Pipeline Risk in Leveraged Loan Syndication*

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Abstract

Arrangers of a syndicated loan need to elicit investors' demand to place the loan on the best possible terms. The demand discovery process must be incentive compatible. This implies that there is always risk not just about prices that can be obtained, but also about quantities that can be placed with investors. When this risk is borne by the arranger, we refer to it as *pipeline risk*. When exposed, the arranger may have to retain larger shares when investors are willing to pay less than expected. We document this type of retention, and show that it is associated with subsequent reduction in arranging and lending activity of the affected arranger.

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

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"We are investment bankers, not commercial bankers, which means that we underwrite to distribute, not to put a loan on our balance sheet."

Matt Harris, Managing Director, Chase Securities, as quoted by Esty (2003).

1 Introduction

Arranging a syndicated loan is a capital markets exercise. What are the economic problems that the arranging banks have to solve, and consequently, what are the risks they face? To address these questions, we examine novel data from the leveraged loan market, that is, the non-investment grade segment of the syndicated loan market, which represents slightly more than half of the syndicated loan issuance volume. We obtain three main results.

First, we show that arrangers face a demand discovery problem: They need to ascertain how much investors are willing to pay for the loans. To do so, they use a process that resembles the one described by bookbuilding theory (Benveniste and Spindt, 1989).

Second, incentive compatibility in demand discovery dictates that smaller amounts should be allocated to investors who indicate a low willingness to pay. This means that there is risk about quantities as well as prices. The risk can be borne by the issuer, or the arranger (via underwriting guarantees), or shared. To the extent that arrangers assume this risk, they have to retain larger shares when investors are willing to pay less than expected. We show that, on average, this is the case. Because the risk to arrangers arises from their syndication pipelines, we refer to it as *pipeline risk*.

Third, we show that arrangers that experience this unfortunate retention (i.e., larger retention due to overall lower willingness to pay than expected) subsequently reduce the number and dollar volume of leveraged term loans that they arrange, as well as their lending via credit lines. We argue that this link can, for instance, be interpreted as the result of a debt overhang problem. Under this interpretation, unfortunate retention negatively affects credit supply.

We believe our results are useful to inform the policy debate. Regulators are indeed 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 by arrangers to borrowers and, hence, of arrangers' risk exposures. In addition, although pipeline risk is considered in stress tests, exposure to pipeline risk does not carry a direct capital charge, which is only imposed once the risk has materialized and leveraged loans are on the balance sheet. So far, regulation has mostly focused on borrower riskiness. Our analysis suggests a new angle to regulators and supervisors that wish to get to the heart of pipeline risk: target underwriting agreements directly.

In our empirical analysis we use the S&P Capital IQ's Leveraged Commentary and Data (LCD). The terms of the loans are frequently adjusted during the syndication process or, in market parlance, "flexed." Our LCD sample contains information on leveraged loan syndication from 1999 to 2015, including information on secondary market prices and also on flex, which makes the dataset unique. We combine this data with lender share data from the Shared National Credit Program (SNC), an annual survey of syndicated loans carried out by U.S. financial regulators.

We first focus on the nature of the economic problem, and then on the consequences at the bank level. To structure our 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 the following simplified example that illustrates the basic intuition: An arranger is asked by the borrower to sell a given quantity S of a loan, as indicated in Figure 1. The arranging bank does not know the investors' willingness to pay for the loan. To simplify, suppose that it can

[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 and "Draft Guidance on Leveraged Transactions," 23 November 2016, European Central Bank.

either be high or low, as indicated by the (perfectly elastic) demand schedules D_h and D_l in Figure 1.

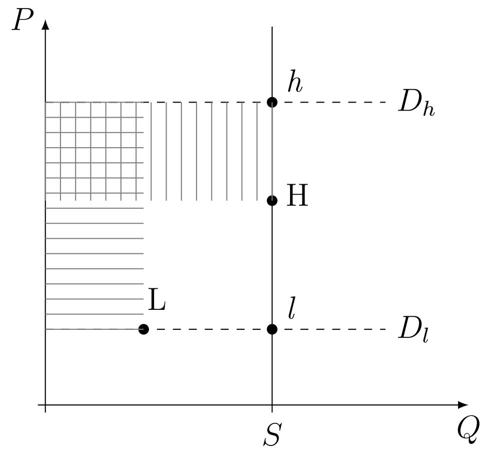


Figure 1. Price, quantity, and incentive compatibility
An arranger is asked by a borrower to see a given quantity S of a loan. The willingness of investors to pay for the loan can be either high or low, as indicated by the demand schedules D_h and D_l. To preserve incentives for investors to reveal their 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).

To obtain the best terms for the loan, 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: The arranger sets the price to the one at H rather than the one at h. Per unit of the loan, this leaves an amount equal to the vertical distance between h and H on the table for investors. Since S units are sold in total, the total amount of money left on the table is as indicated by the vertically shaded area.

Second, when investors indicate a low willingness to pay, the arranger will not underprice, and hence will choose a price equal to the level indicated by D_l. However, the arranger must punish investors by rationing quantities, so that the price and quantity is as indicated at point L. If investors had a high valuation, but indicated a low valuation, per unit of the loan they would be able to cheat the arranger out of an amount equal to the vertical distance between D_h and L. Since the quantity of the loan sold at L is reduced, however, they can only cheat the arranger out of a total amount equal to the horizontally shaded area. If the arranger makes the vertically shaded area just slightly bigger than the horizontally shaded area, it will be incentive compatible for investors to reveal that they have a high willingness to pay when this is the case.

In practice, 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, less of the loan is placed with investors. Depending on how the risk is shared, this will imply either a reduction in the amount received by the borrower or an increase in the share retained by the arranger, or a combination of both. On average across all deals, both the amount received by investors should be lower and the share retained by the arranger should be higher. Third, unfortunate retention can generate a debt overhang problem, which reduces the arranger's willingness to arrange and participate in loans going forward.

We find empirical support for these three hypotheses. First, according to the pricing information in LCD, the leveraged term loans are on average underpriced in the primary market and pricing is adjusted only partially.[2]

[2] We find that the median loan is underpriced by 75bps relative to the mid-point of the bid-ask spread in the secondary market. Given the bid-ask spreads prevalent in secondary markets, this would suggest that the median loan is underpriced by about 30-40 bps relative to the bid price in the secondary market. This level of underpricing 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) report an average of around 19 percent over four decades in the US).

Second, when spreads are flexed up, on average, the share retained by the lead arranger is larger, and amounts that the borrower receives are decreased. The point estimates imply that a 100 bps upward flex in (effective) spread is associated with an increase in the lead arranger share of around 2% to 6%. This is substantial, given an average lead share of about 7.4%, and a median lead share of about 2.6% in our data.

Third, arrangers facing unfortunate retention in a given quarter reduce dollar volume of loans they arrange in the following quarter. The economic magnitudes of the point estimates can be described as follows. Consider an arranging bank that faces a one-standard deviation increase in the variable we use to proxy unfortunate retention. This bank subsequently arranges roughly $60 million less in loans in each industry in the following quarter. (On average, banks arrange about $220 million in each industry in each quarter.) We also find a negative relationship between unfortunate retention and subsequent supply of credit via credit lines. Here, a one-standard deviation increase in the proxy is associated with a subsequent reduction in lending via credit lines, for this arranger, by about $9 million in each industry, in the following quarter. (On average, banks lend about $150 million via credit lines in each industry in each quarter.)

A potential explanation for the reduction in arranging activity and lending is that unfortunate retention produces debt overhang problems (Myers, 1977): The presence on a firm's balance sheet of risky assets decreases the firm willingness to invest, because part the surplus generated is captured by creditors (See also Admati, DeMarzo, Hellwig, and Pfleiderer (2018) and Bahaj and Malherbe (2018) for applications in a bank context). (We discuss identification issues and other potential interpretations in Section 5.2.)

Ivashina and Scharfstein (2010) provide evidence that, on average, aggregate lead shares are higher in times in which investors' aggregate demand is low. They argue that these higher aggregate lead shares may have a negative effect on aggregate credit supply. We provide evidence, that at the level of the arranger, unfortunate retention is associated with subsequent contraction in arranging and lending activity. This suggests that the aggregate relationship described by Ivashina and Scharfstein (2010) may be due to the need for incentive compatibility in the demand discovery process.

Since providing underwriting guarantees is profitable, there are strong incentives to seek exposure to pipeline risk.[3] With the potential for aggregate shocks, many arrangers could be affected by debt overhang simultaneously. Pipeline risk could therefore amplify fluctuations in the credit cycle. Two recent episodes of market wide adverse realization of pipeline risk, the first quarter of 2008 and the last quarter of 2015 (see Appendix A) highlight that pipeline risk is potentially a macroprudential concern.

Besides the policy angle, our paper contributes to the literature in a number of ways. We provide strong evidence that demand discovery is a key economic function of arrangers. We establish that demand discovery gives rise to pipeline risk, which in turn is a key determinant of the share retained by lead arrangers and, hence, syndicate structure.

Apart from the paper by Ivashina and Scharfstein (2010) mentioned above, few papers have examined how shocks to institutional investor demand affect the syndication process. An exception is the paper by Ivashina and Sun (2011), who look at the time a loan spends in syndication as a proxy for demand and show how it relates to spreads.

