) |
| Financial ratio | 2.2557* | -0.0299* | 3.0096** | -0.0216 | 3.2532** | -0.0256 | 1.7535 | -0.0309* |
| | (1.2321) | (0.0166) | (1.4362) | (0.0183) | (1.5266) | (0.0162) | (1.2560) | (0.0169) |
| Guaranteed | -0.4302 | -0.0239* | | | | | | |
| | (1.1034) | (0.0133) | | | | | | |
| Sponsored | -2.9057** | -0.0082 | | | | | | |
| | (1.2107) | (0.0259) | | | | | | |
| Borrower consent | 0.5880 | 0.0146 | | | | | | |
| | (0.8883) | (0.0155) | | | | | | |
| Agent consent | -1.6266* | -0.0005 | | | | | | |
| | (0.9115) | (0.0161) | | | | | | |
| Log (min assignment) | -0.3157*** | -0.0019* | | | | | | |
| | (0.0577) | (0.0011) | | | | | | |
| *Borrower characteristics* | | | | | | | | |
| Rated | -0.6164 | -0.0768*** | 7.7275*** | -0.0038 | 5.0437* | -0.0200 | 0.9878 | -0.0719** |
| | (4.0507) | (0.0291) | (2.6636) | (0.0265) | (2.9893) | (0.0343) | (2.8593) | (0.0283) |
| Rating AA | 2.2821 | 0.0102 | -6.1785** | -0.0792*** | -3.2728 | -0.0388 | 1.1073 | 0.0075 |
| | (4.1202) | (0.0233) | (2.9978) | (0.0246) | (3.3831) | (0.0315) | (2.9671) | (0.0220) |
| Rating A | 0.8464 | 0.0285 | -7.4405*** | -0.0518** | -4.7000 | -0.0179 | -0.4695 | 0.0255 |
| | (4.0231) | (0.0239) | (2.5912) | (0.0250) | (2.9474) | (0.0317) | (2.7688) | (0.0228) |
| Rating BBB | -2.1673 | 0.0687*** | -9.6288*** | -0.0190 | -7.6690*** | 0.0141 | -3.6829 | 0.0651*** |
| | (4.0267) | (0.0256) | (2.5217) | (0.0242) | (2.8944) | (0.0321) | (2.7738) | (0.0242) |
| Rating BB | -1.9333 | 0.0904*** | -9.8415*** | 0.0132 | -7.8429** | 0.0390 | -3.8417 | 0.0846*** |
| | (4.0687) | (0.0287) | (2.7062) | (0.0299) | (3.0272) | (0.0358) | (2.8705) | (0.0278) |
| Rating B | -0.0719 | 0.1528*** | -7.9128*** | 0.0772** | -5.9846* | 0.0895** | -2.1608 | 0.1470*** |
| | (4.1644) | (0.0336) | (2.8386) | (0.0352) | (3.2042) | (0.0393) | (2.9981) | (0.0327) |
| Rating CCC | -1.4974 | 0.3824*** | -10.1723** | 0.3630*** | -9.5907** | 0.3282*** | -3.4172 | 0.3747*** |
| | (5.1518) | (0.0724) | (4.4130) | (0.0823) | (4.2767) | (0.0975) | (4.2452) | (0.0724) |
| Rating CC and below | -4.2049 | 0.7306*** | -12.6745*** | 0.6626*** | -18.2833*** | 0.7189*** | -7.0102** | 0.7183*** |
| | (4.5385) | (0.0907) | (3.5682) | (0.0895) | (4.6557) | (0.1171) | (3.5487) | (0.0908) |
| Profitability (ROA) | -6.3677** | -0.0988* | | | -5.3853 | -0.1423** | -7.2944** | -0.1044** |
| | (3.1386) | (0.0525) | | | (3.6112) | (0.0562) | (3.2254) | (0.0531) |
| Leverage | -3.0603** | 0.1083*** | -6.1486*** | 0.1256*** | -3.7354** | 0.1198*** | -4.1559*** | 0.1040*** |
| | (1.3783) | (0.0286) | (2.0513) | (0.0448) | (1.7282) | (0.0356) | (1.3542) | (0.0289) |
| Size ( log(assets)) | -2.3079*** | 0.0133** | -2.8049*** | 0.0146** | -1.5796*** | 0.0103 | -2.3087*** | 0.0130** |
| | (0.3246) | (0.0056) | (0.3832) | (0.0072) | (0.3552) | (0.0062) | (0.3241) | (0.0056) |
| Industry default probability | 12.9886 | 0.0532 | 0.0746 | 0.0497 | -6.7023 | 0.1248 | 10.7457 | 0.0445 |
| | (16.4307) | (0.2629) | (17.9938) | (0.2935) | (19.8072) | (0.3099) | (16.6674) | (0.2652) |
| Industry default probability, lead 3 years | 7.2303 | 0.8354** | 16.9321 | 0.9227** | 25.5160 | 0.8320** | 8.4616 | 0.8334** |
| | (20.5573) | (0.3953) | (22.1133) | (0.4133) | (24.5012) | (0.4090) | (20.8704) | (0.3963) |
| Log (1+ previous loans) | -1.1665** | -0.0028 | -1.6571*** | -0.0117 | -1.7890*** | -0.0048 | -1.1960** | -0.0026 |
| | (0.4787) | (0.0093) | (0.5556) | (0.0100) | (0.5496) | (0.0098) | (0.4863) | (0.0094) |
| Altman z-score | | | -0.1631 | -0.0039 | | | | |
| | | | (0.2067) | (0.0036) | | | | |
| Equity volatility | | | | | 61.4961** | 1.0504** | | |
| | | | | | (28.5499) | (0.4508) | | |
| Equity bid-ask spread | | | | | -0.3259 | 0.0049 | | |
| | | | | | (0.4227) | (0.0070) | | |
| Equity amihud illiquidity | | | | | 0.0636 | -0.0022 | | |
| | | | | | (0.3843) | (0.0050) | | |
| *Syndicate characteristics* | | | | | | | | |
| Previous lead | -1.6323*** | -0.0125 | -0.9680 | -0.0011 | -1.3446** | -0.0004 | -1.5396** | -0.0121 |
| | (0.6019) | (0.0106) | (0.6451) | (0.0113) | (0.6588) | (0.0105) | (0.6114) | (0.0105) |
| Lead fraction banks | -3.3360*** | -0.0397** | -1.9029 | -0.0283 | -2.6119* | -0.0461** | -2.9843** | -0.0374** |
| | (1.1795) | (0.0179) | (1.2752) | (0.0198) | (1.3569) | (0.0196) | (1.1810) | (0.0178) |
| Lead country US | 3.5268*** | -0.0280 | 4.4612*** | -0.0296 | 4.3118*** | -0.0340 | 3.6655*** | -0.0268 |
| | (0.9654) | (0.0221) | (1.0864) | (0.0269) | (1.1698) | (0.0263) | (0.9691) | (0.0221) |
| Lead market share | -21.6982*** | 0.0322 | -23.7995*** | 0.0278 | -21.0365*** | 0.0008 | -22.1805*** | 0.0298 |
| | (3.6848) | (0.0390) | (4.3262) | (0.0455) | (3.9672) | (0.0369) | (3.7034) | (0.0390) |
| Repeat interactions lead to participant | -0.3601 | -0.0017 | -0.2899 | -0.0013 | -0.2789 | -0.0013 | -0.3543 | -0.0017 |
| | (0.2548) | (0.0012) | (0.2155) | (0.0010) | (0.2063) | (0.0010) | (0.2561) | (0.0012) |
| Reciprocal | -28.4109*** | -0.0571* | -30.5094*** | -0.0736** | -30.3211*** | -0.0615* | -29.3516*** | -0.0611** |
| | (1.5144) | (0.0296) | (1.6375) | (0.0350) | (1.7479) | (0.0318) | (1.5083) | (0.0304) |
| *Cyclicality* | | | | | | | | |
| GDP Growth | | | | | | | -58.1228 | -0.6152 |
| | | | | | | | (42.9659) | (0.6406) |
| Observations | 8995 | 8995 | 7170 | 7170 | 6918 | 6918 | 8996 | 8996 |
| $R^2$ | 0.50 | 0.12 | 0.52 | 0.13 | 0.51 | 0.13 | 0.50 | 0.11 |

