THE DETERMINANTS OF CORPORATE LOAN LIQUIDITY

Vijay Bhasin*
Freddie Mac

Mark Carey*
Federal Reserve Board

1. Introduction

Most empirical research on the liquidity of financial assets has focused on the determinants of bid-ask spreads. However, most real assets and many financial assets are illiquid in that no one makes a market and thus relatively large search costs are associated with trades. Market-makers greatly reduce such costs and may reduce transaction costs, especially where dealers or exchanges compete.

Little is known about the characteristics of financial assets that determine whether markets are made, but intuition suggests such characteristics should influence market-makers' revenues and costs, just as bid-ask spreads are influenced by revenues and costs. Stoll (1978) and much empirical evidence about bid-ask spreads suggest that revenues are a function of order flow from uninformed traders (basically, of the volume of the asset outstanding, e.g. market capitalization), while costs may be divided into fixed, inventory, and adverse selection costs. An inventory of volatile stocks is more expensive to maintain because dealers by nature hold undiversified portfolios, and thus

---

* Prepared for the Bank Structure Conference organized by the Federal Reserve Bank of Chicago in May 1999. This paper is an abbreviated version of a working paper with the same name, and empirical results are preliminary and likely to change somewhat in details. This paper represents the authors' opinions and not necessarily those of Freddie Mac, the Board of Governors, or the Federal Reserve System. We thank Peter Schellbach, Beth Donahue, Steve Bavaria, Ed Emmer, Savitri Alex, Kevin Petrovcik, Phil Strahan, Marc

Saidenberg, Becky Demsetz and participants in various seminars for useful conversations and suggestions, but interpretations and errors are ours alone. We especially thank Roman Iwakiw, whose excellent research assistance made this paper possible.

volatile stocks are less liquid other things equal. Similarly, opaque firms' equity is less liquid because dealers bear greater lemons risks of transacting with informed traders.[1]

This paper empirically examines determinants of the incidence of market-making for corporate loans. Although private corporate debt has historically been viewed as illiquid, a dealer market for secondary trading of corporate loans has recently emerged. Trading volume was $41 billion in 1996 and $62 billion in 1997, with more than 22 dealers in operation (*Gold Sheets* (1997, 1998)). This "par" loan market is separate from the distressed loan market both institutionally and in the nature of loans that trade. It also differs from the loan sales market, as described below.

We identify loans for which markets are made as those that appear in a weekly newsletter listing of loans for which multiple dealers provide indicative bids. Other loans are those that appear in Loan Pricing Corporation's (LPC) large database of corporate loan originations but not in the newsletter's list. Although secondary market transactions in such other loans do occur, we presume that loans in which multiple dealers make markets are the more liquid.[2] Search costs for such loans are certainly reduced relative to other loans, and perhaps transaction costs as well.

The evidence indicates that markets are much more likely to be made in loans for large dollar amounts than small loans, analogous to findings that large-cap stocks have smaller bid-ask spreads. However, loans to observably riskier borrowers are much more likely to have market makers than loans to safe borrowers, while loans with performance pricing features are less likely to have market makers (the latter vary the loan interest rate spread with measures of borrower risk, making the loan a less risky investment). Such a positive relationship between risk and liquidity is the opposite of that found for equity bid-ask spreads. Moreover, Wahal (1997) offers evidence that the number of market makers for a NASDAQ stock is negatively related to its risk. A positive relationship for loans is surprising because dealers' costs should be higher at the margin for

riskier borrowers and loans, so they should be less likely to make markets in risky loans, not more.

We speculate that markets are more likely for riskier loans because order flow is larger for them than for safe loans, more than offsetting dealers' higher costs. In this view, the active loan trading market has developed in parallel with active portfolio credit risk modeling and management systems by leveraged financial intermediaries like banks (e.g., RAROC, CreditMetrics). Credit risk management systems strive to maintain a balance between portfolio return and institutional insolvency risk. Insolvency is caused by events in the bad tail of the portfolio return distribution and, other things equal, individually riskier loans contribute more to the probability of tail events than do individually safe loans.[3] Assuming trading costs have a fixed component per dollar traded, it is cost-effective for intermediaries to adjust their portfolio risk posture by trading relatively small volumes of risky debt rather than large volumes of safer debt.[4]

The implications of this conjecture for bond market-making are less clear. If bond investors' risk management needs differ from those of loan investors, then bonds may resemble equities in that safer bonds may be more liquid. For example, where bond portfolios are financed with equity (like pension funds and mutual funds), portfolio risk management strategies may differ from those of banks and insurance companies. Direct evidence on the incidence of market-making for bonds is required.

A secondary dealer market for loans appears inconsistent with theories about the role of private debt, which hold that private lenders undertake screening or monitoring of borrowers that is too costly for diffuse public debtholders (Diamond (1984), Rajan (1992), Hadlock and James (1997)). If banks mainly screen borrowers, each secondary market purchaser would have to pay the same information acquisition costs as the originating bank in order to avoid buying lemons. Such duplication of costs would appear to be a barrier to active trading and market making. However, active trading of loans may be less puzzling if private lenders mainly control agency problems through the writing and renegotiation of restrictive loan covenants (Berlin and Mester (1992), Beneish and Press (1993), Carey and Rosen (1997)). As long as all loan buyers are capable of efficiently renegotiating covenants when necessary, active trading might not hinder monitoring.

Alternatively, those loans for which markets are made may be public debt in all but name in that their borrowers may require no screening or monitoring.

On the whole, our evidence offers most support for the latter explanation. Common proxies for information problems posed by the loan borrower are on the whole not significant predictors of loan market making. Some proxies have the expected sign whereas others do not, and none are robustly significant. However, the estimated coefficient on an indicator for the presence of financial ratio covenants in the loan agreement is significantly negative, implying that markets are more likely to be made in loans without such covenants, other things equal. Such loans are more like public debt, which also has few covenants.

