Does Loan Securitization Insulate Borrowers from Idiosyncratic Investor Shocks?

Abstract

The collateralized loan obligation (CLO) market has experienced dramatic growth, with 65% of syndicated term loans now securitized and ultimately funded by CLO investors. Presumably, with loans securitized and distributed to a large number of investors, borrowing firms are not only insulated from shocks to banks but also from idiosyncratic shocks to nonbank investors in CLOs. We provide evidence that, due to concentrated capital and sticky relationships, the CLO market exposes firms to shocks that are idiosyncratic to insurance companies, which are the largest group of CLO investors. We present three main findings. First, when insurers experience favorable cash flows, they are more likely to invest in CLO deals, especially deals by CLO managers that they previously invested with. Second, when CLO managers are more exposed to insurers' favorable cash flows through past relationships, they are more likely to launch new CLO deals. Third, among private borrowing firms, those more affected (through sticky relationships with CLO managers) are more likely to take new loans. Our results imply that substantial frictions exist in the loan securitization market that cause firms to be exposed to idiosyncratic investor shocks.

Keywords: Collateralized Loan Obligation (CLO), Securitization, Insurance Companies, Corporate Borrowing, Loans, Leveraged Loans

JEL Codes: G22, G23, G32

1 Introduction

The CLO market has grown drastically, with the amount outstanding rising from $100 Billion in 2005 to $650 Billion in 2020. 65% of syndicated term loans are now securitized and ultimately funded by a large group of CLO investors, including banks, insurance companies, pension funds, hedge funds, and private debt funds. Traditional bank financing exposes borrowing firms to banks' idiosyncratic shocks through sticky lending relationships.[1] One may suspect that by securitizing and distributing loans to a wide range of investors, the CLO market can insulate firms from not only idiosyncratic shocks to banks but also idiosyncratic shocks to investors in the CLO market.

We study the effect of idiosyncratic shocks to investors' capital supply on CLO creation and on borrowing firms' financing outcomes. The first challenge is identification. We need exogenous shocks to investors' capital supply to the CLO market that are not otherwise correlated with new CLO creation and firms' financing behavior. The second challenge is the lack of data on CLO investors. To address these two challenges, we use tranche-level holding and transaction data of Life and Property & Casualty insurance companies, which are the largest investor class for U.S.-based CLOs (DeMarco et al. (2020)). In our data, in 2020, of CLOs issued by their relationship CLO managers, i.e., those that insurers invested with in the past, insurers purchased 23% of all tranches and 40% of mezzanine tranches. We find that when insurers experience higher cash flows, they increase their investment in CLOs, especially in deals by their relationship CLO managers. Based on this finding, we use insurers' operating cash flows as shocks to their demand for CLOs. Different CLO managers are differentially exposed due to their different levels of past relationships with each insurer. We argue that these shocks are plausibly exogenous to CLO managers and borrowing firms. These shocks are also idiosyncratic in the sense that they do not affect all CLO investors, given that we control for time fixed effects in our analyses, which controls for the aggregate conditions in the CLO market.

Using insurers' cash flows as shocks to their capital supply to the CLO market, we

[1] See, for example, Cortés and Strahan (2017) and Ben-David et al. (2019).

identify the causal effect of these investors' shocks on new CLO formation and on firms' financing behavior. Our results suggest that following positive shocks to insurers' capital supply to the CLO market, their relationship CLO managers are more likely to launch new deals. Borrowing firms, whose previous loans are bought by these CLO managers, are more likely to take new loans. This result holds only for private firms, which is consistent with the idea that private firms are more financially constrained and further below their optimal leverage. One specific channel could be that private firms are more likely to be credit-rationed. When banks can more easily offload loans to CLOs, they are more likely to make loans to these private firms. In addition, we find that when insurers' cash flows are high, new loans have lower spreads and are more likely to be used for general purpose/investment and refinancing/payouts.