Notes:
All regressions include year, industry, and loan purpose dummies.
The AAA rating is the omitted rating dummy in the regressions.
Standard errors are clustered at the firm level and are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Table A.2. Robustness Checks: Opacity, Lead Exposure, and Subsequent Borrower Default**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Leveraged loan | | Firms in same industry | | Equity volatility | | Equity bid-ask spread | | Equity amihud illiquidity | |
| | Yes | No | Low | High | High | Low | High | Low | High | Low |
| Lead share | -0.0033*** | -0.0002 | -0.0028** | -0.0009 | -0.0023 | -0.0001 | -0.0012 | -0.0012 | -0.0035** | -0.00004 |
| | (0.0012) | (0.0010) | (0.0012) | (0.0011) | (0.0017) | (0.0008) | (0.0010) | (0.0017) | (0.0015) | (0.0011) |
| Observations | 4807 | 4189 | 4691 | 4305 | 3148 | 3770 | 3915 | 3003 | 3391 | 3527 |
| $R^2$ | 0.11 | 0.06 | 0.11 | 0.15 | 0.17 | 0.08 | 0.11 | 0.16 | 0.11 | 0.12 |

Notes:
All regressions include the covariates in baseline regression, Table 2 col (3). The regressions in col (3) and (4) also include a measure of firms in same industry, and regressions in col (5) - (10) also include equity volatility, equity bid-ask spread, and equity amihud illiquidity measures
Leveraged loans are loans priced at 125 basis points or more above LIBOR. See Appendix A for other variable definitions
Low refers to below the median, while High refers to above the median of the variable of interest. See Table 1 for summary statistics
Standard errors are clustered at the firm level and are reported in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%.

