



ELSEVIER

Contents lists available at SciVerse ScienceDirect

Journal of Financial Economics

journal homepage: www.elsevier.com/locate/jfec

Did securitization affect the cost of corporate debt? ☆

Taylor D. Nadauld ^{a,*}, Michael S. Weisbach ^b^a Department of Finance, Brigham Young University, Provo, Utah, USA^b Ohio State University and NBER, USA

ARTICLE INFO

Article history:

Received 23 February 2011

Received in revised form

6 July 2011

Accepted 4 August 2011

JEL classification:

G21

G31

Keywords:

Securitization

Collateralized loan obligations (CLO)

Corporate bank loans

ABSTRACT

This paper investigates whether the securitization of corporate bank loan facilities had an impact on the price of corporate debt. Our results suggest that loan facilities that are subsequently securitized are associated with a 17 basis point lower spread than that of facilities that are not subsequently securitized. We consider facility characteristics that are associated with the likelihood of securitization and estimate the extent to which these characteristics are related to spreads. We document that Term Loan B facilities, facilities of B-rated firms, and facilities originated by banks that originate CLOs are securitized more frequently than other facilities. Spreads on facilities estimated to be more likely to be subsequently securitized have lower spreads than otherwise similar facilities. The results are consistent with the view that securitization caused a reduction in the cost of capital.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

While much attention has focused on the role of securitization in the mortgage market, relatively little has been paid to the securitization of corporate bank loans in the form of collateralized loan obligations (CLOs).¹ This lack of attention is surprising given that both the volume of non-investment-grade bank loans and the number of newly originated CLOs spiked dramatically between the years 2002 and 2007, from over \$125 billion of loans and 43 CLOs in

2002 to over \$540 billion of loans and 213 CLOs in 2007.² One potential explanation for this pattern was that the popularity of CLOs created a demand for collateral that could be used to construct them (see, for example, Gennaioli, Shleifer, and Vishny, *in press*). Consequently, banks active in the securitization business had incentives to adjust their lending behavior to increase the quantity of loans that could be used for collateral, affecting the cost of capital for firms in the primary lending market.

In this paper we estimate the extent to which the practice of securitizing bank debt influenced the cost of such debt for borrowers in the primary corporate debt market. To do so, we rely on a sample of over 4,000 loan facilities from the Dealscan database. We match these loan facilities to a database of CLOs provided by Moody's. The Moody's sample provides data on the characteristics and identity of all the securities serving as collateral in

* We would like to thank Viral Acharya, Heitor Almeida, Murillo Campello, Jennifer Dlugosz, Isil Erel, Andrew Karolyi, Eric Oberg, René Stulz, and participants in seminars at Brigham Young University, Erasmus University, HEC Paris, Ohio State University, and the University of Amsterdam for helpful suggestions. We also thank our unusually diligent referee, Victoria Ivashina, for helpful comments and suggestions.

* Corresponding author.

E-mail address: taylor.nadauld@byu.edu (T.D. Nadauld).

¹ See, for example, Mian and Sufi (2009), Demyanyk and Van Hemert (2011), Dell'Ariccia, Igan, and Laeven (2008), Keys, Mukherjee, Seru, and Vig (2010), Loutskina and Strahan (2009), and Nadauld and Sherlund (*forthcoming*).

² The estimates on the dollar volume of non-investment-grade loans originated in 2002 and 2007 are likely understated in both years. The reported figures are calculated using our sample of U.S.-originated syndicated bank loans made to non-financial borrowers with available sales data that is described in Section 3.

any Moody's-rated CLO as of the first quarter 2009, which can be used to predict the attributes of "securitizable" loan facilities. We first address the question of whether a loan facility that was ultimately securitized had a lower spread than an otherwise similar loan facility that was not securitized. Our estimates indicate that the answer to this question is a clear "yes"; they suggest that of the most common type of securitized facility, a B-rated, Term Loan B, a facility that is ultimately securitized has about a 17 basis point lower yield than an otherwise identical loan that was not securitized.

There are a number of possible interpretations to this result. It is possible that CLOs, for some unidentified reason, were more likely to add relatively low-yielding loans in their portfolio, or that an omitted variable is driving both spreads and securitization demand in our specification. Alternatively, there could have been a reduction in the demand for capital from the firms whose loan facilities tend to be securitized. These interpretations imply that CLOs could have relatively low-yielding loan facilities in their portfolios, but that this ownership distribution of loan facilities is not associated with any additional costs. More consistent with the securitization-driven explanations of the Financial Crisis is a story in which banks have a high demand for securitizable loan facilities when they put together CLOs and consequently lower the yields to attract more borrowers.³ This latter explanation implies that demand for loans from CLOs has a real effect, as it lowers the cost of capital for the firms obtaining the loans.

To distinguish between these explanations, we estimate the effect on a loan's spread of factors that are correlated with the demand for bank loan facilities from participants in the securitization market and thus potentially impact credit supply in the primary market, but are unrelated with the demand for credit from corporate borrowers in the origination market. First, we consider features related to the structure of corporate loans. Corporate loans are typically made up of a number of tranches (also referred to as facilities), often containing an amortizing "Term Loan A" portion, a bullet "Term Loan B" portion, and a "Revolver" that can be drawn down at the discretion of the borrower. These tranches usually have the same seniority, but because of the amortization of Term Loan A and the options implicit in the revolver, they have different effective maturities and yields. An important difference between the tranches, however, is that typically only the Term Loan B (bullet) portion is securitized, while the other tranches are typically held by the issuing bank.⁴ Consequently, the difference in yields between the tranches potentially reflects differences in demands for securitizable loans, among other factors.

³ The terms supply and demand can be ambiguous when discussing a primary and secondary loan market. The phrase "demand for securitizable loan facilities" refers to demand from the secondary market, which is manifest as increased supply in the primary loan-origination market.

⁴ In Section 2.2 we discuss at least two reasons why Term Loan Bs are preferred as collateral by arrangers of CLOs.

Second, the credit rating of a borrower affects the likelihood of a loan facility being securitized. In a sample of B- and Ba-rated loan facilities, holding other factors constant, the lower credit quality B-rated firms obtained facilities that were more likely to be securitized. This pattern is consistent with Benmelech and Dlugosz (2009), who find that cash-flow arbitrage CLOs tend to employ B-rated bank facilities as collateral. Demand from deal arrangers in the securitization market for B-rated collateral rather than Ba-rated collateral represents an increase in demand for corporate bank loans that is unrelated to factors affecting the demand for loans from borrowers in the primary loan market.

Third, we use the identity of the loan-arranging bank in our identification strategy. Over the 6-year period between 2002 and 2007, 79% of all CLOs were underwritten by just ten banks. Leveraged loans arranged by banks that also underwrite CLOs are more likely to be securitized because CLO underwriters can more accurately evaluate the value of a particular loan to CLO structures. That is, CLO underwriting banks are more likely to arrange a given bank loan for the purpose of using it as collateral in a CLO.⁵ Consistent with this logic, we document that in our sample, loan facilities arranged by these securitization-active banks were securitized more frequently than loan facilities issued by other banks.

We exploit these three institutional features of the CLO market to identify the impact of securitization on the cost of corporate credit. Since increased demand for securitizable assets occurs more frequently in Term Loan B facilities originated by securitization-active banks, we estimate the difference between spreads on these facilities relative to Term Loan B facilities issued by non-securitization-active banks. We find that spreads on Term Loan B facilities originated by securitization-active banks are 11 basis points lower than spreads on facilities issued by other banks, holding other factors constant.

If this decline occurs because of demand for securitizable loans, then we expect this decline in spreads to be larger in B-rated debt than in Ba-rated debt because B-rated debt is securitized more frequently. For this reason, in a sample of Term Loan B facilities only, we estimate the difference in spreads between B-rated facilities originated by securitization-active banks and compare those estimates to spreads on Ba-rated facilities originated by securitization-active banks. Consistent with the securitization demand-driven hypothesis, our estimates indicate that the difference in the spread on loans issued by securitization-active banks to B-rated borrowers was almost 21 basis points lower than the spread on loans made by non-securitization-active banks to B-rated borrowers. In contrast, there is virtually no difference in spreads between Ba-rated loans from securitization-active banks and non-securitization-active banks.

In addition, if the demand to securitize Term Loan B facilities issued to B-rated borrowers was highest among securitization-active banks, we would expect to find differences in the spreads of Term Loan B facilities with

⁵ We discuss more specifically why this is the case in Section 2.

these securitization-friendly attributes relative to Term Loan A facilities or revolving facilities. Our estimates indicate that the incremental effect of being a securitization-friendly Term Loan B facility is 30.6 basis points relative to Term Loan As and is 20.8 basis points relative to revolvers. These equations imply that the drop in spreads for securitization-friendly facilities does not reflect a bank-specific characteristic, such as an increased risk tolerance, since this characteristic would likely be reflected in the spreads of securitization-friendly Term Loan A facilities and revolvers as well.

Another way to do the comparison is by estimating the factors that affect the differences across facilities within a particular loan. This approach has the advantage of having common underlying risks within the loan, although the data are limited to loans that contain multiple types of facilities. In this case, the differences in spreads between Term Loan B and either Term Loan A or revolvers decline with characteristics associated with securitization, again consistent with the view that demand for collateral for CLOs affects the pricing of the facilities in the primary market.

Overall, the results are consistent with the view that CLOs' demand for collateral affected pricing in the corporate debt market. The effect of the securitization-driven debt market on the housing market during the 2002–2007 period is well-known. [Shivdasani and Wang \(2011\)](#) and [Axelson et al. \(2011\)](#) show that the debt market was an important driver of the leveraged buyout (LBO) boom during that period. Our results suggest that securitization had a pricing impact on the corporate debt market more broadly.

Perhaps the most closely related work to ours is [Ivashina and Sun \(2011\)](#), who provide evidence that demand for loans from institutional investors in the secondary market, measured by the time a loan remains in syndication, is negatively related to spreads on these loans. The authors present evidence that some but not all of their effect is due to demand from CLOs. Our analysis extends their work in a number of directions. First, we focus exclusively on the role of securitization in loan pricing. Second, we provide direct evidence on the types of loans most associated with securitization, in particular, Term Loan B facilities, loans issued by banks that also issue CLOs, and loans that are made to B-rated borrowers. Third, we use these characteristics as a way to identify the causal nature of the relation between pricing and securitization. To the extent that [Ivashina and Sun's \(2011\)](#) and our identification strategies are different from one another and our results are nonetheless similar, each paper's analysis complements the other's and strengthens the conclusion that securitization affects the demand for collateralizable loan facilities, and ultimately the cost of capital in the primary market.

Other related work includes [Kara, Marques-Ibanez, and Ongena \(2011\)](#), who identify a relationship between the securitization-activity of loan-originating banks and lower spreads in the European loan market. [Benmelech, Dlugosz, and Ivashina \(2011\)](#) test whether the CLO market suffers from a lemons problem by investigating whether loans originated by the bank that acts as the CLO underwriter underperform the rest of the CLO portfolio. [Nini](#)

(2008) examines the investment behavior of firms more likely to benefit from securitization-driven increases in credit supply. Finally, there is a literature discussing numerous other factors outside of securitization which influence the spread charged to corporate borrowers in the bank loan market (see [Guner, 2006](#); [Sufi, 2007](#); [Ivashina, 2009](#)).

2. Institutional background

Collateralized loan obligations (CLOs) transform speculative-grade bank loan facilities into highly rated bonds through the process of pooling and tranching.⁶ The incidence of securitizing corporate bank loans exploded between 2002 and 2007 and has been well-documented in the literature and popular press. Over 80% of the CLOs originated between 1996 and 2008 were originated in the years 2002–2007, with nearly 50% occurring in 2006 and the first half of 2007 alone.⁷ Also noteworthy is the fact that between 2002 and 2007, 79% of new CLOs were originated by just ten banks. In short, the creation of CLOs was very active over a relatively short period of time and concentrated in a relatively small number of originating banks.

