Nonbank Market Power in Leveraged Lending

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Abstract

Banks finance their lending to risky firms by selling these loans to nonbank financial institutions. Among these nonbanks, collateralized loan obligations (CLOs) provide the bulk of funds. I show that CLO managers have significant market power during loan origination, which increases firms' cost of borrowing in the leveraged loan market. Akin to bank market power in classic lending relationships which are the result of a bank's "information monopoly," nonbank market power is the result of asymmetrically informed nonbanks. Information asymmetries across nonbanks arise from differential information flows during loan underwriting. Contrary to the underwriting of public securities, banks in general disseminate private information about the borrower when marketing a loan. However, some nonbanks self-restrict their information access to publicly available information. To identify my results, I construct a new instrument using novel data on mergers in the CLO industry. I provide the first analysis of these mergers and their determinants. Overall, this research highlights a key distinction between public and private debt markets and its economic consequences for borrowing firms. My findings have important implications for the ongoing legal debate on the applicability of securities law to leveraged loans.

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1 Introduction

Today many corporate loans seem to resemble bonds in all but name. Banks underwrite loans with bond-like features to sell to nonbank financial institutions, many of which also invest in the bond market. This development has not gone unnoticed. In a legal case, which the loan market's advocacy group warns will "jeopardize a trillion-dollar market that is vital to the economy," the U.S. Court of Appeals is left to answer whether these loans should in fact be treated as public securities.[1] Despite the apparent convergence of loan and bond markets, loans continue to carry perplexingly large spreads compared with their bond counterparts (Schwert, 2020). The credit spread on an otherwise identical loan is nearly twice that of a bond.

My paper establishes that imperfect competition in the loan market is an important contributor to high loan spreads. However in doing so, I depart from a long literature that studies inter-bank competition. Instead, I turn to competition in the nonbank sector and provide evidence on the market power of nonbanks, and collateralized loan obligations (CLOs) in particular.

In addition to showing that CLO managers have significant market power, I also investigate the source of this market power. I argue that information asymmetries arise during loan origination, because loans are not public securities. These information asymmetries create an "information oligopoly" for CLO managers, which resembles the information monopoly enjoyed by incumbent banks in traditional lending (Rajan, 1992; Sharpe, 1990). Because of the hold-up problem associated with this information oligopoly, it is costly for the bank to replace the funds of one CLO manager with the funds of another CLO manager.[2]

As a third contribution, I provide the first analysis of mergers in the CLO industry. I show that these mergers are liability-driven, not asset-driven. Rather than pursuing targets for their loan portfolios, acquirers choose targets to improve their CLO funding conditions. This form of target selection, combined with targets' high levels of diversification, make the acquired loans random additions to the acquirer's portfolio. This justifies my use of these additions as an instrument in my main analysis.

[1] In May 2022, the Loan Syndications and Trading Association (LSTA) filed an amicus curiae brief outlining its position which can be found at https://www.lsta.org/app/uploads/2022/05/AS-FILED_21-2726-Motion-for-Leave-to-File-Amici-Brief-of-LSTA-et-al-2d-Cir..pdf. At the time of writing the 2nd Circuit's opinion is expected at the end of 2022.

[2] Some work refers to the rent extraction due to an incumbent bank's information monopoly as "market power," while other work refers to it as "bargaining power." I use the former terminology.

I establish these results in the context of the leveraged loan market. The term "leveraged loan" refers to a loan to a sub-investment-grade borrower, which is typically syndicated. While banks continue to provide capital for credit lines, nonbank lenders have largely replaced banks in the provision of capital for term loans. This market for institutional term loans has grown rapidly since the Global Financial Crisis. Today nonbank loans constitute the primary source for high yield corporate debt in the U.S. To illustrate, in 2021 risky firms raised $910 billion in institutional term loans compared to $430 billion in bonds (White & Case, 2022).

Post-crisis regulatory capital requirements have made it more costly for banks to hold risky loans (Irani, Iyer, Meisenzahl, and Peydró, 2021). Consequently, the transfer of these loans from a bank's balance sheet to the balance sheets of less regulated institutions can mutually benefit both parties. Typically, the underwriting agreement prevents the arranging bank from freely adjusting a loan's terms to guarantee the sale of the entire issue. Thus, an arranger who is unable to sell a loan in full may be required to retain a loan's unsold portion. This risk to banks from loan underwriting has been coined "pipeline risk" (Bord and Santos, 2015; Bruche, Malherbe, and Meisenzahl, 2020).

Nonbanks that account for significant demand for a given loan may internalize the fact that their participation decision represents a risk to the arranging bank. This may grant market power to the nonbank to command lender-friendly loan terms. However, the underwriting agreement aligns the arranging bank's incentives with those of the borrowing firm by remunerating the arranger for borrower-friendly terms through increased underwriting fees. Thus, the arranger may have to choose between the cost of retaining a larger loan share and the reduction in underwriting fees associated with giving in to the nonbank.

For a given new loan issue, I measure a nonbank's market power over the arranging bank as the dollar volume of the nonbank's holdings in the borrowing firm's pre-existing loans. These holdings reflect the nonbank's demand for the firm's outstanding loans, which is informative about her demand for the new loan issue. Thus, my measure captures the extent to which the nonbank exposes the arranging bank to pipeline risk.

The complication with this measure is that for any investor a large holding may simultaneously reflect positive private beliefs about the borrower's quality. These beliefs can for example arise as a result of private information. The anticipated effect

of private beliefs is in the opposite direction of the effect of market power. While the market power from large holdings would lead to a higher spread, positive private beliefs may instead induce a nonbank to accept a lower spread. Thus, failure to account for private beliefs may negatively bias my estimates of the effect of market power.

To empirically disentangle these two forces, I employ exogenous portfolio variation arising from mergers in the largest class of nonbank investors, namely CLOs. A CLO is an actively managed loan fund financed with a tranched debt structure. CLO managers, who are often affiliated with large private equity firms, such as KKR, or insurance companies, such as Prudential Financial, typically manage many CLOs. A CLO's management contract aligns the CLO manager with the CLO's equity class. In total, this sector provides 63% of primary market funds for leveraged term loans. For comparison, the next largest primary market investor category are mutual funds with 13%, followed by banks with 12% (Hinckley et al., 2022). While the previous discussion applies to nonbank investors broadly, I focus on CLOs because they provide frequent and detailed portfolio disclosures necessary for studying primary market transactions.[3]

My main specification compares the terms at which a given CLO manager lends to different borrowers in the same industry, controlling for time-varying credit risk. Recall that the influence of a CLO manager's private beliefs about the borrower counteracts the market power effect. Thus, my identification strategy instruments a CLO manager's holdings of a borrower with the amount of that borrower's loans obtained through her M&A activity. The main identifying assumption is that merger target portfolios are unrelated to the acquirer's beliefs about borrowers within an industry. I justify this assumption below.

Using this instrument, I show that CLO managers who expose the bank to pipeline risk indeed have market power to affect loan prices. A one-standard-deviation increase in a CLO manager's holdings enables her to command an 8.4 basis point higher credit spread and a 6.2 basis point higher original issue discount. Taken together the borrower experiences an increase in cost of debt of 10.9 basis points. These numbers constitute a significant increase in a borrower's funding costs, comparable to market power effects measured in the relationship banking literature.

[3]Legally, primary market sales to CLOs are structured as secondary market transactions. In practice, these transaction are contracted at primary market terms prior to a loan's closing. Thus, economically, they represent primary market acquisitions.

Market power shifts other price terms in favor of the lender, as well. Specifically, leveraged loans are callable instruments. To discourage early repayment, these loans often contain so-called "soft call provisions." A soft call provision stipulates a premium over par which the borrower must pay in order to call the loan prior to the end of the soft call period. I find that both the soft call premium and the soft call period increase with CLO manager market power.

Nonbank market power is also evident in secondary market prices. On average a loan's initial secondary market price lies above its primary market price. In other words, loans are underpriced at issuance, like initial public offerings of equities. I show that the extent of loan underpricing increases with my measure of nonbank market power. This pattern in post-issuance prices represents additional evidence that my estimates reflect market power rather than compensation for risk. If higher spreads were driven by omitted risk factors, the secondary market would price those risks.

In contrast, I do not find meaningful effects for non-price terms such as the loan amount, maturity or covenants. This finding is consistent with pre-syndication loan amount commitments by the arranging bank and concentration of covenant rights with providers of credit lines (Berlin, Nini, and Yu, 2020).

The principal threat to my identification is that merger-obtained holdings correlate with acquirers' private beliefs about borrower credit quality. In particular, acquirers may select targets with loan portfolios that reinforce their tilt towards their preferred assets. Note that portfolio-based target selection that is independent of beliefs does not undermine my identification. One such motive is diversification.

To address concerns about belief-based target selection, I demonstrate that during my sample period acquirers select targets based on their CLO liabilities, not their assets. Specifically, acquirers target CLO managers who are constrained in their ability to issue new CLOs due to risk retention requirements or whose CLOs are financed with low leverage or expensive debt tranches. The value proposition for merging stems from both the ability to back the acquired assets with CLO debt refinanced at improved terms and from acquirers' capacity to provide equity for new CLO issues.

I argue that in terms of their assets, targets are indistinguishable from alternative, but non-selected, CLO managers. Instead it is the structure of their liabilities that distinguishes targets. More precisely, targets are more likely than non-targets to manage CLOs with low leverage or high cost of debt. Public statements on merger rationales corroborate these results. In 71% of the mergers, participants point to im-

proved access to outside CLO investors as motivation for the merger and 55% mention enhanced access to inside equity. Less than 10% of merger statements contain any reference to the loan portfolio, with all such statements being general, not borrower-specific. Regardless, I take a conservative approach and exclude these mergers from my sample. Consistent with CLO managers' stated intentions, I find that target CLOs experience a notable increase in debt refinancing post merger.

Next, I turn to the mechanism that yields market power to CLO managers and ask, what impedes banks from substituting across CLO managers? A necessary condition for market power is the presence of switching costs. In classic models of bank lending, private information allows the incumbent bank to undercut competitor bids on future loans. This induces firms to continue borrowing from their incumbent banks (Rajan, 1992; Sharpe, 1990).

I show that CLO lending to firms is also highly persistent. This persistence suggests that arranging banks indeed find it difficult to replace incumbent CLO managers. A competing hypothesis is that persistence in a firm's nonbank investor base arises as an artifact of banks forming persistent relationships with both firms and nonbanks. Surprisingly, I find strong nonbank persistence even in the absence of any common relationship bank. For example, when a firm switches to a new arranging bank, its CLO investor base remains largely unchanged.

Motivated by the importance of private information in traditional bank-firm relationships, I next turn to the role of information in modern loan underwriting. I argue that information asymmetries *across* nonbanks create a hold-up problem for the bank, which makes it costly for the arranging bank to switch between them. In the presence of information asymmetries, nonbank investment decisions serve as informative signals about borrower quality. Thus, the loss of a previously highly invested CLO manager may depress demand for a new issue through revised nonbank beliefs.

Information asymmetries across nonbank investors arise during syndication. The arranging bank collects private information about the borrowing firm. During book building the bank distributes information to potential investors in the form of memoranda, also called bank books. Different from securities underwriting, the bank assembles both a private bank book containing material private information about the borrower and a public bank book free of such information. Many nonbank investors opt for the public bank book and restrict their information access to avoid jeopardizing their public securities trading with the risk of insider trading allegations.

In line with information asymmetries imposing switching costs on the bank, I find that CLO lending persistence increases with the level of information asymmetries. For instance, among public borrowers CLO lending is more persistent for smaller firms, as measured by their assets. For the full universe of sample firms, I further show that lending persistence is higher when different credit rating agencies disagree more in their public ratings for a borrower.

Importantly, I observe information asymmetry effects not only in CLO lending persistence but also in loan pricing. Consistent with the arranging bank experiencing a hold-up problem, market power effects are more pronounced for high information asymmetry borrowers. For example, loans of borrowers with a high degree of rating disagreement are approximately twice as sensitive to market power. For these borrowers a one-standard-deviation move in market power by my measure increases the cost of borrowing by 20.9 basis points.

This study relies on insights from a number literatures. Many ideas are drawn from the study of the competitive effects of information in the classic bank-firm model tracing back to the seminal theoretical insights of Sharpe (1990) and Rajan (1992). Schenone (2010) provides evidence of bank's information monopolies, while Darmouni (2020) finds that adverse selection increases the cost of lending for non-relationship banks.[4] I find that banks face an information problem with respect to nonbanks. In some ways banks and nonbanks in my setup resemble borrowers and banks in the classic model.

The work on relationship lending instead tends to focus on the advantage of receiving credit at a rate below that offered by competing, but uninformed banks. Early papers study the stock market's reaction to bank relationships (James, 1987; Lummer and McConnell, 1989). Direct evidence on loan terms comes from Berger and Udell (1995) who find that relationships lead to lower loan rates, while Petersen and Rajan (1994) find more pronounced quantity effects. Other work offers the insight that banks do not have to extract rents from their lending business if they can benefit from cross-selling other services (Burch, Nanda, and Warther, 2005; Drucker and Puri, 2005; Yasuda, 2005). Especially important for my work are Bharath, Dahiya, Saunders, and Srinivasan (2007) who study the persistence of bank lending relationships. I use a similar approach to establish the presence of switching costs with respect to nonbanks.

[4] A separate literature studies the effect of competition among uninformed banks. Prominent examples of this literature include, Petersen and Rajan (1995), Boot and Thakor (2000), Cetorelli and Strahan (2006) and Zarutskie (2006).

I follow the approach continued by Bharath, Dahiya, Saunders, and Srinivasan (2011) and relate this persistence to information asymmetries of the borrower.

My work further connects to papers on information asymmetries between the arranging bank and other syndicate members (Gopalan, Nanda, and Yerramilli, 2011; Ivashina, 2009; Sufi, 2007). This concept is related but separate from my case. Rather, I focus on the inability of arranging banks to eliminate nonbanks' informational asymmetries despite a possible information advantage of the arranging banks.

A rich literature studies the effects of bank mergers (Berger, Saunders, Scalise, and Udell, 1998; Erel, 2011; Fraisse, Hombert, and Lé, 2018; Huber, 2021). Most relevant for my work is a stream initiated by Garmaise and Moskowitz (2006) that employs bank mergers as an instrument to identify effects of bank market power. I apply their approach to a new class of lender, CLO managers. The closest work in this literature is Giannetti and Saidi (2019) who use bank mergers to exclude variation from private bank information. Other papers in that literature include Favara and Giannetti (2017), and Saidi and Streitz (2021).

Lastly, my work contributes to a burgeoning literature on the role of nonbanks in corporate lending. Irani et al. (2021) and Irani and Meisenzahl (2017) link nonbank growth to bank capital regulation and liquidity, while Ivashina and Sun (2011) and Fleckenstein, Gopal, Gutiérrez, and Hillenbrand (2021) show the connection between nonbank demand and loan availability and terms. A significant subset of this literature focuses on CLOs. A common finding is that firms have benefitted from growth in the CLO sector through lower spreads and improved credit availability (Bord and Santos, 2015; Nadauld and Weisbach, 2012; Shivdasani and Wang, 2011). Fleckenstein (2022) ties the cyclicality in nonbank lending to agency frictions of CLOs. Bhardwaj, Ge, and Mukherjee (2022) turn to the insurance sector to show that demand for CLO issues affects CLO formation and loan market conditions. Their finding that CLO liability demand has important consequences for CLO managers and corporate borrowers is reflected in my results that CLO liabilities are the dominant determinant of mergers in this industry. Other work has centered on the role of CLO loan trading in the secondary market and the potential of fire-sales (Bhardwaj, 2021; Bozanic, Loumioti, and Vasvari, 2018; Elkamhi and Nozawa, 2022; Kundu, 2022b). The focus of my work is on the primary market.

The paper most closely related to my own is Bruche et al. (2020). These authors study the demand discovery problem faced by arranging banks in the underwriting markets.

In their model an arranging bank sells a loan to a representative nonbank who is better informed than the bank about the value of the loan. To deter the nonbank from indicating low demand for high quality loans, the truth-revealing mechanism requires the bank to retain a larger share of the loan whenever the nonbank indicates low demand. My analysis complements the important insights from their work in a number of ways. First, I deviate from the representative investor assumption and instead explore heterogeneity among nonbanks. Second, this allows me to focus on another dimension of information asymmetries. By focusing on the information asymmetries across nonbanks, I sidestep the issue of whether nonbanks are indeed better informed than the bank and show that their notion of pipeline risk is relevant without this assumption. Third, their work tends to focus on bank outcomes and employs loan price adjustments to explain bank retention. In contrast, my work predominantly studies the impact of market power on loan prices and thus concerns borrower outcomes.

The remainder of this article is structured as follows. Section 2 presents the data. Section 3 studies the extent to which CLO managers have market power. Section 4 investigates the determinants of mergers in the CLO industry and provides evidence on the instrument's validity. Section 5 studies the source of CLO managers' market power. Section 6 concludes. While I briefly describe necessary institutional details throughout my analysis, I provide a more detailed account in Appendix E.

2 Data Description

My analysis primarily relies on data from five sources: CLO portfolio holdings from LPC Collateral, hand-collected information on mergers and changes in CLOs' collateral management agreements, loan origination data from Loan Connector, data on CLO securities and fees from Creditflux, and corporate balance sheet data from Compustat. I include references to any other data sources in my analysis. The sample period begins in January 2010 and ends at the end of December 2021. Time is structured in quarters and summarized to the last date for each quarter.

First, I obtain data on CLOs' security-level portfolio holdings from LPC Collateral. I restrict the sample to CLOs predominantly invested in U.S. dollar denominated syndicated loans. LPC Collateral collects portfolio information from CLOs' trustee reports. If in a given quarter multiple reports are available for a CLO, I include only data from the last report. I also keep credit rating information from the rating agencies Moody's, S&P, and Fitch, which I convert to numerical scores using the

classification of Becker and Milbourn (2011). For comparability, all rating references are translated to the S&P scale. Additionally, I collect information on a CLO's manager, issue date, reinvestment period and legal maturity date.

Second, I hand-collect data on mergers involving CLO managers and changes in CLOs' collateral management agreements. Acquisitions that result in the changing management of a CLO are either structured as a management "replacement deal" or as a "platform deal." In a platform deal, the acquirer becomes the owner of the legal entity which is listed as contractual counterparty in the collateral management agreements of CLOs managed by the target CLO manager. These deals typically require that the acquirer assumes management obligations of all CLOs managed by the target. Alternatively, in a management replacement deal, the collateral management agreements of CLOs' are amended to replace the existing CLO manager with the acquirer. Replacement deals enable the acquirer to purchase only selected CLOs from a CLO manager. However, these deals may require the approval of CLO note holders to amend the collateral management agreement. Rarely, the replacement of a CLO's manager can also happen for reasons other than an acquisition.[5]

To collect this data, I search through CLO industry and major general financial news publications. I complement this search with results from LexisNexis and mergers listed in SDC's M&A database. Lastly, I collect Moody's reports on amendments to collateral management agreements that replace an existing CLO manager. I reflect changes to a CLO's manager in the quarter in which a change becomes effective.

