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Does the Secondary Loan Market Reduce Borrowing Costs?*

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Abstract. We show that lenders make price concessions for the right to resell loans and reveal a strong countervailing association between the ex ante probability of loan resale and the initial loan spreads. We disentangle the side effects (reduced monitoring) from the benefits (enhanced liquidity) brought by the secondary loan resales. The average net impact of simultaneously reducing the probability of the presence of resale constraint and raising the probability of resale across the full sample is to lower spreads by 14 basis points. On balance, the secondary loan market provides clear benefits to the issuers of debt.

JEL Classification: G32

1. Introduction

What is the impact of secondary loan trading on the cost of borrowing? Because increased liquidity from loan resales benefits lenders, banks may grant lower spreads to liquid loans (*price concession hypothesis*). On the other hand, loan resales transform banks from credit monitors into originators and distributors reducing lenders' monitoring incentives. The resulting increased risk may be associated with higher borrowing costs (*diminished monitoring hypothesis*). To measure the impact of each hypothesis separately,

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we estimate the probability of loan resale and loan resale constraint for each loan facility using ex ante information only and then use the forecasted probability of resale and resale constraint to explain the ex ante loan yield spread. We identify the secondary market feedback variable, probability of loan resale, as a proxy for lenders' monitoring incentives. Restrictive covenants stipulate that the borrower's permission is required for loan resale and we treat such covenants as a proxy for loan liquidity. As a result, we are able to separate the costs (diminished monitoring) from the benefits (greater liquidity) of secondary loan resales. Our study shows that, on net, the loan resale market has lowered loan costs for noninvestment grade borrowers, and possibly raised loan costs for investment grade borrowers.

The main result of this article, documenting a positive net benefit to borrowers from secondary loan trading, is highly relevant due to the importance of this market. Syndicated loans represent one of the most important debt financing vehicles in the US economy, funding a significant portion of the overall corporate capital needs. The rapid development of the primary syndicated loan market is matched by an even faster growing secondary loan trading market, increasing from $8 billion in 1991 to $413 billion in 2010—a compound annual growth rate of 35.2%.

Making use of the secondary loan market database jointly provided by the Loan Syndication Trading Association (LSTA) and the Thomson-Reuters Loan Pricing Corporation (LPC), we show that the ex ante probability of loan resale dramatically impacts the primary market loan spread. This impact on the primary market is above and beyond the effect of the ex ante risks and other characteristics of the borrowers, raising the spread by roughly 55 basis points for noninvestment grade loans, a finding consistent with the *diminished monitoring hypothesis*. We also find that the presence of loan covenants restricting resale increases the loan spread by as much as 37 basis points. When the borrower does not set a restriction on loan resale, it allows the lenders to access external funds enhancing lender liquidity and lowering costs. The average net impact of simultaneously reducing the probability of the presence of resale constraint and raising the probability of resale across the full sample is to lower spreads by 14 basis points (or $435,000 savings on the annual interest expense for the median-sized loan). Although this beneficial net impact for issuers is absent for investment grade borrowers as well as for firms with little risk of default, it is strong for riskier issuers of noninvestment grade loans (16 basis points) and nonrated loans (25 basis points), *prima facie* evidence of the benefit of the secondary loan market.

We understand these results in the context of Gorton and Pennacchi's (1995) motivation of the empirical regularity of loan resales in the face of

clear moral hazard for purchasers of this debt. Their framework relies on implicit contractual agreements between loan purchasers and sellers to manage the moral hazard issues (impaired monitoring with resale) and views loan sales as providing liquidity which, in their model, takes the form of cheaper financing. Gorton and Pennacchi (1995) argue persuasively that the secondary market solves one problem, a shortfall of liquidity, and introduces another, underperformance in monitoring. In a closely related paper, Parlour and Plantin (2008) note that a liquid secondary market can lower the cost of a loan by removing the liquidity premium, but incentives to monitor before resale of the loan are impacted by the possibility of resale. Their model indicates that loans will be less expensive if the option to resell is available. In summary, the option to resell the loan, *ceteris paribus*, is an unambiguously good thing for the bank originating the loan because it enhances liquidity. This should induce a syndicate to lower the spread it charges if a borrower unconditionally allows its loan to be sold (i.e., absence of resale constraint). However, the higher the probability of resale, *ceteris paribus*, the more likely that lead banks' delegated monitoring will be negatively impacted and the greater the loan spread required to entice other lenders to join the loan syndicate.[1] In this way, loan resale probability is associated with reduced monitoring and increased moral hazard on an ex ante basis. As explained earlier, to proxy for the costs of the option to resell, we employ loan covenants restricting resale. Such covenants create a

[1] In loan syndication agreement, lead agent banks routinely add a clause to indicate that participating lenders should be responsible for their own credit decision. The following is an example of the typical agreement wording: "Each Lender acknowledges that it has, independently and without reliance upon the Agent or any other Lender and based on the financial statements and such other documents and information as it has deemed appropriate, made its own credit analysis and decision to enter into this Agreement. Each Lender also acknowledges that it will, independently and without reliance upon the Agent or any other Lender and based on such documents and information as it shall deem appropriate at the time, continue to make its own credit decisions in taking or not taking action under this Agreement." However, academic research suggests that lenders are able to "free ride" on the monitoring efforts of other lenders in a loan syndicate, especially lead lenders' monitoring efforts (Esty and Megginson, 2003). In addition, a strand of research on the loan syndicate structure has established that monitoring responsibilities are delegated to lead banks within a loan syndicate and information asymmetry exists between lead and participating lenders (e.g., Dennis and Mullineaux, 2000; Sufi, 2007; among others). We assume that the reduced monitoring incentives due to the ex ante likelihood of a loan being resold is anticipated by syndicate participants at the loan origination.

potential cost in obtaining the needed permission or paying an assignment fee (or both).[2]

Our results contrast with the implications of theories of loan securitization, which predict that banks choose to sell better (safe) loans where the value of monitoring is negligible, and thus the associated moral hazard and adverse selection problem is minimized (e.g., Greenbaum and Thakor, 1987; Pennacchi, 1988; Berger and Udell, 1993) as well as with the literature outlining the certification hypothesis for the initial loan distribution in the primary market (Dennis and Mullineaux, 2000; Sufi, 2007; Ivashina, 2009; Panyagometh and Roberts, 2010). We document that safe (investment grade) loans are resold, but we also show that the typical loan resold is an ex ante relatively riskier loan, and that a higher price is paid on these loans with increased ex ante probability of resale.

Our work also offers perspective on how constraints on loan resales impact the initial loan yield spreads. Constraints on resale, implemented by loan covenants requiring borrower consent, have been shown to increase both the size of the loan syndicate and the cost of the loan (Lee and Mullineaux, 2004; Güner, 2006). Our results support the *price concession hypothesis*, whereby the borrower exacts a concession on the loan spread as compensation for allowing resale of the loan. Furthermore, we disentangle the impact of reduced loan monitoring and increased liquidity by controlling separately for the ex ante probability of loan resale and constraints on resale. Our results overturn Gupta, Singh, and Zebedee (2008) which (mis)-identified the probability of resale as a liquidity proxy.

Our empirical investigation is conducted using a two-stage econometric model to address the simultaneity of loan resale constraints (fixed jointly with the loan spread) and the ex post nature of the resale probability (resales occur well after spreads are fixed, so that we cannot take loan resale as known at the time the loan spread is set). Our 1st-stage estimation uses a logistic regression framework to model the probability of loan resale and the probability that the loan agreement will include resale constraints (including agent consent, borrower consent, minimum assignment size, and assignment

[2] In law, permission to resell may not be "unreasonably withheld or delayed," but borrowers commonly raise objections to loan resales (Neale and Clark, 2011). Many loans with restrictions on resale are in fact resold. Altogether, 13% of the sample of loans with restrictions on resale end up being resold. Few loans that have no restrictions on resale are actually resold (only 5% of the samples of loans with no restrictions on resale are resold). The probability that a loan will be resold is actually weakly *negatively* correlated with the option to resell, a phenomenon similar to loans secured by assets tending to have higher default probability than unsecured loans; in spite of their secured status, loans most in need of monitoring will be more likely to have constraints placed on resale.

fee), conditioning only on ex ante information available at the time the primary market price is set, well in advance of any secondary market activity. Our 2nd-stage estimation employs the predicted probability of loan resale and loan resale constraint, which are computed based on the 1st-stage logistic models, as explanatory variables in a conventional loan yield spread model. This modeling exercise allows us to jointly test the impacts of resale constraint and loan resales on the cost of borrowing.

We are also interested in evaluating the extent to which investment grade loans differ from noninvestment grade loans in their pricing reaction to loan constraints and resale as well as the reaction of spreads on loans issued by firms at greater risk of bankruptcy, lead-lender effects, the impact of restrictive financial covenants on spreads, the influence of sample selection on loan pricing when loans involve nonbank institutional lenders, and the impact of loan type: revolver versus term loan. We investigate each of these in turn to ensure that the measured effect of resale constraint and probability of resale are not proxying for risk of default of a loan/borrower or for some omitted variables (like lender characteristics).

The remainder of the paper is organized as follows. Section 2 overviews the related literature and develops the two testable hypotheses (i.e., *price concession hypothesis* and *diminished monitoring hypothesis*) in more detail. Sections 3 and 4 describe the data and report the main empirical results. Section 5 concludes.

2. Related Literature and Hypothesis Development

Our research is motivated by prior empirical studies that focus on the specialness of banks (e.g., James, 1987; Lummer and McConnell, 1989; Best and Zhang, 1993; Billett, Flannery, and Garfinkel, 1995, 2006; among others). Overall, these papers find evidence that banks are unique and enhance the value of firms through their monitoring and certifying services. The traditional theories of financial intermediation (e.g., Diamond, 1984, 1991; Boyd and Prescott, 1986) also imply that bank loans should be illiquid assets; by holding loans and monitoring borrowers, banks play an important role in mitigating information asymmetry problems.

Following the upsurge of loan resale activities in the late 1980s, a number of theoretical models incorporating loan transfers addressed the benefits and costs of direct loan resales in the context of the theoretical roles of banks as delegated monitors and liquidity providers.[3] On the positive side, the

[3] Direct loan sales that we study here have a similar meaning to the loan participation in Gorton and Pennachi (1995), which includes both loan assignments and novations.

increased liquidity associated with loan resales benefits lenders and facilitates portfolio and risk management by banks (Gorton and Pennnacchi, 1995; Parlour and Plantin, 2008) and this benefit may be partially transferred to borrowers in the form of lower yield spreads as compensation for allowing their loans to be resold (*price concession hypothesis*). In support of this hypothesis, Güner (2006) finds that the average yield of loans originated by active loan sellers is lower than that of loans originated by less active loan sellers, and Gupta, Singh, and Zebedee (2008) obtain similar results for resold loans.[4] Consistent with the *price concession hypothesis*, which implies that the marketability of loans is considered positive news, first-time secondary loan sales elicit a positive stock price reaction (Gande and Saunders, 2012). A similar effect occurs in debt markets where some borrowers whose highly liquid loans trade on the secondary market enjoy an interest rate discount on subsequent loans (Santos and Nigro, 2009).