The covenant result supports the view that private lenders add value through post-origination monitoring and control activity. Covenants are a key element of monitoring activity because lenders have a legal right to take action only if there is a covenant violation.[5] However, implications of the results for the role of private information in banks' corporate lending are less clear-cut. Proxies for information problems may fail to predict which loans trade either because corporate loans generally pose few information problems, because available proxies identify information-problematic borrowers poorly, or because loan dealers are informed traders. Dealers might be informed if they gain access to all information available to lending banks by maintaining an inventory position in a loan (however, our conversations with traders lead us to believe they do not maintain continuous long positions in the loans for which they make markets).

Activity in the loan trading market differs from banks' "loan sales" activity (Gorton and Haubrich (1990), Berger and Udell (1993), Gorton and Pennacchi (1995), Demsetz (1997)). Most "loan sales" are adjunct to the loan origination and syndication process and involve one-time sales by originating banks of participations in very short-term, low-risk loans at or very near the time of origination.[6] Dealer market transactions involve assignments of medium-term, risky loans and occur throughout the life of loans, with the same piece of a loan potentially being traded repeatedly. Transactions occur long after origination and dealers making markets in such loans need not be associated with the originating banks. Investors other than banks are often involved. Explicit or implicit guarantees between buyers and sellers having to do with

borrower credit risk are rare or nonexistent.[7]

In addition to shedding light on basic questions of microstructure and financial intermediation, the determinants of loan liquidity are of some practical importance. For example, corporate loans have been suggested as an asset class ripe for large-scale securitization partly because of the advent of the dealer market. This paper's results hint that it may be relatively difficult to fully remove the broad mass of corporate loans from bank balance sheets by securitization. If the main role of private lenders in corporate finance is to monitor and control moral hazard, it may be necessary for such lenders to retain substantially all of the credit risk associated with corporate loans in order to have sufficient incentives to monitor. Many securitizations completed to date have this feature in that the originating bank retains a large subordinated claim on the securitized pool of assets.

Indexes of traded loan prices have been suggested as measures of the portfolio performance characteristics of corporate loans as an asset class. However, our results suggest the loans for which markets are made, and upon which such indexes are based, are systematically different from the vast majority of corporate loans, implying that loan price indexes should be used with caution. Similarly, it is not clear the dealer market will ultimately provide good high-frequency estimates of the market value of more than a few corporate loans.

The current draft of the paper is preliminary. Much more work is planned. Among other matters, logit results involving covenant and collateral variables are from a sample about a year shorter than the full sample (other results are unchanged in this shorter sample). Covenant information in the database we use must be extracted from a free-form text field, and we have not yet completed that task for the final year. In addition, we plan to examine determinants of how long loans trade (some trade for relatively brief periods following origination, and others begin trading well after origination). Moreover, results in Table 1 are likely to change slightly with planned small changes in the way exposure to trading is measured. Details of a number of results are omitted from this abbreviated version of the paper, as are many footnotes.

Section 2 presents some background information about the institutional structure of the loan trading market. Section 3 describes the data, while section 4 presents and

discusses the results of logit analysis of the incidence of market making. Section 5 offers concluding remarks.

2. Background

A dealer market for trading large corporate commerical and industrial (C&I) loans has existed since the late 1980s. The origins of the market are murky, but practitioner literature implies that trading activity was initially focused on newly syndicated loans, with the dealers extending the syndication process beyond the loan origination date (Calder (1992)). Initially, there were only a few dealers and volume was small, but by 1996 annual volume exceeded $41 billion and more than 22 dealers were in existence (*Gold Sheets* (1997)).

As the 1990s progressed, banks and institutional investors (including loan mutual funds, insurance companies and pension funds) began using the market to buy and sell seasoned loans. Bank motivations to trade cited by practitioners include activist portfolio credit risk management, and merger- and recession-related portfolio reallocations. As the market developed, additional volume came from “relative value” trading in response to perceived disparities in the pricing of risk in loan and corporate bond markets.

By convention, the “par” market includes loans trading at prices above 80 percent of par values. Loans trading at greater discounts and those in default appear in the distressed loan market. Although a given organization may make markets in both par and distressed loans, individual traders tend to specialize in only one of the two markets. In this paper, we study only the par market.

Loan agreements, or “deals,” often involve more than one type of loan facility. Most multifacility deals involve a line of credit and a term loan as part of the same agreement. Both whole deals and individual facilities trade, with the former denoted “pro rata” trading (a fixed percentage of the total face amount of all facilities in a deal is exchanged). However, dealers more frequently make markets in individual facilities, especially term loans, than in pro rata shares of deals because nonbanks are less interested in lines of credit than in term loans (so there is less order flow). Moreover, dealer inventory and adverse selection costs are also higher for lines of credit, as described further below.

Almost all loans pay floating interest rates, so

credit risk and prepayment risk are primary determinants of secondary loan prices. Even credit risk is muted in the case of loan contracts that feature rules specifying changes in interest rate spreads as borrower credit quality changes ("performance-based pricing" features). The prices of such loans tend to be less volatile, but lenders still bear default risk. [8]

The number of loans for which multiple dealers make markets is relatively small. During the years covered by our data (1992-96), 189 individual facilities or pro rata deals appeared in the weekly newsletter's par market table. These loans were issued by 83 different borrowers. In early 1992, there were 15 loans in the par table and only three dealers contributed information to the table, but by the end of 1996 83 loans issued by 39 borrowers appeared in the table and 16 dealers contributed indicative bids.

Loans listed in the newsletter table are by no means the complete set of loans in which secondary transactions involving dealers occurred. Dealers broker or otherwise intermediate trades in loans that typically do not trade actively. For example, dealers reportedly assisted many Japanese banks in selling large chunks of their portfolios in early 1998. In addition, many dealers stand ready to make a market in loans originally syndicated by an affiliate, especially near the time of origination. However, most such trading represents an extension of the syndication process.

In discussions, market participants estimated a representative pace during 1996 as one trade per day per dealer organization, with average trade size in the $5-10 million range. The largest dealers limit exposure to any one borrower's loans to around $50 million. Miller and Snyder (1996) estimate aggregate dealer inventories to be on the order of $500 million in 1996. Thus, the overall pace of loan trading is slow relative to stock and bond markets, and the market is not too deep for most loans.

