Liquidity in the Pricing of Syndicated Loans*

Anurag Gupta[1]

Ajai K. Singh[2]

Allan A. Zebedee[3]

March 2006

[1]Department of Banking and Finance, Weatherhead School of Management, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, Ohio 44106-7235. Ph: (216) 368-2938, Fax: (216) 368-6249, E-mail: anurag@case.edu.

[2]Department of Banking and Finance, Weatherhead School of Management, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, Ohio 44106-7235. Ph: (216) 368-0802, Fax: (216) 368-6249, E-mail: ajai.singh@case.edu.

[3]Department of Finance, College of Business Administration, San Diego State University, 5500 Campanile Drive, San Diego, CA 92182-8236 and US Securities and Exchange Commission, Office of Economic Analysis, 100 F Street, N.E., Washington, DC 20549-1105. Ph: (202) 551-6657, Fax: (202) 942-9657, E-mail: zebedeea@sec.gov.

* We thank Allen Berger, George Pennacchi, Manju Puri, Anthony Saunders, Duane Seppi and S. Viswanathan for helpful discussions and comments on earlier drafts. We also thank Loan Pricing Corporation and Loan Syndications and Trading Association for providing us the data for this study. We remain responsible for all errors. The US Securities and Exchange Commission disclaims responsibility for any private publication or statement of any SEC employee or Commissioner. This study expresses the authors' views and does not necessarily reflect those of the Commission, the Commissioners, or other members of the staff.

Liquidity in the Pricing of Syndicated Loans

Abstract

We examine whether banks price expected liquidity in syndicated loan spreads. Using extensive data on US term loans, we show that banks have the ability to discern the expected liquidity of a loan at the time of origination. More importantly, we show that loans with higher expected liquidity have significantly lower spreads at origination, after controlling for other determinants of loans spreads such as borrower, loan, syndicate and macroeconomic variables. We therefore identify a new factor (expected liquidity) being priced in syndicated term loans, which, in the aggregate, results in an annual saving of $1.5 billion to the borrowing firms in our sample. Thus, for the first time in the literature, we document a link between the secondary market liquidity of an asset and it's pricing in the primary market.

JEL Classification: G12, G21, G32

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

> *"In fact, 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)

Syndicated loans represent credit granted by a group of banks or other financial institutions to a borrower. The originating institutions have traditionally sold 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), 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 securities, on an over-the-counter market. The emergence of this market has provided loan originators with several advantages, the primary advantage being that they no longer have to hold capital against the loans that they sell, and hence, are free to grant new credits. In essence, in the case of loans that are liquid in the secondary market, the loan origination activity has become an unfunded activity where banks can originate loans, earn their fee, and then sell them off in the secondary market. This market has also provided the loan originators with a viable alternative mechanism for risk diversification.

Since the presence of an active secondary market provides the loan originators with clear benefits, the natural question is whether they pass on some of these benefits to the borrowers. If the loan origination market is competitive, then the originating banks must pass on some of this liquidity-related cost advantage to the borrowing firms, by charging lower loan spreads at the time of origination. In this paper, our primary objective is to examine whether the emergence of the loan secondary market has had 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 cost advantage to the borrowers. By examining this primary question, we also address the related question regarding the ability of the originating institutions to discern 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 liquidity is a priced factor, with more liquid assets trading at higher prices (and lower yields). 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 Elton, Gruber, Agrawal and Mann (2001), Krishnamurthy (2002), Chordia, Sarkar and Subrahmanyam (2003), Longstaff (2004), Longstaff (2005) and others in the Treasury and corporate bond markets. However, it is neither obvious nor has it been shown before that the financial intermediaries can discern and price the expected liquidity of a security or an asset at the time of its issuance in the primary 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.[1] In fact, Boot (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 suggests that even if the moral hazard problem is mitigated, controlling for borrower and loan characteristics such as industry, leverage, credit rating, and risk 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 – the emergence of an active dealer-driven secondary market has significantly altered the market for loan sales.[2] As Gande and Saunders (2005) show, using recent data, 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.

We 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 all other determinants of loan spreads.[3] Our results are consistent across several different sub-samples of loans, and robust to alternative definitions of liquidity. The magnitude of this pricing effect is quite significant – of the order of between 60 and 100 basis points, between the most liquid and the most illiquid loans, controlling for other determinants of loan spreads. These

[1] The moral hazard problem can be mitigated (Gorton and Pennacchi, 1995) if the originating institution retains a portion of the loan. In this regard, Sufi (2005) presents some empirical evidence that the lead arranger retains a larger proportion of the loans that require greater monitoring.

[2] 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 1 of the paper we provide more details on the reasons for the explosive growth of the secondary loan market.

[3] Our empirical specification controls for 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.

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.[4] To our knowledge, this paper is the first one to document such a relationship between the secondary market liquidity and the primary market pricing of an asset, and is the first paper to document a systematic liquidity factor being priced into syndicated loan spreads at origination.

Our results suggest that the primary market for loan syndications is quite competitive, and the loan arranger is sharing at least part of the liquidity-related benefit with the borrowing firms.[5] In the aggregate, we estimate that this pricing of expected liquidity into loan spreads results in an average annual savings of about $1.5 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.

The rest of the paper is organized as follows. Section 1 introduces the syndicated loan secondary market. Section 2 provides an overview of the empirical methodology. Section 3 presents the data used in this paper, along with some descriptive statistics. Section 4 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 5 presents a series of robustness tests. Section 6 concludes the paper.

1. Syndicated loans and the 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 to a syndicate of financial entities under the negotiated terms and conditions. In 2005, the total 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

[4] 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.

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

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) 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 main focus of 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 many 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. Then why has the secondary market for loans grown at such a high rate, especially during the last decade? If the loans being sold are mostly "lemons", then rational investors would assume adverse selection (e.g. Akerlof (1970)) and discount these loans below fair value, thereby leading to an unraveling of this market.

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 and will continue to grow. On the supply side, banks may have many motivations for selling performing corporate credit exposures. 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. Under the current Basel Accord (effective since 1988, now being revised), banks are subject to the same capital charge on differently rated loans. This has created incentives for banks to sell higher rated loans that have lower returns, while retaining the lower rated loans, in order to boost return on capital. The fourth reason is extraction of economic rents from loan origination activity. Some banks are adept at originating credit exposures due to their expertise in credit assessment and strong client relationships. 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, hedge funds, mutual funds and other funds such as CDOs and CLOs 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.

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.[6] 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.

These loans are transferred from the primary to the secondary market by assignment or by participation. When transferred by assignment, the buyer 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

[6] 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.

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.

2. Research hypotheses and design

Our primary objective is to examine whether the expected liquidity of a syndicated loan is being 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. Liquidity is broadly defined as secondary market activity; hence our model predicts the probability that the loan will become available on the secondary market. This model is an innovation in this paper, since, to the best of our knowledge, we are not aware of any other paper that has developed an empirical specification for predicting the liquidity of a syndicated loan. 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.[7] 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 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 a loan will become available on the secondary market 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,

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

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

[7] 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 (2004), Hubbard, Kuttner, and Palia (2002), Ivashina (2005), Meorman (2005), Santos and Winton (2005), Strahan (1999), and others.

In estimating equation 1, we use an instrumental variables approach as outlined in Woolridge (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.[8] The instruments are chosen as factors that are likely to affect the probability a loan will be available in the secondary market but do not directly affect the initial spread charged by the syndicated group. A variety of instruments were investigated based on the loan, borrower, and syndicate characteristics. The intuition behind our final choice of instruments is as follows.[9]

In terms of loan characteristics, we identify three instruments. The first, s*tandard*, is a dummy variable equal to one if the number of years to maturity is an integer, with the logic being that standard loan features may be more likely to be accepted by the secondary market. The second and third loan characteristics used as instruments capture the need for the agent (*agent consent*) and/or the borrowing company (*company consent*) to approve any re-sale of the loan. These dummy variables directly pertain to the liquidity of the loan so their impact on spreads, if any, should only be through potential liquidity effects.

We include two dummy variables for borrower characteristics as instruments in equation 1. Both are related to the opaqueness of the borrower's financials. If the firm's financial statements are available it is easier for outside investors to evaluate the firm's loans as a potential investment. This transparency is not expected to affect the negotiated spread at origination since the syndicate members already have access to the firm's financial statements. These variables are therefore only expected to impact the spread through potential liquidity effects. The first variable, *Registered Rule 144A Debt*, is equal to one if the firm has issued Rule 144A debt prior to the loan origination. Rule 144A securities are restricted to qualified institutional investors. The second variable, *Registered Public Debt*, is equal to one if the firm has issued public debt prior to the loan origination.