Theoretically, securitization can occur for a number of reasons. First, [DeMarzo \(2005\)](#) suggests that securitization reduces asymmetric information problems about the quality of individual loans by providing the purchaser with a diversified pool of loans from different issuers, presumably having a lower information asymmetry problem than any individual loan would have. Second, [Gaur, Seshadri, and Subrahmanyam \(2011\)](#) point out that securitization reduces market incompleteness, providing investors who value that particular cash-flow distribution with the ability to purchase it. Finally, [Coval, Jurek, and Stafford \(2009\)](#), relying on the assumption that investors purchase bonds based solely on credit ratings, attribute the proliferation of securitization activity between 2002–2007 to the potential for deal arrangers to deliver the cheapest possible set of assets that can obtain a high quality credit rating, thereby engaging in ratings arbitrage. The observation that the bank loans of B-rated borrowers were securitized more frequently than B-rated loans is consistent with a “cheapest-to-deliver” view of collateral selection in securitization.

Yet, none of these theories of securitization provides a rationale for why securitization should affect the spreads on loan facilities that subsequently are securitized. In other words, given two loan facilities, why should their spreads differ depending on whether they are subsequently securitized if the risks associated with the loans' repayment are identical? For this to be the case, the very process of securitization likely influences the lender's decision about the loan at the time of origination.

⁶ The term “tranche” is used to describe different bonds arising from a CLO deal and is also used to describe different loan facilities within a bank loan. The term *tranche* in this sentence refers to the tranches (bonds) that arise from the origination of a CLO.

⁷ Data on CLO originations are presented in [Table 2](#).

2.1. Lender demand for CLO collateral and loan spreads

The origination of a CLO has two principal participants, the CLO underwriter (bank) and a collateral manager (asset manager). The CLO creation process can occur one of two ways: either the investment bank can contact a collateral manager and agree on a deal, or a collateral manager can decide that they want to be in the business of managing a portfolio of bank loans and set up a CLO as a vehicle to do so. Both the asset manager and CLO underwriter have incentives to originate deals. CLO underwriters have incentives to originate deals because they are compensated in the form of deal fees and through the sale of the bonds arising from the CLOs, while asset managers are compensated based on assets under management.

CLOs require loan facilities as collateral. If a bank-loan originator has a high demand for securities that can subsequently become part of a CLO, it has an incentive to offer the borrower a lower interest rate than it otherwise would given current market rates and the risk on that particular investment.⁸ Consequently, securitized facilities can end up having interest rates that do not fully reflect the risks associated with the cash-flow distributions generated by their collateral. In this way, CLO demand can impact loan facility spreads at origination. It is possible that demand from a single loan arranger to place a facility in a CLO could not be sufficient to induce all syndicate members to accept a lower spread. Most likely, syndicate members will be more prone to accepting a lower spread if more than one of them is active in the securitization market.⁹

2.2. The structure of loans

An important feature that we rely on to identify the demand for securitizable loan facilities is the structure of the bank loans themselves.¹⁰ Bank loans usually receive capital from a syndicate of lenders, comprised of up to three types of investors: institutional investors, banks, and finance companies. To cater to the preferences of each type of investor, these loans contain multiple facilities or tranches. Commercial banks typically invest in the revolving portion of the loan. “Revolving” credit lines can be drawn down and repaid at the discretion of borrowers, but fees are paid based

⁸ The underwriter of a CLO frequently warehouses loan facilities that are to be used as collateral in a CLO during the portfolio selection process. An underwriting bank is likely to feel more comfortable warehousing a loan facility that it originated rather than a facility on which it has less information.

⁹ The data presented below provide some evidence, albeit limited, in support of this possibility. Of the Term Loan B facilities with exactly two lead arrangers that are B-rated and hence more likely to be securitized, 42.3% of the time both lead arrangers are securitization-active. Among the less likely to be securitized Ba-rated loans, both lead arrangers are securitization-active only 37.4% of the time. The 5% difference suggests that B-rated loans tend to have a larger number of syndicate participants that are also active in originating CLOs. A similar difference exists between B- and Ba-rated loans when comparing the securitization activity of the lead arranger when only one lead arranger participates in the loan origination.

¹⁰ We rely on the institutional details provided in a primer on bank loans published annually by *Standard and Poor's* (2007).

on the entire amount committed to the lending facility regardless of whether it has been drawn down. “Term Loan A” facilities are typically senior, amortizing loans that are generally kept by the issuing bank or purchased by other commercial banks. In contrast, “Term Loan B” facilities, which are also senior and usually *pari passu* to the Term Loan A, typically mature with bullet payments, and are usually sold to institutional investors.

Term Loan B facilities are appealing to CLOs for a number of reasons.¹¹ The main difference between Term Loan A and Term Loan B concerns the payout structure, which is amortizing for Term Loan A facilities and bullet for Term Loan B. The amortizing payout structure leads to a shorter duration for Term Loan A than Term Loan B facilities. This shorter duration creates reinvestment risk, and even if there are good places to reinvest the money, the CLO managers are more frequently required to search for places to reinvest the steady stream of amortized principal as it is paid back. Collateral managers find it easier to reinvest the bullet payments of Term Loan Bs when they mature or prepay.¹² In addition, the purchasers of AAA bonds (insurance companies, pension funds) produced by CLOs tend to prefer to purchase bonds with longer maturity. It is easier for CLO arrangers to create bonds with a longer expected maturity with collateral of longer duration.

CLOs are more likely to invest in institutional tranches (Term Loan B specifically) than in the revolving facilities or Term Loan A facilities (see *Table 1* for evidence). When demand for loans from CLOs increased dramatically in the 2002–2007 period, this demand likely affected the Term Loan B portion of corporate loans substantially more than either the Term Loan A portion or the revolver portion.

2.3. The ratings structure of CLOs

The predominant form of corporate loan securitization is what is known as a cash-flow arbitrage CLO.¹³ The idea underlying this structure is to combine a group of low-rated loans into a structure that has a higher rating. Covenants in CLO deals require that each deal maintain a minimum weighted-average credit rating (WAR), which is calculated as the average credit rating of the collateral, weighted by the size of each piece of collateral. Not surprisingly, CLOs are almost always structured to use the minimum quality collateral so as to satisfy this constraint and yield a high, usually AAA, rating for the CLO. *Benmelech and Dlugosz* (2009), analyzing a comprehensive sample of cash-flow arbitrage CLOs, show that the weighted-average credit rating in 85% of the deals in their sample was B+ (B1 in Moody's rating classification). Furthermore, they document that the average B1 rating of the collateral was almost uniformly met

¹¹ This paragraph is based on conversations with practitioners who originate CLOs and summarizes the typical arguments for why CLOs usually prefer to purchase the Term Loan B tranche of a loan rather than the Term Loan A tranche.

¹² Because of these differences in duration, we control econometrically for differences in term structure when estimating differences in spreads between Term Loan As, Term Loan Bs, and revolvers below.

¹³ Other forms of CLOs include balance-sheet CLOs, whose primary purpose is to remove loans from banks' balance sheets. According to Moody's data on CLO originations, balance-sheet CLOs represent about 1% of all CLOs.

with uniformly B-rated collateral (with collateral concentrated specifically in the B1 rating).¹⁴

Consequently, when demand for CLO collateral increased in the securitization-active period, we expect that this demand will be reflected in demand for B-rated collateral more than for higher-rated debt. This increase should be in the institutional (Term Loan B) tranche of the loan and not for the Term Loan A or revolver tranches of the loans. In addition, it should be higher for loan facilities issued by banks active in securitization, that presumably package these facilities immediately into the CLOs that they arrange themselves. These differences in attractiveness to originators of CLOs lead to clear identification of the effect of demand for collateral on the relative pricing of different kinds of bank loan facilities.

3. Data

3.1. Sample construction

To study the way in which securitization affects the pricing of loan facilities, we utilize data from two publicly available databases: Reuter's Dealscan and Moody's Enhanced Monitoring Service (EMS) data services. We restrict our sample to Dealscan loan facilities originated between 2002 and September of 2007, at which time CLO originations began to decline.¹⁵ Our sample requires that facilities have Moody's credit ratings on the borrowing firm's senior debt at the time of loan origination.¹⁶ Our analysis focuses specifically on firms with Moody's senior-debt credit ratings of B (B1, B2, or B3) or Ba (Ba1, Ba2, Ba3). We further restrict the sample to include only syndicated loans originated in the United States and remove financial firms with Standard Industrial Classification (SIC) codes between 6000 and 6500. We also identify and remove any second-lien or mezzanine facilities from the sample.

The Moody's EMS sample provides data on the characteristics and identity of all the securities serving as collateral in any Moody's-rated CLO as of the first quarter 2009. The strength of the Moody's data is that it allows us to identify exactly which loan facilities serve as collateral in CLOs as of the first quarter 2009. Unfortunately, it

provides only a one-time snapshot of securitized facilities, and does not contain unique identifiers that map to Dealscan.

To illustrate how our matching of the two databases occurs, consider the following examples from the Dealscan and Moody's EMS databases. In October 2006, Armstrong World Industries raised \$1,100M through a bank loan; \$300M in the form of a revolving line, \$300M in a Term Loan A facility, and the remaining \$500M in a Term Loan B facility. The Moody's EMS database reports a security with the name "Armstrong World Ind.—Term Loan B" in the amount of \$500M with expected maturity in October 2013. It is important to note that no other facility associated with the Armstrong World Industries bank loan appears in the Moody's database. Consequently, we classify the Term Loan B portion of the Armstrong debt issuance as being securitized while the revolving and Term Loan A facilities are not.

3.2. Potential biases introduced through "snapshot" sampling

We emphasize that there are limitations inherent in constructing the database in this manner. Because the Moody's data represent a snapshot of CLOs in 2009, we cannot tell whether a loan facility was initially securitized and subsequently paid off prior to 2009 or if it was included and then dropped from the CLO prior to 2009.¹⁷ We also cannot be sure that the facilities we observe as being securitized in 2009 were intended to be securitized at origination. In addition, the imperfect nature of matching suggests that some matches were likely missed due to human error or uncertainty in the naming of the facilities. Consequently, it is likely that the matching process employed here understates the number of facilities in our sample that are securitized. Finally, it could be the case that better facilities, those with a lower spread, are more likely to be outstanding as of 2009.

For these reasons, our primary empirical strategy does not rely on an exact determination of whether a loan facility was securitized. Instead, we rely on the EMS database to identify attributes of loan facilities that are simply correlated with securitization activity. This approach avoids potential survivorship bias coming from higher quality loans being more likely to be outstanding in 2009.

3.3. Summary statistics

Table 1 presents summary statistics on the full sample of facility-level loan data. Panel A breaks down these statistics by facility type. It indicates that revolving

¹⁴ The average CLO deal in their sample transformed the B-rated collateral into securities in which 70% of the principal balance of the originated bonds was rated AAA, while 90% of the principal was rated BBB or higher. The pattern is very similar in the Moody's sample of CLOs we analyze below.

¹⁵ Our identification strategy relies on differences in CLO demand for securitizable loan facilities on account of facility attributes, rather than substantial changes in CLO demand through time. As such, we begin our sample in 2002 so that our estimates are concentrated during the "securitization boom."

¹⁶ We require the rating on the senior debt and not on the specific loan because it is available for a much larger number of loans: there are 4,536 facilities in Dealscan that meet our sample criteria for which there is a rating on the senior debt and only 2,351 for which there is a rating on the specific facility. For the loans in our sample that have both facility-specific credit ratings and senior-debt credit ratings, the ratings are either the same or within one ratings class (i.e., B1 senior debt and Ba3, B1, or B2 facility-specific rating) over 71% of the time.

¹⁷ Collateral managers of CLOs actively manage the portfolio through time selling their participation in one loan facility and replacing it with another. They would do so because their compensation is in part tied to the adequacy of the collateral pool. CLOs do contain covenants that constrain the frequency of trading within the collateral. Benmelech and Dlugosz (2009) report that "typically 10–15% of the par value of assets may be traded per year in addition to defaulted securities or credit-risk securities."