Loan dealers very rarely post firm bid or ask prices and depths. Instead, prices are negotiated. In 1996, settlement in the market usually occurred within 30 days of the trade date, with the majority of trades settling within 5 to 10 business days. Credit risk is transferred on the settlement date as opposed to the trade date as in the bond market (Calder (1992)). Historically, a lack of standardization was a major impediment to reliable settlement, with some trades failing to settle because of misunderstandings (or cold feet on the part of one

counterparty when prices move during the settlement period). The recently constituted Loan Traders Association is promoting standardized procedures, including binding arbitration in the event of settlement problems.

Settlement is slow partly because of the legal nature of the transaction. Trades in the secondary market occur almost exclusively through assignments, and thus completion of a trade requires an exchange of legal documents with the administrative agent for the loan syndicate.[9] Moreover, many loans trading in the secondary market carry clauses requiring approval of changes in the syndicate by the borrower or agent bank (or both). Although such approvals are routinely granted, they represent a friction not found in the public markets. Fixed dollar assignment fees, payable to the administrative agent, are also a common feature in loan contracts and represent another friction.

Trading in most facilities starts after the deal's origination date, although there exist instances of when-issued trading (trading in advance of a loan contract signing). In our data, some loans already have markets made at the start of the sample period, so we measure time lags in the commencement of market making relative to the date of first exposure rather than the origination date.[10] Figure 1 shows the frequency distribution of trading start delays. The median delay from first exposure is about two weeks. Figure 2 shows the lag between the end of market making and the end of exposure (which usually occurs due to refinancing, repayment, or the end of the sample period). 85 percent of sample loans have markets made to the end or almost the end of their lives. It is clear from Figure 2 that the dealer market does not simply extend the loan syndication process for a few weeks or months beyond the loan origination date.[11]

3. Data

3.1 Corporate Loans Generally

We use the January, 1997 release of Loan Pricing Corporation's (LPC) *Dealscan* database as representative of the universe of bank (and nonbank) loan agreements involving medium-size and large corporations. For the typical loan, this database of originations includes the name and location of the borrower and the names of all lenders party to the loan contract at origination, the type, purpose, amount, and contract date of the loan, and information on price and some nonprice terms. The great majority of the loans are

floating-rate. None of the loans are securities from a legal standpoint (data on private placements are collected separately), and very few are subordinated to other debt of the borrower.[12] We estimate that for year-end 1992, loan agreements in the database cover between half and three-quarters of all commercial and industrial loans outstanding by volume (but a far smaller fraction by number).

We exclude from consideration loan records flagged as being based on incomplete or unconfirmed information, those to non-U.S. borrowers and those with a missing contract date. We also excluded loans made before 1990 and those made during the last quarter of 1996, for reasons explained below. These criteria leave a database containing information on 16,299 facilities in 11,479 deals made during the years 1990-96.

According to LPC, the great majority of the data were collected from commitment letters and credit agreements drawn from SEC filings. Especially in more recent years, some data were collected from news reports or through LPC's relationships with major banks. LPC's collection strategies yield a database of mostly medium-size to large loans that are representative of the financing activity of publicly held or larger private firms, but virtually no small business loans are included. The median full-sample loan was for $40 million and had a maturity of just over three years. Loan size was $350,000 at the first percentile and $2 billion at the 99th percentile.

3.2 Loans for Which Markets are Made

We identified actively traded loans as those appearing in a table of traded par loans in LPC's *Gold Sheets* weekly newsletter. As noted, market convention denotes as par loans those trading at 80 percent or more of par value. Loans with lower prices and those in default appear in a separate distressed-loan table in the newletter (we do not include them in our sample). A complete set of copies of the newsletter was available to us for the approximately five-year period 2/24/92-12/9/96. LPC constructs the table each week by calling dealers and inquiring about loans for which they are currently willing to quote indicative bid prices. Only those loans for which at least two dealers provide an indicative bid appear in the table.[13]

To obtain details of the terms of loans in which markets are made, we matched them with loans listed in *Dealscan*. The main match criteria were the borrower name, loan type, spread and maturity information given in the

newsletter tables, but for each loan we consulted SEC filings and other sources of information about the borrower's capital structure in order to verify that our match was correct. We were able to find a match in every case.

3.3 Borrower Characteristics

We obtained borrower characteristics, such as leverage, for the full sample by matching their names to firm names in the Compustat database, succeeding for about half the borrowers and 11,339 loans (8109 deals). Median loan size and maturity for this subsample are not far from full-sample values. A relatively small number of financial and government borrowers appearing in the full sample were excluded from this sample by construction. None of the actively traded loan borrowers were financial firms or governments. However, 13 of them do not appear in Compustat and thus are excluded from our analysis.

3.4 Covenant Information

Indicators of the presence in a loan of financial ratio covenants, performance-based pricing and borrowing base features (described below), and secured status can be obtained from *Dealscan* by combining a secured vs. unsecured indicator with information in a free-form text field describing each loan. We extracted information from the free-form field by a combination of programmatic scanning and hand-coding. As of this draft, construction of this element of the dataset is complete only through the June, 1995 release of *Dealscan*. Thus we are able to use such variables only for a subsample of traded and nontraded loans, as described further below.

4. Logit Analysis of Traded vs. Nontraded Loans

We estimate logit models of the form

(1) MARKET MADE = f(OBSERVABLE_RISK,
INFORMATION/MORAL_HAZARD_PROBLEMS,
MONITORING_INTENSITY,
ORDER_FLOW,
CONTROL_VARS)

where MARKET MADE takes the value 1 for loans for which multiple dealers make a market and 0 for other loans. All variables are measured as of the origination date of the

loan, with borrower balance sheet or income statement variables as of the the fiscal year-end immediately prior to origination.

The predictions of the market microstructure literature are straightforward: dealers should be most likely to make markets in relatively large, low-risk loans to borrowers posing few information problems. Previous research on private debt implies that market-making in loans should not exist (because it appears inconsistent with both private-information and monitoring/control explanations for the "specialness" of private debt). However, market making would be unsurprising if the loans involved were economically more like publicly issued debt than private debt, apart from their contract form. We are unable to assess whether traded loans lack this "specialness" using the standard event-study method because the number of traded loans with uncontaminated loan announcement dates is too small to form a usable sample. Instead, we include in our empirical model proxies for information/moral hazard problems suggested by the literature. If traded loan borrowers pose few private information problems relative to most borrowers, and if private information problems represent a substantial barrier to trading, we would expect such proxies to have predictive power. Given the key role of covenants in monitoring/control theories, if loans for which markets are made are more like public debt than other loans such theories imply they should include fewer or weaker covenants than other loans.

