Liquidity in the Pricing of Syndicated Loans*

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ABSTRACT

We examine whether banks price expected liquidity in U.S. syndicated term loans. Using extensive data we show that loans with higher expected liquidity have significantly lower spreads at origination, controlling for other determinants of loan spreads such as borrower, loan, syndicate and macroeconomic variables. A matched sample analysis confirms our results. We estimate that the pricing of expected liquidity results in annual savings of over $1.6 billion to the borrowers, in our sample alone. For the first time in the literature, we identify what influences the decision of financial intermediaries to make *secondary* markets for an asset, and the consequent pricing impact of this decision in the *primary* market.

JEL Classification: G12, G21, G32

Keywords: Syndicated loans, loan secondary market, loan pricing, liquidity, loan trading.

"… many credit approvals at banks today take into consideration the estimated level of liquidity of the facilities being considered. Liquidity, in this sense, is the relative ease (or lack thereof) of transferability. Factors considered in the liquidity assessment include legal restrictions, availability of potential buyers and, of course, potential discounts." (PNC Capital Markets Report, PNC Bank, November 2003)

1. Introduction

Syndicated loans represent credit granted by a group of banks or other financial institutions to a borrower. The originating institutions traditionally sell portions of some of their loans to other banks and financial institutions via individually negotiated deals, for a variety of reasons that are outlined in Pennacchi (1988), Gorton and Pennacchi (1995), Haubrich and Thomson (1996), Dahiya, Puri and Saunders (2003), and others. However, over the last fifteen years, an active dealer-driven secondary market has emerged, which has led to these loans being traded, much like debt or equity securities, on an over-the-counter market. The growth of this market has provided loan originators with several new advantages. For example, since it is easier for them to sell off loans, they can now free up capital and increase their grant of new credit, leveraging their comparative advantage in loan origination activity, thereby increasing their return on assets and equity (Gorton and Haubrich (1990), Carlstrom and Samolyk (1995) and Demsetz (2000)). Furthermore, originating loans that can be sold off easily improves the liquidity of the balance sheets of the originating banks, reduces their financing frictions, and lowers their cost of capital.[1] The loan secondary market also provides originators with a very effective mechanism for risk diversification (Cebenoyan and Strahan (2002)).

Since increased liquidity provides the loan originators with clear benefits, the natural question is whether they pass on some of these benefits to the borrowing firms. If the loan origination market is competitive, then the originating banks must pass on some of the liquidity-related cost advantage to the borrowers, by charging lower loan spreads at the time of origination. In this paper, our primary objective is to examine whether the *secondary* market loan liquidity has any impact on the pricing of syndicated term loans in the *primary* market. In particular, we examine whether banks price the expected liquidity of a loan into the loan spread at origination, thus passing on some of the liquidity-related benefits to the borrowers. By examining this primary question, we also address the related question

[1] See Stein (1998), Kashyap and Stein (2000), Holmstrom and Tirole (2000) and Diamond and Rajan (2006) for more on this literature.

regarding the ability of the originating institutions to ascertain the expected liquidity of a loan at the time of origination. Financial institutions can only be expected to systematically price expected liquidity into the loan spread if they can discern with sufficient accuracy, at the time of origination, the probability that the loan will be liquid in the secondary market.

The concept that liquidity is priced into financial assets plays an important role in the pricing of all financial assets. Starting with Amihud and Mendelson (1986), several studies have documented that more liquid assets trade at higher prices (and lower yields).[2] However, these studies focus on the determinants of *secondary* market liquidity and its pricing implications in the cross-section. For many assets, liquidity must be analyzed at a more fundamental level – whether secondary markets are made *at all* or not. What determines whether there will be a secondary market for an asset? Does this decision to make *secondary* markets have any effect on the pricing of these assets in the *primary* market? We raise and answer these important questions, for the first time in the literature, using evidence from the syndicated loans market. This market is ideally suited for such analysis since secondary markets are never made for a large fraction of the loans originated in the primary market.

Our study is also the first to analyze the determinants and the pricing impact of liquidity in a "private" market, as opposed to the public equity and debt markets. The (private) syndicated loan market is characterized by a trading friction not found in public debt or equity markets – most loan sales require the consent of either the borrower or the lead bank, or both. What makes assets liquid, in the presence of such frictions? What is the resultant pricing impact, if any, in the primary market? We answer these questions using data from the secondary loan market.

In the syndicated loan market, it is not axiomatic to expect lower spreads on loans that are liquid in the secondary market. Potentially, as shown in Pennacchi (1988), loan sales could raise a moral hazard problem because the financial intermediary could reduce its screening of loan applicants, syndicate the 'lemons' and retain the higher quality loans.[3] In fact, Boot

[2] These studies include Chordia, Roll, and Subrahmanyam (2000), Pastor and Stambaugh (2003), Acharya and Pedersen (2005), and many others in the U.S. equity markets, as well as Krishnamurthy (2002), Chordia, Sarkar and Subrahmanyam (2005), Longstaff (2004), Longstaff (2005) and others in the Treasury and corporate bond markets.

[3] The moral hazard problem can be mitigated (Gorton and Pennacchi (1995)) if the originating institution retains a portion of the loan, or by the use of more restrictive covenants (Drucker and Puri (2007)). In this regard, Sufi (2005) presents empirical evidence that the lead arranger retains a larger proportion of the loans that require greater monitoring.

(2000) argues that bank loans are illiquid largely due to their information sensitivity, consistent with the conclusion provided by Bhattacharya and Thakor (1993), that asymmetric and proprietary information provide the most fundamental explanation for the existence of financial intermediaries. In such a context, syndicated loans would largely be illiquid assets, and the sale of a borrower's loan would convey negative information about the borrower, consistent with the empirical evidence in Dahiya, Puri and Saunders (2003). Nonetheless, this line of reasoning suggests that even if the moral hazard problem is mitigated, controlling for borrower and loan characteristics such as industry, leverage, credit risk, maturity, size, restrictive clauses etc., the primary market spreads on the loans that are liquid should be no lower than the spreads on the illiquid loans.

However, these studies analyze loan sales in the context of privately negotiated deals whereas the emergence of an active dealer-driven secondary market has significantly altered the market for loan sales.[4] Using recent data, Gande and Saunders (2005) show that when a borrower's existing loans trade for the first time in the secondary market, it elicits a positive stock price response. This is opposite to the empirical evidence on loan sales in earlier papers. Similarly, Drucker and Puri (2007) show that borrowers benefit from loan sales via increased access to private debt capital, greater likelihood of obtaining future loans, as well as greater likelihood of preserving their lending relationships, but these benefits come at the expense of more restrictive covenants. In fact, Guner (2006) argues that borrowers dislike the sale of their loans and hence they demand a discount on the loan spread, since the loan sale forces them to deal with multiple banks if and when they need to renegotiate. However, Guner's sample period (1987-1993) is not representative of the loan secondary market today.

As the existing literature has argued, from the borrower's perspective, there may be advantages as well as disadvantages to their loans being sold in the secondary market. Therefore, the impact of these variables on the loan spread at the time of origination is not unambiguous. From the lender's perspective, there appear to be clear benefits to originating loans that are liquid in the secondary market, which suggests that they should charge lower spreads on these loans, if the loan primary market is competitive. Using extensive *loan-level*

[4] The demand for loans in the secondary market has grown tremendously, partly from hedge funds, while the incentives for banks to sell loans have changed over the years, due to regulation as well as macroeconomic conditions. In Section 2 of the paper, we provide more details on the reasons for the growth of the secondary loan market.

primary and secondary market data, we directly examine the impact of liquidity on loan spreads in order to resolve this question.

Our results show that banks price the expected liquidity of a loan, *at the time of origination*, by charging lower spreads on loans that are more likely to trade in the secondary markets, controlling for other determinants of loan spreads. This liquidity effect is at the *loan level*, and not just at the borrower level, since there are liquid as well as illiquid loans in the market at the same time for the same borrower. We define liquidity as the ease with which a loan originator can sell the loan in the secondary market, without the need to discount it. Therefore, in our paper, liquidity measures the ease of locating a counterparty, and hence, dealer costs and inventory risk from the perspective of the loan originating institution in the primary market. These search costs are affected by the demand from potential investors, which is related to borrower *as well as loan* characteristics. This is similar to the notion that different claims issued by the same firm (e.g., common versus preferred stock) may have different levels of liquidity.

Our empirical specifications control for several alternative explanations for the differences in loans spreads between liquid and illiquid loans. These include differences in credit risk, information asymmetry, and opaqueness of the borrowers, as well as differences in lender and loan characteristics (including restrictive covenants). Our results are consistent across several different sub-samples of loans and robust to several alternative definitions of liquidity. The magnitude of this pricing effect is very significant (ranging from 88 to 137 basis points) between the most liquid and the most illiquid loans, controlling for other determinants of loan spreads. As further robustness, we do a matched sample analysis by comparing the spreads on liquid loans with those on illiquid loans from the same lender to the same borrower at the same time (hence almost everything is controlled for in these tests, including any unobservable private information with the lender), and find a consistent effect.

Interestingly, we find that loans from higher risk borrowers (speculative grade) are more liquid than loans from lower risk borrowers (investment grade). This is opposite to the results consistently reported in the studies from the equity markets (see Stoll (1978), Wahal (1997), Madhavan (2000) and others), that more volatile stocks are less liquid (higher inventory costs), and stocks of higher risk firms are less liquid (higher adverse selection costs). Conventional intuition would suggest that dealers should be less willing to make markets in loans from higher risk borrowers. Our results, to the contrary, are driven by the

higher order flow for loans from risky borrowers that more than offsets the higher costs of the dealers due to other factors. There is greater investor demand for speculative grade loans, due to their higher yields as well as their suitability for managing the credit risk of debt portfolios, that leads to greater order flow for these loans.

Our pricing results are qualitatively similar to those reported in studies on the pricing of liquidity in equity and bond markets, where more liquid assets are reported to have higher prices and lower yields. However, our paper links the *secondary* market liquidity of loans to their *primary* market pricing, which is fundamentally different from the existing literature that links liquidity and pricing within the secondary market.[5] To our knowledge, this is the first paper to document expected liquidity being priced into syndicated loan spreads at the time of their origination.[6]

Our results suggest that the primary market for loan syndications is quite competitive (contrary to the suggestions otherwise, in Ho and Saunders (1981) and Guner (2006)), and the loan arranger shares at least part of the liquidity-related benefit with the borrowing firms.[7] In the aggregate, we estimate that this pricing of expected liquidity into loan spreads results in an average annual savings of over $1.6 billion to the borrowing firms, just for our sample of U.S. syndicated term loans. Excluding the naïve explanation of altruistic motives on the part of banks, there is no reason, other than competition, for banks to share this cost advantage with their borrowing clientele. Our results also imply that banks must have the ability to discern the expected liquidity of a loan at the time of its origination. Absent this ability, we should not see any systematic pricing of expected liquidity into loan spreads. Our paper is the first in the literature to develop a model for predicting the liquidity of a loan at the time of its origination.

The rest of the paper is organized as follows. Section 2 introduces the syndicated loan secondary market. Section 3 provides an overview of the empirical methodology. Section 4 presents the data used in this paper, along with some descriptive statistics. Section 5

[5] Ellul and Pagano (2006) show the link between the underpricing of common stock IPOs and their subsequent liquidity in the aftermarket. However, all IPOs subsequently trade in the secondary market. On the other hand, a majority of loans do not. Therefore, the syndicated loan market provides a novel context for examining this linkage.

[6] In a contemporary paper, Moerman (2005) relates loan spreads to the information asymmetry associated with the borrowing firm, as proxied by the bid-ask spread on the firm's *prior* loans on the secondary market, which is different from the liquidity effect analyzed in this paper.

[7] This effect is similar to what happened in the mortgage markets decades ago, where borrowers have benefited (by way of lower mortgage rates) from the liquidity in home loans due to the emergence of mortgage backed securities.

presents the empirical results in two parts. The first part focuses on why some loans trade in the secondary market and others do not. The second part models the syndicated loan spreads (over LIBOR) at origination as a function of loan, firm, and syndicate characteristics and macroeconomic conditions. Section 6 presents additional robustness tests. Section 7 concludes the paper.

2. Syndicated Loans and their Secondary Market

A syndicated loan is a large-scale loan typically structured and placed by a lead arranger or an agent, who then sells portions of the deal (within the primary market) to a syndicate of financial entities under the negotiated terms and conditions. These loans (or parts thereof) may then be subsequently transferred from the primary to the secondary market by assignment or by participation. When transferred by assignment, the buyer/investor becomes the lender of record; hence it typically requires borrower consent, and frequently the consent of the lead bank as well. In the case of transfer by participation, the buyer only obtains the right to re-payment, while the relationship between borrower and the original lender remains intact. Participation involves an additional element of risk to the buyer since they do not have any direct claim on the assets of the borrower in the event of default. Most of the loan trading is by way of assignment.

In 2005, the total primary market U.S. syndicated loan volume was about $1.5 trillion according to the Loan Pricing Corporation (LPC). Relative to other financing alternatives syndicated loans account for approximately one-third of all corporate financing and represent the largest single financing tool used in corporate America. Figure 1 presents the mix of syndicated loans originated in the U.S. from the year 2000 onwards. While there has been modest growth in the primary syndicated loan market, the mix of loans has remained relatively constant over this period with leveraged loans (defined by LPC as loans with a credit rating below investment grade or loan spread above 150 bp) representing, on average, about one-third of all new syndicated loan originations.