Third, I collect loan origination data from Loan Connector, which succeeds the Dealscan database. To connect these data to LPC Collateral, I use LINs (loan identification numbers). I supplement missing observations with origination data from LPC Collateral. In order to accurately capture CLO holdings of a loan, I exclude loans which are predominantly held by European CLOs, and I restrict my analysis to U.S. dollar and Canadian dollar loans. European CLO holdings of these loans account for less than 0.5% of total CLO holdings in the median quarter.[6] The exclusion of

[5]One such reason can be so-called "key-man" provisions. For instance, in 2005, four of the six CLOs managed by Katonah Capital, a subsidiary Kohlberg & Co, included provisions, which permitted investors to redeem their investments upon the "key-man's" departure, unless Kohlberg proposed a suitable replacement manager. Even though Kolberg and Allied Capital had agreed on the sale of Katonah in late 2004, a trigger of the key-man provision in early 2005 forced Kohlberg to find a new CLO manager for its four CLOs. Ultimately, Sankaty (now Bain), Blackstone and INVESCO acted as replacement managers. Allied Capital walked away from the merger. For more details see https://www.institutionalinvestor.com/article/b150nn7x1zbz75/a-key-womans-leverage.

[6]The U.S. and the European CLO markets are largely segmented. U.S. CLOs account for 0.8%,

Canadian dollar loans would leave my results almost unchanged since only 13 such loans contribute to my final sample, in contrast to 6,797 U.S. dollar loans.

Because I study the institutional segment of the leveraged loan market, I include only institutional loans held by CLOs in my sample. I classify a non-amortizing term loan as institutional if the loan type is "Term Loan B," if the loan is flagged as institutional, or if the loan has substantial primary market purchases by CLOs. Consistent with convention, I treat the type "Term Loan C" or up as equivalent to a Term Loan B. The requirement for a loan to be held by a U.S. CLO implicitly excludes almost all loans made to investment grade borrowers. Overall, firms rated BBB or BBB-, the highest ratings in my sample, account for only 0.9% of loans in my sample and my conclusions would be unaffected by their exclusion. Because CLOs are effectively barred from investing in loans of borrowers in default or without a rating, I exclude all 28 such issues from my sample. Finally, I exclude loans made to financial and public sector firms as identified by SIC codes beginning in six or nine.

Fourth, some results employ data from Creditflux on the capital structure of CLOs, CLO fees, and banks' CLO underwriting activity. Tests with this data exclude the last two years of the sample period, because my available sample stops at the end of 2019. I link CLOs in LPC Collateral to Creditflux with a fuzzy string match. I verify the validity of all fuzzy matches and search the unmatched sample for additional matches. In the overlapping sample period, I find a match for 1,856 of 1,977 CLOs. Further, I manually match 49 CLO underwriter banks to the loan origination sample.

Fifth, I augment borrower information from Loan Connector with balance sheet data from S&P Compustat-Capital IQ. To connect these databases, I utilize the Dealscan-Compustat link table provided by Chava and Roberts (2008). I cover the entire sample period by extending their link table. Because Compustat collects balance sheets from public filings, this data are limited to the public part of my sample.

I study banks and CLO managers at their highest level of corporate aggregation. In any given quarter, I assign a CLO to its CLO manager's ultimate parent company. I identify parent companies through S&P NetAdvantage, the CLO manager's website, and mentions in industry publications. CLO managers' investment decisions and bank interactions occur at the CLO manager level, as opposed to the CLO level.[7]

1.1% and 0.0% of CLO holdings in euro, pound sterling, and Swedish krona loans. Other European currency loans make up less than 1% of European CLO holdings. Further, CLO managers that are active in both markets typically employ separate portfolio managers and analysts for each market.

[7]Because decisions are made at the CLO manager level, CLO managers typically employ significantly fewer portfolio managers than CLOs under management. For example, at the start of 2020

Hence, the CLO manager level constitutes the appropriate level of aggregation for my study. I aggregate all banks to their bank holding company. I classify a bank as arranging bank for a loan if it has the role title "lead left." Lastly, I treat borrowers with the same LIN issuer identifier, encoded in the initial six entries, as identical.

3 The Market Power of CLO Managers

3.1 Variable Creation

Post-crisis risk-based regulatory capital requirements have increased banks' cost of holding risky loans. In response, banks shifted to an originate-to-distribute market structure, especially for risky leveraged loans (Irani et al., 2021). In this market structure, the main responsibility of the arranging bank is not providing funding for a loan, but marketing the loan to nonbank investors. Nonetheless, the arranging bank provides a loan amount guarantees to the borrower. Thus, should the arranging bank be unable to sell the entire loan, the arranging bank is obligated to make up the loan's unsold portion from her own funds. On average bank funding accounts for 12% of loans marketed to institutional investors. Of the remainder, the majority share is provided by CLOs who provide 72% (Hinckley et al., 2022).

To reduce the risk that the arranging bank takes on as a result of the loan amount guarantee, the arranging bank is allowed to adjust a loan's price terms, and sometimes other terms, in response to investor demand. However, to stop the bank from simply changing a loan's terms against the borrower and to keep her incentives aligned with the borrower, the arranging bank participates in the costs that a borrower incurs as a result of loan term adjustments through a reduction in underwriting fees. Both the committed loan amount and the loan price-fee schedule ("flex") are contractually agreed upon prior to the arranging bank contacting investors.

Therefore, the terms of these contract features are negotiated based on an arranging bank's anticipated loan demand, rather than realized demand. Investors' loan demand depends on a many factors, which makes anticipating their demand difficult. For example, important factors include current market conditions, overall portfolio size of the investor, information about the firm, or investment restrictions faced by the investor. Nonetheless, for borrowers with prior loans, the arranging bank may have

KKR Credit Advisors (US) LLC, a subsidiary of KKR & Co, employed two portfolio managers for its 27 U.S. CLOs of which 20 were in their reinvestment period (Fitch Ratings, 2020).

access to additional information about loan demand: CLO managers' dollar holdings in the borrower's outstanding loans.

Since there exists an active secondary loan market, a CLO managers's holdings in any particular loan will reflect her demand for that loan. While frictions, such as tradings costs or restrictions from CLO covenants, mean that holdings reflect demand only approximately, a CLO can act on any large deviations by trading in that loan. Because a firm's new loan and her outstanding loans are debt instruments issued by the same firm, a CLO manager's demand for the latter is predictive about demand for the former. Indeed, in my subsequent analysis in Section 5, I document that a CLO manager's holding in a borrower's loans have strong predictive power for investments in new loans. Diversification motives that may counteract this relationship for additional holdings do not constitute a concern because the majority of repeat issues in the leveraged loan market refinance some outstanding loan. Furthermore, in Table C2, I show that even absent refinancing, holdings are strong predictors of CLO managers' participation decisions on both the extensive and the intensive margin.

Because of the loan amount guarantee made by the arranging bank, a CLO manager's investment decisions for a new loan may represent a risk to the arranging bank. If the bank cannot freely compensate a funding shortfalls, for example by replacing one CLO manager with another, she may have to bear a cost from either capital charges on funds provided by herself or from reduced fees due to adjusting loan terms. In this section, I present evidence that CLO managers have market power. Hence, I infer from the presence of this market power that the arranging bank cannot freely substitute between different CLO managers' funds. In Section 5, I will return to this issue and argue that information asymmetries make switching between nonbank investors costly for an arranging banks.

A CLO manager may internalize that her investment decision can impose an externality on the bank. The extent to which this externality allows the CLO manager to command more favorable loan terms, would depend on the size of the risk that a bank faces from a CLO manager's investment decision. For a given loan issue, I measure the risk that a CLO manager poses for the bank by the CLO manager's dollar holdings prior to the start of syndication. I refer to a CLO manager's resulting capacity to decrease the loan price as market power, because this reduction represents an economic rent to the CLO manager.

Specifically, I let *Prior Holding* capture a CLO manager's total dollar holdings in prior

loans of firm $f(l)$ in million U.S. dollars. I record the holdings in outstanding loans two quarters prior to a new loan becoming effective. A two quarter lag ensures that a CLO manager's holding is measured before the start of the loan's syndication and that this holding is therefore not the result of short-term response to the syndication itself.[8] Because CLOs past their reinvestment date are in general unable to invest in a new loan issues, I exclude holdings from these CLOs.

Further, I clarify that my measure deliberately deviates from share-based measures of market power that are frequently used in the literature. The reason for this choice is that an arranging bank's potential cost of not complying with a CLO manager is a function of the dollar amount that the bank may have to retain as a result. This cost is only indirectly linked to the CLO manager's relative share. Put differently, all else equal it is less costly for a bank to retain 100% of a $1 million loan ($1 million) than 10% of a $100 million loan ($10 million).

3.2 Sample Creation and Empirical Strategy

My sample includes institutional loans issued between January 2010 and December 2021 for which at least one CLO manager participating in the primary market. I measure a CLO managers' primary market participation, *Participation*, as their total holding in a loan one quarter after the loan's effective date. Legally, CLOs acquire primary market allocations as secondary market trades. The LSTA (2021) reports a median time to settle these trades of close to three weeks. Thus, a one quarter delay in measurement ensures that typically trades will have settled. An observation in my sample records a unique loan - CLO manager that includes each CLO manager with positive *Prior Holding* for a loan. Furthermore, I exclude CLO managers that have a private equity relationship with a borrower through an affiliated sponsor. These CLO mangers might exercise market power to achieve borrower-friendly loan terms that benefit their affiliated private equity business, which could mask my estimate of interest. I consider a CLO manager and a borrower to be in a private equity relationship starting from the first time that the private equity firm is listed as sponsor on a loan. In practice, this choice did not materially alter my results. Summary statistics for my final sample are presented in Table 1.

Similar to offerings of public securities in the U.S., loans are priced uniformly. This

[8] With the caveat that syndication times are only available for a small subset of my sample, the median syndication time is 56 days from the day the arranger receives the mandate to the loan becoming effective. These estimates are similar to prior studies and industry figures.

means that all loan allocations are sold at the same primary market terms. In the absence of within-loan variation, I instead take a given CLO manager and compare loan outcomes of newly issued loans by firms in the same industry and quarter with respect to the CLO manager's prior holdings of these borrowers after controlling for quarterly rating notch-implied credit risk premia. Formally, I estimate the model

$$y_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}. \tag{1}$$

In addition to my previously defined measure of CLO manager m's market power in the origination of loan l by firm $f(l)$, $Prior\ Holding_{f(l)m}$, I include manager-industry-time fixed effects, $\mu_{mi(l)t(l)}$. This fixed effect ensures that I compare loan outcomes, y_l, of loans issued in the same quarter t by firms in the same industry i that are exposed to the same CLO manager. By only using variation within a CLO manager-industry-quarter, I hold a CLO manager's industry-level loan demand for that quarter constant. The addition of, rating-quarter fixed effects, $\rho_{r(l)t(l)}$, controls for differences in loan outcomes due to time-varying credit risk premia at the rating-notch r level. I also control for time-invariant borrower characteristics with firm fixed-effects, $\phi_{f(l)}$. Finally, I include a set of non-price loan terms, X_l, which I describe together with my my first results in Table 2. I argue that these terms are not jointly determined with a loan's price, because they are not a result of the syndication. My inference is based on standard errors that are clustered at the CLO manager level.

Ordinary least squares (OLS) estimates of my model recover the true parameter values if there are no confounding factors that vary with a CLO manager's loan holdings in any industry that would simultaneously affect loan pricing. For instance, this might be true in a Capital Asset Pricing Model (CAPM)-style world, in which portfolio weights, that are scaled by the total portfolio size, mirror that of the market portfolio portfolio. However, the leveraged loan market is presumably not well-approximated by the assumptions that generate such investor portfolios.

My principal concern is that a CLO manager's may have private beliefs about the quality of given borrower. These private beliefs would simultaneously affect her holding decisions in outstanding loans and outcomes of any new loan issue. For example, a CLO manager who has positive private beliefs about a borrower, i.e., she beliefs that the borrower's probability of default is lower or any loss given default is higher than implied by market prices, would hold relatively more of outstanding loans of that borrower. At the same time, the CLO manager would also have a higher willingness to pay for new loan issues of this borrower, which makes her more prone to give in to

borrower-friendly, as opposed to lender-friendly, loan terms.

In the leveraged loan market, differences in private beliefs are likely to be large. One reason is that CLO managers often have vastly different information access with respect to the borrowing firm. Loans are not public securities. Thus, loans trade without the risk of violating insider trading regulations, even when a trading party possesses private information. The syndication process can further exacerbates pre-existing information asymmetries. During loan syndication, the bank disseminates private information, which the bank collected about the borrower, to investors. However, many CLO managers and other nonbank investors voluntarily limit their information access to receive only public information. I describe the reasons this institutional feature in detail in Appendix E and I focus on its consequences in Section 5.

In order to disentangle the effects of a CLO manager's market power from the effects of her private beliefs, I construct a new instrument that is inspired by a literature which uses bank mergers as an instrument (e.g., Garmaise and Moskowitz, 2006; Giannetti and Saidi, 2019). Specifically, I propose that holdings which a CLO manager obtained through the acquisitions of other CLO managers satisfy the requirements to serve a valid instrument.

For an instrument to be valid it has to satisfy both relevance and exclusion restriction. Since the instrument's relevance is inherently testable, I will discuss this condition together with my main results. In contrast, the exclusion restriction requires a more thorough justification. The identifying assumption for the instrument to be excluded is that holdings obtained through mergers affect loan prices only through the additional risk that that a CLO manager poses to the bank. The main concern for this assumption is that merger-obtained holdings may also be correlated with private beliefs. This would be the case, if acquirers select target's for having a specific loan portfolio. I argue that this concern does not reflect merger decision for CLO managers in my period. The essence of my argument is that CLO managers' loan portfolios are well diversified and that acquirers select their merger targets not for their assets but on the basis of the target's CLO liabilities.

To my knowledge, mergers in the CLO industry have not been studied in the literature. Therefore, I am unable to point to earlier work as reference for this claim. Instead, I provide supporting evidence as a contribution in this paper. However, in the interest of proceeding to my results, I will delegate this necessary discussion on the instrument's exclusion restriction and surrounding details to Section 4.

Next, I describe the construction of the instrument. I begin with my hand-collected sample of changes in CLO management and exclude CLO contract transfers for which both acquirer and seller resume operating independently following the transaction. Individual CLO portfolios are less diversified than a CLO manager's total managed portfolio which potentially may make the CLO's loan portfolio a more meaningful point of consideration for mergers. To avoid concerns from acquirers selecting specific CLOs I exclude these non-merger transactions. Specifically, I characterize an ownership change as a merger if the acquirer assumes the entirety of the target's active U.S. CLO contracts. This definition includes partial sales in which the target retains her European CLO business or CLOs past their reinvestment period. The former case is valid due to the segmentation of the U.S. and European CLO business. The latter case makes allowance for acquirers declining to assume CLOs that are in the process of winding down. As will become clear shortly, the reason for this stance is that restructuring a CLOs liabilities is significantly less attractive or even excluded for non-active CLOs.

Furthermore, I consider only transactions for which both parties maintain CLO management activities prior to merger announcement. This restriction excludes cases in which a CLO manager becomes a subsidiary of an acquirer without any such prior activity. While the acquirer may not have chosen a specific CLO manager because of her loan portfolio, such mergers do not generate variation in portfolios necessary for identification. Rather, they leave the entire target's loan portfolio intact and therefore do not affect the funding risk that this CLO manager poses to arranging banks. In 27 out of 87 mergers in my sample period, the acquirer did not possess CLO management capabilities prior to merger. I include another 3 mergers for which the acquirer makes reference to the target portfolio fit in public merger statements. I further discuss this point in Section 4. My total 57 sample mergers account for 313 U.S. CLO management contracts changing hands between 84 CLO managers.[9]

For a given CLO manager-loan issue, the instrument equals the CLO manager's total volume of the issuing firm's outstanding loans obtained through her prior merger activity. Merger-implied portfolio additions are taken in the quarter preceding a merger. To account only for direct portfolio effects, I discard the amount corresponding to loans matured or refinanced in the interim between merger and new loan issuance. If

[9]Those numbers are comparable with studies employing bank mergers as an instrument. For example, 80 out of 210 banks in the 1992 to 1999 sample of Garmaise and Moskowitz (2006) were involved in mergers and Saidi and Streitz (2021) record 79 merger events between banks for their 1990 to 2015 sample.

a CLO manager obtained multiple loans of an issuer, either through a target's portfolio including multiple loans or through repeated merger activities, I take the total amount. Absent any applicable holdings, I set the instrument to zero.

3.3 Results

Arguably, the most salient and most frequently discussed price term of leveraged loans is their credit spread. Therefore, I begin my analysis by examining the extent to which CLO managers have market power to influence this price term. Table 2 presents estimation results of my baseline specification in Equation 1 with the spread as dependent variable. Table 2 starts with the first-stage results of my main two-stage least squares specification in Column 1. As necessary for my instrument to be relevant, loans obtained through a CLO manager's merger activity significantly alter the CLO manager's holdings between borrowers in the same industry. The statistically significant coefficient estimate is 0.556. Hence, a CLO manager who receives \$100 in loans of Borrower A and \$0 in loans by control Borrower B in the same industry is expected to hold \$55.6 more of Borrower A loans than Borrower B loans in their subsequent issues in the same quarter. Importantly, the Cragg-Donald F-statistic rejects that the instrument is weak at conventional levels.

Column 2 presents two-stage least squares (2SLS) estimates for my baseline specification. The coefficient estimate on *Prior Holding* is positive and statistically different from zero. Economically, a one-standard-deviation increase in CLO manager's market power through her existing holding of a borrower raises the loan spread on a new loan by 8.37 basis points (bps) on average. This results supports the hypothesis that CLO managers who expose banks to funding risk have market power during loan origination, which allows them to command lender-friendly loan terms.

While I choose the most tightly controlled specification as baseline, I present results using less stringent controls in Columns 3 to 5. Column 3 removes the requirement that control borrowers have to be in the same industry by exchanging CLO manager-industry-quarter fixed effects with CLO manager-quarter fixed effects. Column 4 excludes loan controls and rating-quarter fixed effects. In both cases, the resulting estimate is statistically significant and of a similar magnitude compared to my baseline specification. The specification in column 5 modifies the baseline specification by excluding borrower fixed effects. Without borrower fixed effects my estimate remains statistically significant and increases meaningfully. Under this specification, a one-standard-deviation market power increases is predicted to raise loan spreads by 19.9

bps.

For reference, I provide ordinary least squares (OLS) estimates in Table C3. Except for the model corresponding to Table 2's Column 4, I find positive and statistically significant point estimates on my variable of interest. However, consistent with private beliefs introducing a significant a negative bias, the OLS estimates are considerably smaller.