Our identification strategy relies on the idea that insurers' operating cash flows are not related to the CLO market and the borrowing firms' financing outcomes through any channel other than through insurers' capital supply to the CLO market. Insurers' operating cash flows are a function of product demand, pricing, realized losses, and so on. By controlling for time fixed effects in all of our regressions, we remove the average time trend in the CLO market conditions and in firms' demand for loans. We also control for CLO manager and firm fixed effects in our regressions, which removes the effects of manager- or firm-level fixed characteristics. With these fixed effects, it is unlikely that insurers' cash flows are otherwise related to CLO managers' activities and firms' financing behavior.

We combine three sets of data. First, we use the CLO-i Creditflux data for details on CLOs' assets and liabilities. Second, we use LPC Dealscan data for loan issuance and contract details. The third dataset, based on insurers' statutory filings, covers the universe of insurers' investment in CLOs at the tranche level, as well as insurers' financial information. Our sample, spanning between 2002 and 2020, includes 913 insurers that ever invested in CLOs, 2,098 CLO deals, 221 CLO managers, and 9,480 firms.

Our analyses take five steps. First, we find that when insurers experience favorable cash flows, they increase their investment in CLOs. One potential reason behind this

result is that when insurers have more funds to invest, they increase investment in CLOs. Another possible reason has to do with insurers' reaching-for-yield incentives (see, Becker and Ivashina (2014)). Cordell et al. (2021) argue that CLOs offer higher yields relative to comparable corporate bonds. This is also the case in insurers' portfolios, as suggested by Fringuellotti and Santos (2021). Ge and Weisbach (2021) find that when insurers are in better financial health (e.g., due to exogenous shocks to their underwriting performance), they shift towards riskier investment assets that offer higher yields. Thus, our finding that insurers increase their investment in CLOs following favorable operating performance is consistent with the idea that insurers are more risk tolerant and seek higher yields in their portfolios when their financial conditions improve.

Second, we document a sticky relationship between insurers and CLO managers: if an insurer invested in a manager's deals in the past, the insurer is more likely to invest in the manager's new deals. The insurer-CLO manager relationship is stickier if the CLO manager has a smaller CLO portfolio or has a shorter track record, where one would expect relationships to matter more due to worse information asymmetry. Moreover, when insurers' operating cash flows increase, their likelihood to invest in CLOs by their relationship CLO managers increases more than that in non-relationship managers.

Third, we find that if a CLO manager is more exposed to insurers' favorable operating cash flows, the CLO manager is more likely to launch a new CLO deal. We calculate each CLO manager's exposure to insurers' operating cash flows as a weighted average of insurers' cash flows, where the weights are each insurer's purchasing share of the manager's deals prior to the cash flows.

Fourth, we document another sticky relationship, i.e., the one between CLO managers and borrowing firms. Specifically, if a CLO manager purchased loans from a certain firm in the past, the manager is more likely to purchase loans from this firm when she launches a new CLO deal. This result can be explained by CLO managers' information advantage of the firms whose loans they previously acquired. In addition, we find that banks' dual role as the CLO underwriter and the loan originator results in more persistent ties between CLO managers and their portfolio firms. This suggests that banks can alleviate search

frictions between firms and CLO managers, thereby helping their relationship borrowers obtain CLO financing.

Finally, we examine how investors' capital supply affects borrowing firms' financing outcomes through new CLO deals. The endogenous variable is the weighted average number of new CLOs launched by each firm's relationship managers, where the weight is the lagged share of the firm's loans held by each CLO manager. Relying on our findings summarized above, we construct the instrument as firms' exposure to insurers' cash flows through CLO managers. Specifically, the instrument is each firm's weighted average of its relationship CLO managers' exposure to insurers' cash flows as described in the third step above. The weight is again the lagged share of the firm's loans held by each CLO manager, as in the endogenous variable construction.