In contrast, the secondary market for syndicated loans has grown tremendously over the last decade. Figure 2 presents the secondary market trading volume in syndicated loans in the U.S., which has grown from just $8 billion in 1991 to over $176 billion in 2005, reflecting a compounded annual growth rate of nearly 23% per year over the last 15 years. In addition, the mix of loans has also changed over this time period. As shown in Figure 2, a part of this growth is the result of increased trading in distressed loans (traded at prices below 90% of

par). This stylized fact has so far been the focus of several studies in the academic literature on syndicated loan sales.

In particular, the previous literature on loan sales, which includes Pennacchi (1988), James (1987), Gorton and Pennacchi (1995) and others, has largely advocated that banks have incentives to sell underperforming credits. In this context, Dahiya, Puri and Saunders (2003) present empirical evidence that loan sale announcements are followed by *negative* stock returns for the borrowers along with higher probabilities of their bankruptcy. However, if the loans being sold are mostly "lemons", then rational investors would assume adverse selection (Akerlof (1970)) and discount these loans below fair value, thereby leading to an unraveling of this market. Then why has the secondary market for loans grown at such a high rate, especially during the last decade?

The recent literature on loan sales has tried to address this question. Using more recent data, Gande and Saunders (2005) document a *positive* stock price reaction for the borrowers, including distressed firms, at initial loan sale announcements. They argue that loan trading provides an alternative source of information about the borrower, which is perceived as "good news" by their equity investors. From a theoretical perspective, Behr and Lee (2006) argue that loan sales allow banks to choose its optimal funding mix between sophisticated (loan) and uninformed (deposit) investors. As a result, in equilibrium, banks will always have incentives to sell off some of their loans.

Therefore, while the influx of distressed loans is one of the reasons for the tremendous growth of the secondary market for syndicated loans in recent years, it is not the primary reason. There are several supply side and demand side reasons why this market has grown and will continue to grow. On the supply side, banks may sell performing corporate credit exposures for several reasons. The first reason is portfolio management considerations. Banks may sell loans to avoid excessive risk concentration to particular obligors or industries, or to move on to higher return opportunities. The second reason is strategic shifts in lending strategy. At various points in the economic cycle, banks become hot or cold towards certain industries, geographic regions, or to commercial lending in general. The third reason is regulatory capital arbitrage as well as regulatory constraints under the Basel Accord, which have created incentives for banks to sell some loans while holding the others in order to boost return on capital. In addition, as pointed out by Carlstrom and Samolyk (1995), regulatory constraints and information asymmetries create the incentive for banks in one region to originate and sell loans to banks in other regions that have adequate capital.

The fourth reason is extraction of economic rents from loan origination activity. Some banks (especially larger, high reputation banks) are adept at originating credit exposures due to their expertise in credit assessment and strong client relationships (similar to the arguments given in Demsetz (2000)). Since banks are required to maintain regulatory capital, additional loans on their balance sheet result in diminishing marginal benefits. Therefore, the sale of their loan portfolio allows them to use their capital base more effectively to support a higher level of origination activity without experiencing balance sheet growth.

On the demand side, starting from the mid-nineties onwards, nonbank financial institutions like hedge funds, mutual funds and other funds such as CDOs (Collateralized Debt Obligations) and CLOs (Collateralized Loan Obligations) have emerged as major buyers of syndicated loans in the primary and the secondary markets. Syndicated loans are senior, typically secured, floating interest rate instruments that have stricter covenants than bonds, and higher recovery rates than other debt securities. The returns on these loans are fairly uncorrelated with equity returns – as per LPC estimates, the correlation of returns between loans and the S&P 500 was 0.12 between 1992 and 2002. Since 1992, loans have had positive returns in every single year, including recession years. The Sharpe ratios for various loan return indices are between 0.8 and 0.9, compared with between 0.6 and 0.7 for bonds and about 0.3 for the S&P 500 index. Being floating rate instruments, they are free of duration risk, which makes them attractive to fixed income fund managers. These stable returns and high recovery rates even in times of credit crunch have attracted many investors to this market. This is especially true from the year 2000 onwards, since the equity markets have not provided attractive returns while traditional fixed income instruments have had high volatility, thereby forcing investors to look to other asset classes for higher, stable yields. Loans provide them with risk-return characteristics that are not available through any other asset class. In addition to these investors, the secondary loan market also allows smaller banks to acquire exposures to sectors or countries where they may not have the critical size to originate loans in the primary market. These demand side factors have been the primary drivers of growth in this market.

The investor base in this market primarily consists of sophisticated institutional investors with virtually no noise traders. The primary market makers are larger investment and commercial banks, who provide two-way price quotes and commit capital to take outright

positions and create liquidity.[8] Institutions actively engaged in primary market loan origination have an advantage in trading on the secondary market, in part because of their acquired skills in accessing and understanding loan documentation. In addition, the active traders in this market consist of other commercial and investment banks, distressed debt traders, and vulture funds. Some non-financial corporations and large institutional investors like pension funds and insurance companies have also recently started to trade corporate loans in the secondary market. The heterogeneity of both the issuers and the investors has enhanced liquidity in this quickly expanding market.

3. Research Hypotheses and Design

Our primary objective is to examine whether the expected liquidity of a syndicated loan is priced into its yield spread at the time of origination. We do that by a two-stage modeling process. In the first stage, we develop a model for predicting the liquidity of a loan at the time of origination. A loan is defined as liquid if there is an available secondary market for it. Therefore, liquidity captures the *ex ante* ease with which a loan originator can sell its loan in the secondary market. Thus, in our paper, liquidity is a function of dealer cost and inventory risk from the perspective of the primary market issuer of the asset, rather than from the secondary market dealer's perspective. The loan originator is likely to incur lower search costs in locating a counterparty to sell the loan when there is a secondary market for it, and perhaps lower transaction costs as well. The probability that there will be a secondary market for a loan captures these search and transaction costs, and hence the inventory risk faced by the loan originator. Our first-stage model estimates this probability, which is an innovation in this paper.

In the second stage, we examine whether, controlling for all the other determinants of loan spreads, the expected liquidity of the loan has any impact on the loan spread at origination. Our second stage model draws upon the large literature on the determinants of loan spreads.[9] Our innovation in the second stage is the inclusion of the expected liquidity variable as a determinant of the loan spread in the primary market, controlling for all other

[8] Some of the earlier entrants in this market were BT Alex Brown, Bear Stearns, Citibank and Goldman Sachs. Now there are nearly 35 market makers for secondary market trading of syndicated corporate loans, representing the loan trading desks of virtually every large commercial and investment bank.

[9] See, for example, Angbazo, Mei, and Saunders (1998), Casolaro, Focarelli, and Pozzolo (2003), Chen (2005), Coleman, Esho, and Sharpe (2004), Dennis, Nandy, and Sharpe (2000), Harjoto, Mullineaux, and Yi (2006), Hubbard, Kuttner, and Palia (2002), Ivashina (2005), Moerman (2005), Santos and Winton (2005), Strahan (1999), and others.

determinants previously examined in the literature. We now proceed with a more formal description of each stage.

In the first stage, we develop a probit model to estimate the probability that there will be a secondary market for the loan after origination. This model is conditioned on the information available at the time of origination of the loan, about the loan, the borrower, the syndicate, and the macroeconomic environment. The cross-sectional model is estimated for a sample of n loans (i=1,...,n), as follows,

$$\mathrm{P}(Z_i = 1 \mid X_{1,i}, X_{2,i}, X_{3,i}, X_{4,i}, X_{5,i}) = \Phi\left[c + \beta_1' X_{1,i} + \beta_2' X_{2,i} + \beta_3' X_{3,i} + \beta_4' X_{4,i} + \beta_5' X_{5,i}\right] + u_i \quad (1)$$

where $\left\{u_i \mid X_{1,i}, X_{2,i}, X_{3,i}, X_{4,i}, X_{5,i}\right\} \sim N(0,1)$ and

Z_i: Indicator variable for loan liquidity, equal to one if the loan is classified as liquid,

X_1: Vector of loan characteristics,

X_2: Vector of borrower characteristics,

X_3: Vector of syndicate characteristics,

X_4: Vector of macroeconomic variables,

X_5: Vector of instruments.

In estimating equation 1, we use an instrumental variables approach as outlined in Wooldridge (2002). The instruments are needed to predict the liquidity (after partialing out any controls) in order to ensure that our second stage model can be identified. The instruments are chosen as factors that affect the probability that there will be a secondary market for the loan, but *do not directly* affect the initial spread charged by the syndicated group. This implies that the instruments for liquidity must be related to factors that affect the *demand* for loans in the secondary market, rather than *supply* side factors. The supply side factors affect the decision making process between the lenders and the borrower. Therefore, they implicitly affect *both* the liquidity and the yield spread of the loan, and thus cannot be used as instruments. Only factors that drive the demand for a loan in the secondary market, excluding any characteristic of the loan agreement between the lenders and the borrower, can potentially be valid instruments.[10] We choose two instruments of liquidity in our

[10] The lenders and the borrower have different motivations for making the loan liquid. For the lender, it may be improvement of liquidity, diversification of risk, strategic behavior, etc., as discussed in Section 2. For the borrower it may be benefits of increased access to capital versus potentially negative information conveyed by loan sale. These characteristics are reflected in the terms of the loan agreement (for example, covenants). We include all the terms of the loan agreement available to us as explanatory variables in both stages of the model, since they are likely to affect *both* the liquidity as well as the yield spread on the loan

analysis - one (*Bank Tier*) reflecting a lender characteristic, the other (*Transparency*) reflecting a borrower characteristic.[11] In our empirical analysis, we statistically examine the strength and validity of these instruments.

Our first instrument is bank tier as a proxy of bank reputation. The two variables *Tier 1 Bank* and *Tier 2 Bank* measure the rank of the lead arranger based on its primary market share. *Tier 1 Bank* is equal to one if the lead bank is amongst the top three lead arrangers in the league tables for 1998-99 (the two years prior to the start of our sample period), while *Tier 2 Bank* is equal to one if the lead bank in between the fourth and the thirtieth rank.[12] In a competitive market like the syndicate loan market, the rank of the lead arranger is not expected to matter in terms of the initial spread, once the identity of the lead bank has been controlled for (commercial, investment or universal bank). The lead bank's reputation could, however, affect the future liquidity of the loan, since the bank's reputation serves as an implicit guarantee when a loan is sold in the secondary market, as argued by Gorton and Haubrich (1990) and Gorton and Pennacchi (1995). This effect is comparable to the certification effect detailed in the IPO literature (see, for example, Booth and Smith (1986)). Loans originated by higher tier lead banks are likely to be easier to sell in the secondary market since the buyers would be more confident in buying these loans. In addition, the higher tier banks have stronger relationships with institutional investors, who are the major buyers of syndicated loans in the secondary market. Therefore, it would be easier for higher tier banks to sell the loans that they originate.

Our second instrument, *Transparency*, measures the ease of availability of the financial statements of the borrower. If the firm's financial statements are publicly available it is easier for outside investors to evaluate the firm's loans as a potential investment. This transparency *will not* affect the negotiated spread at origination since the syndicate members already have detailed access to the firm's financial statements. Therefore, the public availability of the financial statements of the borrower are *only* likely to affect the demand for the loans of that borrower. This variable is therefore only expected to impact the spread through potential liquidity effects. The Transparency variable is set equal to one if the firm has had any public equity or debt issue (including Registered Rule 144A debt issuance to qualified institutional

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(and hence, cannot be used as instruments).

[11] As further justification for their exclusion in the second stage, the variables chosen as instruments proved to be statistically insignificant in the second-stage loan pricing model discussed below. In addition, our results are not sensitive to the choice of instruments. We re-estimated our model with several different sets of instruments, but our primary results remained unchanged.

[12] Our results are robust to alternative classifications of lead bank tiers.

investors) prior to the loan origination date, since the financial statements of such firms will be in the public domain.

We classify loans into liquid and illiquid categories using several alternative definitions to ensure that our results are not driven by any one particular method of defining loan liquidity. However, it is important to note that any error in our methods of categorizing loans into liquid versus illiquid will only bias the entire procedure against us. To the extent that the dependent variable in the probit model is specified with error, there is a lower likelihood of the model producing accurate predictions of expected liquidity. This will only attenuate the coefficient on expected liquidity in the second stage regression.

The fitted values of $P(Z_i = 1 | X_{1,i}, X_{2,i}, X_{3,i}, X_{4,i}, X_{5,i})$ or $\hat{p}_i$ from equation 1 are then included as an explanatory variable in a regression model of loan spreads. Since we only analyze term loans in this paper, we use the "All-in Drawn Spread" (AIS) as the loan spread. The AIS is the sum of the amount the borrower pays in basis points over LIBOR plus any annual or facility fees paid to the lender. It is a more complete measure (than just the basis points spread over LIBOR) of the ongoing costs for the borrower as well as the income for the lender (or the subsequent buyer of the loan), and is used as the standard measure of loan spreads in the literature.[13]

The second stage regression model is as follows:

$$AIS_i = c + \alpha_1' Y_{1,i} + \alpha_2' Y_{2,i} + \alpha_3' Y_{3,i} + \alpha_4' Y_{4,i} + d.\hat{p}_i \qquad (2)$$

where

Y_1: Vector of loan controls,

Y_2: Vector of borrower controls,

Y_3: Vector of syndicate controls,

Y_4: Vector of macroeconomic control variables.