I proceed to investigate the impact of CLO managers' market power on loan price terms other than the spread. In Table 3, I present estimates of Equation 1 with non-spread price terms as the dependent variable. Because information on these terms is not always available, my sample size falls below that used to analyze spreads. Nevertheless, the first-stage coefficients closely resemble those seen earlier and the Cragg-Donald F-statistics indicate that the relevance condition continues to be satisfied. Column 1 presents estimates for the original issue discount (OID). The OID, sometimes called upfront fee, indicates the extent to which a loan's primary market price represents a discount relative to the loan's par value. I find that a one-standard-deviation increase in a CLO manager's market power leads to an average increase in the OID by 6.16 bps. An increase in a loan's OID at otherwise identical loan terms means that CLO managers acquire the same loan at a cheaper price, which implies a higher yield on their investment.

To consider the total cost of loans for borrowing firms, credit spread and OID are commonly combined into a measure called "effective yield." The effective yield distributes the cost stemming from a loan's OID evenly over the loan's effective maturity. Leveraged loans near-universally provide the borrower with an option to repay, or call, the loan early. The majority of risky borrowers exercise this option well before a loan's stated maturity. Thus, loans are commonly assumed to be called within three to four years on average, even though the median stated maturity in my sample is just above six years. Under the more conservative four-year effective maturity assumption, a loan's effective yield is calculated as $\textit{Effective Yield} = \textit{Spread} + OID/4$. The estimate in Column 2 implies that taken together, the same one-standard-deviation increase in a CLO manager's market power raises the yield a borrower has to provide by 10.9 bps. This estimate is very close to the results from the separate spread and OID estimates. In Table C4, I reestimate Table 3 without the inclusion of borrower fixed effects. Similar to before, the absence of this control raises the estimated market power effect. For instance, the same increase in market power raises the effective yield by 29.1 bps.

In order to decrease the value of a borrower's option to repay early, lenders may equip a loan with a "soft call provision." Unlike "hard call provisions," which when present preclude borrowers in the bond market from calling a bond early, a soft call provision still permits the borrower to call her loan. However, in order to call a loan before the end of its "soft call period" the borrower must repay the loan at a premium over par, which is referred to as "soft call premium." In Column 3 and 4, I show that CLO managers also use their market power to decrease the value of the option they write by imposing tighter soft call provisions. Both the soft call premium and the soft call period increase with CLO manager's market power. Here, a one-standard-deviation market power increase raises the soft call premium by 2.67% and lengthens the soft call period by 8.64% relative to the median.

Next, I investigate to what extent secondary markets subsequently reflect lender-friendly loan terms imposed by CLO managers. In particular, I compare the price paid by primary market participants to the price paid in a loan's first secondary market trade. Industry terminology names this first trade price the "break price." To calculate break prices, I employ loan trade information that CLOs record in their trustee reports. I measure a loan's break price as the trade price from its first trade in which a CLO manager sold the loan to an external party and I require the trade to have been initiated within six months of a loan's effective date.

Because primary market allocations to CLOs legally constitute secondary market trades, primary market purchases may appear as trades in CLOs' trustee reports. However, these trades contain no open market information because they are agreed at primary market terms. The requirement that a CLO must act as seller ensures that I exclude any such trades. Because trades between CLOs managed by the same CLO manager may not resemble arm's length transactions, I further require the sale to an external party. CLOs do not disclose their trade counterparties. Thus, I exclude a trade if another CLO of the same CLO manager purchased the loan within six months of the sale. Finally, I restrict myself to trades within six months of the loan becoming effective for my results not to be driven by events that occur after the primary market. My sample break prices are recorded after a median number of 45 days and their distribution closely matches that found by Bruche et al. (2020).

The consequences of CLO manager's market power are indeed visible in loans' secondary market valuations. In Column 5, I show that the resulting lender-friendly loan terms lift the break price over the primary market price. In other words, the exercise of market power leads to loan terms that favor the lender and thus causes a loan to

be more underpriced. A one-standard-deviation increase in market power leads to an expected 8.92 bps increase in loan underpricing. Economically this is a large change that amounts to a 15.3% increase relative to the average level of loan underpricing.

Furthermore, this finding adds additional credence to my identification strategy. Because loans are uniformly priced in the primary market, there exists no within-loan outcome variation. Thus, it may be conceivable that I observe cheaper loans not as a result of market power, but rather as compensation for some unidentified risk factor that correlates with my instrumented market power measure. However, if my findings were driven by risk, this risk should equally affect loan pricing in arm's-length secondary market transactions. The fact that, instead, I find a commensurate effect on loan underpricing is direct evidence that my findings are not the explained by priced risks.

Lastly, I turn away from loan price terms. In Table 4, I examine the effect of CLO manager market power on the loan amount, maturity, propensity to be structured as covenant-lite loan or to fall below first liens in seniority. Consistent with these loan terms generally being pre-determined before underwriting, I find no statistically or economically significant effects on the loan amount, the maturity or the propensity of a loan to be a first lien. I find an increase in the propensity of a loan to be covenant-lite, which is statistically significant at the 10%-level. The point estimate corresponds to a 1.67% higher likelihood of a loan being covenant-lite. If anything, this finding strengthens my earlier conclusions, because covenant-lite loans in my sample have on average more borrower-friendly terms such as lower spreads.

Overall, the presented evidence indicates that CLO managers have significant market power, which affects the terms at which firms borrow.

4 Mergers in the CLO Industry

In Section 3, I have argued that variation in CLO manager's portfolio stemming from mergers provides a valid instrument to identify CLO managers' market power. While I have ruled out concerns about this instrument being weak in my previous analysis, I supply further evidence that this instrument satisfies the exclusion restriction in this section.

Recall that the main concern regarding the instrument's exclusion restriction is that loans obtained in mergers correlate with acquiring CLO managers' private beliefs

about borrower quality. Specifically, this correlation can arise if these private beliefs affect acquirers' target choices. To alleviate this concern, I investigate target characteristics and the determinants of mergers in the CLO industry.

4.1 Time Series of Mergers in the CLO Industry

Figure 1 depicts the annual number of merger and acquisition events with a U.S. CLO manager as target for the years 2009 to 2021. In response to the Global Financial Crisis, CLO contracts changed significantly, which resulted in the emergence of a class of newly structured CLOs called CLO 2.0. Even though the first CLO 2.0 was issued in 2010, market conditions during the early post-crisis years were generally perceived as unfavorable to the issuance of CLOs. During these years, the CLO industry consolidated. The years 2010 and 2011 record the highest merger activity in my sample period. With CLO issuance continuing to increase in 2012 to 2014, acquisitions became less frequent. In fact, I only record two merger events for the year 2013.

At the end of 2014, the SEC, the Federal Reserve Board, and other financial regulators ruled that CLO managers are subject to securitization provisions under the Dodd-Frank act. "Skin-in-the-game" provisions would require CLO managers to retain minimum exposure levels to their managed CLOs at a level equivalent to 5% of a CLO's value. This regulation was received with concerns that the cost of issuing CLOs would increase dramatically. During the two year implementation period of this policy, merger activity rose again and especially independent CLO managers sought access to institutional capital. This trend culminated in 2017, after the regulation came into effect in late 2016.

Ultimately, CLO risk retention rules were only short-lived. In early 2018, the LSTA unexpectedly won in a lawsuit against the SEC and the Federal Reserve Board, which reversed the application of risk retention requirements to CLOs. Still, merger activity remained at high levels in 2019 and 2020. Both of these years saw depressed CLO issuance. During 2019, issuance dropped by almost 40% relative to the previous year, which was attributed to deteriorated funding conditions. Due to the Covid-19 pandemic this trend continued in 2020. Lastly, CLO issuance rebound in 2021 and reached close to record levels again. This high issuance activity was accompanied only three mergers in that year.

In summary, merger levels appear to respond countercyclically to CLO issuance con-

ditions. At a high level, the CLO industry experienced elevated consolidation levels when either current funding conditions for new CLOs were unfavorable or when CLO managers anticipated higher future costs due to risk retention regulations.

4.2 Stated Merger Rationales

To further examine the determinants of mergers in the CLO industry, I now investigate public statements on these mergers. In the previous section I have described the aggregate merger activity in the U.S. CLO industry. In order to scrutinize the validity of my instrument, I now limit my analysis to mergers used in the construction of my instrument by requiring both merger parties to act as CLO manager of U.S. CLOs prior to the acquisition. This conditions holds for 60 out of 87 mergers in the years 2009 to 2021.[10]

I am able to collect statements for 50 mergers in my sample[11] from which I remove another five mergers, which contain only universal statements, such as the general expectation of high return on investment. For the remaining 45 mergers, I group statements about the rationale for merging. Further, I allocate each reason into one of five categories depending on whether they concern improvements in access to outside investors (*Investor Access*), ameliorated equity constraints, in particular with respect to risk retention regulation (*Equity Access*), non-CLO business lines or the target's European CLO business (*Business Diversification*), improvements in operations (*Operational*), or portfolio consideration (*Loan Portfolio*). The resulting distribution is displayed in Figure 2.

Statements about outside investor access are most frequently mentioned, with 71% of mergers including such a reference. Within this category more than half state that increased scale improves investor access. For example, in regard to Apollo's merger with Gulf Stream Asset Management an Apollo representative stated, *"[. . .] while smaller market participants can continue to add a high level of service to their existing investors, without the scale and global reach of a platform such as Apollo's, the smaller firms are unable to effectively compete in the market to raise new funds, and their growth prospects are limited."* Other reasons include enhanced investor relationships (33% of mergers), and better distribution channels (20% of mergers).

[10] I display the breakdown of my sample events by year in Figure B.1.

[11] The ten mergers without public statements involve small targets, so that their contribution to my instrument is small. In six cases the merger is mentioned in public reports, while the parties declined to comment in four cases.

The second most frequent category is improved equity access, which is mentioned for 55% of mergers. In particular, 9% of mergers make a direct reference to equity requirements as a result of risk retention requirements. Both reasons, outside investor access and the availability of inside equity, support my argument that obtained loan portfolios were not influential for the acquisition decision. Instead these CLO managers argue that mergers facilitate the new issuance or refinancing of CLO securities in ways unrelated to specific CLO loan portfolios.

24% of mergers allude to business lines of the target CLO manager other than her U.S. CLO business being an important reason for merging. While 9% of mergers contain an aspect of expanding the manager's European CLO business, 18% of merger statements mention non-CLO activities.[12] In both cases it is unlikely that individual loan portfolio components of the CLO manager affiliated with the target affected the merger decision.

In fact, only five statements refer directly to the loan portfolio. Of these five statements, two mention that the acquisition helps diversify the asset portfolio. Diversification in itself is consistent with the exclusion of the instrument as long as this diversification motive is not affected by the acquirer's private beliefs. Three mergers contain statements about the general "fit" of the target's assets. For instance, one acquirer states that the target CLOs *"[. . .] have been well managed in a manner consistent with our style and philosophy such that the assets are very complimentary with our existing portfolios,"* and another acquirer claims that the *"assets are complementary to our existing CLO portfolios."* No statement further expands on this asset *"complimentarity"* and all but one of these three mergers prominently states other considerations, including capital access. Ultimately, it is unclear whether the inclusion of the three mergers poses a problem to the validity of my instrument. Regardless, their inclusion does not alter my qualitative results. Still, as mentioned earlier, I have excluded these mergers in constructing my instrument.

4.3 Target Characteristics

The fact that the target's loan portfolio does appear prominently in acquisition decisions is perhaps not surprising given the high levels of diversification that CLOs

[12]For example, in 2020, Morgan Stanley announced the acquisition of Eaton Vance. While Eaton Vance's equity and fixed income asset manager, Eaton Vance Asset Management, also manages CLOs, about two-thirds of Eaton Vance's assets under management came from other business lines; most importantly its wealth management division.

are required to maintain. Specifically, CLO contracts stipulate covenants that restrict portfolio concentration to prevent the CLO manager from risk shifting against the CLO's debt holders (Kundu, 2022a). Typical concentration limits dictate borrower exposures below 1-2%, industry exposures below 10-15%, and very risky, CCC rated, exposures below 5-7.5% of a CLO's loan portfolio. Diversity score tests further constrain concentration. Since a manager's CLO-level loan portfolios are not perfectly correlated, manager-level portfolio diversification even exceeds that of individual CLOs.

To illustrate the resulting diversification and compare merger targets to other CLO managers, I define a set of counterfactual target candidates that the acquirer could have chosen instead. For each merger, I construct this target candidate set from CLO managers that at the time of merger announcement manage between half and double the number of CLOs managed by the target.[13] I compare the resulting target candidates to the target and the acquirer in Table 5.

In terms of their loan portfolios, realized targets appear very similar to my defined set of target candidates. On average the target's loan portfolio includes 312.56 loans from 234.33 distinct borrowers. These numbers closely resemble that of CLO managers in my control group, which on average have 311.69 loans from 231.83 distinct borrowers. Thus, on average each issuer accounts for only 0.32% of the overall loan portfolio. The maximum exposures to individual loans and issuers are also similar for both groups and fall below the limits commonly set by CLO covenants. Overall, high levels of diversification limit the extent to which acquirers can meaningfully differentiate among target candidates by their borrower specific beliefs.[14]

4.4 Target Selection and Loan Portfolios

Next, I provide direct evidence on the role of loan portfolios in target selection. The main identification concern in my analysis is that a CLO manager's holdings reflect her private beliefs about a borrower. If an acquirer chooses a target CLO manager as a result of private beliefs about loans in the target's portfolio, the target should be

[13] In general, I take a "buy-side" view of M&A activity with the acquirer selecting a target out of a set of potential targets rather than the target selecting an acquirer ("sell-side") out of a set of potential acquirers. Sell-side transactions are less problematic for my identification since the acquirer's demand is unobserved by the target. Furthermore, larger CLO managers are usually more diversified which in line with my prior argument makes issuer level demand less relevant. In practice, a good portion of acquisitions in my sample were sell-side initiated with targets approaching investments banks in response to limited capital and risk retention regulations.

[14] For a tractable formalization of this claim see Appendix D.

distinguishable from other, non-selected, CLO managers by a higher loan portfolio overlap. However, Table 5 shows that the average target's portfolio overlap with the acquirer is very similar to that of the other CLO managers.

Still, it is possible that the importance of portfolio overlaps is masked by other factors. To formally test this hypothesis, I estimate the following regression:

$$Target_{am} = \beta Portfolio\ Overlap_{am} + \kappa X_{mt(a)} + \alpha_a + \mu_m + \varepsilon_{am}. \tag{2}$$

The dependent variable $Target_{am}$ indicates the realized target manager m in acquisition a by taking on the value one for the target and zero for all other CLO managers. The variable of interest $Portfolio\ Overlap_{am}$ measures the value-weighted fraction of a CLO manager's loan portfolio from assets also held by the acquirer. Because I measure portfolios in the quarter prior to merger announcement, I avoid capturing possible portfolio assimilation between target and acquirer loan portfolio following the announcement of the merger. I include merger fixed effects α_a to control for factors common to all target candidates of a merger. For instance, this includes the extent of idiosyncrasy of the acquirer portfolio at merger announcement. This fixed effect further absorbs present macroeconomic conditions. Additionally, manager fixed effects μ_m control CLO manager characteristics that are invariant over different merger events. Finally, to account for time-varying differences that may be relevant for target selection and affect a manager's portfolio choice, I control for a set of manager characteristics.

I investigate the predictive power of a target's portfolio overlap with respect to both a CLO manager's entire asset portfolio and the subset of institutional term loans. Only institutional term loans are included in my main analysis of CLO manager market power and also in the construction of my instrument. Nevertheless, in a merger the acquirer would not purchase just the institutional term loans, but rather the entire asset portfolio. My instrument aggregates loans of a borrower that are obtained in a merger and still outstanding. To account for either target's being chosen on the basis of an issuer's loans or aggregate issuer holdings, I distinguish between security and issuer level overlap. A security in a CLO manager's portfolio overlaps at the security level if it appears in the acquirer portfolio, and at the issuer level if the acquirer holds any security of the security's issuer.

I find that the target CLO manager is statistically indistinguishable from other CLO managers on the basis of portfolio overlap. Table 6 shows that β is insignificant in

all specifications. Economically the loan portfolio overlap also does not meaningfully explain target choices. The coefficients -0.001 for the issuer-level total portfolio overlap implies that a move from the first to the third quarter of portfolio overlap make the target candidate 2.72% less likely to be chosen as target. While the results for the loan portfolio are somewhat larger they are statistically indistinguishable from zero and much smaller than later estimates on liabilities and fees.XXX

A remaining hypothesis is that the overall portfolio overlap is too coarse to distinguish the target. For example, it is conceivable that the distribution within the target's loan portfolio is a determining factor. To test this claim, I expand my previous mail from the merger-CLO manager level to the merger-CLO manager-issuer or -loan sample and estimate

$$Target_{am} = \beta \left| w_{ami}^{Target\ Cand.} - w_{ai}^{Acq.} \right| + \kappa X_{mt(a)} + \alpha_{ai} + \varepsilon_{ami}. \tag{3}$$

$Target_{am}$ is defined as previously. $w_{ai}^{Acq.}$ captures the portfolio weight of issuer i (or loan l) in the portfolio of the acquirer of acquisition a. $w_{ami}^{Target\ Cand.}$ captures the portfolio weight in target candidate m's loan portfolio, including the realized target. I also include a merger-borrower fixed effect, α_{ai} to capture issuer specific factors that are common to all target candidates. Finally, I include the same vector of CLO manager characteristics as before.

The resulting OLS estimates are tabulated Table 7.

4.5 Target Selection and CLO Liabilities

Having provided evidence that loan portfolios contain no discernible explanatory power for acquirers' merger decision, I investigate the role of targets' liabilities. Indeed capital access is not only the most frequently talked about issue surrounding CLO mergers, but its importance is also overwhelmingly stressed in general industry views.[15] Acquirers may be able to create shareholder value from mergers by retiring the target CLOs' existing liabilities if they have access to cheaper debt financing than the target. In that case, target candidates with particularly disadvantageous CLO

[15]For example, in August 2021, Business Insider interviewed a number of CLO industry professionals. The appreciation of capital access appears unanimous. For example two notable quotes include "If you can raise money, which is the name of the game in CLOs, you stand out", and "We're a larger issuer, so we know a lot of repeat investors. It's a niche, collegial market, but one that's growing in awareness." (see https://www.businessinsider.com/top-clo-managers-investors-bankers-lawyers-traders-careers-structure-credit-2021-8?r=clo-teaser). These opinions resonate closely with opinions expressed in private interviews.

financing would be more attractive as they offer a greater return on capital invested in the merger.

