Pipeline Risk in Leveraged Loan Syndication*

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January 23, 2017

Abstract

We study the syndication of leveraged term loans and the associated risks that arrangers face. We establish that to place the loans with institutional investors on the best possible terms, arrangers must elicit their willingness to pay. Incentive compatibility implies that arrangers must retain larger shares of the loans that investors find less attractive. The retention of problematic loans is likely to result in a form of debt overhang and to impair arrangers' subsequent ability to arrange and extend credit. Using novel data, we provide empirical support for these hypotheses.

JEL classifications: G23, G24, G30
Keywords: syndicated loans, leveraged loans, pipeline risk, lead arranger share, debt overhang

*The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve System. We would like to thank Bo Becker, Tobias Berg, Jennifer Dlugosz, Rustom Irani, Victoria Ivashina, Sonia Falconieri, Alexander Ljungqvist, Farzad Saidi, Anthony Saunders, and Sascha Steffen, and seminar and conference participants at London Business School, Cass Business School, the Federal Reserve Board, the University of Toronto, the Federal Reserve Bank of New York, Sveriges Riksbank, INSEAD, and DGF 2016 for helpful comments. We would also like to thank Angelica Aldana, Nicole Corazza, and Kerry Kantin for help with the LCD data, and KC Brechnitz, Scott Cham, and many others for enlightening conversations about the institutional set-up and functioning of syndicated lending. Max Bruche gratefully acknowledges financial support from the European Commission under FP7 Marie Curie Career Integration Grant 334382. Part of this research was completed while Ralf Meisenzahl was a visitor at the London School of Economic's Center for Economic Performance.

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1 Introduction

Leveraged loans — syndicated loans with high credit risk — make up a large part of the overall syndicated loan market. According to Thomson Reuters LPC, total U.S. syndicated loan issuance in 2013 was about 2.1 trillion, of which more than half, about $1.1 trillion, was classified as leveraged. In turn, a large part of all leveraged term loans are classified as *institutional* (more than $600 billion in 2013), meaning that they are meant to be distributed by arranging banks to institutional investors such as hedge funds, mutual funds, and CLOs.

What are the economic problems that arrangers have to solve in such an originate-to-distribute model, and consequently, what are the risks they face? To answer these questions, we use novel data to examine the syndication process for such loans, and obtain three main results.

First, we show that an important economic function of arrangers is to ascertain how much institutional investors are willing to pay for these loans. To do so, they use a process that resembles the one described by bookbuilding theory (Benveniste and Spindt, 1989). Second, incentive compatibility requires that investors must receive smaller allocations when they indicate a low willingness to pay. We argue that in the context of syndicated term loans, issuers often have limited flexibility on the amount. As a consequence, arrangers must make up for any shortfall and retain larger shares in those loans that investors find less attractive. We show that this is the case in the data. Third, when banks have to retain such problematic loans, this is likely to generate a form of debt overhang problem. We also find empirical support for this prediction: When arrangers have difficulties placing loans with investors, they subsequently reduce the number and dollar volume of loans that they arrange, as well as the shares that they hold in new, unrelated syndications.

Our findings contrast with the prior literature, which has typically emphasized different economic functions of lead arrangers, and has e.g. argued that arrangers retain a larger share of the loan when they need to show that they are committed to monitoring the borrower.

While a loan is in the syndication pipeline, an arranger faces the risk of having to retain a larger share if it turns out that investors are willing to pay less than expected. We refer to the risk of such retention as *pipeline risk*. Unlike underwriting in traditional equity IPOs, formal or informal guarantees often need to be given to borrowers *before* the arranger can learn much about investors' willingness to pay. Since the whole process typically takes 4-6 weeks, this means that pipeline risk can be sizeable. We discuss the process in more detail in Section 2.

Pipeline risk also raises macro-prudential concerns, as it can be correlated across arrangers during a market-wide downturn. This for instance occurred during the first quarter of 2008 or the last quarter of 2015 (see Appendix A). Pipeline risk can therefore amplify credit cycles, with broader implications for bank lending and the real economy, as suggested by Ivashina and Scharfstein (2010).

Regulators are concerned about pipeline risk.[1] However, to the best of our knowledge, no systematic information exists which would allow an assessment of the extent of guarantees given to borrowers, and hence of arrangers' risk exposures. Since regulators only impose capital charges on arrangers once adverse shocks have realized, pipeline risk is essentially not accounted for.

In our empirical analysis we use S&P Capital IQ's Leveraged Commentary and Data (LCD) data set, because we need data not just on the final syndication outcome, but also on adjustments to the terms of the loans during the syndication process. LCD contains information on leveraged loan syndication from 1999 to 2015, including initially proposed and final loan amounts, spreads, and original issue discounts (OIDs). These loan terms are frequently adjusted or, in market parlance, "flexed." We combine the LCD data with lead arranger shares from the Shared National Credit Program (SNC), an annual survey of syndicated loans carried out by U.S. financial regulators.

To structure our empirical analysis, we draw on the literature on bookbuilding. Bookbuilding is generally described as a means for the arranger to elicit private information from market participants about their willingness to pay for the asset being sold. To illustrate the theory, consider an example in which a borrower wants to finance a leveraged buyout bid of a given size. We can represent this by a fixed supply of the loan, as indicated by the vertical supply curve in the left panel of Figure 1. The arranging bank does not know whether investors have a high or a low willingness to pay, as indicated by the (perfectly elastic) demand schedules D_h and D_l in the left panel of Figure 1. In order to maximize the expected price, the arranging bank must make it incentive compatible for investors to reveal their true willingness to pay. To achieve this, the arranging bank must do two things. First, it must reward investors when they reveal a high willingness to pay, by underpricing the issue (setting the price to that at point H rather than the full price at point h), and by giving investors large quantities. Second, the arranging bank must punish investors when they reveal a low willingness to pay by rationing quantities, so that the total quantity placed shrinks from that at point l to that at point L. (There is also no underpricing in this case, so that the price at point L is equal to the price at point l.) The logic of incentive compatibility implies

[1] See e.g. " Interagency Guide on Leveraged Lending," 21 March 2013, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency.

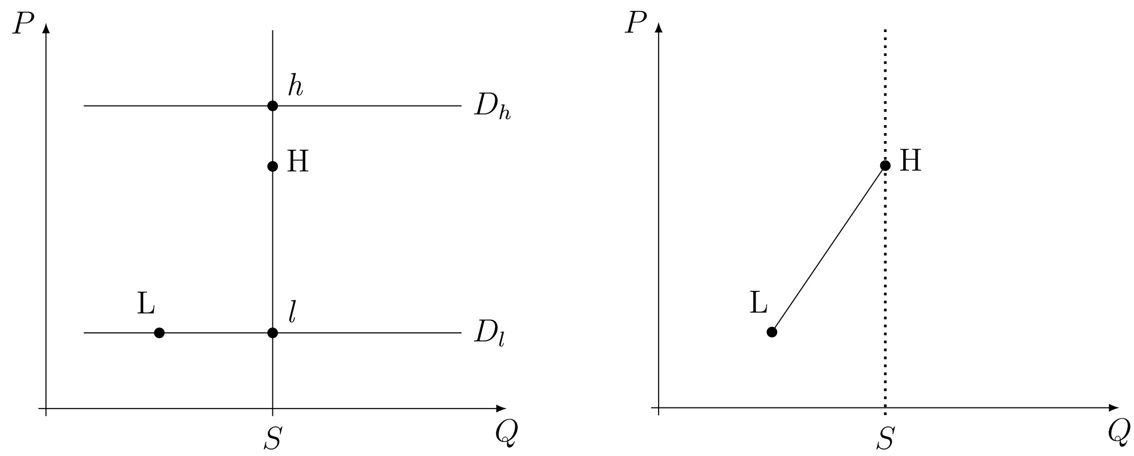


Figure 1. Price, and quantity, and incentive compatibility
A borrower wants to raise a fixed amount of financing by placing a loan of size S. The willingness of investors to pay for the loan can be either high or low, as indicated by the demand schedules D_h and D_l. To preserve incentives for investors to reveal their willingness to pay, the arranger needs to underprice when investors reveal high demand (point H), and ration investors when they reveal low demand (point L).

that even when the underlying supply curve is vertical, the effective supply curve that investors face in equilibrium must be upward-sloping, as indicated in the right panel of Figure 1.

In practice, building on the empirical literature on underpricing, we can identify situations in which investors reveal a high willingness to pay as those in which the arranger increases price during syndication, or, in our case, decreases spreads, and vice versa. We then have several testable implications of the theory. First, underpricing should on average be positive. Also, because prices only partially adjust to revealed information, underpricing should be higher when investors indicate a high willingness to pay and spreads are flexed down. Second, when investors indicate a low willingness to pay and spreads are flexed up, the arranger is likely to retain a larger share. Third, when this happens, this may generate a debt overhang problem, which would reduce the arranger's willingness to arrange and hold loans going forward.

We find support for these three hypotheses. First, according to the pricing information in LCD, the median leveraged term loan is underpriced in the primary market by 38-75 bps relative to the secondary market.[2] Also, pricing is adjusted only partially. The point estimates imply

[2] The underpricing that we find is comparable to the 47bps reported by Cai, Helwege, and Warga (2007) for high-yield bonds. It is much lower than the underpricing for stocks (Jenkinson and Ljungqvist (2001) for instance report an average of around 19% over four decades in the US.

that a downward flex in spread of 100 bps is associated with an increase in underpricing by about 8-11 bps. Second, when spreads are flexed up, the share retained by the lead arranger is larger. The point estimates imply that a 100 bps upward flex in spread is associated with an increase in the lead arranger share of around 2-4%. This is substantial, given an average lead share of only about 5.3% in our data. Third, arrangers which are less successful in placing their loans in a given quarter subsequently reduce the number and dollar volume of loans they arrange in the following quarter, and the dollar volume of participations that they hold in subsequent unrelated syndications. The point estimates imply, roughly, that an arranging bank which has to increase spreads in two additional syndications is likely to arrange one loan less in the following quarter. In terms of amounts, a bank which has to raise spreads on an additional $500m of loans arranges about $250m less, and reduces the shares it will hold through time in unrelated, new syndications (mostly in credit lines) by about $75m, in the following quarter.

Related Literature Leveraged loan pipeline risk is related to underwriting risk in public security offerings, e.g. stock IPOs. However, while arrangers of leveraged loans typically need to provide guarantees before demand discovery takes place, equity underwriters effectively only offer guarantees after demand discovery has taken place, and restrict the formal risk to overnight exposure.[3] Also, mortgage securitizers face the risk that loans can become delinquent while still in the pipeline. While this mortgage securitization risk has also been referred to as "pipeline risk" (Brunnermeier, 2009), or as "warehousing risk" (Keys, Seru, and Vig, 2012), it is not related to demand discovery.

Few papers have examined how demand affects the syndication process. Ivashina and Sun (2011) look at the time a loan spends in syndication as a proxy for demand and show how it relates to spreads. Ivashina and Scharfstein (2010) have examined the implications of fluctuations in aggregate demand for syndicated loans for credit cycles. They provide evidence that, on average, lead banks retain larger shares when investors' aggregate demand is low. They suggest three possible causes: shocks to borrowers, shocks to bank capital, or shocks to investor sentiment. We provide micro-level evidence that this relationship may instead be the incentive-compatible outcome of a demand discovery process. In addition, we show that, after having faced lower-than-expected demand, arrangers reduce subsequent participation in new syndications. Our interpretation is that

[3]There is evidence that IPO underwriters buy substantial numbers of shares in less successful IPOs in aftermarket price stabilization. However, it seems that they eliminate much of the risk associated with this activity via overallotment options (Ellis, Roni, and O'Hara, 2000, see section 3).

the retention of larger shares of problematic loans create a debt overhang problem (Myers, 1977): The presence on a firms' balance sheet of debt-financed, problematic assets decreases the firm willingness to invest. (Admati, DeMarzo, Hellwig, and Pfleiderer (2016) and Bahaj and Malherbe (2016) propose recent applications of debt overhang to banks.)

By highlighting a key driver of the shares retained by arrangers, our paper speaks to the literature on the determinants of loan syndicate structure. For instance, Sufi (2007) provides evidence that lead arrangers hold larger shares in loans which are informationally opaque. He interprets this as evidence that the initial share retained by the lead arranger serves as a commitment to monitor the borrower.[4] Ivashina (2009) documents that such larger lead shares are also associated with lower spreads. We note that our paper differs from most of the literature on syndicate structure also because we focus on (non-investment grade) leveraged term loans, using lender shares from SNC. In contrast, the literature that examines syndicate structure has so far relied on lender share data from Thomson Reuters' DealScan, in which investment-grade credit lines are overrepresented (see Appendix D for details).

By construction, like the analysis of Ivashina and Sun (2011), our analysis focuses on the syndication process and not just on syndication outcomes. In contrast, much of the literature has focused on syndication outcomes only. Examples include determines whether a loan is syndicated at all (Dennis and Mullineaux, 2000), spreads and fees (Angbazo, Mei, and Saunders, 1998; Berg, Saunders, and Steffen, 2016; Cai, Saunders, and Steffen, 2016), covenants (Drucker and Puri, 2009), and syndicate composition (Cai, Saunders, and Steffen, 2016; Benmelech, Dlugosz, and Ivashina, 2012).

Finally, we also draw on the bookbuilding literature. Benveniste and Spindt (1989) establish the underpricing and partial adjustment results explained above. Biais and Faugeron-Crouzet (2002) show that the French *Mise en Vente* can also be seen as a demand discovery mechanism, and leads to similar outcomes as bookbuilding. A series of studies have tested the bookbuilding hypothesis and its implications in the context of stock IPOs. Examples include Hanley (1993), Cornelli and Goldreich (2001), and Cornelli and Goldreich (2003).

[4] An arranger clearly will have greater incentives to monitor if it holds a larger share (Gustafson, Ivanov, and Meisenzahl, 2016). However, when it comes to leveraged term loans, arrangers can typically sell their initial shares in opaque over-the-counter secondary markets (Bord and Santos, 2012). Therefore, it is not clear whether, for such loans, the share initially retained by the lead arranger can serve as a reliable *commitment* to monitor. In this context, monitoring incentives could also be ensured by non-loan exposure to the borrower's performance (Neuhann and Saidi, 2016).

2 Overview of the syndication process

This section is based on a series of interviews with market participants and summarizes how these described the practice of the leveraged loan syndication process, especially as it relates to term loans. We first give a general overview and then provide more details on each of the separate stages.

The overall process is structured as follows: First, the borrower awards the mandate to a lead arranger. If the borrower requires guarantees, the lead arranger often provides these via a "commitment letter" just after obtaining the mandate. Second, after an initial meeting with potential investors, the arranger draws up a proposed loan document (the facility agreement) which serves as the basis for marketing the deal. Third, book-running commences. Depending on demand for the loan, the terms might be adjusted in several rounds. Finally, syndication closes and a final loan document is signed by all lenders. The borrower receives the funds, and trading in the secondary market can commence. The timing of the stages is depicted in Figure 2. We now describe each of them in more detail.