Finally, we use three syndicate characteristics as instruments. The first is the *number of banks* included in the syndicate. While syndicating loans means less risk for each bank, since each bank holds a smaller piece, within syndicated loans, it is not clear that this relationship is monotonic, as the size of the syndicate grows. Since our target population is syndicated loans, the number of banks is not necessarily related to the initial spread charged by the syndicate. However, as the number of banks increases, the potential for any one bank to sell the loan in the secondary market increases. The second and third variables (*Tier 1 Bank* and *Tier 2 Bank*) measure the rank of the

[8] Since the probit model is a non-linear model, technically, the coefficients in the second stage can be identified even if we do not have instrumental variables. However, as Woolridge (2002) points out, one can rarely justify the estimator in this case.

[9] 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.

lead arranger based on 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 fourth and thirtieth. 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. 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.

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.

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.

The objective of this second stage model is to estimate the impact of expected liquidity on the loan spread, after controlling for all other factors 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.[10] 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 on 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 et al. 2005, Harjoto et al 2004, etc.) 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 lower spreads, as documented by several prior studies (for example, Bharath et al. 2005). 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 accounted for.

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

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. Finally, we examined the impact of several 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. (2004) show that investment banks charge higher spreads than commercial banks. We also investigated the importance of the lead bank's reputation, since the syndicate members usually rely on the lead bank for borrower information and analysis (see, for example, Jones, Lang and Nigro (2005)). The lead bank's reputation could affect the future liquidity of the loan as well, 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).

Finally, we control for several loan characteristics, especially the loan purpose, since 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.

3. Data

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

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.

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.[11] 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.[12] 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 increasing from about 600 in January 2000 to about 1,500 in April 2005. Our measure of liquidity is based on the observation that a loan is quoted in the secondary market by at least two dealers during this time span.

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 7,903 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 7,903 USD term loans. These specifications are labeled A through F throughout our analysis. The sample sizes vary across the models due to differences in data availability. The first specification

[11] 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.

[12] 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.

A has a sample size of 1,590 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 1,590 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 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 many 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 DealScan database. However, similar to the loan characteristics data, there are a number of facilities with missing credit rating data. To address this shortcoming, Specifications D and E rely on Compustat for credit rating data. The credit rating data are extracted from Compustat for the fiscal year prior to the loan origination fiscal year. In total, Specification D includes 1,656 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 2,784 loans. These results are labeled as Specification E.

Finally, Specification F uses the full sample of 7,903 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 available sample for the analysis.

Table 1 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.[13] Out of the full sample of 7,903 loans, about 16.7% of the loans are classified as liquid loans using this definition. These loans represent 736 unique borrowers. In our 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 7,903 loans consists of facilities with a total principal of about $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 $154 million, and more than 50% of the facilities are 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. This could be an important factor in determining the liquidity of a loan, since it creates a potential impediment to the sale of that loan.

Of the loans for which credit rating data is available, nearly 80% are speculative grade loans. This is quite understandable, 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 70% 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 26% 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 (JP Morgan Chase, Bank of America, and Citigroup) in this

[13] 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 still categorized as illiquid.

market. Since these three tier 1 banks are also universal banks, it partially explains why 70% of the loans have a universal bank as their lead arranger.

4. Empirical results

4.1 Why are some loans liquid?

Univariate comparison of loans by liquidity

The determinants of loan spreads can be meaningfully examined only within a multivariate framework. However, to obtain some initial information, in Table 2 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 amongst 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.

Liquid loans are also on average of larger size (in terms of principal), as compared to the illiquid loans.[14] A significantly greater percentage of liquid loans have a sponsor, dividend restrictions, and collateral. This is quite understandable from the perspective of the investors in this market. Since a buyer of the loan in the secondary market does not have the extent of information about the borrower that the original lender has, the buyer would be more interested in buying loans that have clauses that mitigate some of the agency costs and the associated moral hazard problems. 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 appear to have a greater prevalence of clauses requiring agent and borrower consent, which is also consistent with the prevalence of other restrictive clauses in these loans.

[14] 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.

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. One of the most significant differences between the liquid and the illiquid loans is in their credit quality at origination. Nearly 90% of the liquid loans have speculative grade borrowers, while the corresponding fraction for illiquid loans is about 70%. 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.[15] In addition, a greater percentage of the liquid loans appear to be concentrated within the consumer and technology sectors.

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, (2004). 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 could again indicate 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 2. Some differences in the loan characteristics between illiquid and liquid loans do not conform to conventional expectations. Specifically, illiquid loans are more likely to have standardized features and less likely to require agent as well as company consent. The percentage of borrowers with liquid loans that have previously issued public debt is statistically no different from the percentage of borrowers with illiquid loans. However, borrowers with liquid loans are more likely to have issued Rule 144A debt. The most significant differences however are in the structure of the syndicate. Liquid loans have larger syndicates and are more likely to be arranged by a top tier bank. Larger syndicates are more likely to include institutional investors; therefore, there is a greater probability that there will be members in the syndicate that participate with explicit intentions of trading the loan in the future. Loans

[15] 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.

arranged by one of the three top tier banks are probably more liquid since these banks are also amongst the most active market makers for these loans in the secondary market.

This sub-section has presented some descriptive statistics for univariate comparison of liquid versus illiquid loans along several dimensions. Since many of these factors 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.

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 3. 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 which may also influence the initial spread. To save space, the table presents the coefficients only for the variables of interest.

Several variables are significantly associated, within the multivariate framework, with the probability of a loan being liquid, reflecting factors that affect the investor demand for these loans. Longer maturity loans have greater liquidity, even in the presence of all other factors. 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.

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, as well as the incentives of the bank selling the loan.

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.[16] 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.

While agent consent and company consent lower the expected liquidity of a loan, as predicted above, the result is not statistically significant. Nor does the existence of public debt suggest that the transparency of the financials is a contributing factor to liquidity. The key instruments identified relate to the syndicate. 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. In addition, as the number of banks in the syndicate increases, so does liquidity.

The results of the probit model are fairly 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.

To further facilitate our exposition of the probit models, in Table 4 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 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 6.2% and 20.1% depending on the model chosen. Furthermore, for each additional bank added to the syndicate, the probability of the loan being available on the secondary market increases by between 0.4% and 12.3%.

[16] 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 speculative grade obligors.

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 5, we presents the summary statistics for the expected liquidity measure decomposed by our 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 21.4%, while it is much higher at 68.0% 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 average expected liquidity measure for illiquid loans. There are two factors that may contribute to this result. First, we use a 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.[17] Second, the market for syndicated loans has been becoming more liquid over time. We address both these issues in section 6.

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 panel A of figures 3, 4 and 5 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.

If the surge in the secondary market activity of these loans is primarily attributable to an influx of distressed loans, as suggested by prior studies in the literature (see, for example, Dahiya, Puri and Saunders (2003), and others), then our probit model might be capturing this effect by predicting which loans will become distressed. To address this possibility we examine the distribution of the expected liquidity measure for liquid loans by the first loan price in panel B of figures 3, 4, and 5, for model specifications B, E, and F respectively. The first loan price is the bid price of a loan on the first day it is quoted on the secondary market. We use the first loan price to

[17] This is not a big concern, since most of the loans that are liquid become available on the secondary market within 6 months of origination. The average time for a liquid loan to appear on the secondary market has been declining over the years.

discern which loans are in financial distress when they begin trading. If the first price is less than 90 percent of par, as per LPC definitions, the loan is considered to be a distressed loan (a "fallen angel", in industry terminology). This variable is not available at the time of loan origination, and is therefore not included in the probit model. However, if an important reason for a loan to become liquid is that it becomes a fallen angel, our expected liquidity measure should be higher for fallen angels than it is for near par or par loans. Panel B of figures 3, 4, and 5 clearly show that the expected liquidity measure is not higher (or lower) for distressed loans. In fact, for liquid loans, the distribution of the expected liquidity measure when segmented by the first loan price shows no clear patterns. Therefore, our expected liquidity measure does not capture the probability that a loan will become distressed in the future – it only captures the probability that the loan will be available on the secondary market.

In summary, these results clearly suggest that there are significant differences between liquid and illiquid loans. They also suggest that, using only 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.