To provide formal evidence on the role of CLO liabilities for merger selection, I estimate

$$Target_{ac} = \beta Funding\ Characteristic_{ct(a)} + \kappa X_{ac} + \upsilon_{v(c)a} + \varepsilon_{ac}. \tag{4}$$

Parallel to previous specifications, $Target_{ac}$ captures whether CLO c was managed by the target acquired in merger a. *Funding Characteristic* captures different funding characteristics. Specifically, I consider CLO *Leverage Ratio* (the ratio of supplied CLO equity to the sum of CLO equity and outstanding debt tranche amount), *Cost of Debt* (the tranche amount weighted average spread over Libor), *Junior Fee* and *Senior Fee*. κ constitutes a vector of other CLO and Manager characteristics. I ensure that I compare CLOs in the same vintage through the vintage-merger fixed effect $\upsilon_{v(c)a}$. If acquirers select targets based on their capacity to improve CLO profitability via improved capital access, I would expect that worse funding characteristics, i.e., lower leverage, higher cost of debt, and lower fees, predict the chosen target.

The resulting estimates in Table 8 fall in line with those predictions. All estimates are statistically significant and in the expected direction.

4.6 Post-Merger CLO Refinancing

Lastly, I confirm that the acquirer's actions following the merger are consistent a liability-driven target choice. I begin by studying the targets' CLO refinancing activity surrounding mergers. While I offer formal evidence from a difference-in-differences specification in Table C8 in Appendix C, I present graphical evidence in Figure 3. This figure plots the fraction of target and non-chosen target candidate CLOs that were reset, called or reissued over the prior year relative to the merger date. Two years preceding the merger, target and target candidates follow a similar trend. The target refinances her CLOs at a lower rate, consistent with relatively worse capital access. This difference increases shortly prior to the merger consistent with the target forgoing refinancing once the merger has been agreed upon. The reason is that refinancings in that period limit the acquirer's ability to refinance acquired contracts at their terms because newly issued tranches stipulate non-call periods of typically one to two years. Following the merger this pattern reverses. Already one quarter after the merger the fraction of CLOs refinanced is approximately equal between target

and target candidate. This trend continues and one year after merger more than 20% of target CLOs have been refinanced compared to 11% of CLOs held by other target candidates. Consistent with capital constraints being important for CLO financing, Figure 4 shows that the increase in refinancings of target CLOs following the merger is accompanied by the acquirer's prior CLOs refinancing at lower rates relative to their trend. Difference-in-differences results confirming this visual evidence are available in Table C9 as part of Appendix C.

5 Sources of Market Power

In Section 3, I established that CLO managers' market power is reflected in lender-friendly loan terms. For a CLO manager to influence loan pricing in the origination process, the arranging bank must not be able to costlessly make up for this CLO manager's funds. Said differently, switching costs constitute a necessary condition for the presence of market power. I examine the presence of such switching costs in this section.

5.1 Lending Persistence

Facing a potential funding shortfall, the arranging bank can respond in one of two ways: either the bank adjusts the loan amount to be raised down or she must raise these funds from another source. This source can be either herself or another investor.

Adjusting the loan amount downwards, when this option is available, is not costless. The risk-sharing agreement between the borrowing firm and the arranger obligates the arranging bank to participate in deteriorated loan terms through a reduction in fees. In practice, the option to reduce the loan amount is only available for few loans. The loan amount represents a common negotiation feature only when the issuer is flexible with respect to the precise amount raised. One example are loans with the purpose of increasing a borrower's leverage, i.e., dividend recapitalizations. In contrast, many loan purposes necessitate raising a specific loan amount. For instance, loans to roll over existing debt require an amount equal to the refinanced debts' face value plus any expenses to cover incurred call provisions. Similarly, loans that finance acquisitions typically must raise a fixed proportion of the acquisition price. Whenever a specific loan amount is required, the option to alter the loan amount is typically not present.

Raising funds internally is also costly for the arranging bank due to regulatory capital constraints. The retention of a risky loan substantially erodes a bank's regulatory

capital because of high associated regulatory risk weights.[16] Indeed, the fact that the arranging bank attempts to sell the loan in the first place is direct evidence that retention represents at least an opportunity cost to the bank.

Since both the provision of internal funds and loan amount adjustments are costly, I am left to study, whether the arranging bank can costlessly substitute between funds of different investors. To study this aspect, I follow an approach used by the relationship literature and study switching costs intertemporally. This literature argues that the persistence of bank-borrower relationships is evidence of opportunity costs that borrowers face when switching away from their incumbent bank (e.g., Bharath et al., 2011). Following this line of reasoning, persistence of CLO lending for a given borrower would constitute evidence of switching costs that an arranging bank faces with respect to invested CLO managers.

To formally test the extent to which a borrower's CLO lenders remain stable over different loan issues in time, I expand my earlier used loan-CLO manager sample to include all CLO managers with at least one active CLO during the loan's syndication. This means that I add active CLO managers without investments in a borrower's loans to that sample.

I begin by providing graphical evidence in Figure 5. Each grey point in this figure plots a CLO manager's holdings prior to a new loan issue against this CLO manager's investment participation in that issue. The graph displays a positive relationship between prior holdings and subsequent investments and therefore is evidence of CLO lending being persistent on the intensive margin. One striking feature of this figure is that many observations are clustered around the identity line. These clustered observations predominantly correspond to CLO managers that roll over their refinanced investment into the new loan issue.

In order to also capture the effect of extensive margin decision, I display points of a binned scanned plot in blue. I define one bin for all observations corresponding to CLO managers without prior investments. The other bins split the sample with positive prior holdings into 19 equally sized buckets by observation count. The binned scatter plot displays a close to similar relationship.

[16] Under Basel II and III's standardized approach, BBB rated corporate borrowers carry a 75% and 100% risk weight respectively. In contrast B rated borrowers carry a 150% risk weight, while prime borrower risk weights can be as low as 20%.

Next, I complement my graphical evidence by estimating the CLO model:

$$Participation^{M}_{lm} = \beta Prior\ Holding^{M}_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}. \tag{5}$$

I provide separate specifications depending on the margin of study, M. For intensive margin results, I define $Participation^{Int.}_{lm} = \ln(1 + Participation_{lm})$ and $Prior\ Holding^{Int.}_{lm} = \ln(1 + Prior\ Holding_{lm})$, $Participation_{lm}$ and $Prior\ Holding_{lm}$ following earlier definitions in Subsection 3.1. Extensive margin results use the definitions, $Participation^{Ext.}_{lm} = \mathbb{1}\{Participation_{lm} > 0\}$ and $Prior\ Holding^{Ext.}_{lm} = \mathbb{1}\{Prior\ Holding_{lm} > 0\}$. By including loan fixed effects, λ_l, in my specification, my results are identified by comparing the investment decision of different CLO managers for the same loan issue. Within a loan all CLO managers face the same borrower, arranging bank, and loan terms. Further, in the spirit of Khwaja and Mian (2008) loan fixed effects eliminate any effect resulting from aggregate supply conditions or due to borrower credit demand. I further account for time-varying manager-level differences that may affect my results by including manager-time fixed effects, $\mu_{mt(l)}$. I cluster standard errors at the CLO manager level.

My coefficient of of interest in this model is β with $\beta > 0$ indicating persistence in CLO investments. OLS estimates in Table 9 establish that CLO lending is indeed persistent. All relevant coefficients are statistically significant beyond the 1% level. On the extensive margin, I find that in the same loan issue CLO managers who hold existing loans of the borrower are 53.7 percentage points more likely to invest in the new loan issue than uninvested CLO managers (Column 1). This estimate is close to the difference in unconditional investment likelihoods. CLO managers without prior investments invest in a new loan issue with a 8.8% unconditional likelihood compared to 62.5% for the invested subset. On the intensive margin, I find that a 100% increase in loan holding increase the expected size of investment by 54.4% (Column 4). These numbers are even more pronounced when I only study deals with a single institutional term loan in Columns 2 and 5. In Column 3, I combine extensive and intensive margin effects of my variable of interest to explain CLO manager's investment propensity. I find that a CLO manager is more likely to participate in a new issue the higher they are invested in the borrower.

5.2 Relationships and Lending Persistence

The underlying argument that links persistence to switching costs is that an increase in the cost of switching should decrease the likelihood of switching because a larger benefit from switching is required to offset associated costs. To scrutinize the factors that influence the degree to which CLO lending is persistent, I modify my previous model and estimate

$$\begin{aligned} Participation^{M}_{lm} = \beta_1 Prior\ Holding^{M}_{f(l)m} \times Characteristic_{lm} \\ + \beta_2 Prior\ Holding^{M}_{f(l)m} + \beta_3 Characteristic_{lm} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}. \end{aligned} \tag{6}$$

One competing theory that can potentially explain my result is that banks form persistent relationships with both their borrowing firms and their CLO managers. In this case, the observed persistence between CLO managers and borrowing firms would arise as a result of a common relationship bank. These CLO manager-bank relationships could invalidate the interpretation of banks facing switching costs. Rather it may be costly for the CLO manager to not provide funds if non-investment jeopardizes a beneficial relationship with the bank.

While there is a long literature on bank-firm relationships, bank-CLO manager are a more nascent topic of research. On reason that CLO managers may benefit from relationships with banks could be preferential primary market access since new loans are on average underpriced. In recent work, Bhardwaj (2021) shows that banks also benefit from relationships with CLO managers because these CLO managers provide secondary market liquidity insurance to the bank's distressed borrowers.

The extent to which CLO manager-bank relationships grants market power to either party would depend on the relative value of the relationship to the bank and the CLO manager. Absent reliable estimates on these quantities, it is conceivable that lending persistence does not predominantly arise due to switching costs faced by banks but by CLO managers.

Recall that I defined a relationship between bank b and firm f to exist if the bank acted as lead arranger for the firm on a previous loans outstanding and held by active CLOs. I follow Bhardwaj (2021) and define a manager-bank relationship to exists if bank b acted as underwriter for any active CLO managed by manager m. Since this relationship exists only due to interactions at the beginning of a CLOs life, I further stipulate that at least one of these CLOs was managed by m prior to the CLO being priced. This slight deviation accounts for subsequent CLO acquisitions which may

not transfer relationships. This deviation does not meaningfully impact my results.

To test whether relationships are responsible for my results, I let $Characteristic_{lm} = Relationship_{lm}$ indicate the presence of a relationship with the value 1 and 0 otherwise for a host of relationship measures. The main concern is that CLO lending persists only in the presence of relationships that could be the result of CLO managers, not banks, facing switching costs. To test this hypothesis, the coefficient of relevance is β_3. If CLO lending persistence is in fact explained by these relationships, then CLO lending outside of these relationships should not be persistent, i.e., $\beta \leqslant 0$. In contrast, if CLO lending persists outside of relationships there exists another reason that gives rise to the observed persistence.

I define manager m to be connected to firm $f(l)$ through a common relationship bank if there exists an arranging bank $b(l)$ such that b is both a relationship bank of firm f and a relationship bank of CLO manager m. I define a relationship between bank b and firm f to exist if the bank acted as lead arranger for the firm on a previous loans outstanding and held by active CLOs. With respect to CLO manager-bank relationships, I follow Bhardwaj (2021) and consider bank b to be a relationship with CLO manager m if the bank acted as underwriter for any active CLO managed by the CLO manager. Since this relationship exists only due to interactions at the beginning of a CLOs life, I further stipulate that at least one of these CLOs was managed by m prior to the CLO being priced. This slight deviation accounts for subsequent CLO acquisitions which may not transfer relationships.

I present regression estimates using this relationship definition, *Manager-Bank-Firm (Liab.)*, in Columns 1 and 2 of Table 10. Along both the extensive and the intensive margin, this test statistically rejects that CLO participations persist only in the presence of common relationship definition.

One reason why CLO lending may persist outside of this relationship measure is the existence of other uncaptured relationships. For example, one alternative is that CLO managers and banks form relationships on the basis of their loan-based interactions. CLO managers and banks interact very frequently in the primary market and so it seems natural that relationships can form based on their interactions here. For example, banks often assign their corporate borrowers to a fixed banker. Similar to personal relationships that a banker forms with borrowers (Herpfer, 2021; Karolyi, 2018), the banker may also form relationships with the CLO managers she interacts with. To capture these relationships at a given issue, I define a CLO manager and

firm to be related via a common relationship bank if the CLO manager holds a loan of that borrower previously originated by one of the the borrower's relationship banks on the new loan issue. Under this definition, the CLO manager and the responsible banker are likely to have previously interacted.footnoteIn the case of a bankers' departure, predecessors are typically introduced to key accounts in order to carry over relationships. Note that I do not require the CLO manager to gain its participation on the primary market and allow for relationships from subsequent secondary market acquisitions. I consider this definition to be more conservative, since bank - CLO manager interactions are likely to occur during secondary market trades.[17]

To capture these asset-side relationships, I define a CLO manager and a firms to be related for a given issue if the CLO manager holds a loan of that borrower previously originated by one of the borrower's relationship banks, *Manager-Bank-Firm (Assets)*. The results from using this definition are displayed in Table 10's Columns 3 and 4.

Finally, to rule out further concerns about the definition of CLO manager-bank relationships, I change the definition of $Relationship_{lm}$ to only reflect the relationship between arranging bank and borrower. Specifically, I define a relationship to exist at the issue level when at least one bank constitutes a relationship bank with respect to the firm. This measure strictly expands my previous relationship definitions and restricts non-relationship loans to include only loans for which the firm hired a non-relationship bank as arranger. If a bank and a firm are not in a relationship, then the borrower cannot be connected to the CLO manager through a relationship bank. The results for this definition are tabulated in Table 10's Columns 5 and 6.

[17]Loans on the secondary market can be acquired by way of assignment or participation. Assignments make the acquiring party a direct signatory of the loan and thereby confer all rights and benefits to the acquirer. In contrast, participation agreements constitute arrangements only between the transacting parties. Arranger and acquirer interact on assignments. Assignments usually trade through arranger's secondary market desks. Changing loan signatories requires high assignment fees which are usually waived for trades over the arranger's trading desk. Assignments further require the consent of borrower and agent bank, though any objections have to be prudent. The bank also confirms that the assignments abide to the minimum assignment amounts stipulated in the loan documents. By contractually engaging only between transacting parties, participations avoid having to comply with aforementioned restrictions and fee. However, participations do not generally confer rights to the acquirer and the acquirer is typically precluded from voting on non-material amendments. More importantly, though, the acquirer is treated as general creditor vis-à-vis the seller and has no direct claim to any collateral supporting the loan. Typically more than 90% of a CLO's portfolio are required to be invested in senior secured loans. Thus, the acquirer assumes credit risk of both borrower and seller. As a consequence CLOs typically contain covenants that restrict loans bought via participations to account for less than 10% of a CLO's portfolio.

5.3 Information Asymmetries and Lending Persistence

Information asymmetries are central for the formation of long-term relationships between firms and banks. In contrast to bond investors, banks collect private information on their borrower. Subsequent lending decisions incorporate this information. As recognized in seminal contributions by Sharpe (1990) and Rajan (1992), the incumbent bank's information monopoly results in increased cost of providing credit for uninformed competitors due to adverse selection. The original bank's ability to offer a cheaper loan results in the borrower continuing its bank relationship. While the relationship bank offers a rate lower than that of its competitors, its ex post monopoly allows for the extraction of rents from the borrower.

In the leveraged loan market, arranging banks may face a related mechanism with respect to its nonbank investors, and especially CLO managers. If CLO managers are asymmetrically informed about the borrower, an observed decision by a previously invested CLO manager to not provide funds can be interpreted as a signal about negative borrower prospects. This negative signal may grant an "information oligopoly" to the invested CLO managers if that signal is costly to the bank.[18]

For this argument to be valid three conditions must be met. First, there have to be information asymmetries about the borrower across CLO managers. Absent information asymmetries, observed investment decisions do not incrementally inform other CLO managers about the borrower.[19] Second, CLO managers decisions must be observable. Otherwise they cannot serve as signal. Third, these signals must be costly to the bank. If the updating of other CLO manager's beliefs about the borrower does not represent a cost to the bank, then the non-investment decision would not be costly,

Information asymmetries arise naturally during syndication. Prior to receiving the information memorandum about a loan, CLO managers must declare themselves to be private or public side investors. Private side investors receive an information memorandum that incorporates the private information collected by the bank on the borrower. In contrast, public side investors receive an information memorandum that includes only public information. Access to private information, also called "material non-public information," may restrict non-loan investment activities of a CLO man-

[18] Alternatively, the term "information oligopsony," would further highlight the fact that CLO managers act as purchasers of loan.

[19] I do not strictly require the presence of information asymmetries but rather the perception of CLO managers that other CLO managers may possess additional information about the borrower with some positive probability.

ager's affiliated subsidiaries. Under U.S. securities law, trading public securities in the possession of private information constitutes insider trading.

In my sample 42.1% of leveraged loans are made to private firms. Trading restrictions may also extend to these private firms for at least two reasons. First, private borrowers may decide to subsequently pursue an initial public offering (IPO). IPO participants who previously obtained material non-public information can also be considered insider traders. Second, in some conditions private securities such as private equity can also fall under insider trading regulations.[20]

A CLO manager may be able to circumvent having to self-restrict information access by segregating information flows between subsidiaries. Such segragation is often called an "information wall." In practice the presence of information walls varies and even compliant CLO managers often choose public side participations to avoid remaining risks.[21]

Information asymmetries can also arise for reasons unrelated to the syndication. For example, many CLO managers are affiliated with large private equity firms. Information obtained by the affiliated private equity business may flow to the CLO manager. For example a sponsoring private equity firm can be represented on the firm's board. Since I exclude observations for which the CLO manager has a sponsor relationship with the firm, this particular information asymmetry is unlikely to be important in my case. However, private information received by the private equity firm about borrowers for which they ultimately decided against an investment may well be present.

Information asymmetries can also arise between non-private equity firms if screening and monitoring of a firm requires the CLO manager to exert costly effort. Such costly effort can lead to CLO managers specializing with portfolios tilted towards borrowers for which the CLO manager acquired more information (Van Nieuwerburgh and Veldkamp, 2010). If some of the acquired information is soft and cannot be transmitted, the bank may be unable to remove the resulting information asymmetry even if the bank is in possession of that information.

[20]SEC Rule 10b5-1 covers fraud and deceit as a result of insider trading for any, including private, securities. For example, in 2011 the SEC fined private Stiefel Laboratories Inc. and its CEO for insider trading; see https://www.sec.gov/divisions/enforce/claims/stiefel-laboratories.htm.

[21]In 2018 Debtwire (2018) surveyed senior executives of 100 major credit firms about their conflict management. 58% of respondents report that they do not have an information wall in place. 34% respond that they previously removed an information wall. Managers without an information wall justify their absence due increased synergies (71%), lower expenses (36%), and lower administrative burden (21%).

Having discussed the role of information asymmetries in the primary loan market, I now turn to discuss the extent to which CLO manager's investment decisions are observable by other market participants and the costs arising for the bank. On the one hand, information about CLO manager participations may be conveyed to loan market participants during the syndication process. In this case, the cost to the arranger from a non-investing CLO manager is immediate. Other CLO managers revise their beliefs about the quality of the borrower down, which leads them to demand less of that loan at any given price.