Table 1

Facility summary statistics by facility type, credit rating, facility purpose, and facility attribute.

In this table we report summary statistics on loan facilities identified as having been securitized and compare them against the attributes of non-securitized facilities. The Moody's EMS database provides a "snapshot" of the characteristics and identity of all the securities serving as collateral in any Moody's-rated CLO as of the first quarter of 2009. The securitized sample is defined as any loan facility identified as collateral in a CLO according to Moody's EMS database as of the first quarter 2009. We outline the matching process in the text. We report summary statistics on the number of loan facilities and all-in-drawn spread over LIBOR charged on loan facilities at the time of loan origination. Panels A–C report summary statistics by facility type, credit rating, and facility purpose, respectively. Panel D reports summary statistics on facility attributes. The Dealscan sample consists of senior secured and unsecured loan facilities originated between 2002 and September 2007 which have Moody's credit ratings on the senior debt of the issuing firm available at the time of loan origination. We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample.

Panel A Non-securitized sample						Securitized sample						Diff	t-Stat
Facility type	Count	All-in-drawn spread over LIBOR				Count	All-in-drawn spread over LIBOR						
		25th %tile	Median	Mean	75th %tile		25th %tile	Median	Mean	75th %tile			
Revolver	2514	150.0	225.0	226.8	275.0	34	200.0	250.0	235.3	250.0	8.5	(1.06)	
Term Loan A	278	150.0	225.0	228.0	300.0	20	143.8	150.0	175.6	200.0	-52.4	(-3.40)	
Term Loan B	1413	200.0	250.0	276.7	325.0	277	200.0	225.0	240.4	275.0	-36.3	(-7.39)	

Panel B Term Loan Bs only - Non-securitized sample						Term Loan Bs only - securitized sample						Diff	t-Stat
Moody's sr. debt credit rating	Count	All-in-drawn spread over LIBOR				Count	All-in-drawn spread over LIBOR						
		25th %tile	Median	Mean	75th %tile		25th %tile	Median	Mean	75th %tile			
Ba1	49	175.0	200.0	224.5	275.0	9	175.0	175.0	181.9	187.5	-42.5	(-2.86)	
Ba2	138	175.0	225.0	230.7	275.0	22	150.0	187.5	200.0	225.0	-30.7	(-2.13)	
Ba3	290	200.0	225.0	250.0	275.0	50	175.0	225.0	223.0	250.0	-27.0	(-3.24)	
B1	458	225.0	250.0	273.9	300.0	101	200.0	225.0	241.1	275.0	-32.8	(-4.67)	
B2	338	225.0	275.0	306.6	350.0	68	225.0	250.0	265.4	287.5	-41.2	(-3.39)	
B3	140	250.0	275.0	332.3	400.0	27	225.0	250.0	259.3	275.0	-73.1	(-4.27)	

Panel C Term Loan Bs only—Non-securitized sample						Term Loan Bs only—securitized sample						Diff	t-Stat
Facility purpose	Count	All-in-drawn spread over LIBOR				Count	All-in-drawn spread over LIBOR						
		25th %tile	Median	Mean	75th %tile		25th %tile	Median	Mean	75th %tile			
Corporate purposes	445	200.0	250.0	267.9	325.0	85	200.0	225.0	241.2	250.0	-26.8	(-2.65)	
Debt repayment	123	225.0	275.0	308.5	350.0	30	175.0	200.0	214.2	250.0	-94.3	(-6.56)	
Takeover	183	200.0	225.0	250.9	275.0	39	200.0	200.0	227.2	250.0	-23.6	(-2.14)	
Working capital	168	200.0	250.0	279.7	325.0	19	175.0	225.0	226.3	275.0	-53.4	(-3.18)	
Leveraged buyout (LBO)	209	225.0	275.0	289.1	325.0	63	225.0	250.0	256.7	300.0	-32.4	(-4.04)	
Acquisition line	112	218.8	250.0	266.3	300.0	12	175.0	225.0	256.3	337.5	-10.0	(-0.39)	
Other	173	225.0	267.5	277.4	304.2	29	200.0	219.6	243.1	264.3	-	-	

Panel D Term Loan Bs only—Non-securitized sample						Term Loan Bs Only—securitized sample						Diff	t-Stat
Loan attribute	Count	25th %tile	Median	Mean	75th %tile	Count	25th %tile	Median	Mean	75th %tile			
Facility amount (\$ million)	1432	\$125.0	\$219.5	\$388.0	\$400.0	278	\$180.0	\$315.0	\$519.8	\$600.0	\$131.8	(2.91)	
Sales size (\$ million)	1432	\$272.7	\$616.5	\$1,757.3	\$1,500.7	278	\$347.3	\$704.1	\$3,055.0	\$1,510.7	\$1,297.6	(1.58)	
Tranche maturity (months)	1355	60.0	72.0	71.4	84.0	276	72.0	84.0	76.3	84.0	5.0	(5.74)	
Syndicate size (#of participants)	1431	3.0	5.0	8.5	9.0	277	3.0	5.0	7.0	7.0	-1.4	(-2.37)	
% With covenants	1432	-	-	54.2%	-	278	-	-	62.6%	-	8.40%	(2.63)	

facilities are the most common facility, followed by Term Loan Bs and Term Loan As. Panel B focuses exclusively on the Term Loan B sample and provides statistics on the number and spread over London InterBank Offered Rate (LIBOR) for securitized and un-securitized loan facilities of

different credit qualities. As expected, facility spreads increase monotonically as credit quality declines. Panel C reports the same statistics broken down by the reported purpose of the facility. The somewhat vague description of "corporate purposes" appears most frequently in the

Table 2

The creation of CLOs through time and by originator.

This table reports the frequency and timing of CLO originations by CLO underwriter. Data include all CLOs originated in the United States and Europe as reported in Moody's EMS database. Of the 884 reported CLOs, less than 1% are reported as balance-sheet CLOs. The remaining are primarily "cash-flow arbitrage" CLOs. Over 80% of all deals were created between the 2002 and 2007 period, with almost 50% of the deals being created in 2006 and 2007. Over 78% of the deals were originated by the top-ten originating banks. The top-ten underwriting banks over our 2002–September 2007 sample period are classified as "securitization-active".

CLO originating bank	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
JPMorgan	0	1	0	3	2	6	6	7	7	13	26	18	5	94
Citigroup	1	0	0	1	0	0	0	2	1	17	28	24	11	85
Bear, Stearns & Co. Inc.	0	0	0	4	2	3	2	3	12	13	21	17	1	78
Credit Suisse	0	0	1	2	2	2	7	10	5	12	13	14	1	69
Lehman Brothers	1	0	2	2	1	1	3	3	6	11	10	19	5	64
Deutsche Bank	0	0	1	1	0	4	3	8	5	2	16	18	5	63
Goldman Sachs & Co.	0	0	1	2	5	5	4	5	3	6	12	17	3	63
Morgan Stanley	0	1	2	3	3	3	3	2	3	7	16	18	2	63
Wachovia Securities Inc.	0	0	1	2	2	0	3	3	5	9	18	18	2	63
Merrill Lynch & Co.	1	2	4	1	3	1	2	2	4	10	7	10	3	50
Bank of America Securities LLC	0	0	0	1	1	1	1	2	2	5	14	7	3	37
UBS Securities LLC	0	0	0	0	0	1	0	1	3	5	5	5	1	21
IXIS Securities North America Inc.	0	0	0	0	0	0	0	2	3	2	9	1	0	17
Barclays Capital	0	0	0	0	0	0	1	1	0	0	2	4	4	12
CIBC World Markets Inc.	0	2	2	3	1	0	2	0	0	0	0	0	0	10
Royal Bank of Scotland plc	0	0	0	0	0	0	0	0	0	0	1	7	0	8
Salomon Smith Barney	0	0	0	0	2	1	3	2	0	0	0	0	0	8
BNP Paribas	0	0	0	0	0	0	0	1	0	1	2	3	0	7
Others (28 other banks)	0	0	2	4	7	1	3	2	5	10	20	13	5	72
Total	3	6	16	29	31	29	43	56	64	123	220	213	51	884

data, followed by debt repayments and corporate takeovers. Facilities supporting leveraged buyouts represent 16% of the Term Loan B facilities we study, and these loans are securitized at a higher rate than other loan facilities. Panel D reports statistics on facility attributes such as facility amounts, annual sales of the borrowing firms, tranche maturity, syndicate size, and the percentage of facilities with financial covenants.

Table 1 also shows the differences in the attributes of loan facilities identified as having been securitized, relative to their non-securitized counterparts. The table indicates that securitized loan facilities have lower spreads, with the largest differences in spreads concentrated in lower credit-quality facilities. In addition, securitized facilities have larger facility sizes, slightly longer maturities, and were arranged by smaller syndicates. The differences between securitized and non-securitized facilities highlight the importance of controlling for differences in facility size, sales size, tranche maturity, and covenants, in drawing inferences on the incremental effect of securitization.

The time-series pattern of CLO origination in our sample is illustrated in Table 2. The sample is predominantly made up of CLOs originated between 2002 and 2007. In addition, the CLOs are highly concentrated among a relatively small number of originating banks, with the top ten banks underwriting 692 of the 884 CLOs (78%) over the entire sample and 569 of the 719 deals (79%) during the 2002–2007 time period. Although Table 2 focuses on the CLO underwriting activity of 18 unique banks, at least 38 different banks were involved in the underwriting of at least one CLO between the years 1996 and 2008.

For each loan facility in our sample, we identify the bank which served as the lead arranger of the bank loan, a role often filled by more than one bank (45% of originations in the full sample). We classify banks as being a lead arranger if they are designated by Dealscan as being a "top-tier arranger," or "lead arranger" in the deal summary.¹⁸ We classify facilities as being originated by a "securitization-active" bank if any of the lead arranging banks is among the top ten CLO underwriting banks. Of the 272 securitized loan facilities that were arranged by the top ten "securitization-active" banks, 117 of the facilities (43%) had the same bank involved in both the arranging and securitization of the facility. In contrast, of the 59 securitized facilities that we identify as being arranged by "non-securitization-active" banks, only eight (13.6%) of them had the same bank involved in the arranging and securitization process. These calculations suggest that there was a connection between the arrangement and securitization of the facilities from the "securitization-active banks," and that these banks are particularly likely to securitize loan facilities that they arrange themselves.

Fig. 1 plots the quantity of originations of Term Loan B facilities over time. Panel A plots the 3-month moving average of the number of Term Loan B facilities originated by securitization-active and non-securitization-active banks, where a securitization-active bank is defined as one of the top ten banks ranked by the number of

¹⁸ Being lead arranger is typically much more involved than being a member of the lending syndicate, since lead arrangers usually serve as the primary underwriter of loan quality, develop the banking relationship with borrowers, and arrange the lending syndicate.