Our paper speaks to the literature on the determinants of loan syndicate structure. We highlight that the loan share retained by arrangers is driven by the revelation of private information of investors during the demand discovery process. In contrast, following Sufi (2007) most of the literature notes that lead arrangers hold larger initial shares in loans to informationally opaque

[3] In the U.S., there exists a form of capital charge on underwriting guarantees, and the current guidance emphasises the importance of pipeline risk management. It is unclear whether this regulatory treatment creates a sufficient counterbalance to the incentives to seek exposure.

borrowers and interprets such shares as a commitment to monitor the borrower.[4] Ivashina (2009) documents that such larger lead shares are also associated with lower spreads. Our paper also differs from most of the literature on syndicate structure in that we study leveraged loans, that our data has a large focus on term loans, and that we use 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 the Online Appendix for details).

Other aspects of syndicated lending examined in the literature include the propensity to syndicate a loan (Dennis and Mullineaux, 2000), final spreads and fees (Angbazo, Mei, and Saunders, 1998; Berg, Saunders, and Steffen, 2016; Cai, Saunders, and Steffen, 2016), covenants (Drucker and Puri, 2009), and final syndicate composition (Cai, Saunders, and Steffen, 2016; Benmelech, Dlugosz, and Ivashina, 2012).

Finally, we 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).

As such, 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

[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. Monitoring incentives could also be ensured by non-loan exposures (Neuhann and Saidi, 2016).

demand discovery has taken place and restrict the formal risk to minimal (overnight) exposure (Lowry, Michaely, and Volkova, 2017).[5] 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.

2 Overview of the syndication process

This section is based on a series of interviews with market participants and summarizes how they describe the practice of the leveraged loan syndication process. The timing of the process is depicted in Figure 2.

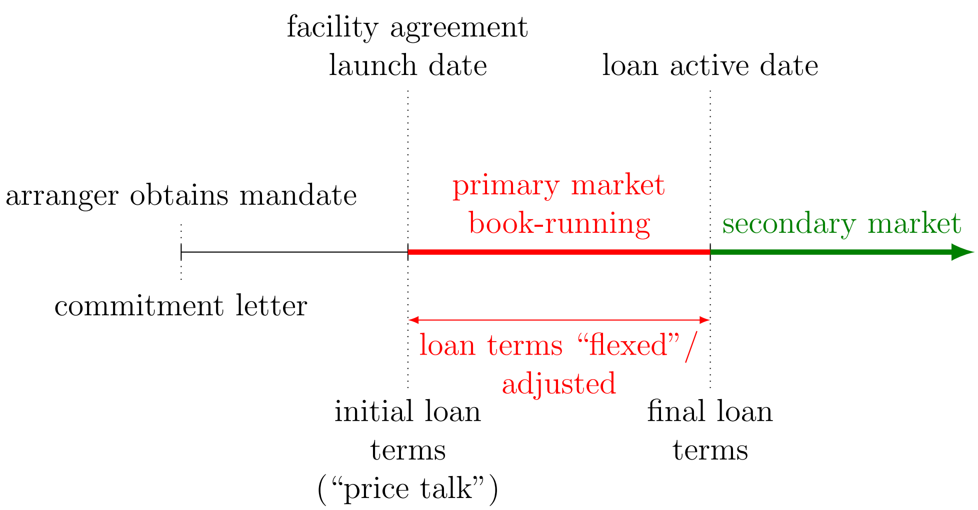


Figure 2. Syndication timeline
Timeline for the leveraged term loan syndication process.

[5] There is evidence that IPO underwriters buy substantial numbers of shares in less successful IPOs in after-market 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).

Mandate Issuers typically solicit bids from several potential arrangers. Bidders perform an initial credit analysis and then compete on pricing, syndication strategy, an guarantees provided by the arranger (if any). Key elements of pricing 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 and what share of the loan the arranger intends to retain in the primary market (the "sell down target"). Guarantees often involve a minimum amount raised for the borrower and a maximum spread to be paid by the borrower. We discuss these in more detail below.

The proposed loan structure and baseline pricing are summarized in a "term sheet," which can later be shown to investors. The specifics of the mandate, fees, and guarantees are described in a "mandate letter," a "fee letter," and a "debt commitment letter." The mandate and fee letters are kept confidential. In acquisitions and LBOs, debt commitment letters are shown to the board of the target, but are otherwise also kept confidential.

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.[6] Price variables as set in the facility agreement are referred to as the "talk price."

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

[6] 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 could differ from those initially specified in the term sheet.

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 the right amount of demand exists 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,” that is, to adjust the terms of the loan (e.g. changing the interest rate). In such a case, the marketing process is re-iterated at the new terms. There can be multiple rounds of adjustments and marketing.

The book-running process typically takes several weeks (46 days on average in our sample). Because 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. The borrower receives the funds and trading of the loan in the secondary market can commence.

Risk-sharing and debt commitment letters Market participants distinguish between “underwritten” and “best-efforts” deals. Historically, underwritten deals were deals in which the arranger would guarantee an amount and an interest rate to the borrower, and would fully assume the risks associated with finding the investors willing to provide the required funds at the guaranteed interest rate. Nowadays, such fully underwritten deals are very rare. Nevertheless, market participants still refer to deals in which some guarantees are given as underwritten. In a best-efforts deal, no guarantees or only very minimal guarantees are provided. We follow this convention.

In the U.S., when arrangers provide guarantees, they typically do so via debt commitment letters that specify how much of the risk associated with adjusting loan terms the arranger will assume. Arrangers are legally on the hook for the guarantees that they provide under such letters.[7] We note that loan underwriting differs slightly from bond underwriting, where banks sometimes directly provide a bridge loan to the borrower, to be repaid out of the issuance proceeds.

To our knowledge, no systematic, publicly available data on debt commitment letters exist. However, according to practitioners, a typical debt commitment for an underwritten deal looks as follows: The arranger guarantees that a minimum amount will be raised, at a maximum yield, in exchange for a fee. Arranger fees for underwritten deals tend to be in the range of 2-3% of face value, whereas fees for best-efforts deals are around 0.25%.[8] The difference of about 1.75-2.75% could be interpreted as an insurance premium paid to the arranger for the (partial) insurance that is provided.

Specifically, the commitment typically takes the following form: The arranger initially attempts to place the entire amount at a given yield, but is allowed to increase the yield as described by a "permitted flex" clause. Before being allowed to flex the yield, the arranger often must give up a part of the fee, e.g. 0.25%.

If the permitted flex has been exhausted (i.e. the guaranteed maximum yield has been reached) and the yield is still insufficient to place the loan, then the arranger is fully on the hook. The arranger will have to further increase the yield at its own expense. First, it could allow investors to pay a lower price for the loan, but would then have to make up for the corresponding loss one-for-one out of its own pocket. Second, it could retain the unsold part of the loan. (In case demand is high enough to allow for a decrease in the yield, a "reverse flex" clause may stipulate how gains are to be split between the arranger and the issuer.)

[7] There are cases in which underwriters have tried to get out of the commitments in commitment letters. But when borrowers have sued, the underwriters have had to settle, most notably in the case of the LBO of Clear Channel Communications (Cho and Todd, 2008).

[8] To our knowledge, no deal-specific data on actual arranger's fees is publicly available. Dealogic provides deal-specific fees, but these are imputed. These imputed fees are generally within the range that we indicate here.

It is important to note that in contrast to traditional equity IPOs, guarantees are given to issuers at the mandate stage and hence *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.

3 Data

S&P Capital IQ's Leveraged Commentary and Data (LCD) provides data on the syndication process of leveraged loans, that is, syndicated loans with high credit risk.[9] Our version of the data set contains information on 12,070 leveraged loan deals from January 1, 1999 until October 15, 2015, where each deal consists of one or more facilities. We conduct our analysis at the deal level. The main variables of interest for our purposes are those that describe adjustments to prices, spreads, and amounts during the syndication process, collectively known as "flex."

For our analysis, we use subsets of the LCD data. For simplicity, we always ignore a very small number of deals which have more than one arranger or more than one deal purpose, leaving 11,842 deals. For our analysis in Section 4, we must then also restrict our sample to loans for which we have good coverage of data items related to pricing. Specifically, we require a secondary market price and OID so that we can calculate underpricing, and the initially proposed yield or "talk yield" as a control. This restriction reduces the sample to 3,004 deals, starting with deals in November

[9]Formally, S&P defines a leveraged loan as a loan with either a non-investment-grade rating, or with a first or second lien and a spread of at least 125bps over LIBOR.

2008.

Requiring information on pricing has an effect on the composition of deals in this sample. A deal consist of one or more facilities, classified as either "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. Presumably because institutional facilities are more likely to trade, LCD is more likely to contain secondary market prices for institutional facilities. All of the 3,004 deals for which we have pricing information include at least one institutional facility.

In Section 5, we do not require pricing information, but match the LCD data with data from the Shared National Credit (SNC) database. We defer a description of this matched sample to Section 5.

3.1 Description of loan characteristics

Table 1 provides the summary statistics for our sample of 3,004 leveraged loan deals with pricing information. The median deal amount (including undrawn commitments on credit lines) is $465 million. The distribution of deal amounts is highly skewed, with a small number of very large deals.