4.2 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 6 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 1,590 loans to 7,903 loans, the coefficient on expected liquidity is negative and highly significant. For example, for model F, the coefficient of -71.589 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 0.71 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 71 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 other factors 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. 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 3. Our results for these variables and 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 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 (2005), Mazumdar and Sengupta (2005) and Santos and Winton (2005).

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 factors. This result is consistent with the findings of Harjoto, Mullineaux and Yi (2005). 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 150 basis points, compared with speculative grade loans, adjusting for all other determinants of loan spreads.

In Table 7, 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 banks in the primary market.

The results of the relative spread model are very consistent with the results for the absolute spread model. The coefficient on expected liquidity is negative and strongly significant for all six specifications. For example, for the full sample of 7,903 loans, the coefficient on expected liquidity is -0.407, 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 0.407% (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 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 6 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 7,903 loans, the relative spread model has an adjusted R-squared of about 57%, while it is about 35% 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 in the banks originating these loans. It appears that banks may be pricing different factors 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 factors. Further, it is likely that much of this relative pricing effect may be implicit in their pricing process, without every pricing factor being explicitly estimated as a percentage of LIBOR.

Our results in this section on expected liquidity are strongly suggestive of 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, it indicates 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 71 basis points and an average expected liquidity of 16.7 percent for our full sample of 7,903 loans, representing $1.22 trillion in principal, the estimated *annual* benefit to the borrowing firms (in our sample), in the aggregate, is approximately $1.5 billion.

5. Robustness tests

5.1 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. 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 trading activity for 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 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 other 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 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.

Table 8 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 7,903 loans, 16.7% are classified as liquid loans as per our primary definition of liquidity, while only 10.4% 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 those 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 definitions of liquidity (the primary definition and the three alternative definitions), we repeat our two-stage analysis across all six samples. As before, we 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 use the absolute spread model for all the robustness tests). The coefficients on the expected liquidity variable across these samples and alternative definitions of liquidity are presented in Table 9. 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 6, with the same control variables. A simple examination of the results in Table 9 reveals that higher expected liquidity is very 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. For example, in our full sample of 7,903 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 -75.579, which is similar to the coefficient of -71.589 using our primary definition of liquidity (*Liquid 0*).

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 60 and 100 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.

5.2 Liquidity by Year

To explore the time-series dimension of this pricing effect, we re-estimate the loan spread models for all six samples (using our primary definition of liquidity, *Liquid 0*) by including an interaction term between expected liquidity and the year dummies. The objective of these tests is to examine whether the pattern of incorporation of expected liquidity into loan spreads has changed over the five years in our sample (2000-04). In Table 10, we report the coefficients on expected liquidity and the expected liquidity interaction terms. As before, we do not report other coefficients for brevity. However, the models contain all the loan variables and controls that are listed in Table 6. It appears that the incorporation of expected liquidity into loan spreads has been progressively increasing over our sample period. The coefficient on expected liquidity is negative for all

samples, though it is statistically significant only for the full sample of 7,903 loans. The coefficients on the interaction terms indicate the year-by-year incremental pricing effect of expected liquidity into loan spreads, over and above the effect indicated by the coefficient on expected liquidity alone. Therefore, over the years 2001, 2002 and 2003, there does not appear to be any significant incremental effect (over that for the year 2000) of expected liquidity on loan spreads. However, the interaction term is negative and significant in the year 2004 across all the samples.

It appears that the pricing of expected liquidity became significantly more aggressive in the year 2004, while it remained relatively stationary over the previous four years (2000-03). This is largely a reflection of the tremendous growth that the secondary loan market has witnessed in recent years. With the loan trading volume in the year 2004 being nearly one and a half times that during the year 2000, banks appear to be passing on more of the benefits of liquidity to the borrowing firms. This may also indicate that borrowers are now more aware of how the emergence of this secondary market may help them reduce their borrowing costs, so they may be demanding more discounts on loans that have greater probability of trading. Alternatively, some borrowers may now be more willing to structure the loan in a manner in which it becomes more liquid in the secondary market, in return for a lower spread at origination. Whether expected liquidity is now fully priced into loan spreads is an unresolved question that can only be addressed using data from future years as it becomes available. In addition, since the secondary loan market is itself growing, this question cannot be conclusively addressed until the market reaches a stationary state.

5.3 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 firms with two loan agreements in close proximity to each other, with one of the loans later becoming liquid while the other remains illiquid. The loan characteristics are then compared. If the characteristics are comparable then differences in the spread can be interpreted as evidence of a liquidity effect.

Table 11 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 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 (60 months versus 73 months) and smaller in size ($202 m versus $305 m) when compared to the liquid loans. The illiquid loans are 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

2 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, and yet have similar yield spreads, indicates that controlling for these factors, 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, so there is no difference in any borrower variables.

The second sample examines the loans, to the same borrowing firms, originating within one month of each other excluding those with the same facility start date. This provides 17 matched pairs. The illiquid loans in this sample are shorter in duration (41 months versus 65 months) but larger in size ($324 m versus $289 m). Other differences include the presence of a guarantor (12% versus 24%) and security (35% versus 65%). Despite these differences, the loans are comparable on several dimensions, most importantly on credit risk, information asymmetry and opaqueness. The initial spread for the illiquid loans is 388 basis points compared to 329 basis points for the liquid loans. Although this difference of 59 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 23 matched pairs. The loan characteristics for this third sample are the mostly similar, while the average loan spread on the liquid loans is lower than that for the illiquid loans by 63 basis points, again confirming the prior evidence on the liquidity effect.

6. Conclusions

Our primary objective is to examine whether the expected liquidity of syndicated term loans is priced 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 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 lead 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 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 other determinants of loan spreads, the difference in pricing between loans at the two extremes of expected liquidity is remarkably stable, between 60 and 100 basis points. This difference is of significant magnitude, compared to the effect of some of the other determinants of loan spreads like credit rating, firm specific variables, and loan parameters.

The pricing of expected liquidity remained relatively stationary over the first four years (2000-2003) of our sample. However, we find that banks appear to be passing on more of the benefits of liquidity to the borrowing firms in the year 2004 than in the previous four years of our sample (2000-2003). This can partly be explained by the increasing trading volume in loans in recent years, indicating that the pricing of expected liquidity has become significantly more aggressive after 2003.

Our primary contribution to the literature is the identification of a new factor, namely expected liquidity, which is priced in syndicated loans at the time of origination. This marks a significant departure from the extant literature which has focused on examining the impact of liquidity on asset prices in the secondary market only. In contrast to previous studies, we document the impact of secondary market liquidity on the primary market issuance price of syndicated loans.

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 is sharing 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 about $1.5 billion.

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 Controls

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

References

Acharya V. and L. Pedersen, 2005, Asset pricing with liquidity risk, *Journal of Financial Economics 77, 375–410.*

Akerlof, G.A., 1970, The market for 'lemons': quality uncertainty and the market mechanism, *Quarterly Journal of Economics* 84, 488-500.

Allen, L. and A. A. Gottesman, 2005, The informational efficiency of the equity market as compared to the syndicated bank loan market, *Working paper,* Baruch College, CUNY.

Amihud Y. and H. Mendelson, 1986, Asset pricing and the bid-ask spread, *Journal of Financial Economics* 17, 223–249.

Angbazo, L. A., J. Mei and A. Saunders, 1998, Credit spreads in the market for highly leveraged transaction loans, *Journal of Banking & Finance*, 22, 1249-1282.

Bharath, S.T., S. Dahiya, A. Saunders and A. Srinivasan, 2005, So what do I get? The bank's view of lending relationships, *forthcoming, Journal of Financial Economics.*

Bhattacharya S. and A.V. Thakor, 1993, Contemporary Banking Theory, *Journal of Financial Intermediation* 3, 2-50.

Boot, A., 2000, Relationship banking: What do we know?, *Journal of Financial Intermediation* 9, 7-25.

Booth, J.R., 1992, Contract costs, bank loans, and cross-monitoring hypothesis, *Journal of Financial Economics* 31, 25-42.

Casolaro, L., D. Focarelli and A. F. Pozzolo, 2003, The pricing effect of certification on bank loans: Evidence from the syndicated credit market, *working paper*, Banca d'Italia, Italy.

Chen, J., 2005, Two-sided matching and spread determinants in the loan market: An empirical analysis, Working *paper*, Johns Hopkins University, Baltimore, MD.

Chordia T., R. Roll, and A. Subrahmanyam, 2000, Commonality in liquidity, *Journal of Financial Economics* 56, 3–28.