4.1 Variables

4.1.1 Observable Risk

Proxies for observable risk (risk posed by the borrower that is public information at origination) include dummies for the borrower's senior public debt rating (if any); leverage and interest coverage ratios; the loan interest rate spread over LIBOR and the upfront fee amount (both in basis points); and dummies for the stated purpose of the loan. The omitted purpose is "general corporate purposes/working capital." The omitted senior debt rating dummy is "below investment grade." Interest coverage is measured as the ratio of EBITDA to interest expense.[14] The leverage ratio is the sum of short and long term debt divided by that amount plus (book) stockholders equity. Where the latter is negative we set it to zero, so the ratio is always in the [0,1] interval.

4.1.2 Information Problems

We follow the literature in choosing proxies for the degree of asymmetric information or moral hazard risk posed by the borrower. Smaller firms are commonly presumed to pose larger information asymmetries; we measure size by the natural logarithm of total assets or sales. The number of years up to the date of the loan that data for the borrower appears in Compustat is another proxy for the extent and history of widely available information about the borrower. Firms engaged in extensive research and development (R&D) and those with relatively large growth opportunities are thought to be relatively hard to monitor and control. The incentives and opportunities of such firms to expropriate wealth from lenders may shift rapidly. We measure these characteristics with the ratio of R&D expense to sales and the ratio of the firm's market-to-book value. Market-to-book is the ratio of total assets plus the market value of common equity less the book value of common equity to the book value of equity and debt. R&D expense is often missing in Compustat; we set such observations to zero, and then include a dummy in regressions for those observations in which it was originally missing (never significant).

4.1.3 Monitoring Intensity

We assume that covenants are closely related to control of moral hazard risks and to the extent of post-origination monitoring activity required of lenders (Smith and Warner (1979)). We emply three indicators: 1) whether the loan is secured; 2) whether it contains one or more financial ratio covenants of the leverage ratio, current ratio, fixed-charge coverage ratio, or debt-to-cash-flow ratio variety; and 3) whether it contains a borrowing base specification.

Financial ratio covenants place the borrower in technical default should it fail to maintain financial performance consistent with the minimum or maximum values of the ratios specified in the loan contract. Such covenants were found by Beneish and Press (1993) to be the most frequent causes of technical defaults (and subsequent renegotiations). Thus, other things equal, the presence of such covenants in a loan contract implies a heavier monitoring and renegotiation load on the lenders.

Loans with a borrowing base limit the total amount outstanding to some fraction of the value of specified borrower assets. An example is an amount equal to the sum of 80 percent of eligible accounts receivable plus 50

percent of eligible inventory. The apparent intent is to reduce the risk that the loan will exceed the market value of assets that are relatively liquid in the event of distress, but another effect is to place the borrower in technical default should the calculated base drop below its borrowings. Like financial ratio covenants, borrowing bases imply more monitoring and control activity by the lenders.

4.1.4 Order Flow

The primary proxy for uninformed investor demands to buy and sell a loan is loan size, which is measured as the log of the facility amount. Under the hypothesis that a substantial volume of intermediaries' trading demand is for risk management purposes, another proxy is an indicator for whether the loan contains performance-based pricing rules. Such rules vary the loan interest rate spread according to the values of observable, verifiable measures, such as senior public debt ratings or leverage ratios. Unlike ratio covenants and borrowing bases, performance pricing clauses imply no significant extra monitoring load on the lenders, but they do have the effect of making the total return on a loan less sensitive to credit risk (since spreads adjust as risk changes). Thus, under the risk management hypothesis, loans with performance-based pricing should be less likely to trade because a change in the borrower's riskiness has less effect on an investor's risk-return posture.

4.1.5 Control Variables

The regressions include the original term to maturity of the loan as well as dummy variables for loan facility type, the year of origination, and the industry of the borrower. Original maturity is measured in years. One-digit SIC codes are used to group firms by industry, with codes 7 and 8 lumped together (services). Codes 2 and 3 (manufacturing) are the omitted dummy. Code 4 is transportation and communications, and code 5 wholesale and retail trade. The omitted origination-year dummy is for 1994, and all years prior to 1992 are lumped together, as described further below.[15]

4.2 Sample Selection

4.2.1 Sample Timing Considerations

As noted, we are able to identify actively traded loans during 1992-6, but it is not clear the set of loans for which markets are *not* made should include only those

originated during the same years. Some market-made loans were originated prior to 1992, and began trading prior to our main sample period, implying that pre-1992 loans should be included in the nontraded sample. Similarly, because some loans begin trading well after origination, classifying all those originated late in the sample period as not having a market made might be inappropriate. Selecting the appropriate window for nontraded loans is a judgement call: we include in the nontraded sample all loans originated from the beginning of 1990 to the end of the third quarter of 1996. The dummy variable for pre-1992 originations should soak up most effects of any errors in our judgement. Results are qualitatively robust to changes in this choice of time window.

4.2.2 Omitted Loans

Loans to borrowers in certain industries were omitted from the logit sample to avoid sparse-sample estimation problems associated with dummy variables. Omissions include all loans to borrowers in SIC categories 0 and 1 (natural resources, and construction), SIC 6 (financial institutions) and SIC 9 (governments). There were either one or no market-made loans in each of these industries, but a total of about 1700 other loans with borrowers in such industries and in Compustat. Thus, the fact that a borrower is in such industries has considerable univariate predictive power for whether markets are made in its loans, but we are unable to assess such power in a multivariate setting.

For similar reasons, we omitted loans with missing upfront fees or original maturities, "D"-tranche term loan facilities, standby lines of credit (mostly CP backups), bridge loans, and miscellaneous facility types which appear infrequently in *Dealscan* (an example is demand loans). Here it is the standby line and bridge loan types that have univariate predictive power...markets are rarely or never made in such loans.