[13] Annual or facility fees are fairly uncommon in LIBOR based term loans (they are more prevalent in lines of credit), therefore less than 5% of the term loans in DealScan have this data reported. Our results are robust to the exclusion of the loans with annual or facility fees from our sample. For the rest of the loans, the *only* measure of yield spread that is available is the AIS, hence the literature uses it as the principal pricing measure in the primary market. In later tests, we also use a relative pricing measure to ensure that our results are robust.

The objective of this second stage model is to estimate the impact of expected liquidity on the loan spread, after controlling for all other variables that could affect the spread. The coefficient of primary interest is "*d*", which should be significantly negative if loan originators price expected liquidity into loan spreads.[14] The negative coefficient on expected liquidity would imply that liquid loans are originated with lower spreads, ex ante, than illiquid loans, controlling for other determinants of loan spreads.

This two step approach outlined above presents several advantages. First, it allows us to condition only on the information available at the time of the loan origination. Our key variable of interest, liquidity, is only observed after the loan has been issued. The first stage predicts the probability a loan will be liquid conditional on information available at the time of syndication of the loan. This predicted probability then enters into the second stage loan pricing model. The second advantage of the two part model is that it allows the regressors to have a different effect on the likelihood the loan is available in the secondary market and on the initial spread charged by the banks in the primary market.

Consistent with prior studies, we include several control variables in the second-stage regression in order to rule out other possible explanations for our results, such as differences in credit risk, information asymmetry and opaqueness, lender type, and loan characteristics, between liquid and illiquid loans. Some of the important control variables are discussed below.

To address the first alternative hypothesis, we control for differences in credit risk between liquid and illiquid loans. The primary variable we use is the credit rating of the borrower at the time of origination of the loan. In addition, we use profitability and leverage variables to control for any residual differences in credit risk. We also use the firm size and the loan size as proxies for credit risk. Several prior studies (Bharath, Dahiya, Saunders and Srinivasan (2006), and Harjoto, Mullineaux and Yi (2006), among others) have used firm size to control for credit risk, and have shown that loans to larger borrowers carry lower spreads, all else being equal. A larger loan size is also associated with lower spreads. As shown by Booth (1992), there may be economies of scale in loan origination and monitoring, leading to lower spreads for larger loans. In addition, it may be argued that banks would give larger loans only when they are more certain about the credit quality of the borrower, thereby leading to

[14] In estimating the two step procedure we use the instrumental variables approach as outlined by Wooldridge (2002). This approach ensures that the standard errors and test statistics are asymptotically valid.

lower spreads, as documented by several prior studies (for example, Bharath et al. (2006)). We control for covenants and collateral, since, as suggested by Rajan and Winton (1995), these features are more likely to be present in loans to firms that require more intensive monitoring, and are therefore associated with higher probabilities of distress. The relationship between loan maturity and spreads is not that unambiguous. Though Flannery (1986) indicates that longer maturity loans would have higher credit risk, the empirical evidence on the impact of loan maturity on spreads has been mixed. We control for the loan maturity to ensure that any impact of maturity on the loan spread is controlled for.

We control for differences in information asymmetry and opaqueness between the borrowers of the liquid versus illiquid loans by including variables for firm profitability, firm size, loan size, credit rating, collateral and covenants. In addition, we control for the industry of the borrower, since firms in some industries are naturally more opaque than others. We also examined the impact of other potential control variables related to information asymmetry and opaqueness, such as R&D intensity, intangible asset ratios, and whether the borrowing firms had any previous public debt issues. We exclude these variables from the final empirical model due to their statistical insignificance.

In addition to the variables above, we control for the identity of the lead bank – whether it is an investment or a commercial bank, since Harjoto et al. (2006) show that investment banks charge higher spreads than commercial banks. We include the number of lead banks as an additional control for unobserved borrower risk, since safer loans are easier to syndicate (Guner (2006)). Finally, we control for several loan characteristics, especially the loan purpose, since the loan purpose could be associated with differences in loan spreads. This is especially true for loans originated for "Restructuring" purposes (which includes takeovers, LBOs, spin-offs and stock buy-back), since they alter the capital structure of the borrowing firm.

4. Data

The data for this study are obtained from five sources – the DealScan database from Loan Pricing Corporation (LPC), the mark-to-market pricing service from Loan Syndications and Trading Association (LSTA), Compustat, DataStream and the Securities Data Corporation (SDC).

The loan origination information is obtained from DealScan, which contains data on over $2 trillion of large corporate and middle market syndicated loans, obtained from SEC filings for public companies and other sources for private companies. All the loan and lender characteristics and some borrower characteristics are obtained from DealScan. The rest of the borrower characteristics are obtained from Compustat. The data on macroeconomic variables are obtained from DataStream. We obtain prior debt issuance data (both public and Rule 144A) from SDC.

The categorization of loans based on their liquidity is done using a unique dataset of secondary market loan price quotes from LSTA. They provide independent secondary market pricing service on syndicated loans to over 100 institutions that manage over $200 billion in bank loan portfolios. LSTA receives bid and ask price quotes for over 3,000 loans from nearly 35 dealers on a daily basis, in the late afternoon.[15] These price quotes reflect the market information for the day. As part of the pricing service, they provide the average of all bids and all asks for loans that have more than 2 bid quotes (about 1,800 out of these 3,000 loans have more than 2 bids). They also provide the number of bid and ask quotes (separately) for each of these loans, along with other information including loan identifier (LIN), the name of the borrower, and the type of loan.[16] We use these secondary market loan prices to construct several proxies for the liquidity of the loans in our sample.

The volume of loan trading in the secondary market grew steadily during the 1990s, and by the year 2000, had crossed $100 billion in annual volume. The coverage of our secondary market data starts in 1996. However, until November of 1999, the coverage is very sparse (only about 100 loans in the cross section), and is only available monthly. This is reflective of the lower level of activity during the growth phase of this market, until the year 2000. We therefore begin our study with loans originated in the year 2000. From the year 2000 onwards, we have daily price quotes, with the number of loans available in the cross-section in the secondary market database increasing from about 600 in January 2000 to about 1,500 in March 2005.

[15] These dealers include the loan trading desks of most of the big commercial and investment banks in New York, and, as per LPC estimates, account for over 80% of the secondary market trading in syndicated loans.

[16] Since there is no common identifier between DealScan and the LSTA pricing data, the loans in the secondary market pricing data must be manually matched with the primary market data in DealScan. Further, these two databases do not have any identifier that is recognized in Compustat, so the matching with Compustat also must also be done manually, to ensure zero errors.

Our primary measure of liquidity classifies a loan as being liquid if it is quoted in the secondary market by at least two dealers at any point during this time span, and the first quoted bid price is greater than 98 (hence it is a par loan). If the loan is quoted by multiple dealers, then it is reasonable to assume that it is possible to trade that loan on that day. In addition, if it is first quoted close to or above par, it implies that the loan does not have to be discounted to initiate a sale. Therefore, as per our definition, a loan is classified as liquid only if there is a secondary market for it without the need for a fire sale (i.e. a sale at a discounted price).[17]

We examine the syndicated loans originated during the five years 2000-2004, covered by DealScan. We focus only on U.S. dollar (USD) denominated syndicated term loans to U.S. borrowers. All other types of loans (primarily revolvers and lines of credit) are excluded from this study because their pricing function at origination is different from that of term loans. Revolvers and lines of credit also charge a commitment fee on the undrawn portion of the credit line. However, the undrawn portion never trades. Since it is impossible to predict the drawdown schedule of a borrower at origination, the incorporation of expected liquidity into the drawn spread of a credit line is likely to be much less transparent than that in term loans. In order to have a relatively homogeneous sample of loans where the loan spread has a clear interpretation, we restrict our analysis to USD term loans to US firms. Over the sample period there are 7,912 USD syndicated term loans representing 4,975 unique borrowers available for the analysis.

In the empirical results, we present six distinct specifications drawing on the available sample of 7,912 USD term loans. These specifications are labeled A through F throughout our analysis. The sample sizes vary across the specifications due to the differences in data availability. The first specification A has a sample size of 1,591 loans. It is the most restrictive sample requiring no missing data for any variable in the estimation process. Specifications B and C draw on the same sample of 1,591 loans but incorporate control variables for missing data. The DealScan database has missing data for many loan characteristics which may or may not be important determinants of the expected liquidity and/or the origination spread. For many of these characteristics, the data is only reported if there is data to report, suggesting that missing data may reflect a zero value. To test this statement, we incorporate indicator variables for each missing field to determine if the missing value is in fact a zero value. A number of these missing indicator variables do confirm that the missing data is not

[17] Our results are robust to defining a loan as liquid even if its first quoted bid price is below 98.

important in the models. However, in some cases the estimated parameters for the indicator variables for the missing fields are statistically different from zero. We retain all missing indicator variables in the model to control for missing data but do not report these results for the sake of brevity. These results are available directly from the authors.

In addition, there are multiple data sources for some of our firm specific controls. For example, credit ratings are available from both DealScan and Compustat. Specifications A, B and C rely on credit ratings from the Compustat database. The credit rating data are extracted from Compustat for the fiscal year prior to the loan origination fiscal year. However, specifications D and E rely on DealScan for credit rating data. In total, Specification D includes 1,657 loans.

In addition to relying on Compustat for credit rating data, other borrower characteristics such as sales, R&D expenses to sales, long-term debt, intangible assets to total assets, etc. are also drawn from Compustat. These data are also populated by a number of missing values for the loans identified from the DealScan database. By dropping the non-credit rating borrower characteristics from the empirical specification the sample size increases to 2,791 loans. These results are labeled as Specification E.

Finally, Specification F uses the full sample of 7,912 loans identified from the DealScan database. All the data used in estimating this model are drawn from the DealScan database. Where appropriate, controls for missing data are incorporated into the model but other variables such as credit rating data are excluded from the specification to maximize the sample available for the analysis.

Table I presents descriptive statistics of the variables across the different samples of loans for each of the models in our paper. The definition of these variables is provided in the Appendix. The table presents the mean of the variables across each sub-sample. The liquidity variable in this table is based on our primary definition of liquidity, as per which a loan is classified as a liquid loan if on any day after origination there is a price quote for that loan in our secondary market database, and its first quoted bid price is greater than 98 (par loan).[18] Out of the full sample of 7,912 loans, about 14.9% of the loans are classified as liquid loans using this definition. These liquid loans represent 736 unique borrowers. In our

[18] Note that we only have data for loans that have at least 2 bids, so loans for which only one dealer posted a bid or an ask price are categorized as illiquid.

robustness tests, we consider alternative definitions of liquidity as well to check if our results are sensitive to the definition used for liquidity.

Our full sample of 7,912 loans consists of facilities with a total principal of $1.22 trillion, covering a significant percentage of the total volume of USD syndicated term loans originated during 2000-2004. Even our most restrictive sample, Specification A, includes loans with a total principal of $535 billion dollars. The average size of each loan is about $155 million, with more than 50% of the facilities between $100 million and $500 million. The average maturity of these loans is about four and a half years. Many of these loans are secured and have dividend restrictions, though a relatively smaller fraction has guarantors or sponsors. In addition, many of the loans require agent and/or company consent before the loan can be sold in the secondary market. These restrictive clauses could be an important factor in determining the liquidity of a loan, since they create a potential impediment to the sale of that loan. They could also affect the yield spread on the loan.

Of the loans for which the credit rating data is available, nearly 80% are speculative grade loans. This is not surprising, since investment grade companies (especially high investment grade firms) have greater ability to disintermediate their fund raising activities and borrow directly from the public capital markets via equity, bond or commercial paper issuance. It is the speculative grade borrowers that do not have ready access to public capital markets, who usually approach financial institutions for syndicated loans. The average borrowing firm appears to be marginally unprofitable, as indicated by the mean net income to sales ratio across the borrowers. This is also consistent with most of them being speculative grade.

These loans also differ on lender characteristics. About 68% of the loans have a universal bank as their lead arranger. This is not surprising, since our sample period starts after the abolition of the Glass-Steagall Act, thereby allowing financial institutions to evolve from being pure investment or commercial banks to universal banks who offer the full menu of financial services. In addition, from the mid-nineties onwards, investment banks started to become active lenders in the syndicated loan market, which was traditionally the stronghold of commercial banks. In our sample, only 29% of the loans have a commercial bank as their lead arranger, indicating that pure commercial banks control a much lower fraction of the syndicated loan primary market now. Also interesting is the fraction of the market accounted for by banks in different tiers. Nearly one-third of the loans in our sample have a tier 1 bank as their lead arranger, which is reflective of the dominance of the top three banks (Citigroup, JP Morgan Chase, and Bank of America) in this market. Since these three tier 1

banks are also universal banks, it partially explains why 68% of the loans have a universal bank as their lead arranger.

5. Empirical Results

5.1 Why are Some Loans Liquid? Univariate Analysis

The determinants of loan spreads can be meaningfully examined only within a multivariate framework. However, to obtain some initial information, in Table II we present summary statistics of the dataset decomposed by our liquidity proxy.

We report the decomposition for three of the six specifications (B, E, and F), since they encompass the samples for all the six specifications. The other three specifications (A, C, and D) do not show anything different from that shown from these three specifications. This table highlights some very interesting differences. Liquid loans, on average, have a maturity that is about 20 months longer than that of illiquid loans. One reason for this difference is the much larger percentage (by about 50 percentage points) of institutional loans among liquid loans. These institutional term loan tranches (designated by the lenders as tranches B through H) are carved out specifically for institutional investors, and are issued as installment loans (as opposed to amortizing loans for Term Loan and Term Loan A tranches) with longer maturities.