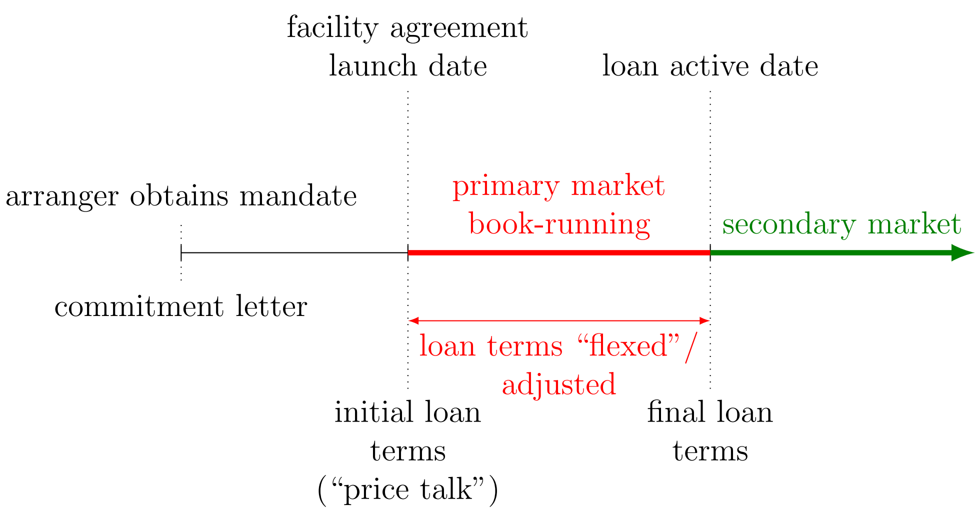


Figure 2. Syndication timeline
Timeline for the leveraged term loan syndication process.

Mandate Issuers typically solicit bids from several potential arrangers. Bidders perform an initial credit analysis and then compete on two main dimensions: baseline price and syndication strategy. Key price elements include the spread ("the margin") over a base rate such as LIBOR, an original issue discount ("OID") (described in more detail in the next section), and fees. The strategy consists of how the loan will be tranched, what share of the loan (if any) the arranger intends to retain in the primary market (the "sell down target"), and how baseline prices and fees can be adjusted ("flexed") in the process, and who bears the cost of such flex. In particular, loans can either be "underwritten," in which case formal guarantees on the terms of the loan are given to the borrower, or can be "best-efforts," in which case no such guarantees are offered. When formal guarantees are offered, it is often the case that two or more arrangers co-underwrite the loans (that is, share the risk associated with giving guarantees).

It is important to note that in contrast to traditional equity IPOs, guarantees are typically given to issuers *before* book-running starts and the arranger can gauge market demand for the issue. As a result, underwriting loan issues can be much more risky. The reason for this difference in timing is that borrowers who require guarantees often do not want the market to know that they are seeking financing. A typical example would be an LBO: the acquirer needs to present a debt commitment letter to the board of the target to show that financing is in place for the bid. At the same time, the acquirer does not want information about the bid to leak out to the market ahead of time, and hence does not want the arranger to start book-running before the target receives the bid.

The proposed loan structure and baseline pricing are summarized in a "term sheet," which may later be shown to investors. The specifics of the mandate, fees, and guarantees and the flex permitted to the arranger are described in a "mandate letter," a "fee letter," and a "commitment letter." The mandate and fee letters are kept confidential. In acquisitions and LBOs, commitment letters are shown to the sellers of the shares or assets.

Facility agreement After an initial meeting with potential investors, the arranger draws up a "facility agreement" which describes all of the proposed terms of the deal, including pricing, structure, the set of covenants and their tightness, as well early repayment conditions.[5] Price variables as set in the facility agreement are referred to as the "talk price."

[5] If investors appetite is not as expected at this initial meeting, some flex activity can take place before the facility agreement is produced. That is, the terms in the facility agreement may differ from those initially specified in the term sheet.

Book-running Once the facility agreement is finalized, the deal is "launched" and a "book runner," often an entity linked to the lead arranger, starts marketing the deal to investors. Information about deals currently being marketed is provided to investors by platforms such as Thomson Reuter LPC's LoanConnector or S&P Capital IQ's Leveraged Commentary and Data. As part of the marketing, information about the deal is shared with potential investors, who are given time to go through their risk analysis and, ultimately, obtain the green light from their credit committees. If there is the right amount of demand to meet the selldown target at the talk price, the deal is successful and is closed. If the deal is under- or over-subscribed, the arranger uses feedback from investors to flex the price (and/or covenants, lock-ins, etc.). In such a case, the marketing process is re-iterated at the new terms. If syndication is still unsuccessful, there may be additional flex and subsequent marketing rounds. At some point, even though the selldown targets are not met, the arranger may decide not to decrease the price any further. If the deal is underwritten, this means that the underwriters have to retain a larger share than expected. Sometimes, the underwriters prefer to pull the deal out of the market altogether and issue a bridge loan instead, and to defer further marketing attempts.

The book-running process typically takes several weeks (46 days on average in our sample). Since formal guarantees need to be made before book-running starts, underwriters are exposed during at least this period.

Secondary market Once the arranger has established which investors will participate in the deal, the final loan document can be signed and the deal is closed and becomes "active." The borrower receives the funds, and trading of the loan in the secondary market can commence.

3 Data

We first describe how we construct a sample from the LCD data, and then describe loan characteristics and the adjustments to loan terms (flexes) in our sample. We delay the discussion of how we construct a sample with information on the share retained by lead arrangers using the Shared National Credit data to Section 5.

3.1 Sample construction

We use loan-level data on the syndication process provided by S&P Capital IQ's Leveraged Commentary and Data (LCD). LCD covers the syndication of leveraged loans, which S&P defines as any syndicated loan with either a non-investment-grade rating, or with a first or second lien and a spread of at least 125bps over LIBOR. The data set contains information on 12,071 deals from January 1, 1999 until October 15, 2015. (As we explain below, however, for our formal analysis we mostly focus on deals from November 2008 onwards.) Each deal consists of one or more facilities, classified either as "pro-rata" facilities or "institutional" facilities. The pro-rata facilities are revolving credit facilities (i.e. credit lines) or amortizing term loans, traditionally bought by banks, and the institutional facilities are bullet term loans, traditionally bought by institutional investors.

To better understand the coverage of the LCD data, we compare LCD to DealScan, a syndicated loan origination database that has been extensively used in the literature. Figure 3 shows the total number of loans in DealScan, the number of U.S. leveraged loan deals with institutional term loans in DealScan, and the number of U.S. leveraged loan deals with institutional term loans in LCD, per year. The coverage of U.S. leveraged loans in DealScan is somewhat wider before 2007, however the LCD and DealScan data have roughly the similar number of observations after 2007. We provide a more detailed discussion in Appendix D.

The LCD data sometimes groups the facilities in a deal into subsets when these differ in their (perceived) credit risk, e.g. when some facilities are first lien, and other facilities are second lien. We refer to these subsets as the "parts" of a deal. This means that each deal consists of one or more parts, and each part then consists of one or more facilities. 2,126 out of the 12,071 deals consist of more than one part. While our main analysis is on the aggregated institutional facilities at the deal level, we also use this additional, more granular information in the Online Appendix to the paper to conduct complementary analyses.

To illustrate the structure of the data, consider the following (fictitious) example: In a deal that closes in June 2010, Company ABC takes out three facilities: a revolving credit facility, a first lien term loan, and a second lien term loan. LCD reports information on two parts, "Company ABC (6/10)," which contains information about the revolving credit facility and the first lien loan, and "Company ABC (2nd Lien 6/10)," which contains information about the second lien loan only.

At the deal level, the available information always includes the overall deal size, issuer name

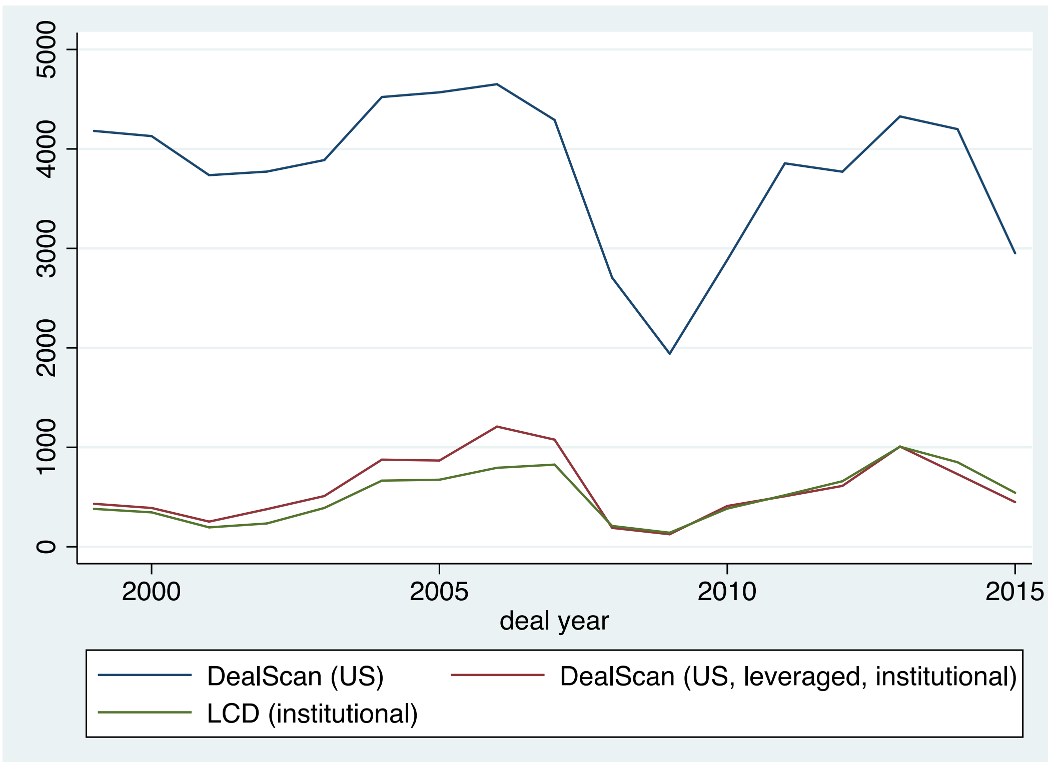


Figure 3. Number of deals in DealScan and LCD over time
Number of deals in DealScan and LCD over time. DealScan (US) are all deals syndicated in the USA and in USD. DealScan (US, leveraged, institutional) are deals that contain at least one leveraged institutional facility. LCD (institutional) are all deals with at least one institutional facility in LCD.

and issuer industry, a launch date and a closing month for the deal,[6] and an issuer rating (if the issuer is rated). LCD also records whether the deal is sponsored, for instance by a private equity firm.

At the part level, LCD records a rating if available (which is the same for all facilities within a part), whether the part is a first-lien or second-lien and whether the facilities within a part have covenant-light (cov-lite) status or have full covenant status. A purpose and lead arranger are also available at the part level.

At the facility level, information includes amounts, maturities, spreads, and potentially information on how these variables were adjusted during the process. The main independent variables of interest to us are these pricing adjustments. Furthermore, for some facilities, LCD also contains the first observed secondary market price.

We restrict our analysis to deals which contain at least one institutional facility for two reasons. First, pro-rata facilities (especially credit lines) are much less likely to be traded in secondary markets, and hence there are next to no secondary market prices for such facilities. Second, one of the main aims of LCD is to inform institutional investors about deals that they can buy into, and hence it has better coverage of flex for institutional facilities. We will need information both on the first secondary market price as well as on flex. Hence, we drop all deals that consist only of lines of credit and amortizing term loans, leaving 8,816 deals. Furthermore, we consider only the institutional facilities within these deals. Finally, we exclude a small number of deals that have parts with different purposes or lead arrangers, leaving 8,716 deals.

We further restrict our sample to loans with information about pricing and drop all deals for which we do not have the initially proposed yield (the "talk yield"). If the talk yield is observed in the data then all other pricing information is usually also present. This restriction reduces the sample to 3,711 deals, as talk yield information become available starting with deals in November 2008.[7]

Within our 3,711 deals, we aggregate information across all institutional facilities within a deal

[6]The launch date is the day the arranger starts marketing the deal to primary market participants. The closing date is the day the syndicate composition is finalized and the loan documents are signed.

[7]Note that our sample does not include the early phase of the financial crisis or the pre-crisis period. This distinguishes it from many other samples of syndicated deals used in the literature. For example, there is no overlap with the sample of Ivashina and Sun (2011). Although we do not report results here, we have run our analysis on the larger sample that also includes the pre-crisis deals for which sufficient pricing information is available. The main results are unchanged. If the analysis is run only on pre-crisis deals, coefficients in general show the same sign, but tend to be statistically insignificant, probably due to a small sample size.

and conduct our analysis at the deal level. The mean number of institutional facilities per deal is 1.14, and more than 75% of deals only have a single institutional facility, indicating that the way in which we aggregate data is unlikely to have a large impact on our results.

3.2 Description of loan characteristics

Table 1 provides the summary statistics for our sample of leveraged loan deals. The median deal size (including pro-rata facilities, e.g. undrawn commitments on credit lines) is \$400m. The median total institutional amount lent per deal is \$350m. The distribution of deal sizes and institutional amounts is highly skewed, with a small number of very large deals.

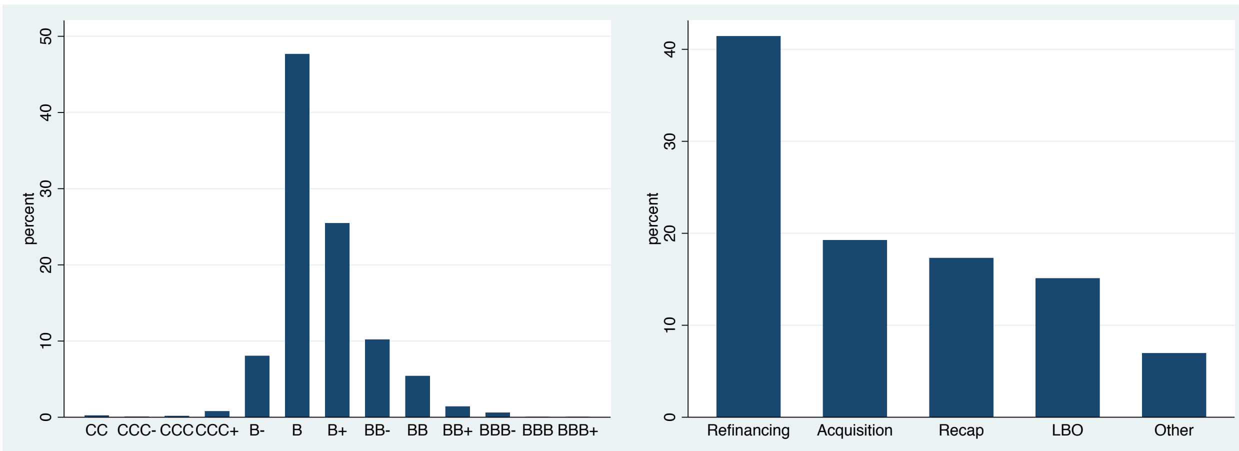
Table 1
Summary statistics

This table displays summary statistics for the basic variables at the deal level, as used in our analysis. Total Deal Size is the sum of amounts and commitments across all pro-rata and institutional facilities in a deal. Institutional Amt. is the sum of amounts only across institutional facilities in a deal. Both Total Deal Size and Institutional Amt. are reported in millions of USD. Rated, Sponsored, and Cov- lite are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite, respectively. Spread and OID (original issue discount) are calculated as averages across the spreads and OIDs of institutional facilities in each deal, and are reported in percentage points of par. Effective spread is computed as spread + OID/4, also reported as percentage points of par. Break Price is the average first secondary market price of institutional facilities in a deal, reported reported in percentage points of par.