On the other hand, a CLO manager's non-investment decision may not become public during syndication. In this case, they bank may be able to avoid any effects during the syndication itself. Because CLOs file monthly trustee reports that outline their portfolio holdings, CLO managers' investment decisions will become public within a few weeks of a loan's issue. Thus, other CLO managers would update their beliefs with a delay. Nevertheless, the new information will ultimately be reflected in lower secondary market prices of that loan. These lower prices can be damaging to a arranging bank's reputation with nonbank investors for future loan issues, because nonbank investors acquire loans in the primary market with the expectation that the issues will be underpriced.[22]

Having discussed how information asymmetries can make the replacement of invested CLO managers costly for the arranging bank, I will now turn to provide evidence on the effect of information asymmetry on the extent to which CLO manager's investments are persistent. Under the outlined theory, higher information asymmetries increase switching costs for the bank. Thus, I test the prediction that higher information asymmetries are accompanied with more persistent CLO lending.

Since neither a CLO manager's information about a borrower prior to loan issue nor their choice to act as private or public side participant is observed, I instead proxy for aggregate issue-level information asymmetries. To this end, I follow previous work on the role of information asymmetries in traditional firm-bank relationships[23] and let $Characteristic_{lm} = Opacity_l$ capture the degree to which a borrower is opaque. The argument is that publicly available signals are less informative for opaque borrowers, which makes information asymmetries between insiders and outsiders more pronounced.

[22] In my sample, 14.2% of loans were overpriced. In comparison, Ritter and Welch (2002) record 30.5% of IPOs with negative first day returns over that period.

[23] The importance of information asymmetries for that relationship has spurred a vast theoretical and empirical literature. For detailed references, see Kysucky and Norden (2016).

I employ three measures of borrower opacity: a borrower is opaque if the borrower is (1) small, (2) has disagreeing public ratings, or (3) if the borrower is private. Small firms are treated as more opaque in the literature for reasons such as less frequent coverage by journalists, or the positive correlation of size with the number of employees who may leak private information. I consider a borrower small if their assets are in the bottom quartile of firms in my sample. Information on a firm's assets is available only for the subset of public firms in my sample, which restricts my analysis to that subset. Another frequently used measure is the presence of a public rating from one of the large rating agencies. I excluded loans without rating from my sample because CLOs are restricted from investing in these loans. Thus, I cannot use this measure of information asymmetry. Instead, I use the fact that most loans have two or more ratings and capture rating disagreement. To this end, I assign numerical values to ratings following the classification of Becker and Milbourn (2011) and calculate the average absolute distance from the mean rating for each borrower. I classify borrowers in the top quartile of this measure as opaque. The rationale for this measure is that public ratings serve to communicate private information about the borrower to public side investors. The more a firm's ratings disagree, the less informative is the rating signal, which increases information asymmetries. Lastly, I capture whether the issuer is private, which I retrieve from Compustat/CRSP. The literature treats private issuers as more opaque as issuers do not file public information.

My estimation results are reported in Table 11. Consistent with the bank facing information asymmetries that make it costly for her to replace invested CLO managers, I find that CLO lending is more persistent for more opaque borrowers using both opacity measured by size and opacity measured by rating disagreement. Specifically, a CLO manager's investments in small firms are 4.0% more like to persist. They are also 7.6% larger, despite smaller borrowers on average issuing smaller loans. Both these numbers are significant at the 1%-level. The extensive margin effect of ratings dispersion are smaller, but positive and significant at the 10%-level with these CLO managers being 1.2% higher when ratings are dispersed. The intensive margin effects are statistically significant at the 1% level. The economic magnitude here corresponds to a 2.2% increase.

Interestingly, I find that CLO lending is less persistent for private firms. This is result is not inconsistent with my argument. On the one hand, public firms have higher public disclosure requirements. Their public reporting increases the information avail-

able to CLO managers that are active as private side participants. This means that a borrower being public decreases information asymmetries between public and private side investors. On the other hand, a firm's status as public firm also affects CLO managers' decision whether to act as public or private side lenders. While obtaining private information for public firms can directly impact trading in public securities, the impact is less severe for private firms. Thus, CLO managers are less likely to act as private side market participants for public firms, which increases the overall information asymmetries across CLO managers.

5.4 Pricing Implications

Having provided evidence that CLO managers' lending is more persistent for firms with larger information asymmetries, I now turn to the implications for loan pricing. If higher lending persistence for high information asymmetry borrowers is indeed the result of arranging banks facing higher switching costs, I should also find that CLO managers exercise more market power in issues by these firms. To investigate this hypothesis, I adjust Equation 1 and estimate the model

$$\begin{aligned} Spread_l =& \beta_1 Prior\ Holding_{f(l)m} + \beta_2 Prior\ Holding_{f(l)m} \times Opacity_{f(l)} + \\ & \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}, \end{aligned} \tag{7}$$

where $Opacity_{f(l)}$ refers to my previously defined measures. In addition to the interaction term, I also include the level of Opacity$_{f(l)}$. The main coefficient of interest is β_2, which captures the extent to which CLO managers' market power is different for opaque borrowers. I expect that CLO managers have more market power for opaque firms, i.e., $\beta_2 > 0$.

I present two-stage least squares estimates of this model in Table 12. Consistent with my hypothesis, I find positive and statistically significant coefficients on β_2 for small borrowers and borrowers with less informative public credit ratings. The estimated effects are large. In Column 1, I find that small public borrowers experience a 26.1 bps higher spread increase than other public firms as a result of a one-standard-deviation increase in CLO manager market power. For the entire firm sample, Column 2 shows that an uncertain rating increases the effects of market power by 78.4% .

In column 3, I provide results that distinguish between private and public firms. I find a negative effect that is statistically insignificant with a p-value of 21.3%. This is consistent with my previous finding that being private implies slightly less persistent

CLO manager lending, which I argue is a result of the informational asymmetries not being unambiguous. Interestingly, I find in Column 4 that an uncertain rating has an even larger effect when I consider only the sample of public firm. This is again consistent with the information benefits of being public not being as clear-cut for the institutional loan segment.

6 Conclusion

Nonbanks have market power in leveraged loan underwriting. While, typically, loans are more expensive than bonds, banks traditionally provide additional services to borrowing firms that bond markets cannot provide. The capacity of a bank to extract future rents from relationships allows the bank to provide loans to borrowers for whom capital markets are closed or to support borrowers in distress with subsidized credit. In my study, I establish the existence of market power for CLO managers, which account for the majority of nonbank lending. I further point to informational asymmetries as an important source of their market power. However, I remain silent on whether nonbanks fulfill additional functions, similar to banks, as a result of their economic rents. The answer to this question will be important in evaluating the welfare implications of nonbank market power.

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Figures

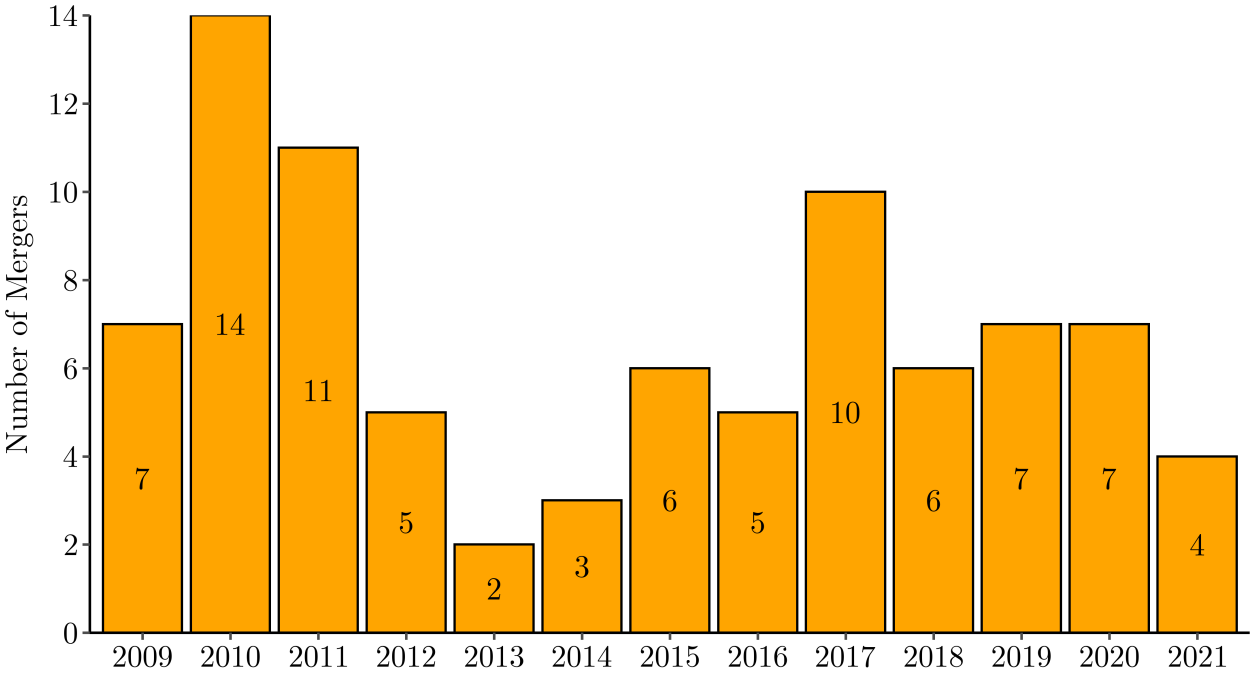

Figure 1. Mergers in the U.S. CLO Industry in the Years 2009 to 2021

This figure plots the number of merger and acquisition events in the U.S. CLO industry in a given year for the period 2009 to 2021. A merger is considered to be in the U.S. CLO industry if the acquisition target has a U.S. CLO manager business. Merger events are recorded for the year in which they become effective.

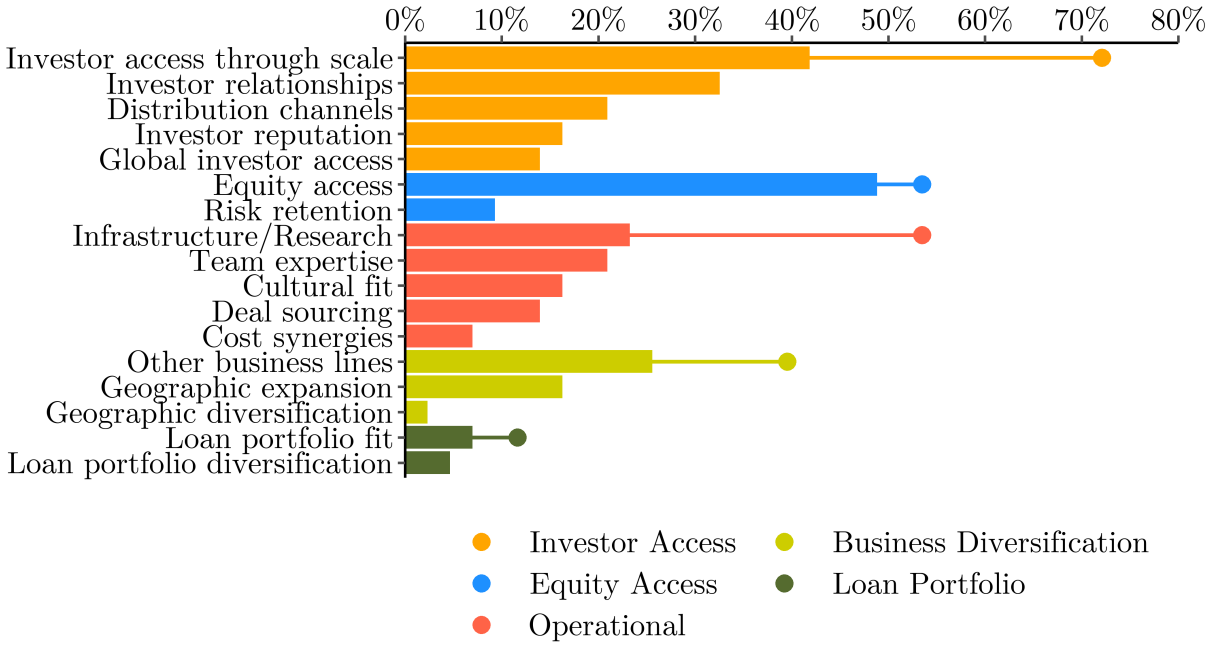

Figure 2. Stated Merger Rationales

This plot displays the frequency of stated merger motivations. Each motivation is grouped into one of five categories by color. Bars displays the frequency of each motivation. Points displays the frequency of a category.

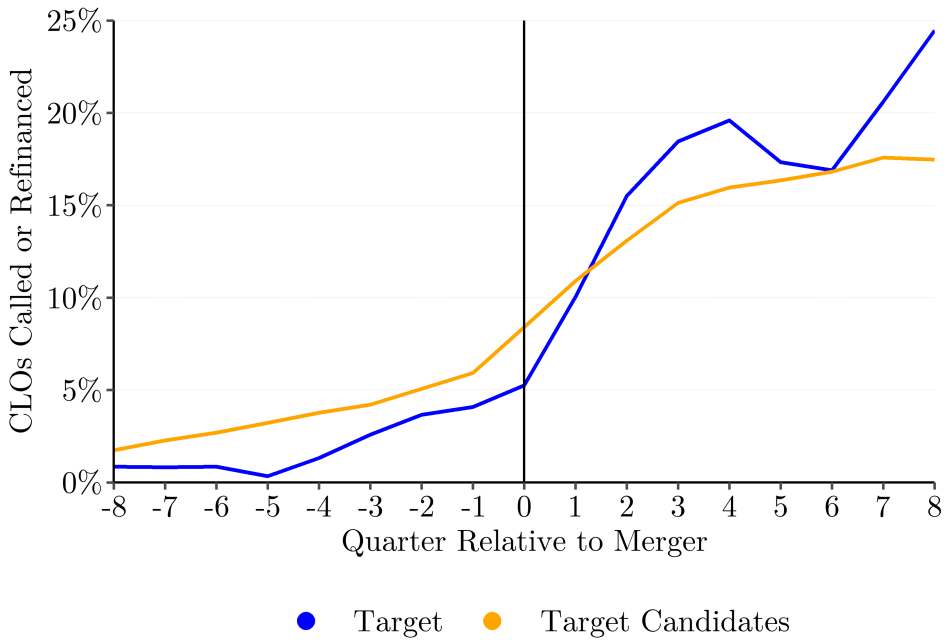

Figure 3. Target and Target Candidate CLO Refinancing

This plot displays the rate at which target CLO managers refinance or call CLOs around merger events. I begin with the sample defined in Table C8. For each merger-quarter, I display the average CLO vintage-adjusted fraction of CLOs that target CLO managers and CLO managers in the target candidate refinance or call in the previous year. *Quarter Relative to Merger* = 0 denotes the quarter in which the merger becomes effective.

Figure 4. Target and Acquirer CLO Refinancing

This plot displays the rate at which acquirer CLO managers refinance or call CLOs around merger events. I begin with the target and acquirer samples defined in Table C8 and Table C9. For each merger-quarter, I display the average CLO vintage-adjusted fraction of CLOs that target CLO managers and acquirer CLO managers refinance or call in the previous year. *Quarter Relative to Merger* = 0 denotes the quarter in which the merger becomes effective.

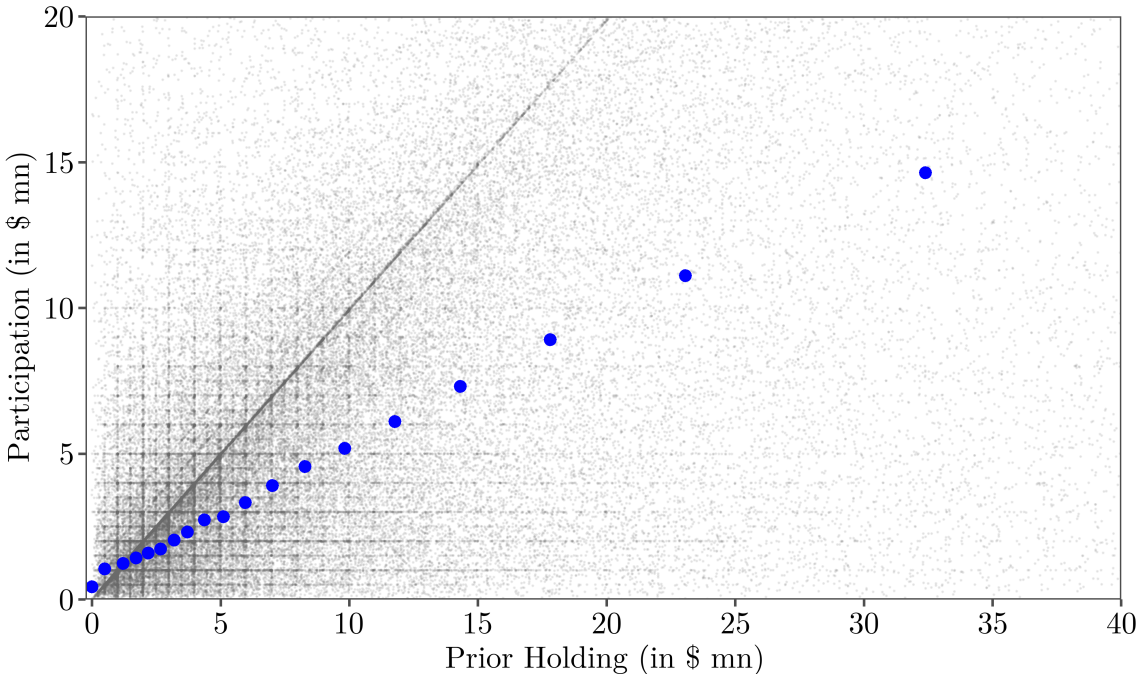

Figure 5. CLO Manager Lending Persistence

This figure displays the relationship between CLO managers' participations in new loan issues and their holdings of the borrower before syndication. Each gray dot corresponds to a CLO manager-loan observation in the sample outlined in Table 9. Blue points make up a binned scatter plot. Of this binned scatter plot, one bin contains observations corresponding to no prior holding ($Prior\ Holding_{f(l)m} = 0$). The other 19 points split the sample into equal-sized bins by $Prior\ Holding_{f(l)m}$.