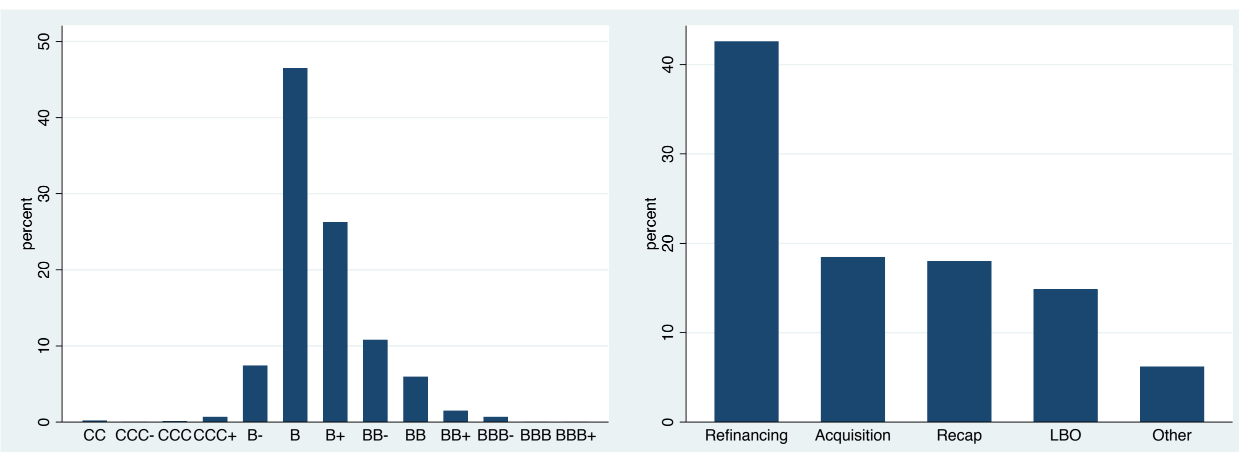
It takes on average 46 days from the launch date until the loan becomes active. About 94% of the deals involve some rating, 67% involve a sponsor, and 33% involve at least one cov-lite facility. If the issuers in these deals have a rating, they are practically always non-investment grade, as illustrated in Figure 3a. Figure 3b also illustrates that given the low interest rates over our sample period, deals that refinance existing debt are the most common (43%), followed by deals that finance transactions — acquisitions or LBOs — which together represent about 33% of our deals.

A first component of pricing, the spread, measured in basis points over LIBOR, is available for

Table 1
Summary statistics

This table displays summary statistics for the basic variables at the deal level, in our sample with pricing information. Total Deal Amount is the sum of amounts and commitments across all facilities in a deal, 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 the 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 facilities in a deal, reported in percentage points of par.

	Total Deal Amount	Rated	Sponsored	Cov-lite	Spread	OID	Eff. Spread	Break Price
mean	708	0.939	0.668	0.432	4.38	1.00	4.63	99.847
sd	745				1.45	1.33	1.63	1.291
min	20				1.75	-1.25	1.83	78.375
25%	275				3.25	0.25	3.38	99.500
median	465				4.00	0.75	4.25	100.125
75%	850				5.25	1.00	5.50	100.500
max	8600				11.125	22.50	12.25	102.625
N	3,004	3,004	3,004	3,004	3,004	3,004	3,004	3,004



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

Figure 3. Ratings and purpose for deals in our sample
Histogram of (a) issuer ratings and (b) most common purposes for the deals in our sample.

almost all deals. The median deal spread is 400 bps. For most facilities, we also observe a second pricing component: the original issue discount (OID), sometimes also called the "upfront fee" by market participants. 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.[10] As opposed to upfront fees in other syndicated loans, OIDs in leveraged loans are typically not tiered by commitments, so that all lenders who participate in the primary market receive the same OID. We aggregate by averaging across the facility OIDs in a deal. The median OID at the deal level is 75 bps, with substantial variation across deals.[11] As we discuss below in detail, taking into account OIDs is crucial for computing correct measures of underpricing in the syndicated loan market.

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

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

Over all deals for which we observe OIDs in our sample, the median of the effective spread as defined in Equation (2) is 25bps higher than the median of the spread.

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.

[10]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 $(100-x)\%$.

[11]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 up-front fee of about 80bp in their Table 1, which is similar to our OID.

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.[12] We aggregate by averaging across the facility break prices in a deal. As indicated in Table 1, the median break price at the deal level is slightly above par.

3.2 Description of adjustments (flexes)

Our main set of independent variables of interest relate to flex information: At launch, the arranger initially proposes a spread and OID. Depending on the level of demand, the arranger may then adjust spreads and the OID. 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.

We have 2,139 deals (out of 3,004) in our sample in which a non-zero flex is reported for the spread, OID, or amount, of at least one facility. We have 530 deals in which more than one facility is flexed. We aggregating to the deal level by taking the average of the facility-level spread flex, the average of the facility-level OID flex, and by summing the facility-level amount flex within a deal. Table 2 reports summary statistics on the distribution of flexes in our sample, at the deal level. We frequently have non-zero spread flex (in 1,416 deals). Non-zero OID flex and amount flex are less frequent (1,217 and 1,013 deals, respectively). Although there is substantial variation across deals, the average flex is not significantly different from zero in any category.

We plot the fraction of deals for which effective spreads and amounts are flexed up or down by year in Figure 4. We can see in panel (a) that effective spreads are flexed frequently (30-55 percent of deals per year). Panel (b) indicates that amounts were unlikely to be flexed before the crisis,

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

Table 2
Summary statistics - flex

Summary statistics for flex of amounts, spread, OID, and effective spread, at the deal level, in our sample with pricing information. We report statistics for observations with non-zero flex. The deal-level amount flex is the sum of the amount flexes for all loans in a deal. The deal-level spread flex and OID flex are the averages of spread flex and OID flex over the facilities within a deal, respectively. The deal-level effective spread flex is the deal-level spread flex plus the deal-level OID flex divided by 4. Amount flex is reported as bps of initially proposed amount. Spread flex, discount flex, and effective spread flex are in bps of face value.

	Amount flex	Spread flex	OID flex	Eff. spread flex
mean	817	5	11	6
sd	3,130	61	133	70
min	-7,679	-175	-450	-200
25%	-200	-25	-50	-38
median	312	-25	-25	-12
75%	1,087	50	50	38
max	34,833	300	1,700	425
N	1,033	1,416	1,217	1,835

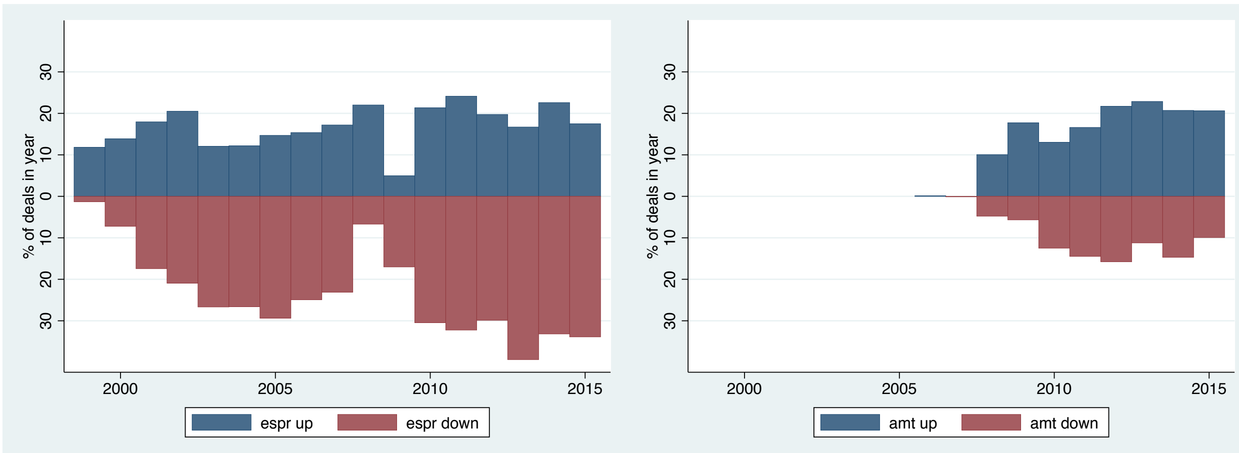
but that this practice has changed since the crisis; they are now flexed in about 20-35% of deals. We examine in more detail whether, when, and how loans are flexed in Appendix B.

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 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 issued (Benveniste and Spindt, 1989). An implication is that investors receive, on average, information rents in the form of underpricing.

In the context of leveraged loans, underpricing can be calculated as the difference between the



(a) effective spread flex **(b) amount flex**

Figure 4. Average up and down flex by year
Fraction of deals in our sample in a given year for which effective spreads and amounts are flexed up or down. Effective spreads are flexed frequently. Amounts were not flexed before the financial crisis, but are now being flexed, reflecting a change in market practice.

secondary market price and the primary market price:

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

For our sample of 3,004 deals with pricing information, 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 3.