The first-stage result suggests that firms' exposure to insurers' cash flows predicts CLO launches by its relationship managers. The second-stage result suggests that, when relationship managers launch new CLOs due to increased investors' capital supply, private firms are more likely to take new loans and loan spreads decline. These results suggest that investors' capital supply affects firms' financing outcomes and the cost of credit through the CLO market.

We contribute new insights to the CLO literature. Our results have three important implications. First, by having their loans securitized and distributed across a wide set of investors, firms may become more insulated from shocks to banks. However, we find that firms can become susceptible to shocks to non-bank investors in the CLO market as capital is highly concentrated among investors in this market. Second, academics and industry participants attribute the growth of the market to tighter bank regulations, as well as borrower demand for securitizable loans due to their covenant-light nature.[2] Our results suggest that investors' capital supply is likely an important driving force behind the growth of the CLO market, rather than simply accommodating the desires of banks

[2]See Acharya et al. (2013), Neuhann and Saidi (2016), Kim et al. (2018), and Irani et al. (2021) for the importance of bank regulations in fostering the shadow banking sector. Several others emphasize the role of borrower demand for cov-lite loans. See Prilmeier and Stulz (2020), FT article dated May 10th, 2012 (link) and Forbes article dated September 26, 2014 (link).

and borrowing firms. Third, increased investor capital supply to the CLO market can affect firm financing rather than merely allowing banks to offload more loans.

Our paper is particularly related to two papers that are consistent with the idea that CLO investors' demand affects loans. Ivashina and Sun (2011) find that when loans remain in syndication before being sold for a shorter time, instrumented by larger aggregate fund flows into CDOs, they on average have lower interest rates. This paper does not examine the effect on firms' financing activity, which we highlight. Fleckenstein et al. (2020) find that non-bank loans, often bought by CLOs, are more cyclical than bank loans. They argue that such variation could be driven by CLO investors' funding fluctuations without directly observing such fluctuations.[3]

We differ from these papers in three main ways. First, our paper has important implications for understanding the growth of the CLO market, while the other two papers are silent on this topic. Second, While these two studies focus on the aggregate changes in funding supplies to the CLO market, we highlight that funding shocks that are idiosyncratic to a group of investors matter for CLO formation and firm financing. Third, our setting allows us to provide cleaner *causal* evidence for the notion that non-bank investors' funding supply affects the financing of CLO loans. We use microdata on the largest group of investors to directly identify shocks to investors' demand for CLOs. Moreover, we connect the link between investors and CLOs, as well as between CLOs and borrowing firms, and demonstrate that these relationships are sticky. This allows us to create cross-sectional variation in exposure to investor demand and to trace the effect of investor demand shocks to specific managers and borrowing firms.

Our paper is also related to a concurrent paper by Fringuellotti and Santos (2021). They focus on why insurers purchase CLOs and argue that insurers do so in search of

[3]Other papers in the CLO literature include the following. Nadauld and Weisbach (2012) argue that securitization lowers loan spreads. Benmelech et al. (2012), Wang and Xia (2014), and Bord and Santos (2015) study the effect of securitization on the credit quality of corporate loans. Shivdasani and Wang (2011) argue that growth in the collateralized debt obligations fueled the LBO boom of 2004 to 2007 by focusing on the role played by banks' active structured credit underwriting. We differ by directly examining shocks to investors' demand for CLO securities. Loumioti and Vasvari (2019a) and Loumioti and Vasvari (2019b) study the impact of balance sheet constraints imposed on the funds on their portfolio choice and portfolio rebalancing. Cordell et al. (2021) study performance of CLOs. Kundu (2021) and Bhardwaj et al. (2021) examine how shocks to CLOs' asset side (loan holdings) affect borrowing firms.

high yields. We use insurers' demand for CLOs driven by their operating performance as our source of identification and focus on the effect of insurers' demand on CLO issuance, as well as borrowing firms' financing and investment.