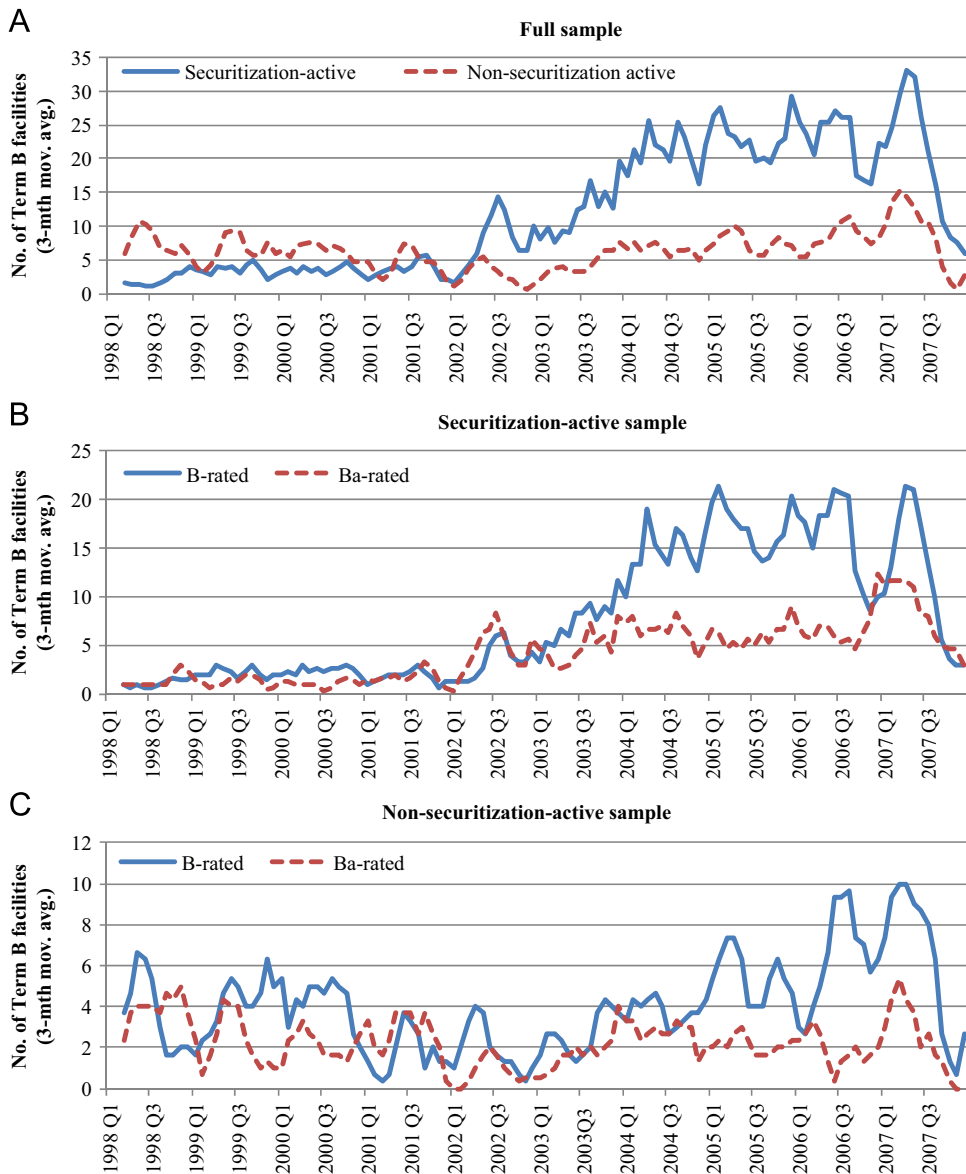


Fig. 1. Plots of Term Loan B origination volume.

Fig. 1 plots the quantity of originations of Term Loan B facilities over time. Panel A plots the 3-month moving average of the number of Term Loan B facilities arranged by securitization-active and non-securitization-active banks. We classify lead arranging banks as being securitization-active if any lead arranging bank involved in the origination of a loan facility is among the top ten banks ranked by the number of securitization deals underwritten. Panel B splits the sample into facilities with B-rated senior debt and Ba-rated senior debt and plots the origination activity of each ratings class by securitization-active banks. Panel C plots differences in securitization activity by ratings class for non-securitization-active banks. The sample includes syndicated loan facilities originated between 1998 and 2007, as reported in Dealscan, with Moody's senior-debt credit ratings of B (B1, B2, or B3) or Ba (Ba1, Ba2, Ba3). We restrict the sample to include only syndicated loans originated in the United States and removed financial firms with SIC codes between 6000 and 6500. Section 3 of the paper more fully describes the data screens employed in arriving at our final sample.

securitization deals underwritten during our sample period. The plot indicates that origination patterns were very similar until 2002, when securitization-active banks began to increase their origination of Term Loan B facilities aggressively. Panel B plots the origination activity of securitization-active banks by credit rating. The plot indicates that much of the boom in Term Loan B originations was concentrated in facilities of a lower credit-quality. Finally, Panel C plots the origination activity of non-

securitization-active banks by credit quality. While non-securitization active banks also increased their origination of lower credit-quality facilities, the plots suggest that the difference was not as dramatic as the difference observed in the origination activity of securitization-active banks. Overall, these plots suggest that there was a large increase in securitization activity after 2002, and that this increase was concentrated in the securitization-active banks, and in lower credit-quality issues.

4. Results

4.1. Do securitized loans have lower spreads?

4.1.1. Univariate tests

Panel B of Table 1 presents the average difference in spreads between Term Loan B facilities that were securitized and those that were not securitized according to the Moody's data. As a rough control for facility attributes, we present the comparison by rating class for the most commonly issued rating levels: Ba1, Ba2, Ba3, B1, B2, and B3.

This panel indicates that in each rating class, spreads are lower for the securitized sample than for the non-securitized sample, with the difference ranging from 27 basis points for the Ba3 rating category to 73.1 basis points for the B3 category. The average difference in spreads among the B-rated facilities is 49 basis points, as opposed to the 33.4 basis point difference among B-rated facilities. The lower spreads for securitized facilities are consistent with the notion that the ability to securitize a facility leads to a lower spread, and consequently a lower cost of capital for the firm borrowing the money. However, it is not a conclusive estimate of the incremental effect of securitization on spreads for at least three reasons. First, we have an imperfect matching of loan facilities to CLOs that likely understates the fraction of loans that are securitized. Second, these differences do not control for other factors that are known to affect facility pricing. Finally, it is possible that some other factor could affect both spreads and securitization decisions simultaneously, leading the observed relation between the two to occur but not to be causal.

The first issue, involving the imperfect matching of loan facilities to CLOs, results from both the fact that we have only a snapshot of CLOs as of 2009, and also from the "by hand" nature of the matching process. As a result, it is likely that most or all of the facilities classified as securitized really were securitized, but that a number of facilities that we classified as non-securitized actually were securitized. Such a misclassification would imply that the differences documented in Table 1 would understate the true differences in spreads between securitized and non-securitized loan facilities.

4.1.2. Multivariate tests

The second issue, that factors in addition to whether a particular loan facility is securitized are likely to affect spreads, is addressed using a multivariate regression framework. We create a dummy variable set equal to one if the facility was part of a CLO in the Moody's database, and estimate a regression of the following form:

$$\text{Spread}_{i,t} = \alpha_0 + \beta \times \text{Securitized}_{i,t} + \gamma \times \text{Borrower factors}_{i,t} + \varphi \times \text{Macro factors}_{i,t} + \varepsilon_{i,t},$$

where the subscripts refers to loan facility i at time t . The list of borrower controls includes credit ratings along with dummy variables for secured loan facilities, loan facilities with covenants, and the existence of a pricing grid. We also control for facility amount, facility type, borrowers'

sales, size of the lending syndicate, tranche maturity, industry, year, and lead arranger fixed effects.

We control for macroeconomic factors such as the term structure of interest rates and changes in the market price of risk. Our term structure control is calculated as the difference between the 5-year and 3-month T-bill rate in the month of deal origination. To control for changes in the price of credit risk, within each month, we calculate the spread of a 10-year Ba- and B-rated bond index over the 10-year T-bond rate. Loan facilities whose borrowers have B-rated (Ba-rated) senior debt are assigned the value of the B-spread (Ba-spread) in the month of origination.

Table 3 reports estimates of this equation using the sample of Term Loan B facilities with a Moody's senior debt rating of B or Ba. Column 1 suggests that the impact of securitization on spreads is negative for all Term Loan B facilities, but not statistically different from zero. The estimates in column 3 show that the impact of securitization on yield is concentrated in the lower-rated B facilities, which are associated with a statistically significant 17.7 basis point drop in spread. These results are consistent with the notion that banks lower the spreads on loan facilities that will be securitized for the more commonly securitized B-rated facilities.

4.2. Empirical approach

The results in Table 3 suggest that securitized loan facilities are associated with lower spreads, holding other factors constant, at least to the extent that the facilities' risk is measured by Moody's ratings. But what is the appropriate interpretation of this finding? The pattern is certainly consistent with the explanation in which high demand for securitizable assets from CLOs led to a lower cost of capital. However, the negative association between securitization and spreads does not by itself rule out an alternative explanation in which the demand for funds in the borrowing market shifted differentially, with a relatively smaller increase in demand for loans that could easily be securitized than for loans that are difficult to securitize.¹⁹

The usual way to address this type of endogeneity is through an instrumental variables approach. Unfortunately, to be a valid instrument for whether a facility is securitized would require a variable to be related to the securitization decision but unrelated to the spread charged in the facility. Since in practice, virtually all publicly available variables relating to the facility potentially are at least arguably related to its spread, the use of instrumental variables is not likely to be a practical solution.

To distinguish between alternative explanations, we instead rely on the fact that the securitization process by

¹⁹ In considering a primary-market demand explanation for the observed lower spreads on securitized facilities, it is not clear why CLOs would choose to purchase loan facilities with lower spreads than average. One possibility would be if spreads were not priced completely by the market for some reason, leading banks to sell the lower spread facilities and keep the higher spread ones for any particular quality level.

Table 3

Do securitized loans have lower spreads?

In this table we estimate an OLS regression of facility attributes and other controls on the all-in-drawn spread of loan facilities originated between 2002 and September 2007. We create an indicator variable, *Securitized indicator*, for loans identified as collateral in a CLO as of 2009 using Moody's EMS database. *Term structure* is calculated as the difference between the five-year and three-month T-bill rate in the month of deal origination. *Credit spread* is the spread of a 10-year Ba- and B-rated bond index over the 10-year T-bond rate, respectively. *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* is equal to one if the spread is adjustable based on accounting performance. *Size of syndicate* is the number of lenders involved in the lending syndicate. *Tranche maturity* is the number of months until the facility matures. *Log facility amount* and *Log sales size* represent the dollar amount of the loan facility and total sales of the borrowing firm, measured in U.S. \$ million. *Secured indicator* is an indicator equal to one if the loan facility is secured. In various specifications, as indicated in the table, we control for tranche-type fixed-effects (Revolver, Term Loan A, or Term Loan B), credit-rating fixed-effects (Ba1, Ba2, Ba3, B1, B2, B3), tranche-purpose fixed-effects ("corporate purposes," "LBO," "debt repayment," etc.), year fixed-effects, lead arranger fixed-effects, and industry fixed-effects (two-digit SIC code). We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. Standard errors are clustered by year and by borrowing firm. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.: All-in-drawn spread	Term B only, Ba and B-rated sr. debt (1)	Term B only, Ba-rated sr. debt (2)	Term B only, B-rated sr. debt (3)
Securitized indicator	-6.872 (1.46)	16.476*** (3.00)	-17.698** (2.07)
Term structure	3.214 (0.24)	0.931 (0.06)	7.714 (0.80)
Credit spread	32.857*** (3.15)	44.273*** (3.94)	21.228* (1.83)
Covenants indicator	-9.372 (1.35)	-19.570*** (2.98)	-8.264 (1.04)
Pricing grid indicator	-8.665 (1.15)	-3.492 (0.43)	-12.308 (1.52)
Size of syndicate	-0.325** (2.38)	-0.212 (1.12)	-0.660*** (5.39)
Tranche maturity	-1.133*** (2.69)	-1.083*** (4.96)	-1.257* (1.94)
Log facility amount	-7.133** (2.20)	-0.743 (0.29)	-11.715*** (3.15)
Log sales size	-3.828* (1.75)	-5.024* (1.74)	-1.422 (0.47)
Secured indicator	2.743 (0.48)	-10.052 (0.92)	13.352 (1.04)
Constant	334.458*** (6.49)	302.778*** (4.00)	621.844*** (9.28)
Tranche-type fixed effects	No	No	No
Moody's sr. debt fixed effects	Yes	No	No
Tranche-purpose fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Lead arranger fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Standard errors clustered by:			
Borrower	Yes	Yes	Yes
Year	Yes	Yes	Yes
Adjusted R ²	0.386	0.482	0.312
Observations	1613	540	1073

its very nature leads to a preference for certain types of loan facilities over others. For example, it is commonly believed that it is easier to construct CLOs from Term Loan Bs, which have bullet payments that are set in advance, than Term Loan As, which have amortizing payments, or revolvers, whose payments depend on the extent to which the borrower chooses to draw them down. In addition, Table 2 suggests that CLOs are highly concentrated in a small number of issuing banks, so loan facilities initiated by those banks are more likely to be securitized than facilities by other non-issuing banks. Finally, Benmelech and Dlugosz (2009) suggest that B-rated loan facilities are the most commonly used type of facility in CLOs, a finding confirmed in the summary

statistics of our sample of securitized facilities (see Table 1).