On average, liquid loans are also of larger size (in terms of principal), as compared to the illiquid loans.[19] A significantly greater percentage of liquid loans have a sponsor, guarantor, dividend restrictions, and collateral. This is quite understandable from the perspective of the investors in this market. A buyer of the loan in the secondary market does not have the extent of information about the borrower that the original lender has. Hence, the buyer would be more interested in purchasing loans that have clauses that mitigate some of the agency costs and the associated moral hazard problems, consistent with the findings of Drucker and Puri (2007). This is also consistent with a larger fraction of the liquid loans being institutional tranches, since they normally have more protective clauses than the tranches that the lenders retain for themselves. In addition, the liquid loans have a greater

[19] Regarding the size of the liquid loans, it is important to note that these loans trade in bits and pieces – the entire loan does not have to be sold as one piece. The minimum tradable size in the secondary loan market has been declining over the years, from over $5 million during the nineties to about $1 million now, which is one of the factors that has facilitated enhanced investor interest in this market.

prevalence of clauses requiring agent and borrower consent, which is also consistent with the prevalence of other restrictive clauses in these loans.

Regarding loan purpose, it appears that there is greater liquidity in loans originated for restructuring purposes, which include takeovers, LBO/MBO, spinoffs, DIP financing, as well as stock buy-backs. Many of these restructuring loans are high yield loans, which might explain their attractiveness to potential investors like CLO hedge funds. In addition, a greater percentage of the liquid loans appear to be concentrated within the consumer and technology sectors.

One of the most significant differences between the liquid and the illiquid loans is in their credit quality at origination. Over 90% of the liquid loans have speculative grade borrowers, while the corresponding fraction for illiquid loans is less than 75%. There is very little trading activity in loans to investment grade borrowers. Nearly the entire market is concentrated on obligors rated BB and B. These are high yield credits that have loan spreads of several hundred basis points over LIBOR. The high spread over LIBOR is an important reason for their attractiveness to the investors in this market.[20] This result is also strikingly different from that reported in studies on the equity markets (see, for example, Stoll (1978) and Wahal (1997)), that more volatile stocks are less liquid (higher inventory costs) and stocks of high risk firms are less liquid (higher adverse selection costs). We find the opposite result; loans of speculative grade borrowers are more liquid that loans of investment grade borrowers. The conventional intuition from the microstructure literature suggests that dealers should be less willing to make markets in speculative grade loans! However, due to demand side factors (discussed in Section 2), there is considerably greater order flow for speculative grade loans, which more than offsets the higher costs of the dealers due to other factors.

Not surprisingly, we observe that the percentage of loans with universal and investment banks as their lead arranger is higher within liquid loans. There is much less liquidity among loans where a commercial bank is the lead arranger. This is perhaps correlated with some of the other loan and borrower characteristics, and well as the differential loan spreads charged by commercial versus investment banks, as observed by Harjoto, Mullineaux and Yi, (2006).

[20] Note that most of these speculative grade loans trade as par/near par loans, implying that they have a market price above 90 (90% of par). Distressed loan trading volume is about one-fourth of the total volume in the secondary market. It is important to understand the distinction between the two terminologies – speculative grade refers to the credit quality of the obligor at origination, while the secondary market segment (distressed/par) refers to the credit quality of the obligor *at the time* the loan is traded.

This could also be due to the closer ties of investment and universal banks with some of the institutional investor clientele that accounts for the bulk of the trading volume in the secondary loan market. Consistent with this observation, we also find that the bulk of the liquid loans are originated by tier 1 banks, which again indicates the impact of the market ties of the lead arranger on the liquidity of these loans.

In terms of our instrumental variables, several differences are documented in the summary statistics presented in Table II. Loans arranged by one of the three top tier banks are more liquid since these banks are also among the most active market makers for these loans in the secondary market. In addition, the higher reputation of the tier 1 banks serves as an assurance to the loan investors about the quality of the loan. Borrowers with liquid loans are also more like to have transparent financial statements in the public domain, indicating that investors in the secondary market have a preference for loans from borrowers who have already issued public debt or equity.

This sub-section has presented some descriptive statistics for univariate comparison of liquid versus illiquid loans along several dimensions. Since many of these variables are correlated with each other, a univariate analysis cannot tell us about the fundamental differences between loans that are liquid versus loans that are illiquid. In order to do that, we analyze these differences within a nonlinear multivariate framework in the next sub-section.

5.2 Multivariate Comparison of Loans by Liquidity

We estimate a probit model for expected liquidity of a loan at origination, based on market observable variables, using the maximum likelihood method. The results for this estimation are presented in Table III. For each of the models, in addition to the instruments identified above, we control for specific loan, borrower and syndicate characteristics as well as macroeconomic variables and time effects. To save space, the table presents the coefficients only for the variables of interest.

First, a Wald Test clearly indicates the joint significance of the instruments. Across all the specifications, our instruments are jointly highly significant. Individually, the lead bank tier is a strong instrument. In particular, having a bank in the top tier as a lead arranger greatly increases the probability that the loan will become available in the secondary market. The transparency of the financial statements of the borrower is significant only in the full sample (F). This is because sample F contains a larger proportion of loans from small, private firms

that have never had any prior public debt or equity issue. The other samples do not have that many non-transparent firms hence there isn't enough power, though the coefficients have the correct sign. Our results are robust to the exclusion of these instruments.

In addition, several variables are significantly associated, within the multivariate framework, with the probability of a loan being liquid. These variables reflect factors that affect the investor demand for syndicated loans. For example, longer maturity loans have greater liquidity, even in the presence of all other variables. This result is strongly significant across all six samples. The presence of a sponsor, dividend restrictions, and collateral also increase the liquidity of a loan. These results are quite understandable, since all three of these features reduce the risks introduced due to information asymmetries between the loan-origination bank and the buyer of the loan in the secondary market. In particular, these three features of a loan reduce the borrower's probability of default, as well as the loss given default (LGD) of the loan. Surprisingly, the presence of a guarantor does not improve the liquidity of the loan, once the presence of a sponsor is controlled for. Furthermore, while agent consent and company consent lower the expected liquidity of a loan, the result is not statistically significant. The liquidity of a loan is also increasing in the number of lead banks. In general, as the loan size increases, the need for additional banks in the syndicate also increases. In order to meet this need, co-lead arrangers are often brought into the negotiations to further increase the potential reach of the syndicate amongst the institutional investor clientele. As the syndicate becomes larger, the potential for any of the syndicate members to sell the loan in the secondary market also increases.

Among firm risk variables, the most significant effect relates to the market segment of the loan. As observed earlier, investment grade loans are less likely to be liquid than speculative grade loans, across the three samples for which firm credit rating data is available. This result holds up even when individual credit ratings are introduced as variables in the probit model, rather than just a binary classification into investment and speculative grade firms. This result is driven by both the type of investors active in the secondary loan market (increased order flow), as well as the incentives of the bank selling the loan (increased supply).

On the supply side, from a bank's perspective, one of the reasons why they sell loans is to manage the credit risk of their loan portfolios. Due to the classic credit paradox, banks end up with excessive risk exposure to some obligors, due to the obligations of maintaining lending relationships. This excessive risk exposure is more problematic if the obligors are

speculative grade than if they are investment grade. Since excessive risk exposure to a particular obligor is inefficient from a portfolio risk-return perspective, they must sell of some of these loans in order to maximize risk-adjusted returns.[21] Since these incentives are much stronger when the obligors are speculative grade, we see many more speculative grade loans being sold rather than investment grade loans.

On the demand side, some of the largest investors in this market are hedge funds (and other money managers) who buy syndicated loans due to their higher risk-adjusted returns and lower correlation with other asset classes like stocks and bonds. These investors are primarily hunting for yields, which are significantly higher in the speculative grade segment. Therefore, there is much less demand in the secondary market for investment grade loans.

The results of the probit model are consistent across all six specifications, which indicates the robustness of our inferences about the loan and firm variables that significantly improve the liquidity of a loan in the secondary market. Furthermore a Wald test indicates that the instruments are statistically strong.

To further facilitate our exposition of the probit models, in Table IV we present the marginal effects based on the probit models discussed above. Unlike the previous table, the reported statistics are directly interpretable as the change in the probability associated with a unit increase in the choice variable from the mean. In the case of the dummy variables, the marginal effect is calculated for a discrete change from 0 to 1. Overall, the results are similar to the ones reported above. However, the marginal impact of the instrumental variables is of special interest. In particular, using a tier 1 bank as a lead arranger increases the probability of a loan becoming liquid by between 5.1% and 19.0% depending on the model chosen.

While the probit model is essential for understanding why some loans are liquid in the secondary market and others are not, it is an intermediate step to our primary question of whether banks price the expected liquidity of a loan in the primary market. The probit model is used to forecast the expected liquidity of the loan at the time of origination. In Table V, we presents the summary statistics for the expected liquidity measure decomposed by our

[21] Banks can use the credit default swap market as an alternative mechanism for laying off the credit risk exposure to a particular obligor. However, credit default swaps are typically available (at reasonable prices) only for investment grade obligors (and mostly high investment grade obligors). Therefore, this alternative is either not feasible or prohibitively expensive for most speculative grade obligors.

liquidity proxy for models B, E, and F, since they encompass the samples for all the six specifications. The other three specifications (A, C, and D) do not show anything different from that shown from these three specifications. The main observation from this table is that the expected liquidity measure is significantly higher for the liquid loans as compared to the illiquid loans. For example, in model B the average expected liquidity measure for the illiquid sample is 22.2%, while it is much higher at 62.6% for the liquid sample. The difference between the two is statistically significant at the one percent level. These statistics give us additional confidence that our probit model indeed differentiates liquid loans from illiquid loans effectively. However, an important observation is the surprisingly high expected liquidity measure for some illiquid loans. This may be due to the specific liquidity proxy used in these tests. We use the proxy for liquidity based on our primary definition of liquidity, that a loan is liquid if on any day after origination there is a price quote for it in our secondary market database. Due to data constraints, this variable is potentially censored for some loans, especially the ones originated in recent years.[22]

In the meantime, to further examine the robustness of our expected liquidity measure, we present its distribution, for specifications B, E, and F, decomposed by our liquidity proxy, in panels A, B, and C of figure 3 respectively. The large probability mass to the left of the distribution for the illiquid loans suggests that the majority of these loans are unlikely to ever be available on the secondary market. In contrast, the probability mass for the liquid loans is concentrated towards the right, indicating that most of the liquid loans indeed have a high expected liquidity measure as per our probit model. These distributions suggest that our probit model is indeed able to distinguish liquid loans from illiquid loans in a statistically significant manner. Alternatively, our expected liquidity measure is highly correlated with the realized liquidity of the loans.

In summary, these results clearly show that there are significant differences between liquid and illiquid loans. They also suggest that, using only the information available at the time of loan origination, it is possible to predict the expected liquidity of a loan with some accuracy. In the next section, we examine whether banks incorporate the expected liquidity of the loan, conditional on information available at the time of loan origination, into the price of the loan in terms of its yield spread.

[22] This is not a big concern, since *most* of the loans that are liquid become available on the secondary market within a few days to a couple of months after origination. The average time for a liquid loan to appear on the secondary market has been declining over the years. In many instances, a loan becomes liquid on the day of its origination, sometimes even before its origination date (traded on a "when issued" basis).

5.3 *Do Banks Price Expected Liquidity?*

The liquidity of a loan in the secondary market provides the originating bank with clear cost advantages. If the primary market for loan originations is competitive, then some or all of this liquidity related cost advantage to the originating bank must be passed on to the borrowing firms. In this section, we examine whether some of this secondary market liquidity related cost advantage is indeed being passed on to the borrowing firms in terms of lower loan spreads in the primary market.

Table VI presents the results for the empirical models for loan spreads with appropriate controls. The independent variable for expected liquidity is obtained from the fitted values in the first stage probit model. We find that, across all six loan samples, ranging from 1,591 loans to 7,912 loans, the coefficient on expected liquidity is negative and highly significant.[23] For example, for model F, the coefficient of -88.35 indicates that for every 1% increase in expected trading probability of a loan at origination, the loan spread (over LIBOR) reduces on average by about 0.88 basis points, after controlling for all other determinants of loan spreads. This reduction in loan spread is of a sizable magnitude, since at the theoretical extremes, the spread on a loan with expected liquidity of 100% would be 88 basis points lower than that on a loan with zero probability of being liquid, controlling for all other effects.

In all of these models, we control for the effects of several types of variables on loan spreads, to ensure that what we observe as a liquidity effect is not in fact due to any other variable missing from our model. In particular, we control for the risk, information asymmetry and opaqueness of the firm using credit ratings as well as other firm-specific variables like size, profitability, long-term debt etc.[24] We control for loan purpose, firm industry, bank/issuer characteristics, macroeconomic variables and year fixed effects, in addition to all the loan variables listed in Table I. Our results for the coefficients of these variables as well as our model R-squares are consistent with those reported in prior studies. For example, we find that, across all models, the presence of a loan sponsor and dividend restrictions are

[23] Our standard errors in all the tests are robust and clustered at the firm level to correct for any bias due to the potential correlation of residuals for loans for the same firm. See Petersen (2007) for more details.

[24] As mentioned earlier, we also included several other control variables (R&D intensity of the firm, intangible asset ratio, etc.) in the model to examine whether they had any effect on our results. We did not include these variables in the final model specifications reported in the paper since these variables were insignificant.

associated with higher loan spreads, controlling for all other variables. This is consistent with the results reported by Santos and Winton (2005). Similarly, the presence of collateral is associated with higher loan spreads – this effect has been reported by many prior studies, including Angbazo, Mei and Saunders (1998), Strahan (1999), Chen (2005), Casolaro, Focarelli and Pozzolo (2005), Harjoto, Mullineaux and Yi (2006), Mazumdar and Sengupta (2005) and Santos and Winton (2005).