Loan sales may also bring negative effects. First, and most important, loan sales shift the role of the lending bank from credit monitor and certifier to originator and distributor (Gorton and Pennnacchi, 1995; Parlour and Plantin, 2008). The result is a reduction in added value attributable to lenders' unique monitoring services accompanied by an increase in the ex post loan risk (*diminished monitoring hypothesis*). Second, a loan sale could convey negative information about the borrowers' financial situation. Finally, because loan sales may increase the number of syndicate lenders, the result may be higher costs faced by borrowers if renegotiation becomes necessary.

Consistent with the *diminished monitoring hypothesis* and further negative effects, the announcement of a loan sale negatively impacts the stock returns of borrowers (Dahiya, Puri, and Saunders, 2003). In a similar vein, the onset of secondary loan trading transfers wealth from bondholders to

Haubrich (1989) classifies loan resales into three categories: assignments, novation, and participations. Assignment and novation correspond to a direct loan sale involving a portion and all of the lender's commitment, respectively, whereas participation is similar to loan securitization.

[4] Gupta, Singh, and Zebedee (2008) employ a model very similar to ours to forecast the probability of resale, only they interpret their forecast as a liquidity measure, and find a negative coefficient on this liquidity proxy, in contrast to the positive coefficient we find. See Kamstra, Roberts, and Shao (2006). This is a function of Gupta, Singh, and Zebedee's (2008) use of an institutional loan dummy as an exogenous control in their 2nd-stage model. If this variable is treated as endogenous, their coefficient on the probability of resale flips positive matching our results. This result holds on both the term loan subsample from 2000 to 2004 that Gupta, Singh, and Zebedee (2008) focus on and on the larger sample we employ, from 1994 to 2004. We highlight the sample selection (endogeneity) issue with the institutional investor participation in Section 4.2.4.

shareholders, because reduced bank monitoring incentives permit increased risk shifting by shareholders at a cost to bondholders (Gande and Saunders, 2012). In reaction to reduced monitoring, borrowers with traded loans incur additional costs in the form of more restrictive loan covenants (Drucker and Puri, 2009).

Our research is also related to work on loan securitization and credit default swaps, which largely supports the *diminished monitoring hypothesis*. As with loan sales, banks engaging in securitization (Keys *et al*., 2010) or hedging with credit default swaps (Ashcraft and Santos, 2009) lessen their risk exposure creating incentives for reduced monitoring.

In testing the *price concession* and *diminished monitoring hypotheses*, we employ a loan pricing model drawn from the extensive literature on the determinants of loan contract terms, including loan spread, maturity, secured status, and commitment fees (Berger and Udell, 1993; Guedes and Opler, 1996; Saunders, 1996; Dennis, Nandy, and Sharpe, 2000). The unanimous view is that initial loan spreads reflect and measure all ex ante risk factors, including Altman's *Z*-score, the leverage of the firm, the credit rating of the firm's existing debt, whether the loan is secured, a revolver or term loan, and loan purpose (takeover attempt, leveraged buyout, or repayment of existing debt, and others).

3. Data and Summary Statistics

3.1 DATA

Our sample includes all US loan facilities extended to public companies in the Dealscan database from 1994 to 2004. The secondary market-to-market loan pricing data are obtained from LSTA and LPC. This database records daily quotes of 5,101 loan facilities through 2004 with the earliest loan originations traced back to 1994. The firm-level borrower data (including market-to-book ratio, leverage ratio, and Altman's *Z*-score calculated according to Altman, 1968) are collected from Compustat, and the market data (including London interbank offered rate (LIBOR), interest rate volatility, and the moving average term premium) are retrieved from the Financial Forecast Center datasets. To maintain consistency and comparability, we only select loans that use LIBOR as the benchmark rate. Some loans have multiple benchmark rates and in this case, we collect the all-in-spread drawn over LIBOR as the primary loan pricing information. Out of the loans eliminated, roughly half do not indicate a benchmark rate, roughly one-quarter benchmark the prime rate, one-eighth are fixed-rate loans, 1% benchmark the Treasury spread, and the rest use a variety of benchmarks.

We delete those facilities with recorded loan type as bankers' acceptance, bridge loan, lease, loan-style floating-rate note, standby letter of credit, step payment lease, bond, note, guidance line, traded letter of credit, multioption facility, and other or undisclosed loan (roughly 4% of the loan facilities). After matching the Dealscan data and the secondary loan market data by unique facility ID number, we identify those facilities in the full Dealscan sample that have been traded on the secondary market.[5] We then carefully match our sample with the Compustat database by the name of the borrowers employing a combination of algorithmic matching and manual checking and retrieve the most recent prior year-end firm characteristics variables from Compustat. After deleting observations with missing values of control variables, like the Altman's *Z*-score, the sample available for regression analysis is 10,992 loan facilities, of which 1,012 are loans that are resold.[6]

3.2 UNCONDITIONAL ANALYSIS

Table I reports the descriptive statistics for the all-in-spread drawn and the conditioning variables of the loan yield spread model based on the full data period (1994–2004). We form a loan resale constraint variable, *Resale Constraint*. There are four types of constraints: borrower consent, agent consent, minimum assignment size, and assignment fee.[7] The variable, *Resale Constraint*, takes a value of 0 if there are no constraints

[5] The facility ID is a unique number assigned to each loan facility by the LPC. There is a one-to-one match for each original loan facility (tranche). In this article, we conduct multivariate analysis at the loan facility level.

[6] The sample of loans not resold may include facilities that will later be included in a securitization package. This is unobservable in DealScan. As discussed above, securitization has a similar impact as loan resales reducing lenders' incentive to monitor and increasing liquidity. Thus, the possibility of securitization could introduce an errors-in-variables problem, creating a downward bias in the coefficient estimate on the probability of loan resale. We use a predicted value of the probability of resale through our instrumental variable's 1st-stage regression, controlling for the errors-in-variables bias.

[7] According to LPC's definition, the agent consent constraint refers to the case in which lead banks' agreement is required in order for an institution to trade all or a portion of a loan to another entity. Borrower consent requires borrower's agreement in order for an institution to trade all or a portion of a loan to another entity. Minimum assignment size stipulates the minimum amount of a facility that can be traded under an assignment. Assignment fee is the fee paid to the agent bank for handling the assignment documentation required when trading. Mullineaux and Pyles (2008) provide a detailed discussion on the assignment constraints. In our sample, out of 10,992 loan facilities, 6,480 loans have borrower consent restrictions, 6,181 have agent consent restrictions, 6,657 have restrictions on the minimum assignment size, and 6,573 have assignment fee requirements. Overall,

Table I. Summary of variables classified by trading dummy

This table reports the mean, median, and standard deviation for the main variables of our analysis, broken out into the sample of loans that are resold and unsold. The last two columns report tests for difference in mean and median across these two samples. Definitions of the variables are provided in Table II. The total number of observations that have matched information from Compustat is 10,992, including 1,012 loan facilities resold on the secondary market. Summary statistics of variables before the log transformation are also reported. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

	Resold loans			Unsold loans			Tests	
Variable	Mean	Median	SD	Mean	Median	SD	Mean difference	Rank sum
Spread	2.68	2.75	0.01	1.60	1.50	0.01	−26.61***	−27.23***
Prob loan resale	0.46	0.47	0.28	0.055	0.01	0.12	−46.58***	−45.68***
Prob resale constraint	0.89	0.95	0.17	0.65	0.73	0.30	−41.25***	−29.44***
Nonbanks participate	0.80	1	0.40	0.38	0	0.49	−31.59***	−25.98***
Total assets	4,597	1,510	8,594	3,463	580	8,174	−4.02***	−18.35***
Leverage	0.49	0.48	0.20	0.37	0.35	0.21	−18.17***	−17.62***
Market-to-book	1.59	1.32	0.88	1.75	1.41	1.21	5.58***	3.53***
Altman's *Z*	1.21	1.10	0.92	1.80	1.71	1.15	18.94***	17.16***
Noninvestment grade	0.78	1	0.42	0.23	0	0.42	39.73***	−37.11***
Nonrated	0.15	0	0.36	0.55	1	0.50	32.61***	24.2***
Log firm size	7.52	7.32	1.29	6.53	6.36	1.82	−22.14***	−18.35***
Loan size	442	230	1030	290	110	623	−4.63***	−18.3***
Log loan size	19.38	19.32	1.01	18.47	18.58	1.58	−25.63***	−18.93***
Maturity	5.30	5.17	1.83	3.44	3	1.96	−30.58***	−27.38***
Log maturity	1.58	1.64	0.49	1.03	1.01	0.71	−32.71***	−27.38***
Secured	0.83	1	0.38	0.49	0	0.50	−26.44***	−20.69***
Missing secured	0.10	0	0.30	0.30	0	0.46	18.96***	13.47***
Concentration	0.35	0.37	0.15	0.34	0.34	0.18	−2.12**	−2.95***
Log concentration	−1.18	−1.01	0.59	−1.29	−1.09	0.75	−5.38***	−2.95***
Revolver	0.37	0	0.48	0.81	1	0.39	28.02***	31.58***
Leveraged buyout	0.07	0	0.25	0.01	0	0.11	−6.93***	−12.99***
Takeover	0.29	0	0.46	0.16	0	0.37	−8.72***	−10.27***
Repay	0.21	0	0.41	0.25	0	0.44	3.36***	3.18***
Other purpose	0.11	0	0.31	0.16	0	0.37	5.49***	4.74***
No. of lenders	14.21	10	14.17	7.57	5	8.17	−14.65***	−20.51***
Log lenders	2.25	2.3	0.92	1.47	1.61	1.10	−25.24***	−20.51***
LIBOR	3.86	4.88	2.16	4.34	5.44	2.01	6.8***	6***
Term premium	1.30	0.72	1.07	1.27	0.88	0.95	−1.05	1.55
Interest volatility	0.36	0.36	0.06	0.39	0.37	0.09	15.02***	8.93***
Lead lenders share	16.82	10	19.18	39.41	20	37.58	31.79***	19.63***
No. of nonbank lenders	4.53	2	10.04	0.82	0	2.26	−11.74***	−31.81***
Nonbank as major	0.56	1	0.50	0.22	0	0.42	−20.83***	−23.45***
Bank as major	0.96	1	0.20	0.93	1	0.25	−4.11***	−3.38***

on resale, or 1 otherwise.[8] We partition the sample by a trading dummy that takes a value of 1 if the loan facilities were resold or 0 otherwise. We call the subsample with the trading dummy equal to 0 "*resold loans*" and the rest "*unsold loans*."

Among all the loan issues during 1994–2004, 9% of the loan tranches turn out to be resold by the original holders by the end of 2004. The ex ante all-in-spread drawn is significantly higher for the loans that were subsequently resold, by 108 basis points. This difference in spread does not appear to be a premium for an expected discounted resale of the loan. In fact, the resold loans were initially sold at, or very close to par. The median 1st-day loan resale price is 99.75, the 99th percentile is 102.28, and the 25th percentile is 98.5. Only a small number of loans were resold at a large discount on the 1st trading day—the 5th percentile price is 85, the 1st percentile is 58—skewing the distribution and leading to a mean 1st day resale price of 97.46, slightly below par. Table I shows that the mean of the predicted probability of loan resale is 6% for the unsold loans and 46% for the sold loans. Prob Resale Constraint for resold loans is 89%, but for unsold loans it is significantly lower (65%). Details on the construction of this predicted probability and the predicted probability of resale constraint are presented below in Section 4.1. We also find that compared to unsold loans, resold loans consist of a higher percentage with nonbank participation (Nonbanks Participate). Larger firms (Total Assets) and higher ex ante risk measures on average, such as a higher mean leverage ratio, lower mean Altman's *Z*-scores, and noninvestment grade loans are concentrated in the sample of resold loans. Moreover, resold loans are of longer maturity and more likely to be secured against collateral. In addition, these loan facilities correspond to a higher mean loan concentration ratio, lower proportion of credit revolvers, and greater percentage of loans borrowed for riskier purposes, such as leveraged buyouts and takeovers.