	Total Deal Size	Institutional amt.	Rated	Sponsored	Cov-lite	Spread	OID	Eff. Spread	Break Price
mean	663	552	.895	.678	.395	4.65	1.03	4.90	99.843
sd	775	617				1.59	1.35	1.77	1.299
min	10	10				1.75	-2.50	2.00	78.375
25%	225	200				3.50	0.25	3.50	99.500
median	400	350				4.25	0.75	4.50	100.125
75%	775	660				5.50	1.38	5.88	100.500
max	9,500	7,600				15.00	22.50	16.50	104.250
N	3,711	3,711	3,711	3,711	3,711	3,709	3,686	3,686	3,087

As opposed to equity or bond issuances, which are usually completed within 1 or 2 days, the loan syndication process is lengthy. It takes on average 46 days from the launch date until the loan becomes active, suggesting a considerably longer exposure of banks to risks in the syndication process than in equity or bond issuances.

About 90% of the deals involve some rating, 68% involve a sponsor, and 40% involve at least one cov-lite facility. If the issuers in these deals have a rating, they are practically always non-investment grade, as illustrated in Figure 4a. Figure 4b also illustrates that given the low interest rates over our sample period, deals that refinance existing debt are the most common (41%), followed by deals that finance transactions — acquisitions or LBOs — which together represent about 34% of our deals.



(a) Rating **(b) Purpose**

Figure 4. Ratings and purpose for deals in our sample

Histogram of (a) issuer ratings and (b) most common purposes for the deals in our sample.

The data includes information on pricing. The first component, the spread, measured in basis points over LIBOR, is available for almost all facilities. The median deal spread is 425 bps. For some facilities, we observe a second pricing component: the original issue discount (OID). In our terminology, an OID of $x\%$ indicates that the lenders have to hand over only $(100 - x)\%$ of face value at origination, while spreads and principal repayments are calculated on the basis of the full face value. Note that our use of the term OID differs from the way some market participants use this term, who confusingly use OID to refer to the fraction of face value that lenders have to hand over, the $(100 - x)\%$. As opposed to upfront fees in other syndicated loans, OIDs in leveraged institutional facilities are typically not tiered by commitments, so that all lenders who participate in the primary market receive the same OID. When aggregating by averaging across the facility OIDs in a deal, the median OID at the deal level is 75 bps, with substantial variation across deals.

To compare loans with different OIDs and spreads along a single dimension, by convention, market participants in the US compute the yield on a loan as follows:

$$yield = LIBOR + spread + \frac{OID}{4}. \tag{1}$$

The idea behind this calculation is that the OID is amortized over an effective maturity of (on average) 4 years. Following this convention, we define the effective spread as

$$\textit{effective spread} \equiv \textit{spread} + \frac{OID}{4}. \tag{2}$$

Over all deals for which we observe OIDs in our sample, the effective spread as defined in Equation (2) is on average 25bps higher than the spread. Taking only the deals in 2009, it is on average 80bps higher than the spread. While OIDs do not necessarily have a large impact on the cost of debt in every deal, they clearly had a substantial impact during the height of the crisis in 2009.[8] As we discuss below in detail, OIDs are also crucial for computing measures of underpricing in the syndicated loan market.

For many facilities we also observe a third piece of information on pricing, the break price. The break price is defined as the first price observed in the secondary market after the deal is completed. LCD collects this from market participants as the average mid-point between bids and offers, where the bids and offers are required to have "reasonable" depth.[9] As indicated in Table 1, when aggregating by averaging across the facility break prices in a deal, the median break price at the deal level is slightly above par.

3.3 Description of adjustments (flexes)

Our main set of independent variables of interest relate to flex information: At launch, the arranger initially proposes a spread range and OID range. Depending on the level of demand, the arranger may then adjust spreads and the OID, in order to allocate the facility. In some instances, the arranger may also increase or decrease the amount borrowed between launch and close. Market participants refer to the changes that have been made to the initially proposed quantities by the close as spread flex, OID flex, and amount flex, respectively. One of the key advantages of the LCD data is that it provides this flex information.[10]

[8] Berg, Saunders, and Steffen (2016) argue that fees are an important part of the cost of debt, focussing mostly on credit lines. They report an average OID / up-front fee of about 80bp in their Table 1, which is similar to ours.

[9] Although we are told that no formal criteria are used, it was indicated to us that e.g. quotes with a depth of $3m on either side would be considered "reasonable."

[10] When the initially proposed quantity is a range, the flex is defined as the difference between the final quantity and the edge of the range. E.g. if the initial spread range is 525-550 bps, and the final spread is 600 bps, the spread flex would be reported as 600 - 550 = 50 bps.

We have 2,453 deals (out of 3,711) in our sample in which at least one of the spread, OID, or amount of an institutional facility was flexed. We have 325 deals in which more than one institutional facility is flexed. When aggregating to the deal level, we take the average flex across all facilities within a deal. Table 2 reports summary statistics on the distribution of flexes in our sample, at the deal level. Spreads are flexed frequently (in 1,626 deals). OIDs and amounts are flexed less often (1,389 and 1,153 deals, respectively).

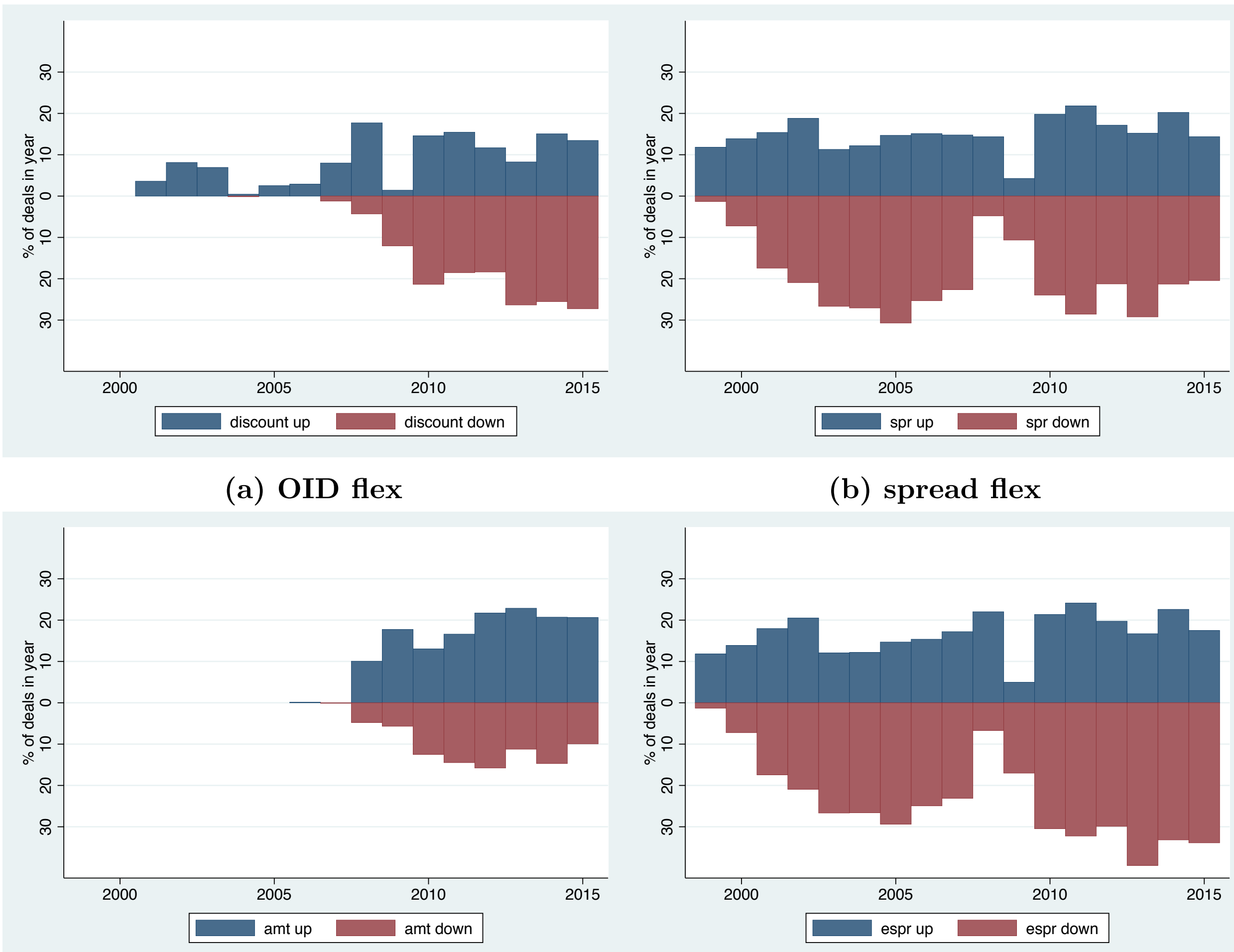
Table 2
Summary statistics - flex

Summary statistics at the deal level on the flex of amounts, spread, OID, and effective spread of institutional term loans in our sample. We calculate the deal-level amount flex by summing the amount flexes for all institutional loans in a deal. We calculate the deal-level spread flex and OID flex by taking averages over all institutional spread flexes and institutional OID flexes within a deal, respectively. We calculate the deal-level effective spread flex as the deal-level spread flex plus the deal-level OID flex divided by 4. Amounts are in million USD. Spread flex, discount flex, and effective spread flex are in bps of face value.

	Institutional amt. flex	Spread flex	OID flex	Eff. spread flex
mean	28	8	13	8
sd	273	64	132	67
min	-3,900	-200	-450	-200
25%.	-25	-25	-50	-37.5
median	10	-25	-25	-12.5
75%	50	50	50	50
max	2,600	325	1,700	425
N	1,153	1,626	1,389	2,103

We plot the fraction of deals for which spreads, OIDs, and amounts are flexed up or down by year in Figure 5. Comparing panel (a) and (b) shows that there has been a shift in the use of flex. While spread flex has been common practice for a long time (30-50 percent of deals per year), flexes in OIDs were uncommon before 2007. Moreover, if the OID was flexed before the financial crisis, it was only flexed up (and not down). Since the financial crisis, flexes in the OIDs (up and down) have become as frequent as flexes in the spreads. Flexes in amounts also became common practice with the financial crisis.

Flexing an OID up or flexing a spread up both make a loan more attractive to investors. Do arrangers tend to flex OID and spread in the same direction or in opposite directions? Table 3 indicates that they are much more likely to be flexed in the same direction. According to



(a) OID flex **(b) spread flex**

(c) amount flex **(d) effective spread flex**

Figure 5. Average up and down flex by year

Fraction of deals in our sample in a given year for which OIDs/ spreads/ amounts/ effective spreads are flexed up or down. OIDs were not flexed down before the financial crisis, and amounts were not flexed at all before the financial crisis, but are flexed both up and down now, reflecting a change in market practice.

practitioners, arrangers primarily flex in order to meet investors' demand for yield (as defined in Equation (1)). However, in situations in which the spread has been increased already but yield needs to be increased further, arrangers often increase the discount rather than further increasing the spread. This is because a very high spread can generate substantial prepayment risk.[11] Overall, this description by practitioners already suggests that flexes could be proxies for information about the ultimate demand for the loan that is revealed to arrangers during the bookbuilding process.

Table 3
Relation between discount and spread flex

Fraction of deals in our sample in which we observe spreads/ discounts being flexed down (↓) / not being flexed (=)/ being flexed up (↑), in percentage points.

	discount ↓	discount =	discount ↑	Total
spread ↓	13.74	11.37	0.16	25.28
spread =	10.46	43.38	2.51	56.35
spread ↑	0.49	7.81	10.08	18.38
	24.68	62.57	12.75	100.00

We describe when and whether loans are flexed in detail in Appendix B. In our sample, loans with a high talk yield, or loans that finance acquisitions or LBOs as opposed to refinancing existing loans, or that contain a revolving credit facility, are more likely to experience spread flex. A possible interpretation is that for such more complex loans, the arranger finds it harder to anticipate the true demand for the loan, and hence adjustments occur more frequently. Also, the likely direction in which spreads are flexed relates to net inflows into high yield mutual funds and CLOs. (These flows occur after the arranger has launched the deal, and hence are not known to the arranger at launch.) Net outflows, indicating low aggregate demand, are more likely to be associated with spreads being flexed up. Flexes in discounts exhibit a similar pattern. Finally, amounts are much more likely to be flexed when the loan is issued to finance a dividend or a share repurchase.

4 Demand discovery

In this section we provide evidence that a key economic function of the arranger in leveraged loan syndication is to engage in demand discovery. Specifically, we use the LCD data to test implications

[11]We were also told that accounting reasons (both on part of the lender or the borrower) could also influence the choice between providing yield via discount or spread.

of bookbuilding theory which relate to loan underpricing.

As mentioned in the introduction, bookbuilding theory describes how underwriters or arrangers elicit information from market participants about their willingness to pay for the security being issue (Benveniste and Spindt, 1989). Our first test checks whether arrangers underprice loans. Theory predicts that loan arrangers compensate potential investors for revealing information about their willingness to pay in some situations via underpricing in the primary market, so that on average, the loan is underpriced.

In the context of leveraged loans, underpricing can be calculated as the difference between the secondary market price and the primary market price:

$$\text{underpricing} = \underbrace{\text{break price}}_{\text{secondary market price}} - \underbrace{(\text{par} - \text{original issue discount})}_{\text{primary market price}}$$

To illustrate the importance of accounting for original issue discounts, consider that in 2009, in our data, break prices were on average about 130 bps below par. With these numbers, if market participants had bought the loan at par, they would have suffered an immediate mark-to-market loss of 130 bps. However, primary market prices include a discount. In 2009, on average, this discount was above 300 bps. So actually, on average, market participants enjoyed a mark-to-market gain of more than 170 bps. As is evident, the original issue discount plays a crucial role in the pricing of syndicated loans and cannot be ignored if returns to primary market investors are to be computed.

For 3,079 deals in our sample, we have at least one facility for which we have both a break price and a discount, and so can calculate a deal-level underpricing variable by taking the average underpricing across all facilities within the deal. The resulting distribution of our deal-level underpricing variable is described in Table 4.

The median underpricing is 75 bps of par. Since the break price that we have is a midpoint, and bid-ask spreads are substantial, the actual profit that a primary market participant could make by buying in the primary market and selling at the bid is going to be lower. With a typical bid-ask spread of about 75 bps, the profit would be about 37.5 bps. This number is lower than the 19% underpricing found for stocks (Jenkinson and Ljungqvist, 2001), is similar to the 47 bps underpricing found for speculative-grade bonds and higher than the zero underpricing found for investment-grade bonds (Cai, Helwege, and Warga, 2007).

To illustrate the cyclical nature of underpricing, Figure 6 plots the time series of our underpricing measure. The LCD data starts reporting break prices for deals in 2002. Initially, break prices are

Table 4
Summary statistics - underpricing

Summary statistics for deal-level underpricing in our sample. We first calculate underpricing at the facility level as break price − (par − discount), and then aggregate to the deal level by taking the average across all institutional facilities in a deal.

	underpricing
mean	84.836
sd	48.89
min	-150
25%	50
median	75
75%	100
max	450
N	3,079

only reported for a small fraction of the deals, so it is possible that some of the apparent early volatility in underpricing reflects data availability issues rather than cyclical variation. However, coverage improves over time. From the end of 2008 and on, break prices are reported for more than 80% of all deals. It can be seen that underpricing peaked at over 170 bps during the financial crisis in 2008-09. With the sharp increase in deals after the financial crisis, shown in Figure 3, underpricing has also fallen substantially since the crisis.