One could put forward an alternative argument that the lower spreads on the loans that are liquid could partially be due to positive unobservable private information that the bankers may possess about the borrowers. By definition one cannot control for such differences across borrowers. However, this argument raises several questions. First, why should a bank sell a loan about which it has positive private information? These are precisely the loans that a bank would like to hold. Second, since the private information with the bankers is unobservable, the secondary market investors have no access to it. In that case, the loan buyers will not offer any premium for such loans, so why should these loans be any more liquid? Of course, outside investors may use bank reputation as a proxy for such information, but that is already controlled for in our tests as an instrument for loan liquidity. Third, such information is likely to be highly idiosyncratic and firm-specific. Therefore, it is unlikely to systematically affect our results that are based on 7,912 different loans to 4,975 unique borrowers. Fourth, as we will show in the matched sample analysis later in section 6.2, the liquidity effect we document is at the loan level, not at the borrower level.[25] For the same borrower-lender combination, there are liquid as well as illiquid loans that exist in the market at the same time, which cannot differ on unobservable private information with the lender. Lastly, given the number of control variables we have in our model, the residual effect of any unobservable private information with the lender cannot be as large as 88 to 137 basis points in magnitude (which is the size of the liquidity effect that we observe in this market).

Nevertheless, we re-estimate our models with firm fixed effects in the second stage to control for any unobserved borrower heterogeneity, similar to Guner (2006). To accommodate firm

[25] The liquidity of loans is driven by investor demand. As explained in Section 2, investors have preference for certain type of loans. For example, a hedge fund may be interested in buying only long maturity loans of a BB borrower, in which case the short maturity loans of the same borrower may not have a secondary market. Therefore, the liquidity of loans, while being related to borrower characteristics, is also dependent on loan characteristics, and is thus loan specific. This is similar to the notion that different claims issued by the same firm (debt versus common stock versus preferred stock) may have different levels of liquidity due to different investor clientele/preferences.

fixed effects, we must drop firms with only one loan in the sample. However, on average we only have about 2 loans per firm; therefore, the inclusion of firm fixed effects drastically reduces our sample sizes for all the specifications. For specification F (our full sample), we are left with 5,205 facilities representing 1,855 unique firms. The coefficient of expected liquidity for this specification is -138.03 with a robust t-statistic of 5.73. For specification E, the sample includes 2,158 facilities with 714 unique firms and the coefficient of expected liquidity is -100.43 with a robust t-statistic of 2.31. Both these results are highly significant and consistent with our results without firm fixed effects. For the other specifications (A through D), the coefficient of expected liquidity has the correct (negative) sign, but lower significance due to the much smaller sample sizes. Therefore, unobserved borrower heterogeneity does not appear to have any effect on our results.

We obtain an interesting result for institutional tranches. These loans have higher spreads than those for tranches that are held by the banks themselves, controlling for all other variables. This result is consistent with the findings of Harjoto, Mullineaux and Yi (2006). However, in the previous section, we find that institutional tranches have a greater probability of trading. Therefore, even through institutional tranches are more liquid, and their higher expected liquidity depresses their loan spread, they still have higher loan spreads than other tranches. This effect is largely due to the longer duration of the institutional loans, since they are installment loans with back-end loaded repayment schedules that increase their duration. This effect of longer duration is not adequately captured by the maturity variable.

Predictably, investment grade loans have lower spreads than speculative grade loans. This risk effect is consistent across individual credit ratings as well. Depending on the model, our results suggest that the spread on investment grade loans is on average lower by between 100 and 140 basis points, compared with speculative grade loans, adjusting for all other determinants of loan spreads.

To test the validity of the instruments we take advantage of the non-linear properties of the model in the first stage. Specifically, since the probit model is a non-linear model, we can include the instruments in the second stage and the model will be technically identified as discussed in Wooldridge (2002). This allows us to perform a test of over-identification using all the instruments. The results presented at the bottom of Tables VI and VII and labeled as Wald Test of Restrictions indicate that the instruments are not related to the loan spread. This confirms the validity of the instruments since they satisfy the exclusion restriction.

In Table VII, we present the OLS model for loan spreads using the relative spread as the measure of loan pricing, similar to the measure used by Angbazo, Mei and Saunders (1998). The relative spread is defined as the ratio of the loan spread over LIBOR to the LIBOR at the time of origination of the loan. The intuition behind examining the relative spread model is two-fold. First, we want to check whether the inferences that we arrive at using the absolute spread model hold when we move to a relative spread pricing framework. Second, the comparison of the relative spread model to the absolute spread model can provide important insights into the implicit pricing process used by the loan originators in the primary market.

The results of the relative spread model are consistent with the results for the absolute spread model. The coefficient on expected liquidity is negative and strongly significant for all the six specifications. For example, for the full sample of 7,912 loans, the coefficient on expected liquidity is -0.464, which indicates that for every 1% increase in the expected liquidity of a loan at origination, the loan spread is lower, on average, by about 0.464% (as a percentage of the LIBOR on the date of origination). To put that in perspective, if the current 3-month LIBOR is 5%, then for every 1% increase in the expected liquidity of the loan, the loan spread is on average lower by about 2.3 basis points, controlling for all other determinants of loan spreads. Thus, the liquidity pricing coefficient is again of significant magnitude. The sign and significance of most of the other variables, like sponsor, dividend restrictions, collateral, institutional tranche, and credit rating, are similar to those reported in Table VI for the absolute spread model.

It is interesting to note that all the relative spread models have significantly higher explanatory power as compared to the absolute spread models. For example, for our full sample of 7,912 loans, the relative spread model has an adjusted R-squared of about 58%, while it is about 36% for the absolute spread model. This increase in R-squared is again consistent with the higher explanatory power for relative spread models reported in Angbazo, Mei and Saunders (1998). More importantly, it may shed light on the *implicit* pricing process being used by the banks originating these loans. It appears that banks may be pricing different variables into loan spreads based on the term structure environment at the time of loan origination, instead of just using absolute adjustments for each of these variables. Further, it is likely that much of this relative pricing effect may be implicit in their pricing process, without every pricing variable being explicitly determined as a percentage of LIBOR.

Our results in this section on expected liquidity strongly suggest several inferences. First, if banks systematically price expected liquidity into loan spreads at origination, then they must have some ability to discern, at or before origination, which loans are more likely to be liquid in the secondary markets. If they had no ability to systematically predict the liquidity of these loans, we should not observe the systematic pricing of expected liquidity in the primary market that we document across all our samples. Second, they indicate that the market for syndicated loan originations is quite competitive, which creates the necessary incentives for banks to pass on some of the benefits of expected liquidity to the borrowing firms. If banks were not actively competing with each other for syndication business, there would not be any incentive for them to pass these benefits on to the borrowing firms, except for the naïve hypothesis of altruistic motives. These results point towards a certain degree of "efficiency" in the pricing of syndicated loans in the primary market. Third, there appear to be clear, tangible benefits of the emergence of an active secondary market for syndicated loans. Given our estimated savings of 88 basis points and an average expected liquidity of 14.9 percent for our full sample of 7,912 loans, representing $1.22 trillion in principal, the estimated *annual* benefit to the borrowing firms *just in our sample*, in the aggregate, is over $1.6 billion.

6. Additional Robustness Tests

6.1 Alternative Measures of Liquidity

In all our tests above, we consider a loan to be liquid if there are more than two bid price quotes for that loan, on any day, in our secondary market database, and its first quoted bid price is greater than 98 (par loan). Since actual trade information on loans is not available, we have to rely on the appearance of price quotes for these loans as a proxy for dealer/market interest and liquidity of that loan. However, this is a fairly large and active market, so if two or more dealers have posted two-way price quotes for a loan, it is reasonable to assume that it was possible to trade the loan on that day. In addition, if the loan was first quoted at par, it implies that the loan did not have to be discounted to be sold in the secondary market. Therefore, it is reasonable to categorize this loan as liquid, since it had a secondary market at a fair price. In any case, as explained earlier, any error in our categorization will only bias our tests against finding any results. We use this definition as our primary measure of liquidity, and call it *Liquid 0*.

To test the robustness of our results to alternative definitions of liquidity, we construct three additional measures of liquidity using the time-series of price quotes from the secondary market database. The first alternative measure of liquidity (*Liquid 1*), more stringent than the first, considers a loan to be liquid only if the price quotes for that loan appear in our database within one year of its origination. This categorization also alleviates a potential problem with the first measure – that loans originated during the earlier part of our sample period have had more opportunity (time) to be available on the secondary market, as compared to the loans originated later. The second alternative measure (*Liquid 2*) exploits the time-series information on the price quotes for each loan, and considers a loan to be liquid only if it is quoted in the market for at least 100 trading days. This is an even stricter measure of liquidity, since it considers the loan to be liquid only if there was sustained market interest in that loan over a long period of time. The third alternative measure (*Liquid 3*), also based on the time-series information on the price quotes for each loan, categorizes a loan as liquid only if the median number of dealers who posted price quotes for it, over the time for which it was quoted in the market, is at least three. This implies that there must have been three or more dealers who posted two-way price quotes for it for at least half of the time period over which this loan was quoted in the market.[26]

Table VIII presents the percentage of loans that are categorized as liquid under these four definitions of liquidity across the six loan samples analyzed in this paper. The definitions of liquidity get increasingly restrictive as we move from the primary definition (*Liquid 0*) to the third alternative definition (*Liquid 3*). For example, in our full sample of 7,912 loans, 14.9% are classified as liquid loans as per our primary definition of liquidity, while only 9.3% are classified as liquid using the definition *Liquid 3*. A similar trend is observed across all six samples. The percentage of loans categorized as liquid is significantly higher in the first five samples (A through E) since they require the firms to either have Compustat data, or at least credit rating data in DealScan. The firms that get excluded from these five samples are generally smaller, private firms, whose loans are less liquid, which causes the percentage of liquid loans to be lower in sample F. However, across all samples and all definitions of liquidity, there are a large number of liquid and illiquid loans. Hence there is sufficient power in all our empirical tests across all sub-samples.

Using these four alternative definitions of liquidity (the primary definition and the three additional definitions), we repeat our two-stage analysis across all six samples. As before, we

[26] All of these alternative measures still retain the restriction that the loan should be first quoted at par, i.e., at a price greater than 98. All of our results are robust to the exclusion of this restriction.

estimate the stage 1 probit model and then use the expected liquidity from this model as the dependent variable in the stage 2 loan spread model (we report the results for the absolute spread model for all the robustness tests – the results are similar using the relative spread model). The coefficients on the expected liquidity variable across these samples and alternative definitions of liquidity are presented in Table IX. For brevity, we do not report all the other variable coefficients – the structure of these empirical models is identical to the ones reported in Table VI, with the same control variables. A simple examination of the results in Table IX reveals that higher expected liquidity is strongly associated with lower loan spreads, controlling for all other determinants of loan spreads, across all four definitions of liquidity. The coefficients are of the same sign and similar magnitude, and are all highly significant (using robust standard errors clustered at the firm level). For example, in our full sample of 7,912 loans (sample F), even using the most stringent definition of liquidity (*Liquid 3*), our primary result remains unchanged. The coefficient on expected liquidity using *Liquid 3* is -93.205, which is similar to the coefficient of -88.351 using our primary definition of liquidity (*Liquid 0*). These results are also robust to using firm fixed effects to control for unobserved borrower heterogeneity.

All twenty-four of these tests lead us to the same inference – controlling for all other determinants of syndicated loan spreads, in the primary market, banks charge lower spreads on loans that have higher expected liquidity in the secondary market. While the magnitude of this pricing effect may vary slightly, depending on the definition of liquidity as well as the specific sample of loans, the difference in pricing between loans at the two extremes of expected liquidity is remarkably stable, between about 80 and 150 basis points. This is of significant magnitude, compared to the effect of some of the other determinants of loan spread like credit rating, firm specific variables, and loan parameters.

6.2 Matched Sample Results

As an alternative research design to our two stage approach presented above, we examine a matched sample of loans (in the spirit of Longstaff (2004)). The matched sample is constructed by identifying two loan agreements with the same borrower and lender, with origination dates in close proximity to each other, where one of the loans later becomes liquid while the other remains illiquid. The loan characteristics of the liquid loan are then compared to those for the illiquid loan. If the characteristics are comparable then differences in the spread can be interpreted as evidence of a liquidity effect.

Table X presents the results of the matched comparison of liquid and illiquid loans. Three distinct samples are presented based on the proximity of the facility start dates. The first sample requires the liquid and illiquid loans to have the same facility start date. In total, 180 matched pairs are identified and a comparison of the loan characteristics is presented in the second and third columns. The illiquid loans appear to be shorter in duration (62 months versus 74 months) and smaller in size ($224 m versus $322 m) when compared to the liquid loans. More importantly, the illiquid loans are much less likely to be issued as institutional tranches. The other loan characteristics are similar across our liquidity measure. Interestingly, these results are similar to the differences described in table II for the full sample of loans. In terms of the loan spread at origination, in this univariate setting, there is no difference in the yield between the liquid and illiquid loans. However, that does not imply that there is no liquidity effect. The fact that the matched liquid loans are of longer maturity, larger size, and more likely to be institutional loans (all of these are variables that *increase* loan spreads), and yet have similar yield spreads, indicates that controlling for these variables, the spread on the liquid loans would be lower than that on the matched sample of illiquid loans. Note that the matched loans have the same borrower as well as lender, so there is no difference in any borrower or lender characteristics.