Our paper is also related to the literature on how banks' credit supply affects firms' financing and real outcomes including Khwaja and Mian (2008), Duchin et al. (2010), Ivashina and Scharfstein (2010), and Almeida et al. (2012).[4] One may expect that, as a result of banks distributing loans to the CLO market with a wide range of investors, firms would be insulated from banks' balance-sheet shocks. We demonstrate that idiosyncratic shocks to large non-bank investors in the CLO market can also affect borrowing firms. The shocks are propagated through CLO managers' sticky relationships with both investors and borrowing firms. Our paper is also broadly related to others that find shocks to non-bank investors affect firms' financing activities and capital structure, e.g., Zhu (2021), Gopal and Schnabl (2020), Erel and Liebersohn (2022), and Howell et al. (2021). While they study bond mutual funds, finance companies and FinTech lenders, we examine the fast-growing CLO market using detailed data on investors, including data on their financial conditions.[5]

Moreover, our paper also contributes to our understanding of the investment behavior of insurers, as well as their effect on financial markets and firms. Insurers are an important group of institutional investors, with $9.4 trillion of assets. It is important to understand their investment behavior and how they affect the rest of the economy. Specifically, we highlight insurers' role as large investors in the CLO market. Their demand for CLOs, affected by their operating performance, can affect CLO new deal issuance as well as firms' borrowing through the CLO market. Our paper is also related to Chodorow-Reich et al. (2021) and Coppola (2021), who argue that insurers insulate the corporate bonds they *hold* in their portfolios from market downturns. We find that insurers' capital supply through their *purchase* of financial assets can be still subject to their own idiosyncratic

[4]Other papers include Leary and Roberts (2005), Peek and Rosengren (2000), Becker and Ivashina (2014), Paravisini et al. (2015), Acharya et al. (2019), Acharya et al. (2018), Leary (2009), and so on.

[5]Other papers on non-bank lendings include Chernenko et al. (2022), Lim et al. (2014), Buchak et al. (2018b), Buchak et al. (2018a), and Jiang et al. (2020).

shocks, despite their infrequent sales.[6]

2 Data

2.1 CLO Deals and Managers

Detailed data on global CLOs comes from Acuris Creditflux, a leading information aggregator that maintains a comprehensive database of CDOs, CLOs, and credit hedge funds. The data, sourced directly from over 45, 000 trustee reports and CLO prospectuses, provide detailed information on around 3,153 CLO deals managed by 226 fund managers over the the sample period of 2002 through 2020. The Creditflux CLO database has been extensively used in the literature,[7] and provides comprehensive coverage of holdings and trading of corporate leveraged loans in the secondary market, especially after 2009 when it becomes near complete. Creditflux data provides detailed information on the investments of CLO funds in more than 14,000 firms belonging to 35 broad Moody's industries at a monthly frequency.

A summary description of the CLO balance sheet at the fund's inception is provided in Table 1. A typical CLO in our sample has total assets under management (AUM) of $507 million. 63% of CLO liabilities are classified as senior tranches (defined as AAA rated at inception) and 25% are classified as mezzanine tranches (defined as those rated between AA and B). The weighted average coupon rate (expressed as spread over Libor) on CLO tranches is 1.73%. On the asset side, a typical CLO holds loans of approximately 192 firms, with an outstanding maturity of about 5 years. The loans have an average spread of 3.85% over Libor and have a rating score of 11, which corresponds to a B rating. The equity holders of the CLO earn the difference between spreads received from portfolio loans, and those paid to the debt investors.[8] There are 226 fund managers in

[6]Other papers examining insurers' investment include Ellul et al. (2011), Becker and Ivashina (2014), Ellul et al. (2015), Greenwood and Vissing-Jorgensen (2018), and Ge and Weisbach (2021) among others.

[7]See Ivashina and Sun (2011), Benmelech et al. (2012), Loumioti and Vasvari (2019a), Loumioti and Vasvari (2019b), among others.

[8]The largest fraction of loans held in the CLO portfolio are rated BB/B, and earn a spread of about 4-5%, while the largest debt tranche of a CLO is rated AAA, and the fund pays a spread of about 0.75

our sample. As shown in Table 1, over the sample period considered in this paper, the average AUM of managers is $2.18 Billion and has been in the CLO business for about 8 years.