Tables

Table 1. Summary Statistics

Variable	Unit	Mean	Std. Dev.	p25	p50	p75	Obs.
Panel A: Loan Level							
Spread	bps	405.51	175.06	300.00	350.00	450.00	4,674
Original Issue Discount	bps	68.21	101.69	0.00	50.00	100.00	3,835
Effective Yield	bps	417.17	183.31	300.00	375.00	475.00	3,835
Soft Call Premium	bps	115.23	47.72	100.00	100.00	100.00	3,607
Soft Call Period	months	10.24	8.18	6.00	6.00	12.00	3,607
Break Price − Par	bps	15.48	134.74	-12.50	25.00	75.00	2,738
Underpricing	bps	57.66	101.47	13.00	54.00	100.00	2,291
Loan Amount	$ mn	767.33	790.92	285.25	510.00	984.59	4,674
Maturity	months	71.72	15.69	62.00	74.00	84.00	4,674
Secured	0/1	0.98	0.13	1.00	1.00	1.00	4,674
First Lien	0/1	0.89	0.31	1.00	1.00	1.00	4,674
Cov-lite	0/1	0.63	0.48	0.00	1.00	1.00	4,674
Sponsored	0/1	0.62	0.49	0.00	1.00	1.00	4,674
Panel B: Deal Level							
No. Loans		1.19	0.46	1.00	1.00	1.00	3,920
Total Amount	$ mn	914.92	928.96	350.00	625.00	1,133.31	3,920
No. Loans Outst.		1.73	1.10	1.00	1.00	2.00	3,920
Total Amount Outst.	$ mn	1,384.54	2,014.32	389.97	752.20	1,581.30	3,920
No. Borrower Ratings		2.06	0.30	2.00	2.00	2.00	3,920
Has S&P Rating	0/1	0.99	0.10	1.00	1.00	1.00	3,920
Has Moody's Rating	0/1	0.99	0.09	1.00	1.00	1.00	3,920
Has Fitch Rating	0/1	0.08	0.27	0.00	0.00	0.00	3,920
Median Rating		13.64	1.66	B (13)	B (13)	B+ (14)	3,920
Rating Dispersion		0.45	0.52	0.00	0.50	0.50	3,856
Uncertain Rating	0/1	0.20	0.40	0.00	0.00	0.00	3,856
Assets	$ bn	25.58	183.59	1.66	3.41	8.18	1,707
Small	0/1	0.25	0.43	0.00	0.00	0.50	1,707
Private	0/1	0.56	0.50	0.00	1.00	1.00	3,920
Bank-Firm Relationship	0/1	0.66	0.47	0.00	1.00	1.00	3,788
Panel C: Loan-CLO Manager Level							
$\mathbb{1}\{\text{Participation} > 0\}$	0/1	0.24	0.43	0.00	0.00	0.00	482,208

Table 1. Summary Statistics *(continued)*

Variable	Unit	Mean	Std. Dev.	p25	p50	p75	Obs.
Participation$^+$	$ mn	7.84	10.48	1.99	4.16	9.47	116,376
$\mathbb{1}\{\text{Prior Holding} > 0\}$	0/1	0.29	0.45	0.00	0.00	1.00	482,208
Prior Holding$^+$	$ mn	11.20	15.24	2.81	5.94	13.40	138,152
Manager-Bank-Firm (Liab.)	0/1	0.07	0.25	0.00	0.00	0.00	395,182
Manager-Bank-Firm (Asset)	0/1	0.19	0.39	0.00	0.00	0.00	465,845

This table summarizes variables used in the subsequent analysis. The sample period begins in January 2010 and ends in December 2021. Panel A contains descriptive statistics for variables at the loan level. Loan terms stem from Loan Connector if available and LPC Collateral otherwise. Panel B contains descriptive statistics for variables at the deal level. Panel C contains descriptive statistics for variables at the loan-CLO manager level. *Participation*$^+$ and *Prior Holding*$^+$ refer to the positive part of *Participation* and *Prior Holding*, respectively. Constructed variables are defined in Appendix A.

Table 2. CLO Manager Market Power and Loan Spreads

	Prior Holding	Spread			
	(1)	(2)	(3)	(4)	(5)
Prior Holding		0.549***	0.476***	0.651***	1.304***
		(0.130)	(0.126)	(0.192)	(0.327)
Prior Holding (Merger)	0.556***				
	(0.078)				
Estimation	OLS	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	–	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	–	Yes
Borrower FE	Yes	Yes	Yes	Yes	–
Manager-Quarter FE	–	–	Yes	–	–
Loan Controls	Yes	Yes	Yes	–	Yes
Observations	132,912	132,912	138,080	132,912	132,924
R^2	0.586	0.878	0.848	0.653	0.743
Cragg-Donald F-statistic	1,561				

This table examines CLO managers' market power to affect loan spreads and displays results from the estimation of

$$Spread_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. The sample includes institutional loans issued between January 2010 and December 2021, which have recorded primary market purchases by CLOs. For any loan, the set of CLO managers contains those with positive $Prior\ Holding_{f(l)m}$. Columns two to five present two-stage least squares (2SLS) estimates with $Prior\ Holding\ (Merger)_{f(l)m}$ serving as excluded instrument for $Prior\ Holding_{f(l)m}$. Column one presents the first-stage of the model estimated in Column two and the corresponding Cragg-Donald F-statistic. Controls include manager-industry-quarter, $\mu_{mi(l)t(l)}$, rating-quarter, $\rho_{r(l)t(l)}$, and borrowing firm, $\phi_{f(l)}$, fixed effects (FE). Included loan controls, X_l, are $\ln Loan\ Amount_l$, $\ln Maturity_l$, $Cov\text{-}lite_l$, $Secured_l$, $First\ Lien_l$, $Sponsored_l$, $CLO\ Share_l$, and a set of loan purpose fixed effects, $Loan\ Purpose_{p(l)}$. Constructed variables are defined in Appendix A. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 3. CLO Manager Market Power and Non-Spread Price Terms

	OID	Effective Yield	Soft Call Premium	Soft Call Period	Underpricing
	(1)	(2)	(3)	(4)	(5)
Prior Holding	0.404***	0.714***	0.175***	0.034***	0.580***
	(0.137)	(0.168)	(0.055)	(0.009)	(0.189)
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes	Yes
Observations	108,857	108,857	104,571	104,571	73,302
R^2	0.812	0.908	0.814	0.818	0.749
First-Stage Estimates					
Prior Holding (Merger)	0.530***	0.530***	0.521***	0.543***	0.543***
	(0.082)	(0.082)	(0.091)	(0.083)	(0.083)
Cragg-Donald F-statistic	1,118	1,118	662	1,130	1,130

This table examines CLO managers' market power to affect price terms other than a loan's spread. Displayed results are estimates of the model

$$y_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. Sample construction and independent variables match those described in Table 2. The outcome variables, y_l, include the loan price terms OID_l (original issue discount), $Effective\ Yield_l$, $Underpricing_l$, $Soft\ Call\ Premium_l$, and $Soft\ Call\ Period_l$. All columns present two-stage least squares (2SLS) estimates with $Prior\ Holding\ (Merger)_{f(l)m}$ serving as excluded instrument for $Prior\ Holding_{f(l)m}$. Cragg-Donald $F-$statistics, and first-stage coefficient and standard error estimates of the instrument, are reported below their 2SLS counterparts. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 4. CLO Manager Market Power and Non-Price Loan Terms

	ln (Loan Amount) (1)	Maturity (2)	Cov-lite × 100 (3)	First Lien × 100 (4)
Prior Holding	0.002	-0.028	0.109*	-0.010
	(0.001)	(0.029)	(0.064)	(0.047)
Estimation	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes
Observations	132,912	132,912	132,912	132,912
R^2	0.760	0.686	0.786	0.588
First-Stage Estimates				
Prior Holding (Merger)	0.556***	0.556***	0.556***	0.556***
	(0.078)	(0.078)	(0.078)	(0.078)
Cragg-Donald F-statistic	1,561	1,561	1,561	1,561

This table examines CLO managers' market power to affect a loan's non-price terms. Displayed results are estimates of the model

$$y_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. Sample construction and independent variables match those described in Table 2. The outcome variables, y_l, include the loan terms ln *Loan Amount*$_l$, ln *Maturity*$_l$, *Cov-lite*$_l$, and *First Lien*$_l$. A column's outcome variable is excluded from the vector of loan controls. The indicators *Cov-lite*$_l$ and *First Lien*$_l$ are scaled by a factor of 100. All columns present two-stage least squares (2SLS) estimates with *Prior Holding (Merger)*$_{f(l)m}$ serving as excluded instrument for *Prior Holding*$_{f(l)m}$. Cragg-Donald $F-$statistics, and first-stage coefficient and standard error estimates of the instrument, are reported below their 2SLS counterparts. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 5. Characteristics of CLO Managers involved in Mergers

Variable	Unit	Merger Target	Target Candidate	Acquirer
Panel A: CLOs				
No. CLOs		5.80	5.19	11.42
No. Active CLOs		4.40	4.03	9.19
No. CLOs in Warehouse		0.30	0.48	1.42
Panel B: Asset Portfolio				
No. Loans		312.56	311.69	481.00
No. Borrowers		234.33	231.83	343.38
Max. Loan Exposure	%	1.56	1.45	1.19
Max. Borrower Exposure	%	1.79	1.75	1.58
Avg. Rating		13.54	13.70	13.72
Portfolio Overlap (Loan-Level)	%	35.88	37.62	100.00
Portfolio Overlap (Issuer-Level)	%	41.29	43.80	100.00
Panel C: CLO Characteristics				
Cost of Debt	%	1.90	1.77	1.43
Leverage Ratio	%	80.32	81.68	78.08
Junior Fee	bps	30.67	30.76	29.73
Senior Fee	bps	17.01	16.79	16.96
Time Since Issue	months	58.45	57.83	49.49
Remaining Reinvestment Period	months	23.86	16.45	26.12
Maturity	months	97.10	100.21	112.19
Portfolio Size	$ mn	387.99	382.49	447.63

This table compares the characteristics of CLO managers who are acquisition targets to other CLO managers. For each acquisition the target candidates set contains CLO managers, other than target and acquirer, that manage between half and double the number of CLOs as the target. An acquisition's target candidate value corresponds to median variable value in the target candidate set. The columns *Merger Target*, *Target Candidate*, *Acquirer* display the average variable values taken over the sample mergers. All variable values are measured in the quarter preceding merger announcement. *No. Loans* and *No. Borrowers* capture the total number of distinct loans and borrowers in a CLO manager's portfolio respectively. *Max. Loan Exposure* and *Max. Borrower Exposure* refer to the largest portfolio weight by loan and borrower in a CLO manager's asset portfolio. *Time Since Issue* captures the number of months that have passed since a CLO's closing date. Other variables are defined in Table 6 and Table 8.

Table 6. CLO Manager Mergers and Manager-Level Portfolio Similarity

	Target			
	Total Portfolio		Sample	
Match Level	Issuer	Loan	Issuer	Loan
	(1)	(2)	(3)	(4)
Portfolio Overlap	0.023	0.029	0.032	0.042
	(0.038)	(0.045)	(0.043)	(0.050)
Merger FE	Yes	Yes	Yes	Yes
CLO Manager Controls	Yes	Yes	Yes	Yes
Observations	1,960	1,960	1,960	1,960
R^2	0.015	0.015	0.015	0.015

This table examines acquisition target's portfolio similarity with the acquirer and displays results from the estimation of

$$Target_{am} = \beta Portfolio\ Overlap_{am} + \alpha_a + \kappa X_{mt(a)} + \varepsilon_{am}.$$

The unit of observation is at the merger-manager (am) level. For each sample merger the sample includes the target CLO manager and CLO managers contained in the target candidate set as defined in Table 5. The dependent variable, $Target_{am}$, is an indicator that identifies the target. All variables are measured prior to merger announcement. Columns one and two consider the total asset portfolios while Columns three and four consider only the subset of sample loans. All estimates are obtained using ordinary least squares (OLS). Controls include merger fixed effects (FE), α_a. CLO manager controls, $X_{mt(a)}$, include the log of the manager's total managed assets, ln *Managed Assets*$_{mt(a)}$, the log of the manager's number of CLOs, ln *No. CLOs*$_{mt(a)}$, the log of one plus the manager's number of CLO's in warehouse, ln(1 + *No. CLOs in Warehouse*), the par-value weighted *Median Rating* of portfolio assets, *Avg. Rating*, the par value-weighted fraction of assets with *Median Rating* of CCC or lower, *Fraction CCC Bucket*$_{mt(a)}$, the par value-weighted fraction of asset in default *Fraction Defaulted*$_{mt(a)}$, the par value-weighted fraction of loans classified as middle market, and the par value-weighted fraction of assets invested in structured finance securities *Fraction Structured Finance Securities*$_{mt(a)}$. All other included variables are defined in Table 5. Standard errors are two-way clustered at the merger and the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 7. CLO Manager Mergers and Within-Portfolio Similarity

Match Level	Target			
	Issuer		Loan	
	(1)	(2)	(3)	(4)
$-1 \times \left\lvert w - w^{\text{Acq.}} \right\rvert$	-0.012	-0.006	-0.019	-0.021
	(0.038)	(0.043)	(0.037)	(0.042)
Merger FE	Yes	–	Yes	–
Merger-Issuer FE	–	Yes	–	–
Merger-Loan FE	–	–	–	Yes
CLO Manager Controls	Yes	Yes	Yes	Yes
Observations	467,706	458,273	611,751	589,016
R^2	0.014	0.093	0.015	0.108

This table examines the loan portfolio similarity of CLO managers involved in mergers and displays results from the estimation of

$$Target_{am} = \beta \left(-1 \times \left| w_{ami} - w_{ai}^{Acq.} \right| \right) + \alpha_{ai} + \kappa X_{mt(a)} + \varepsilon_{ami}.$$

The unit of observation is at the merger-manager-issuer (ami) and merger-manager-loan level for Columns one to two and three to four, respectively. The merger-CLO manager sample is identical to that of Table 6. For columns one to two, the sample includes all issuers for which the CLO manager holds any loan. For columns three to four, the sample includes all loans in the issuers asset portfolio. w_{ami} captures the portfolio weight of issuer or loan i in a CLO manager's total asset portfolio. $w_{ai}^{Acq.}$ captures the portfolio weight of issuer or loan i in the acquirer's total asset portfolio. All estimates are obtained using ordinary least squares (OLS). Controls include either merger, α_i, or merger-issuer/loan, α_{ai}, fixed effects (FE). All other included variables are as in Table 6. Standard errors are clustered at the merger-CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 8. CLO Manager Mergers and CLO Characteristics

	Target		
	(1)	(2)	(3)
Leverage Ratio	-0.040***		
	(0.009)		
Cost of Debt (in %)		0.004**	
		(0.002)	
ln (Junior Fee)			-0.005**
			(0.002)
ln (Senior Fee)			-0.003
			(0.003)
Vintage-Merger FE	Yes	Yes	Yes
Target Candidate FE	Yes	Yes	Yes
CLO Controls	Yes	Yes	Yes
CLO Manager Controls	Yes	Yes	Yes
Observations	8,604	3,364	5,681
R^2	0.253	0.269	0.251

This table examines the fee and funding characteristics of CLOs involved in mergers and displays results from the estimation of

$$\textit{Target}_{ac} = \beta \textit{Funding/Fee Characteristics}_{ac} + \kappa_1 X_{ct(a)} + \kappa_2 X_{m(c)t(a)} + \upsilon_{v(c)a} + \mu_{m(a,c} + \varepsilon_{ac}.$$

The unit of observation is at the merger-CLO (ac) level. Merger and target candidate sample for the period 2009 to 2019 are constructed analogously to Table 6. For each merger-target candidate the sample contains all outstanding CLOs managed by the target candidate at the time of merger announcement. The dependent variable, $\textit{Target}_{ac}$, indicates CLOs of the realized target manager with a value of one and takes on the value zero otherwise. All independent variables are measured prior to merger announcement. $\ln(\textit{Junior Fee})_c$ and $\ln(\textit{Senior Fee})_c$ are the logarithm of a given CLO's junior and senior fees in basis points. $\textit{Leverage Ratio}_{ct(a)}$ is the ratio of a CLO's equity to the sum of its outstanding debt and equity. $\textit{Cost of Debt (in \%)}_{ct(a)}$ is the average spread on a CLO's debt tranches weighted by the their outstanding par amount in %. Controls include vintage-merger, $\upsilon_{v(c)a}$, and target candidate fixed effects (FE), $\mu_{m(a,c)}$. A CLO's vintage refers to its year of issue. Included CLO controls, $X_{ct(a)}$ are as follows: $\ln \textit{CLO Assets}_{ct(a)}$, the logarithm of the CLO's total assets, $\ln(1 + \textit{Remaining Active Quarters})_{ct(a)}$, the logarithm of one plus the the number of quarters until a CLO's reinvestment end date, $\textit{Reinvestment Period}_{ct(a)}$, an indicator that equals one if the CLO is active, $\ln(1 + \textit{Quarters to Maturity})_{ct(a)}$, the logarithm of one plus the number of quarters until a CLO's legal maturity date, $\textit{Callable}_{ct(a)}$, an indicator that equals one if the CLO is callable at merger announcement, $\textit{Fraction CCC Bucket}_{ct(a)}$, the fraction of a CLO's assets rated CCC or below, $\textit{Fraction Defaulted}_{ct(a)}$, the CLO's fraction of assets in default, and $\textit{Fraction Structured Finance Security}_{ct(a)}$, the fraction of assets invested in structured finance security. Target candidate controls, $X_{m(c)t(a)}$, equal those of Table 6. Standard errors are clustered at the merger-CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 9. Lending Persistence of CLO Managers

	$\mathbb{1}\{\text{Participation} > 0\}$			$\ln(1 + \text{Participation})$	
	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}\{\text{Prior Holding} > 0\}$	0.493***	0.550***	0.303***		
	(0.006)	(0.006)	(0.009)		
$\ln(1 + \text{Prior Holding})$			0.100***	0.501***	0.570***
			(0.003)	(0.005)	(0.006)
Loan FE	Yes	Yes	Yes	Yes	Yes
Manager-Quarter FE	Yes	Yes	Yes	Yes	Yes
Observations	482,208	337,169	482,208	482,208	337,169
R^2	0.436	0.469	0.447	0.525	0.561
Sample Restrictions					
No. Loans > 1	–	Yes	–	–	Yes

This table examines the persistence of CLO manager lending and displays results from the estimation of

$$Participation^{M}_{lm} = \beta Prior\ Holding^{M}_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}.$$

The unit of observation is at the loan - manger (lm) level. The loan sample is identical to that of Table 2. In Columns two and five, I further restrict the loan sample to loans, which are in deals with a single institutional loan (*No. Loans* = 1). For a given loan l an observation corresponds to a CLO manager m with an active CLO two quarters prior to the loan's effective date. The margin identifier, M, takes a value in $\{Ext., Int.\}$. For $M = Ext.$, I let $Participation^{Ext.}_{lm} = \mathbb{1}\{Participation_{lm} > 0\}$ and $Prior\ Holding^{Ext.}_{lm} = \mathbb{1}\{Prior\ Holding_{lm} > 0\}$. For $M = Int.$, I define $Participation^{Int.}_{lm} = \ln(1 + Participation_{lm})$ and $Prior\ Holding^{Int.}_{lm} = \ln(1 + Prior\ Holding_{lm})$. All estimates are obtained using ordinary least squares (OLS). Controls include loan, λ_l, and manager-quarter, $\mu_{mt(l)}$, fixed effects (FE). Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 10. Relationships and Lending Persistence