The second sample examines the loans to the same borrowing firms originated within one month of each other, excluding those with the same facility start date (since these are already accounted for above in the first sample). This provides 16 additional matched pairs. The illiquid loans in this sample are shorter in duration (44 months versus 64 months), similar in size ($313 m versus $315 m), but less likely to be institutional tranches (38% versus 75%). Other differences include the presence of a guarantor (13% versus 25%) and security (38% versus 63%). Despite these differences, the loans are nearly identical on several dimensions, most importantly on credit risk, information asymmetry and opaqueness. The initial spread for the illiquid loans is 397 basis points compared to 322 basis points for the liquid loans, even though they are less likely to be institutional term loans (that have higher spreads). Although this difference of 75 basis points is again in a univariate setting, it indicates the pricing of expected liquidity, since the liquid loans have lower spreads at origination. Similarly, the third sample focuses on loans originating between thirty and ninety days of each other, which provides 20 matched pairs. The loan characteristics for this third sample are mostly similar, while the average loan spread on the liquid loans is lower than that for the illiquid loans by 60 basis points, again confirming the prior evidence on the liquidity effect.

The results in this section present evidence on the pricing of liquidity in syndicated loan spreads. The matched samples present an ideally controlled setting in which the loans being compared are identical on all borrower, lender as well as macroeconomic variables. This makes it easier to compare the loan spreads of liquid loans with illiquid loans. In particular, since there is no difference in the unobservable private information with the lender about the borrower between the liquid and illiquid loans, the difference in loan spreads can be directly attributed to differences in liquidity. Across three difference samples, this analysis shows that the spreads on liquid loans, at the time of origination, are consistently lower than those on illiquid loans. The results also show that this liquidity effect is at the loan level, not at the borrower level, since there are liquid as well as illiquid loans for the same borrower. This suggests some ability on the part of the loan originators to discern the expected liquidity of these loans at the time of their origination. It also indicates that they charge lower spreads on the more liquid loans, suggesting that there are benefits to enhancing the liquidity of their asset portfolios, some of which are being passed on to the borrowing firms.

7. Concluding Remarks

Our primary objective is to examine whether the expected liquidity of syndicated term loans is priced into their yield spread at the time of their origination. To answer this question, we develop a two-stage empirical model. In the first stage, we develop a probit model to identify the attributes of loans that are liquid and to estimate how these different characteristics affect the probability that a loan will be available on the secondary market. We find that loans with longer maturity, institutional loans, loans with the presence of a sponsor, dividend restrictions, and collateral, and loans with larger syndicates led by top tier banks have a greater likelihood that they will be available on the secondary market. In the second stage of the analyses, we examine whether this expected liquidity measure is priced in the primary market loan spread. Across several model specifications, we find a robust result: expected liquidity has a highly significant negative coefficient, indicating that banks charge lower primary market spreads on loans that have higher expected liquidity in the secondary market. Our empirical specifications control for several alternative explanations that include differences in credit risk, information asymmetry and opaqueness between the borrowers of liquid and illiquid loans. In addition, we control for differences in the syndicate characteristics and macroeconomic variables.

Controlling for the other determinants of loan spreads, the difference in pricing between loans at the two extremes of expected liquidity is remarkably stable, between 88 and 137

basis points. This difference is of significant economic magnitude, compared to the effect of some of the other determinants of loan spreads like credit rating, firm specific variables, and loan parameters.

We make four important contributions to the literature. First, we analyze liquidity at a more fundamental level – we identify the factors that determine whether secondary markets are made *at all* for certain assets or not. Ours is the first paper to examine liquidity from such a perspective. Our results provide insights into the factors that affect the decision of financial intermediaries to make secondary markets for assets that are relatively more illiquid (as compared to common stocks, for example). Second, we analyze the determinants and pricing impact of liquidity in a "private" market, as opposed to the public debt and equity markets. The private syndicated loan market has a trading friction (agent and/or borrower consent) that makes this analysis different and important. Third, we show that the conventional intuition that risky assets or claims issued by riskier firms are more illiquid, need not always be true. We find that loans from risky borrowers are more liquid than loans from safer borrowers, primarily due to higher investor demand that increases the order flow for riskier loans. The enhanced order flow lowers dealer costs and inventory risk, more than offsetting any adverse selection costs. Fourth, we identify a new variable, namely expected liquidity, which is priced in syndicated loans at the time of origination. This marks a significant departure from the extant literature which, with the exception of Ellul and Pagano (2006), has focused on examining the impact of liquidity on asset prices in the secondary market only. In contrast to the previous studies, we document the impact of *secondary* market liquidity on the *primary* market issuance price of syndicated loans. Our paper is also the first in the literature to develop a model that can predict the expected liquidity of a syndicated term loan at the time of its origination.

Our results have important implications for the competitive structure of the loan syndications market. If the emergence of an active secondary loan market provides a competitive setting, originating banks must pass on some of their cost savings to the borrowing firms. Our results indicate that the loan arranger shares at least part of their reduced costs with the borrower. We estimate that the aggregate annual savings to borrowers just in our sample given the pricing of this liquidity factor is over $1.6 billion, thus lowering their cost of capital. This should increase the valuation of the borrowing firms. We leave it for future research to examine whether the increase in liquidity in the secondary loan market has had a positive effect on the market value of borrowers.

Appendix

Variable definitions

Loan Variables

Liquid	Dummy=1 if loan is categorized as liquid
Maturity	Maturity of the loan in months
Facility amount	loan facility amount in millions
Standard	Dummy=1 if maturity of loan is an integer
Guarantor	Dummy=1 if the loan has a guarantor
Sponsor	Dummy=1 if the loan has a sponsor
Dividend restrictions	Dummy=1 if the loan has covenants restricting dividend payments
Secured	Dummy=1 if the loan is secured
Refinancing indicator	Dummy=1 if the loan is refinancing a previous loan
Syndicate	Dummy=1 if distribution method is syndication
Hybrid	Dummy=1 for term loans that have some features of bonds, like lower covenants and amortizing payments
Institutional	Dummy=1 if the loan was an institutional tranche, i.e., a term loan tranche B or above, specifically carved out for institutional investors
Agent Consent	Dummy=1 if agent's agreement is required to sell the loan
Company Consent	Dummy=1 if borrower's agreement is required to sell the loan
Required lenders	Percentage of lenders that must approve non-material amendments and waivers

Firm Variables

Investment grade	Dummy=1 if the loan is investment grade, i.e. BBB or above.
A S&P Rating	Dummy=1 if firm is rated A or above by S&P
BBB S&P Rating	Dummy=1 if firm is rated BBB by S&P
BB S&P Rating	Dummy=1 if firm is rated BB by S&P
B S&P Rating	Dummy=1 if firm is rated B by S&P
CCC S&P Rating	Dummy=1 if firm is rated CCC by S&P
D S&P Rating	Dummy=1 if firm is rated D by S&P
Sales	Sales of the borrower
Profitability	Net income divided by sales
Debt	total long-term debt

Loan Purpose

Capital Budgeting	Dummy=1 if loan purpose is capital budgeting, including capital expenditure, project finance, acquisition
LT financing	Dummy=1 if loan purpose is LT financing, including recapitalization, debt repayment
ST financing	Dummy=1 if loan purpose is ST financing, including working capital, CP backup
Restructuring	Dummy=1 if loan purpose is restructuring, including takeover, LBO/MBO, spinoff, DIP, stock buy-back
Other	Dummy=1 if loan is for other general purposes

Syndicate Variables

Number of banks	Number of lead banks in the syndicate
Investment bank	Dummy=1 if the lead bank is an investment bank
Commercial bank	Dummy=1 if the lead bank is a commercial bank
Universal bank	Dummy=1 if the lead bank is a universal bank
Others	Dummy=1 if the lead bank is a finance company, development bank or others
Tier 1 bank	Dummy=1 if the lead bank is amongst the top three in the league tables for 1998-99.
Tier 2 bank	Dummy=1 if the lead bank is between 4th and 30th in the league tables for 1998-99.
Tier 3 bank	Dummy=1 if the lead bank below 30th in the league tables for 1998-99

Macroeconomic Variables

capvol2	Implied volatility of a 2-year maturity interest rate cap on the 3m LIBOR
1yrminus3m	Difference between the 1-year and the 3-month spot rates
BBBminusAAA	Difference between the long-term yields on BBB and AAA debt

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Table I
Summary Statistics

This table presents the summary statistics for each sample presented in the results section. The samples are organized by empirical specifications A through F. The summary statistics are specific to control variables included in each specification. The reported control variables include loan specific characteristics, firm specific characteristics and bank specific characteristics.

	[A]	[B]	[C]	[D]	[E]	[F]
Loan Specific Characteristics						
Liquid	0.372	0.372	0.372	0.398	0.374	0.149
Maturity in Months	54.782	54.782	54.782	56.969	58.653	54.170
Facility Amount in millions	336.555	336.555	336.555	321.906	279.946	154.611
Guarantor	0.118	0.118	0.118	0.122	0.108	0.075
Sponsor	0.204	0.204	0.204	0.232	0.322	0.217
Dividend Restrictions		0.590	0.590	0.632	0.504	0.214
Dividend Restrictions Missing		0.332	0.332	0.293	0.432	0.747
Secured		0.596	0.596	0.642	0.594	0.293
Secured Missing		0.332			0.345	0.661
Refinancing Indicator		0.733			0.670	0.414
Refinancing Indicator Missing		0.096			0.142	0.327
Hybrid		0.040	0.040	0.045	0.076	0.037
Hybrid Missing		0.346			0.343	0.485
Institutional	0.464	0.464	0.464	0.505	0.499	0.212
Required Lenders	0.649	0.649	0.649	0.690	0.539	0.219
Agent Consent		0.652			0.540	0.229
Agent Consent Missing		0.344			0.458	0.769
Company Consent		0.620			0.513	0.209
Company Consent Missing		0.360			0.471	0.777
Loan Purpose						
Short-term Financing	0.187	0.187	0.187	0.186	0.159	0.147
Long-term Financing	0.180	0.180	0.180	0.186	0.190	0.160
Restructuring	0.234	0.234	0.234	0.246	0.271	0.163
Other	0.292	0.292	0.292	0.291	0.292	0.383
Firm Characteristics						
Investment Grade			0.226	0.183	0.177	
A S&P Rating	0.022	0.022				
BBB S&P Rating	0.199	0.199				
BB S&P Rating	0.437	0.437				
B S&P Rating	0.294	0.294				
CCC S&P Rating	0.030	0.030				
D S&P Rating	0.013	0.013				
Sales	2,990.216	2,990.216	2,990.216	3,111.968		
Profitability	-0.007	-0.007	-0.007	(0.074)		
Ln(Debt)	6.756	6.756	6.756	6.641		

Table I (continued)

Firm Characteristics						
Consumer	0.195	0.195	0.195	0.208	0.194	0.168
Technology	0.103	0.103	0.103	0.127	0.106	0.062
Health	0.047	0.047	0.047	0.047	0.043	0.026
Manufacturing	0.354	0.354	0.354	0.360	0.348	0.279
Other Industry	0.301	0.301	0.301	0.258	0.309	0.465
Bank Characteristics						
Number of Banks	7.066	7.066	7.066	7.064	6.807	4.811
Investment Bank	0.182	0.182	0.182	0.192	0.207	0.093
Commercial Bank	0.166	0.166	0.166	0.144	0.169	0.291
Universal Bank	0.810	0.810	0.810	0.817	0.799	0.675
Other Bank	0.031	0.031	0.031	0.031	0.042	0.113
Number of Lead Banks	1.507	1.507	1.507	1.468	1.588	1.469
Loan Origination Year						
2000	0.169	0.169	0.169	0.202	0.189	0.176
2001	0.163	0.163	0.163	0.152	0.143	0.163
2002	0.190	0.190	0.190	0.183	0.168	0.178
2003	0.238	0.238	0.238	0.235	0.212	0.205
2004	0.240	0.240	0.240	0.228	0.288	0.278
Instruments						
Tier 1 Bank	0.531	0.531	0.531	0.542	0.463	0.318
Tier 2 Bank	0.309	0.309	0.309	0.311	0.379	0.312
Transparency	0.848	0.848	0.848	0.815	0.525	0.248
N	1,591	1,591	1,591	1,657	2,791	7,912

Table II

Summary Statistics by Liquidity Proxy

This table presents the summary statistics decomposed by our liquidity proxy for three samples. The samples from models B, E and F were chosen because they encompass all six models presented in the results section. Summary statistics reported include variables measuring loan specific characteristics, firm specific characteristics and bank specific characteristics. *** signifies statistically different from liquid = 0 at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better.