2.2 Loan Syndication Data

We compile a sample of leveraged loans between 2002 and 2020 from Refinitiv LPC DealScan database (DealScan). It contains information about all the syndicated loans, and our sample of all leveraged loans comprises a subset of such syndicated loans which are identified as (i) a term-loan facility, and (ii) has an all-in-drawn spread of greater than 125 basis points. This restriction criterion leads to a total sample of 82,499 leveraged loans originated by 21,702 unique firms in the sample.

We next match the firms in the DealScan sample with those held by the CLO funds using a fuzzy matching on names, yielding a matched sample of 9,480 unique borrowers. These are relatively large companies, and in terms of volume, they account for 90% of the CLO holdings in the sample. These firms have a 2.3% chance of issuing a new leveraged loan facility in any given quarter. The average size, spread, and maturity of the loans are $916 million, 315 bps, and 5.6 years.

2.3 Insurance Company Data

We obtain data on life insurance companies' financials and investments through S&P Global based on insurers' statutory filings. All US-domiciled operating insurance companies need to report these filings, giving us data on the universe of insurers in the U.S. Insurers' financial variables are available from 1996. We obtain data on their investment from 2002 to 2020.

Insurers report detailed investment holding and transaction data at the CUSIP level in Schedule D of their statutory filings. To map CUSIP to the CLO tranches, we proceed in two steps. First, we filter all CUSIPs whose description includes the string "CLO",

- 1% over Libor.

"CDO", "collateralized loan obligations", or "collateralized debt obligations". Then, we use the Creditflux data to create a list of CLO tranches securities (with information on deal name, manager name, and tranche name) and hand-match each of them to CUSIPs using the information on issuers' names and issues' description in the NAIC data. Insurers' holdings comprise 7,154 CLO tranches of 1,851 CLOs issued by 188 managers and amounted to $84 Billion in 2020.

2.3.1 Insurers' Cash Flows

Our instrumental variable, insurers' operating cash flows, is reported directly by insurers. It is the sum of premiums, net investment income, and miscellaneous income, minus benefits and losses, transfers to separate accounts, commissions, dividends to policyholders, and taxes. We add back dividends to policyholders as this is an endogenous decision. We also subtract investment income related to insurers' holdings of CLOs. This addresses the concern that insurers' past high cash flows can be correlated with the favorable performance of their relationship CLO managers, which may drive our results. We then scale this cash flow measure by insurers' lagged assets and use these cash flows as our instrument.

3 Effect of Insurers' Cash Flows on Their CLO Investments

We hypothesize that when life insurers' operating cash flows are high, they are likely to increase their investment in CLOs. The first reason is that when operating cash flows are high, insurers have more cash flows to invest in financial assets, since their payout to shareholders is limited by regulation (see, Ge (2022)). The second reason is related to Ge and Weisbach (2021), who show that when property and casualty insurers experience favorable operating performance, they shift their investment portfolio towards riskier bonds likely due to their increased appetite to reach for yield. Cordell et al. (2021) argue

that CLOs cater to investors' reaching-for-yield demand given their high yields relative to corporate bonds with the same rating. In this section, we first examine whether positive idiosyncratic cash flow shocks increase insurers' investment in CLOs.

In Table 2, we estimate the following regression:

$$\mathrm{Y}_{i,t} = \beta \times \text{Insurer CF}_{i,t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t}$$

$\mathrm{Y}_{i,t}$ denotes insurer i's investment in CLO in year t. We measure CLO investment as $\text{Log(1+CLO Purchase)}_{i,t}$, which is the U.S. dollar value (in millions) of CLO tranches purchased, expressed in natural logarithm. Insurer $\text{CF}_{i,t-1}$ is insurer i's operating cash flows over assets in year $t-1$. We include insurer and year fixed effects. Standard errors are clustered at insurer level.