Resold loans also tend to be funded by a larger loan syndicate (number of lenders). Interestingly, we find that lead lenders take a smaller share (17%) in resold loans compared with 39% in unsold loans. We take this as evidence that lead lenders have less monitoring incentives in a loan that will be later resold through the secondary market. These loans also involve more nonbank institutions (number of nonbank lenders) and a higher percentage

5,539 loans have all the four types of loan resale constraints and 7,360 loans have at least one constraint.

[8] Borrower consent is the only constraint of these four that the borrower alone controls after the loan origination, and it could be argued that agent consent is not, at least in some instances, a binding constraint. We detail robustness tests with the loan resale constraint variable, *Resale Constraint*, defined as only the borrower's consent constraint below.

of resold loans have at least one nonbank lender playing a lead role (nonbank as major). The results on the variable "Bank as Major" indicate that commercial banks still dominate nonbank institutional lenders in the credit market and play a lead role in loan syndications through involvement in the overwhelming majority of the loans (96% in resold loans and 93% in unsold loans).

The mean difference *t*-test statistics shown in the last column confirm that borrower and loan characteristics associated with the resold loans differ from those associated with the unsold loans at the 99% confidence level. The unconditional results indicate that, compared to the unsold loans, the resold loans are in general riskier assessed on an ex ante basis.

The correlations (available in the Supplementary Appendix Table A1) confirm that riskier firms or loans have larger spreads (spreads are positively correlated with leverage, secured status of loan, and maturity of loan), and that spreads are narrower the larger the consortium of lenders (measured by Log Lenders) and the consortium tends to be larger with larger loans. The correlation matrix also confirms that multicollinearity should not be a significant concern.[9] Unconditionally, the spread is positively correlated with the probability of loan resale and the lifting of the loan resale constraint. Interestingly, the probability that a loan will be resold is weakly positively correlated with the presence of constraints on the option to resell.

The sample statistics reported in this article are not dissimilar to those reported in prior studies. In our sample, the all-in-spread drawn over LIBOR averages 1.70% with the mean maturity of 43 months, mean market to book ratio of 1.74, and mean loan concentration ratio of 0.34. In comparison, Sufi (2007), using Dealscan, reports a mean all-in-spread drawn of 1.59% and mean loan maturity of 37 months. In addition, Coleman, Esho, and Sharpe (2006) conduct their study using the Thomson Reuters SDC syndicated loan database. They report an average maturity of 49 months, an average loan yield spread over LIBOR of 1.27%, an average market to book ratio of 1.79, and an average loan concentration ratio of 0.42.[10]

[9] In the regressions, we conduct variance inflation factor (VIF) tests, where $VIF = 1/(1 - R^2)$ (Belsley, Kuh, and Welsch, 1980). We conduct VIF test against each explanatory variable. Since, none of the test statistics exceed the critical value of 10, we conclude that multicollinearity is not severe.

[10] Although these comparisons are informative, they lack the power of formal statistical tests. Unfortunately, we cannot provide formal tests of difference between our statistics and those reported in these papers without knowing both the variance of all the sample statistics and covariance with our data.

4. Regression Analysis

Our regression analysis to explain primary market pricing of loans is performed in the presence of endogeneity of the loan resale constraint (our proxy to assess the value of access to cheap funding with resale) and uses an ex post event, the actual resale of a loan, to estimate the ex ante probability of resale (our proxy to assess the impact of impaired monitoring). We measure the option to resell by regressing the incidence of loan covenants restricting resale on firm and loan-specific characteristics in a conditional logistic regression framework. We also measure the probability that a loan will be resold, now exploiting the sample of resold loans by regressing the incidence of loan resale on firm and loan-specific ex ante characteristics, also in a conditional logistic regression framework. We use these two probability estimates (reduced-form predicted values) in a 2nd-stage regression to estimate their impact on primary market loan spreads. In this 2nd-stage regression, we control separately for factors that are expected to impact pricing of the loan on the secondary market; that is, the characteristics of the loan agreement, the issuing firm, and the lender. This 2nd-stage regression permits us to disentangle the impact of resale likelihood (our proxy for monitoring) from the influence of resale constraint and the effect of other features of the loan, lender, and issuing firm. We detail these regressions and some technical identification issues below.

4.1 1ST-STAGE MODELS

One of the most pressing econometric issues that confront us in the evaluation of the costs and benefits of loan resales is the endogeneity of contracted resale constraint with the price and likelihood of resale of the loan. The resale constraint is decided upon at the same time as the price of the loan with the constraints and price influencing each other. Firm and loan characteristics that determine how likely a loan is to be resold subsequently also determine the resale constraint and the price. We handle the endogeneity of this system of equations by a standard two-stage least squares approach (Lee, 1981). We model the probability of resale and the resale constraint[11] with logistic regressions employing only ex ante information, available well in advance of the originating loan sale, building binary choice models on

[11] We conduct robustness tests with the loan resale constraint variable, *Resale Constraint*, defined as only the borrower's consent constraint. We find that the sign and significance of the estimated coefficients on probability of loan resale and the presence of resale constraint remain the same. These results are available in Supplementary Appendix Table A2.

dummy variables that take the value of 1 if the loan was resold (constrained) or 0 otherwise.

Our ultimate goal is to estimate the probability of loan resale and the resale constraint for each loan facility using ex ante information only and then use the forecasted probability of resale and resale constraint to explain the ex ante loan yield spread. Therefore, we choose proxies for the borrower's risk on an ex ante basis as well as certain ex ante loan features that can be observed before loan yield spread is finalized. The logistic model is in the following form:

$$\text{Event dummy} = f\{\text{borrower ex ante risk factors, facility characteristics, control variables}\}$$

As a standard practice in the implementation of two-stage least squares, the reduced-form models for resale and the presence of resale constraint include the same set of exogenous variables.[12] These variables can be categorized into three groups: borrowers' ex ante risk factors, loan facility characteristics, and other control variables. Borrowers' ex ante risk factors include firm leverage, market-to-book ratio, Altman's Z-score, a noninvestment grade dummy, a nonrated dummy, log firm size, squared log firm size, squared leverage, and an interaction term multiplying the Altman's Z-score by log firm size. Loan facility characteristics include log loan size, log maturity,[13] secured status of the loan, a dummy variable for missing secured status, log concentration, loan facility ratio, a credit revolver dummy, primary loan purpose dummies (including leveraged buyout, takeover, repay, and other purpose), and log lenders (the natural logarithm

[12] We run reduced-form regressions for the probability of loan sales and the sale constraints. As is conventional in two-stage regression, all available regressors thought to impact these variables or the loan price variable are included in the reduced-form regressions. See, for instance, Wooldridge (2009). We do not include the presence of resale constraints variable in the resale probability equation because it is jointly determined (endogenous) and this is a reduced form of the equation. These reduced form of predicted values, being separate functions of the explanatory variables (and indeed nonlinear logistic functions of these variables), are not strongly collinear with each other so that consistent estimates of the structural equation parameters (in our case, the loan price equation parameters) result, so long as we exclude as many of the instruments in the structural equation as predicted variables are included, or if the predicted variables are nonlinear functions of the instruments (both are satisfied in our regressions). Were these structural equations, we would have different regressors for each of the probability of loan sales, the probability of sale constraints and institutional loan type, but these are reduced form of instrumental regressor equations.

[13] We also modeled maturity as simultaneously determined with loan spread. This leads to qualitatively identical results, which are available in Supplementary Appendix Table A3.

of the number of lenders). We also include LIBOR, term premium, and interest rate volatility as additional control variables. Details on the construction of these variables as well as the short hand we use to refer to them are provided in Table II.

Table III displays the estimated coefficients of these two logistic regressions. The results indicate that some ex ante borrower characteristics and loan features do help to predict the probabilities of loan resales and of the presence of the loan resale constraint. From Model 1, we find that loan facilities extended to firms with high market-to-book ratios and a rating of noninvestment grade are more likely to be resold in the secondary market. Interestingly, in Model 1, the estimated coefficient on log firm size is positive and significant. The coefficient of 0.56 on the log firm size indicates that for every 1% increase in a firm's asset, the likelihood of the firm's loan being traded on the secondary loan market increases by 0.64%. But the coefficient on squared log firm size is negative and significant indicating that while, in general, the loans to larger firms with less information opacity are more likely to be resold, those borrowed by the largest firms (which are usually good quality) are less likely to be resold. We also find that loan facilities that are perceived to be riskier (longer maturity, secured loans, term loans, and leveraged buyout loans) are more likely to be resold in the secondary market. The probability of resale is also increased if the loan is larger (Log Loan Size), represents a greater portion of the borrower's total debt (Log Concentration), and the lender syndicate consists of more members (Log Lenders), while it decreases if a loan facility represents a bigger portion of a loan deal (Facility Ratio). Finally, market conditions including average LIBOR rate, term premium, and interest rate volatility also have some influence on the likelihood of loans being resold. The goodness of fit measured by McFadden's pseudo-R^2 is 46% for the probability of loan resale model.

The 1st-stage loan resale constraint model results indicate that loan resale restrictions are more likely to be used when firms have a lower leverage ratio, a higher market-to-book ratio, a lower Altman's Z-score, or a noninvestment grade or no rating. In addition, larger borrowers tend to utilize protective loan resale covenants, but if borrowers are very large then the use of these covenants declines (the estimated coefficient on the squared log firm size is significantly negative). Moreover, when firms take out a larger loan with longer maturity, lower concentration ratio and facility ratio, or deal with a larger lending syndicate, loan resale covenants tend to be used. Revolver status and leveraged buyout loans have significant impact on loan resale but not on resale constraint. However, loan resale constraints are more likely to be used in loans for takeovers or debt repayment.