	[B]		*[E]*		*[F]*	
	[liquid=0]	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**
Loan Specific Characteristics						
Maturity in Months	46.875	68.127***	51.089	71.310***	51.212	71.064***
Facility Amount in millions	307.229	386.043**	249.659	330.629***	124.974	323.866***
Guarantor	0.099	0.150***	0.085	0.147***	0.075	0.137***
Sponsor	0.141	0.311***	0.247	0.447***	0.217	0.443***
Dividend Restrictions	0.485	0.765***	0.406	0.670***	0.214	0.624***
Dividend Restrictions Missing	0.407	0.204***	0.515	0.293***	0.747	0.343***
Secured	0.457	0.829***	0.459	0.819***	0.293	0.778***
Secured Missing	0.424	0.145***	0.455	0.160***	0.661	0.202***
Refinancing Indicator	0.665	0.848***	0.623	0.744***	0.413	0.718***
Refinancing Indicator Missing	0.128	0.042***	0.176	0.084***	0.327	0.103***
Hybrid	0.024	0.068***	0.063	0.099***	0.037	0.098***
Hybrid Missing	0.373	0.299***	0.384	0.274***	0.519	0.290***
Institutional	0.297	0.745***	0.336	0.773***	0.212	0.753***
Required Lenders	0.569	0.784***	0.459	0.672***	0.219	0.625***
Agent Consent	0.575	0.782***	0.461	0.670***	0.229	0.624***
Agent Consent Missing	0.421	0.215***	0.537	0.326***	0.769	0.372***
Company Consent	0.539	0.758***	0.431	0.650***	0.209	0.605***
Company Consent Missing	0.435	0.231***	0.551	0.337***	0.777	0.383***
Loan Purpose						
Short-term Financing	0.198	0.169	0.177	0.127***	0.147	0.119***
Long-term Financing	0.166	0.204**	0.178	0.209***	0.160	0.199***
Restructuring	0.208	0.277***	0.220	0.355***	0.163	0.360***
Other	0.314	0.255**	0.336	0.219***	0.383	0.227***
Firm Characteristics						
Investment Grade			0.245	0.064***		
A S&P Rating	0.031	0.007***				
BBB S&P Rating	0.267	0.083***				
BB S&P Rating	0.381	0.532***				
B S&P Rating	0.265	0.341***				
CCC S&P Rating	0.033	0.025				
D S&P Rating	0.016	0.007				
Sales	3,174.766	2,692.813**				
Profitability	0.016	-0.045				
Ln(Debt)	6.640	6.944***				

Table II (continued)

Firm Characteristics						
Consumer	0.178	0.225**	0.175	0.226***	0.168	0.231***
Technology	0.078	0.145***	0.094	0.127***	0.062	0.121***
Health	0.041	0.057	0.038	0.052*	0.026	0.046***
Manufacturing	0.360	0.343	0.352	0.336	0.279	0.327**
Other Industry	0.343	0.230***	0.341	0.259***	0.465	0.275***
Bank Characteristics						
Number of Banks	6.733	7.628***	6.819	6.788	4.811	6.895***
Investment Bank	0.154	0.228***	0.171	0.267***	0.093	0.250***
Commercial Bank	0.209	0.093***	0.217	0.088***	0.291	0.100***
Universal Bank	0.767	0.882***	0.765	0.854***	0.675	0.856***
Other Bank	0.043	0.010***	0.060	0.013***	0.113	0.020***
Number of Lead Banks	1.446	1.610	1.580	1.600	1.469	1.627***
Loan Origination Year						
2000	0.173	0.164	0.197	0.176	0.176	0.188
2001	0.189	0.118***	0.153	0.127*	0.163	0.120***
2002	0.200	0.174	0.178	0.151*	0.178	0.157**
2003	0.211	0.282***	0.187	0.253***	0.205	0.252***
2004	0.227	0.262	0.285	0.293	0.278	0.283
Instruments						
Tier 1 Bank	0.462	0.647***	0.406	0.558***	0.318	0.550***
Tier 2 Bank	0.311	0.306	0.378	0.382***	0.312	0.382***
Transparency	0.850	0.845	0.496	0.573***	0.248	0.531***
n	999	592	1,747	1,044	6,733	1,179

Table III
Probit Model for Liquidity

This table presents the probit model results examining the determinants of loan liquidity for specifications A through F. The dependent variable, *liquid0*, is defined as one if the loan is available on the secondary market any time between 2000 and Q1 2005. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better, based on standard errors that are robust and clustered at the firm level.

	[A]		[B]		[C]		[D]		[E]		[F]	
ln(Maturity)	0.712	***	0.639	***	0.641	***	0.597	***	0.610	***	0.488	***
ln(Facility Amount)	0.366	***	0.373	***	0.372	***	0.383	***	0.460	***	0.517	***
Guarantor	-0.004		-0.055		-0.040		0.002		0.008		-0.025	
Sponsor	0.250	**	0.248	*	0.255	**	0.210	*	0.164	**	0.256	***
Dividend Restrictions			0.569		0.559	***	0.458	**	0.308	**	0.461	
Secured			0.654		0.633	***	0.700	***	0.590	***	0.714	***
Refinancing Indicator			0.144						-0.003		0.071	
Hybrid			0.290		0.296	**	0.357	*	0.275	*	0.326	***
Institutional	0.757	***	0.676	***	0.686	***	0.690	***	0.678	***	0.859	***
Required Lenders	0.641	***	-0.039		0.119		0.468		0.161		0.022	
Investment Grade					-0.582	***	-0.425	***	-0.476	***		
Number of Lead Banks	0.296	***	0.299	***	0.321	***	0.334	***	0.083	*		
Tier1	0.562	***	0.568	***	0.548	***	0.548	***	0.506	***	0.630	***
Tier2	0.354	**	0.352	**	0.343	*	0.378	**	0.374	***	0.446	***
Transparency	0.189		0.183		0.184		0.194		0.119		0.146	**
Credit Rating	yes		yes									
Loan Purpose	yes		yes		yes		yes		yes		yes	
Transfer Consent			yes						yes		yes	
Firm Specific Controls	yes		yes		yes		yes					
Industry	yes		yes		yes		yes		yes		yes	
Bank Controls	yes		yes		yes		yes		yes		yes	
Macroeconomic Controls	yes		yes		yes		yes		yes		yes	
Year Controls	yes		yes		yes		yes		yes		yes	
n	1,591		1,591		1,591		1,657		2,791		7,912	
Pseudo R-Squared	0.365		0.396		0.391		0.365		0.357		0.497	
Wald Test of Instruments	11.51	***	11.23	**	10.39	**	10.88	**	15.38	***	38.99	***

Table IV
Marginal Effects on the Probability of Loan being Liquid

This table presents the marginal effects on the probability of a loan being liquid based on the probit model results presented in Table III. The marginal effects are calculated at the mean for continuous variables and for a discrete change from 0 to 1 for dummy variables. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better, based on standard errors that are robust and clustered at the firm level.

	[A]		[B]		[C]		[D]		[E]		[F]	
ln(Maturity)	0.237	***	0.208	***	0.210	***	0.211	***	0.205	***	0.032	***
ln(Facility Amount)	0.122	***	0.122	***	0.122	***	0.135	***	0.154	***	0.034	***
Guarantor	-0.001		-0.018		-0.013		0.001		0.003		-0.002	
Sponsor	0.087	**	0.084	*	0.087	**	0.076	*	0.056	**	0.019	***
Dividend Restrictions			0.178	***	0.176	***	0.156	**	0.103	**	0.038	
Secured			0.203	***	0.198	***	0.232	***	0.189	***	0.059	***
Refinancing Indicator			0.046						-0.001		0.005	
Hybrid			0.102		0.105	*	0.134	**	0.098	*	0.028	***
Institutional	0.253	***	0.221	***	0.226	***	0.240	***	0.224	***	0.083	***
Required Lenders	0.200	***	-0.013		0.038		0.157		0.053		0.001	
Investment Grade					-0.170	***	-0.139	***	-0.143	***		
Number of Lead Banks	0.099	***	0.097	***	0.105	***	0.118	***	0.028	*		
Tier1	0.184	***	0.182	***	0.176	***	0.190	***	0.170	***	0.051	***
Tier2	0.122	**	0.119	**	0.117	*	0.137	**	0.128	***	0.035	***
Transparency	0.061		0.057		0.058		0.066		0.040		0.010	**
Credit Rating	yes		yes									
Loan Purpose	yes		yes		yes		yes		yes		yes	
Transfer Consent			yes						yes		yes	
Firm Specific Controls	yes		yes		yes		yes					
Industry	yes		yes		yes		yes		yes		yes	
Bank Controls	yes		yes		yes		yes		yes		yes	
Macroeconomic Controls	yes		yes		yes		yes		yes		yes	
Year Controls	yes		yes		yes		yes		yes		yes	
n	1,591		1,591		1,591		1,657		2,791		7,912	

Table V

Expected Liquidity Summary Statistics by Liquidity Proxy

This table presents the summary statistics for the expected liquidity as estimated from Table III decomposed by our liquidity proxy for three samples. The samples from models B, E and F were chosen since they are representative of all the six samples. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better.

	[B]		*[E]*		*[F]*	
	[liquid=0]	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**
Expected Liquidity						
Mean	0.205	0.650***	0.222	0.626***	0.077	0.558***
Standard Deviation	0.239	0.241	0.239	0.235	0.155	0.269
Minimum	2.05e-07	0.015	3.02e-07	0.008	3.22e-11	1.28e-05
Maximum	0.967	0.989	0.971	0.983	0.984	0.990
95% Conf. Interval	0.190	0.631	0.211	0.612	0.073	0.542
	0.220	0.669	0.234	0.641	0.081	0.573
n	999	592	1,747	1,044	6,733	1,179

Table VI
OLS Model for Initial Spread

This table presents the OLS model results for initial spread for specifications A through F. The dependent variable is the absolute All-in Drawn Spread (AIS) over LIBOR at the time of origination. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better, based on standard errors that are robust and clustered at the firm level.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquidity	**-127.596**	***	**-116.311**	***	**-137.211**	***	**-115.316**	***	**-106.964**	***	**-88.351**	***
ln(Maturity)	6.309		-2.044		-1.345		-12.971		-8.540		-4.514	
ln(Facility Amount)	5.572		3.662		1.552		-1.006		0.570		-8.938	***
Guarantor	-4.398		-6.209		-2.789		2.699		-0.777		-27.484	***
Sponsor	35.686	***	30.709	***	39.016	***	22.445	**	23.392	***	57.656	***
Dividend Restrictions			57.851	***	60.276	***	36.366	***	31.877	***	42.522	***
Secured			54.213	***	65.890	***	52.026	***	38.969	***	58.900	***
Refinancing Indicator			7.402						-0.686		-1.110	
Hybrid			182.537	***	199.157	***	198.262	***	175.075	***	180.586	***
Institutional	70.106	***	59.360	***	59.488	***	53.634	***	41.647	***	71.580	***
Required Lenders	39.208	***	27.829		23.151		13.080		44.770	**	62.678	***
Investment Grade					-104.763	***	-137.379	***	-139.228	***		
Number of Lead Banks	5.174		5.651		10.137		13.562		-1.964		-6.633	***
Credit Rating	yes		yes									
Loan Purpose	yes		yes		yes		yes		yes		yes	
Transfer Consent			yes						yes		yes	
Firm Specific Controls	yes		yes		yes		yes					
Industry	yes		yes		yes		yes		yes		yes	
Bank Controls	yes		yes		yes		yes		yes		yes	
Macroeconomic Controls	yes		yes		yes		yes		yes		Yes	
Year Controls	yes		yes		yes		yes		yes		Yes	
Intercept	yes		yes		yes		yes		yes		Yes	
n	1,591		1,591		1,591		1,657		2,791		7,912	
R-Squared	0.196		0.328		0.265		0.314		0.357		0.359	
Wald Test of Restrictions	0.82		1.60		1.43		1.03		2.43	*	0.31	
Dependent Mean	272.591		272.591		272.591		288.490		294.306		279.527	

Table VII
OLS Model for Initial Relative Spread

This table presents the OLS model results for initial relative spread for specifications A through F. The dependent variable is the initial relative spread measured as the ratio of the initial All-in Drawn Spread over LIBOR and the LIBOR at the time of origination. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better, based on standard errors that are robust and clustered at the firm level.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquidity	**-0.700**	***	**-0.601**	***	**-0.727**	***	**-0.640**	***	**-0.625**	***	**-0.464**	***
ln(Maturity)	0.005		-0.033		-0.031		-0.114	**	-0.095	**	-0.058	***
ln(Facility Amount)	0.027		0.007		-0.006		0.004		0.027		-0.039	***
Guarantor	0.002		0.005		0.031		0.072		0.018		-0.178	***
Sponsor	0.264	***	0.220	***	0.274	***	0.204	***	0.214	***	0.373	***
Dividend Restrictions			0.201	**	0.219	**	0.100		0.070		0.124	**
Secured			0.266	***	0.309	***	0.280	***	0.298	***	0.336	***
Refinancing Indicator			-0.019						-0.052		-0.029	
Hybrid			1.395	***	1.524	***	1.543	***	1.302	***	1.354	***
Institutional	0.375	***	0.324	***	0.321	***	0.268	***	0.180	***	0.380	***
Required Lenders	0.224	***	0.180		0.196		0.174		0.304	***		
Investment Grade					-0.542	***	-0.699	***	-0.726	***		
Number of Lead Banks	-0.044		-0.028		-0.006		-0.039		-0.026		-0.070	***
Credit Rating	yes		yes									
Loan Purpose	yes		yes		yes		yes		yes		yes	
Firm Specific Controls	yes		yes		yes		yes					
Industry	yes		yes		yes		yes		yes		yes	
Bank Controls	yes		yes		yes		yes		yes		yes	
Macroeconomic Controls	yes		yes		yes		yes		yes		yes	
Year Controls	yes		yes		yes		yes		yes		yes	
Intercept	yes		yes		yes		yes		yes		yes	
n	1,591		1,591		1,591		1,657		2,791		7,912	
R-Squared	0.525		0.603		0.557		0.592		0.604		0.580	
Wald Test of Restrictions	0.960		1.860		1.75		1.43		2.51	*	0.74	
Dependent Mean	1.520		1.520		1.520		1.576		1.624		1.523	

Table VIII
Liquidity Proxies

This table presents four different measures of liquidity and their summary statistics for specifications A through F. Liquid 0 is equal to one if the loan is quoted in the secondary market between 2000 and Q12005, and the first quoted bid price is greater than 98, and zero otherwise. This is the liquidity proxy considered in Tables I through VI. Liquid 1 is equal to one if the loan is quoted within 365 days of its origination date, and the first quoted bid price is greater than 98, and zero otherwise. Liquid 2 is equal to one if the loan is quoted for at least 100 trading days on the secondary market, and the first quoted bid price is greater than 98, and zero otherwise. Liquid 3 is equal to one if the loan is quoted on average by at least three dealers in the secondary market, and the first quoted bid price is greater than 98, and zero otherwise.