Chordia T, A Sarkar, and A Subrahmanyam, 2003, An Empirical Analysis of Stock and Bond Market Liquidity, *forthcoming, Review of Financial Studies.*

Coleman, A. D.F., N. Esho and I. G. Sharpe, 2004, Does bank monitoring influence loan contract terms?, *Working paper*, Australian Prudential Regulation Authority, Sydney, Australia.

Dahiya, S., M. Puri and A. Saunders, 2003, Bank borrowers and loan sales: New evidence on the uniqueness of bank loans, *Journal of Business*, 76, 563-582.

Dennis, S. A. and D. J. Mullineaux, 2000, Syndicated loans, *Journal of Financial Intermediation*, 9, 404-426.

Elton, E., M. Gruber, D. Agrawal and C. Mann, 2001, Explaining the rate spread on corporate bonds, *Journal of Finance* 56, 247-277.

Flannery, M., 1986, Asymmetric Information and risky debt maturity choice, *Journal of Finance* 41, 19-37.

Gande, A. and A. Saunders, 2005, Are banks still special when there is a secondary market for loans?, *working paper*, Vanderbilt University.

Gorton, G.B. and J.G. Haubrich, 1990, The loan sales market, *Research in Financial Services* 2, 85-135.

Gorton, G.B. and G.G. Pennacchi, 1995, Bank loan sales: Marketing nonmarketable assets, *Journal of Monetary Economics*, 35, 389-411.

Harjoto, M., D. J. Mullineaux and H.C. Yi, 2004, Loan pricing at investment versus commercial banks, *working paper*, San Jose State University, San Jose, CA.

Hubbard, R. G., K. N. Kuttner and D. N. Palia, 2002, Are there bank effects in borrowers' costs of funds? Evidence from a matched sample of borrowers and banks, *Journal of Business,* 75, 559-581.

Ivashina, V., 2005, Structure and pricing of syndicate loans, *working paper,* New York University.

James, C., 1987, Some evidence on the uniqueness of bank loans, *Journal of Financial Economics* 19, 217-235.

Jones, J.D., W.W. Lang and P.J. Nigro, 2005, Agent bank behavior in bank loan syndications, *Journal of Financial Research* 28, 385-402.

Krishnamurthy, A., 2002, The bond/old-bond spread, *Journal of Financial Economics* 66, 463-506.

Longstaff, F.A., 2004, The flight-to-liquidity premium in U.S. Treasury bond prices, *Journal of Business* 77, 511-526.

Longstaff, F.A., 2005, Asset pricing in markets with illiquid assets, *working Paper*, UCLA.

Mazumdar, S. C. and P. Sengupta, 2005, Disclosure and the loan spread on private debt, *Financial Analysts Journal*, 61, 83-95.

Moerman, R.W., 2005, The impact of information asymmetry on debt pricing and maturity, *working paper*, University of Chicago.

Pastor L. and R. F. Stambaugh, 2003, Liquidity risk and expected stock returns, *Journal of Political Economy* 111(3), 642–685.

Pennacchi, G., 1988, Loan sales and the cost of bank capital, *Journal of Finance*, 43,375-395.

PNC Bank, 2003, PNC Capital Markets Report.

Rajan, R., and A. Winton, 1995, Covenant and collateral as incentives to monitor, *Journal of Finance* 50, 1113-1146.

Santos, J. A.C. and A. Winton, 2005, Bank loans, bonds, and information monopolies across the business cycle, *working paper,* Federal Reserve Bank of New York.

Strahan, P. E., 1999, Borrower risk and the price and nonprice terms of bank loans, *working paper*, Federal Reserve Bank of New York.

Sufi, A., 2005, Agency and renegotiation in corporate finance: Evidence from syndicated loans, *working paper*, MIT.

Woolridge, J.M., 2002, Econometric analysis of cross section and panel data, MIT Press.

Table 1
Summary Statistics

This table presents the summary statistics for each sample presented in the results section. The samples are organized by empirical specification. In total, six specifications are presented labeled 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 Characteristics						
Liquid	0.404	0.404	0.404	0.441	0.417	0.167
Maturity in Months	54.763	54.763	54.763	56.951	58.639	54.160
Facility Amount in millions	336.641	336.641	336.641	321.980	279.808	154.464
Guarantor	0.118	0.118	0.118	0.122	0.108	0.084
Sponsor	0.204	0.204	0.204	0.232	0.321	0.250
Dividend Restrictions		0.589	0.589	0.632	0.505	0.275
Dividend Restrictions Missing		0.332	0.332	0.293	0.431	0.687
Secured		0.596	0.596	0.642	0.594	0.365
Secured Missing		0.321			0.344	0.593
Refinancing Indicator		0.733			0.670	0.459
Refinancing Indicator Missing		0.096			0.141	0.294
Hybrid		0.040	0.040	0.045	0.077	0.047
Hybrid Missing		0.346			0.343	0.485
Institutional	0.464	0.464	0.464	0.505	0.499	0.292
Required Lenders	0.648	0.648	0.648	0.690	0.540	0.279
Loan Purpose						
Short-term Financing	0.187	0.187	0.187	0.186	0.159	0.143
Long-term Financing	0.181	0.181	0.181	0.186	0.189	0.166
Restructuring	0.233	0.233	0.233	0.245	0.271	0.192
Other	0.292	0.292	0.292	0.291	0.292	0.360
Borrower Characteristics						
Investment Grade			0.226	0.184	0.178	
A S&P Rating	0.022	0.022				
BBB S&P Rating	0.199	0.199				
BB S&P Rating	0.438	0.438				
B S&P Rating	0.293	0.293				
CCC S&P Rating	0.030	0.030				
D S&P Rating	0.013	0.013				
Sales	3,410	3,410	3,410	3,113		
Profitability	(0.007)	(0.007)	(0.007)	(0.074)		
Ln(Debt)	6.756	6.756	6.756	6.641		
Finance	0.021	0.021	0.021	0.011	0.045	0.041
Other	0.009	0.009	0.009	0.011	0.020	0.055
Consumer	0.195	0.195	0.195	0.208	0.194	0.178
Technology	0.103	0.103	0.103	0.127	0.107	0.071
Health	0.047	0.047	0.047	0.047	0.043	0.029
Other Industry	0.301	0.301	0.301	0.258	0.309	0.437

Table 1 (continued)

Syndicate Characteristics						
Investment Bank	0.182	0.182	0.182	0.192	0.207	0.117
Commercial Bank	0.166	0.166	0.166	0.144	0.169	0.263
Universal Bank	0.809	0.809	0.809	0.816	0.798	0.702
Other Bank	0.031	0.031	0.031	0.031	0.042	0.100
Loan Origination Year						
2001	0.163	0.163	0.163	0.152	0.143	0.156
2002	0.191	0.191	0.191	0.183	0.168	0.175
2003	0.238	0.238	0.238	0.236	0.212	0.212
2004	0.240	0.240	0.240	0.228	0.288	0.279
Instruments						
Standard	0.578	0.578	0.578	0.558	0.629	0.718
Agent Consent		0.652			0.540	0.288
Agent Consent Missing		0.345			0.458	0.710
Company Consent		0.620			0.514	0.268
Company Consent Missing		0.360			0.471	0.718
Registered Public Debt	0.333	0.333	0.333	0.309		
Registered Rule 144A Debt	0.482	0.482	0.482	0.455		
Tier 1 Bank	0.531	0.531	0.531	0.542	0.463	0.353
Tier 2 Bank	0.309	0.309	0.309	0.312	0.379	0.322
Number of Banks	1.508	1.508	1.508	1.468	1.588	1.493
n	1,590	1,590	1,590	1,656	2,784	7,903

Table 2
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.