**Table A.3. Robustness Checks: Other Measures of Long Run Performance**

**Panel A. Profitability (ROA), lead 3 years**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | | Interaction term (X): | | | |
| | ROA | Opaque | Leveraged loan | Below median firms in same industry | Equity volatility | Equity bid-ask spread | Equity amihud illiquidity |
| X | 0.6021*** | -0.0727** | -0.0689 | -0.0643** | -1.8760 | -0.0062 | -0.0227 |
| | (0.1032) | (0.0363) | (0.0495) | (0.0274) | (1.2482) | (0.0101) | (0.0198) |
| Lead share | 0.0005 | -0.0012** | -0.0013 | -0.0011** | -0.0011 | -0.0003 | -0.0005 |
| | (0.0004) | (0.0006) | (0.0009) | (0.0005) | (0.0008) | (0.0004) | (0.0004) |
| X * Lead share | -0.0039* | 0.0024** | 0.0020 | 0.0018** | 0.0399 | 0.0001 | 0.0005 |
| | (0.0021) | (0.0012) | (0.0016) | (0.0009) | (0.0297) | (0.0003) | (0.0004) |
| Observations | 6222 | 6222 | 6222 | 6222 | 5290 | 5290 | 5290 |
| $R^2$ | 0.22 | 0.13 | 0.18 | 0.19 | 0.21 | 0.23 | 0.22 |

**Panel B. Altman Z-Score, lead 3 years**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | | Interaction term (X): | | | |
| | Altman z-score | Opaque | Leveraged loan | Below median firms in same industry | Equity volatility | Equity bid-ask spread | Equity amihud illiquidity |
| X | 1.0628*** | -0.9595 | -0.9802 | -1.1731** | -14.0113 | -0.2839 | -0.1253 |
| | (0.2252) | (0.7223) | (0.9189) | (0.5521) | (24.7482) | (0.2559) | (0.2821) |
| Lead share | 0.0306 | -0.0229* | -0.0234 | -0.0262** | -0.0129 | -0.0128 | -0.0091 |
| | (0.0219) | (0.0117) | (0.0165) | (0.0103) | (0.0151) | (0.0081) | (0.0072) |
| X * Lead share | -0.0115* | 0.0352 | 0.0313 | 0.0368** | 0.2407 | 0.0067 | 0.0031 |
| | (0.0062) | (0.0234) | (0.0298) | (0.0170) | (0.5829) | (0.0071) | (0.0063) |
| Observations | 6126 | 6126 | 6126 | 6126 | 5231 | 5231 | 5231 |
| $R^2$ | 0.42 | 0.46 | 0.47 | 0.46 | 0.54 | 0.54 | 0.54 |

**Panel C. Equity Volatility, lead 3 years**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | | Interaction term (X): | | | |
| | Altman z-score | Opaque | Leveraged loan | Below median firms in same industry | Equity volatility | Equity bid-ask spread | Equity amihud illiquidity |
| X | -0.00383 | 0.00470 | 0.00908 | -0.00212 | -0.48939 | 0.00422** | -0.00060 |
| | (0.00294) | (0.00431) | (0.00973) | (0.00364) | (0.36774) | (0.00166) | (0.00240) |
| Lead share | -0.00034 | 0.00008 | 0.00016 | -0.00001 | -0.00053** | 0.00011* | 0.00001 |
| | (0.00027) | (0.00007) | (0.00015) | (0.00006) | (0.00024) | (0.00006) | (0.00006) |
| X * Lead share | 0.00011 | -0.00016 | -0.00031 | 0.00006 | 0.02176** | -0.00011** | 0.00002 |
| | (0.00008) | (0.00014) | (0.00032) | (0.00012) | (0.00880) | (0.00005) | (0.00006) |
| Observations | 5291 | 5291 | 5291 | 5291 | 5291 | 5291 | 5291 |
| $R^2$ | 0.47 | 0.59 | 0.55 | 0.62 | 0.33 | 0.61 | 0.62 |

Notes:
All regressions include the covariates in baseline regression, Table 2 col (3), in addition to the borrower's Altman z-score at the time of syndication. Industry median performance controls are included, specifically ROA and Altman z-score (lead 3 years). Regressions in Panels A and B colums (5)-(7) and Panel C also include equity volatility, equity bid-ask spread, and equity amihud illiquidity measures.
Panel C also controls for market volatility, lead 3 years.
Opaque indicates those publicly traded borrowers without a rating. Leveraged loans are loans priced at 125 basis points or more above LIBOR.
See Appendix A for other variable definitions and Table 1 for summary statistics.
Standard errors are clustered at the firm level and are reported in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.