	Participation					
Relationship Indicator =	Manager-Bank-Firm (Liab.)		Manager-Bank-Firm (Assets)		Bank-Firm	
Extensive/Intensive Margin	Ext.	Int.	Ext.	Int.	Ext.	Int.
	(1)	(2)	(3)	(4)	(5)	(6)
Prior Holding × Relationship	0.054***	0.048***	0.155***	0.121***	0.118***	0.096***
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Prior Holding	0.497***	0.510***	0.408***	0.445***	0.427***	0.458***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Loan FE	Yes	Yes	Yes	Yes	Yes	Yes
Manager-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	395,182	395,182	395,182	395,182	395,182	395,182
R^2	0.446	0.538	0.450	0.541	0.448	0.539

This table examines the influence of relationships on the persistence of CLO manager lending and displays results from the estimation of

$$Participation^{M}_{lm} = \beta_1 Prior\ Holding^{M}_{f(l)m} \times Relationship_{f(l)m} + \beta Prior\ Holding^{M}_{f(l)m} + \beta_3 Relationship_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}.$$

The unit of observation is at the loan - manger (lm) level. The is the subset of that described in Table 9 corresponding to loans that become effective before January 2020. Variable are defined as in Table 9 and Appendix A. Odd columns display results for $M = Ext.$ and even columns display results for $M = Int.$. All estimates are obtained using ordinary least squares (OLS). Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 11. Information Asymmetries and Lending Persistence

	Participation					
Opacity Indicator =	Small		Uncertain Rating		Private	
Extensive/Intensive Margin	Ext.	Int.	Ext.	Int.	Ext.	Int.
	(1)	(2)	(3)	(4)	(5)	(6)
Prior Holding × Opacity	0.020***	0.038***	0.007*	0.011***	-0.012***	-0.010***
	(0.007)	(0.007)	(0.004)	(0.003)	(0.004)	(0.003)
Prior Holding	0.490***	0.497***	0.492***	0.499***	0.500***	0.506***
	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)
Loan FE	Yes	Yes	Yes	Yes	Yes	Yes
Manager-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	199,378	199,378	474,336	474,336	482,208	482,208
R^2	0.456	0.547	0.437	0.526	0.437	0.525

This table examines the influence of information asymmetries on the persistence of CLO manager lending and displays results from the estimation of

$$Participation^{M}_{lm} = \beta_1 Prior\ Holding^{M}_{f(l)m} \times Opacity_{f(l)m} + \beta Prior\ Holding^{M}_{f(l)m} + \beta_3 Opacity_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}.$$

The unit of observation is at the loan - manger (lm) level. The sample is identical to that described in Table 9. Variable are defined as in Table 9 and Appendix A. Odd columns display results for $M = Ext.$ and even columns display results for $M = Int.$. All estimates are obtained using ordinary least squares (OLS). Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table 12. CLO Manager Market Power and Information Asymmetries

	Spread			
	(1)	(2)	(3)	(4)
Prior Holding	0.621**	0.496***	0.816***	0.527**
	(0.283)	(0.145)	(0.233)	(0.210)
Prior Holding × Small	1.710*			1.679*
	(1.018)			(0.944)
Prior Holding × Uncertain Rating		0.389*		0.773**
		(0.209)		(0.391)
Prior Holding × Private			-0.461	
			(0.369)	
Estimation	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes
Observations	59,346	132,203	132,912	59,281
R^2	0.916	0.877	0.878	0.914
First-Stage Estimates				
Cragg-Donald F-statistic	227	565	783	148
Sample Restrictions				
Public Borrower	Yes	–	–	Yes
No. Ratings > 1	–	Yes	–	Yes

This table examines the impact of information asymmetries on CLO managers' market power and displays results from the estimation of

$$Spread_l = \beta_1 Prior\ Holding_{f(l)m} + \beta_2 Prior\ Holding_{f(l)m} \times Opacity_{f(l)} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. The sample construction follows that described in Table 2 with the additional restrictions that borrowers have disclosed public information (*Public Borrower*) or that borrowers have credit ratings from multiple rating agencies (*No. Ratings* > 1). These additional restrictions are imposed only where necessary. $Opacity_{f(l)}$ definitions follow Table 11 and other variable definitions are identical to those in Table 2. All columns present two-stage least squares (2SLS) estimates. $Prior\ Holding\ (Merger)_{f(l)m}$ and $Prior\ Holding\ (Merger)_{f(l)m} \times Opacity_{f(l)}$ serve as excluded instruments for $Prior\ Holding_{f(l)m}$ and $Prior\ Holding_{f(l)m} \times Opacity_{f(l)}$. Cragg-Donald $F-$statistics are reported below their corresponding 2SLS results. First-stage estimates are presented in Table C10. I add $Opacity_{f(l)}$ variables that appear in interaction terms to the loan controls listed in Table 2. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Appendices

Appendix A Variable Definitions

Effective Yield. $\textit{Effective Yield} = \textit{Spread} + \frac{\textit{Original Issue Discount}}{4}$, following Bruche et al. (2020).

Soft Call Period. Number of months from a loan's effective date to the first day at which the loan can be called at par.

Soft Call Premium. The premium over par that a loan issuer has to pay in order to call a loan before the end of the soft call period. If the soft call premium varies over time, I record the first soft call premium following issuance.

Break Price. A loan's trade price in its first non-internal loan sale of a CLO manager within the first 183 days of the loan being effective. I classify a CLO manager's sale as internal if another CLO of that manager purchases the same loan within the next 183 days. Trade prices are recorded as $ price per $100 face value of a loan.

Break Price − Par. $100 \times (\textit{Break Price} - 100)$.

Underpricing. $\textit{Underpricing} = \textit{Break Price} - (\textit{Par} - \textit{Original Issue Discount})$, following Bruche et al. (2020).

Number of Loans *(No. Loans)***.** The number of institutional term loans in a deal.

Total Amount. The sum of loan amounts of institutional term loans in a deal.

Number of Loans Outstanding *(No. of Loans Outst.)***.** The number of sample loans outstanding two quarters prior to a deal becoming effective.

Total Amount Outstanding *(Total Amount Outst.)***.** The total loan amount of sample loans outstanding two quarters prior to a deal becoming effective.

Has Moody's/S&P/Fitch Rating. Indicator that equals one if the borrower has a credit rating from Moody's/S&P/Fitch Rating two quarters prior to a deal becoming effective.

Median Rating. I transfer ratings recorded by CLOs into numeric scores following Becker and Milbourn (2011). I reproduce their conversion table in Table A1. A borrower's agency rating at the end of each quarter is calculated as the median recorded rating from any of the three large credit rating agencies on first lien loans by that borrower. Median Rating is the median rating of a borrower's three agency ratings, rounded to the closest rating notch, two quarters prior to a new deal becoming effective.

Rating Dispersion. Average absolute distance of available agency ratings from their average. This measure is only calculated if two or more ratings are available.

Uncertain Rating. Indicator that equals one if the deal's rating dispersion is inside the fourth quartile.

Assets. The last recorded total assets in public filings of the borrower in the period two quarters to six quarters before a deal becomes effective.

Small. Indicator that equals one if the borrower's total assets are in the first quartile by deals with this information available.

Private. Indicator that equals one if the borrower filed public statements two quarters to six quarters before a deal becomes effective.

Bank-Firm Relationship. Indicator that equals one if an arranging bank for a loan also acted as arranging bank for any of the borrower's other sample loan that are outstanding two quarters before the new loan becomes effective.

Participation. A CLO manager's participation in a new loan measured as the CLO manager's total holding in the new loan one quarter after that loan becomes effective.

Prior Holding. A CLO manager's total holding in a borrower's loans that are outstanding two quarters prior to a new deal becoming effective.

Manager-Bank-Firm (Liab.). Indicator that equals one if a loan's arranging bank both is (1) a relationship bank of the borrowing firm as defined by *Bank-Firm Relationship*, and (2) has a CLO liability-side relationship with the CLO manager. A bank and a CLO manager are defined to have a liability-side relationship if the arranging bank underwrote at least one of the CLO manager's active CLOs for this CLO manager.

Manager-Bank-Firm (Asset). Indicator that equals one if a loan's arranging bank both is (1) a relationship bank of the borrowing firm as defined by *Bank-Firm Relationship*, and (2) has an asset-side relationship with the CLO manager. A CLO manager and an arranging bank on a loan are defined to have an asset-side relationship if two quarters before this loan becomes effective the CLO manager holds an outstanding loan of the borrower for which the arranging bank also acted as arranging bank.

Table A1. Numeric Rating Scores

Value	S&P	Fitch	Moody's	Category
28	AAA	AAA	Aaa	Investment Grade
26	AA+	AA+	Aa1	
25	AA	AA	Aa2	
24	AA−	AA−	Aa3	
23	A+	A+	A1	
22	A	A	A2	
21	A−	A−	A3	
20	BBB+	BBB+	Baa1	
19	BBB	BBB	Baa2	
18	BBB−	BBB−	Baa3	
17	BB+	BB+	Ba1	Non-Investment Grade
16	BB	BB	Ba2	
15	BB−	BB−	Ba3	
14	B+	B+	B1	
13	B	B	B2	
12	B−	B−	B3	
11	CCC+	CCC+	Caa1	
10	CCC	CCC	Caa2	
9	CCC−	CCC−	Caa3	
7	CC	CC	Ca	
4	C	C		
0	SD	RD	C	Default
0	D	D		

This table presents an adjusted version of Becker and Milbourn (2011)'s translation of S&P, Fitch and Moody's credit ratings into numeric values. The S&P rating category "SD" and the Fitch rating category "RD", each indicating selective default, have been added. Following definitions in Standard & Poor's (2016) and Moody's (2020), I reclassify the Moody's rating "C" to indicate default corresponding to a numerical value of 0.

Appendix B Figures

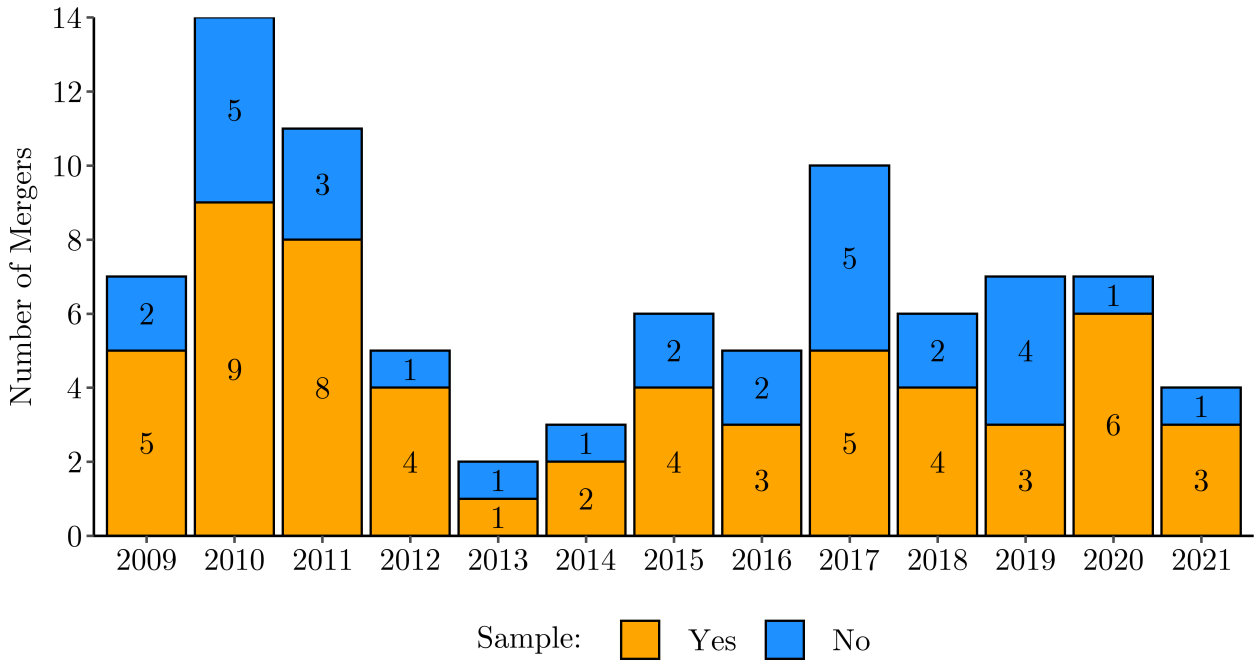

Figure B.1. Mergers in the U.S. CLO Industry in the Years 2009 to 2021: Sample Breakdown

This figure plots the number of merger and acquisition events in the U.S. CLO industry in a given year for the period 2009 to 2021. A merger is considered to be in the U.S. CLO industry if the acquisition target has a U.S. CLO manager business. Merger events are recorded in the year in which the they become effective. The orange bars display the annual count of merger events that are used in the instrument construction, while the blue bars count any non-included merger events.

Appendix C Tables

Table C2. Lending Persistence of CLO Managers: Refinanced Loans

	$\mathbb{1}\{\text{Participation} > 0\}$			$\ln(1 + \text{Participation})$	
	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}\{\text{Prior Holding} > 0\}$	0.338***	0.365***	0.178***		
	(0.006)	(0.007)	(0.008)		
$\mathbb{1}\{\text{Refinanced Prior Holding} > 0\}$	0.218***	0.265***	0.185***		
	(0.005)	(0.006)	(0.008)		
$\ln(1 + \text{Prior Holding})$			0.088***	0.316***	0.338***
			(0.003)	(0.006)	(0.007)
$\ln(1 + \text{Refinanced Prior Holding})$			0.013***	0.267***	0.343***
			(0.004)	(0.005)	(0.006)
Loan FE	Yes	Yes	Yes	Yes	Yes
Manager-Quarter FE	Yes	Yes	Yes	Yes	Yes
Observations	482,208	337,169	482,208	482,208	337,169
R^2	0.446	0.484	0.456	0.542	0.588
Sample Restrictions					
No. Loans > 1	–	Yes	–	–	Yes

This table reexamines the results of Table 9 by distinguishing between CLO managers' holdings of a borrower that are refinanced and those that are not refinanced. Displayed results are estimates of the model

$$\textit{Participation}^{M}_{lm} = \beta_1 \textit{Prior Holding}^{M}_{f(l)m} + \beta_2 \textit{Refinanced Prior Holding}^{M}_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}.$$

The unit of observation is at the loan - manger (lm) level. The sample and its restrictions are identical to those described in Table 9. For $M = \textit{Ext.}$, I let $\textit{Refinanced Prior Holding}^{\textit{Ext.}}_{lm} = \mathbb{1}\{\textit{Refinanced Prior Holding}_{lm} > 0\}$ and for $M = \textit{Int.}$, I let $\textit{Refinanced Prior Holding}^{\textit{Int.}}_{lm} = \ln(1 + \textit{Refinanced Prior Holding}_{lm})$. Other variable definitions match those described in Table 9. All estimates are obtained using ordinary least squares (OLS). Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C3. CLO Manager Market Power and Loan Pricing: Ordinary Least Squares

	Spread			
	(1)	(2)	(3)	(4)
Prior Holding	0.044***	0.038**	-0.042	0.389***
	(0.016)	(0.015)	(0.026)	(0.061)
Estimation	OLS	OLS	OLS	OLS
Manager-Industry-Quarter FE	Yes	–	Yes	Yes
Rating-Quarter FE	Yes	Yes	–	Yes
Borrower FE	Yes	Yes	Yes	–
Manager-Quarter FE	–	Yes	–	–
Loan Controls	Yes	Yes	–	Yes
Observations	132,912	138,080	132,912	132,924
R^2	0.879	0.849	0.655	0.746

This table reexamines the two-stage least squares (2SLS) results of Table 2 and Table 3 using ordinary least squares (OLS). Table 2 and Table 3 investigates CLO managers' market power to affect loan pricing. Displayed results are estimates of the model

$$y_l = \beta \textit{Prior Holding}_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. Sample construction and independent variables match those described in Table 2 and Table 3. All columns present OLS estimates. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C4. CLO Manager Market Power and Loan Pricing: No Borrower Fixed Effects

	OID	Effective Yield	Soft Call Premium	Soft Call Period	Underpricing
	(1)	(2)	(3)	(4)	(5)
Prior Holding	1.222***	1.911***	0.252***	0.054***	1.040***
	(0.398)	(0.501)	(0.090)	(0.019)	(0.326)
Estimation	2SLS	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes	Yes
Observations	108,867	108,867	104,581	104,581	73,306
R^2	0.613	0.781	0.706	0.679	0.482
First-Stage Estimates					
Prior Holding (Merger)	0.549***	0.549***	0.547***	0.561***	0.561***
	(0.079)	(0.079)	(0.089)	(0.080)	(0.080)
Cragg-Donald F-statistic	1,194	1,194	724	1,202	1,202

This table reexamines the results of Table 2 without borrower fixed effects. Table 2 investigates CLO managers' market power to affect loan spreads. Displayed results are estimates of the model

$$Spread_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. Sample construction and independent variables match those described in Table 2. All columns present two-stage least squares (2SLS) estimates with $Prior\ Holding\ (Merger)_{f(l)m}$ serving as excluded instrument for $Prior\ Holding_{f(l)m}$. Cragg-Donald $F-$statistics, and first-stage coefficient and standard error estimates of the instrument, are reported below their 2SLS counterparts. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C5. CLO Manager Market Power and Loan Spreads: Sample Definition

	Spread			
	(1)	(2)	(3)	(4)
Prior Holding	0.549***	0.476***	0.506***	0.502***
	(0.130)	(0.169)	(0.126)	(0.097)
Estimation	2SLS	2SLS	2SLS	2SLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes
Observations	132,912	79,849	110,534	479,445
R^2	0.878	0.870	0.863	0.881
First-Stage Estimates				
Prior Holding (Merger)	0.556***	0.584***	0.646***	0.772***
	(0.078)	(0.083)	(0.076)	(0.067)
Cragg-Donald F-statistic	1,561	1,041	1,483	7,317
Sample Restrictions				
Prior Holding > 0	Yes	Yes	–	–
Participation > 0	–	Yes	Yes	–

This table reexamines the results of Table 2 for different sample definitions. Table 2 investigates CLO managers' market power to affect loan spreads. Displayed results are estimates of the model

$$Spread_l = \beta Prior\ Holding_{f(l)m} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. The included variables match those in Table 2. The sample includes institutional loans issued between January 2010 and December 2021, which have recorded primary market purchases by CLOs. Column four includes all CLO managers with active CLOs two quarters prior to a loan's effective date. Columns one and two additionally require CLO managers to have positive $Prior\ Holding_{f(l)m}$ ($Prior\ Holding_{f(l)m} > 0$). Columns two and three require CLO manager to also participate in the loan issue ($Participation_{lm} > 0$). The model of estimation of Column one is identical to those in Table 2's Column two. All columns present two-stage least squares (2SLS) estimates with $Prior\ Holding\ (Merger)_{f(l)m}$ serving as excluded instrument for $Prior\ Holding_{f(l)m}$. Cragg-Donald $F-$statistics, and first-stage coefficient and standard error estimates of the instrument, are reported below their 2SLS counterparts. Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C6. CLO Manager Mergers and Within-Portfolio Similarity: Sample Loans