The estimated coefficients on Insurer CF are positive and statistically significant, suggesting that insurers increase their investment in CLOs following favorable operating cash flows. The estimate in Column (2) suggests that a one-standard-deviation increase in insurers' cash flows is associated with 6.28 percent increase in the amount of CLO liabilities purchased by insurers.

4 Insurer-CLO Manager Relationship and Insurers' CLO Purchase

Our results in Table 2 suggest that insurers increase their investment in CLOs following an increase in their operating performance. However, insurers may not invest randomly across all newly issued CLOs. We hypothesize that they may rely on their past relationships with CLO managers and disproportionately invest in deals issued by those managers. One reason is that CLO managers are more likely to market to their past investors since they have easy access to these investors. Another possible reason is information asymmetry. In the CLO market where information is more opaque, insurers'

familiarity with certain CLO managers is presumably more important as they may produce private information about the managers. Consistent with this argument, Barbosa and Ozdagli (2021) find that insurers buy more bonds from issuers whose bonds they already hold. In this section, we first construct a measure of the manager-insurer relationship and then show that higher insurers' cash flows lead them to increase investments in new CLOs launched by their relationship managers.

We use insurers' holdings data to calculate each insurer i's total investment ($\text{Holding}_{i,m,t}$) in tranches issued by manager m in year-quarter t. We calculate each manager's total outstanding liabilities ($\text{Outstanding Liabilities}_{m,t}$) using Creditflux data and then create a binary relationship variable ($\text{Manager-Insurer Relation}_{i,m,t}$) indicating a nonzero share of insurer i in manager m's outstanding liabilities, i.e.,

$$\text{Manager-Insurer Relation}_{i,m,t} = 1\left(\frac{\text{Holding}_{i,m,t}}{\text{Outstanding Liabilities}_{m,t}} > 0\right).$$

In other words, we define that an insurer has a relationship with a manager if it holds any of the outstanding tranches issued by the manager.[9]

We use this relationship measure to test our hypothesis that, when insurers experience higher operating cash flows, they increase their investment disproportionally in deals launched by their relationship managers. Table 3 presents the results of the following specification:

$$\begin{aligned}1(\text{Insurer Investment})_{i,c(m,t)} = {} & \beta \times \text{Manager-Insurer Relation}_{i,m,t-2} + \lambda \times \text{Insurer CF}_{i,t-1} \\ & + \gamma \times \text{CLO Manager-Insurer Relation}_{i,m,t-2} \times \text{Insurer CF}_{i,t-1} \\ & + \alpha_i + \alpha_c + \alpha_t + \varepsilon_{i,c(m,t)}.\end{aligned}$$

Observations are at the insurer-CLO deal level. We match each CLO deal to every possible investor, where the set of potential investors are insurers with CLO holdings during year t and before. $1(\text{Insurer Investment})_{i,c(m,t)}$ is an indicator for whether insurer

[9] As a robustness measure, we use an alternative definition of relationship based on average insurer share over the past five years. We get similar results with the baseline and the alternative measures.

i invested in CLO c launched by manager m in year t (multiplied by 100). We consider investments within one year of each CLO's formation. As defined above, the indicator, CLO Manager-Insurer Relation$_{i,m,t-2}$, is one if insurer i holds a CLO of manager m in year $t-2$. Insurer CF$_{i,t-1}$ is insurer i's operating cash flows over assets in year $t-1$. We use year fixed effects (α_t) to absorb aggregate trends and CLO fixed effects (α_c) to address the possibility that some deal characteristics (e.g., debt maturity) may be attractive to many insurance companies. We also control for insurer fixed effects (α_i) because of factors like insurers' share in the CLO market, which can be simultaneously correlated with our relationship measure (through past investments) and the likelihood of new CLO investment. Standard errors are double clustered by CLO and launch year.