The median underpricing is 75 bps of par. This number is lower than the 19% underpricing found for stocks (Jenkinson and Ljungqvist, 2001), and compares 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).[13]

[13] Because 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.

Table 3
Summary statistics - underpricing

Summary statistics for deal-level underpricing in our sample with pricing information. 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 facilities in a deal.

	Underpricing
mean	84.53
sd	49.09
min	-150
25%	50
median	75
75%	100
max	450
N	3,004

Although bookbuilding theory predicts underpricing on average, so do many other theories. This means that the presence of underpricing on its own is not conclusive evidence of bookbuilding or demand discovery.

A unique implication of bookbuilding theory is that pricing should only adjust partially to revealed information: If investors 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. The following hypothesis summarizes the testable implication.

Hypothesis 1. *On average, the flex in the effective spread is negatively related to underpricing.*

In addition, incentive compatibility in demand discovery produces risk about how much of a loan will be placed with investors. To see this, imagine the contrary: Suppose that an arranger wants to place a certain quantity of a loan, and always decreases the price (increases the yield) as much as necessary to ensure that the entire quantity is placed with investors. Then investors have a strong incentive to pretend to have a low willingness to pay, as this will induce a lower equilibrium price (a higher yield). Theory shows that by adjusting both the price and quantities (instead of just the price), arrangers can leave lower information rents to investors in expectation.

The risk that not all of the loan will be placed with investors can be borne by the issuer, or by the underwriter, or shared. Ideally, we would have deal-specific data on the exact risk-sharing agreements as contained in debt commitment letters (see Section 2). Unfortunately, such data does not exist.

If the borrower bears some of this risk, then when investors indicate a low willingness to pay, the borrower will receive a lower amount (that is, amount flex will be negative). If the borrower bears none of this risk, then when investors indicate a low willingness to pay, the amount that the borrower receives will be unaffected (amount flex will be zero). On average, when investors indicate a low willingness to pay, the borrower will receive a lower amount. We can again identify deals in which investors indicate a low willingness to pay as those in which the effective spread is flexed up, to obtain the following empirical prediction:

Hypothesis 2. *On average, the flex in the effective spread is negatively related to the flex in the amount.*

Since in some deals, the arranger bears some of the risk, the willingness to pay will also be related to the share retained by the arranger. We defer a discussion of this issue to the next section.

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

$$\mathit{Underpricing}_i = c + \beta_1 \mathit{Effective\ Spread\ Flex}_i + \gamma X_i + \epsilon_i. \tag{3}$$

Similarly, we can test Hypothesis 2 by estimating the following equation:

$$\mathit{Amount\ Flex}_i = c + \beta_2 \mathit{Effective\ Spread\ Flex}_i + \gamma X_i + \epsilon_i. \tag{4}$$

The prediction is that both β_1 as well as β_2 is negative.

We estimate equations (3) and (4), and control for additional loan characteristics (X_i). In all specifications, the controls include the loan amount, maturity, talk yield, and dummies for whether the deal contains a revolving credit facility, is rated, is sponsored, includes a covenant-lite facility, or a second lien, as well as fixed effects for loan purpose, borrower industry, and deal month-year. Table 4 shows the results.

Column (1) shows our baseline regression for equation (3). Consistent with Hypothesis 1, flexes in the spread have a negative and statistically significant effect on underpricing. The point estimate implies that a negative effective spread flex of 100 bps is associated with an increase in underpricing by about 7 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 this baseline specification, we include time (syndication-month-year) fixed effects, to control for aggregate demand for syndicated loans and time-varying aggregate risk appetite. This baseline specification includes arranger fixed effects, as arrangers may specialize in deals that require specific syndication strategies, and these deals may therefore differ in underpricing.

In column (2), we replace arranger fixed effects with arranger-year fixed effects, to allow for changes over time in the types of deals that arrangers specialize in, and the associated syndication strategies and therefore underpricing. The coefficient on effective spread flex is not affected.

Column (3) shows our baseline regression for equation (4). Consistent with Hypothesis 2, we find that amount flex is negatively related with effective spread flex. The magnitude of our coefficient implies that when the effective spread is increased by 100 basis points, on average, the amount is decreased by about 3% of the initially proposed amount. This baseline specification includes arranger fixed effects, to control for potentially arranger-specific syndication strategies that imply a given level of amount flex. In column (4), we replace arranger fixed effects with arranger-year

Table 4
Demand Discovery

Regressions of underpricing and amount flex on effective spread flex, at the deal level. Underpricing and Effective Spread Flex is measured in bps of par. Amount Flex is measured in bps of the initially offered amount. Eff. Spread Flex is the change in effective spread (see equation (2)). 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. RC, Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether the deal contains a facility that is a revolving credit facility, is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of facilities. Log Talk Amount is the log of the initially proposed total deal amount. Log Talk Yield is log of the average of the initially offered all-in yield to maturity across all facilities. Time fixed-effects are at the syndication month-year. (See Tables 1, 2, and 3 for relevant summary statistics).

	(1) Underpricing	(2) Underpricing	(3) Amount Flex	(4) Amount Flex
Eff. Spread Flex	-0.0664***	-0.0701***	-2.718***	-2.839***
	(0.0196)	(0.0190)	(0.421)	(0.420)
RC	6.009***	6.368***	-256.5***	-242.6***
	(1.817)	(1.888)	(72.89)	(74.50)
Rated	10.03**	8.228**	40.02	74.23
	(4.010)	(3.756)	(79.49)	(86.08)
Sponsored	-10.44***	-10.46***	-132.3	-131.2
	(2.205)	(2.176)	(105.7)	(111.0)
Cov-lite	4.354**	4.782**	134.1	131.1
	(1.925)	(1.987)	(87.62)	(87.81)
Second Lien	-6.620*	-5.609	-3.418	-23.27
	(3.401)	(3.372)	(76.74)	(76.86)
Log Maturity (Years)	0.214	-0.466	518.3**	452.7**
	(4.280)	(4.425)	(198.9)	(217.7)
Log Talk Amount	3.188***	3.240***	-179.5***	-183.9**
	(1.039)	(1.082)	(67.02)	(72.34)
Log Talk Yield	79.43***	78.18***	-63.61	-15.42
	(6.381)	(6.123)	(158.7)	(167.8)
Arranger FE	Yes	No	Yes	No
Arranger-Year FE	No	Yes	No	Yes
Purpose FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Observations	3000	3000	3000	3000
R^2	0.415	0.461	0.110	0.151

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

fixed effects, to allow for potential time variation in arranger-specific syndication strategies.

We provide more variations of these regressions in Appendix C.2, where we confirm, for instance, that net inflows into funds that invest into leveraged loans are a good proxy for aggregate demand as suggested by Ivashina and Sun (2011). In Appendix C.3, we furthermore discuss a potential sample selection issue: It is possible that when investors indicate a low willingness to pay in the primary market, loans are subsequently less likely to trade in the secondary market. This might imply that we do not observe a break price for such deals, and hence cannot compute underpricing. In short, we find that the availability of break prices is not related to spread flex once we control for deal amount, whether there is rating, and initial talk yield as a proxy for the riskiness of the deals.

5 Pipeline Risk

Having established that the syndication of leveraged term loans is essentially a demand discovery exercise, we now turn to the risks that arrangers face during such a process and to the consequences that arise when these risks materialize.

5.1 Lead share retention

As argued in the previous section the demand discovery process must be incentive compatible, and this generates risk about how much of a loan will be placed with investors. The risk that not all of the loan will be placed with investors could be borne by the issuer, or by the underwriter, or shared. If arrangers assume some of the risk on a deal, they will be forced to retain more when investors indicate a low willingness to pay. If arrangers assume no risk, their retention should be unaffected. This implies that, on average across all deals, arrangers should retain more when investors indicate a low willingness to pay. As before, we can identify deals in which investors indicate a low willingness to pay as those in which the effective spread is flexed up, to obtain the following empirical prediction:

Hypothesis 3. *On average, the flex in the effective spread is positively associated with the share retained by the arranger.*

To test Hypothesis 3, 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.[14]

In the LCD sample that we have used so far, we restricted ourselves to the deals for which we had good coverage of pricing-related items. Matching this sample with SNC would leave us with very few observations, and to test Hypothesis 3, we do not need all pricing-related items. For this reason, we consider here the full 11,842 sample of deals with a single lead arranger and single deal purpose. We then match deals in LCD to deals in SNC using the borrower name, origination date, and deal amounts for term loans in both data sets. This produces a final matched sample of 1,796 deals.

We define the lead share as the dollar value of the arranger's share in term loans plus the share in the utilized part of credit lines, over the dollar value of term loan face value plus utilized part

[14] 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`.

of credit lines. We obtain similar results if we define the lead share based on committed amounts rather than utilized amounts (See Appendix C.4.)

The average lead share in our sample is 7.4 percent, and the median lead share is 2.6 percent. These numbers are low in comparison to lead shares in DealScan but are consistent with the magnitudes of and general decline in lead shares for term loans in SNC as described in other papers (Bord and Santos, 2012). A 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.[15]

We test Hypothesis 3 by estimating the following equation at the deal level:

$$\textit{Lead Share}_i = c + \beta_3 \textit{Effective Spread Flex}_i + \gamma X_i + \epsilon_i, \tag{5}$$

According to Hypothesis 3, we expect coefficient β_3 to be positive.