Our approach is to compare the relative yields on facilities with securitization-friendly characteristics to those with securitization-unfriendly characteristics during the 2002–2007 securitization boom. The "securitization affecting supply of capital argument" predicts that the demand from CLOs for facilities having these attributes increased relative to other types of loan facilities, leading to lower yields. However, there is no particular reason why demand for capital should be reflected *differentially* between these types of facility offerings. Therefore, we interpret the difference in yields for loan facilities originated by securitization-active banks

relative to non-securitization-active banks and differences between B-rated facilities and Ba-rated facilities as reflecting the effect of securitization on the cost of capital.

4.3. Which factors affect the likelihood that a loan is securitized?

A key assumption in our analysis is that the factors we posit as being related to the securitization decision actually do affect the likelihood a particular loan facility is securitized. To ensure that these assumptions hold in our sample, we estimate equations predicting whether a particular loan facility from the Dealscan sample is securitized according to the Moody's classification. We estimate the following econometric specification:

$$\Pr(\text{Securitized}_{i,t}) = \alpha_0 + \beta \times \text{Facility type}_{i,t} + \gamma \times \text{Borrower factors}_{i,t} \\ + \varphi \times \text{Macro factors}_t + \varepsilon_{i,t}.$$

The *Facility type* variables are dummy variables indicating the type of facility. The equation also includes the borrower controls used in Table 3, with the exception of tranche maturity, which is extremely highly correlated within tranche type.²⁰ Because the dependent variable is dichotomous, we estimate the equation by probit. We constrain the sample to include years 2002–2009, since loan facilities originated prior to 2002 likely would have matured prior to 2009, making it impossible for such facilities to serve as collateral in CLOs as of 2009.²¹

Table 4 reports estimates of this equation. The results in column 1 suggest that Term Loan B facilities are more likely to be securitized than Term Loan A facilities (the omitted category). The estimated coefficient implies, holding other factors constant, that Term Loan Bs are 3 percentage points more likely to be securitized than Term Loan A's (the omitted group in the probit estimation).²² Revolvers are securitized at a significantly lower rate than either type of Term Loan (unconditionally, with less than 1% frequency). The estimated coefficient on the securitization-active indicator suggests that loan facilities initiated by the banks we consider to be "Securitization-active" are more likely to be securitized than other facilities. We estimate whether B-rated facilities are securitized at a different rate than Ba-rated facilities through the inclusion of a B-rated dummy variable. The resulting estimates confirm those of Benmelech and Dlugosz (2009) and are consistent with the unconditional results presented in Table 1.

In column 2 we include tranche purpose fixed-effects, year fixed-effects, and industry fixed-effects, and reestimate the model. These controls do not materially change the inference on securitization likelihood for Term Loan B

or securitization-active facilities. However, in this specification we cannot reject the hypothesis that Ba and B facilities are securitized at the same rate at conventional significance levels since the *t*-statistic drops to 1.44. The *t*-statistic is sensitive to the choice of clustering standard errors by borrower; when they are clustered instead by credit rating, the *t*-statistic on the B-rated dummy variable rises to 3.20, which is statistically significant at conventional levels.

In column 3 we test whether B-rated Term Loan B facilities are securitized more frequently than their Ba-rated Term Loan B counterparts. The test requires an interaction term, the interpretation of which can be problematic when estimated via probit (see Ai and Norton, 2003), so we estimate this equation using a linear probability model.²³ The coefficient on the interaction of Term Loan Bs with B-rated senior debt is 0.018, and is marginally statistically significant (*t*-statistic=1.62).²⁴ Since Ba-rated Term Loan Bs were securitized about 10% of the time according to the Moody's data (which substantially undercounts the fraction that were securitized in practice), an estimated 1.8 percentage point increase in securitization likelihood for B-rated Term Loan Bs relative to Ba-rated Term Loan Bs represents about an 18% increase in securitization likelihood. Column 3 also tests whether "Securitization-active" banks securitize Term Loan B facilities more frequently than Term Loan B facilities originated by non-securitization-active banks. The positive estimated interaction term suggests that the effect of being from a securitization active bank on securitization likelihood is most pronounced in Term Loan B facilities. Overall, the results in Table 4, together with the evidence in Benmelech and Dlugosz (2009), suggest that B-rated loan facilities are more likely to be securitized than Ba-rated ones, that facilities from banks designated as "Securitization-active" are more likely to be securitized than facilities from other banks, and that these differences are most pronounced in Term Loan B facilities.

4.4. The impact of CLO demand on loan pricing: differences in spreads by type of loan

The hypothesis that demand from CLOs affected pricing on loan facilities predicts that when CLO demand is high, then facilities that are most attractive to CLOs should be favored by banks issuing loans. Consequently, these facilities should be priced more aggressively than facilities that are less attractive to CLOs. Since loan facilities originated by securitization-active banks appear to be more likely to be securitized than facilities originated by non-securitization-active banks and because CLO demand appears to be more concentrated in B-rated debt, we hypothesize that spreads will reflect differences in this demand.

²⁰ Revolvers have a very short maturity, while Terms B and A facilities have longer maturities. Including tranche maturity in the probit specification is essentially redundant to controlling for facility type when revolvers are included in the sample.

²¹ Over 90% of the loan facilities in our sample have an expected tranche maturity of less than 7 years.

²² Unconditionally, 12.8% of Term Loan Bs are securitized compared to a 4.3% frequency for Term Loan As.

²³ Although the mean of the dependent variable in this equation is 0.071, Angrist and Pischke (2009) suggest that even when the mean of the dependent variable is close to either zero or one, a linear probability model will nonetheless produce accurate estimates of marginal effects (see Angrist and Pischke, 2009, p. 109).

²⁴ These estimates are obtained when standard errors are clustered both by borrower and by credit rating. The *t*-statistic falls to 0.97 when standard errors are clustered by borrower and year.

Table 4

What type of loans get securitized?

In columns 1 and 2 we estimate a probit model where the dependent variable is equal to one if the loan facility is identified as collateral in a CLO as of 2009, and zero otherwise. Column 3 employs the same dependent variable but the coefficients are estimated using an OLS linear probability model. *Term Loan B* is equal to one if the facility is a Term Loan B facility. *Securitization active bank* is equal to one if any of the lead arrangers of the loan facility are among the top-ten CLO underwriters (see Table 2). *B-rated senior debt* is equal to one if the senior debt associated with the loan facility is rated B1, B2, or B3 at loan origination. *Revolver* is equal to one if the loan facility is a revolving facility (Term Loan As serve as the omitted loan facility type). *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* is equal to one if the spread is adjustable based on accounting performance. *Syndicate size* is the number of lenders involved in the lending syndicate. *Log facility amount* and *Log sales size* represent the dollar amount of the loan facility and total sales of the borrowing firm, measured in U.S.\$ million. *Secured indicator* is an indicator equal to one if the loan facility is secured. In various specifications, as indicated in the table, we control for tranche-purpose fixed-effects ("corporate purposes," "LBO," "debt repayment," etc.), year fixed-effects, and industry fixed-effects (two-digit SIC code). We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. The sample size in column 2 drops slightly because the inclusion of fixed effects perfectly predicts outcomes in the left-hand side variable. These observations are dropped from the estimation. Standard errors are clustered by year. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.=1 if loan is identified as having been securitized	Estimated using probit		Estimated using OLS (Mean dep. var.=0.071)
	Term B, Term A, and Revolvers (1)	Term B, Term A, and Revolvers (2)	Term B, Term A, and Revolvers (3)
Term Loan B*B-rated senior debt			0.018* (1.62)
Term Loan B*Securitization-active bank			0.038* (1.94)
Term Loan B	0.341*** (3.128)	0.484*** (3.966)	0.030*** (2.92)
B-rated senior debt	0.156** (1.987)	0.126 (1.440)	0.004 (0.80)
Securitization-active bank	0.218*** (2.691)	0.301*** (3.387)	0.006 (0.93)
Revolver	-0.874*** (-7.327)	-0.907*** (-7.207)	-0.065*** (8.55)
Covenants indicator	0.069 (0.796)	0.300*** (3.157)	0.036*** (3.29)
Pricing grid indicator	0.076 (0.910)	0.070 (0.771)	-0.003 (0.17)
Syndicate size	-0.011*** (-2.636)	-0.005 (-1.418)	-0.001* (1.95)
Log facility amount	0.158*** (4.096)	0.067 (1.553)	0.015*** (6.79)
Log sales size	0.008 (0.256)	0.010 (0.270)	-0.002 (0.24)
Secured indicator	0.522*** (5.139)	0.452*** (4.333)	0.037*** (5.40)
Constant	-5.222*** (-7.229)	-4.835*** (-4.909)	-0.402*** (3.92)
Tranche-purpose fixed effects	No	Yes	Yes
Year fixed effects	No	Yes	Yes
Industry fixed effects	No	Yes	Yes
Standard errors clustered by:			
Borrower	Yes	Yes	Yes
Credit rating	No	No	Yes
Pseudo-R ²	0.201	0.297	
Adjusted R ²			0.124
Observations	5101	4755	5070

We test whether increased demand by CLOs lowered spreads by estimating the following specification:

$$\text{Spread}_{i,t} = \alpha_0 + \beta_1 \times \text{Sec.Active}_{j,t} * \text{B rated}_{i,t} + \beta_2 \times \text{Sec.Active}_{j,t} + \beta_3 \times \text{Brated}_{i,t} + \delta X_{i,t} + \varepsilon_{i,t},$$

where the sample is constrained to Term Loan Bs only. The estimate on the interaction of the securitization-active and B-rated dummy variables represents the difference in the spread relative to non-securitization-active B-rated facilities or securitization-active Ba-rated facilities, holding other factors constant. The other variables in the

equation, represented by $X_{i,t}$, are the term structure and credit spread variables discussed above, along with the remaining set of the controls described in our discussion of Table 3. We include tranche purpose fixed-effects, year fixed-effects, industry fixed-effects, and credit-rating fixed-effects where appropriate. As in Table 3, we cluster standard errors by year and borrower.

Table 5 reports estimates of this equation over the 2002–September 2007 sample period. Column 1 reports results controlling only for the impact of securitization-active banks on spreads, column 2 adds the B-rated dummy, and column 3 includes both of those dummy

variables plus the interaction term. The estimate of the coefficient on the interaction term is -20.9 , which implies Term Loan B facilities from securitization-active banks had 20.9 basis point lower spreads than Term Loan B facilities from other banks, holding other attributes of the facility constant. When the interaction term is included in Table 5, the coefficient on the securitization-active bank dummy, which measures the impact on Ba-rated debt (since there is a dummy interacting the B-rated dummy with the securitization-active bank dummy), is actually positive, albeit not significantly different from zero. These estimates suggest that the pricing

Table 5

Do “securitization-friendly” Term Loan B facilities have lower spreads?