	[B]		*[E]*		*[F]*	
	[liquid=0]	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**	**[liquid=0]**	**[liquid=1]**
Loan Characteristics						
Maturity in Months	46.684	66.661**	50.282	70.305***	50.954	70.104***
Facility Amount in millions	298.860	392.283*	245.597	327.561***	121.236	319.726***
Guarantor	0.099	0.146***	0.086	0.139***	0.074	0.130***
Sponsor	0.137	0.302***	0.236	0.440***	0.213	0.432***
Dividend Restrictions	0.475	0.757***	0.385	0.673***	0.204	0.629***
Dividend Restrictions Missing	0.416	0.208***	0.533	0.289***	0.757	0.336***
Secured	0.442	0.821***	0.440	0.809***	0.283	0.771***
Secured Missing	0.436	0.151***	0.472	0.165***	0.671	0.204***
Refinancing Indicator	0.658	0.844***	0.617	0.744***	0.407	0.718***
Refinancing Indicator Missing	0.134	0.040***	0.183	0.083***	0.333	0.098***
Hybrid	0.022	0.067***	0.064	0.095***	0.037	0.095***
Hybrid Missing	0.385	0.288***	0.400	0.262***	0.527	0.276***
Institutional	0.295	0.712***	0.330	0.734***	0.207	0.715***
Required Lenders	0.560	0.779***	0.440	0.679	0.208	0.634***
Loan Purpose						
Short-term Financing	0.201	0.168	0.183	0.126***	0.149	0.116***
Long-term Financing	0.158	0.213***	0.174	0.211**	0.158	0.205***
Restructuring	0.205	0.275***	0.210	0.355***	0.159	0.358***
Other	0.317	0.257***	0.343	0.222***	0.385	0.231***
Borrower Characteristics						
Investment Grade			0.258	0.066***		
A S&P Rating	0.033	0.006***				
BBB S&P Rating	0.277	0.084***				
BB S&P Rating	0.385	0.515***				
B S&P Rating	0.253	0.351***				
CCC S&P Rating	0.032	0.028				
D S&P Rating	0.014	0.011				
Sales	3,526	3,238				
Profitability	0.022	-0.049*				
Ln(Debt)	6.597	6.990***				
Finance	0.032	0.006***	0.070	0.010***	0.048	0.011***
Other	0.012	0.005***	0.027	0.011***	0.063	0.017***
Consumer	0.182	0.215	0.179	0.214**	0.170	0.218***
Technology	0.075	0.145***	0.081	0.142***	0.058	0.135***
Health	0.042	0.054	0.039	0.048	0.026	0.043***
Other Industry	0.347	0.233***	0.352	0.250***	0.470	0.272***

Table 2 (continued)

Syndicate Characteristics						
Investment Bank	0.158	0.216***	0.170	0.259***	0.091	0.243***
Commercial Bank	0.214	0.095***	0.219	0.099***	0.294	0.110***
Universal Bank	0.759	0.883***	0.764	0.846***	0.673	0.844***
Other Bank	0.045	0.009***	0.064	0.012***	0.116	0.018***
Loan Origination Year						
2001	0.186	0.129***	0.150	0.133	0.162	0.126***
2002	0.193	0.187	0.174	0.160	0.178	0.161
2003	0.214	0.272***	0.194	0.238***	0.207	0.237***
2004	0.240	0.241	0.305	0.264***	0.283	0.257*
Instruments						
Standard	0.598	0.549*	0.644	0.609***	0.738	0.618***
Agent Consent	0.569	0.774***	0.443	0.676***	0.219	0.632***
Agent Consent Missing	0.430	0.219***	0.557	0.319***	0.780	0.364***
Company Consent	0.531	0.751***	0.414	0.653***	0.200	0.608***
Company Consent Missing	0.445	0.235***	0.571	0.330*	0.787	0.375***
Registered Public Debt	0.346	0.313				
Registered Rule 144A Debt	0.453	0.524***				
Tier 1 Bank	0.448	0.653***	0.396	0.557***	0.314	0.546***
Tier 2 Bank	0.318	0.297	0.385	0.371	0.312	0.373***
Number of Banks	1.444	1.602***	1.594	1.580	1.472	1.596***
n	947	643	1,622	1,162	6,580	1,323

Table 3

Probit Model for Expected Liquidity

This table presents the probit model results examining why some loans trade while other do not for specifications A through F. The dependent variable, liquid0, is defined as one if the loan trades in the secondary market 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
ln(Maturity)	0.724	***	0.636	***	0.636	***	0.594	***	0.580	***	0.485	***
ln(Facility Amount)	0.389	***	0.394	***	0.385	***	0.387	***	0.506	***	0.553	***
Guarantor	-0.084		-0.170		-0.105		-0.059		-0.067		-0.076	
Sponsor	0.241	**	0.245	**	0.269	**	0.248	**	0.262	***	0.309	***
Dividend Restrictions			0.594	***	0.588	***	0.497	***	0.359	**	0.475	
Secured			0.696	***	0.656	***	0.668	***	0.563	***	0.671	***
Refinancing Indicator			0.067						-0.057		0.071	
Hybrid			0.280		0.408	*	0.466	**	0.336	***	0.373	***
Institutional	0.712	***	0.647	***	0.637	***	0.625	***	0.588	***	0.780	***
Required Lenders	0.627	***	-0.038		0.032		0.412		0.278		0.204	
Investment Grade					-0.724	***	-0.594	***	-0.625	***		
Standard	0.010		0.085		0.067		0.122		0.075		-0.011	
Agent Consent			-1.183						-1.023		-0.138	
Company Consent			0.221						-0.232		-0.067	
Registered Public Debt	-0.065		-0.045		-0.046		0.004					
Registered Rule 144A Debt	0.124		0.115		0.123		0.117					
Tier1	0.569	***	0.550	***	0.580	***	0.431	**	0.486	***	0.617	***
Tier2	0.328		0.315		0.334		0.220		0.323	***	0.411	***
Number of Banks	0.293	***	0.303	***	0.327	***	0.323	***	0.069	**	0.048	*
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	
n	1,590		1,590		1,590		1,656		2,784		7,903	
Pseudo R-Squared	0.379		0.412		0.406		0.379		0.367		0.502	

Table 4

Marginal Effects on the Probability of the 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 3. 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
ln(Maturity)	0.258	***	0.224	***	0.224	***	0.226	***	0.213	***	0.041	***
ln(Facility Amount)	0.139	***	0.139	***	0.136	***	0.147	***	0.186	***	0.047	***
Guarantor	-0.029		-0.058		-0.037		-0.022		-0.024		-0.006	
Sponsor	0.089	**	0.089	**	0.098	***	0.096	***	0.097	***	0.030	***
Dividend Restrictions			0.201	***	0.200	***	0.183	***	0.131	**	0.049	***
Secured			0.233	***	0.221	***	0.242	***	0.120	***	0.068	***
Refinancing Indicator			0.023						-0.021		0.006	
Hybrid			0.104		0.154	*	0.184	**	0.129	***	0.042	***
Institutional	0.253	***	0.227	***	0.224	***	0.234	***	0.213	***	0.090	***
Required Lenders	0.211	***	-0.013		0.011		0.152		0.101		0.019	
Investment Grade					-0.225	***	-0.207	***	-0.205	***		
Standard	0.003		0.030		0.024		0.046		0.028		-0.001	
Agent Consent			-0.426						-0.368		-0.011	
Company Consent			0.077						-0.085		-0.006	
Registered Public Debt	-0.023		-0.016		-0.016		0.001					
Registered Rule 144A Debt	0.044		0.040		0.043		0.045					
Tier1	0.199	***	0.190	***	0.201	***	0.162	***	0.178	***	0.062	***
Tier2	0.120	*	0.114	*	0.121	*	0.085		0.120	***	0.040	***
Number of Banks	0.105	***	0.107	***	0.116	***	0.123	***	0.025	**	0.004	*
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	
n	1,590		1,590		1,590		1,656		2,784		7,903	
Pseudo R-Squared	0.379		0.412		0.406		0.379		0.367		0.502	

Table 5

Expected Liquidity Summary Statistics by Liquidity Proxy

This table presents the summary statistics for the expected liquidity as estimated from Table 3 decomposed by our liquidity proxy for the 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	0.214	0.680***	0.241	0.662***	0.083	0.583***
Standard Deviation	0.245	0.243	0.235	0.238	0.160	0.273
Minimum	4.21e-08	0.015	5.51e-07	0.008	1.05e-10	8.55e-06
Maximum	0.986	0.999	0.982	0.998	0.992	0.994
Upper Conf. Interval (95%)	0.199	0.661	0.229	0.649	0.079	0.568
Lower Conf. Interval (95%)	0.230	0.698	0.253	0.676	0.087	0.598
N	947	643	1,622	1,162	6,580	1,323