Table II. Variable definition

Variable	Units of measurement	Description
Dependent variable		
Spread	Percent	This is the initial all-in-spread drawn and is defined as the percentage coupon spread over LIBOR plus the annual fee plus the upfront fee spread over the duration of the revolver.
Main variables of interest		
Prob loan resale	Percent	This variable is the probability of a loan being resold and is calculated based on coefficient estimates from a logistic regression.
Prob resale constraint	Percent	This variable is the probability of the presence of one or more loan resale constraint (including borrower consent, agent consent, minimum assignment size, and assignment fee) and is calculated based on coefficient estimates from a logistic regression.
Other independent variables in the baseline model		
Nonbanks participate	0/1	This variable takes the value of one if there is at least one nonbank institutional lender in a loan syndicate and 0 otherwise.
TA or total assets	$ (millions)	This variable is the book value of total assets.
MKVALF	$ (millions)	This variable is the market value of firm at fiscal year end.
CEQ	$ (millions)	This variable is the total common equity.
TD	$ (millions)	This variable is the total debt including long-term debt and current liabilities.
EBIT	$ (millions)	This variable is the earning before interests and taxes.
SALES	$ (millions)	This variable is the total sales of the year.
WC	$ (millions)	This variable is the working capital.
RE	$ (millions)	This variable is the retained earnings.
CPI	$ (millions)	This variable is the consumer price index for all items.
Deal	$ (millions)	This variable is the deal amount (from Dealscan)
Leverage	Ratio	This variable is defined as TD/(TA + MKVALF − CEQ).
Market-to-book	Ratio	This variable is defined as (TA + MKVALF − CEQ)/TA.
Altman's Z	Score	This variable is the Altman's Z-score: this variable is defined as $3.3 \times$ EBIT/SALES + SALES/ TA + $1.4 \times$ RE/TA + $1.2 \times$ WC/TA.
Noninvestment grade	0/1	This variable takes the value of one if the S&P long-term debt rating is BB or below and 0 otherwise.
Nonrated	0/1	This variable takes the value of one if the S&P long-term debt rating is missing and zero otherwise.
Firm size	$	This variable is defined as $(100 \times$ (TA + MKVALF − CEQ)/CPI).
Log firm size	Number	This variable is defined as natural logarithm of firm size.
Squared log firm size	Number	This variable is the square of log firm size.
Squared leverage	Number	This variable is the square of leverage.
Altman Z*Size	Number	The interaction variable calculated as Altman's Z times log firm size.
Loan size	$	This variable is defined as $(100 \times$ loan facility amount/CPI).
Log loan size	Number	This variable is defined as the natural logarithm of loan size.

(continued)

Table II. Continued

Variable	Units of measurement	Description
Maturity	Years	This variable is defined as loan maturity in years.
Log maturity	Number	This variable is the natural logarithm of maturity.
Secured	0/1	This variable takes the value of 1 if the loan facility is secured and 0 otherwise.
Missing secured	0/1	This variable takes the value of one if the secured status is not available for the loan facility and zero otherwise.
Log concentration	Log %	This variable is defined as log(Deal/(Deal + TD)).
Facility ratio	Ratio	This variable is defined as loan facility amount (loan size) over loan deal amount.
Revolver	0/1	This variable takes the value of 1 if the loan is a credit revolver and 0 if the loan is term loan.
Leveraged buyout	0/1	This variable takes the value of 1 if firm borrows the loan for leverage buyout and 0 otherwise.
Takeover	0/1	This variable takes the value of 1 if firm borrows the loan for takeover transaction and 0 otherwise.
Repay	0/1	This variable takes the value of 1 if firm borrows the loan for repaying other debt or recapitalization and 0 otherwise.
Other purpose	0/1	This variable takes the value of 1 if loan purpose is not "leveraged buyout" or "takeover" or "repay" and 0 otherwise.
Log lenders	Number	This variable is defined as the natural logarithm of one plus the total number of lenders in a loan syndicate.
LIBOR	Percent	This variable is defined as deal month end 3-month London interbank offered rate.
Term premium	Percent	This variable is the 12-month average of the yield differential between 10- and 1-year US bonds prior to the deal month.
Interest volatility	Percent	This variable is a monthly moving average series of the 12-month standard deviation of monthly yields on 10-year US T-bonds.
Other variables used in the article		
Lead lender share	Percent	This variable is the total share of a loan that lead lenders fund in a loan syndicate. When data are missing, the pro-rata allocation of the loan among all lenders is assumed.
No. of nonbank lenders	Integer	This variable is the sum of number of nonbank institutional lender participating in a loan syndicate.
Nonbank as major	0/1	This variable takes the value of 1 is at least one nonbank lender plays a lead lender role in a loan syndicate and 0 otherwise.
Bank as major	0/1	This variable takes the value of 1 is at least one commercial lender plays a lead lender role in a loan syndicate and 0 otherwise.
Days to resale	Integer	This variable is the number of days between the loan deal active date and the 1st day the loan is resold on the secondary market.
Resold loans	0/1	This variable takes the value of 1 if a loan was resold before the end of our sample period (2004) or 0 otherwise.
Time trend	Integer	This variable takes the value of 1, 2, . . . , 11 for loans issued in 1994, 1995, . . . , 2004, respectively.

Table III. 1st-stage models

This table reports the coefficients from 1st-stage reduced-form logistic regression models. The dependent variable of Column (1) is the dummy variable taking a value of 1 if the loan has been resold on the market or 0 otherwise. The dependent variable of Column (2) is the dummy variable taking the value of 1 if there is at least one loan resale constraint (agent consent, borrower consent, minimum assignment size, and assignment fee) in the loan contract or 0 otherwise. Definitions of all variables are provided in Table II. Robust standard errors, clustered at the firm level, are in parentheses, beside the coefficient estimates in each column. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

	(1) Loan resale	(2) Loan resale constraint
Leverage	−2.46	−1.69*
	(1.69)	(0.95)
Market-to-book	0.37***	0.45***
	(0.11)	(0.08)
Altman's Z	−0.33	−0.26**
	(0.33)	(0.13)
Noninvestment grade	1.48***	0.36**
	(0.25)	(0.16)
Nonrated	0.45	0.43**
	(0.29)	(0.17)
Log firm size	0.56**	1.17***
	(0.26)	(0.17)
Squared log firm size	−0.08***	−0.12***
	(0.02)	(0.01)
Squared leverage	1.75	0.64
	(1.39)	(0.84)
Altman *Z**Size	0.02	0.04**
	(0.04)	(0.02)
Log loan size	1.53***	0.57***
	(0.20)	(0.11)
Log maturity	0.82***	0.21***
	(0.10)	(0.05)
Secured	1.32***	−0.07
	(0.19)	(0.11)
Missing secured	−0.04	−2.68***
	(0.20)	(0.10)
Log concentration	−1.19***	−0.44***
	(0.31)	(0.16)
Facility ratio	−3.60***	−1.38***
	(0.48)	(0.25)
Revolver	−1.21***	0.11
	(0.09)	(0.07)
Leveraged buyout	0.78**	−0.26
	(0.34)	(0.31)
Takeover	−0.10	0.35***
	(0.17)	(0.12)

(continued)

Table III. Continued

	(1) Loan resale	(2) Loan resale constraint
Repay	0.07	0.46***
	(0.17)	(0.09)
Other purpose	0.26	−0.28***
	(0.19)	(0.10)
Log lenders	0.18**	0.99***
	(0.08)	(0.05)
LIBOR	−0.44***	0.01
	(0.06)	(0.03)
Term premium	−4.08***	−0.90**
	(0.82)	(0.40)
Interest volatility	−0.77***	0.01
	(0.11)	(0.07)
Ancillary statistics		
Number of observations	10,992	10,992
R^2	45.5%	35.8%

The McFadden's pseudo-R^2 for the probability of loan resale constraint model is 36%.

Summary statistics on the predicted probability of resale constraint presented in Table I show that, surprisingly, the mean of the predicted probability of the presence of the loan resale constraint is 65% for the unsold loans and 89% for the resold loans. The need to lift resale constraints often does not prevent syndicate lenders from reselling the loans. We believe that this feature of resold loans being more likely to have had resale constraints placed on them is an outcome of the endogeneity of this loan covenant and the moral hazard of resale on monitoring of the loan. Much as loans more likely to default tend to be securitized, presumably loans more likely to suffer from a lack of bank monitoring if resold are likely to have this possibility anticipated and guarded against.

As the primary regression coefficients demonstrate, the probability of resale constraint and the probability of loan resale respond very differently to the same set of conditioning information. The probability that a loan will be resold is actually weakly positively correlated with constraints on resale (see Supplementary Appendix Table A1). These differences help make it possible to identify the impact of an expected loan sale separately from an expected imposition of resale constraint. We now turn to measuring the impact of our proxy for access to cheap funding (the lack of constraints on resale) and our proxy for monitoring (the probability of resale) on the primary market price.

4.2 SECOND-STAGE MODELS

In our loan pricing model, we extend the well-established loan yield spread model by adding as explanatory variables the predicted probability of loan resale and the predicted value of a loan resale constraint calculated from the 1st-stage logit models.[14] Our primary market loan pricing model has the following form:[15]

$$\begin{aligned}&\text{All-in-spread-drawn}\\&= f\{\text{predicted probability of loan resale,}\\&\text{predicted probability of the presence of the loan resale constraint,}\\&\text{borrower characteristics, contract features, control variables}\}\end{aligned}$$

Under the Gorton and Pennacchi (1995) model of loan sales compatibility, the higher the probability of resale, *ceteris paribus*, the more likely that bank monitoring will be negatively impacted and the higher the loan spread required to entice other lenders to join the loan syndicate. The presence of a loan resale constraint, *ceteris paribus*, is an unambiguously bad thing for the syndicate originating the loan as such constraints restrict liquidity. This should induce a syndicate to raise the spread it charges if there are constraints on loan resale. Thus, we expect positive signs on the loan resale variable and the resale constraint variable. The econometric issue of identifying the coefficients on the proxies for access to cheap funding and monitoring in our 2nd-stage regression is resolved with the use of exclusion restrictions,[16] and by the very nature of our regressions, which are nonlinear in the variables (by virtue of the nonlinear logistic function used to calculate our proxies). As Brown (1983) points out, in situations such as ours with variables that are nonlinear in the 1st-stage regression parameters and a 2nd-stage model that is linear in the parameters, the rank condition for

[14] Following Dennis, Nandy, and Sharpe (2000), we also model the loan yield spread and maturity under a simultaneous equation framework by allowing these two most important loan contract terms to be determined at the same time. The simultaneous equation model yields qualitatively similar results, where the sign and significance of the estimated coefficients on our main variables of interest in the loan yield equation remain the same. These results are available in Supplementary Appendix Table A3.

[15] According to LPC's definition, all-in-spread drawn describes the amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan to any annualized fees paid to the bank group.

[16] We employ squared log firm size, squared leverage, the interaction between Altman's *Z*-score and log firm size, and facility ratio in only our 1st-stage model to aid in identification.

identifiability can be satisfied even with entirely overlapping conditioning variable sets.[17]

4.2.a Base model for predicting primary market spread

The 2nd-stage loan pricing regression results based on the entire sample from 1994 to 2004 are reported in Table IV, using a fairly comprehensive set of controls including variables intended to capture borrowers' ex ante risk factors (including leverage, market-to-book ratio, Altman's *Z*-score, debt rating, and size), loan facility characteristics (including nonbank institutional participation dummy, loan size, maturity, secured status, loan concentration, revolving credit dummy, loan purposes, and syndicate size), and other common control variables found in loan pricing models (including LIBOR, term premium, and interest volatility). A 2nd-stage regression controlling for firm fixed effects is also presented in Table IV to account for the possibility of omitted firm characteristics. As constructing the 1st-stage loan resale probability and loan resale constraint regressions and the 2nd-stage loan pricing regression using the same sample period might introduce look-ahead bias, in Table V we will present estimations based on splitting the sample period at different dates and running the 1st-stage regression in-sample and 2nd-stage regression out-of-sample. Our qualitative results are unaffected by look-ahead bias.

The regression model *t*-statistics we report throughout our article are based on standard errors clustered at the firm level. However, to account for strong contemporaneous correlations in spreads within a year, we cluster standard errors by year and confirm that our findings remain qualitatively identical. These results are available in Supplementary Appendix Table A4.