In this table we estimate an OLS regression of facility attributes and other controls on the all-in-drawn spread of loan facilities originated between 2002 and September 2007. *Securitization active bank* is equal to one if any of the lead arrangers of the loan facility are among the top-ten CLO underwriters (see Table 2). *B-rated senior debt* is equal to one if the senior debt associated with the loan facility is rated B1, B2, or B3 at loan origination. *Term structure* is calculated as the difference between the 5-year and 3-month T-bill rate in the month of deal origination. *Credit spread* is the spread of a 10-year Ba- and B-rated bond index over the 10-year T-bond rate, respectively. *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* is equal to one if the spread is adjustable based on accounting performance. *Size of syndicate* is the number of lenders involved in the lending syndicate. *Tranche maturity* is the number of months until the facility matures. *Log facility amount* and *Log sales size* represent the dollar amount of the loan facility and total sales of the borrowing firm, measured in U.S. \$ million. *Secured indicator* is an indicator equal to one if the loan facility is secured. In various specifications, as indicated in the table, we control for credit-rating fixed-effects (Ba1, Ba2, Ba3, B1, B2, B3), tranche-purpose fixed-effects (“corporate purposes,” “LBO,” “debt repayment,” etc.), year fixed-effects, and industry fixed-effects (two-digit SIC code). We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. Standard errors are clustered by year and by borrowing firm. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.: All-in-drawn spread	Term Loan B sample (1)	Term Loan B sample (2)	Term Loan B sample (3)
Securitization-active bank*B-rated sr. debt			-20.918*** (2.65)
Securitization-active bank	-11.473* (1.65)	-11.337 (1.55)	2.801 (0.34)
B-rated sr. debt		20.924** (2.39)	36.366*** (5.37)
Term structure	4.870 (0.35)	5.412 (0.43)	5.406 (0.44)
Credit spread	33.965*** (2.90)	32.985*** (3.00)	33.239*** (3.02)
Covenants indicator	-11.133 (1.56)	-15.189*** (1.97)	-15.153*** (2.00)
Pricing grid indicator	-9.730 (1.32)	-10.454 (1.24)	-10.246 (1.22)
Size of syndicate	-0.351** (2.34)	-0.415*** (2.69)	-0.414*** (2.80)
Tranche maturity	-1.194*** (2.92)	-1.294*** (3.05)	-1.280*** (3.04)
Log facility amount	-8.142*** (2.86)	-9.119*** (2.91)	-9.153*** (2.93)
Log sales size	-5.272** (2.21)	-4.045 (1.43)	-4.082 (1.46)
Secured indicator	1.863 (0.30)	4.697 (0.59)	4.784 (0.60)
Constant	421.483*** (7.20)	440.514*** (5.56)	655.358*** (6.68)
Moody's sr. debt fixed effects	Yes	No	No
Tranche-purpose fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Lead arranger fixed effects	No	No	No
Standard errors clustered by			
Borrower	Yes	Yes	Yes
Year	Yes	Yes	Yes
Adjusted R^2	0.372	0.343	0.344
Observations	1613	1613	1613

impact of being active in securitization is concentrated in the B-rated debt, which is the most commonly securitized type of loan facility.

This 20.9 basis point spread for B-rated debt from securitization-active banks is a substantial magnitude; a 20.9 basis point discount on an average-sized Term Loan B facility (\$400 million U.S. dollars) represents *annual* savings of close to US\$ 1 million over the life of the loan. This estimate implies that the impact of the issuing bank's identity is approximately the same as the impact of covenants on spreads. In addition, increased CLO demand also potentially affects non-pricing loan characteristics such as the existence and tightness of loan covenants. To the extent that the bank's belonging to the "Securitization-active" group reflects the likelihood of securitization, it implies that banks are willing to discount loan facilities to be able to have them as collateral for CLOs.

4.5. Comparisons of Term Loan B facilities to Term Loan A facilities and revolvers

The results from Table 5 suggest that loan facilities that are sold into CLOs are issued at a lower spread than facilities that are not sold into a CLO. In addition, the difference in spreads between loan facilities originated by securitization-active banks and non-securitization-active banks is most pronounced in facilities of lower credit quality, which are the facilities most commonly securitized. While we have interpreted this finding as a consequence of heightened demand for collateral from CLOs, an alternative explanation is that the results occur because of some unmeasurable bank-specific factor, such as an increase in banks' risk tolerance over this period for the banks we classify as securitization-active. Such an increase in risk tolerance for the securitization-active banks could lead to both an increase in securitization activity as well as an increase in lending to lower credit-quality borrowers, consistent with the empirical evidence presented thus far.

To distinguish between the demand for collateral and increased risk tolerance explanations for the lower spreads on Term Loan B facilities from securitization-active banks, we consider how other facilities issued by these same banks are priced. We do so because the other facilities are not as attractive as collateral for CLOs as Term Loan B facilities but have similar seniority as Term Loan B facilities and consequently similar risk. In particular, we estimate whether the pricing of Term Loan B facilities originated by securitization-active banks, especially for lower-rated facilities, is different from the pricing of Term Loan A facilities with similar securitization-friendly attributes. To perform this test, we use a sample made up of both Term Loan A facilities and Term Loan B facilities, and estimate whether the relation between securitization activity, ratings, and pricing documented above for Term Loan B facilities also holds for Term Loan A facilities.

In doing so, it is important to control for other differences between Term Loan A and Term Loan B facilities. Both are typically senior bank debt with equal priority, but have a different payoff structure because

Term Loan A facilities are normally amortizing and Term Loan B bullet. Given that these loans have no prepayment penalties, Term Loan B facilities will always be issued at a higher spread than Term Loan A. However, if the demand for collateral is largest at securitization-active banks and for B-rated loans, we expect the differences to be largest for these types of loans. To evaluate this hypothesis, we include interaction terms into the equation that allow for separate effects based on type of facility (Term Loan A or Term Loan B), the securitization activity of the bank, and the rating of the borrowing firm's senior debt. In addition, our estimates include the same controls as in earlier tests, as well as year, tranche-purpose, and industry fixed-effects.

Column 1 of Table 6 reports estimates of this equation. The effect of demand for collateral can be seen in the coefficient on the "Term Loan B*Securitization-active bank*B-Rated senior debt," which picks up the incremental effect on pricing of a loan facility having these attributes, which are those most associated with being desirable as collateral for a CLO. The results in this column indicate that securitization-friendly Term Loan B spreads are 30.6 basis points lower than spreads on Term Loan A facilities with securitization-friendly attributes. This substantial coefficient suggests that the incremental effect of having characteristics that make a facility particularly attractive as collateral for CLOs implies that these facilities are sold at a substantial discount to otherwise similar facilities.

In addition to Term Loan A facilities, most loans also contain revolvers, which are lines of credit that can be drawn down at the borrower's discretion. These facilities also have the same seniority as Term Loan B facilities but have a shorter expected maturity. Because the options implicit in these revolvers make them less attractive as collateral for CLOs, we expect to observe the spread between revolvers and Term Loan Bs to decline for those facilities for which the Term Loan Bs are most attractive as collateral for CLOs.

Column 2 of Table 6 presents estimates of an equation comparing the spreads of Term Loan Bs and revolvers, again using interaction terms to allow for separate effects of type of facility, the rating of the senior debt associated with the facility, and the securitization activity of the issuing bank. The results from this equation are similar to the results for Term Loan As in the first column. In particular, the incremental effect of having a securitization-active originating bank and a B rating is to lower the facilities' spread by about 20.8 basis points, and this drop is statistically significantly different from zero.

To evaluate the magnitude of the results presented in Table 6, recall that results presented in Table 5 indicate that in a Term Loan B sample, B-rated debt is priced 20.9 basis points lower in facilities originated by securitization-active banks than in B-rated facilities originated by non-securitization-active banks. The results in Table 6 indicate that a similar discount for B-rated facilities originated by securitization-active banks does not exist in a Term A or revolver sample. In fact, the results in Table 6 indicate that B-rated, Term Loan A facilities originated by securitization-active banks are priced about

Table 6

Is the “securitization-friendly” decline in spreads specific to Term Bs only?

In this table we estimate an OLS regression of facility attributes and other controls on the all-in-drawn spread of loan facilities originated between 2002 and September 2007. *Term Loan B* is equal to one if the facility is a Term Loan B facility. *Securitization active bank* is equal to one if any of the lead arrangers of the loan facility are among the top-ten CLO underwriters (see Table 2). *B-rated senior debt* is equal to one if the senior debt associated with the loan facility is rated B1, B2, or B3 at loan origination. *Term structure* is calculated as the difference between the 5-year and 3-month T-bill rate in the month of deal origination. *Credit spread* is the spread of a 10-year Ba- and B-rated bond index over the 10-year T-bond rate, respectively. *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* is equal to one if the spread is adjustable based on accounting performance. *Size of syndicate* is the number of lenders involved in the lending syndicate. *Tranche maturity* is the number of months until the facility matures. *Log facility amount* and *Log sales size* represent the dollar amount of the loan facility and total sales of the borrowing firm, measured in U.S. \$ million. *Secured indicator* is an indicator equal to one if the loan facility is secured. We control for tranche-purpose fixed-effects (“corporate purposes,” “LBO,” “debt repayment,” etc.), year fixed-effects, and industry fixed-effects (two-digit SIC code). We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. Standard errors are clustered by year and by borrowing firm. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.: All-in-drawn spread	Term Loan B and Term Loan A sample (1)	Term Loan B and Revolver sample (2)
Term Loan B*Securitization-active bank*B-rated sr. debt	−30.606** (2.03)	−20.761** (2.27)
Term Loan B*Securitization-active bank	17.350 (1.14)	−7.571 (1.31)
Term Loan B*B-rated sr. debt	12.008 (0.95)	9.085 (0.92)
Securitization-active bank*B-rated sr. debt	9.027 (0.44)	−7.284* (1.70)
Term Loan B	40.230*** (2.76)	52.713*** (11.41)
Securitization-active bank	−13.681 (0.77)	14.893*** (2.60)
B-rated sr. debt	23.407* (1.70)	33.749*** (4.18)
Term structure	4.965 (0.40)	7.719 (1.13)
Credit spread	34.684*** (2.76)	28.180*** (4.52)
Covenants indicator	−14.973** (2.11)	−12.736* (1.89)
Pricing grid indicator	−10.560* (1.65)	−17.318*** (3.21)
Size of syndicate	−0.410*** (3.07)	−0.536*** (3.91)
Tranche maturity	−1.252*** (3.16)	
Log facility amount	−8.700*** (3.22)	−20.518*** (7.67)
Log sales size	−4.587 (1.64)	0.246 (0.10)
Secured indicator	4.440 (0.70)	16.044*** (3.41)
Constant	548.103*** (5.12)	538.217*** (12.37)
Tranche-purpose fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Standard errors clustered by:		
Borrower	Yes	Yes
Year	Yes	Yes
Adjusted R ²	0.408	0.428
Observations	1904	4238

9.0 basis points higher than their non-securitization active counterparts. Similarly, a B-rated, securitization-active discount does not exist in the revolver sample. Taken together, the results presented in Tables 5 and 6 indicate that the discount associated with securitization-friendly attributes is concentrated in the Term Loan B sample, consistent with a CLO-demand-driven hypothesis

as opposed to an alternative increased risk tolerance explanation.

4.6. Within-loan comparisons of facility spreads

Thus far our analysis has been conducted at the loan-facility level. In doing so, our goal was to measure the

incremental effect that demand for collateral from CLOs has on the pricing of facilities, so we have controlled for factors that affect spreads but are unrelated to demand for collateral. The results suggest that, holding these other factors constant, the effect of characteristics associated with the likelihood of securitization, in particular being issued by a securitization-active bank and having a B rating, lowers the spread difference for a Term Loan B facility relative to an otherwise similar Term Loan A or revolving facility. We interpret this finding as consistent with the demand for collateral explanation. However, the econometric controls we use are imperfect and it is possible that unobservable differences across types of loans and not demand for collateral from CLOs could explain this result.

Because of this issue, we use an approach introduced by *Ivashina and Sun (2011)* and compare the spreads across facilities in the same loan. Since the facilities are from the same loan, they necessarily have the same risk. Using this specification, the number of observations in the sample declines, since not all loans containing Term Loan B facilities also contain a Term Loan A or revolver. To perform this comparison, we estimate equations that predict the difference in spreads between Term Loan B facilities and either Term Loan A facilities or revolvers within the same loan as a function of factors likely to affect the demand for collateral from CLOs.²⁵ In doing so, we also include into the equation other factors that potentially affect the differences in spreads.