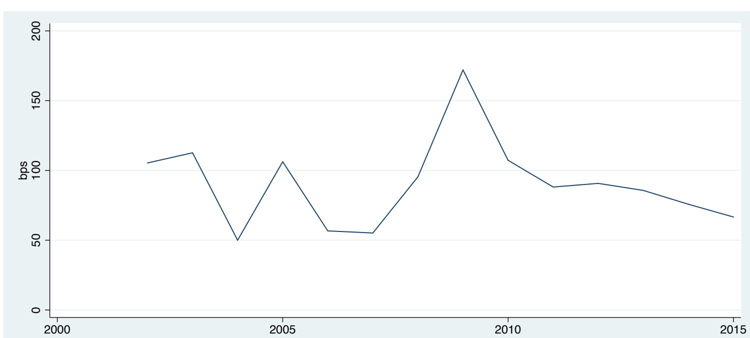


Figure 6. Underpricing
Average deal underpricing by year. We first calculate underpricing at the facility level as break price − (par − discount), and then aggregate to the deal level by taking the average across all institutional facilities in a deal. In the early part of the sample, few break prices are reported, so that we can only calculate underpricing for a small fraction of the deals. Coverage improves over time. By the end of 2008, when our sample starts, we can calculate underpricing for more than 80% of all deals.

A key implication of bookbuilding theory is that pricing should only adjust partially to revealed information: If potential syndicate members reveal that they find the loan terms very attractive, then the lead arranger can decrease the spread or discount, but must do so in a way that leaves a larger underpricing rent to investors as a reward for revealing that they find the loan terms attractive. The following hypothesis summarizes the testable implication.

Hypothesis 1. *The flex in the spread or discount is negatively related to underpricing.*

We test Hypotheses 1 by estimating the following equation at the deal level:

$$Underpricing_i = c + \beta_1 Spread\ Flex_i + \gamma X_i + \epsilon_i. \tag{3}$$

We control for additional loan characteristics (X_i) including whether the deal is rated, is sponsored, includes a covenant-lite facility, or includes a second lien as well as the loan amount, the talk all-in yield and fixed effects for loan purpose, borrower industry, and deal month-year. Table 5 shows the results of estimating Equation (3).

In column 1, we follow Ivashina and Sun (2011) and include the sum of net inflows to high yield mutual funds (obtained from the financial accounts of the United States) and CLO issuance (obtained from Lipper) to control for institutional demand and overall risk appetite, and therefore do not include time fixed effects. Consistent with Hypothesis 1, flexes in the spread have a negative and statistically significant effect on underpricing. The point estimate implies that a negative spread flex of 100 bps is associated with an increase in underpricing by about 13 bps. This "partial adjustment" is strong evidence that arrangers of leveraged loans engage in demand discovery, as do underwriters in equity IPOs (Hanley, 1993).

In column 2, we drop arranger fixed effects and add an indicator variable that is equal to 1 if a deal was arranged by one of the three lead arrangers with the largest market share and 0 otherwise. We can see that deals arranged by one of the top three lead arrangers exhibit about 8 bps less underpricing. This is consistent with the interpretation of Benveniste and Spindt (1989) that a potential substitute for underpricing in the current deal is the promise of additional underpricing in the future. In our context, lead arrangers with higher deal flow may be able to reduce underpricing in the current deal by rewarding potential syndicate members also with access to future deal flow. Since other theories offer alternative interpretations of this finding, it should be seen only as complementary evidence in favor of demand discovery.

Table 5
Underpricing and Spread Flex: Partial Adjustment

Regressions of underpricing measures on spread flex and original issue discount flex, and deal flow proxies, at the deal level. Underpricing is calculated as break price − (par − OID) at the facility level, and aggregated to the deal level by taking averages across all institutional facilities in a deal. Spread Flex and Discount Flex represent changes in spreads and discounts, respectively, over the syndication period, and assume that when no change is reported, this is because there is no change. Top Three is a dummy that indicates whether the lead arranger for a deal is one of the top three lead arrangers in terms of number of deals. Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Yield is log of the initially offered all-in yield to maturity. Log Talk Amount is the log of the initially proposed total institutional loan amount. Time fixed-effects are at the syndication month-year. (See Tables 1, 2, and 4 for relevant summary statistics).

	(1) underpricing	(2) underpricing	(3) underpricing	(4) underpricing	(5) underpricing
Spread Flex	-0.126***	-0.119***	-0.0865***	-0.0848***	-0.0837***
	(0.0238)	(0.0232)	(0.0235)	(0.0230)	(0.0245)
Discount Flex					-0.00368
					(0.00991)
Fund & CLO flows	0.804**	0.828**			
	(0.325)	(0.334)			
Log Synd. Time				9.190**	
				(4.475)	
Top Three		-7.596***			
		(2.014)			
Rated	8.622**	12.72***	9.553**	9.209**	9.542**
	(3.989)	(4.010)	(3.959)	(3.984)	(3.958)
Sponsored	-10.81***	-13.08***	-9.970***	-9.901***	-9.993***
	(2.130)	(2.067)	(2.166)	(2.130)	(2.169)
Cov-lite	-2.873	-2.318	3.186*	3.094*	3.196*
	(1.921)	(2.080)	(1.819)	(1.819)	(1.818)
Second Lien	-12.88***	-13.93***	-6.322*	-6.129*	-6.297*
	(3.351)	(3.569)	(3.321)	(3.268)	(3.309)
Log Maturity (Years)	0.207	3.458	4.259	4.148	4.231
	(4.013)	(4.283)	(3.990)	(4.010)	(3.991)
Log Talk Amount	5.183***	5.736***	4.101***	4.153***	4.113***
	(1.093)	(1.176)	(1.034)	(1.046)	(1.042)
Log Talk Yield	97.81***	93.74***	80.04***	79.53***	80.09***
	(6.543)	(6.425)	(5.868)	(5.784)	(5.884)
Arranger FE	Yes	No	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes
Observations	3075	3078	3075	3075	3075
R^2	0.308	0.264	0.409	0.411	0.409

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Next, in column 3-5, we drop the top three dummy and include arranger fixed effects, and more importantly also replace fund and CLO flows with syndication-month fixed effects. While the coefficients on spread flex are smaller than in column 1, the estimate remains highly statistically significant. The effect of flexes in the spread on underpricing implies that a negative spread flex of 100 bps is associated with an increase in underpricing by about 8 to 9 bps. Ivashina and Sun (2011) argue that time-to-syndication provides a plausible measure of demand for a specific loan.[12] We add time-to-syndication in column 4 and find that our point estimate on spread flex remains unchanged. Loans that take longer to syndicate exhibit significantly higher underpricing, possibly because complicated loans take longer to evaluate, and because for such loans, it is optimal to pay higher information rents in order to extract information about demand.

In column 5, we also include discount flex but find no significant effect of discount flexes on underpricing. This may be the result of low power (due to a lower number of observations in which the discount is flexed), or could suggest that the relevant margin of adjustment during the syndication process is the spread.

Benveniste and Spindt (1989) suggest that lower valuation uncertainty should produce lower underpricing. Some of the control variables that can be interpreted as proxies for valuation uncertainty merit discussion. We find that in times of high demand, measured by net inflows in high yield mutual funds and CLO issuances, underpricing is higher. Similarly, more risky loans, measured by the talk spread, are likely to be harder to value and indeed exhibit more underpricing. Some deals are sponsored by private equity groups. We interpret the presence of a sponsor as proxy for lower valuation uncertainty for the loan because not only the credit quality of the relatively unknown borrower, but also the credit quality of the presumably better known sponsor matters for the repayment probabilities. Consistent with this prediction, sponsored deals are associated with lower underpricing by about 12 bps. However, almost all theories predict that valuation uncertainty should be positively related to underpricing. Unlike the evidence on partial adjustment, these complementary finding cannot be seen as evidence in favor of a particular theory.

There is a potential sample selection issue that could affect our estimate of the relationship between underpricing and spread flex. It is possible that when investors show little interest in a deal in the primary market, such that the arranger needs to flex spread up substantially, they also show little interest in the secondary market, so that the loans are less likely to trade in the

[12] In Appendix C, we show that riskier loans and loans with downward flexes have longer time-to-syndication.

secondary market. In terms of numbers, we observe a break price for 588 (86%) of the 682 deals with positive spread flex. This compares to 874 (93%) of the 938 deals with negative spread flex. A simple test of difference of proportions suggests that this difference is significant. However, a multiple regression shows that once we control for the fact that a break price is more likely to be observed for larger, rated loans, with a longer maturity and a lower talk yield, the difference becomes statistically insignificant. (See Appendix C.3 for details.)

This selection issue, if present, would mean that we are less likely to observe a break price and hence the level of underpricing for deals with low demand and hence positive spread flex. Bookbuilding theory suggests that if underpricing were observed for such deals, it should be low. If we are missing such observations, then this should bias us against finding a significant and negative relationship between underpricing and spread flex. The fact that this is what we find indicates that the bias, if it exists, cannot be very strong. However, we cannot rule out that we overestimate the level of underpricing due to this selection issue.

5 Pipeline Risk

We have argued that engage in demand discovery, then this should have implications for the share they retain. For convenience, we repeat the key intuition here: Consider an arranger who announces that he will allocate large quantities in the loan to investors who express a high willingness to pay, and small quantities (or zero) to investors who express a low willingness to pay. The arranger will increase the final price (decrease the spread or discount) if most investors express a high willingness to pay, and decrease the price (increase the spread or discount) if most investors express a low willingness to pay. Then investors have no incentive to lie: If an investor pretends to have low willingness to pay in the loan, that will lower the final price, but this is unattractive precisely because the investor will then only obtain a small allocation. To preserve incentives, it is crucial that when prices are decreased (spreads or discounts are increased), less of the loan is allocated to investors.

In the context of leveraged term loans, it is often the case that the total amount that is borrowed cannot easily be flexed, such as in an LBO or an acquisition. But the logic of incentive compatibility dictates that when investors indicate a low willingness to pay, their allocations must be smaller. In such situations, the arranger must then make up for any shortfall of funds provided by investors, and the share retained by the arranger must therefore be higher. In the context of leveraged loan syndication, bookbuilding theory therefore leads to this new empirical prediction:

Hypothesis 2. *The flex in the spread or the flex in the discount is positively associated with the share retained by the arranger.*

To test this hypothesis, we match the LCD data with the Shared National Credit Program (SNC) to obtain the shares of lead arrangers (or simply the *lead shares*). The SNC is an annual survey of syndicated loans carried out by the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation (FDIC), the Office of the Comptroller of the Currency, and, until recently, the Office of Thrift Supervision. The program obtains confidential information from administrative agent banks on all loan commitments exceeding $20 million and shared by three or more unaffiliated federally supervised institutions, or a portion of which is sold to two or more such institutions. Information on new and existing loans that meet these criteria is collected as of December 31 of each year.[13]

In the LCD sample that we have used so far, we restricted ourselves to the deals for which we had information on the initially proposed yield (the "talk yield"). Matching this sample with SNC leaves us with very few observations. This is why here we also consider all deals from LCD which contain at least one institutional facility, which have a single lead arranger and a single stated purpose (8,716 deals).

We only retain term loans in SNC and match those to LCD on borrower name, origination date, and deal amounts. This yields a final matched sample of 1,848 loans. The average lead share in our sample is 5.3 percent. This number may appear low when compared to DealScan but is consistent with the time trend in lead shares for term loans in SNC (Bord and Santos, 2012). Another potential reason for the discrepancy relates to so-called "primary assignments," which are pre-arranged loan purchases on the origination date and at the primary market price, but which are structured as secondary market transactions. These allow off-shore investors, such as CLOs, to avoid the tax implications of direct participation in the primary market. A portion of what DealScan reports as the share of the arranger will typically be sold immediately upon close via such primary assignments. From that point of view, the lead share reported in SNC appears to be the more appropriate measure.[14]

[13]Information on the purpose of the SNC is provided at `www.federalreserve.gov/bankinforeg/snc.htm` and inclusion criteria at `www.newyorkfed.org/banking/reportingforms/guidelines.pdf`.

[14]In addition, while DealScan contains lender shares for about 18 percent of all deals in DealScan, it contains lender shares for only about 4 percent of the leveraged loan deals that we consider here. This

We test Hypothesis 2 by estimating the following regression:

$$Lead\ Share_i = c + \beta_1 Spread\ Flex_i + \gamma X_i + \epsilon_i, \tag{4}$$

If Hypothesis 2 is true, the coefficient β_1 should be positive.

The SNC lead share is observed on December 31. For this reason, when estimating equation (4), we initially focus on deals which close towards the end of the year, for which the arranger will have had less time to decrease its initial share by selling in secondary markets. Table 6 shows the estimation results, using only deals with an estimated closing date in October to December. In column (1), we only control for market-wide fluctuations in demand using fund & CLO flows as a market-wide demand proxy. Although the coefficient on spread flex is positive as predicted, it is not significant. When controlling more broadly for economic conditions using syndication month fixed effects in columns (2) through (7), however, we find a positive and statistically significant effect of spread flexes on lead share. We then examine whether conditions at the arranger matter for this effect, first by including time-invariant arranger fixed effects in column (3), and then via time-varying arranger-year fixed effects.[15] These do not appear to matter, as the point estimates are not substantially affected by the inclusion of these controls. A 100 bps upward flex in the spread is associated with an increase in the lead share of between 1.90 - 4.11 percent of face value, a 36-78 percent increase relative to the average lead share of 5.3 percent of face value. This result is robust to the inclusion of log syndication time (column 5). In column (6), we also control for the talk yield, which reduces the sample size by almost two-thirds. In this specification, the point estimate increases.

We also replicate a result of the prior literature: arrangers tend to keep a higher share (of about 2-3%) of unrated loans as opposed to rated loans (Sufi, 2007): the coefficient on the rated dummy is negative in columns 1-6 and statistically significant in columns 1 and 2. In studies that did not specifically focus on leveraged term loans, this has been interpreted as evidence that the share retained by the arranger is used as a commitment to monitor. In our case, the fact that the arranger can sell the leveraged term loans in an opaque over-the-counter secondary market

means that using DealScan as a source of lead share information when matching with LCD would result in only in a very small set of deals with both lead share and flex information, and is therefore not useful. (See Appendix D for details.)

[15]Irani and Meisenzahl (forthcoming) document that lenders conditions mattered for loan sales during the financial crisis. Specifically, they find that lenders that relied heavily on wholesale funding pre-crisis sold more loan shares.

Table 6
Lead Share - end year deals

Regressions of lead arranger share on spread flex and deal flow proxies, at the deal level. Lead Share is taken from the Shared National Credit Program, and matched with deals in LCD with an estimated closing date from October to December, as described in the main text. (Lead Share is expressed as a fraction between 0 and 1.) Spread flex and discount flex represent changes in spread and discount over the syndication period, and assumes that when no change is reported, this is because there is no change. Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Yield is log of the initially offered all-in yield to maturity. Log Talk Amount is the log of the total institutional loan amount. Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. Time fixed-effects are at the syndication month-year.