As discussed earlier, our calculation of the net impact on primary market loan spreads of the introduction of the secondary market is a function of two countervailing effects: the impact of the presence of a loan resale constraint (impacting liquidity) and the impact of a change in the probability of resale (impacting monitoring). The average net impact we calculate is equal to the probability of resale coefficient estimate times the sample mean of the estimated probability of loan resale minus the loan resale constraint coefficient estimate times the sample mean of the estimated probability of loan

[17] As a practical matter, it is often impossible to determine analytically if the rank condition is satisfied in the situation of nonlinear identifying conditions. In practice, nonlinearity provides the necessary conditions for identifiability, and reliable estimation of model parameters establishes conditional support for identification. In our 2nd-stage regression, we easily and reliably identify separate effects from our 1st-stage instrumented variables and the 2nd-stage exogenous variables, all with the expected signs and magnitudes.

Table IV. Loan pricing model

This table reports the coefficients from 2nd-stage least squares model estimations. The dependent variable of Columns (1) and (2) is the all-in-spread drawn loan yield spread in percentage, and the analysis is conducted at the loan facility level over 1994–2004. Probability of being resold and the presence of one or more than one loan resale constraint(s) (including agent consent, borrower consent, minimum assignment size, and assignment fee) are considered endogenous variables. The predicted values of the endogenous variables are obtained through the 1st-stage reduced-form model. The 1st-stage models are reported in Table III. Column (2) reports the results additionally controlling for the firm fixed effects. The net impact of loan sales is equal to the probability of resale coefficient estimate times the sample mean of the estimated probability of loan resale minus the loan resale constraint coefficient estimate times the sample mean of the estimated probability of loan resale constraint. Definitions of the variables are provided in Table II. There are 2,837 firms in the sample and 10,992 loan facilities. Year dummies are included but not reported. Robust standard errors, clustered at the firm level, are in parentheses, beside the coefficient estimates in each column. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

	(1)	(2)
	OLS regression	(1) + firm fixed effects
Prob loan resale	0.53***	0.70***
	(0.10)	(0.13)
Prob resale constraint	0.15*	0.31**
	(0.09)	(0.14)
Nonbanks participate	0.35***	0.20***
	(0.02)	(0.03)
Leverage	1.15***	1.13***
	(0.09)	(0.15)
Market-to-book	0.04***	0.04**
	(0.01)	(0.02)
Altman's Z	−0.15***	−0.23***
	(0.01)	(0.03)
Noninvestment grade	0.49***	0.36***
	(0.04)	(0.07)
Nonrated	0.38***	0.24***
	(0.04)	(0.08)
Log firm size	−0.07***	−0.27***
	(0.02)	(0.05)
Log loan size	−0.11***	−0.10***
	(0.02)	(0.02)
Log maturity	−0.05***	−0.04**
	(0.02)	(0.02)
Secured	0.60***	0.37***
	(0.03)	(0.04)
Missing secured	0.19***	0.19***
	(0.05)	(0.07)
Log concentration	0.07***	0.04
	(0.03)	(0.04)

(continued)

Table IV. Continued

	(1)	(2)
	OLS regression	(1) + firm fixed effects
Revolver	−0.34***	−0.25***
	(0.03)	(0.03)
Leveraged buyout	0.30***	0.35***
	(0.10)	(0.13)
Takeover	−0.00	0.04
	(0.03)	(0.04)
Repay	−0.02	−0.04
	(0.03)	(0.04)
Other purpose	−0.13***	−0.12***
	(0.03)	(0.04)
Log lenders	−0.12***	−0.12***
	(0.02)	(0.03)
LIBOR	−0.05**	−0.05*
	(0.02)	(0.02)
Term premium	−0.11**	−0.08
	(0.05)	(0.06)
Interest volatility	0.94***	0.85***
	(0.24)	(0.23)
Ancillary statistics		
Net impact (%)	−0.34	−0.14
Net impact ($,thousand)	−1,036	−435
Number of observations	10,992	10,992
R^2	60.0%	80.9%

resale constraint. In addition, the net impact in dollars is also reported for the median-sized loan in the sample.

Starting with the probability of loan resale coefficient, Table IV shows that this estimate is positive and strongly statistically and economically significant for our models with and without firm fixed effects. For example, the coefficient of 0.70 in Model 2, the fixed firm effects model, implies that the syndicate lenders would charge an additional 70 basis points if the probability of loan resale changed from 0 to 1. Turning to the coefficient for the presence of loan resale constraint, Table IV shows a positive value that is statistically and economically significant, indicating that imposing the loan resale constraint elicits an increase in the loan spreads. In other words, the absence of loan resale constraint brings down the costs of borrowing. These results are consistent with the notion that lenders lower the firm's cost of borrowing when there are fewer constraints on resale (cheap funding) and charge a higher interest rate if the option to resell the loan is likely to be exercised transforming banks from delegated monitors into underwriter-like loan originators. The net impact of the two opposing forces on loan spreads

Table V. Loan yield spread model—rolling window method

This table reports the coefficients from 2nd-stage least squares model estimations using the out-of-sample predicted probability of being resold and the presence of one or more loan resale constraint(s) estimated based on the 5-year rolling window regressions. The dependent variable of Columns (1) and (2) is the all-in-spread drawn loan yield spread in percentage, and the analysis is conducted at the loan facility level over 1994–2004. Column (2) reports the results additionally controlling for the firm fixed effect. Column (3) reports the results additionally controlling for the lender fixed effects. The net impact of loan sales is equal to the probability of resale coefficient estimate times the sample mean of the estimated probability of loan resale minus the loan resale constraint coefficient estimate times the sample mean of the estimated probability of loan resale constraint. Definitions of all variables are provided in Table II. There are 1,956 firms, 6,298 loan facilities, and 313 lenders in the sample. Year dummies are included but not reported. Robust standard errors clustered at the year level are reported in the brackets. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

	(1)		(2)		(3)	
	OLS regression		(1) + firm fixed effects		(2) + lender fixed effects	
Prob loan resale	0.29**	(0.13)	0.51***	(0.19)	0.19***	(0.07)
Prob resale constraint	0.51***	(0.12)	0.26*	(0.15)	0.41***	(0.13)
Nonbanks participate	0.33***	(0.03)	0.17***	(0.04)	0.24***	(0.03)
Leverage	1.33***	(0.11)	1.25***	(0.25)	1.36***	(0.10)
Market-to-book	0.04**	(0.02)	0.05	(0.04)	0.05***	(0.01)
Altman's Z	−0.16***	(0.02)	−0.20***	(0.06)	−0.16***	(0.02)
Noninvestment grade	0.75***	(0.05)	0.70***	(0.13)	0.68***	(0.04)
Nonrated	0.61***	(0.05)	0.69***	(0.14)	0.58***	(0.05)
Log firm size	−0.14**	(0.07)	−0.34***	(0.05)	0.01	(0.02)
Log loan size	−0.13***	(0.02)	−0.15***	(0.03)	−0.16***	(0.02)
Log maturity	−0.15***	(0.03)	−0.02	(0.02)	−0.03**	(0.02)
Secured	0.24*	(0.13)	0.34***	(0.06)	0.64***	(0.06)
Missing secured	0.62***	(0.06)	0.14**	(0.08)	0.29***	(0.09)
Log concentration	0.33***	(0.03)	0.12**	(0.06)	0.10***	(0.03)
Revolver	−0.19***	(0.04)	−0.29***	(0.04)	−0.44***	(0.06)
Leveraged buyout	0.45***	(0.14)	0.37**	(0.15)	−0.02	(0.15)
Takeover	0.04	(0.04)	0.06	(0.05)	−0.04	(0.05)
Repay	0.01	(0.14)	0.03	(0.08)	−0.00	(0.04)
Other purpose	−0.21***	(0.05)	−0.08	(0.05)	−0.09**	(0.04)
Log lenders	−0.18***	(0.03)	−0.15***	(0.05)	−0.11***	(0.03)
LIBOR	−0.04	(0.02)	−0.05	(0.04)	−0.01	(0.02)
Term premium	−0.06	(0.07)	−0.01	(0.08)	0.01	(0.07)
Interest volatility	1.06**	(0.49)	0.61	(0.52)	0.89	(0.57)
Ancillary statistics						
Net impact (%)	−0.31		−0.11		−0.261	
Net impact ($,thousand)	−1031		−362		−848	
Number of observations	6,298		6,298		5,707	
R^2	60.0%		83.5%		66.1%	

is negative. Based on our models, the expectation of loan resale brings down the cost of borrowing by 14.3 to 34.1 basis points ($435,000 to $1,036,000 for the median-sized loan) depending on the exact model specification.

We introduce an important control: a dummy variable indicating nonbank lender participation. We construct this variable through checking each syndicate lenders' identity.[18] We find that this variable is strongly positively associated with loan spread consistent with the findings in Jiang, Li, and Shao (2010). The significance, magnitude, and sign of the remaining coefficient estimates (on our control variables) are generally consistent across these two specifications as well as for an alternative model specification including Moody's KMV expected default frequency (EDF) as a control for borrowers' default risk (available in Supplementary Appendix Table A5). We find that leverage is strongly positively associated with loan yield spreads. This is consistent with the prediction in Merton (1974). In addition, the positive and significant sign on market-to-book ratio, noninvestment grade dummy and the negative and significant signs on Altman's *Z*-score, log firm size, and log loan size suggest that smaller firms with greater information opacity and higher default risk or firms with smaller loans pay a higher spread. Maturity is inversely related to the loan yield spread. This is consistent with the credit quality hypothesis in Gottesman and Roberts (2004). The positive sign on the secured dummy reveals the fact that loans to riskier borrowers are often secured on the borrowers' major assets. The sign on the relationship proxy, loan concentration, is significant and positive suggesting that the cost of loan financing is increasing as a bank–borrower relationship develops, consistent with the hold-up hypothesis proposed by Rajan (1992) and the empirical findings in Ioannidou and Ongena (2010). Additionally, we find that the revolving credit dummy and loan yield spreads are negatively related because of the lower level of risk of the revolving credits as compared to the term loans. Furthermore, the signs on the coefficients for the loan purpose dummy variables are intuitive. For example,

[18] We believe that this variable is a more appropriate control for nonbank participation, compared to institutional loan dummy, which is defined as loans that are designed to be sold to institutional investors, used in Gupta, Singh, and Zebedee (2008). Loans designed to be sold are, in fact, often not sold. In addition, in some cases, LPC also identifies institutional loans as tranche B, C, D, or E loans in a multi-tranche loan structure when the original purpose of designing a loan tranche is missing, causing some misidentification problems. Most importantly, due to a strong correlation of the institutional loan dummy with loan spread, including this variable may flip the sign of other variables. As a modification, we check lenders' identity for each loan in the sample and construct a nonbank institution participation dummy to better capture the effect of nonbank lenders on loan spread.

loans funded for risky endeavors, like leveraged buyouts, require an interest premium. Loans with a large syndicate size are associated with lower yield. Finally, the direct and significant association between loan yield spreads and interest volatility again supports the model proposed in Merton (1974). However, the negative coefficient on the risk-free rate proxied by LIBOR contradicts a prediction of the model. Angbazo, Mei, and Saunders (1998) also find an inverse relationship between the yield spread and corporate bond rates. They argue that since loan interest rates are sticky and typically lag behind interest rate adjustments, a negative relationship can be found between the two. The adjusted R^2 of approximately 60% is comparable to those in Dennis, Nandy, and Sharpe (2000) and Coleman, Esho, and Sharpe (2006).