We present estimates of the within-loan spread differences in *Table 7* for differences between Term Loan B and Term Loan A facilities, and in *Table 8* for differences between Term Loan B and revolvers. In each case, the coefficient on the securitization-active bank dummy variable interacted with the B-rated dummy variable is negative and significant (albeit at the 10% level for the revolver comparison in *Table 8*). The magnitudes of the securitization discount presented in *Tables 7 and 8* are roughly consistent with those presented in *Tables 5 and 6*. The -47.8 estimate on the interaction term reported in column 3 of *Table 7* indicates that the difference in spreads between Term Loan A and Term Loan B facilities within the same deal is 47.8 basis points lower if the loan is originated by securitization-active banks and has B-rated senior debt, not far from the estimated -30.6 across-deal difference between securitization-friendly Term Loan As and Term Loan Bs reported in *Table 6*. The estimated within-deal coefficient of -14.2 for Term Loan Bs compared to revolvers reported in column 3 of *Table 8* is also fairly close to the across-deal estimate of -20.8 basis points reported in *Table 6*.

These findings suggest that even comparing within loans, facilities that are most likely to be securitized are priced at a discount relative to other facilities. It does not appear that the measured pricing discount of facilities

likely to be securitized occurs because of unobserved heterogeneity; rather the evidence is consistent with the view that issuing banks price these loan facilities more aggressively because they can be easily sold to CLOs.

5. To what extent do the measured differences in spreads come from securitization?

5.1. Are the differences in spreads driven solely by LBO deals?

The securitization boom between 2002 and 2007 coincided with a high volume in the LBO market. *Shivdasani and Wang (2011)* suggest that this pattern was not a coincidence, and that structured finance was an important determinant of the 2002–2007 LBO boom by increasing the availability and pricing of leverage. These authors present evidence of a pricing effect in aggregate and in a smaller loan-level sample of Term Loan B facilities supporting public targets of LBO transactions. Since some of the loans in our sample are used to finance LBOs, it is possible that our results could merely reflect the 2002–2007 LBO boom.

However, only 16% of the facilities in our Term Loan B sample are used to provide financing to LBOs; the vast majority of them are used for general corporate purposes. To evaluate whether our results are driven by the LBO loan facilities in our sample, or whether the demand for collateral affected the cost of capital more generally in this period, we exclude from our sample of facilities those used to finance LBOs and re-estimate the equations reported above.²⁶ The results are similar to those for the full sample. Term Loan B facilities with securitization-friendly attributes exhibit lower spreads than Term Loan Bs without securitization-friendly attributes, and Term Loan Bs exhibit lower spreads than Term Loan As and revolvers with securitization-friendly attributes. Within-deal results are also quantitatively similar, although differences between Term Loan Bs and revolvers within the same deal are not statistically significant at the conventional levels when LBOs are excluded. Overall, it appears that the pattern of securitization affecting the cost of debt financing affected corporate borrowing more generally than just for buyouts during this period.

5.2. Do the results reflect the influence of CLOs, or of institutional demand more broadly?

We have documented that the spreads on loan facilities that tend to be favored by CLOs are lower than otherwise similar spreads on facilities that are less likely to be held by CLOs. We have attributed this difference to CLO demand; however, it is possible that this decrease reflects a more general demand for these facilities by institutions.

Since we do not know the identity of every investor, it is impossible to draw definitive conclusions about the

²⁵ In the event where a bank loan includes multiple facilities of the same type, we use the facility with the lowest spread, so as to be conservative in our estimate of differences in spread. Of the 2,878 deals in our sample, 52 deals have multiple Term Loan A or Term Loan B facilities.

²⁶ Estimates of the main specifications from *Tables 5–8* on the non-LBO subsample are available upon request.

Table 7

Within-deal differences in loan spreads: Term Bs vs. Term As.

In this table we estimate an OLS regression of facility attributes and other controls on *differences* in the all-in-drawn spread of Term Loan B facilities compared to Term Loan A facilities within the same deal. The sample size of 186 represents the number of deals that have both Term Loan A and Term Loan B facilities during our 2002–September 2007 sample period as well as data on the required control variables. *Securitization active bank* is equal to one if any of the lead arrangers of the loan facility are among the top-ten CLO underwriters (see Table 2). *B-rated senior debt* is equal to one if the senior debt associated with the loan facility is rated B1, B2, or B3 at loan origination. *Term structure* is calculated as the difference between the 5-year and 3-month T-bill rate in the month of deal origination. *Credit spread* is the spread of a 10-year Ba- and B-rated bond index over the ten-year T-bond rate, respectively. *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* and *Term A pricing grid indicator* are equal to one if the spread is adjustable based on accounting performance. *Size of syndicate* is the number of lenders involved in the lending syndicate. *Tranche maturity* and *Term A maturity* represent the number of months until the Term Loan B and Term Loan A facilities mature, respectively. *Log facility amount* and *Term A facility amount* represent the dollar amount (\$ million) of the Term B and Term A loan facilities, respectively. *Log sales size* represents the sales of the borrowing firm, measured in U.S. \$ million. *Secured indicator* is an indicator equal to one if the loan is secured. We control for tranche-purpose fixed-effects (“corporate purposes,” “LBO,” “debt repayment,” etc.), year fixed-effects, and industry fixed-effects in all specifications and credit-rating fixed-effects in column 1. We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. Standard errors are clustered by year and by borrowing firm. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.: Within deal spread	Term Loan B spread vs. Term Loan A spread in the same deal (1)	Term Loan B spread vs. Term Loan A spread in the same deal (2)	Term Loan B spread vs. Term Loan A spread in the same deal (3)
Securitization-active bank*B-rated sr. debt			–47.764*** (2.82)
Securitization-active bank	–7.996 (0.43)	–4.146 (0.20)	23.347 (0.69)
B-rated sr. debt		6.160 (0.40)	44.489*** (2.83)
Term structure	–0.201 (0.03)	–0.879 (0.21)	–1.296 (0.25)
Credit spread	3.371 (0.25)	0.451 (0.04)	–1.741 (0.13)
Covenants indicator	1.096 (0.04)	0.589 (0.02)	–3.091 (0.08)
Pricing grid indicator	–5.602 (0.42)	–5.732 (0.42)	–5.220 (0.40)
Term A pricing grid indicator	–7.710 (0.39)	–6.054 (0.29)	–5.214 (0.23)
Size of syndicate	–0.081 (0.77)	–0.156 (1.22)	–0.099 (0.97)
Tranche maturity	–0.649 (0.62)	–0.915 (0.91)	–0.795 (0.89)
Term A maturity	1.065 (0.92)	1.245 (1.17)	1.111 (1.19)
Log facility amount	–1.624 (0.46)	–5.669 (1.19)	–5.170 (0.87)
Term A facility amount	–0.178 (0.06)	0.995 (0.55)	0.822 (0.84)
Log sales size	3.941 (0.41)	4.741 (0.46)	4.533 (0.52)
Secured indicator	3.380 (0.47)	–0.212 (0.03)	5.637 (0.57)
Constant	21.431 (0.10)	82.070 (0.38)	59.662 (0.29)
Moody's sr. debt fixed effects	Yes	No	No
Tranche-purpose fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Standard errors clustered by:			
Borrower	Yes	Yes	Yes
Year	Yes	Yes	Yes
Adjusted R ²	0.513	0.488	0.502
Observations	186	186	186

Table 8

Within-deal differences in loan spreads: Term Bs vs. revolvers.

In this table we estimate an OLS regression of facility attributes and other controls on *differences* in the all-in-drawn spread of Term Loan B facilities compared to revolving facilities within the same deal. The sample size of 1,150 represents the number of deals that have both Revolvers and Term Loan B facilities during our 2002–September 2007 sample period as well as data on the required control variables. *Securitization active bank* is equal to one if any of the lead arrangers of the loan facility are among the top-ten CLO underwriters (see Table 2). *B-rated senior debt* is equal to one if the senior debt associated with the loan facility is rated B1, B2, or B3 at loan origination. *Term structure* is calculated as the difference between the 5-year and 3-month T-bill rate in the month of deal origination. *Credit spread* is the spread of a ten-year Ba- and B-rated bond index over the ten-year T-bond rate, respectively. *Covenants indicator* is equal to one if a facility has financial covenants. *Pricing grid indicator* and *Revolver pricing grid indicator* are equal to one if the spread is adjustable based on accounting performance. *Size of syndicate* is the number of lenders involved in the lending syndicate. *Tranche maturity* and *Revolver maturity* represent the number of months until the Term Loan B and revolving facilities mature, respectively. *Log facility amount* and *Revolver facility amount* represent the dollar amount (\$ million) of the Term B and revolving loan facilities, respectively. *Log sales size* represents the sales of the borrowing firm, measured in U.S. \$ million. *Secured indicator* is an indicator equal to one if the loan facility is secured. We control for tranche-purpose fixed-effects (“corporate purposes,” “LBO,” “debt repayment,” etc.), year fixed-effects, and industry fixed-effects (two-digit SIC code) in all specifications and credit-rating fixed-effects in column 1. We restrict our sample to include syndicated loan facilities originated in the United States and exclude firms with SIC codes between 6000 and 6500. We also restrict our analysis to loan facilities with senior debt rated Ba1, Ba2, Ba3, B1, B2, and B3. We identify and remove any second-lien or mezzanine facilities from the sample. Standard errors are clustered by year and by borrowing firm. The symbols ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Dependent var.: Within deal spread	Term Loan B spread vs. Revolver spread in the same deal (1)	Term Loan B spread vs. Revolver spread in the same deal (2)	Term Loan B spread vs. Revolver spread in the same deal (3)
Securitization-active bank*B-rated sr. debt			–14.171* (1.90)
Securitization-active bank	–6.887*** (2.55)	–6.798** (2.29)	2.971 (0.64)
B-rated sr. debt		–8.014 (1.50)	2.373 (0.47)
Term structure	3.823 (0.68)	4.369 (0.79)	4.406 (0.80)
Credit spread	13.278** (2.08)	12.087* (1.79)	12.084* (1.76)
Covenants indicator	4.358 (0.90)	5.040 (0.99)	4.587 (0.93)
Pricing grid indicator	–6.076** (2.10)	–6.106** (2.06)	–5.991** (2.02)
Revolver pricing grid indicator	–1.180 (0.34)	–3.138 (0.75)	–2.624 (0.65)
Size of syndicate	–0.028 (0.14)	–0.030 (0.15)	–0.034 (0.17)
Tranche maturity	–0.115 (0.75)	–0.190 (1.14)	–0.174 (1.10)
Revolver maturity	0.254 (1.46)	0.288 (1.56)	0.282 (1.54)
Log facility amount	–9.286*** (2.92)	–10.289*** (2.93)	–10.292*** (2.94)
Revolver facility amount	7.627*** (3.69)	8.770*** (4.46)	8.763*** (4.50)
Log sales size	–1.771 (1.51)	–1.300 (1.18)	–1.326 (1.20)
Secured indicator	–2.798 (0.39)	–0.990 (0.13)	–0.649 (0.09)
Constant	19.993 (0.38)	41.140 (1.08)	27.786 (0.76)
Moody's sr. debt fixed effects	Yes	No	No
Tranche-purpose fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Standard errors clustered by:			
Borrower	Yes	Yes	Yes
Year	Yes	Yes	Yes
Adjusted R ²	0.130	0.111	0.113
Observations	1150	1150	1150

sources of the demand increase for these facilities. However, the fact that the difference in spreads is largest among B-rated loans is strongly suggestive of the fact that CLOs are an important driver of these differences for two reasons. First, as argued by Coval, Jurek, and Stafford

(2009), there are reasons to suspect CLOs have a preference for lower-rated debt, since one reason for their existence is to arbitrage ratings. Consistent with this argument, Benmelech and Dlugosz (2009) show that CLO collateral is indeed more highly concentrated in B-rated

Table 9

Differences in CLO ownership by credit rating.