Table 5 shows the estimation results. We find a positive and statistically significant coefficient on effective spread flex (β_3). Because the conditions at the arranger could be correlated with effective spread flex and also matter for the retained lead share, we control for these first by including time-invariant arranger fixed effects in column (1) and then by including time-varying arranger-year fixed effects in columns (2) and (3).[16] In column (3), we also include the initially proposed yield

[15]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 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 the Online Appendix for details.)

[16]Irani and Meisenzahl (forthcoming) document that lenders conditions mattered for loan sales during the

Table 5
Lead Share and Effective Spread Flex

Regressions of Lead Share on Effective Spread Flex, 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.) Eff. Spread Flex represents changes in the effective spread over the syndication period, assumes that when no change is reported, this is because there is no change, and is measured in basis points of par. RC, Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether at least one facility is a revolving credit facility, or 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 proposed total amount. Log Talk Yield is log of the initially offered all-in yield to maturity. Time fixed-effects are at the syndication month-year.

	(1) Lead Share All Deals	(2) Lead Share All Deals	(3) Lead Share All Deals	(4) Lead Share Q4 Deals	(5) Lead Share Q4 Deals	(6) Lead Share Q4 Deals
Eff. Spread Flex	0.000196**	0.000259**	0.000418**	0.000327*	0.000529***	0.000571**
	(0.0000908)	(0.000109)	(0.000208)	(0.000179)	(0.000168)	(0.000273)
RC dummy	0.0363***	0.0405***	0.0538***	0.0300*	0.0291	0.0703
	(0.00893)	(0.0104)	(0.0201)	(0.0179)	(0.0308)	(0.0462)
Rated	-0.0210***	-0.0233***	-0.0446*	-0.00645	-0.0197	0.0635
	(0.00765)	(0.00768)	(0.0232)	(0.0210)	(0.0302)	(0.106)
Sponsored	-0.0153	-0.0132	-0.0245	-0.0193	-0.0225	-0.0904*
	(0.00963)	(0.00963)	(0.0254)	(0.0183)	(0.0246)	(0.0468)
Cov-lite	-0.00910	-0.0168	-0.0267	-0.0185	-0.00738	0.00611
	(0.0109)	(0.0120)	(0.0215)	(0.0161)	(0.0216)	(0.0354)
Second Lien	0.00366	0.00445	0.0168	-0.0124	-0.0175	-0.0227
	(0.00980)	(0.0102)	(0.0322)	(0.0136)	(0.0165)	(0.0640)
Log Maturity (Years)	-0.0201	-0.0160	-0.0432	-0.0234	0.0199	0.206
	(0.0170)	(0.0207)	(0.0615)	(0.0315)	(0.0395)	(0.250)
Log Talk Amount	-0.0163***	-0.0148***	-0.0215**	-0.0149*	-0.00862	-0.0277
	(0.00363)	(0.00404)	(0.00975)	(0.00875)	(0.0111)	(0.0276)
Log Talk Yield			0.00893			-0.0259
			(0.0472)			(0.125)
Arranger FE	Yes	No	No	Yes	No	No
Arranger-Year FE	No	Yes	Yes	No	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1796	1796	582	473	473	181
R^2	0.416	0.556	0.580	0.593	0.786	0.865

Standard errors in parentheses

SEs clustered by syndication month

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(the “log talk yield”) as a control for the riskiness of the loans, as in our previous regressions. It can be seen while the requirement that the talk yield be present reduces the number of available observations substantially, the coefficient on effective spread flex is still positive and significant. The magnitudes of the coefficients imply that a 100 basis point increase in the effective spread is associated with an increase of about 2-4% in the lead share, which is large given the median lead share of only about 2.6% in our data.

The SNC lead share is observed on December 31. Given the existence of an active secondary market, our data on the lead share may therefore not accurately reflect the share initially retained by the lead arranger. In particular Aramonte, Lee, and Stebunovs (2015) document that banks sell substantial parts of their term loan shares in the first quarter after origination.

For this reason, our results are likely to underestimate the effect of flexes on lead shares. To get a sense of the bias, we repeat the same set of regressions as in columns (1) to (3) in columns (4) to (6), but on a sample restricted to only those deal that take place in the final quarter of each year. The idea is that the bias must be smaller if banks had less time to sell down their positions. We see that the coefficients on effective spread flex are now larger, but also that standard errors increase slightly due to the decrease in the number of observations. The point estimates now imply that an increase in the effective spread of about 100 basis points is associated with with an increase of about 3-6% in the lead share.

5.2 Debt overhang

In the previous subsection, we provided evidence that arrangers face the risk that they end up with larger shares when investors indicate a lower willingness to pay, that is, they face “unfortunate retention” in the sense that they retain a larger share precisely in the loans which investors find

financial crisis. Specifically, they find that lenders that relied heavily on wholesale funding pre-crisis sold more loan shares.

less attractive.

We now ask whether the unfortunate retention of these loans affects the subsequent behavior of arrangers. Theory suggests that when banks 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, 2018).[17] We would therefore expect that when many loans get stuck in an arranger's pipeline simultaneously, this could induce the arranger to reduce arranging activity and scale back 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. In this subsection, we provide empirical support for this hypothesis.

Because positive effective spread flex implies higher than anticipated retention, while negative effective spread flex implies lower than anticipated retention, we can construct a proxy of unfortunate retention for arranger i as the difference between total amount of loans with positive flexes and the total amount loans with negative flexes over a given quarter t ($\mathit{Net\ Flex}_{it}$).

We examine outcome variables Y_{ijt} that describe lending or arranging activity for a given lead arranger i, in a given quarter t, and in a given industry j, and estimate the following type of equation in our baseline specification:

$$Y_{ijt} = \beta_4 \mathit{Net\ Flex}_{it-1} + \alpha Y_{ijt-1} + \theta_i + \gamma_t + \delta_j + \epsilon_{ijt} \tag{6}$$

We expect *Net Flex* to be positively related to unfortunate retention, and hence negatively related with arranging and lending, so that the coefficient β_4 should be negative. To run this regression, we partially balance the panel: Industry-quarters with no activity (missing Y_{ijt}) are included with both $\mathit{Net\ Flex}_{it}$ and Y_{ijt} set to 0, unless the arranger in question has never been active in the

[17]Bahaj and Malherbe (2018) show that, even when banks can raise funds that benefit from government guarantees to finance new lending, the presence of risky assets on the balance sheet creates an overhang problem, not a debt overhang in this case, but a "guarantee overhang."

industry in question (no observations Y_{ijt} at all for arranger i in industry j).[18]

We consider two outcome variables. First, we examine the total dollar amount of syndicated loan deals arranged by arranger i in quarter t and industry j, constructed from LCD (*Amount Arranged*$_{ijt}$). Second, we examine the shares bought by arranger i in newly-originated, "unrelated" credit lines, in quarter t and industry j, constructed from SNC (*CL Lending*$_{ijt}$).[19] By "unrelated," we mean credit lines arranged by arrangers *other than* arranger i.

It is natural to focus on lending via credit lines, rather than institutional term loans for instance. This is because the latter are arranged to be distributed, and banks rarely hold shares in these if they have not been actively involved as an arranger. We require the credit lines to be "unrelated," that is, arranged by *other* arrangers to rule out some alternative interpretation of our results, as we explain below.

We report results in Table 6. The coefficient on *Net Flex* is negative and statistically significant in all columns. The standard deviation of our Net Flex variable is about \$1,284 million in our sample based on LCD data (columns (1) and (2)). So the magnitudes of the coefficients in column (1) and (2) imply that a one standard deviation increase in Net Flex is associated with a subsequent decrease in the amounts arranged of about \$57-58 million. This compares to an average amount arranged, by each arranger, in each industry, in each quarter, of about \$219 million. So the effect is economically large.

Similarly, the standard deviation of our Net Flex variable is about \$778 million in our sample

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

[19] To compare *Net Flex* from LCD to shares in credit lines in SNC, we need to hand-match arrangers in LCD to SNC. To do so, we 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. This leaves us with the 18 active arrangers who together account for 88 percent of the leveraged term loan market. As noted above, one caveat is that the SNC only reports loan shares as of December 31st of the reporting year. We assign the year-end loan share to the respective origination quarter.

Table 6
Net flex, arranging activity, and lending via credit lines

Regressions at the arranger-quarter-industry level of Amount Arranged (dollar volume arranged, from LCD) and CL Lending (shares bought in newly-originated credit lines arranged by *other* banks, from SNC), on Net Flex (the difference between the dollar amount of deals with positive effective spread flex minus the dollar amound of deals with negative effective spread flex, of a given arranger, in a given quarter, from LCD). Amount Arranged, CL Lending, and Net Flex are measured in millions of dollars. Time fixed-effects are at the syndication-quarter level.