4.2.b Using probability of loan resale as a proxy for monitoring incentive

We argue that the higher the probability of resale, *ceteris paribus*, the more likely that bank monitoring will be negatively impacted and, therefore, the higher the loan spread required to entice other lenders to join the loan syndicate. One natural question arises, however, whether predicted probability of resale is indeed a good proxy capturing lead lenders' ex ante (before loan initiation) and/or ex post (after loan initiation) monitoring incentive. To answer this question, we first split the loans into two groups: loans with high ex ante probability of resale (greater than or equal to the median) and loans with low ex ante probability of loan resale (less than the median). Then we examine variables that either directly or indirectly reflect the lenders' monitoring incentive for the two groups of loans, respectively. These variables include the loan share funded by lead lender(s) at the loan initiation (Lead Lender Share), number of nonbank institutions involved in the loan syndicate (no. of nonbank lenders), the indicator variable for nonbank institution participation (nonbanks participate), the presence of a nonbank institution serving as a lead lender (nonbank as major), and number of days before the loan was resold (Days to Resale).

The univariate test results in Panel A of Table VI confirm that the estimated probability of resale reasonably accurately captures the actual loan resales; 18% of the loans with high probability of resale are indeed resold, while only 0.3% of loans with loans with low probability of loan resale are resold.

It has been well established in the syndicated loan literature that lead lenders take on responsibility to monitor borrowers and they fund greater percentages of loans in the presence of more severe information asymmetry when more extensive monitoring is called for (Dennis and Mullineaux, 2000;

Table VI. Using probability of resale as proxy for lenders monitoring incentive

Panels A and of this table report the summary statistics of selected variables. In Panel A, we split the sample of 10,992 loans into the ones with high probability of resale and the ones with low probability of loan resale, using the median value of the probability of resale to delineate high from low. There are 1,012 resold loans in our sample, 18 of such loans are classified as loans with low probability of loan resale. In Panel B, loans are classified by the ones with nonbank lender participation versus those without. Out of 10,992 loans, 4,619 loans have at least one nonbank lender in the loan syndicate while the rest of 6,373 loans do not involve such lenders. Definitions of the variables are provided in Table II. In Panel C, we run difference-in-differences regressions using expected default probability, Altman's *Z*-score and return on assets as dependent variable. The interaction terms between relative time variable (t_{-1}, t_0, t_1, and t_2) and high probability of resale dummy variable capture the difference in dependent variable for the group of loans with high probability of resale and that of low probability of resale in year t_{-1}, t_0, t_1, and t_2, respectively. Difference-in-differences test results reported in the last two rows of Panel C indicates the change in the difference between the two groups of loans from t_0 to t_1 and from t_0 to t_2, respectively. In Panel D, we use the nearest neighbor matching approach to match the two groups of loans in terms of the analyzed variable in the loan issue year t_0. Using the matched sample, we conduct the same analysis as in Panel C. In these regressions, time trend and industry fixed effects (using four-digit SIC code) are controlled. Robust standard errors are reported in parentheses, beside the coefficient estimates. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

Panel A: Summary statistics of selected variables classified by probability of resale

	With high probability of resale			With low probability of resale			Mean difference Tests	Rank sum Tests
	Mean	Median	SD	Mean	Median	SD		
Resold loans	0.18	0	0.39	0.003	0	0.06	33.83***	32.36***
Lead lender share	20.83	11	25.20	53.82	50	39.22	−52.47***	−48.49***
No. of nonbank Lenders	2.01	1	5.31	0.31	0	0.68	23.62***	44.21***
Nonbanks Participate	0.61	1	0.49	0.23	0	0.42	43.39***	40.09***
Nonbank as major	0.37	0	0.48	0.14	0	0.34	29.17***	28.10***
Days to resale	357.59	216	427.98	588.94	590	376.17	−2.50**	−3.06***

Panel B: Summary statistics of selected variables classified by nonbank lender participation

	With nonbank lender participation			Without nonbank lender participation			Mean difference Tests	Rank sum Tests
	Mean	Median	SD	Mean	Median	SD		
Probability of resale	0.17	0.04	0.24	0.04	0.01	0.11	46.84***	34.96***
Resold loans	0.18	0	0.38	0.03	0	0.17	25.98***	24.14***
Lead lender share	23.24	11.11	28.60	47.54	33.33	38.77	−37.50***	−37.81***
Days to resale	331.55	158	421.72	484.63	361	432.88	−5.54***	−4.49***

Table VI. Continued

	Panel C: Difference-in-differences analysis for the changes in default probability and operating performance		
Dependent variable	(1) EDF	(2) Altman's *Z*-score	(3) Return on assets
t_{-1}*high probability of resale	0.017***	−0.46***	−0.013***
	(0.006)	(0.07)	(0.004)
t_0*high probability of resale	0.025***	−0.58***	−0.010***
	(0.006)	(0.06)	(0.004)
t_1*high probability of resale	0.039***	−0.99***	−0.033***
	(0.006)	(0.07)	(0.004)
t_2*high probability of resale	0.039***	−0.99***	−0.036***
	(0.006)	(0.07)	(0.005)
Firm size	−0.018***	0.06	0.016***
	(0.002)	(0.04)	(0.002)
Time trend	Yes	Yes	Yes
Industry fixed effects (four-digit SIC code)	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Ancillary statistics			
Difference-in-differences tests			
$\Delta Y(t_1) - \Delta Y(t_0)$	0.014**	−0.41***	0.023***
	(3.68)	(92.99)	(27.92)
$\Delta Y(t_2) - \Delta Y(t_0)$	0.014***	−0.41***	0.026***
	(6.96)	(133.04)	(34.00)
Number of observations	37,709	39,901	42,562
R^2	15.0%	32.3%	9.9%

	Panel D: Difference-in-differences analysis controlling the default probability and operating performance in the loan issue year		
Dependent variable	(1) EDF	(2) Altman's *Z*-score	(3) Return on assets
t_0*high probability of resale	−0.004	−0.10	0.002
	(0.005)	(0.06)	(0.003)
t_1*high probability of resale	0.031***	−0.23***	−0.013***
	(0.006)	(0.06)	(0.005)
t_2*high probability of resale	0.076***	−0.27***	−0.015***
	(0.008)	(0.06)	(0.005)
Firm size	−0.027***	0.14***	0.016***
	(0.003)	(0.05)	(0.002)
Time trend	Yes	Yes	Yes
Industry fixed effects (four-digit SIC code)	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Ancillary statistics			
Difference-in-differences tests			
$\Delta Y(t_1) - \Delta Y(t_0)$	0.035***	−0.13***	−0.011***
	(85.74)	(15.14)	(18.6)
$\Delta Y(t_2) - \Delta Y(t_0)$	0.08***	−0.18***	−0.013***
	(54.27)	(15.31)	(15.3)
Number of observations	20,519	10,722	22,434
R^2	19.8%	3.2%	12.3%

Sufi, 2007; Panyagometh and Roberts, 2010). This implies that the larger the percentage of loans funded by lead lenders, the higher the monitoring incentive at loan initiation and after. Our test shows that loans with high probability of resale have much lower average and median lead lender share (21% and 11%) than the loans with low probability of resale (54% and 50%), indicating that loans with high probability of resale are associated with lower lead lender monitoring incentives. Moreover, this group of loans (with high probability of resale) on average involves more nonbank institutional lenders: 61% of such loans include at least one nonbank institution and 37% have at least one nonbank institution in a lead role, compared to 23% and 14%, respectively, for the loans with low probability of resale. Although there is no direct evidence that nonbank institutions have lesser monitoring incentives, anecdotal evidence shows that they normally select more liquid loans. For instance, prime funds set constraints on liquidity when they invest in debt instruments. In addition, we also find that loans with high probability of resale are resold faster than those with low probability of resale. "Days to Resale" is measured as the number of days between the loan initiation day and the 1st loan resale day. Average "Days to Resale" for loans with high probability of resale is 358 days while that for loans with low probability of resale is 589 days. In Panel B of Table VI, we compare the probability of resale, percentage of actually resold loans, lead lender share, and average days to resale for loans involving nonbank lenders and those not involving nonbank lenders. Supporting our argument, we find nonbank lender participation is associated with the features of lower monitoring incentives. Specifically, compared to the loans including only commercial banks, those involving nonbank lenders in any role have higher average resale probability (17% versus 4% for commercial bank loans). Similarly, a higher percentage (18% versus 3% for commercial bank loans) of the loans with nonbank lender participation are actually resold on the secondary market. In addition, lead lenders tend to hold smaller percentages (23% versus 48% for commercial bank loans) of loans involving the nonbank lenders. When such loans get resold on the secondary market, they tend to be sold in a shorter time (332 days) as compared to 485 days for loans involving only commercial banks.[19]

[19] In addition, we find that among the 1,012 resold loans, 267 loans are resold within 30 days of the loan origination, and about 89% of these loans involve nonbank institutional lenders. To address the concern that these loans are designed for resale and are less likely to affect monitoring incentive and/or liquidity, we perform robustness test through excluding these loans from our sample. As a result, we are left with 745 resold loans and a sample size of 10,725 versus our full sample size of 10,992. Redoing our baseline two-stage regressions, we obtain qualitatively unchanged results (these robustness test results are available in

To confirm further that probability of resale is a legitimate proxy for lender's ex post monitoring incentive, we investigate the outcomes of monitoring services: borrowers' probability of default (measured by Moody's KMV expected default probability and Altman's Z-score) and operating performance (measured by return on assets). We predict that the higher the ex ante probability of resale, the lower the lenders' monitoring incentive leading to more severe deterioration in borrowers' default probability and operating performance. Accordingly, we expect that borrowers' credit quality and operating performance deteriorate more dramatically after a loan issue if the loan has high probability of resale.

Panel C of Table VI reports the results of difference-in-differences analysis in which we examine the change in borrowers' EDF, Altman's Z-score, and return on assets surrounding a loan issue, 1 year before loan issuance (t_{-1}), at issuance (t_0), 1 year after (t_1), and 2 years after (t_2). The difference-in-differences regression has the following specification: $y_{i,t+j}$, $j \in (-1, 2)$ is the variable of interest (EDF, Altman's Z-score, or return on assets) for the borrower of the loan i at j years before or after the loan issue year; d_{t+j}, $j \in (-1, 2)$ is the indicator variable for a firm-year where j years before or after the firm borrows the loan that has high probability of resale (the ex ante probability of resale is greater than the median); t_j, $j \in (-1, 2)$ is the indicator variable for the relative year from t_{-1} to t_2 to control for time trend; log firm size is the natural logarithm of firm's total assets at t_0.

$$y_{i,\,t+j} = \sum_{j=-1}^{2} \beta_j d_{t+j} + \gamma t_j + \phi \cdot \log \text{firm size} + \alpha + \varepsilon_{i,\,t+j},$$

Industry fixed effects (at the four-digit SIC code level) and year fixed effects are both controlled in the regression. β_j represents the difference in the variable of interest for firms with loans with high probability of resale and those with loans with low probability of resale. In addition to β_j, we also examine the difference-in-differences $\beta_{t+j} - \beta_t$ between loans with high probability of resale and those with low probability of resale. We test whether such difference-in-differences are statistically significant based on the estimates of the variance–covariance matrices from the regression.