Table 6
OLS Model for Initial Absolute Spread

This table presents the OLS model results for initial spread for specifications A through F. The initial spread is measured as 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquidity	**-83.699**	***	**-72.882**	***	**-76.680**	***	**-68.880**	***	**-71.556**	***	**-71.589**	***
ln(Maturity)	-0.606		-7.992		-9.074		-19.274	***	-13.430	***	-7.549	***
ln(Facility Amount)	0.374		-1.429		-5.193		-6.298		-6.388	*	-13.940	***
Guarantor	-4.568		-5.027		-1.607		3.210		0.905		-28.312	***
Sponsor	33.922	***	27.915	***	36.828	***	22.654	***	27.042	***	59.206	***
Dividend Restrictions			51.452	***	51.903	***	31.566	***	30.681	***	40.497	***
Secured			46.644	***	56.324	***	42.381	***	31.493	***	59.290	***
Refinancing Indicator			3.910						-5.380		-4.635	
Hybrid			189.058	***	198.881	***	197.718	***	184.997	***	189.161	***
Institutional	62.596	***	51.727	***	48.365	***	46.488	***	39.494	***	72.317	***
Required Lenders	27.261	***	13.934		18.507		5.899		27.998	*	48.956	***
Investment Grade					-102.797	***	-138.342	***	-138.688	***		
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	1,590		1,590		1,590		1,656		2,784		7,903	
R-Squared	0.252		0.365		0.333		0.354		0.373		0.349	
Adjusted R-Squared	0.234		0.346		0.318		0.339		0.364		0.346	
Dependent Mean	272.589		272.589		272.589		288.499		294.085		279.460	

Table 7
OLS Model for Initial Relative Spread

This table presents the OLS model results for initial relative spread for specifications A through F. The initial relative spread is 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquidity	**-0.636**	***	**-0.533**	***	**-0.573**	***	**-0.473**	***	**-0.509**	***	**-0.407**	***
ln(Maturity)	-0.013		-0.049		-0.056		-0.142	***	-0.110	***	-0.070	***
ln(Facility Amount)	0.012		-0.007		-0.029		-0.023		-0.007		-0.065	***
Guarantor	0.003		0.012		0.036		0.075		0.032		-0.184	***
Sponsor	0.264	***	0.213	***	0.273	***	0.211	***	0.228	***	0.381	***
Dividend Restrictions			0.192	**	0.194	**	0.081		0.076		0.118	**
Secured			0.244	***	0.284	***	0.242	***	0.256	***	0.337	***
Refinancing Indicator			-0.043						-0.076		-0.048	
Hybrid			1.462	***	1.556	***	1.562	***	1.371	***	1.405	***
Institutional	0.383	***	0.322	***	0.302	***	0.257	***	0.194	***	0.390	***
Required Lenders	0.184	***	0.147		0.166		0.134		0.307	***		
Investment Grade					-0.557	***	-0.716	***	-0.735	***		
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	1,590		1,590		1,590		1,656		2,784		7,903	
R-Squared	0.519		0.597		0.578		0.615		0.614		0.575	
Adjusted R-Squared	0.508		0.586		0.568		0.607		0.609		0.573	
Dependent Mean	1.521		1.521		1.521		1.577		1.622		1.522	

Table 8
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 zero otherwise. This is the liquidity proxy considered in Tables 1 through 6. Liquid 1 is equal to one if the loan is quoted within 365 days of its origination date and zero otherwise. Liquid 2 is equal to one if the loan is quoted for at least 100 days on the secondary market 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 zero otherwise.

	[A]	[B]	[C]	[D]	[E]	[F]
Liquid 0	*0.404*	*0.404*	*0.404*	*0.441*	*0.417*	*0.167*
Liquid 1	*0.378*	*0.378*	*0.378*	*0.406*	*0.381*	*0.150*
Liquid 2	*0.357*	*0.357*	*0.357*	*0.388*	*0.361*	*0.143*
Liquid 3	*0.287*	*0.287*	*0.287*	*0.313*	*0.272*	*0.104*

Table 9
OLS Model for Initial Absolute 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 8. Each row represents a different liquidity proxy and therefore a separate regression. Expected Liquid 0 repeats the results presented in Table 6 for comparison purposes. In addition, separate probit models are estimated for each liquidity proxy. These results are available 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquid 0	*-83.699*	***	*-72.882*	***	*-76.680*	***	*-68.880*	***	*-71.556*	***	*-71.589*	***
Expected Liquid 1	*-94.468*	***	*-74.519*	***	*-81.817*	***	*-97.504*	***	*-89.623*	***	*-81.594*	***
Expected Liquid 2	*-102.455*	***	*-84.095*	***	*-84.697*	***	*-65.174*	**	*-62.484*	***	*-63.678*	***
Expected Liquid 3	*-99.238*	***	*-70.978*	***	*-79.213*	***	*-62.486*	**	*-69.023*	***	*-75.579*	***
n	1,590		1,590		1,590		1,656		2,784		7,903	

Table 10
OLS Model for Initial Absolute Spread with Year Interactions

This table presents the abridged OLS model results for the initial absolute All-in Drawn Spread over LIBOR for specifications A through F incorporating year interactions with our estimated measure of expected liquidity. The expected liquidity parameter is estimated from the probit model presented in Table 3. *** 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.

	[A]		[B]		[C]		[D]		[E]		[F]	
Expected Liquidity	*-54.868*		*-45.640*		*-35.030*		*-35.537*		*-32.606*		*-42.718*	***
Expected Liquidity * 2001	*-5.638*		*9.720*		*2.756*		*1.727*		*17.378*		*3.910*	
Expected Liquidity * 2002	*-26.816*		*-6.620*		*-29.649*		*-48.887*	*	*-56.478*	***	*3.342*	
Expected Liquidity * 2003	*-7.818*		*-24.750*		*-47.462*	*	*-25.839*		*-40.885*	*	*-22.936*	
Expected Liquidity * 2004	*-78.743*	***	*-105.179*	***	*-110.529*	***	*-134.334*	***	*-157.535*	***	*-153.364*	***
n	1,590		1,590		1,590		1,656		2,784		7,903	
R-Squared	0.346		0.429		0.403		0.416		0.439		0.389	
Adjusted R-Squared	0.328		0.411		0.388		0.402		0.431		0.386	

Table 11
Matched Comparison of Liquid and Illiquid Loans.

This table presents the comparison between a matched sample of loans constructed by identifying borrowing firms that have two loan agreements 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.

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 Characteristics						
Yield Spread	329	328	388	329	399	332.7
Maturity in Months	60	73	41	65	53	65
Facility Amount in millions	202.817	305.069	324.399	289.265	328.922	332.391
Guarantor	6%	7%	12%	24%	13%	17%
Sponsor	47%	48%	29%	29%	39%	43%
Dividend Restrictions	59%	51%	41%	59%	35%	65%
Secured	65%	74%	35%	65%	48%	70%
Refinancing Indicator	67%	68%	41%	65%	65%	70%
Hybrid	11%	12%	6%	0%	9%	13%
Institutional	16%	83%	29%	71%	52%	57%
Required Lenders	49%	52%	47%	53%	57%	74%
Investment Grade	9%	8%	7%	7%	5%	5%
n	180		17		23	

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.

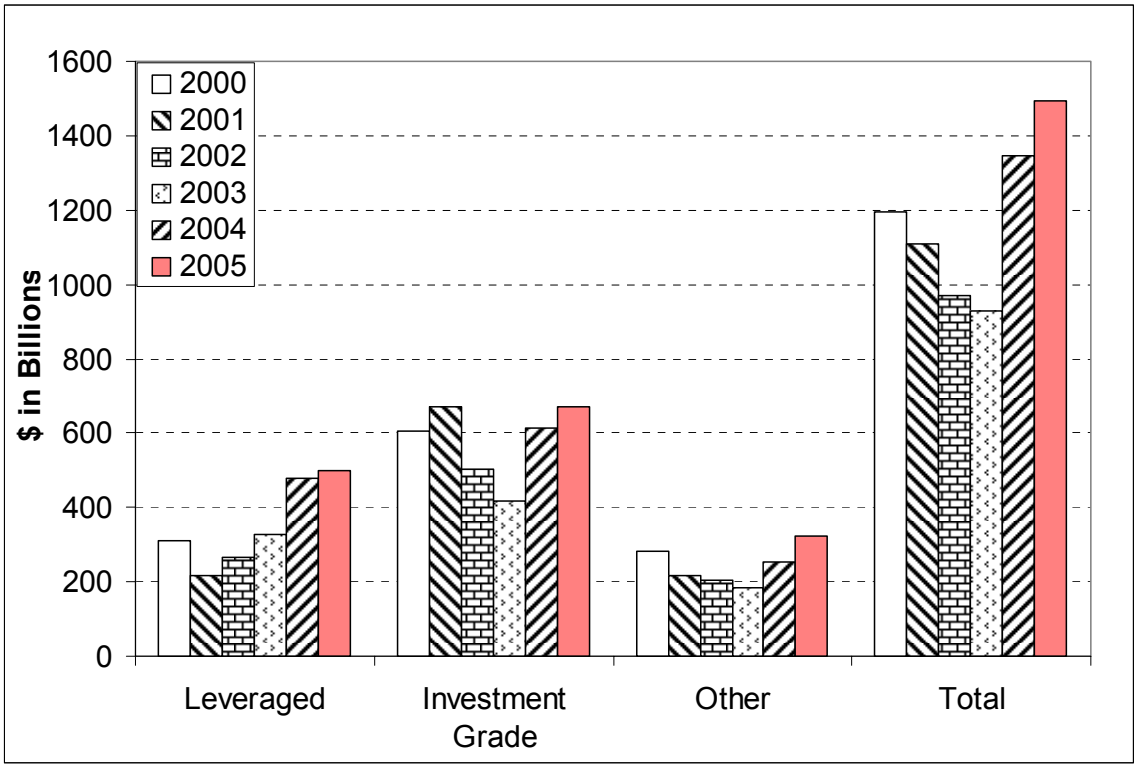


Figure 2
Secondary Market Loan Trading Volume

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.