	(1) Amount Arranged	(2) Amount Arranged	(3) CL Lending	(4) CL Lending
Net Flex	-0.0446***	-0.0452***	-0.0112***	-0.0117***
	(0.0105)	(0.0105)	(0.00297)	(0.00297)
Amount Arranged$_{t-1}$	0.236***	0.210***		
	(0.0278)	(0.0258)		
CL Lending $_{t-1}$			0.304***	0.232***
			(0.0207)	(0.0193)
Arranger FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Industry FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes
Observations	14,823	14,823	21,772	21,772
R^2	0.316	0.333	0.482	0.521

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

that includes SNC data (columns (3) and (4)). So the magnitudes of the coefficients in column (3) and (4) imply that a one standard deviation increase in Net Flex is associated with a subsequent decrease in lending via credit lines of about $9 million. This compares to an average amount lent via credit lines, by each arranger, in each industry, in each quarter, of about $154 million. The effect here is economically smaller, but still suggests a meaningful spillover from unfortunate retention of leverage loans to other lending markets.

These results are consistent with the interpretation that unfortunate retention reduces the affected arranger's ability or willingness to supply arranging services or to lend via credit lines.

There are other possible interpretations of our results. In particular, one might worry that the results may reflect shocks to demand rather than supply: A drop in demand for loans arranged by a given arranger in one quarter may produce an increase in Net Flex for that bank in that quarter, and, possibly, to the extent that demand is correlated across time, a drop in loans arranged by that arranger in the subsequent quarter.

However, by including time fixed effects, we are controlling for a potential drop in aggregate demand. So the drop in demand would have to be arranger specific. For instance, arrangers may specialize in arranging loans for specific industries, and the drop in demand may be specific to a given industry. However, the effect is still negative and significant in our specification with industry-time fixed effects in columns (2) and (4), which controls for industry-specific demand fluctuations.

This implies that, to be a source of concern, the drop in demand would have to be arranger specific, but not related to industry. For instance, unfortunate retention on part of the bank may be interpreted by future borrowers as a lack of due diligence or competence on part of the arranging unit of the bank. Following unfortunate retention, borrowers might then avoid choosing the affected bank as an arranger in subsequent quarters.

However, when we use "unrelated" credit line lending in columns (3) and (4), the effect persists. Even if unfortunate retention implies that an arranger is incompetent, that does not mean that a borrower would object to this arranger holding a share in their credit line, provided that the credit line is arranged by a *different* arranger. For borrowers to object, competence in arranging loans would have to be related to its ability to honor its commitments under a credit line. While we cannot rule this out, we find this interpretation less plausible than the interpretation that unfortunate retention reduces the supply of credit of the affected arranger.

Finally, unfortunate retention may occur at the same time as some other events that also have a negative effect on the bank's ability to arrange and lend. We may therefore be overestimating the effect of unfortunate retention. Our time fixed effects and industry-time fixed effects should control for many, but not all of such events. For instance, suppose an arranger underwrites two deals simultaneously. There is no appetite for either deal. The arranger manages to close the first, but the second deal cannot be closed at all. The retained share for the first deal would be large, and for the second would be enormous. We might only observe the first deal in our data, since the second deal does not close. So we would attribute all of the subsequent drop in arranging and lending to retention to the first deal, which is in fact only the "tip of the iceberg." Of course, this argument suggests that pipeline risk is more substantial than what we document, and should therefore be even more of a policy issue.

To sum up, in this section, we have shown that when investors indicate a low willingess to pay (spreads are flexed up), arranger subsequently increase the shares that they retain. We argue that when arrangers suffer from unfortunate retention, this decreases their willingness to arrange new loans, and to supply credit (via credit lines).

6 Conclusion

We use novel data to study the syndication of leveraged term loans. The data allows us to draw conclusions about the relevant informational frictions and the nature of the economic problem arrangers face. In particular, we show that arrangers need to uncover investors' willingness to pay for the loan. Arrangers often need to give guarantees to borrowers at an early stage of the process. Together with incentive compatibility concerns, this implies that arrangers run the risk of unfortunate retention, that is, of having to retain a larger share when investors reveal a lower willingness to pay than expected. We document that this is the case. Because this risk arises from arrangers' syndication pipelines, we refer to it as *pipeline risk*.

We argue that unfortunate retention can cause debt overhang problems. Consistent with this, we find that when an arranger faces an overall lower willingness to pay in a given quarter, it subsequently reduces the amount of leveraged loans it arranges in the following quarter, as well its lending via credit lines.

Ivashina and Scharfstein (2010) provide evidence that, on average, aggregate lead shares are higher in times in which investors' aggregate demand is low. They argue that these higher aggregate lead shares may have a negative effect on aggregate credit supply. We have provided evidence that at the level of the arranger, unfortunate retention is associated with subsequent contraction in arranging and lending activity. This suggests that the aggregate relationship described by Ivashina and Scharfstein may be due to the need for incentive compatibility in the demand discovery process. If this is true, the regulation of pipeline risk may be not just a microprudential, but also a macroprudential concern.

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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.[20]

- 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.[21]

- 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.

[20] "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`.

[21] "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`.

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.[22]

- 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.[23]

- 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.[24]

- 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

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

[23] "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`.

[24] "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.

initiated in 2015, with a total value of $40 billion.[25]

- In October 2015, arrangers for the $1.2 billion loan financing the buyout of FullBeauty were struggling to sell it.[26] 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. 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.[27]

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[25] "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`.

[26] "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.

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

B How and when are loans flexed?

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 7 indicates that spreads are more likely to be flexed, and that when OIDs are flexed, they are flexed in the same direction as spreads. According to practitioners, arrangers primarily flex to meet investors' demand for yield (as defined in Equation (1)). They often start by increasing the spread, but, if necessary, eventually prefer to generate further increases in the yield via increases in the discount rather than by increases in the spread. This is because a very high spread can generate substantial prepayment risk.[28]

Table 7
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 ↓	13.56	11.47	0.17	25.19
spread =	10.50	43.69	2.59	56.78
spread ↑	0.41	7.72	9.90	18.03
	24.48	62.87	12.65	100.00

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 could 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

[28] 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 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 8 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 8
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 Flows are net inflows into high yield mutual funds and CLO issuances, measured in millions. RC, Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether a deal contains a revolving credit facilicty, or 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)	(2)	(3)	(4)	(5)	(6)
	Spr Flex (d)	Spr Flex (d)	Spr Flex Down (d)	Spr Flex Up (d)	Spr Flex Down (d)	Spr Flex Up (d)
Log Talk Yield	0.232***	0.211***	0.0481	0.186***	0.117**	0.0964**
	(0.0482)	(0.0464)	(0.0392)	(0.0443)	(0.0461)	(0.0435)
Acq.	0.152***	0.148***	0.107***	0.0462**	0.0938***	0.0554**
	(0.0273)	(0.0252)	(0.0242)	(0.0229)	(0.0247)	(0.0229)
LBO	0.203***	0.210***	0.154***	0.0545*	0.140***	0.0741**
	(0.0301)	(0.0282)	(0.0349)	(0.0283)	(0.0338)	(0.0286)
Fund & CLO flows		0.00198			0.0113***	-0.00922***
		(0.00227)			(0.00272)	(0.00249)
RC	0.150***	0.157***	0.0994***	0.0515***	0.0967***	0.0617***
	(0.0195)	(0.0189)	(0.0219)	(0.0174)	(0.0207)	(0.0181)
Rated	0.00509	0.0135	0.00787	-0.000774	0.0309	-0.0153
	(0.0381)	(0.0368)	(0.0361)	(0.0283)	(0.0363)	(0.0281)
Sponsored	-0.0542**	-0.0471**	-0.0717***	0.0155	-0.0596***	0.0109
	(0.0226)	(0.0236)	(0.0174)	(0.0183)	(0.0199)	(0.0186)
Cov-lite	0.00156	-0.0155	0.0579***	-0.0543***	0.0208	-0.0347*
	(0.0226)	(0.0216)	(0.0178)	(0.0193)	(0.0211)	(0.0186)
Second Lien	-0.00744	-0.000999	-0.0177	0.0208	-0.0673**	0.0757**
	(0.0336)	(0.0314)	(0.0315)	(0.0306)	(0.0319)	(0.0301)
Log Maturity (Years)	0.186***	0.230***	0.165***	0.0205	0.179***	0.0511
	(0.0425)	(0.0444)	(0.0373)	(0.0364)	(0.0392)	(0.0378)
Log Synd. Time	-0.0333	-0.0612	0.0541	-0.0877*	-0.0284	-0.0348
	(0.0408)	(0.0393)	(0.0553)	(0.0442)	(0.0494)	(0.0400)
Log Talk Amount	-7.047***	-7.197***	-7.598***	0.361	-6.632**	-0.708
	(2.322)	(2.330)	(2.299)	(2.027)	(2.527)	(2.117)
Log Talk Amount^2	2.034***	2.072***	2.064***	0.0184	1.783***	0.324
	(0.618)	(0.621)	(0.612)	(0.541)	(0.674)	(0.568)
Log Talk Amount^3	-0.244***	-0.248***	-0.238***	-0.0112	-0.203**	-0.0492
	(0.0711)	(0.0717)	(0.0706)	(0.0626)	(0.0780)	(0.0660)
Log Talk Amount^4	0.0105***	0.0107***	0.00997***	0.000736	0.00835**	0.00247
	(0.00300)	(0.00303)	(0.00298)	(0.00265)	(0.00331)	(0.00281)
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	3000	3000	3000	3000	3000	3000
R^2	0.247	0.198	0.200	0.202	0.118	0.121