We find that estimated coefficients (β_j) of the interaction terms between each relative year dummy and high probability of resale dummy are all positive and significant in the EDF regression and negative and significant in the Altman's Z-score regression and Return on Assets regression,

Supplementary Appendix Table A6). Accordingly, we conclude that our results are not driven by the loans that are resold in a short window.

implying that firms with loans with high probability of resale (using the median value of the probability of resale to delineate high from low) have higher probability of default and worse operating performance before and after the loan issues. In addition, comparing the difference in these differences 1 year (t_1)/2 years (t_2) after the loan issue with that at the loan issuance (t_0), we find that the gaps in the outcome variables are significantly widened between the two groups of firms: the expected default probability increases 1.4% more at t_1 and t_2; the Altman's Z-score reduces 0.41 more at t_1 and t_2, while return on assets declines 2.3% more in t_1 and 2.6% more in t_2 for the group of firms with high probability of resale. In summary, consistent with what we expected, the deterioration in credit quality and operating performance is more dramatic for firms with loans carrying above median probability of resale.

Panel D of Table VI reconfirms the results reported in Panel C through matching at time t_0 for the two groups of the firms. For example, in the EDF regression, we match the EDF for the firms issuing loans with high probability of resale with those issuing loans with low probability of resale and ensure that the average EDF for the two groups of firms is identical at $t+0$. In all three regressions, the estimated coefficient on the interaction term at t_0, β_0 is not significantly different from 0. However, the deterioration of credit worthiness and operating performance in the postloan issue periods are more severe for the loans with high probability of resale than for those with low probability of resale even when the credit worthiness and operating performance for the two samples are identical at the loan issuance. These results confirm our findings in Panel C: more dramatic deterioration in credit worthiness and operating performance for firms with loans with high probability of resale are likely related to the reduced monitoring efforts by lenders.

4.2.c Rolling window model for predicting primary market spread

To guard against a look-ahead bias, we explore in Table V a rolling window analysis of the models used in Table IV. Splitting the data and conducting 1st- and 2nd-stage estimation based on nonoverlapping sample periods offer a way to overcome this problem. We estimate the 1st-stage model in-sample over 5-year rolling windows (1994–98, 1995–99, 1996–2000, and so on) and then make out-of-sample predictions on the probability of loan resale as well as the presence of the loan resale constraint for loans issued in the year following each 5-year rolling window. For example, we predict 1999 based on the estimation over 1994–98 and 2000 based on the estimation over 1995–99. Saving the two out-of-sample 1st-stage predicted variables, we redo

the same exercise as in Table IV. Column 3 of Table V introduces a fixed effect for lead lender, which is discussed below. The sample period of Table V is 1999–2004 as the earliest out-of-sample predictions become available from 1999 onward. The number of observations for this period is 6,298.

Given that the estimation was conducted on a smaller sample, it is not surprising that the statistical significance of the variables is slightly reduced. The signs on coefficients are unchanged from Table IV, almost without exception, and the R^2 is comparable for both models with and without firm fixed effects. The impact of the probability of loan resale is still economically and statistically significant, with a coefficient estimate of 0.51 for the firm fixed effects model in column 2, implying that the syndicate lenders would charge an additional 51 basis points if the probability of loan resale changed from 0 to certainty. The coefficient of 0.26 on the resale constraint variable for the case of firm fixed effects suggests that lifting constraints on resale lowers the spread by 26 basis points, virtually identical to the magnitude reported in Table IV. The loan resale–resale constraint variable coefficient estimate is sensitive to controlling for firm fixed effects for the rolling window case, doubling or halving the impact once this control is added.

Finally, the calculations of the net impact of loan sales on loan yield spreads produce results similar to those shown in Table IV ranging from 11 to 31 basis points or representing a sizable annual saving in interest payment of $362 to $1,031,000 for a median-sized loan. In summary, the results in Table V are consistent with the conclusion that our findings are robust to look-ahead bias.

4.2.d Lender fixed effects model—controlling for unobserved lead lender heterogeneity

Empirical studies of the determinants of loan contract terms have established the relevance of lead lenders' characteristics (e.g., Hubbard, Kuttner, and Palia, 2002; Coleman, Esho, and Sharpe, 2006; Hao and Roberts, 2007). Hubbard, Kuttner, and Palia (2002) report a "weak-bank effect" under which firms borrowing from capital-constrained banks incur a higher spread, especially when those firms have elevated levels of information opacity. Coleman, Esho, and Sharpe (2006) show that the input-based monitoring effort made by the predominant lead bank is associated with a higher initial loan yield spread.[20] Drawing on a full set of lender data would make it possible to control for some specific lender characteristics, such as capital

[20] The number of employees (labor input) is an example of an "input-based" monitoring measure constructed by Coleman et al. (2006). The main argument of their paper is that banks with superior monitoring ability are able to charge a higher yield spread and lend for

ratio, liquidity ratio, and/or monitoring abilities. However, simply knowing the lead lender and employing a bank fixed effect in our model allows us to address the concern that unobserved lead bank heterogeneity may introduce a nonzero correlation between the error term and the right-hand side variables and affect both the maximum likelihood estimators in the 1st-stage models and the OLS parameter estimates in the 2nd-stage model. In particular, there is a possibility that banks which are better at monitoring (or possess market power) charge higher spreads and also have loans with a higher probability of resale and/or more restrictive loan resale covenants, leading to a spurious positive association of these variables with higher loan yield spread.

To control for lead lender heterogeneity, we run lead lender fixed effects regressions employing 5-year rolling windows. We report the results of adding additional lender fixed effects in Column 3 of Table V. In this regression, we identify the lead lender as the bank titled "agent" or "administrative agent."[21] If there is no bank with either title, the loan is omitted in our lender fixed effects regression leading to a smaller sample size of 5,707 observations. We show that controlling for unobserved lead lender heterogeneity does not weaken the statistical significance of the coefficient estimates on the probability of loan resale (an estimated coefficient of 0.19, significant at the 1% level) and the loan resale covenant (an estimated coefficient of 0.41, significant at the 1% level). We conclude that the positive and significant association between the probability of loan resale or lifting the loan resale covenants and initial loan spread is not an artifact of omitting important lender characteristics like lender capital ratios, liquidity ratios, or the monitoring ability of the lead lender.

4.2.e Institutional loans and probability of loan resale

Recent studies on the interactions between institutional investors and credit markets reveal that loans with institutional investor participation are more likely to be resold on the secondary market as these investors have higher demand for liquidity (e.g., Nandy and Shao, 2009; Nini, 2009; Jiang, Li, and Shao, 2010; Ivashina and Sun, 2011; Massoud *et al.*, 2011). Consistent with this finding, we confirm in Panel B of Table VI that 18% of loans with

longer maturity, because they provide monitoring benefits to borrowers and are better able to mitigate the asset substitution and underinvestment problems.

[21] Lenders with title "administrative agent" or "agent" are considered the predominant lead lenders who play the most important role in the loan syndicates (Standard and Poor's, 2011).

nonbank institution participation get resold compared to only 3% without such participation. Prior research has revealed endogeneity between loans with nonbank institution participation and high initial loan yields (e.g., Nandy and Shao, 2009; Jiang, Li, and Shao, 2010). That is, nonbank institutions select lower credit quality firms, which naturally face higher borrowing costs. If, however, the presence of institutional lenders is due to publicly unobservable loan-deal variability that is observable to the lenders, the imposition of a causal structure will overestimate the impact of institutional lenders on spreads—a classic selection effect (Li and Prabhala, 2007). To disentangle any selection bias, a two-stage treatment effect model can be applied. To control properly for the impact of institutional loans, we first run a logit model regressing the institutional loan dummy on the set of exogenous variables drawn from Table III. We then add the predicted probability of nonbank lender participation in the 2nd-stage loan yield spread model. As shown in Panel A of Table VII, our main results remain robust after controlling for the impact of nonbank lender participation.[22]

To investigate further whether the impact of ex ante probability of resale and loan resale constraint on loan spread remains the same for loans with nonbank institution participation, we repeat our two-stage analysis on the subsample of 4,619 loans with nonbank lender participation in Panel B of Table VII. We find that the estimated coefficient on probability of resale remains positive and significant. This implies that nonbank participating lenders are concerned about the potentially undermined monitoring incentive by lead lenders and consequently demand a higher spread. In these regressions, however, the significance of the loan resale constraint coefficient is lost. Nonbank lenders (who have higher liquidity needs) take loan liquidity as a premise of investment and tend not to compensate borrowers for allowing them to sell a loan. With the exception of the coefficient on the probability of resale constraint and reduced significance on some of the variables, the coefficient estimates on other control variables remain qualitatively identical.

4.2.f The impact of the loan shares held by lead lenders

It is well established in the literature that an information asymmetry problem exists in a loan syndicate because lead lenders, as delegated monitors, hold more private information than loan participants. As a result, loan syndicate

[22] We find that, instead of using the nonbank participation dummy, treating the institutional loan dummy as an exogenous variable and using it to identify the 1st-stage model and predict spreads in the 2nd-stage model leads to substantial bias, even flipping the sign on the probability of resale variable (available in Supplementary Appendix Table A7).

Table VII. Loan pricing model: controlling for the probability of nonbank lender participation

This table reports the coefficients from 2nd-stage least squares model estimations, controlling for nonbank lender participation. The dependent variable of Columns (1) and (2) is the all-in-spread drawn loan yield spread in percentage, and the analysis is conducted at the loan facility level over 1994–2004. In Panel A, the probability of being resold, the presence of one or more than one loan resale constraint(s) (including agent consent, borrower consent, minimum assignment size, and assignment fee), and the probability of nonbank lender participation are considered endogenous variables. This model is estimated by the two-stage least square procedure. The predicted values of the endogenous variables are obtained through the 1st-stage reduced-form model. Column (2) reports the results additionally controlling for the firm fixed effects. The net impact of loan sales is equal to the probability of resale coefficient estimate times the sample mean of the estimated probability of loan resale minus the loan resale constraint coefficient estimate times the sample mean of the estimated probability of loan resale constraint. There are 10,992 loan facilities borrowed by 2,837 firms. Panel B reports the 2nd-stage loan pricing regression results using a subsample of loans with nonbank lender participation. There are 4,619 loan facilities (borrowed by 1,511 firms) that involve at least one nonbank lender in the loan syndicate. Definitions of all variables are provided in Table II. Year dummies are included but not reported. Robust standard errors clustered at the year level are reported in parentheses, beside the coefficient estimates in each column. Note: ***, **, and * indicate that the coefficient estimates are significantly different from zero at the 1, 5, and 10% level, respectively.