4.3 Results

Table 1 presents results when the sample includes all facilities for which no market is made (both those in nontraded deals and those in deals with some other facilities for which markets are made). Conventional p-values are reported in parentheses below each parameter estimate. The number of observations and an adjusted R^2 appear at the bottom.

The first column of Table 1 shows results for a base specification that is estimateable for a relatively large sample. The other columns explore the implications of including or excluding variables that have missing values for many observations, thus materially affecting sample size. Results for the base specification are fairly representative of overall results, although results for some variables are not robust across variants. Results were obtained when alternative measures of cash flow and borrower size are used and when bond ratings are broken out more finely (not shown in table).

Focusing first on the base specification, loan size is an economically and statistically significant predictor. Markets are much more likely to be made for large loans, consistent with the microstructure literature's hypotheses about the relationship between amounts outstanding, revenue from order flow, and dealer profits. Glancing across the rows of both tables, this result is extremely robust.

The next several rows in the tables portray this paper's most surprising result, that markets are more likely to be made for loans to observably riskier borrowers. Other things equal, loans to investment-grade firms are significantly less likely to trade actively. Loans to highly leveraged firms and loans with high interest rate spreads and high upfront fees are more likely to trade. Also, loans for restructuring purposes, whether the restructuring be real or financial, are more likely to trade. Looking across the rows, results are robust for variables apart from the leverage ratio and the spinoff dummy (the extreme change in the latter's coefficient in the middle columns is likely due to a sparse-sample problem arising from the relatively small number of spinoff loans).

Of the proxies for observable risk, only the measure of pre-loan cash flow (interest coverage) has no predictive power. However, when cash flow is replaced by dummies for negative and low cash flow (healthy cash flow is the omitted category), and when return on sales or return on assets are the basis for the dummies, dealers are more likely to make markets in loans to borrowers with negative pre-loan cash flow (not shown in table).

The asymmetric information/moral hazard proxies yield more ambivalent results, offering at best weak support for a hypothesis that loans to borrowers posing such problems are less likely to trade actively. The "unrated firm" dummy is set to 1 for firms having no public debt rating at the time of loan origination. This variable might be interpreted as

capturing the average observable risk of loans to such borrowers relative to the risk of borrowers rated below investment grade (the omitted dummy). However, the dummy also identifies firms that likely have no public debt outstanding, and thus might be expected to be more information-problematic than rated firms. Looking across the rows, the coefficient is always negative, consistent with the latter hypothesis, but significance is mixed.

The coefficient on borrower size, as measured by the log of total sales, is positive, and that for the R&D to sales ratio is negative, consistent with larger and less R&D-intensive borrowers posing fewer information/control problems. But again significance is mixed, varying with the specification. The coefficient on borrower size is insignificant when the log of assets rather than the log of sales is used in the base specification (not shown in table).

The market to book ratio is included only in column 3 of table 1. It is often missing, and its inclusion reduces the sample size somewhat (column 2 gives results for the base specification estimated on the smaller sample; such results are similar to those in column 1). The coefficient on market-to-book is only marginally significant, but carries a positive sign, which is inconsistent with the joint hypothesis that high market to book firms are more problematic and therefore less likely to trade actively.

The number of years prior to loan origination for which data appears in Compustat, a proxy for availability of information about the borrower, switches signs across specifications but carries a negative sign in the specifications in which it is significant, again inconsistent with the hypothesis information asymmetries are different for loans in which markets are made.

To summarize results for the information problem/moral hazard proxies, the signs of three variables (size, R&D, unrated firm) support a hypothesis that loans in which markets are made differ from most loans in that their borrowers are less problematic, but significance is mixed. Two variables (market to book and number of years of Compustat data) carry signs that either contradict the hypothesis or are not robust, and again significance is mixed. These results support no strong rejection of a hypothesis that adverse selection costs are substantial for loan dealers, or that most corporate loans involve information-problematic borrowers, but neither is there strong support for such hypotheses.

Column 5 of table 1 displays results when covenant and performance-pricing dummies are included in the base specification. As noted, incomplete coding and other missing data problems substantially reduce the usable sample size for this variant; column 4 reports results when the base specification is estimated on the reduced sample (again they are generally similar to results in column 1). Strikingly, dealers are significantly less likely to make markets in loans including financial ratio covenants or a borrowing base, consistent with hypotheses that actively traded loans are less monitoring-intensive than other loans and that lender monitoring is an important aspect of corporate loans in general.

Dealers are also less likely to make markets in loans with performance pricing features. As noted, this loan feature has few monitoring implications, but the result is consistent with the hypothesis that there is more risk-management-oriented uninformed order flow to dealers for loans that are more risky. The result is in somewhat striking contrast to what one might expect from the empirical literature on determinants of bid-ask spreads because performance pricing should significantly reduce the inventory risk faced by dealers. In the absence of a relationship between performance pricing and order flow (or monitoring), one would expect dealers to more frequently make markets in loans having the feature.

Results for the control variables are of some independent interest. Year dummies are rarely significant, which is counter to our prior (the 1988-91 dummy is, but as noted, its value is probably driven by sample selection considerations). We expected the likelihood that markets are made in loans to increase over time, all other things equal, given the growth in the number of dealers and in transaction volume reported in the trade press. The results imply that overall growth in secondary market activity may be associated more with the increase over the sample period in corporate loan syndication volumes and in loans outstanding, and with changes in the composition of such loans.

The significance of B- and C-tranche term loan dummies varies across specifications, but lines of credit (including revolving credits) are significantly less likely to trade actively. We speculate that dealers are more reluctant to make markets in lines because the size of their inventory position is uncertain. While such facilities are in inventory, a dealer must contribute its share of any

drawdown requested by the borrower and will receive its share of any repayment. Especially because drawdowns and repayments are not independent of changes in the borrower's condition, dealer inventory costs are likely higher for lines of credit than for term loans.