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 9 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 10 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 9
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 Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. RC, Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether a deal contains a revolving credit facility, or 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	0.248***	0.217***	0.0278	0.218***	0.0620	0.154***
	(0.0501)	(0.0404)	(0.0465)	(0.0364)	(0.0435)	(0.0355)
Acq.	0.223***	0.233***	0.185***	0.0373*	0.176***	0.0561***
	(0.0253)	(0.0238)	(0.0245)	(0.0215)	(0.0239)	(0.0187)
LBO	0.238***	0.251***	0.172***	0.0642***	0.158***	0.0900***
	(0.0327)	(0.0321)	(0.0286)	(0.0230)	(0.0299)	(0.0247)
Fund & CLO flows		0.00385*			0.0117***	-0.00797***
		(0.00203)			(0.00211)	(0.00195)
RC	0.0992***	0.0960***	0.0800***	0.0217	0.0751***	0.0230
	(0.0258)	(0.0238)	(0.0221)	(0.0160)	(0.0216)	(0.0170)
Rated	0.107***	0.112***	0.0637*	0.0463*	0.0739**	0.0407
	(0.0371)	(0.0351)	(0.0336)	(0.0275)	(0.0328)	(0.0282)
Sponsored	-0.0326	-0.0292	-0.0105	-0.0248	-0.00533	-0.0259
	(0.0224)	(0.0233)	(0.0196)	(0.0160)	(0.0204)	(0.0157)
Cov-lite	0.0286	0.0394**	0.0652***	-0.0351**	0.0553***	-0.0152
	(0.0202)	(0.0192)	(0.0175)	(0.0138)	(0.0194)	(0.0124)
Second Lien	0.0303	0.0370	0.0323	0.00776	-0.000221	0.0456
	(0.0352)	(0.0322)	(0.0278)	(0.0301)	(0.0287)	(0.0307)
Log Maturity (Years)	0.0519	0.0660	0.0976*	-0.0431	0.0850	-0.0156
	(0.0616)	(0.0601)	(0.0555)	(0.0361)	(0.0535)	(0.0383)
Log Synd. Time	0.0266	-0.00865	0.105**	-0.0828**	0.0403	-0.0536*
	(0.0451)	(0.0387)	(0.0434)	(0.0338)	(0.0340)	(0.0284)
Log Talk Amount	-2.205	-2.935	-2.686	0.402	-2.304	-0.683
	(2.670)	(2.763)	(2.529)	(1.065)	(2.580)	(1.182)
Log Talk Amount^2	0.531	0.707	0.609	-0.0591	0.479	0.238
	(0.700)	(0.720)	(0.657)	(0.282)	(0.664)	(0.315)
Log Talk Amount^3	-0.0538	-0.0724	-0.0603	0.00474	-0.0423	-0.0309
	(0.0799)	(0.0817)	(0.0745)	(0.0323)	(0.0746)	(0.0362)
Log Talk Amount^4	0.00193	0.00266	0.00220	-0.000207	0.00131	0.00136
	(0.00335)	(0.00342)	(0.00312)	(0.00135)	(0.00310)	(0.00152)
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	3000	3000	3000	3000	3000	3000
R^2	0.177	0.142	0.170	0.182	0.104	0.114

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

Table 10
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 Flows are net inflows into high yield mutual funds and CLO issuances measured in millions. RC, Rated, Sponsored, Cov-lite, and Second Lien are dummies that indicate whether a deal contains a revolving credit facility, or 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	0.169***	0.202***	0.0246	0.0981**	0.0444	0.137***
	(0.0485)	(0.0393)	(0.0360)	(0.0472)	(0.0310)	(0.0371)
Acq.	0.0829***	0.0733***	0.0498**	0.0629***	0.0476**	0.0530**
	(0.0251)	(0.0237)	(0.0221)	(0.0232)	(0.0214)	(0.0219)
LBO	0.0650*	0.0585*	-0.0496**	0.0852***	-0.0515**	0.0791**
	(0.0337)	(0.0324)	(0.0226)	(0.0317)	(0.0214)	(0.0310)
Eq. Payout	0.184***	0.173**	0.149***	0.120*	0.145***	0.106
	(0.0651)	(0.0676)	(0.0526)	(0.0714)	(0.0518)	(0.0754)
Fund & CLO flows		0.00399*			-0.00331***	0.00456**
		(0.00203)			(0.00122)	(0.00205)
RC	0.0887***	0.0817***	0.0907***	0.0641***	0.0948***	0.0509***
	(0.0184)	(0.0174)	(0.0156)	(0.0185)	(0.0152)	(0.0183)
Rated	0.0377	0.0459	0.0192	0.0414	0.0184	0.0529
	(0.0321)	(0.0317)	(0.0292)	(0.0332)	(0.0287)	(0.0322)
Sponsored	-0.0620***	-0.0616***	-0.0285*	-0.0515**	-0.0326**	-0.0465**
	(0.0229)	(0.0220)	(0.0165)	(0.0196)	(0.0161)	(0.0190)
Cov-lite	0.0180	0.0111	-0.0124	0.0198	-0.0180	0.0115
	(0.0206)	(0.0187)	(0.0164)	(0.0181)	(0.0152)	(0.0172)
Second Lien	0.0817**	0.0667**	0.194***	0.141***	0.192***	0.115***
	(0.0364)	(0.0323)	(0.0284)	(0.0366)	(0.0269)	(0.0318)
Log Maturity (Years)	0.111**	0.102**	0.0104	0.0751*	0.0225	0.0587
	(0.0501)	(0.0488)	(0.0299)	(0.0427)	(0.0290)	(0.0410)
Log Synd. Time	0.0315	0.0248	-0.0385	0.0786**	-0.0195	0.0454
	(0.0426)	(0.0373)	(0.0336)	(0.0332)	(0.0299)	(0.0289)
Log Talk Amount	-3.407	-2.914	-1.954	-2.521	-1.789	-1.725
	(2.792)	(2.658)	(1.534)	(2.608)	(1.475)	(2.564)
Log Talk Amount^2	0.861	0.750	0.495	0.622	0.473	0.410
	(0.730)	(0.693)	(0.412)	(0.685)	(0.396)	(0.673)
Log Talk Amount^3	-0.0934	-0.0826	-0.0535	-0.0666	-0.0531	-0.0420
	(0.0827)	(0.0785)	(0.0480)	(0.0781)	(0.0460)	(0.0767)
Log Talk Amount^4	0.00375	0.00338	0.00215	0.00266	0.00222	0.00162
	(0.00344)	(0.00326)	(0.00205)	(0.00327)	(0.00196)	(0.00321)
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	3000	3000	3000	3000	3000	3000
R^2	0.130	0.099	0.148	0.116	0.123	0.080

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

C Robustness Tests

C.1 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 could 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:

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

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 11 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)). There is no significant relationship between the direction of effective spread flex and syndication time.

Table 11
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 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)	-0.0119	-0.0214
	(0.0147)	(0.0139)
Eff. Spr Flex Down (d)	0.00571	0.0228
	(0.0135)	(0.0141)
Fund Flows	-0.00408*	
	(0.00213)	
RC	0.0174*	0.0143
	(0.00927)	(0.00893)
Rated	0.0333	0.0355**
	(0.0205)	(0.0178)
Sponsored	-0.00900	-0.00775
	(0.0137)	(0.0112)
Cov-lite	0.0229**	0.0137
	(0.0106)	(0.0105)
Second Lien	0.000243	-0.0193
	(0.0154)	(0.0127)
Log Talk Amount	-0.0163**	-0.00656
	(0.00797)	(0.00799)
Log Talk Yield	0.0132	0.0564*
	(0.0303)	(0.0292)
Arranger FE	Yes	Yes
Purpose FE	Yes	Yes
Industry FE	Yes	Yes
Time FE	No	Yes
Observations	3000	3000
R^2	0.039	0.180

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

C.2 Additional demand discovery regressions

We report additional variants of the partial adjustment regressions in Table 4 in Table 12. In column (1), we drop the arranger fixed effects in our baseline specification, and include 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 ("*Top Three*"). 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 could be able to reduce underpricing in the current deal by rewarding potential syndicate members also with access to future deal flow. In column (2), we we follow Ivashina and Sun (2011) and control for institutional demand and overall risk appetite by including *Fund Flows*, defined as 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), and drop time fixed effects. The positive coefficient on Fund Flows indicates that an net inflow increases underpricing, consistent with the notion that a net inflow is associated with higher demand. (We note that these net inflows over the syndication period are not known to the arranger at the start of syndication.)

Ivashina and Sun (2011) also argue that time-to-syndication can be interpreted as a proxy for deal-specific demand. When we include the log of time-to-syndication in column (3), we find a marginally significant, positive effect on underpricing, but the coefficient on effective spread flex is practically not affected. Loans that take longer to syndicate exhibit higher underpricing, possibly because complicated loans take longer to evaluate, and because for such loans, it is optimal to pay higher information rents to extract information about demand. This is consistent with the result presented in Appendix C.1, that riskier loans have a longer time-to-syndication.