In Column (1), we only include Manager-Insurer Relation as the independent variable, along with the fixed effects described above. The estimated coefficient on Manager-Insurer Relation is positive and statistically significant. The magnitude suggests that an insurer that financed a manager in the past is 1.7 ($\frac{1.21+0.84}{1.21}$) times more likely to invest in new CLO deals issued by the manager relative to the unconditional average. Following the literature on traditional bank lending relationships, we interpret this as evidence of a sticky relationship between insurers and CLO managers.

In Column (2), we add the interaction between CLO Manager-Insurer Relation and Insurer CF from the previous year. The estimated coefficient on the interaction term is positive and statistically significant, suggesting that after insurers experience higher cash flows, they increase their investment in deals launched by their relationship managers by more. The estimate suggests that a one-standard-deviation increase in an insurer's cash flow to assets ratio further increases its likelihood of investing in a relationship CLO by 48% ($\frac{5.27\times0.11}{1.21}$). Cash flow shocks also increase the likelihood of investments in unrelated CLOs, but the effect is much smaller in magnitude compared to related CLOs.

As we hypothesize earlier in this subsection, the insurer-CLO manager relationship can be sticky if CLO managers have limited marketing reach or if insurers produce valuable private information on CLO managers. These reasons will predict that relationship will matter more for CLO managers with smaller deals in the past or a shorter track

record, since these managers likely have a more limited marketing reach and their management strategies/skills are more opaque. To test these predictions, in Column (3), we also interact CLO Manager-Insurer Relation$_{i,m,t-1}$ with Large Manager$_{m,t-1}$ and Old Manager$_{m,t-1}$, which are indicators for if manager m's CLO assets and age are higher than the sample mean during year $t-1$.

In Column (3), the negative estimated coefficient on the interaction terms with Large Manager and Old Manager suggests that preexisting relationships are less important for older and larger managers. For instance, our estimates suggest that large managers are only 40% as likely to invest in new funds launched by relationship CLO managers. Similarly, older managers are only 47% as likely to invest with the relationship CLO managers. This is consistent with the notion that as managers grow and develop a wide marketing reach and a longer track record over time, they are less dependent on their preexisting set of investors and can build new ties with investors more easily. It is also possible that managers who grow to be larger are of higher quality, making private information about them less valuable.

One potential reason for sticky relationships between insurers and CLO managers is that certain insurers might dominate in a particular CLO market segment. Thus, CLO managers in that market segment may be restricted to those insurers as potential investors leading to repeated interactions. In Column (4), we investigate whether this drives our result by controlling for insurers' average likelihood to invest separately by CLO size and weighted average coupon across tranches using fixed effects. In addition, we also control for insurer-by-year fixed effects to control for each insurer's average investment probability in each year. The coefficients of interest remain largely unchanged, indicating that repeat deals are the outcome of ongoing relationships and not an artifact of insurer specialization. We also include CLO manager-closing year fixed effects to absorb the effect of time-varying manager-level factors like skill and performance. Results remain similar to Column (3).

Important for the remainder of our analyses, in Columns (2) through (4), the estimated coefficients on the interaction term between insurer-manager relation and insurer

cash flows are always positive and statistically significant, indicating that relationship managers obtain more of insurers' funding when insurers' capital supply to the CLO market increases.

5 Relationship Managers Respond to Insurers' Capital Supply By Launching New CLOs

Our results in Table 3, discussed above, suggest that insurers' higher operating performance increases their demand for CLOs, especially new deals by their relationship managers. In this section, we examine whether insurers' relationship CLO managers launch more deals in response to these demand shocks. We use the sticky manager-insurer relationships to calculate each manager's exposure to insurers' cash flows. Since each manager is related to a different set of insurers, we can exploit the cross-sectional variation in managers' exposure in our analysis.