5. Concluding Remarks

We find that corporate loans for which dealers make markets tend to be large loans to relatively risky borrowers and that such loans are less likely to contain nonprice terms associated with monitoring. In size and monitoring, traded loans are more like publicly issued debt than the average loan. Results for proxies for asymmetric information problems posed by the borrower are mixed---it is not clear that borrowers for loans for which markets are made are less information-problematic. The results are broadly consistent with extant theories of the role of financial intermediaries in corporate lending.

However, the determinants of loan market-making differ from those of bid-ask spreads in other markets in that less risky claims tend to be more liquid in other markets. We suggest an explanation for this contrast that involves a correlation between observable asset risk and order flow as well as between risk and inventory costs. Such a correlation may arise from loan portfolio management considerations.

It may be that a positive relationship between risk and market-making also holds for other varieties of corporate debt, such as publicly issued bonds, and even for equities, although we regard the latter possibility as unlikely. To our knowledge, the microstructure literature has to date focused mainly on equity and derivatives markets. Interesting insights might be gleaned from research on the determinants of liquidity in corporate debt markets generally.

References

Beneish, Messod D., and Eric Press (1993). "Costs of Technical Violation of Accounting-Based Debt Covenants," The Accounting Review 68:2, 233-257.

Billet, Matthew Thayer, Mark J. Flannery and Jon A. Garfinkel (1995). "The Effect of Lender Identity on a Borrowing Firm's Equity Return," Journal of Finance 50:2, pp. 699-718.

Berger, Allen N., and Gregory F. Udell (1993). "Securitization, Risk, and the Liquidity Problem in Banking," in Michael Klausner and Lawrence J. White, eds., Structural Change in Banking (Irwin, Homewood, IL), 227-91.

Berlin, Mitchell, and Loretta J. Mester (1992). "Debt Covenants and Renegotiation," Journal of Financial Intermediation 2, June.

Bhasin, Vijay, Rebel A. Cole and Joseph K. Kiely (1997). "Changes in REIT Liquidity 1990-94: Evidence from Intra-day Transactions," Real Estate Economics 25:4, 615-630 (forthcoming).

Boot, Arnoud, and Anjan Thakor, 1997, Can relationship banking survive competition? Working paper, Indiana University.

Calder, Jonathan D. (1992). "Secondary Loan Trading", in J. H. Carlson and F. J. Fabozzi, eds., Senior Bank Loans, Cambridge: Probus Publishing Company.

Carey, Mark, 1998, Credit risk in private debt portfolios, Journal of Finance, June.

Carey, Mark, and Richard Rosen (1997). "Public Debt as a Punching Bag: An Agency Model of the Mix of Public and Private Debt," working paper (Indiana University).

Demsetz, Rebecca, 1994. Evidence on the relationship between regional economic conditions and economic activity. Proceedings of the 30th Annual Conference on Bank Structure and Competition, 370-380.

Diamond, Douglas W. (1984). "Financial Intermediation and Delegated Monitoring," Review of Economic Studies 51, pp. 393-414.

Gold Sheets, 1997. "Par Loan Surge Spurs Record Volume in Secondary Market," February 3; "Secondary Loan Volume Remains Strong," May 5.

George, T. H., G. Kaul, and M. Nimalendran (1991). “Estimation of the Bid-Ask Spreads and its Components: A New Approach,” Review of Financial Studies, 4, 623-656.

Glosten, L. R., and L. E. Harris (1988). “Estimating the Components of the Bid-Ask Spread,” Journal of Financial Economics, 21, 123-142.

Gorton, Gary, and Joseph Haubrich (1990). “The Loan Sales Market,” in G. Kaufman, ed., Research in Financial Services: Private and Public Policy, (JAI Press, Greenwich, CT), vol 2.

Gorton, Gary B., and George G. Pennacchi (1995). “Banks and loan sales: Marketing nonmarketable assets,” Journal of Monetary Economics 35, 389-411.

Hadlock, Charles, and Christopher James, 1997, Bank Lending and the Menu of Financing Options, Working Paper, University of Florida.

Lee, Charles M. C. (1993), “Market Integration and Price Execution for NYSE-listed Securities,” Journal of Finance 48, 1009-1038.

Miller, Steven. and Christopher Snyder (1996). “Institutional Investment in Leveraged Loans grows,” in J. D. Finnerty and M. S. Fridson, eds., The Yearbook of Fixed Income Investing, Irwin Publishing for The Fixed Income Analysts Society, Inc., pp 73-83.

Mingo, John, 1999, Policy implications of the Federal Reserve study of credit risk models at major U.S. banking institutions, Journal of Banking and Finance, forthcoming.

Peterson, Mitchell A., and David Fialkowski (1994). “Posted versus Effective Spreads,” Journal of Financial Economics, 35, 269-292.

Rajan, Raghuram G. (1992). “Insiders and Outsiders: The Choice Between Informed and Arm’s-Length Debt,” Journal of Finance 47, 1367-1400.

Smith, Clifford W. and Jerold Warner (1979). “On Financial Contracting: An Analysis of Bond Covenants,” Journal of Financial Economics 7 (June), pp. 117-61.

Stoll, Hans R. (1989). “Inferring the Components of the Bid-Ask

Spread: Theory and Empirical Tests," Journal of Finance, 44, 115-134.

Stoll, Hans R. (1978). "The Pricing of Security Dealer Services: An Empirical Study of NASDAQ Stocks," Journal of Finance, 33, 1153-1172.

Wahal, Sunil (1997). Entry, exit, market makers, and the bid-ask spread. Review of Financial Studies 10:3, 871-901.

TABLE 1.