	(1) Lead Share	(2) Lead Share	(3) Lead Share	(4) Lead Share	(5) Lead Share	(6) Lead Share	(7) Lead Share
Spread Flex	0.000124	0.000217**	0.000190*	0.000276*	0.000272*	0.000296*	0.000411*
	(0.0000950)	(0.0000947)	(0.000103)	(0.000157)	(0.000156)	(0.000161)	(0.000225)
Discount Flex						-0.0000563	
						(0.000114)	
Fund & CLO flows	0.000401						
	(0.00120)						
Log Synd. Time					-0.0138		
					(0.0278)		
Rated	-0.0246**	-0.0205*	-0.0149	-0.0265	-0.0263	-0.0266	0.00617
	(0.0112)	(0.0118)	(0.0115)	(0.0167)	(0.0170)	(0.0166)	(0.0474)
Sponsored	-0.00722	-0.00294	-0.00769	-0.0209	-0.0200	-0.0212	-0.0521
	(0.0119)	(0.0147)	(0.0133)	(0.0170)	(0.0164)	(0.0169)	(0.0408)
Cov-lite	0.00310	-0.00107	0.00414	0.0119	0.0122	0.0122	0.0157
	(0.0157)	(0.0149)	(0.0159)	(0.0228)	(0.0225)	(0.0225)	(0.0299)
Second Lien	-0.00896	-0.00220	0.00444	0.00359	0.00351	0.00322	0.00566
	(0.0131)	(0.0127)	(0.0113)	(0.0160)	(0.0158)	(0.0160)	(0.0355)
Log Maturity (Years)	-0.0138	0.00179	-0.0259	-0.00843	-0.00882	-0.00891	0.00141
	(0.0227)	(0.0261)	(0.0263)	(0.0345)	(0.0348)	(0.0347)	(0.0900)
Log Talk Amount	-0.0177***	-0.0206***	-0.0145***	-0.0195***	-0.0194***	-0.0194***	-0.0174
	(0.00393)	(0.00535)	(0.00489)	(0.00713)	(0.00711)	(0.00712)	(0.0142)
Log Talk Yield							-0.00768
							(0.0540)
Arranger FE	No	No	Yes	No	No	No	No
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Arranger-Year FE	No	No	No	Yes	Yes	Yes	Yes
Observations	456	487	486	486	486	486	195
R^2	0.225	0.383	0.519	0.723	0.724	0.723	0.791

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

casts some doubt on this interpretation. An alternative interpretation would be that for unrated loans, arrangers attempt to signal quality through higher initial retention. Finally, the lead share is also significantly negatively related to the amount being borrowed (all columns), as arrangers take smaller shares in larger loans.

We also estimate Equation (4) using all matched deals, and not just those which close in October to December. The results, reported in Table 7, are broadly similar to those in Table 6. However, the coefficients on spread flex are smaller. This is consistent with the interpretation that when looking at all deals in a year, by December 31, arrangers have had (on average) more time to decrease their initial shares by selling in the secondary market.

Overall, this result highlights that the share retained by the lead arranger can have a completely different interpretation from the interpretations commonly found in the literature.

In some deals, the total amount that is issued can be flexed to match the amount that can be allocated to investors. This can be the case for instance when the loan is meant to finance a dividend to shareholders or a share repurchase. One should therefore also observe that if amounts can be flexed, they are flexed down when prices are flexed down (spreads or discounts are flexed up), and they are flexed up when prices are flexed up (spreads or discounts are flexed down).[16] We run the corresponding regression and find that this is indeed also the case. The relevant results are discussed in Appendix C.1.

Having established that lead arrangers retain a larger share precisely in the loans which investors find unattractive, we now ask whether getting stuck with such problematic loans affects the subsequent behavior of arrangers. Theory suggests that when banks have to retain problematic loans, this is likely to generate a debt overhang problem (Myers, 1977), which in turn reduces the banks willingness to raise capital to fund new lending (Admati, DeMarzo, Hellwig, and Pfleiderer, 2016; Bahaj and Malherbe, 2016). We would therefore expect that when many loans get stuck in an arranger's pipeline simultaneously, this could induce arrangers to reduce their arranging activity, or to scale back their lending in other markets. In practice, decision makers would likely complain about larger-than-expected lead shares tying down additional regulatory capital, or triggering risk management limits. We now assess whether this type of overhang resulting from the deal pipeline is related to subsequent arranging activity and participations in other syndicated loans.

[16]Hanley (1993) conducts a similar test in the context of equity IPOs.

Table 7
Lead Share - all deals

Regressions of lead arranger share on spread flex and deal flow proxies, at the deal level. Lead Share is taken from the Shared National Credit Program, and matched with deals in LCD. (Lead Share is expressed as a fraction between 0 and 1.) Spread flex and discount flex represent changes in spread and discount over the syndication period, and assumes that when no change is reported, this is because there is no change. Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Yield is log of the initially offered all-in yield to maturity. Log Talk Amount is the log of the total institutional loan amount. Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. Time fixed-effects are at the syndication month-year.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Lead Share	Lead Share	Lead Share	Lead Share	Lead Share	Lead Share	Lead Share
Spread Flex	0.000132***	0.000151***	0.000114**	0.000136**	0.000136**	0.000129*	0.000154*
	(0.0000487)	(0.0000527)	(0.0000558)	(0.0000616)	(0.0000615)	(0.0000690)	(0.0000867)
Discount Flex						0.0000138	
						(0.0000573)	
Fund & CLO flows	-0.0000667						
	(0.000529)						
Log Synd. Time					-0.00414		
					(0.0103)		
Rated	-0.0282***	-0.0275***	-0.0183***	-0.0165***	-0.0165***	-0.0165***	-0.0210
	(0.00522)	(0.00521)	(0.00540)	(0.00629)	(0.00629)	(0.00630)	(0.0147)
Sponsored	-0.00700	-0.00986*	-0.00879*	-0.00886	-0.00888	-0.00878	-0.0178
	(0.00461)	(0.00540)	(0.00518)	(0.00589)	(0.00588)	(0.00589)	(0.0135)
Cov-lite	0.00929	0.00170	0.00334	0.00363	0.00367	0.00357	0.000555
	(0.00618)	(0.00665)	(0.00656)	(0.00699)	(0.00700)	(0.00692)	(0.0112)
Second Lien	-0.00518	-0.00129	0.00202	0.000562	0.000442	0.000525	-0.000897
	(0.00560)	(0.00560)	(0.00543)	(0.00594)	(0.00594)	(0.00597)	(0.0153)
Log Maturity (Years)	-0.0123	-0.00681	-0.0106	-0.0142	-0.0142	-0.0141	-0.0272
	(0.0112)	(0.0124)	(0.0119)	(0.0125)	(0.0125)	(0.0125)	(0.0241)
Log Talk Amount	-0.0213***	-0.0237***	-0.0192***	-0.0174***	-0.0173***	-0.0174***	-0.0115**
	(0.00241)	(0.00267)	(0.00266)	(0.00275)	(0.00273)	(0.00275)	(0.00494)
Log Talk Yield							-0.00212
							(0.0276)
Arranger FE	No	No	Yes	No	No	No	No
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Arranger-Year FE	No	No	No	Yes	Yes	Yes	Yes
Observations	1750	1864	1860	1860	1860	1860	638
R^2	0.165	0.352	0.463	0.595	0.595	0.595	0.520

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When constructing a proxy for "pipeline overhang," two observations have to be taken into consideration. First, debt overhang theory or, alternatively, the constraints stemming from regulatory capital or risk management imply that pipeline overhang should be measured in levels. Second, better-than-expected syndications potentially offset the effect of worse-than-expected syndications, as they generate slack on the balance sheet that can be used for additional arranging and/or lending. Hence, our main proxy for pipeline overhang for arranger i is difference in syndications with positive and negative effective spread flexes in the previous quarter ($net\ flex_{it-1}$), measured either by the difference in the number of arranged loans (*Net Loans with Positive Flexes*) or in the total arranged loan amount (*Net Amount with Positive Flexes*).

We start by examining the effects of pipeline overhang on the arranging of leveraged term loans. We aggregate all loans arranged by a given lead arranger in the LCD data in each quarter. Quarters with no arranging activity are included with both $net\ flex_{it}$ on $lending_{it}$ set to 0 for those quarters.[17] We study two outcomes at the arranger-quarter level: number of arranged loans and total arranged loan amounts. Like our proxy for pipeline overhang, both outcomes ($lending_{it}$) are measured in levels. Pipeline overhang is expected to reduce an arranger's willingness to arrange *new* loans in the current quarter—that is, we expect a negative coefficient on $net\ flex_{it-1}$ when regressing $net\ flex_{it-1}$ on $lending_t$. In our empirical model, we include lead arranger fixed effect (θ_i) and time fixed effect (γ_t), and later also arranger-time fixed effects, to control for unobserved arranger characteristics and macroeconomic conditions, and time-varying arranger conditions, respectively.

$$lending_{it} = \beta_1 net\ flex_{it-1} + \beta_2 lending_{it-1} + \theta_i + \gamma_t + \epsilon_{it} \tag{5}$$

Table 8 shows the results of estimating Equation (5) with the number of arranged loans as outcome. We pick as our independent variable of interest the difference in number of arranged loans with positive and negative effective spread flexes. Consistent with pipeline overhang reducing the willingness to arrange loans, the coefficient on *Net Loans with Positive Flexes* is negative and statistically significant at the 1 percent level (column 1). One potential concern with this specification is that arranger fixed-effects do not sufficiently control for different trajectories of arrangers' economic conditions. We therefore include arranger-specific trends in column 2 and find that the estimated coefficient remains basically unchanged. To address concerns about trend breaks

[17] We only fill in quarters between the first and the last arranging activity. Fully balancing the panel does not change the results. Dropping quarters with no lending yields similar results.

Table 8
Effective spread flex and arranging activity (number of loans)

Regressions of number of loans arranged on net loans with positive flexes. Number of loans arranged on the quarterly level is calculated from the LCD data. Net loans with positive flexes is the difference of loans with positive and negative effective spread flexes in a quarter in the LCD data. Time fixed-effects are at the syndication-quarter level. Arranger trend is a linear time trend. Arranger post-crisis trend is a linear trend starting in 2009Q3.

	(1)	(2)	(3)	(4)	(5)
	Loans	Loans	Loans	Loans	Loans
Net Loans with Positive Flexes$_{t-1}$	-0.378***	-0.402***	-0.425***	-0.455***	-0.352**
	(0.0865)	(0.0825)	(0.0877)	(0.102)	(0.138)
Loans$_{t-1}$	0.534***	0.404***	0.368***	-0.125	0.377***
	(0.0513)	(0.0580)	(0.0588)	(0.108)	(0.0945)
Arranger FE	Yes	Yes	Yes	No	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Arranger Trend	No	Yes	Yes	No	No
Arranger Post-Crisis Trend	No	No	Yes	No	No
Arranger-Year FE	No	No	No	Yes	No
Observations	2912	2912	2912	2912	966
R^2	0.796	0.815	0.819	0.889	0.843

Standard errors in parentheses
SEs clustered by quarter
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

during the 2008-09 financial crisis, we add a separate, linear post-crisis trend, which increases the size of the coefficient somewhat. To more flexibly control for the arrangers' economic conditions, we use arranger-year fixed effects in column 4. The estimated coefficient is comparable to the baseline in column 1 and remains statistically significant at the 1 percent level, suggesting that unobserved arranger economic conditions do not play a large role. Finally, in column 5 we restrict the sample to the post-crisis period and find that in this shorter panel the point estimate remains almost the same as in the baseline specification. In terms of economic significance, an arranger who flexes spreads up on an additional two loans will arrange about one loan less in the subsequent quarter. For comparison, the standard deviation in *Net Loans with Positive Flexes* is 1.47, and the average number of loans arranged per quarter is 2.78.

Table 9
Effective spread flex and arranging activity (dollar value)

Regressions of total arranged loan amounts on net amount with positive flexes. Number of loans arranged on the quarterly level is calculated from the LCD data. Net amount with positive flexes is the difference of loan amounts of loans with positive and negative effective spread flexes in a quarter in the LCD data. Time fixed-effects are at the syndication-quarter level. Arranger trend is a linear time trend. Arranger post-crisis trend is a linear trend starting in 2009Q3.

	(1)	(2)	(3)	(4)	(5)
	Loan Amount	Loan Amount	Loan Amount	Loan Amount	Loan Amount
Net Amount with Positive Flexes$_{t-1}$	-0.450***	-0.407***	-0.443***	-0.582***	-0.492**
	(0.148)	(0.151)	(0.160)	(0.209)	(0.227)
Loan Amount$_{t-1}$	0.504***	0.381***	0.344***	-0.109	0.327***
	(0.0565)	(0.0644)	(0.0648)	(0.108)	(0.104)
Arranger FE	Yes	Yes	Yes	No	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Arranger Trend	No	Yes	Yes	No	No
Arranger Post-Crisis Trend	No	No	Yes	No	No
Arranger-Year FE	No	No	No	Yes	No
Observations	2912	2912	2912	2912	966
R^2	0.727	0.750	0.756	0.851	0.795

Standard errors in parentheses
SEs clustered by quarter
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

While the findings for the number of loans as outcome are consistent with pipeline overhang, arrangers could just refrain from arranging some small loans, with little effect on their overall arranging activity. We therefore show the results of estimating Equation (5) with the total arranged loan amount as outcome in Table 9. We now pick as our independent variable of interest the difference in the loan amounts of arranged loans with positive and negative effective spread flexes.

In the baseline specification (column 1), the coefficient on *Net Amount with Positive Flexes* is negative and statistically significant at the 1 percent level. In terms of economic significance, an arranger who flexes spreads up on an additional \$1,000 million worth of loans decreases the arranged loan amount in the subsequent quarter by about \$500 million, so that the estimated effect for amounts is similar to the estimated effect for numbers. For comparison, the standard deviation of *Net Amount with Positive Flexes* is \$914.36 million, and the average amount arranged per quarter is \$1,232 million. To ensure the robustness of these results, we include a linear trend in column 2, a separate post-crisis trend in column 3, and bank-year fixed effects in column 4 and find similar results. When looking only at the post-crisis sample, we find a comparable coefficient (column 5). In sum, we find a robust, negative relationship between net flex and loan origination.

The results are consistent with our interpretation that when arrangers have to retain larger-than-expected shares in less successful syndications, they subsequently have less capacity to arrange loans. An alternative interpretation would be that it is borrowers who do not want loans to be arranged by arrangers who have had less successful syndications. Under either interpretation, the arranging banks are affected, so both raise financial stability concerns. Under the second interpretation, however, borrowers themselves would be less likely to be affected directly.

The second interpretation appears to be a priori less plausible. League tables are widely accepted as a measure of arranger success, and are used by arrangers to attract customers. These tables are based on the number and amounts of arranged loans, which are meant to reflect experience and expertise. They are not based on spread flexes. This suggests that borrowers are unlikely to pick an arranger on the basis of spread flexes.

To shed further light on the plausibility of the two interpretations, we check whether net flex is related to participations in unrelated syndications, rather than arranging activity. Under the overhang interpretation, the retention of problematic loans due to syndication issues should also reduce the willingness of affected arrangers to hold participations in unrelated syndications. Under the borrower choice interpretation, while borrowers may not want the less successful arrangers to arrange their loans, there is no reason why they should care about whether the less successful arrangers hold participations in their loans.