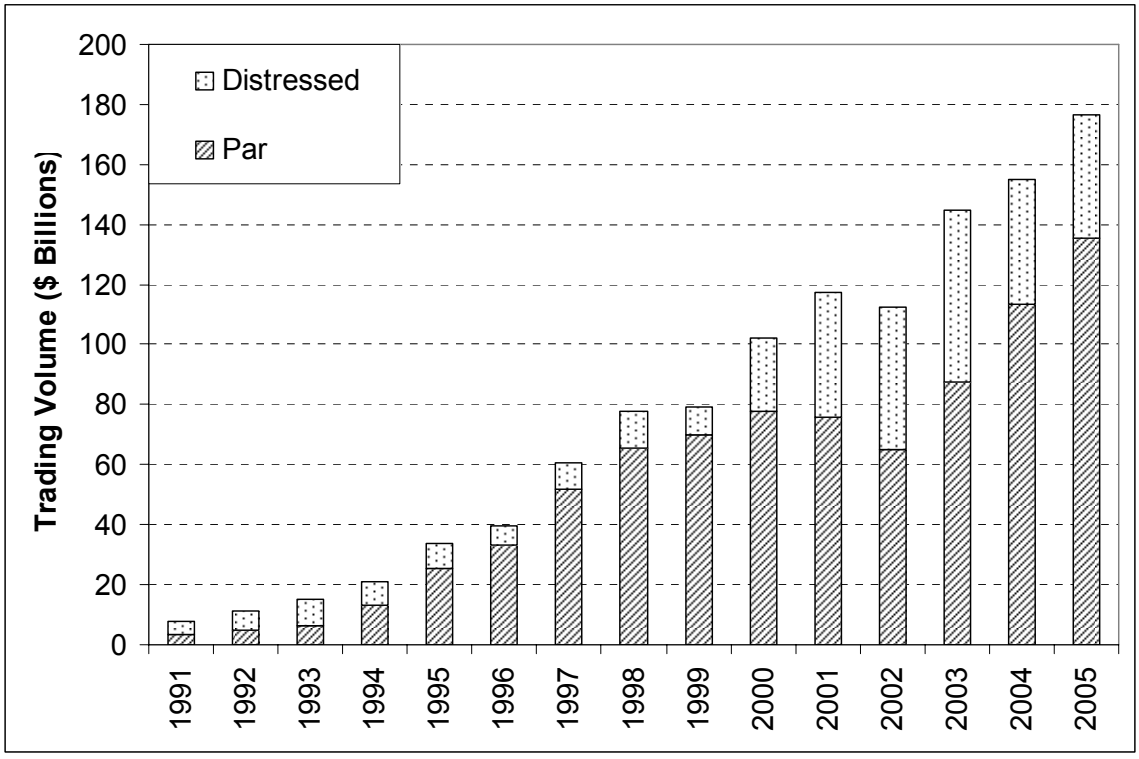
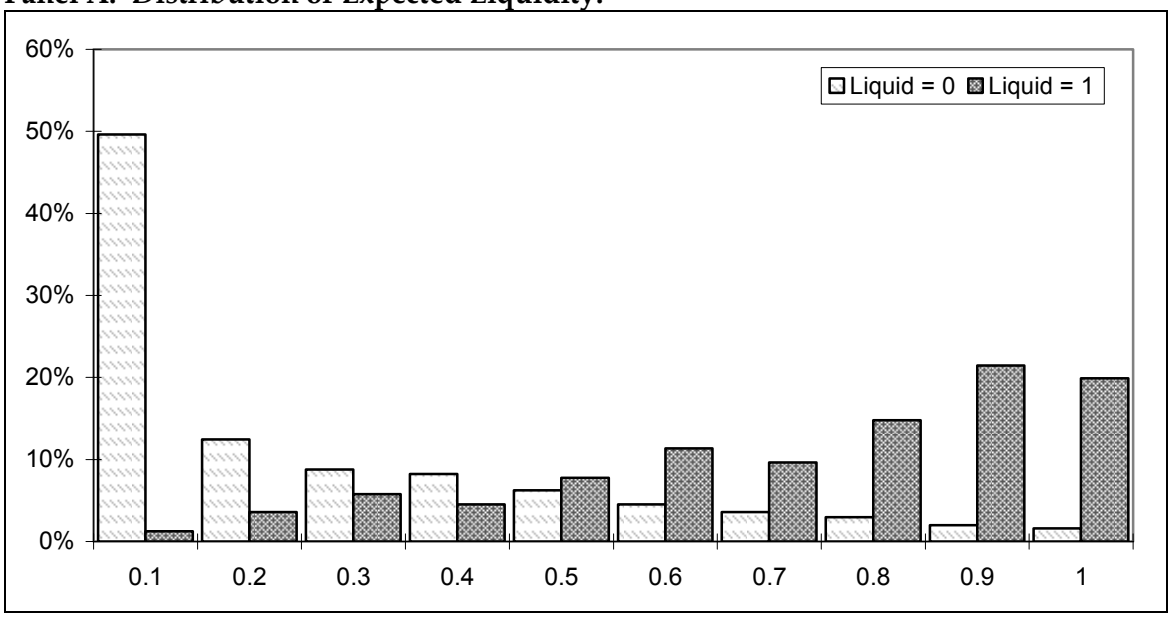


Figure 3
Distribution of Expected Liquidity by Liquidity Proxy – Specification B

These figures present the distribution of our expected liquidity measure (from the probit model) by the observed liquidity proxy for specification B as presented in Table 3.

Panel A. Distribution of Expected Liquidity.



Panel B. Distribution of Expected Liquidity for Liquid Loans by First Loan Price.