In column (4), we include spread flex and discount flex separately. Although both coefficients are negative, the effect of discount flexes on underpricing is not significant. This could be the result of low power, or could suggest that the relevant margin of adjustment during the syndication process is the spread.

Table 12
Demand Discovery: Robustness

Regressions of underpricing on effective spread flex, 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. Eff. Spread Flex is computed from spread flex and discount flex as indicated in equation (2), and assumes 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. Fund Flows are net inflows into high yield mutual funds and CLO issuances measured in billions of dollars. Log Synd. Time is the log of the time between launch date and close date, in days. RC dummy, Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether the deal contains a revolving credit facility, and 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 proposed total institutional loan amount. Log Talk Yield is log of the initially offered all-in yield to maturity. Time fixed-effects are at the syndication month-year. (See Tables 1, 2, and 3 for relevant summary statistics).

	(1) Underpricing	(2) Underpricing	(3) Underpricing	(4) Underpricing
Eff. Spread Flex	-0.0589***	-0.101***	-0.0650***	
	(0.0189)	(0.0201)	(0.0191)	
Top Three	-8.045***			
	(1.802)			
Fund Flows		0.877***		
		(0.325)		
Log Synd. Time			8.775*	
			(4.485)	
Spread Flex				-0.0900***
				(0.0265)
Discount Flex				-0.00121
				(0.00980)
RC	6.300***	6.339***	5.871***	6.068***
	(1.927)	(1.870)	(1.828)	(1.822)
Rated	13.40***	9.152**	9.712**	10.09**
	(4.133)	(4.063)	(4.036)	(4.002)
Sponsored	-12.45***	-10.99***	-10.37***	-10.30***
	(2.224)	(2.176)	(2.171)	(2.200)
Cov-lite	5.147**	-1.322	4.226**	4.223**
	(1.996)	(1.940)	(1.932)	(1.914)
Second Lien	-6.999**	-12.96***	-6.454*	-6.677*
	(3.458)	(3.411)	(3.355)	(3.406)
Log Maturity (Years)	2.513	-4.369	0.321	0.152
	(4.538)	(4.382)	(4.293)	(4.269)
Log Talk Amount	3.506***	4.548***	3.253***	3.109***
	(1.140)	(1.104)	(1.055)	(1.054)
Log Talk Yield	75.55***	96.91***	78.97***	79.30***
	(6.139)	(7.038)	(6.300)	(6.394)
Arranger FE	No	Yes	Yes	Yes
Purpose FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	Yes
Observations	3003	3000	3000	3000
R^2	0.381	0.313	0.416	0.415

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

C.3 Availability of break prices

As mentioned in Section 4, a potential sample selection issue 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.

This selection issue, if present, would mean that we are less likely to observe a break price and, hence, underpricing on deals with 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 we do find a significant and negative relationship indicates that the bias, if it exists, is not very strong. However, we cannot rule out that we overestimate the level of underpricing due to this selection issue.

In terms of numbers, we observe a break price for 645 (82%) of the 784 deals with positive effective spread flex. This compares to 1,188 (92%) of the 1,294 deals with negative spread flex. A simple test of difference of proportions would suggest that this difference is significant. However, this difference in the availability of break prices could just be driven by factors such as deal size or whether the deal has a rating. To assess more formally whether we are less likely to observe a break price in cases in which the spread is flexed up, we estimate the following linear probability model at the deal level:

$$\textit{Break Price Dummy}_i = c + \beta_1 \textit{Eff. Spread Flex} + \gamma X_i + \epsilon_i, \tag{8}$$

Break Price Dummy is a variable that is 1 if there is a break price available for the deal. We control for the same set of loan characteristics (X_i) as in our other regressions. We note that we now of course need to redefine our sample and include deals for which we do not observe a break price, which increases the number of observations.

The results in Table 13 indicate that a break price is more likely to be available for larger, rated deals with a longer maturity. It is plausible that such loans are more likely to trade in a secondary market. In addition, deals which include a revolving credit facility are also marginally more likely to have a break price. Finally, a break price is also less likely to be available when the talk yield is higher. Possibly, the 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.

Table 13
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. Effective Spread Flex is measured in bps of par, and is the change in effective spread (see equation (2)). RC, Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether the deal contains a facility that is a revolving credit facility, is rated, sponsored, or classified as cov-lite or second lien, respectively. Log Maturity is the log of the average maturity of facilities. Log Talk Amount is the log of the initially proposed total deal amount. Log Talk Yield is log of the average of the initially offered all-in yield to maturity across all facilities. Time fixed-effects are at the syndication month-year. (See Tables 1 and 2 for relevant summary statistics).

	(1) Break Price (d)	(2) Break Price (d)
Eff. Spread Flex	-0.0000463	-0.0000515
	(0.000106)	(0.000103)
RC	0.0246*	0.0303*
	(0.0118)	(0.0116)
Rated	0.149***	0.134***
	(0.0281)	(0.0298)
Sponsored	0.0000479	0.00287
	(0.0118)	(0.0124)
Cov-lite	0.0227	0.0193
	(0.0129)	(0.0123)
Second Lien	0.00774	0.00102
	(0.0178)	(0.0178)
Log Maturity (Years)	0.120**	0.133***
	(0.0378)	(0.0371)
Log Talk Amount	0.0987***	0.102***
	(0.00911)	(0.00922)
Log Talk Yield	-0.119***	-0.115***
	(0.0275)	(0.0285)
Arranger FE	Yes	No
Purpose FE	Yes	Yes
Industry FE	Yes	Yes
Time FE	Yes	Yes
Arranger-Year FE	No	Yes
Observations	3610	3610
R^2	0.368	0.410

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

C.4 "Committed" lead share

In Section 5.1, we calculated lead share as follows: We took the dollar value of the arranger's share in the utilized part of credit lines, added to this the dollar amounts retained by the lead arranger in any term loans, and divided the result by the sum of the total dollar value of term loans plus the total dollar value of the utilized part of credit lines.

An alternative is to consider the participation of the lead arranger not just in the utilized part of credit lines, but in the entire committed amount, before adding in the participation in term loans. That is, take the dollar value of the arranger's share in the credit line commitments, add the dollar amounts retained by the lead arranger in any term loans, and divide the result by the sum of the total dollar value of term loans plus the total dollar value of credit line commitments.

To distinguish this new version of lead share, we refer to it as the "committed lead share." We repeat our estimation of equation (5) with this slightly different definition of lead share, and report the results in Table 14. We can see that the magnitude of the coefficients on Effective Spread Flex are roughly the same as with our other definition of lead share.

Table 14
Committed Lead Share and Effective Spread Flex

Regressions of Committed Lead Share on Effective Spread Flex, at the deal level. Committed Lead Share is participations of the lead arranger in committed amounts on credit lines plus participations in term loans, relative to total deal amount. (Committed Lead Share is expressed as a fraction between 0 and 1.) Eff. Spread Flex represents changes in the effective spread over the syndication period, assumes that when no change is reported, this is because there is no change, and is measured in basis points of par. RC, Rated, Sponsored, Cov-lite, and Second lien are dummies that indicate whether at least one facility is a revolving credit facility, or 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 proposed total amount. Log Talk Yield is log of the initially offered all-in yield to maturity. 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
Eff. Spread Flex	0.000211**	0.000269***	0.000392**	0.000326*	0.000499***	0.000571**
	(0.0000838)	(0.0000997)	(0.000193)	(0.000167)	(0.000179)	(0.000273)
RC dummy	0.0523***	0.0571***	0.0718***	0.0433***	0.0405	0.0703
	(0.00812)	(0.00958)	(0.0174)	(0.0144)	(0.0255)	(0.0462)
Rated	-0.0125*	-0.0158**	-0.0308	-0.00591	-0.0230	0.0635
	(0.00707)	(0.00705)	(0.0197)	(0.0210)	(0.0282)	(0.106)
Sponsored	-0.0168*	-0.0149*	-0.0270	-0.0173	-0.0224	-0.0904*
	(0.00881)	(0.00886)	(0.0234)	(0.0169)	(0.0217)	(0.0468)
Cov-lite	-0.00418	-0.0117	-0.0226	-0.00925	0.00150	0.00611
	(0.0103)	(0.0113)	(0.0203)	(0.0153)	(0.0209)	(0.0354)
Second Lien	0.000558	0.000763	0.0160	-0.0154	-0.0166	-0.0227
	(0.00967)	(0.00983)	(0.0289)	(0.0129)	(0.0157)	(0.0640)
Log Maturity (Years)	-0.0121	-0.00841	-0.0124	-0.0169	0.0226	0.206
	(0.0154)	(0.0186)	(0.0500)	(0.0299)	(0.0390)	(0.250)
Log Talk Amount	-0.0221***	-0.0205***	-0.0259***	-0.0206***	-0.0149	-0.0277
	(0.00327)	(0.00356)	(0.00868)	(0.00754)	(0.00915)	(0.0276)
Log Talk Yield			0.0154			-0.0259
			(0.0430)			(0.125)
Arranger FE	Yes	No	No	Yes	No	No
Purpose FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Arranger-Year FE	No	Yes	Yes	No	Yes	Yes
Observations	1796	1796	582	473	473	181
R^2	0.441	0.573	0.597	0.615	0.799	0.865

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