To construct a sample that contains information on participations, we first restrict ourselves to the more active arrangers. We define these as arrangers who arranged loans in at least half of all quarters in the LCD data. We hand-match these to the SNC data. This leaves us with the 19 active arrangers who together account for 88 percent of the leveraged term loan market.[18] In the SNC data, we use all participations of these arrangers, and not just the participations in which the arranger is the lead bank, to construct an arranger-quarter panel of total *new lending* based on the origination date.[19] Note that here, we also includes participations in investment grade term loans and credit lines. One caveat is that the SNC only reports loan shares as of December 31st of the reporting year. We assign that year-end loan share to the respective origination quarter. While this assignment introduces measurement error in term loan lending because of secondary market activity, the assignment should be accurate for credit lines, which are rarely traded.

Table 10
Effective spread flex and participation in new syndications

Regressions of total, credit line, and term loan lending on net amount with positive flexes. Total, credit line, and term loan lending arranged on the quarterly level is calculated from the SNC data. For details, see text. Net amount with positive flexes is the difference of loan amounts of loans with positive and negative effective spread flexes in a quarter in the LCD data. Time fixed-effects are at the syndication-quarter level. Arranger trend is a linear time trend. Arranger post-crisis trend is a linear trend starting in 2009Q3.

	(1) Total Lending	(2) Total Lending	(3) CL Lending	(4) CL Lending	(5) TL Lending	(6) TL Lending
Net Amount with Positive Flexes	-0.147*	-0.166**	-0.137**	-0.149**	-0.00524	-0.0132
	(0.0760)	(0.0828)	(0.0583)	(0.0654)	(0.0237)	(0.0258)
TL Lending					0.401***	0.248***
					(0.0852)	(0.0934)
CL Lending			0.597***	0.382***		
			(0.0624)	(0.0813)		
Total Lending	0.594***	0.371***				
	(0.0750)	(0.0984)				
Arranger FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Arranger Trend	No	Yes	No	Yes	No	Yes
Arranger Post-Crisis Trend	No	Yes	No	Yes	No	Yes
Observations	1035	1035	1035	1035	1035	1035
R^2	0.869	0.889	0.878	0.895	0.718	0.752

Standard errors in parentheses
SEs clustered by quarter.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10 shows the results of estimating Equation (5) with the following outcome variables: new term loan participations, new credit line participations, and new total participations. As our independent variable of interest, we pick the difference in the loan amounts of arranged loans with

[18]The result shown above also hold when using only this subsample of arrangers.
[19]We do this only for the first time a loan is observed in the SNC. We double-check that the origination year and reporting year line up.

positive and negative effective spread flexes. The results relating to total participations are in columns 1 and 2. The coefficient on *Net Amount with Positive Flexes* is negative and statistically significant in the baseline specification (column 1) and when including arranger-specific time trends (column 2). The estimated coefficient implies that an arranger who raises spreads on an additional $1,000 million of loans in one quarter reduces participations by about $150 million in the following quarter. For comparison, the standard deviation of *Net Amount with Positive Flexes* for this subsample of more active arrangers is $1661.9 million, and the average amount arranged is $4,400 million (out of which $3,500 million would be credit lines, and the rest term loans).

Does this change in new total lending come from term loans or from credit lines? Banks are more likely to distribute term loans, whereas they are more likely to hold credit lines. Therefore, we would expect most of the effect to be driven by credit lines. Our results are consistent with this interpretation: First, we look at credit lines in columns 3 and 4. In the baseline specification (column 3) and including arranger-specific linear time trends for pre- and post-crisis (column 4) we find a negative and significant coefficient on *Net Amount with Positive Flexes*, suggesting that a clogged pipeline in the leveraged term loan market negatively affects lending in the syndicated credit line market. The magnitudes of the effect for credit lines and the effect for total participations differ only very slightly. In contrast, we find no effect of our pipeline overhang proxy on new term loan lending in the baseline specification and when including arranger-specific time trends (columns 5 and 6). It is likely that we do not observe an effect here because banks sell their participations in term loans in the secondary market between the origination date and December 31, when we first observe the loan share in SNC.[20]

To sum up, in this section, we have shown that when leveraged term loan syndications do not go well and spreads need to be flexed up, arrangers end up holding a larger-than-expected shares of the loan. Our findings suggest that when such problematic loans clog the pipeline, arrangers' capacities to arrange new loans is decreased considerably. The economic effects of such clogs are not contained to the leveraged loan markets. Sizable spillovers to the shares held in new credit lines suggests that pipeline overhang can hamper a number of bank activities.

[20]Aramonte, Lee, and Stebunovs (2015) document that in the first quarter after origination banks sell substantial parts of their term loan shares.

6 Conclusion

We use novel data on leveraged term loans to study adjustments to pricing and quantities of the loans during their syndication. The data allows us to draw conclusions about the nature of the syndication process and about the underlying informational frictions. Our results show that an important economic function of arrangers is to uncover the true demand for the loan, via an exercise that resembles bookbuilding. In the context of loan syndication, bookbuilding implies that the arranger will place less of the loan and is likely to have to retain a larger share when the demand revealed by investors is lower than expected. We document that this is the case. Retaining such problematic loans can cause a debt overhang problem. Consistently, we show that when arrangers have difficulties placing loans with investors, they subsequently reduce the number and dollar volume of loans that they arrange, as well as the shares that they hold in new, unrelated syndications.

While a loan is in the syndication pipeline, an arranger faces the risk of having to retain a larger share if it turns out that investors are willing to pay less than expected. We refer to the risk of such retention as pipeline risk. Pipeline risk can be sizeable, because often formal or informal guarantees need to be given to borrowers before the arranger can learn much about investors' willingness to pay. Pipeline risk also raises macro-prudential concerns, as it can be correlated across arrangers during a market-wide downturn. Pipeline risk can therefore amplify credit cycles, with broader implications for bank lending and the real economy.

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Appendix

A Anecdotal Evidence on Pipeline Risk

In this appendix, we present some anecdotal evidence on pipeline risk.

- In February 2008 the syndication of $14 billion debt used to finance the buy-out of Harrah's Entertainment by Apollo Management and Texas Pacific Group collapsed. The group of banks syndicating the loan were not able to sell the leveraged buy-out debt to third parties. The unsold debt remained on the banks' books, which in turn led to a sizable loss at a time when banks were already holding more than $150 billion of unsyndicated, mostly LBO-related debt.[21]

- At the beginning of the financial crisis, concerns about syndicated bridge loans financing LBOs emerged, since selling off these loans became virtually impossible. As such, banks were on the hook for billions in bridge loans. Citi's Chief Financial Officer, Gary Crittenden, told participants of a conference call on July 20, 2008 that Citi was involved in four LBO financings that could not be sold and that other such deals would occur in the future.[22]

- The financing for the largest private-equity deal until 2008, the $41 billion leveraged buy-out of BCE Inc. by a consortium of Ontario Teacher's Pension Plan, Providence Equity Partners LLC, Madison Dearborn partners LLC, and Merrill Lynch Global Private Equity, was supposed to be arranged by Citigroup Inc., Deutsche Bank AG, Royal Bank of Scotland PLC and Toronto Dominion Bank. The banks underwrote $34 billion debt to fund the deal. Overall demand for the debt turned out to be so weak that the four banks would have been on the hook for losses of as much as $12 billion. However, the LBO collapsed after KPMG expressed concerns about the financial condition of BCE and delivered a preliminary opinion that it could not provide a certificate of solvency.[23]

[21] "Loan market in 'disarray' after Harrah's upset" Financial Times, February 4, 2008, available at `http://www.ft.com/cms/s/0/645de070-d2c3-11dc-8636-0000779fd2ac.html`.

[22] "Bridge Loans Put Banks in a Bind" Bloomberg Business, August 13, 2007, available at `http://www.bloomberg.com/bw/stories/2007-08-13/bridge-loans-put-banks-in-a-bindbusinessweek-business-news-stock-market-and-financial-advice`.

[23] "BCE Leveraged Buyout Deal Collapses" Wall Street Journal, Dec 11, 2008, available at `http://www.wsj.com/articles/SB122896949125997537`.

- In November 2010, Sports Authority refinanced a $275 million bullet term loan that paid LIBOR + 225bps and had no LIBOR floor with a new, $300m bullet term loan. The arranger, BofA Merrill Lynch, originally priced the loan at LIBOR + 525bps-550bps along with a 1.5% LIBOR floor and a discount of 1-2%. However, due to low demand the terms had to be adjusted to LIBOR + 600bps with a discount of 3%. Concurrently, the cell phone insurance provider Asurion had to sell debt with a discount of 4%, substantially higher than the initially proposed discount of 1%, and also higher than underwritten discount limit of the Barclays-led syndicate.[24]

- In 2013, arrangers for the loan financing the buyout of Rue21 were on the hook for $780 million and stood to lose up to $100 million due to having to slash prices to place the underwritten loan with institutional investors.[25]

- With spreads on high-yield bonds increasing in late 2015, banks found it harder to sell syndicated loans financing LBOs. In the fall of 2015, six deals failed to attracted enough investor interest. Consequently, financing for new deals became much harder to obtain. By January 21, 2016, banks had still not managed to complete the syndication of 20 of the LBOs initiated in 2015, with a total value of $40 billion.[26]

- In October 2015, arrangers for the $1.2 billion loan financing the buyout of FullBeauty were struggling to sell it.[27] According to the LCD data, placing this loan required an increase in the discount of 7.5% of face value.

- In November 2015, Carlyle Group's buyout of Veritas collapsed when the arrangers, Bank of America Merrill Lynch and Morgan Stanley, could not place the LBO debt. One of the first adjustments the banks offered was to cut the size of the term loan B to $1.5 billion from $2.45 billion - moving $ 250 million to bonds and retaining $700 million themselves. With the new spreads well outside the initial range, investors knew the banks were on the hook.

[24] "Covenant-lite loans are back but investors hope to limit mistakes of the past" Financial Times, November 24, 2010, available at `http://www.ft.com/cms/s/2/a242e5d0-f812-11df-8d91-00144feab49a.html`.

[25] "Banks Seeking to Sell Rue21 Debt at a Discount; Three Banks on Hook for $780 million in Buyout Financing," Wall Street Journal, 25 September 2013.

[26] "Buyout firms lose leverage with backers" Financial Times, January 21, 2016, available at `http://www.ft.com/cms/s/0/3ace5424-bfdc-11e5-9fdb-87b8d15baec2.html`.

[27] "Warning for M&A: Another Debt Deal Struggles; Goldman, J.P. Morgan run up against wary investors in attempt to shed leveraged loans," Wall Street Journal, 6 Oct 2015.

However, this offer did not sway investors. The underwriters then tried to sweeten the deal by raising the spread and offering a steeper discount of 5%. When even these terms did not attract investors, the banks bumped up the discount to 10%. After these efforts failed, the financing was subsequently pulled.[28]

[28] "Underwriters on the hook after botch" Reuters, November 20, 2015, available at http://www.reuters.com/article/veritas-ma-carlyle-group-debt-idUSL8N13D3Z620151120.

B When are loans flexed?

What determines when and whether loan terms are flexed? If the underlying reason is that the arranger does not know the ultimate demand for the loan, then we should probably observe more or bigger flexes, up and down, for loans for which demand should be harder to judge. Whether demand for a loan is harder to judge may relate to loan characteristics such as the riskiness or purpose of the loan.

We first examine flexes in spreads. To describe how in our data, the probability and direction of spread flex relate to loan characteristics, we estimate a linear probability model, in which the dependent variable is either a dummy variable that is equal to 1 if the spread was flexed, or equal to 1 if the spread was flexed up only, or equal to 1 if it was flexed down only. Explanatory variables include the log talk yield (the initial all-in yield to maturity at the beginning of the syndication process, see also Equation (1)), and dummies that indicate whether the loan is made to finance an LBO or Acquisition. We control for time-varying and market-wide institutional demand and overall risk appetite, by either including time fixed effects, or fund and CLO flows. We also control for additional loan characteristics including a polynomial of the loan amount, whether the deal contains a revolving credit facility, is rated, is sponsored, includes a covenant-lite facility, or includes a second lien as well as fixed effects for loan purpose, borrower industry, and lead arranger.

Table 11 shows the results from this estimation. In columns (1) and (2), it can be seen that loans with a high talk yield, or loans that finance Acquisitions or LBOs as opposed to refinancing existing loans, or that contain a revolving credit facility, are more likely to experience spread flex. A possible interpretation is that for such more complex loans, the arranger finds it harder to anticipate the true demand for the loan, and hence adjustments occur more frequently. In columns (3) to (6), we examine the direction of spread flex, by using as dependent variables dummies which are 1 when the spread is flexed up only (flexed down only), and show that these are related to net inflows into high yield mutual funds and CLOs: In column (4), we can see that net inflows, indicating high demand, are more likely to be associated with spreads being flexed down. In column (6), we can see that net outflows, indicating low demand, are more likely to be associated with spreads being flexed up. It is important to note that such inflows and outflows are contemporaneous and therefore not known to the lead arranger at launch.

We now turn to flexes in discounts. We first estimate a linear probability model in which the dependent variable is either a dummy variable that is equal to 1 if the discount was flexed, or equal

Table 11
Incidence and direction of spread flex

Regressions of institutional spread flex dummies on loan characteristics at the deal level. Spr Flex (d) is equal to 1 if the spread was flexed. Spr Flex Up (d) and Spr Flex Down (d) are equal to 1 if the spread was flexed up or down, respectively. Log Talk Yield is the initially offered all-in yield to maturity. Acquisition and LBO are indicator variables for the respective loan purpose. (Refinancing is the omitted purpose category.) Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances, measured in millions. Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Amount is the log of the initially offered loan amount. Time fixed-effects are at the syndication month-year. (See Tables 1 and 2 for relevant summary statistics).

	(1) Spr Flex (d)	(2) Spr Flex (d)	(3) Spr Flex Down (d)	(4) Spr Flex Up (d)	(5) Spr Flex Down (d)	(6) Spr Flex Up (d)
Log Talk Yield	0.197***	0.173***	0.0161	0.183***	0.0733*	0.101***
	(0.0390)	(0.0396)	(0.0353)	(0.0374)	(0.0381)	(0.0356)
Acq.	0.148***	0.137***	0.104***	0.0457**	0.0857***	0.0526***
	(0.0229)	(0.0217)	(0.0223)	(0.0211)	(0.0220)	(0.0200)
LBO	0.204***	0.199***	0.152***	0.0585**	0.133***	0.0710**
	(0.0276)	(0.0256)	(0.0284)	(0.0280)	(0.0284)	(0.0280)
Fund & CLO flows		0.00158			0.0101***	-0.00838***
		(0.00217)			(0.00247)	(0.00218)
RC dummy	0.173***	0.175***	0.0944***	0.0796***	0.0942***	0.0816***
	(0.0190)	(0.0188)	(0.0214)	(0.0140)	(0.0194)	(0.0148)
Rated	0.0296	0.0244	0.00780	0.0237	0.0113	0.0144
	(0.0327)	(0.0313)	(0.0289)	(0.0247)	(0.0284)	(0.0235)
Sponsored	-0.0527***	-0.0425**	-0.0666***	0.0122	-0.0511***	0.00708
	(0.0199)	(0.0206)	(0.0156)	(0.0167)	(0.0171)	(0.0168)
Cov-lite	-0.00473	-0.0210	0.0476***	-0.0505***	0.0152	-0.0345**
	(0.0208)	(0.0200)	(0.0163)	(0.0184)	(0.0193)	(0.0170)
Second Lien	-0.00117	0.00298	0.00356	0.00552	-0.0440	0.0567**
	(0.0282)	(0.0265)	(0.0267)	(0.0276)	(0.0271)	(0.0276)
Log Maturity (Years)	0.156***	0.202***	0.152***	0.00246	0.169***	0.0325
	(0.0377)	(0.0356)	(0.0351)	(0.0310)	(0.0353)	(0.0315)
Log Synd. Time	-0.0109	-0.0509	0.0480	-0.0580	-0.0296	-0.0226
	(0.0364)	(0.0360)	(0.0449)	(0.0372)	(0.0407)	(0.0331)
Amount Polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Arranger FE	Yes	Yes	Yes	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	Yes	No	No
Observations	3693	3693	3693	3693	3693	3693
R^2	0.252	0.212	0.193	0.184	0.125	0.122

Standard errors in parentheses
SEs clustered by syndication month.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

to 1 if the discount was flexed up only, or equal to 1 if it was flexed down only. Table 12 shows the results of these estimations. As in the case of spread flex, we find that discounts are more likely to be flexed for loans with a high talk yield, or loans that finance Acquisitions or LBOs as opposed to refinancing existing loans. Again, a possible interpretation is that for such more complex loans, the arranger finds it harder to anticipate the true demand for the loan, and hence adjustments occur more frequently. We can also see that discounts are more likely to be decreased when there are inflows into high yield mutual funds and CLOs, and more likely to be increased when there are outflows. Even though the results for the discount flexes are less statistically significant, they are similar to those for spread flexes.