This table reports data on CLO ownership of securitized Term Loan B facilities. A portion of the same loan facility can be owned by multiple CLOs. Panel A reports the *sum total* of CLO ownership as a percent of the total loan facility, sorted by Moody's senior debt credit rating at the time of loan origination. Panel B reports the *average* CLO ownership percentage in a given facility across all CLOs by credit rating. The upper portion of Panel C calculates the difference in *total* CLO ownership percentages between facilities with B-rated senior debt and facilities with Ba-rated senior debt. The lower portion of Panel C calculates the difference in *total* CLO ownership percentages between facilities with B2- and B3-rated senior debt compared to Ba1- and Ba2-rated senior debt. The upper portion of Panel D calculates the difference in *average* ownership percentages between facilities with B-rated senior debt compared to facilities with Ba-rated senior debt. The lower portion of Panel D calculates the difference in *average* ownership percentages between facilities with B2- and B3-rated senior debt compared to facilities with Ba1- and Ba2-rated senior debt. The ownership percentages reported in Moody's EMS database are as of the first quarter 2009.

Panel A: Total CLO ownership % of Term Loan Bs					Panel B: Average CLO ownership % of Term Loan Bs				
Moody's senior debt rating	N	Mean	Std. dev.	Avg. fac. amt. (\$M)	Moody's senior debt rating	N	Mean	Std. dev.	Avg. fac. amt. (\$ M)
Ba1	10	3.08%	6.98%	744.4	Ba1	10	0.29%	0.22%	744.4
Ba2	24	9.94%	11.88%	693.5	Ba2	25	0.53%	0.73%	717.2
Ba3	52	17.34%	23.01%	667.2	Ba3	53	0.63%	1.02%	654.9
B1	93	14.21%	20.74%	409.1	B1	95	0.99%	2.28%	402.1
B2	61	15.49%	20.35%	569.1	B2	63	0.80%	0.98%	563.4
B3	28	15.83%	26.93%	766.4	B3	28	0.50%	0.48%	766.4

Panel C: Differences in total CLO ownership % of Term Loan Bs					Panel D: Differences in average CLO ownership % of Term Loan Bs				
	B1, B2, B3 rated	Ba1, Ba2, Ba3 rated	Diff.	t-Stat.		B1, B2, B3 rated	Ba1, Ba2, Ba3 rated	Diff.	t-Stat.
Mean	14.89%	13.62%	1.27%	(0.48)	Mean	0.85%	0.56%	0.29%	(1.84)
N	182	86			N	186	88		
	B2, B3 rated	Ba1, Ba2 rated	Diff.	t-Stat.		B2, B3 rated	Ba1, Ba2 rated	Diff.	t-Stat.
Mean	15.59%	7.92%	7.67%	(2.52)	Mean	0.71%	0.46%	0.25%	(1.76)
N	89	34			N	91	35		

debt than Ba-rated debt. In contrast, there is no reason to suspect that other institutional investors have a preference for B-rated debt, and many have rating requirements that lead to a preference for higher-rated debt.

Second, using the Moody's data, we can calculate the quantities of debt of alternative ratings classes held by CLOs, and it appears that they hold higher quantities of B-rated debt than of higher-rated debt. Table 9 reports summary statistics on CLO ownership of Term Loan B facilities. Panel A reports total CLO ownership percentages of Term Loan B facilities by ratings class. Panel B reports average CLO ownership percentages by ratings class. Panels A and B demonstrate that total ownership percentages are larger, on average, for facilities associated with B-rated senior debt compared to facilities associated with Ba-rated senior debt. The same pattern is true for average ownership percentages; on average, CLOs exhibit larger average ownership fractions in lower-rated debt.

In Panel C, we test whether the difference in total ownership percentages is statistically different between the B-rating and Ba-ratings classes, on average. The upper portion of Panel C shows that the difference in total ownership is a statistically insignificant 1.27%, because total ownership in facilities associated with B1-rated senior debt is similar to total ownership in the Ba3 ratings category. The lower portion of Panel C compares total ownership in the B2 and B3 ratings categories against total ownership in Ba1 and Ba2 ratings categories, omitting B1 and Ba3 ratings to generate a larger difference in credit quality. The difference in total ownership across

these categories demonstrates that the lower-rated B1 and B2 ratings hold a statistically significant 7.67% larger total ownership percentage compared with the Ba1 and Ba2 ratings categories. Panel D performs similar tests with average ownership percentages and finds similar results. While we cannot conclusively say that institutional demand more broadly than CLOs has some impact on the differences in spreads documented above, these calculations suggest that CLO demand is an important part of the story.

6. Conclusion

Understanding the debt buildup from 2002 through 2007 followed by the Financial Crisis of 2008 is an important area of research for financial economists. A key element of both the debt buildup and the Crisis is often thought to be the increase in securitization of loans over this period. By packaging loan facilities together in CLOs, the market created a highly rated security as a combination of low-rated (usually B-rated) ones. While the volumes of both loans and CLOs both increased substantially during the securitization-active period, the link between these phenomena is unclear. It is possible that this high volume of debt issuances could reflect a high demand for capital by firms. Alternatively, as has been alleged by theories of the Financial Crisis (see Gennaioli, Shleifer, and Vishny, in press), the demand from CLOs for securitizable loan facilities could have led banks to make loans they otherwise would not have

made. This paper evaluates the pricing implications of this hypothesis, and finds support for the view that demand for securitizable loans lowers the cost of capital for firms.

Controlling for other factors, including the risk of the loan facility, facilities that are securitized are issued at about a 17 basis point lower spread than an otherwise identical facility that was not securitized. This finding is consistent with the notion that the demand for securitizable loan facilities led banks wishing to securitize their facilities to discount them to attract more borrowers. However, there are other interpretations to this finding; it is possible that firms' demand for capital is such that firms' borrowing patterns led loan facilities that get securitized to have lower spreads.

As a way of evaluating explanations based on demand for capital, we consider how the relative spreads between loan facilities with characteristics that are considered to be "securitization-friendly" and loan facilities with characteristics considered to be "securitization-unfriendly" are different during the "Securitization Boom." In particular, we consider the payoff structure of the debt, with "Term Loan B" facilities whose bullet payoff structures are considered more securitization-friendly than amortizing "Term Loan A" facilities or revolvers, whose payoff and amount borrowed is at the discretion of the borrower. Second, we consider the issuer of the loan facility, with banks who are top arrangers of CLOs to be more likely to securitize their own facilities than facilities from other banks. Finally, we consider the rating of the facility, with evidence that loan facilities made to B-rated borrowers are more likely to be securitized than facilities with other ratings.

Our findings suggest that spreads on facilities with characteristics making the facility desirable to a CLO decline relative to other facilities with less securitization-friendly characteristics during the securitization boom. The spread on Term Loan B facilities issued by securitization-active banks to borrowers with B-rated senior debt dropped 20.9 basis points relative to Term Loan B facilities with less securitization-friendly attributes from 2002 through the fall of 2007. Consistent with the CLO demand hypothesis, we provide evidence that the decline in spreads is concentrated in Term Loan B facilities with securitization-friendly characteristics rather than Term Loan A or revolving facilities with otherwise similar securitization-friendly characteristics. This result suggests that the decline in spreads cannot be attributed to a factor associated with the particular banks originating the CLOs, such as an increase in their risk tolerance. This general pattern of a decline in securitization-friendly facilities relative to non-securitization-friendly facilities over the 2002–2007 period is true even for facilities that are part of the same loan package, and is true for a sample excluding LBO loans.

Taken together, we interpret the evidence as being consistent with the hypothesis that securitization had a causal impact on the cost of corporate capital. Were an omitted variable to be driving our results, it would have to be uniquely correlated with Term Loan Bs originated only by securitization-active banks to borrowers with B-rated senior debt but uncorrelated with Term Loan As and revolving facilities with the same characteristics. While

overall institutional demand is one such potential variable, the concentration of spread differences in B-rated rather than Ba-rated debt suggests that securitization plays an important role.

The results in this paper raise a number of questions as well. For example, what was the cause of increased demand for securitized debt? In this paper, we take increased CLO activity as given, yet we know little about the ultimate drivers of final demand for bonds collateralized by corporate debt. Second, does the securitization process, with its complicated cash-flow rules and multiple market participants, lead to information destruction resulting in lenders not charging spreads commensurate with risks? Fundamentally, the question posed by the theoretical literature on securitization remains, namely, how does the restructuring of cash flows from a pool of assets into a securitization structure create real value? Finally, while we do provide evidence that the advent of CLOs led to cheaper capital for corporate borrowers, we do not provide evidence suggesting that CLOs led to inefficient lending outcomes. Whether demand from CLOs caused banks to lend too much, or whether cheaper, CLO-fueled capital led to overinvestment in the real economy, remain important and unanswered questions.

References

- Ai, C., Norton, E., 2003. Interaction terms in logit and probit models. *Economic Letters* 80, 123–129.
- Angrist, J., Pischke, J., 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. University Press, Princeton, NJ.
- Axelsson, U., Jenkinson, T., Stromberg, P., Weisbach, M., 2011. Borrow cheap, buy high? The determinants of leverage and pricing in buyouts. Unpublished. London School of Economics, University of Oxford, Stockholm School of Economics, and Ohio State University.
- Benmelech, E., Dlugosz, J., 2009. The alchemy of CDO credit ratings. *Journal of Monetary Economics*, Carnegie-Rochester Conference Volume 56, 617–634.
- Benmelech, E., Dlugosz, J., Ivashina, V., Securitization without adverse selection: the case of CLOs. *Journal of Financial Economics*, forthcoming.
- Coval, J., Jurek, J., Stafford, E., 2009. The economics of structured finance. *Journal of Economic Perspectives* 23, 3–25.
- Dell'Ariccia, G., Igan, D., Laeven, L., 2008. Credit booms and lending standards: evidence from the subprime mortgage market. IMF unpublished.
- DeMarzo, P., 2005. The pooling and tranching of securities: a model of informed intermediation. *Review of Financial Studies* 18, 1–35.
- Demyanyk, Y., Van Hemert, O., 2011. Understanding the subprime mortgage crisis. *Review of Financial Studies* 24, 1848–1880.
- Gaur, V., Seshadri, S., Subrahmanyam, M., 2011. Securitization and real investment in incomplete markets. *Management Science* 57, 2180–2196.
- Gennaioli, N., Shleifer, A., Vishny, R., Neglected risks, financial innovation and financial fragility. *Journal of Financial Economics*, <http://dx.doi.org/10.1016/j.jfineco.2011.05.005>, in press.
- Guner, B., 2006. Loan sales and the cost of corporate borrowing. *Review of Financial Studies* 19, 687–715.
- Ivashina, V., 2009. Asymmetric information effects on loan spreads. *Journal of Financial Economics* 92, 300–319.
- Ivashina, V., Sun, Z., 2011. Institutional demand pressure and the cost of corporate loans. *Journal of Financial Economics* 99, 500–522.
- Kara, A., Marques-Ibanez, D., Ongena, S., 2011. Securitization and lending standards: evidence from the wholesale loan market. Unpublished, Loughborough University, European Central Bank, and Tilburg University.
- Keys, B., Mukherjee, T., Seru, A., Vig, V., 2010. Did securitization screening lead to lax? Evidence from subprime loans. *Quarterly Journal of Economics* 125, 307–362.

- Loutskina, E., Strahan, P., 2009. Securitization and the declining impact of bank financial condition on loan supply: evidence from mortgage originations. *Journal of Finance* 64, 861–922.
- Mian, A., Sufi, A., 2009. The consequences of mortgage credit expansion: evidence from the U.S. mortgage default crisis. *Quarterly Journal of Economics* 124, 1449–1496.
- Nadauld, T., Sherlund, S., The impact of securitization on the expansion of subprime credit. *Journal of Financial Economics*, forthcoming.
- Nini, G., 2008. How non-banks increased the supply of bank loans: evidence from institutional term loans. Unpublished, Wharton Business School.
- Shivdasani, A., Wang, Y., 2011. Did structured credit fuel the LBO boom? *Journal of Finance* 66, 1291–1328.
- Standard & Poor's, 2007. *A Guide to the Loan Market*. Standard & Poor's, New York.
- Sufi, A., 2007. Information asymmetry and financing arrangements: evidence from syndicated loans. *Journal of Finance* 62, 629–668.