	Panel A: Treating nonbank lender participation as an endogenous variable	
	(1)	(2)
	OLS regression	(1) + Firm fixed effects
Prob loan resale	0.53***	0.72***
	(0.11)	(0.13)
Prob resale constraint	0.19**	0.30**
	(0.10)	(0.15)
Prob nonbanks participate	0.69***	0.22**
	(0.19)	(0.11)
Leverage	1.00***	1.06***
	(0.11)	(0.18)
Market-to-book	0.02**	0.04**
	(0.01)	(0.02)
Altman's *Z*	−0.14***	−0.23***
	(0.01)	(0.03)
Noninvestment grade	0.47***	0.37***
	(0.04)	(0.08)
Nonrated	0.38***	0.25***
	(0.04)	(0.08)
Log firm size	−0.08***	−0.29***
	(0.02)	(0.05)
Log loan size	−0.11***	−0.10***
	(0.02)	(0.02)

(continued)

Table VII. Continued

	Panel A: Treating nonbank lender participation as an endogenous variable	
	(1)	(2)
	OLS regression	(1) + Firm fixed effects
Log maturity	−0.06***	−0.05**
	(0.02)	(0.02)
Secured	0.55***	0.35***
	(0.04)	(0.05)
Missing secured	0.23***	0.18**
	(0.05)	(0.07)
Log concentration	0.05*	0.04
	(0.03)	(0.04)
Revolver	−0.31***	−0.23***
	(0.03)	(0.03)
Leveraged buyout	0.26**	0.35**
	(0.11)	(0.14)
Takeover	0.01	0.04
	(0.03)	(0.04)
Repay	−0.01	−0.04
	(0.03)	(0.04)
Other purpose	−0.14***	−0.13***
	(0.03)	(0.04)
Log lenders	−0.17***	−0.11**
	(0.04)	(0.04)
LIBOR	−0.01	−0.04
	(0.02)	(0.03)
Term premium	−0.08	−0.08
	(0.05)	(0.06)
Interest volatility	1.15***	0.91***
	(0.26)	(0.31)
Ancillary statistics		
Net impact (%)	−0.08	−0.14
Net impact ($,thousand)	−257	−441
Number of observations	10,992	10,992
R^2	59.4%	81.2%
	Panel B: Loan pricing model for the subsample of loans with nonbank lender participation	
	(1)	(2)
	OLS regression	(1) + Firm fixed effects
Prob loan resale	0.35**	0.63***
	(0.16)	(0.21)
Prob resale constraint	0.13	0.07
	(0.19)	(0.30)
Leverage	1.36***	1.46***
	(0.15)	(0.30)

(continued)

Table VII. Continued

	Panel B: Loan pricing model for the subsample of loans with nonbank lender participation	
	(1)	(2)
	OLS regression	(1) + Firm fixed effects
Noninvestment grade	0.63***	0.47***
	(0.06)	(0.12)
Nonrated	0.64***	0.50***
	(0.07)	(0.15)
Log firm size	0.01	−0.34***
	(0.03)	(0.09)
Log loan size	−0.16***	−0.15***
	(0.03)	(0.03)
Log maturity	−0.08**	−0.02
	(0.03)	(0.03)
Secured	0.65***	0.24***
	(0.05)	(0.09)
Missing secured	0.21*	0.12
	(0.11)	(0.17)
Log concentration	0.09*	0.09
	(0.05)	(0.07)
Revolver	−0.50***	−0.28***
	(0.06)	(0.06)
Leveraged buyout	0.22*	0.31*
	(0.13)	(0.18)
Takeover	−0.03	0.11
	(0.05)	(0.07)
Repay	−0.04	0.04
	(0.06)	(0.07)
Other purpose	−0.10**	−0.07
	(0.05)	(0.07)
Log lenders	−0.17***	−0.15**
	(0.04)	(0.06)
LIBOR	−0.02	−0.05
	(0.04)	(0.05)
Term premium	−0.10	−0.11
	(0.10)	(0.13)
Interest volatility	1.10**	1.44**
	(0.49)	(0.62)
Ancillary statistics		
Net impact (%)	0.059	0.106
Net impact ($,thousand)	239	430
Number of observations	4,619	4,619
R^2	58.6%	83.9%

participants (the uninformed party) require compensation in the form of higher loan spreads. However, theory implies that an increase in the ownership of the informed party could moderate the information asymmetry cost (Leland and Pyle, 1977). In particular, Ivashina (2009) shows that increasing lead lender share reduces the level of information asymmetry between lead lenders and participants, decreasing the premium requested by loan syndicate participants. Given that lead lender share is an important determinant of loan spread, it is necessary to demonstrate that our results are robust to the inclusion of lender share in the loan spread regressions.

Although lead lenders' ownership mitigates the cost of information asymmetry, it increases lenders' credit exposure to a particular loan and consequently affects lenders' loan portfolio risk, leading to an increase in the loan spread requested by lead lenders. As argued in Ivashina (2009), these two opposing effects simultaneously determine the loan spread. Moreover, because syndication structure (lead lender share) and loan spread are simultaneously determined during the loan syndication process, we need to instrument the impact of the lead lender share. Detailed discussion of this instrumental variables approach and tabular results are available in Supplementary Appendix Table A8.

We show that when we include predicted lead lender share in our baseline loan spread model in the 2nd stage (similar to Table IV), the estimated coefficients on the probability of loan resale and the presence of loan resale constraint dummy remain significant and robust. Furthermore, the estimated coefficient on the predicted lead lender share is negative and significant at the 5% level. When we add firm fixed effects to the regression specification, this significance disappears. Nevertheless, our results remain not inconsistent with Ivashina's (2009) finding.

4.2.g Analysis controlling for financial covenants

Drucker and Puri (2009) argue that restrictive financial covenants facilitate secondary loan trading because these covenants mitigate problems caused by the reduced monitoring incentive associated with loan resales. It is possible that ignoring these covenants in our model leads to spurious significance for our resale constraint and probability of resale variables, as it is likely that these restrictive covenants are related to our variables of interest. To address this possibility, we construct two financial covenant stringency variables, net worth slack and current ratio slack, used in Drucker and Puri (2009), and incorporate them into our two-stage least squares model. The availability of the two financial covenants stringency variables reduces our sample size to 3,416 loans (when net worth slack is added) and 927 loans (when current

ratio slack is added). In these regressions, the loan purpose variable, leveraged buyout, is dropped because there are either no leveraged buyout loans or only a few such loans in the reduced sample. We find that stringency of these selected financial covenants increases the probability of loan resale, consistent with Drucker and Puri (2009). We also find that it increases the probability of the presence of resale constraints.

After controlling for the financial covenant stringency variables in the 2nd-stage model, the sign and significance of the estimated coefficients on our main variables of interest remain the same for all cases we explore, with the exception of firm fixed effects. For this singular case, the economic magnitude of the loan resale and loan resale constraint variables remain, but the statistical significance does not. We believe this is an outcome of reduced power due to the small subsample available for this specification. Detailed tabular results are available in Supplementary Appendix Table A9.

Overall, we find significant impacts from including these controls for restrictive financial covenants, in particular for net worth slack. The inclusion of the additional controls, for the most part, strengthens our evidence for resale constraint and probability of resale

4.2.h Subset analysis

We also conduct subset analysis segmenting our sample by rating: investment grade, noninvestment grade loans, and nonrated loans, as well as by high versus low default risk as captured by Altman's *Z*-score, and by type: term versus revolver. We are interested in answering several questions with this analysis.

First, do noninvestment grade loans benefit more from lifting loan sale constraints? Put differently, do the holders of investment grade loans need the access to liquidity through the secondary market to the same extent as the holders of noninvestment grade or nonrated loans? We find that the secondary market appears to benefit primarily noninvestment grade and nonrated issuers. In particular, we find that the widening of spreads that comes with increased probability of resale (interpreted in this article as compensation for reduced bank monitoring and potential moral hazard attendant with sale of the loan) is very similar for all grades of loans. The difference arises for investment grade loans from an absence of an impact from lifting the loan sale constraint.

Second, are spreads on loans to firms at higher risk of bankruptcy more sensitive to an increase in the likelihood of resale, as we might expect if resale impacts monitoring? Surprisingly, we find that these firms are no more sensitive to an increase in the likelihood of resale, but see a large reduction in

spread size with the lifting of loan sale constraints. These results make a strong case that the secondary market has most strongly benefited the lower quality, higher default-risk segments of the loan market. We are also interested in exploring whether resale constraint and loan resale probabilities are simply proxying for risk of default or grade of loan. We perform subsample analysis to get at this question, finding that the safest firms do not see a discount in the loan spread with the lifting of resale constraints—the risky firms are driving the concession effect in our sample. Both safe and at-risk-of-default firms, however, exhibit similar widening of spreads with an increase in loan resale probability. These results strongly reinforce the conclusions we draw for investment grade versus noninvestment grade loans.

Finally, we compare pricing of revolvers versus term loans, as Gupta, Singh, and Zebedee (2008) assert that the pricing of these loan types is not comparable. We run our 1st- and 2nd-stage models on the revolver and term loan subsamples separately. In contrast to Gupta, Singh, and Zebedee's (2008) assertion, we find that the ex ante probability of loan resale and the lifting of loan resale constraint significantly affect the pricing of revolvers and term loans in a similar way. Detailed regression results, analysis, and further discussion are available in Supplementary Appendix Table A10.

5. Conclusions

We find that the probability of loan resale is predictable on an ex ante basis and is priced by syndicated lenders. Our conditional analysis shows that the probability of loan resale is significantly and directly related to borrower and loan risks.

Similar to loan securitization and the use of credit default swaps to hedge exposures, direct loan sales through the secondary loan market transform banks into underwriter-like financial intermediaries with a reduced obligation to act as delegated monitors. Theory suggests that the cost of borrowing should increase during such a transformation. Our empirical results strongly and robustly indicate that the probability of loan resale calculated on an ex ante basis is positively related, *ceteris paribus*, to loan yield spread and that the coefficient estimate on probability of loan resale is statistically and economically significant. We estimate that a change in the probability of loan resale from 0% to 100% increases loan yield spreads by 53 basis points.

We also find that the probability that loan covenants restricting resale (proxy for the illiquidity of loans) are present, *ceteris paribus*, is positively associated with loan spreads. This finding is consistent with the existing empirical and theoretical literature documenting the benefits lenders

receive from increased liquidity through loan resales facilitating portfolio and risk management. We find that this benefit largely accrues to lenders to firms that are noninvestment grade or nonrated and at greater risk of default. The average net impact of simultaneously reducing the probability of the presence of a resale constraint and raising the probability of resale across the full sample is to lower spreads by 14.3 to 34.1 basis points [or $435,000 to $1,036,000 savings on the annual interest expense for the median sized loan].

An important contribution of our study is identifying the secondary market feedback variable, probability of loan resale, as a proxy for loan monitoring and addressing how secondary market information affects the primary market loan pricing decision. Our study also overturns the result of Gupta, Singh, and Zebedee (2008) which (mis)-identified the probability of resale as a liquidity proxy.

This empirical investigation enriches our understanding of secondary loan sale activity and its impact on the cost of bank loan financing from the primary credit market and delivers valuable information to government regulators, industry practitioners, and bank loan borrowers. In particular, it reveals a negative impact of loan sales on borrowers, most likely the result of the reduced monitoring efforts attendant with the loan resales, while accounting for the countervailing impact of increased access to liquidity which serves to lower loan spreads. On balance, the benefits of liquidity outweigh the costs of reduced monitoring and, on average, the existence of the secondary loan market unambiguously lowers borrowing costs. The benefits of loan sales in the form of reduced borrowing costs are largely enjoyed by firms with noninvestment grade debt; the cost of borrowing appears to rise with the possibility of resale of loans for firms with investment grade debt.

Supplementary Data

Supplementary data are available at *Review of finance* online.

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