Finally, we examine flexes in amounts. We estimate a linear probability model in which the dependent variable is either a dummy variable that is equal to 1 if the institutional amount was flexed, or equal to 1 if the amount was flexed up only, or equal to 1 if it was flexed down only. Table 13 shows the results of these estimations. Here, we report an additional fixed effect related to the purpose of the deals: Eq. Payout is a dummy that is one if the purpose of the loan is to finance a dividend or share repurchase. It can be seen that in particular in the syndication of such loans, amounts tend to be adjusted. (The omitted purpose category is Refinancing.)

Table 12
Incidence and direction of discount flex

Regressions of institutional discount flex dummies on loan characteristics at the deal level. Disc Flex (d) is equal to 1 if the discount was flexed. Disc Flex Up (d) and Disc Flex Down (d) are equal to 1 if the discount was flexed up or down, respectively. Log Talk Yield is the initially offered all-in yield to maturity. Acquisition and LBO are indicator variables for the respective loan purpose. (Refinancing is the omitted purpose category.) Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Amount Polynomial is a 4th-order polynomial in the log of the initially offered loan amount. Time fixed-effects are at the syndication month-year. (See Tables 1 and 2 for relevant summary statistics).

	(1)	(2)	(3)	(4)	(5)	(6)
	Disc Flex (d)	Disc Flex (d)	Disc Flex Down (d)	Disc Flex Up (d)	Disc Flex Down (d)	Disc Flex Up (d)
Log Talk Yield	0.205***	0.161***	-0.00112	0.209***	0.0252	0.138***
	(0.0447)	(0.0369)	(0.0400)	(0.0325)	(0.0374)	(0.0311)
Acq.	0.218***	0.226***	0.174***	0.0428*	0.167***	0.0571***
	(0.0229)	(0.0221)	(0.0225)	(0.0216)	(0.0220)	(0.0185)
LBO	0.250***	0.256***	0.180***	0.0699***	0.166***	0.0883***
	(0.0282)	(0.0287)	(0.0260)	(0.0232)	(0.0279)	(0.0242)
Fund & CLO flows		0.00369**			0.0114***	-0.00774***
		(0.00185)			(0.00197)	(0.00177)
RC dummy	0.105***	0.100***	0.0654***	0.0410***	0.0633***	0.0382***
	(0.0191)	(0.0182)	(0.0157)	(0.0122)	(0.0152)	(0.0132)
Rated	0.0918***	0.0962***	0.0621**	0.0305	0.0700***	0.0269
	(0.0329)	(0.0314)	(0.0259)	(0.0251)	(0.0242)	(0.0248)
Sponsored	-0.0233	-0.0159	-0.00522	-0.0199	0.00422	-0.0216*
	(0.0179)	(0.0185)	(0.0175)	(0.0134)	(0.0171)	(0.0129)
Cov-lite	0.0310*	0.0406**	0.0619***	-0.0283**	0.0539***	-0.0108
	(0.0175)	(0.0175)	(0.0165)	(0.0121)	(0.0184)	(0.0110)
Second Lien	0.0316	0.0402	0.0358	0.00289	0.00484	0.0420
	(0.0325)	(0.0293)	(0.0260)	(0.0253)	(0.0257)	(0.0263)
Log Maturity (Years)	0.0437	0.0735	0.0963**	-0.0524*	0.0932**	-0.0193
	(0.0498)	(0.0478)	(0.0431)	(0.0305)	(0.0410)	(0.0321)
Log Synd. Time	0.0364	-0.00646	0.0911**	-0.0584**	0.0324	-0.0418*
	(0.0365)	(0.0316)	(0.0359)	(0.0278)	(0.0293)	(0.0241)
Amount Polynommial	Yes	Yes	Yes	Yes	Yes	Yes
Arranger FE	Yes	Yes	Yes	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	Yes	No	No
Observations	3693	3693	3693	3693	3693	3693
R^2	0.178	0.144	0.160	0.166	0.102	0.109

Standard errors in parentheses
SEs clustered by syndication month.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13
Incidence and direction of amount flex

Regressions of institutional amount flex dummies on loan characteristics at the deal level. Amt Flex (d) is equal to 1 if the amount was flexed. Amt Flex Up (d) and Amt Flex Down (d) are equal to 1 if the spread was flexed up or down, respectively. Log Talk Yield is the initially offered all-in yield to maturity. Acquisition, LBO, and Eq. Payout are indicator variables for the loan purpose, where Eq. Payout indicates a Recapitalization to finance a dividend or a share repurchase. (Refinancing is the omitted purpose category.) Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Amount Polynomial is a 4th-order polynomial in the log of the initially offered loan amount. Time fixed-effects are at the syndication month-year. (See Tables 1 and 2 for relevant summary statistics).

	(1)	(2)	(3)	(4)	(5)	(6)
	Amt Flex (d)	Amt Flex (d)	Amt Flex Down (d)	Amt Flex Up (d)	Amt Flex Down (d)	Amt Flex Up (d)
Log Talk Yield	0.138***	0.162***	0.00476	0.132***	0.0153	0.146***
	(0.0468)	(0.0383)	(0.0295)	(0.0416)	(0.0268)	(0.0331)
Acq.	0.0801***	0.0668***	0.0467**	0.0395*	0.0440**	0.0292
	(0.0228)	(0.0222)	(0.0189)	(0.0206)	(0.0185)	(0.0201)
LBO	0.0610*	0.0497	-0.0485**	0.104***	-0.0473**	0.0912***
	(0.0322)	(0.0310)	(0.0225)	(0.0279)	(0.0213)	(0.0262)
Eq. Payout	0.211***	0.192***	0.160***	0.0899	0.160***	0.0682
	(0.0587)	(0.0604)	(0.0508)	(0.0584)	(0.0505)	(0.0598)
Fund & CLO flows		0.00285			-0.00324***	0.00579***
		(0.00191)			(0.00116)	(0.00171)
RC dummy	0.0921***	0.0888***	0.0896***	0.0267*	0.0933***	0.0194
	(0.0167)	(0.0165)	(0.0147)	(0.0152)	(0.0144)	(0.0149)
Rated	0.0615***	0.0630***	0.00813	0.0520**	0.00633	0.0566**
	(0.0227)	(0.0225)	(0.0201)	(0.0240)	(0.0201)	(0.0235)
Sponsored	-0.0480**	-0.0433**	-0.0281**	-0.0187	-0.0310**	-0.0106
	(0.0194)	(0.0194)	(0.0136)	(0.0161)	(0.0137)	(0.0163)
Cov-lite	0.0165	0.0110	-0.00900	0.0327*	-0.0147	0.0346**
	(0.0178)	(0.0173)	(0.0144)	(0.0166)	(0.0137)	(0.0158)
Second Lien	0.0861***	0.0732**	0.186***	0.131***	0.186***	0.116***
	(0.0305)	(0.0279)	(0.0258)	(0.0292)	(0.0255)	(0.0259)
Log Maturity (Years)	0.101**	0.0932**	0.0216	0.0699**	0.0312	0.0520*
	(0.0396)	(0.0381)	(0.0253)	(0.0316)	(0.0247)	(0.0309)
Log Synd. Time	0.0248	0.0119	-0.0303	0.0630**	-0.0118	0.0298
	(0.0349)	(0.0319)	(0.0249)	(0.0269)	(0.0226)	(0.0245)
Amount Polynomial	Yes	Yes	Yes	Yes	Yes	Yes
Arranger FE	Yes	Yes	Yes	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	Yes	No	No
Observations	3693	3693	3693	3693	3693	3693
R^2	0.128	0.095	0.142	0.127	0.117	0.091

Standard errors in parentheses
SEs clustered by syndication month.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C Robustness Tests

C.1 Amount flex and spread flex

In some deals, the total amount that is issued can be flexed to match the amount that can be allocated to investors. This can be the case for instance when the loan is meant to finance a dividend to shareholders or a share repurchase. One should therefore observe that if amounts are flexed, they are flexed down when prices are flexed down (spreads or discounts are flexed up), and they are flexed up when prices are flexed up (spreads or discounts are flexed down). To test this, we estimate the following regression at the deal level, using the same sample that we use for our demand discovery tests:

$$\textit{Amount Flex}_i = c + \alpha \, \textit{Effective Spread Flex}_i + \beta X_i + \epsilon_i, \tag{6}$$

where $\textit{Amount Flex}_i$ is the change in the total institutional loan amount of deal i during the syndication process, and $\textit{Effective Spread Flex}_i$ is the change in the spread during the syndication process. We control for additional loan characteristics (X_i) including whether the deal is rated, is sponsored, includes a covenant-lite facility, or includes a second lien as well as fixed effects for loan purpose, borrower industry, lead arranger, and deal month-year.

Table 14 shows the results of estimating Equation (6). We interpret not observing amount, spread, or discount flex as indicating that amounts, spreads, or discounts were not flexed for those deals. In column 1, we omit deal month-year fixed effects and control for net inflows to high yield mutual funds and CLO issuances to control for institutional demand and overall risk appetite. Consistent with our hypothesis, the point estimate on effective spread flexes is negative and highly significant. The coefficient on fund and CLO flows is positive, indicating that in times of inflows, amounts are more likely to be increased.

In column 2, we disaggregate the effective spread flex into its two components, the spread flex and the discount flex. The point estimate on the spread flex is the same magnitude as the coefficient on the effective spread flex in column 1, while the coefficient on the discount flex becomes is considerably smaller and insignificant. This finding suggests that flexes in the spread are the crucial margin of adjustment during the syndication process. In column 3 and 4, we include deal month-year fixed effects. The point estimates remain almost unchanged.

Table 14
Amount flex, OID flex, and Spread flex

Regressions of total institutional amount flex on effective spread flex, original issue discount flex, and spread flex, at the deal level. Amount Flex, Spread Flex, Effective Spread Flex, and Discount Flex represent changes in amounts, spreads, effective spreads (see Equation (2)), and discounts, respectively, over the syndication period, and assume that when no change is reported, this is because there is no change. Rated, Sponsored, Cov- lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Yield is log of the initially offered all-in yield to maturity. Log Talk Amount is the log of the initially offered institutional amount. Fund & CLO Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. (See Tables 1 and 2 for relevant summary statistics). Time fixed-effects are at the syndication month-year.

	(1) Amount Flex	(2) Amount Flex	(3) Amount Flex	(4) Amount Flex
Eff. Spread Flex	-0.201***		-0.188***	
	(0.0472)		(0.0486)	
Discount Flex		-0.00789		-0.00213
		(0.0270)		(0.0281)
Spread Flex		-0.261***		-0.251***
		(0.0772)		(0.0795)
Fund & CLO flows	0.949**	0.945**		
	(0.429)	(0.431)		
Rated	8.069	8.119	6.722	6.812
	(5.753)	(5.748)	(5.724)	(5.736)
Sponsored	1.672	2.043	0.736	1.152
	(6.902)	(6.949)	(7.195)	(7.258)
Cov-lite	15.73**	15.31**	14.72*	14.30*
	(6.973)	(6.972)	(7.739)	(7.682)
Second Lien	-11.90**	-12.08**	-10.26	-10.48
	(5.721)	(5.753)	(6.456)	(6.465)
Log Maturity (Years)	-4.264	-4.125	2.421	2.689
	(10.73)	(10.72)	(11.72)	(11.75)
Log Talk Yield	27.02***	26.49***	23.29**	22.79**
	(9.907)	(9.839)	(11.01)	(11.04)
Log Talk Amount	0.744	0.579	-0.360	-0.512
	(6.648)	(6.718)	(7.216)	(7.278)
Arranger FE	Yes	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes
Observations	3693	3693	3693	3693
R^2	0.043	0.044	0.061	0.061

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C.2 Time to Syndication

One important question in the syndication process is how fast the arranging bank can sell the loan to institutional investors. The faster the loan is sold—that is, earlier the loan leaves the pipeline, the earlier the arranging bank has free capacity to take on new mandates and originate new loans. It is plausible that certain loan characteristics, such as high credit risk, lengthen the syndication process. Similarly, the flexes in the loan terms may lengthen the syndication process if demand needs to be re-assessed. Moreover, Ivashina and Sun (2011) argue that time-to-syndication contains information about demand of institutional investors for a loan. Hence, understanding the determinants of time-to-syndication sheds light on which loan characteristic or macroeconomic developments increase pipeline risk. We therefore estimate the following equation:

$$\begin{aligned} \textit{Time to Syndication}_i =& c + \beta_1 \textit{Effective Spread Up}_i + \beta_1 \textit{Effective Spread Down}_i \\ &+ \beta_3 \textit{Log Talk Yield}_i + \beta_4 \textit{LBO}_i + \gamma X_i + \epsilon_i, \end{aligned} \tag{7}$$

where time to syndication is the log of number of days between the launch date and the date the loan becomes active. Effective Spread Up (Down) is a dummy variable that is equal to 1 if the effective spread was flexed up (down). Log Talk Yield is the initial all-in yield to maturity at the beginning of the syndication process. LBO is a dummy variable indicating the respective loan purpose (refinancing is the omitted loan purpose category). We control for additional loan characteristics (X_i) including a polynomial of the loan amount, whether the deal is rated, is sponsored, includes a covenant-lite facility, or includes a second lien as well as fixed effects for loan purpose, borrower industry, lead arranger, and deal month-year.

Table 15 shows the results of estimating Equation (7). In column 1, we omit deal month-year fixed effect and find no significant relationship between the explanatory variables and time-to-syndication except for net inflows to high yield mutual fund and CLO issuances, the channel stressed by Ivashina and Sun (2011). When including deal month-year fixed effect, we find that within a deal month-year riskier loans take longer to syndication (column 2). Perhaps surprisingly, we also find a positive and weakly significant relationship between time-to-syndication and the effective spread being flexed down. This finding suggests that arranging banks needs more time for loans with unexpectedly high demand but not for loans with unexpectedly low demand. One possible reason for this pattern is that formal agreements in mandate-, fee-, and commitment letters are more likely to describe how to split a deficit when demand is low than how to split a surplus when demand is high. Renegotiation between the arranger and borrower might therefore be more lengthy when there is a surplus to split. Another plausible reason is that when the effective spread is flexed up, the arranger always has the option of simply retaining a larger share of the loan instead of trying to find additional buyers.