	Target			
	Total Portfolio		Sample	
	(1)	(2)	(3)	(4)
$-1 \times \left\lvert w - w^{\text{Acq.}} \right\rvert$	-0.019	-0.021	-0.028	0.021
	(0.019)	(0.022)	(0.018)	(0.032)
Merger FE	Yes	–	Yes	–
Merger-Loan FE	–	Yes	–	Yes
CLO Manager Controls	Yes	Yes	Yes	Yes
Observations	611,751	589,016	568,594	551,750
R^2	0.015	0.108	0.015	0.105

This table reexamines the results of Table 7 for the subset of loans that are employed in the sample used in Table 2.

$$Target_{am} = \beta \left(-1 \times \left| w_{ami} - w_{ai}^{Acq.} \right| \right) + \alpha_{ai} + \kappa X_{mt(a)} + \varepsilon_{ami}.$$

The unit of observation is at the merger-manager-issuer (ami) and merger-manager-loan level for Columns one to two and three to four, respectively. The sample restricts that of Table 7 to institutional loans that are used in the sample of Table 2. For columns one to two, the sample includes all issuers for which the CLO manager holds any loan. For columns three to four, the sample includes all loans in the issuers asset portfolio. All variables follow the description in Table 7. All estimates are obtained using ordinary least squares (OLS). Standard errors are clustered at the merger-CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C7. Lending Persistence of CLO Managers: Level Specification

	$\mathbb{1}\{\text{Participation} > 0\}$			Participation	
	(1)	(2)	(3)	(4)	(5)
$\mathbb{1}\{\text{Prior Holding} > 0\}$	0.493***	0.550***	0.451***		
	(0.006)	(0.006)	(0.006)		
Prior Holding			0.005***	0.368***	0.429***
			(0.000)	(0.006)	(0.009)
Loan FE	Yes	Yes	Yes	Yes	Yes
Manager-Quarter FE	Yes	Yes	Yes	Yes	Yes
Observations	482,208	337,169	482,208	482,208	337,169
R^2	0.436	0.469	0.442	0.472	0.508
Sample Restrictions					
No. Loans > 1	–	Yes	–	–	Yes

This table reexamines the intensive margin results of Table 9 using level intensive margin variable definitions. Table 9 examines the persistence of CLO manager lending and displays results from the estimation of

$$Participation^{M}_{lm} = \beta Prior\ Holding^{M}_{f(l)m} + \lambda_l + \mu_{mt(l)} + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. The sample and its restrictions are identical to those described in Table 9. For $M = Int.$, I let $Participation^{Int.}_{lm} = Participation_{lm}$ and $Prior\ Holding^{Int.}_{lm} = Prior\ Holding_{lm}$. Other variable definitions match those described in Table 9. All estimates are obtained using ordinary least squares (OLS). Standard errors are clustered at the CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C8. CLO Manager Mergers: Target vs. Target Candidate CLO Refinancing

	CLO Refinanced/Called			
	(1)	(2)	(3)	(4)
Target × Post	0.020**	0.020**	0.020**	0.020**
	(0.008)	(0.008)	(0.008)	(0.009)
Target	-0.005**	-0.007***		
	(0.003)	(0.003)		
Quarter-Merger FE	Yes	–	–	–
Vintage-Quarter-Merger FE	–	Yes	Yes	Yes
Manager-Merger FE	–	–	Yes	–
CLO-Merger FE	–	–	–	Yes
CLO Controls	Yes	Yes	Yes	Yes
Observations	164,467	162,687	162,687	162,687
R^2	0.056	0.130	0.146	0.219

This table examines the rate at which target CLO managers refinance or call CLOs around merger events. Displayed results are estimates of the difference-in-differences model

$$\textit{CLO Refinanced/Called}_{atc} = \beta_1 \textit{Target}_{am(ac)} \times \textit{Post}_{at} + \beta_2 \textit{Target}_{ac} + \nu_{atv(ct)} + \mu_{am(ac)} + \varepsilon_{atc}.$$

The unit of observation is at the merger-quarter-CLO (atc) level. For each sample merger, the sample includes all CLOs managed by the target CLO manager or a CLO manager in the target candidate set that is outstanding before and after the merger becomes effective. For each merger-CLO there is one observation for each quarter in which the CLO is outstanding, but at most eight quarters before or after the merger becomes effective. For each merger each CLO is assigned to the CLO manager that managed the CLO in the quarter prior to the merger becoming effective. $\textit{CLO Refinanced/Called}_{atc}$ is an indicator that identifies CLOs that are refinanced or called in a given period. $\textit{Target}_{ac}$ is an indicator that identifies CLOs by the target CLO manager. $\textit{Post}_{at}$ is an indicator that identifies periods beginning with the quarter in which the merger becomes effective. Controls include merger-quarter-vintage, $\nu_{atv(ct)}$, and merger-CLO manager, $\mu_{am(ac)}$ fixed effects. A CLO's vintage ($v(ct)$) refers to the last year in which the CLO was issued or refinanced prior to a given quarter. Standard errors are clustered at the merger-CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C9. CLO Manager Mergers: Acquirer vs. Target Candidate CLO Refinancing

	CLO Refinanced/Called			
	(1)	(2)	(3)	(4)
Acquirer × Post × # Target Refi / # Acq. CLOs	-0.026***	-0.043***	-0.046***	-0.060***
	(0.008)	(0.011)	(0.012)	(0.015)
Acquirer × Post	-0.007	-0.005	-0.005	0.003
	(0.004)	(0.005)	(0.005)	(0.005)
Acquirer × # Target Refi / # Acq. CLOs	-0.018**	-0.001		
	(0.007)	(0.009)		
Acquirer	0.007***	0.008***		
	(0.002)	(0.002)		
Quarter-Merger FE	Yes	–	–	–
Vintage-Quarter-Merger FE	–	Yes	Yes	Yes
Manager-Merger FE	–	–	Yes	–
CLO-Merger FE	–	–	–	Yes
CLO Controls	Yes	Yes	Yes	Yes
Observations	130,419	128,900	128,900	128,900
R^2	0.061	0.143	0.158	0.225

This table examines the rate at which acquirer CLO managers refinance or call CLOs around merger events. Displayed results are estimates of the difference-in-differences model

$$\textit{CLO Refinanced/Called}_{atc} = \beta_1 \textit{Acquirer}_{am(ac)} \times \textit{Post}_{at} \times \frac{\textit{\# Target Refi}}{\textit{\# Acq. CLOs}}_{at} + \beta_2 \textit{Acquirer}_{am(ac)} \times \textit{Post}_{at} + \beta_3 \textit{Acquirer}_{am(ac)} \times \frac{\textit{\# Target Refi}}{\textit{\# Acq. CLOs}}_{at} + \beta_4 \textit{Acquirer}_{am(ac)} + \nu_{atv(ct)} + \mu_{am(ac)} + \varepsilon_{atc}.$$

The unit of observation is at the merger-quarter-CLO (atc) level. For each sample merger, the sample includes all CLOs that are outstanding before and after the merger becomes effective, which are managed by the acquirer CLO manager or a CLO manager in the target candidate set. For each merger-CLO there is one observation per quarter in which the CLO is outstanding, but at most eight quarters before or after the merger becomes effective. For each merger each CLO is assigned to the CLO manager that managed the CLO in the quarter prior to the merger becoming effective. $\textit{CLO Refinanced/Called}_{atc}$ is an indicator that identifies CLOs that are refinanced or called in a given period. $\textit{Acquirer}_{ac}$ is an indicator that identifies CLOs by the acquirer CLO manager. $\textit{Post}_{at}$ is an indicator that identifies periods beginning with the quarter in which the merger becomes effective. $\frac{\textit{\# Target Refi}}{\textit{\# Acq. CLOs}}$ is the ratio of the the number of target CLOs refinanced in a period to the total number of CLOs managed by the acquirer. Controls include merger-quarter-vintage, $\nu_{atv(ct)}$, and merger-CLO manager, $\mu_{am(ac)}$ fixed effects. A CLO's vintage ($v(ct)$) refers to the last year in which the CLO was issued or refinanced prior to a given quarter. Standard errors are clustered at the merger-CLO manager level. Standard error estimates are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level, respectively.

Table C10. CLO Manager Market Power and Information Asymmetries: First-Stage

	Model: (1)		Model: (2)		Model: (3)	
	Prior Holding	Prior Holding × Small	Prior Holding	Prior Holding × Uncertain Rating	Prior Holding	Prior Holding × Private
	(1)	(2)	(3)	(4)	(5)	(6)
	Prior Holding	Prior Holding	Prior Holding	Prior Holding	Prior Holding	Prior Holding
Prior Holding (Merger)	0.493***	-0.017***	0.558***	-0.025	0.506***	-0.071***
	(0.076)	(0.006)	(0.070)	(0.016)	(0.073)	(0.027)
Prior Holding (Merger) × Small	-0.249***	0.535***				
	(0.073)	(0.120)				
Prior Holding (Merger) × Uncertain Rating			-0.021	0.684***		
			(0.100)	(0.218)		
Prior Holding (Merger) × Private					0.104	0.729***
					(0.073)	(0.124)
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
Manager-Industry-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59,346	59,346	132,203	132,203	132,912	132,912
R^2	0.638	0.637	0.587	0.562	0.586	0.580

Table C10. CLO Manager Market Power and Information Asymmetries: First-Stage *(continued)*

	Model: (4)		
	Prior Holding	Prior Holding × Small	Prior Holding × Uncertain Rating
	(1)	(2)	(3)
Prior Holding (Merger)	0.473***	-0.017***	-0.046***
	(0.058)	(0.006)	(0.015)
Prior Holding (Merger) × Small	-0.250***	0.535***	-0.045
	(0.076)	(0.120)	(0.060)
Prior Holding (Merger) × Uncertain Rating	0.089	-0.007	0.815**
	(0.266)	(0.013)	(0.313)
Estimation	OLS	OLS	OLS
Manager-Industry-Quarter FE	Yes	Yes	Yes
Rating-Quarter FE	Yes	Yes	Yes
Borrower FE	Yes	Yes	Yes
Loan Controls	Yes	Yes	Yes
Observations	59,281	59,281	59,281
R^2	0.638	0.637	0.617

This table provides first-stage results corresponding to Table 12. Table 12 examines the impact of information asymmetries on CLO managers' market power and displays results from the estimation of

$$Spread_l = \beta_1 Prior\ Holding_{f(l)m} + \beta_2 Prior\ Holding_{f(l)m} \times Opacity_{f(l)} + \mu_{mi(l)t(l)} + \rho_{r(l)t(l)} + \phi_{f(l)} + \kappa X_l + \varepsilon_{lm}.$$

The unit of observation is at the loan - CLO manager (lm) level. Sample and variable definitions are identical to those described in Table 12. Standard error estimates for standard errors clustered at the CLO manager level are reported in parenthesis below their corresponding point estimates. *, **, and *** denote statistical significance at the 10%-, 5%-, and 1%-level respectively.

Appendix D Diversification and Borrower Beliefs

In this appendix, I formalize the claim that from the perspective of an acquirer's private beliefs, diversification of CLO managers makes target candidates more similar.

Suppose there are N loans. Every CLO manager, including the acquirer, holds an equally-weighted portfolio of $M \leqslant N$ loans. Suppose that for the acquirer the other managers' loan portfolios appear random, with each loan being equally likely to appear in any given target candidate portfolio.

Let K capture the number of assets in a CLO manager's portfolio that appear in the acquirer's portfolio. Under the described setup, K follows a hypergeometric probability distribution. Thus,

$$\begin{aligned}\mathbb{E}[K] &= M\frac{M}{N} \\ \mathbb{V}[K] &= \left(1-\frac{M}{N}\right)^2 \frac{1}{N-1}.\end{aligned}$$

Hence, for the relative portfolio overlap with another CLO manager $O = \frac{K}{M}$, we have

$$\begin{aligned}\mathbb{E}[O] &= \frac{M}{N} \\ \mathbb{V}[O] &= \left(\frac{1}{M}-\frac{1}{N}\right)^2 \frac{1}{N-1}.\end{aligned}$$

Thus, for a fixed loan universe, N, an increase in portfolio diversification, M, increases the expected portfolio overlap with the acquirer's portfolio for all target candidates. Importantly, though, it also reduces the variability in overlap between different CLO managers (i.e., $\mathbb{V}[O(M+1)] - \mathbb{V}[O(M))] < 0$ for $M < N$).

Appendix E Institutional Setting

A syndicated loan is a loan that is provided by multiple lenders.[24] If a syndicated loan carries sub-investment-grade credit risk, it is called a leveraged loan. The arranger or arranging bank of a syndicated loan is the investment bank responsible for arranging and marketing the loan to other investors, which is also called the syndication. While going forward I will refer to a single such arranging bank, some loans have several.

Syndicated loans are further separated into two categories: bank loans and institutional loans. Bank loans, also called pro rata facilities, are predominantly sold to banks. These loans typically have either a significant contingent component, such as credit lines or letters of credit, or include amortizing repayment schedules.

In contrast, institutional loans are sold predominantly to investors. The largest institutional investor class in the leveraged loan market are CLOs, which account for two thirds of institutional loan holdings. Other institutional investors are loan mutual funds, distressed debt funds, hedge funds, pension funds, or insurance companies. Institutional term loans almost always are structured with bullet repayments. Institutional loans also typically have longer maturities than their bank loan counterparts. The most common institutional loan are so-called "Term Loan B." Usually Term Loan C, Term Loan D, and higher, are also referred to as Term Loan B.

A firm that wants to borrow in the syndicated loan market awards its mandate to the arranger, typically after having solicited bids from several banks. Prior to the arranger marketing the loan, borrower and arranger determine the binding underwriting agreement. This contract states most loan terms such as maturity, covenants, or collateral. Typically excluded are the loan's pricing features and sometimes the loan amount.

Whether the loan amount is a fixed contract feature depends on the syndication method. A loan is syndicated in one of three ways: as underwritten, best-effort, or club deal. Club deals are typically smaller and not part of my sample, and so I will not further describe them here. In a best-effort In an underwritten deal the arranger guarantees the loan amount to the borrower prior to syndication. This means that the arranging bank is contractually obligated to provide herself any difference between the loan amount and the amount raised from other investors. A best effort deal does

[24] For an excellent, in many parts similar, description of the underwriting process in the syndicated loan market, I refer the reader to Bruche et al. (2020). Further details are available in Hinckley et al. (2022)

not provide the same guarantee as an underwritten deal. Thus, such a deal may not close if undersubscribed or the loan may be more flexible with respect to the final loan amount.

A loan's main pricing features are the loan's spread and its original issue discount (OID). The spread of the vast majority of leveraged loans is a floating rate. The most common base rate in the U.S. used to be the London Interbank Offered Rate (LIBOR), but since its recent phase-out this has shifted to the Secured Overnight Funding rate (SOFR). The OID, which is also called "upfront fee", is the fraction of a loan's par value that is withheld as discount at issue. As I mentioned, the underwriting agreement does not typically fix the loan's pricing terms. Rather, they include so-called pricing flex provisions that allow the arranger to adjust price terms depending on the loan's market demand.

It is important to stress that the arranging banks incentives in a deal are very different from sole-lending banks. The arranging bank is hired as agent on behalf of the borrower to market the loan. However, in underwritten deals the arranger may have to step-in as lender. The incentives arising out of her guarantee collide with the interests of the borrower. Specifically, due to risk-based regulatory capital requirements retaining risky loans is very costly for the arranger. Thus, unconstrained arranger would optimally lower the price of the loan until the entire loan is sold. To reduce this agency conflict, the borrower compensates the arranger for borrower-friendly loan terms through underwriting fees. The arranger bank shares in the cost of a more expensive loan through a reduction in fees. Further, the flex pricing provisions stipulate minimum price levels for the loan.

Flex provisions are confidential and secret documents that are typically well-guarded by arrangers. The concern of arrangers is that purchasers of the loan may exploit this information.

Once the underwriting contract has been finalized, the arranging bank will prepare a memorandum containing information about the borrower and the loan's term sheet. This information memorandum is also called the "bank book." Loans do not constitute public securities, which has several implications for the bank book. First, the bank book is confidential and made available only to potential qualified investors. In particular, retail investors are disqualified from direct investments. Second, and important for my later analysis, the bank book includes private information, legally also called material non-public information, about the borrower generated by the bank.

Note that loan investors can trade on their private information, as loans are not considered public securities. In conrast, private information contained in the bank book may restrict non-loan investment activities of a loan investor or the loan investors' related subsidiaries, because trading public securities in the possession of such information constitutes insider trading. The majority of leveraged loans are made to private firms. Trading restrictions also extend to those firms for at least two reasons. First, the borrower may subsequently decide to pursue an initial public offering (IPO). IPO participants who previously obtained material non-public information may also engage in insider trading. Second, private securities such as private equity also fall under insider trading regulations.[25] To avoid these restrictions and the risk of insider trading allegations, nonbank investors typically voluntarily opt out of receiving private information. For these investors that stay on the public-side, the bank assembles a memorandum that contains only public information.

Loan investors may be able to circumvent aforementioned restrictions and thus serve as private side participant by segregating information flows between subsidiaries. In practice the presence of such "information walls" varies and even compliant nonbanks often choose public side participations to avoid any remaining risks.[26]

Based on their individually available information, potential investors will perform their due diligence. In this time, the arranging bank often informally polls selected investors to "read" the market. Ultimately, the arranging bank solicits commitments at for different spread-OID combinations in a range, called "price talk". Depending on demand, the arranging bank can either "print" the loan at one of the solicited spread-OID combinations. Alternatively, the bank can flex the loan price up or down and solicit new bids.

Once the arranging bank prints the loan at given price, the loan issue closes and the credit and security agreements are finalized. Onshore investors are reflected on the original loan documents as lenders or "syndicate members." Offshore accounts, like CLOs or hedge funds, on the other hand face tax disadvantages from primary

[25] SEC Rule 10b5-1 covers fraud and deceit as a result of insider trading for any, including private, securities. For example, in 2011 the SEC fined private Stiefel Laboratories Inc. and its CEO for insider trading; see https://www.sec.gov/divisions/enforce/claims/stiefel-laboratories.htm.

[26] In 2018, Debtwire (2018) surveyed senior executives of 100 major credit firms about their conflict management. 58% of respondents report that they do not have an information wall in place. 34% respond that they previously removed an information wall. Managers without an information wall justify their absence due increased synergies (71%), lower expenses (36%), and lower administrative burden (21%).

market purchases. To avoid these costs, offshore accounts participate in the primary market through so-called "primary assignments." Here, the arranging bank will act as syndicate member on behalf of these offshore accounts. At the same time, the arranger contractually agrees to sell the offshore's loan commitments at primary market prices to these accounts a short period after closing. These transactions legally constitute secondary market trades, so that tax disadvantages can be avoided. Since sales are structured as assignments, the offshore account is following trade settlement reflected as syndicate member on the loan documents.