	[A]	[B]	[C]	[D]	[E]	[F]
Liquid 0	*0.372*	*0.372*	*0.372*	*0.398*	*0.374*	*0.149*
Liquid 1	*0.354*	*0.354*	*0.354*	*0.378*	*0.354*	*0.139*
Liquid 2	*0.328*	*0.328*	*0.328*	*0.352*	*0.325*	*0.128*
Liquid 3	*0.266*	*0.266*	*0.266*	*0.280*	*0.244*	*0.093*

Table IX
OLS Model for Initial Spread using Different Liquidity Proxies

This table presents the abridged OLS model results for initial absolute All-in Drawn Spread over LIBOR for specifications A through F using the alternative liquidity proxies presented in Table VIII. Each row represents a different liquidity proxy and therefore a separate regression. Expected Liquid 0 repeats the results presented in Table VI for comparison purposes. In addition, separate probit models are estimated for each liquidity proxy. These results are available from the authors upon request. *** signifies statistically different from zero at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better, based on standard errors that are robust and clustered at the firm level.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquid 0	*-127.596*	***	*-116.311*	***	*-137.211*	***	*-115.316*	**	*-106.964*	***	*-88.351*	***
Expected Liquid 1	*-153.896*	***	*-130.466*	***	*-149.673*	***	*-151.730*	***	*-117.250*	***	*-97.080*	***
Expected Liquid 2	*-136.976*	***	*-122.523*	***	*-137.878*	***	*-103.359*	***	*-92.566*	***	*-80.076*	***
Expected Liquid 3	*-127.202*	***	*-101.745*	***	*-114.736*	***	*-103.044*	***	*-93.688*	***	*-93.205*	***
n	1,591		1,591		1,591		1,657		2,791		7,912	

Table X

Matched Comparison of Liquid and Illiquid Loans.

This table presents the comparison between a matched sample of loans constructed by identifying two loan agreements for the same borrower and lender, within close proximity of each other. In the first set of results, the matched loans are originated on the same day. In the second set, the matched loans are originated within 30 days of each other. In the third set of results, the matched loans are originated between 30 and 90 days of each other, as per the facility start dates. *** signifies statistically different from liquid = 0 at the 1 percent level or better, ** at the 5 percent level or better and * at the 10 percent level or better.

Difference between matched loans	***0 days***		***0<days≤30***		***30<days<=90***	
	[liquid=0]	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**
Loan Specific Characteristics						
Yield	328	328	397	322	401	341
Maturity in Months	62	74***	44	64*	57	71*
Facility Amount in millions	224.674	322.235*	313.150	315.500	320.961	325.250
Guarantor	7%	8%	13%	25%	15%	25%
Sponsor	46%	47%	38%	31%	45%	50%
Dividend Restrictions	57%	60%	44%	56%	35%	65%*
Secured	74%	80%	38%	63%	50%	75%
Refinancing Indicator	67%	67%	50%	69%	65%	70%
Hybrid	11%	12%	6%	0%	10%	15%
Institutional	17%	85%***	38%	75%**	55%	65%
Required Lenders	58%	61%	40%	50%	60%	75%
Investment Grade	7%	8%	7%	7%	0%	0%
n	180		16		20	

Figure 1
Syndicated Loan Volume in the Primary Market

This figure presents the volume of syndicated loans originated in the US, by market segment, from the year 2000 onwards. The data for this chart is obtained from Loan Pricing Corporation.

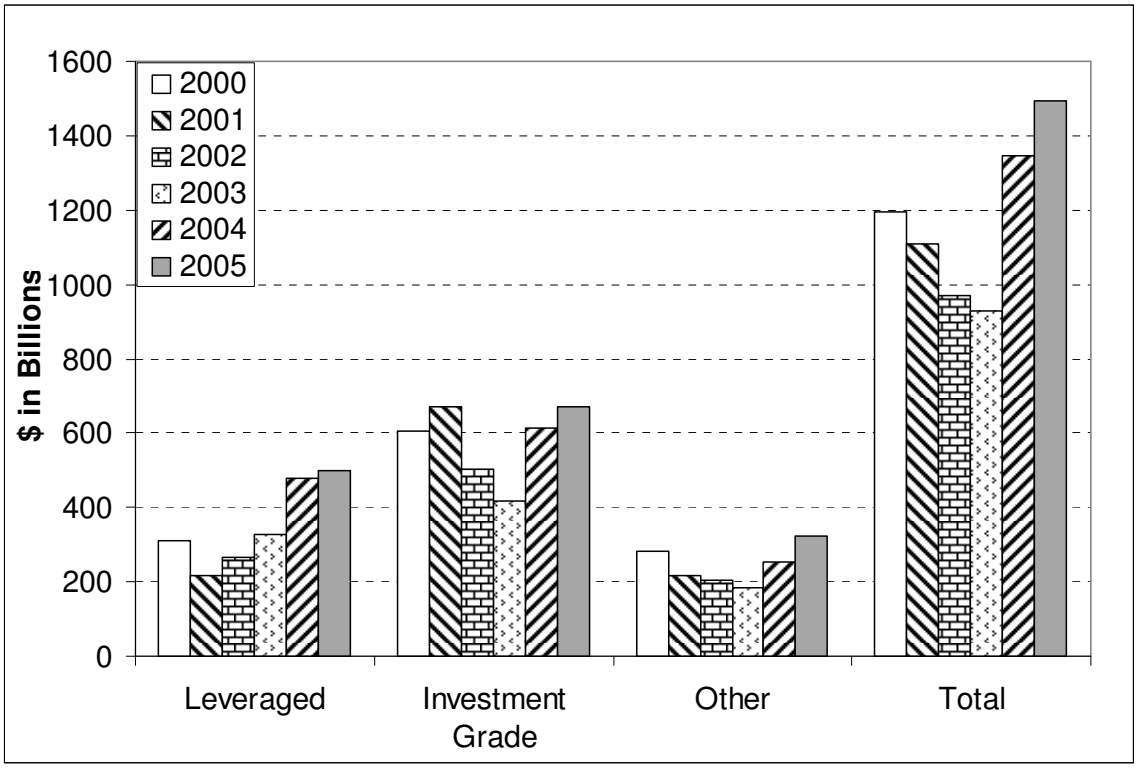


Figure 2
Secondary Market Loan Trading Volume

This figure presents the secondary market trading volume in syndicated loans in the US, by market segment, from the year 1991 onwards. The data for this chart is obtained from Loan Pricing Corporation.

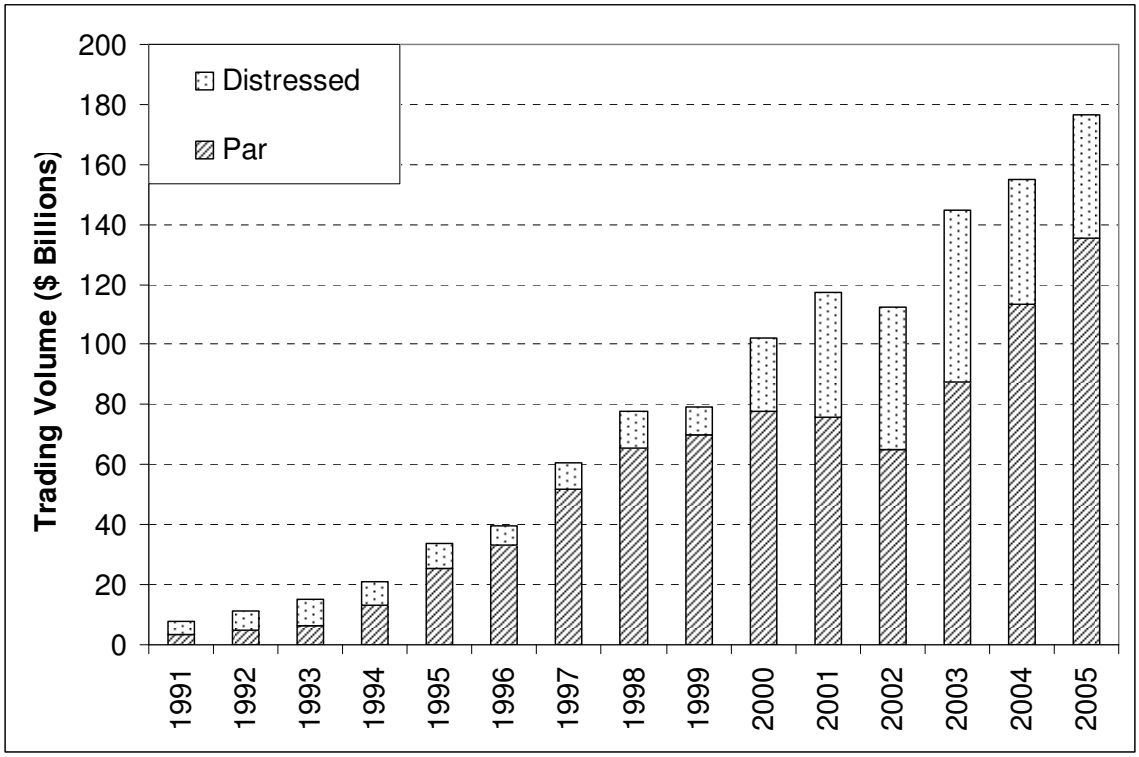
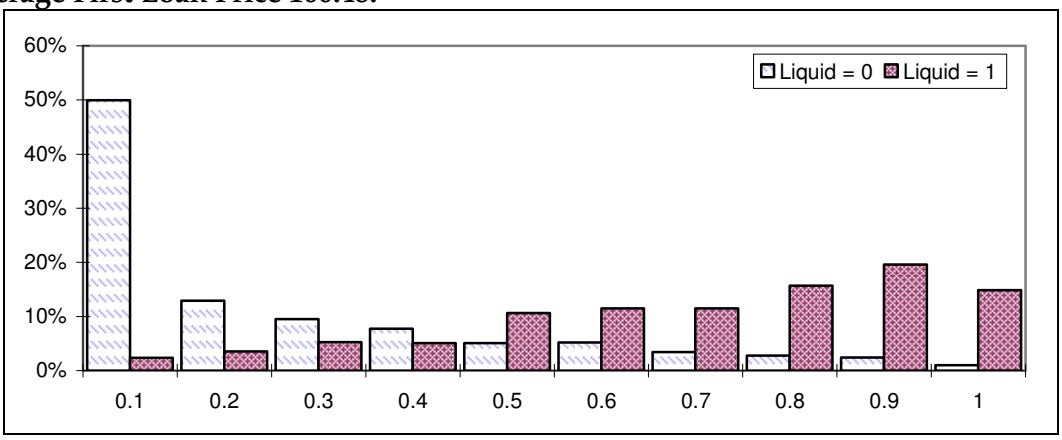


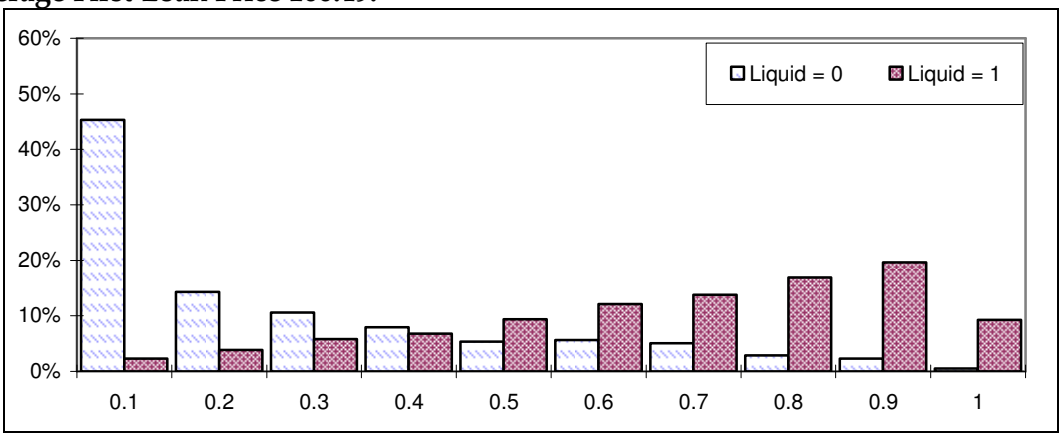
Figure 3
Distribution of Expected Liquidity by Liquidity Proxy

These figures present the distribution of our expected liquidity measure (from the probit model) by the observed liquidity proxy for the specifications presented in Table III.

Panel A. Distribution of Expected Liquidity – Specification B.
Average First Loan Price 100.48.



Panel B. Distribution of Expected Liquidity – Specification E.
Average First Loan Price 100.49.



Panel C. Distribution of Expected Liquidity – Specification F.
Average First Loan Price 100.47.