Logit Results Predicting Whether Market is Made

Dependent Variable: 1 if dealers make market in the loan, 0 otherwise

P-values are in parentheses

Independent Variable	Specification 1	2	3	4	5
Intercept	-23.885	-22.308	-22.890	-22.830	-22.734
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Log loan size	2.107	2.037	1.979	1.983	2.267
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Observable Risk Proxies					
Inv. grade firm	-1.971	-1.948	-2.064	-3.761	-3.994
	(.0038)	(.0099)	(.0072)	(.0008)	(.0009)
Leverage (Book)	2.015	2.377	1.602	0.800	0.754
	(.0210)	(.0876)	(.2671)	(.5179)	(.5581)
Interest coverage	-0.021	0.078	0.026	-0.030	-0.032
	(.6186)	(.1935)	(.7045)	(.5990)	(.5897)
LIBOR spread	0.014	0.015	0.015	0.012	0.010
	(.0001)	(.0001)	(.0001)	(.0003)	(.0072)
Upfront fee	0.004	0.006	0.006	0.004	0.004
	(.0787)	(.0989)	(.0812)	(.0960)	(.1164)
Purpose: spinoff	3.634	-10.818	-11.119	3.520	4.805
	(.0010)	(.9958)	(.9956)	(.0234)	(.0049)
Purpose: takeover	2.314	1.814	1.966	1.976	2.662
	(.0009)	(.0326)	(.0228)	(.0640)	(.0340)
Purpose: debt	1.859	1.502	1.580	2.109	2.853
repayment	(.0062)	(.0688)	(.0591)	(.0395)	(.0182)
Purpose: recap.	2.225	1.743	1.872	2.564	3.542
	(.0026)	(.0863)	(.0680)	(.0169)	(.0056)
Purpose: LBO	4.425	3.960	4.196	4.433	4.681
	(.0001)	(.0007)	(.0005)	(.0006)	(.0022)
Asymmetric Information Proxies					
Unrated firm	-0.322	-1.695	-1.731	-0.147	0.065
	(.3401)	(.0028)	(.0026)	(.7271)	(.8877)
Log Sales	0.704	0.407	0.486	0.683	0.597
	(.0005)	(.1276)	(.0781)	(.0148)	(.0388)
R&D / sales	-57.363	-81.709	-73.498	-36.256	-45.492
	(.0700)	(.1108)	(.1457)	(.3208)	(.2068)
R&D missing	0.032	-0.208	-0.198	0.219	0.399
	(.9361)	(.7196)	(.7346)	(.6579)	(.4663)
# Yrs Compustat	-0.113	0.015	0.024	-0.045	-0.043

data before loan	(.0004)	(.7477)	(.6114)	(.2398)	(.2992)
Market to book			0.562		
ratio			(.0880)		

continued on next page...

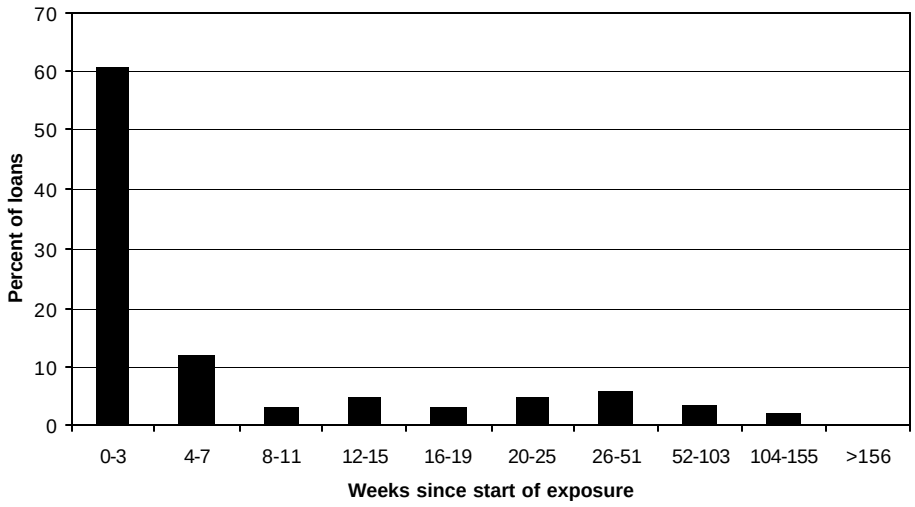
TABLE 1. (Continued)
Logit Results Predicting Whether Market is Made

Dependent Variable: 1 if dealers make market in the loan, 0 otherwise
P-values are in parentheses

Independent Variable	Specification 1	2	3	4	5
Control Variables					
Loan type: line	-3.006	-3.609	-3.675	-2.500	-2.290
	(.0001)	(.0001)	(.0001)	(.0001)	(.0001)
Loan type: term	0.615	-0.398	-0.459	1.407	1.783
loan B	(.2021)	(.6342)	(.5887)	(.0331)	(.0145)
Loan type: term	1.154	0.785	0.766	3.080	4.610
loan C	(.1726)	(.4977)	(.5205)	(.0682)	(.0707)
Year dummy 88-91	-1.618	-0.470	-0.461	-1.681	-1.871
	(.0063)	(.5416)	(.5616)	(.0094)	(.0054)
Year dummy 1992	-0.571	-2.146	-2.228	-0.382	-0.318
	(.2995)	(.0384)	(.0325)	(.4990)	(.6147)
Year dummy 1993	0.250	0.948	0.817	-0.293	0.003
	(.6517)	(.2192)	(.2942)	(.6350)	(.9962)
Year dummy 1995	0.438	0.060	0.077	0.073	-0.624
	(.3238)	(.9222)	(.8994)	(.9238)	(.4745)
Year dummy 1996	0.192	1.026	1.069	0.000	0.000
	(.7000)	(.1167)	(.1015)		
SIC dummy 4000s	-1.009	-1.047	-1.293	-1.138	-1.809
	(.0518)	(.1288)	(.0686)	(.1234)	(.0298)
SIC dummy 5000s	0.545	0.261	0.244	0.658	1.056
	(.1896)	(.6599)	(.6851)	(.2302)	(.0926)
SIC dummy 7-8000s	-1.181	-0.397	-0.357	-0.288	0.004
	(.0318)	(.5419)	(.5820)	(.6665)	(.9957)
Term to maturity	0.193	0.098	0.083	0.193	0.222
(yrs)	(.0521)	(.4354)	(.5166)	(.1267)	(.1049)
Monitoring Variables (and Performance Pricing Dummy)					
Loan Secured					0.299
					(.6006)
Loan has finl					-1.808
covenants					(.0023)
Loan has perf-					-1.347
based pricing					(.0047)
Loan has borrow.					-2.560