C.3 Availability of break prices

As mentioned in Section 4, there is a potential sample selection issue that could bias us against finding a significant negative relationship between underpricing and spread flex: It is possible that when investors show little interest in a deal in the primary market, such that the arranger needs to flex spread up substantially, they also show little interest in the secondary market, so we are less likely to observe a break price. Bookbuilding theory suggests that if underpricing were observed for such deals, it should be low. If true, this would mean that we are less likely to observe a break price for deals with low underpricing and positive spread flex. If we are missing such observations, then this should bias us against finding a significant and negative relationship between underpricing and spread flex.

To assess whether are less likely to observe a break price in cases in which the spread is flexed up, we estimate the following equation:

$$Break\ Price\ Dummy_i = c + \alpha\, Log\ Talk\ Yield_i + \beta_1 Spread\ Flex + \beta_2 Discount\ Flex + \gamma X_i + \epsilon_i, \quad (8)$$

Break Price Dummy is a variable that is 1 if there is a break price available for the deal. *Spread Flex* and *Discount Flex* assume that deals for which no spread flex (no discount flex) is observed represent deals with no spread flex (no discount flex). *Log Talk Yield* is the initial all-in yield to maturity at the beginning of the syndication process. We also control for additional loan characteristics (X_i) including in particular a dummy that indicates whether the loan is rated, the log maturity of the loan, and the log amount of the loan.

We also control for time-varying and market-wide institutional demand and overall risk appetite in three out of the four specifications, by including either time fixed effects or fund and CLO flows.

The results in Table 16 indicate that a break price is more likely to be available for larger, rated loans with a longer maturity. It is plausible that such loans are more likely to trade in a secondary market. A break price is also less likely to be available when the talk yield is higher. Possibly, the

Table 15
Time-to-Syndication

Regressions of log time-to-syndication on loan characteristics at the deal level. Eff. Spr Flex Up (d) and Eff. Spr Flex Down (d) are equal to 1 if the effective spread was flexed up or down, respectively. Fund & CLO Flows are net flows into high yield mutual funds and CLO issuances measured in millions. Rated, Sponsored, Cov- lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Talk Amount is the initially offered loan amount. Log Talk Yield is the initially offered all-in yield to maturity. Time fixed-effects are at the syndication month-year. (See Tables 1 and 2 for relevant summary statistics).

	(1)	(2)
	Log Synd. Time	Log Synd. Time
Eff. Spr Flex Up (d)	-0.00507	-0.00782
	(0.0132)	(0.0125)
Eff. Spr Flex Down (d)	0.00753	0.0272**
	(0.0128)	(0.0131)
Fund & CLO flows	-0.00338	
	(0.00210)	
Rated	0.0163	0.0200
	(0.0161)	(0.0150)
Sponsored	-0.00782	-0.00627
	(0.0114)	(0.00868)
Cov-lite	0.0174*	0.0116
	(0.00953)	(0.00894)
Second Lien	-0.00945	-0.0260**
	(0.0153)	(0.0128)
Log Talk Amount	-0.00512	0.00306
	(0.00672)	(0.00686)
Log Talk Yield	0.0268	0.0651**
	(0.0296)	(0.0270)
Arranger FE	Yes	Yes
Purpose FE	Yes	Yes
Industry FE	Yes	Yes
Time FE	No	Yes
Observations	3693	3693
R^2	0.048	0.176

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16
Availability of break prices

Regressions of a dummy indicating the availability of the break price, Break Price (d), on loan characteristics at the deal level, and on spread flex and discount flex as a proxy of demand. Spread Flex and Discount Flex represent changes in the spread and discount over the syndication period, and assume that if no change is reported, this is because there is no change. Fund & CLO Flows are net flows to high yield mutual funds and CLO issuances measured in millions. Rated, Sponsored, Cov- lite, and Second Lien are dummies that indicate whether at least one facility within a deal is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of institutional facilities. Log Talk Yield is the initially offered all-in yield to maturity. Log Amount is the log of the institutional loan amount. (See Tables 1 and 2 for relevant summary statistics).

	(1) Break Price (d)	(2) Break Price (d)	(3) Break Price (d)	(4) Break Price (d)
Log Talk Yield	-0.120***	-0.119***	-0.0869***	-0.0975***
	(0.0256)	(0.0254)	(0.0238)	(0.0251)
Spread Flex	-0.0000102	0.0000565	0.0000657	0.0000345
	(0.000126)	(0.000133)	(0.000120)	(0.000127)
Discount Flex		-0.0000892	-0.0000917	-0.0000981
		(0.0000859)	(0.0000808)	(0.0000822)
Fund & CLO flows				-0.00240
				(0.00139)
Rated	0.144***	0.144***	0.145***	0.146***
	(0.0278)	(0.0277)	(0.0274)	(0.0275)
Sponsored	-0.00759	-0.00813	-0.00232	-0.000810
	(0.0117)	(0.0118)	(0.0132)	(0.0134)
Cov-lite	0.0158	0.0162	0.000938	0.00340
	(0.0124)	(0.0124)	(0.0115)	(0.0113)
Second Lien	0.0102	0.0107	-0.00172	0.00315
	(0.0174)	(0.0176)	(0.0166)	(0.0168)
Log Maturity (Years)	0.144***	0.143***	0.140***	0.136***
	(0.0361)	(0.0363)	(0.0358)	(0.0359)
Log Talk Amount	0.100***	0.100***	0.0992***	0.0990***
	(0.00889)	(0.00886)	(0.00916)	(0.00916)
Arranger FE	Yes	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	No	No
Observations	3693	3693	3693	3693
R^2	0.368	0.368	0.316	0.317

Standard errors in parentheses
SEs clustered by syndication month
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

causality here is reversed: For loans that are unlikely to trade in the secondary market, investors demand a higher yield.

Once we control for all these effects, there is no significant relationship between spread flex (or discount flex), and the availability of a break price, whether or not we control for time-varying market-wide conditions with time fixed -effects or fund and CLO flows.

D Comparison of the LCD data to DealScan data

In this appendix, we compare the LCD data to the data in Thomson Reuters DealScan, which is more commonly used for research on syndicated loans.

We first show that the number of deals that include leveraged institutional term loans are roughly equal in both datasets. We then try to match up deals in both datasets directly, and find that we can match up between about 30-50% directly (depending on the exact matching criteria). Finally, we check that while lead arranger share can be computed for about 18% of all deals in DealScan, this fraction drops to about 4% of deals when considering only deals that contain leveraged institutional loans.

The main conclusions from these comparisons are as follows: For deals that contain leveraged institutional loans, both datasets cover a similar number of deals. Also, while there is a substantial degree of overlap, at the same time there are deals in either dataset that cannot be matched to the other. Finally, the proportion of leveraged institutional deals in DealScan for which a lead share is available is very low. This means that any empirical analysis of such deals that involves lead share can only be conducted on a very small number of deals, but also that there appears to be a systematic difference in the reporting of lead share for leveraged institutional versus other types of deals in DealScan.

D.1 Number of deals in both datasets

Our LCD data describes deals launched in the US leveraged loan market between January 1, 1999 and October 15, 2015. To find the comparable deals within DealScan, we first restrict ourselves to deals that have a "deal active date" in the same range as the "launch date" in LCD.[29] We also restrict ourselves to deals for which the country of syndication was the USA and which were syndicated in USD. We call the resulting set of 64,373 deals "DealScan (US)."

We then define the subset of leveraged deals within DealScan (US), based on the definition used by LCD: LCD defines a leveraged loan as a loan that is either rated non-investment grade, or is secured by a first or second lien and has a spread of 125bps or higher. Since we do not have access to a rating in DealScan, we use the second part of this definition.

First, we compute the spread as the difference between the all-in-drawn spread and the all-in-

[29] The difference in the dates that we use here will introduce a slight discrepancy as deal typically close 4-6 weeks after being launched.

undrawn spread as reported in DealScan.[30] We then define a facility in DealScan as leveraged if it is secured and has a spread of 125 bps or more. We define a facility as non-leveraged if is either unsecured or has a spread of less than 125 bps.

Our definition is slightly different from that of LCD. Under our definition, all unsecured facilities are non-leveraged, while according to LCD, an unsecured facility could be still be leveraged if it is rated non-investment grade. In practice, given the risk of these loans, lenders will insist on collateral in the vast majority of cases. For instance, in the LCD data, only about 2% of the deals contain facilities that are unsecured, so we are confident that this difference in definitions does not have quantitatively important consequences.

We then classify a deal as leveraged if it contains at least one leveraged facility, and non-leveraged if all classified facilities for that deal are non-leveraged. We cannot classify a deal if none of the facilities within the deal can be classified. We have 23,397 leveraged deals, 16,432 unleveraged deals, and 24,544 unclassified deals.

In our analysis, we restrict ourselves to deals which contain at least one institutional term loan, meaning non-amortizing term loans (Term Loan B or higher). In DealScan, we can identify these as loans with loan type "Term Loan B," "Term Loan C," ..., "Term Loan K." There are also some loans labeled simply as "Term Loans." This label is not specific and could designate either loans which are actually amortizing term loans (Term Loan A) but it could also designate additional institutional term loans (Term Loan B and higher). A broader definition could also include these, but we exclude them here.

We can then define a "leveraged institutional deal" as one which has at least one leveraged institutional facility. There are 10,024 such deals. This is slightly higher than our 8,816 deals with at least one institutional facility in LCD. As illustrated in Figure 7, DealScan appears to have slightly more of these deals in the earlier part of the sample, but in the later part of the sample, the number of deals line up well. (With the broader definition alluded to above, we would obtain 13,721 leveraged institutional deals.)

[30]The all-in-drawn spread includes commitment and annual fees paid for revolvers, which is not part of the spread used by LCD in the definition of a leveraged loan.

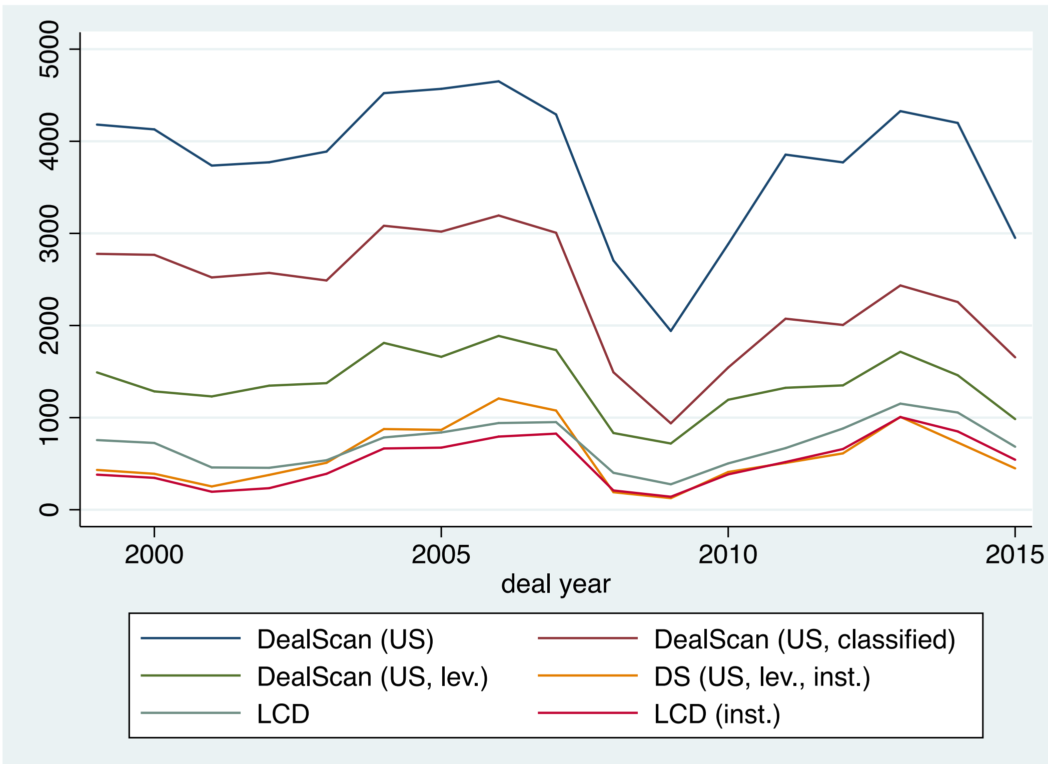

Figure 7. Number of deals in DealScan and LCD over time
Number of deals in DealScan and LCD over time. DealScan (US) are all deals syndicated in the USA and in USD. DealScan (US, classified) are deals that can be classified as either leveraged or non-leveraged. DealScan (US, lev.) are deals that can be classified as leveraged, that is, contain at least one leveraged facility. DealScan (US, lev., inst.) are deals that contain at least one leveraged institutional facility. LCD and LCD (inst.) are all deals and all deals with at least one institutional facility in LCD, respectively.

D.2 Matching deals in both datasets

We now examine to what degrees both datasets overlap for leveraged institutional deals. We match deals by borrower name and approximate date, meaning that the "deal active date" in DealScan must be within 3 months of the estimated closing date in LCD. This results in 5,707 matched deals, out of a total of about 12,071 deals in LCD, representing about 47% of the total LCD sample.[31] In our regressions in the main text, we only consider deals with at least one institutional facility. There are 8,816 of such deals in LCD. Out of this subset, 4,045 deals (or about 46%) can be matched to DealScan.

We can try to evaluate how good our definition of a "leveraged institutional deal" is for predicting whether a deal is in the set of LCD deals with at least one institutional facility: Out of the 4,045 LCD deals with at least one institutional facility that we can match to DealScan, 3,516 fall into our category of "leveraged institutional deals," 297 do not, and 232 cannot be classified. This suggests that the estimated probability of a type II error is $297/(297+3{,}516) \approx 8\%$. (Using the broader definition of "institutional loan" alluded to above, i.e. including all "Term Loans" the estimated type II error would be $\approx$3%.) We do not have any information on false positives, and so unfortunately cannot estimate the probability of a type I error. Nevertheless, the low probability of a type II error suggests that our definition of a "leveraged institutional deal" is at least somewhat reasonable at identifying a subset of loans within DealScan that is similar to the LCD deals with institutional facilities.

Overall, we conclude that there is a substantial degree of verifiable overlap between LCD and DealScan. At the same time, there is also a substantial number of deals which cannot be matched up.

D.3 Lead share in leveraged institutional deals in DealScan

From data in DealScan, we compute a deal-level lead arranger share as in Sufi (2007), but using the slightly broader definition of a lead arranger of Bharath, Dahiya, Saunders, and Srinivasan (2011).

We have the lead share for 11,381 out of 64,373 deals in DealScan (US), or about 18%. However, we have the lead share for only 402 out of 10,024 leveraged institutional deals in DealScan (US),

[31] A fraction of these deals have substantially different deal sizes in both datasets, potentially because facilities are missing in either the DealScan or the LCD description of the deal. If we restrict ourselves to deals with reported sizes which are e.g. within 10% of each other, the number of matched deals is reduced to 4,010.

or about 4%. Similarly, we have the lead share for 160 out of 4,045 deals that we can match to our (institutional) LCD deals, or about 4%. We draw two conclusions from these numbers. First, they suggest a potential sample selection issue in DealScan for research that relies on this data. Second, it is difficult to examine how lead share as reported in DealScan relates to flex in leveraged loans due to a small sample size.