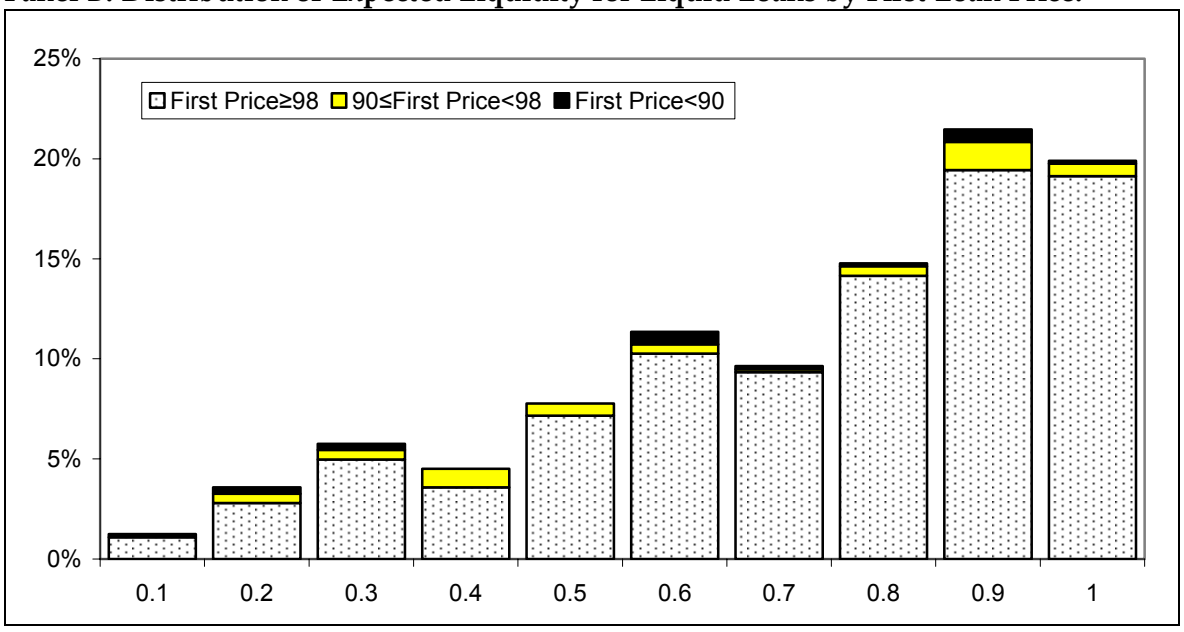
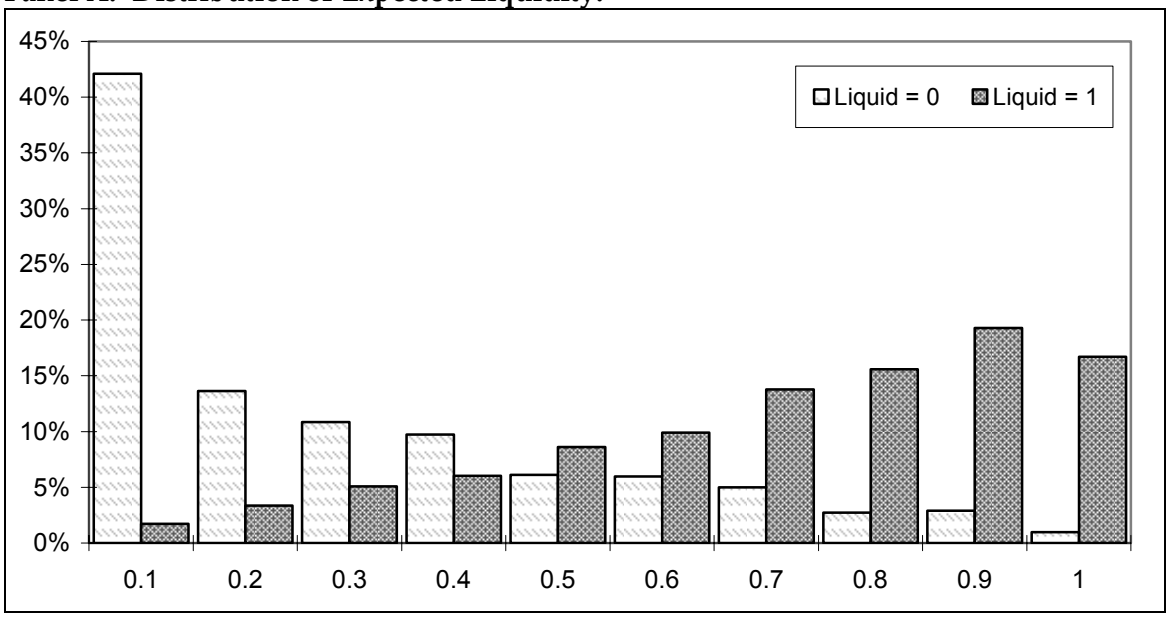


Figure 4
Distribution of Expected Liquidity by Liquidity Proxy – Specification E

These figures present the distribution of our expected liquidity measure (from the probit model) by the observed liquidity proxy for specification E as presented in Table 3.

Panel A. Distribution of Expected Liquidity.



Panel B. Distribution of Expected Liquidity for Liquid Loans by First Loan Price.

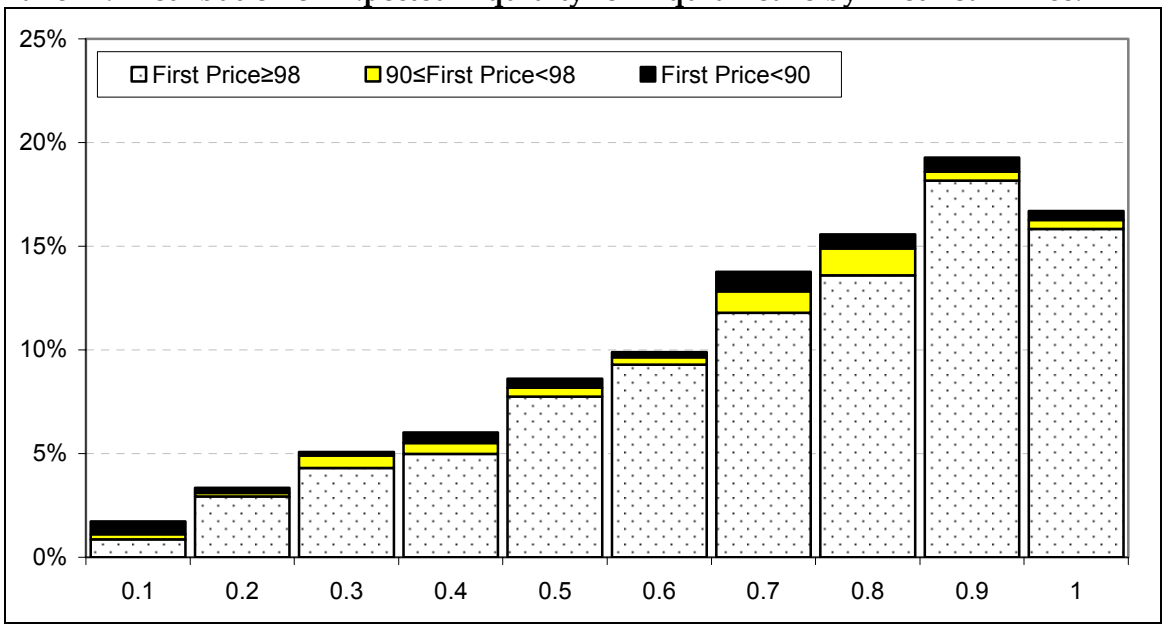
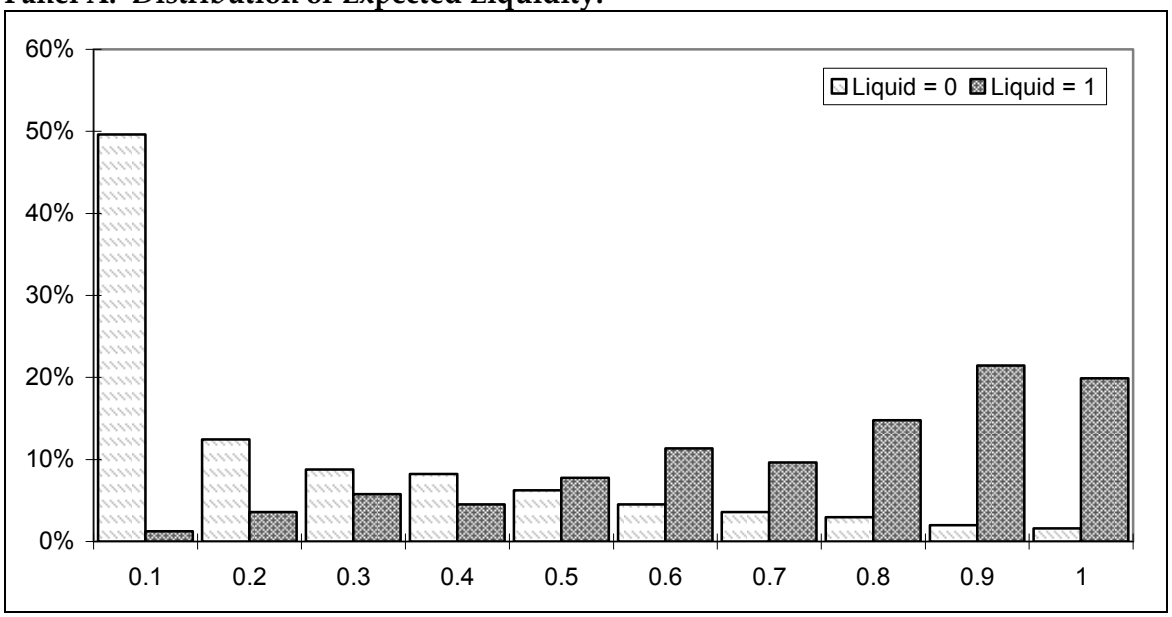


Figure 5
Distribution of Expected Liquidity by Liquidity Proxy – Specification F

These figures present the distribution of our expected liquidity measure (from the probit model) by the observed liquidity proxy for specification F as presented in Table 3.

Panel A. Distribution of Expected Liquidity.



Panel B. Distribution of Expected Liquidity for Liquid Loans by First Loan Price.