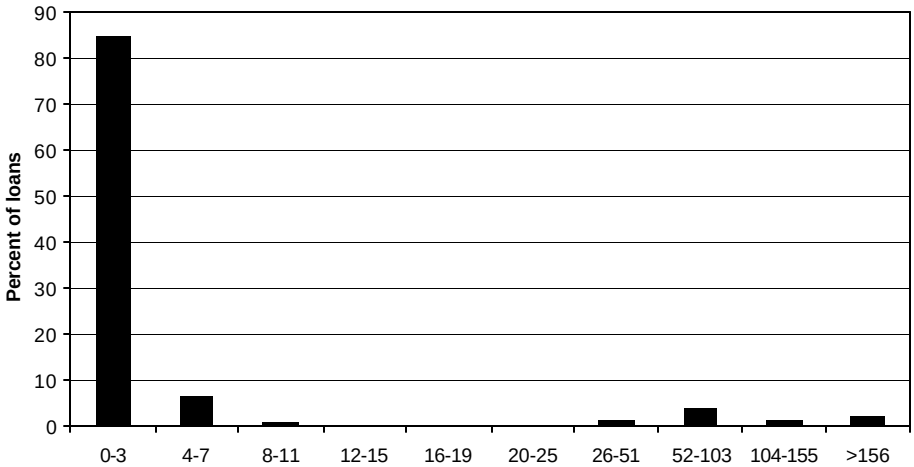
base limit	(.0764)

Figure 1. Delay After First Exposure Until Market-Making Starts



	Number of Observations, and R^2				
Number obs	5205	4354	4354	2954	2954
Pseudo R2	0.76	0.77	0.77	0.76	0.78

Figure 2. Time Before End Exposure That Market Making Ends



Footnotes

1. Empirical studies of equity liquidity include those which calculate effective bid-ask spreads and execution cost differences across exchanges (e.g. Lee (1993), Petersen and Fialkowski (1994)) and those which decompose costs into components (Stoll (1989), Glosten and Harris (1988), and George, Kaul and Nimalendran (1991)). Cross sectional differences in equity bid-ask spreads have been studied by Stoll (1978), and for real estate investment trusts by Bhasin, Cole and Kiely (1997).

2. Conventional measures of liquidity, such as bid-ask spreads, are not available.

3. Carey (1998) and Mingo (1998) offer evidence supporting this assertion. Thinking in terms of standard portfolio models, both the variance and covariance of individual assets influence the riskiness of a leveraged debt portfolio because debt has only a limited upside. In contrast, in equity portfolios, the existence of a large upside for individual stocks causes individual variances to quickly wash out as portfolio size increases.

4. Another, incomplete explanation for the greater liquidity of risky debt relies on conventional wisdom that corporate equity is more liquid than corporate debt. Because junk debt tends to be more like equity than investment grade debt (equity and junk pose both upside and downside credit risk, whereas safe debt mainly has a downside), it is sensible that risky debt is more liquid. The explanation is incomplete in that the reasons why equity is more liquid than debt are unstated, and we are not aware of evidence that equity is more liquid.

5. Beneish and Press (1993) find that financial ratio covenants trigger a majority of technical defaults and subsequent loan renegotiations, so an absence of such covenants is likely associated with less intensive monitoring in the sense of less frequent renegotiations. However, the existence of loans with few covenants does raise questions about whether such loans should be considered public rather than private debt, and about the reasons banks make such loans. They may be “transaction-based” loans in the sense of Boot and Thakor (1997).

6. The loan participations in Gorton and Pennacchi’s (1995) microdata sample average only one month to maturity, and have credit spreads averaging about 25 basis points, comparable to spreads paid by borrowers rated A or better. Such borrowers pose a negligble risk of default over a one-month horizon.

7. Some loan trading transactions probably appear in the loan sales volumes reported in regulatory filings (Call Reports) that are the basis of some empirical work on loan sales.

8. Market participants often describe loans posing relatively high credit risk as “leveraged” loans, but the term refers not to the borrower’s financial leverage but rather to loans with an interest rate spread above a cutoff value determined by market convention (evidence on borrower credit quality appears below).

9. In general, transactions in pieces of loans can occur by means of an “assignment” or a “participation.” In an assignment, the buyer becomes a party to the loan agreement with full rights and obligations, and the seller relinquishes its rights and obligations. A participation is a contract between the selling and buying bank that is legally separate from the loan agreement and that is mainly concerned with rights to cash flows from the loan. The participant generally has limited rights and obligations in the event of renegotiations with the borrower.

10. We measure the start of exposure as the later of the loan’s origination date or the beginning of the sample period. For loans with when-issued trading (prior to origination), we measure exposure as the beginning of trading. The earliest relative to origination that when-issued trading began was six weeks prior to the loan date. We measure the end of exposure as the earlier of the loan’s maturity date, its repayment or refinancing date if known, or the end of the sample period.

11. We plotted the duration of trading (not shown) and the great majority have markets made for more than a couple of months. We plotted the start delay and trading duration for each loan in ascending order of trading start delay (not shown). There does not appear to be any association between the trading delay and the duration of trading, except for the when-issued trades.

12. As noted, substantial minority of the loan agreements, or “deals,” involve more than one loan “facility” originated by the same borrower on the same date. A typical package might include a line of credit and term loan. In general, we conduct our analysis at the facility level, treating each as a separate loan, because the majority of traded loan activity occurs at the facility level. In a typical case, dealers make a market in one or more term loans in a deal but not in the revolver or line of credit.

13. We suspect that the volume of trading in a loan and the existence of multiple dealers making a market in it are closely related. However, loan sales or trades occurring at or very near the time of origination of a syndicated loan may be substantial in volume even though no dealers or only a single dealer makes a

market. Thus, some loans we classify as nontraded may briefly trade actively.

14. EBITDA is earnings before interest, taxes, depreciation and amortization. We also check robustness using return-on-sales and return-on-assets variables, measured as EBITDA divided by total sales or total assets, respectively.

15. The influence of outliers is limited by mechanically truncating variables at the 1st and 99th percentiles (smaller or larger values are set to the values at those percentiles). Exceptions are made when the variable is bounded above or below at a reasonable value, e.g. leverage is not winsorized because it is restricted to the [0,1] interval by construction.