Formally, we calculate manager m's exposure to insurers' performance in quarter t as:

$$\text{CLO Manager Exposure to Insurers}_{m,t} = \sum_{i} \left(\frac{\text{Holding}_{i,m,t-4}}{\text{Outstanding Liabilities}_{m,t-4}} \times \text{Insurer CF}_{i,t-3 \text{ to } t} \right)$$

$\frac{\text{Holding}_{i,m,t-4}}{\text{Outstanding Liabilities}_{m,t-4}}$ is insurer i's share in manager m's outstanding liabilities in quarter $t-4$. Insurer $\text{CF}_{i,t-3 \text{ to } t}$ is insurer i's cash flows between quarter $t-3$ and quarter t scaled by assets in quarter $t-4$. In other words, a manager's exposure is the average value of insurers' cash flows to assets weighted by a continuous measure of its relationship with each insurer.

We test whether exposure to insurers' cash flows increases the likelihood of CLO issuance. To do so, we create measures of CLO issuance activity for each manager in quarter t and match them to our measure of manager exposure in quarter $t-1$. Table 4

shows the results of the following specification:

$$\text{Y}_{m,t} = \beta \times \text{CLO Manager Exposure to Insurers}_{m,t-1} + \alpha_m + \alpha_t + \varepsilon_{m,t}$$

$\text{Y}_{m,t}$ denotes outcomes of manager m in year-quarter t, which is an indicator for CLO issuance in Column (1), the number of CLOs launched in Column (2), and the log of CLO issuance volume plus one in Column (3). CLO Manager Exposure to $\text{Insurers}_{m,t-1}$ is manager m's exposure to insurers' cash flows in quarter $t-1$. We employ manager fixed effects (α_m) and year-quarter fixed effects (α_t) since the decision to launch new deals is potentially correlated with unobserved manager characteristics and aggregate economic trends. We double cluster the standard errors by manager and year-quarter.

Column (1) shows that a one-standard-deviation increase in the exposure to insurers' cash flows increases the probability of CLO issuance in a quarter by 1.96 percentage points (3.71×0.53). For comparison, the unconditional probability of CLO issuance in a given quarter is 16.44%. Columns (2) and (3) show that higher manager exposure is also associated with a higher number and dollar value of new CLOs. These results highlight that insurers' capital supply driven by their operating performance may have a significant impact on relationship managers' decision to launch a new CLO.

Our interpretation of the results in Table 4 relies on the idea that insurers are significant investors in CLO deals. Figure 1 plots the distribution of the percent of CLO liabilities held by insurers, both at the CLO deal and manager levels. Panels (a) and (c) suggest that each insurer in general has a very small share of the liabilities of a CLO deal or a CLO manager. However, Panels (b) and (d) indicate that insurers as a whole hold substantial shares of the liabilities of a CLO deal or a CLO manager. Across all deals (managers), the average share of liabilities held by all insurers as a whole is 14% (11%). When a CLO manager's relationship insurer investors experience correlated shocks, even if these shocks are idiosyncratic to these insurers (i.e. they do not affect other investors), such shocks can be significant enough to affect CLO managers' activities.

6 Sticky Relationships between CLO Managers and Portfolio Firms

Our results discussed earlier suggest that 1) when insurers experience higher cash flows, they increase their investment in their relationship CLOs; 2) CLO managers more exposed to insurer cash flows through past relationships are more likely to launch new deals. Ultimately, we are interested in the effect of increased insurer capital supply to CLO securities on borrowing firms. In this section, we identify which firms are more likely to be affected by increased insurer investment in CLOs through analyzing sticky relationships between CLO managers and borrowing firms.

When CLO managers decide to launch a new CLO, they, on average, purchase over 200 loans worth on average $500 million in a short span of six months.[10] It is likely that their demand for loans increases the capital supply to firms that use leveraged loans for financing. If so, which firms benefit from the capital flow to CLOs depends on how managers choose their portfolio firms when launching a new fund. We hypothesize that managers exhibit persistence in their portfolio choices of firms: a manager is more likely to choose loans of firms in which the manager has invested in the past. As a result, firms having a preexisting relationship with a CLO manager may benefit more when the manager launches a new deal.

There can be several reasons why managers purchase the loans of their past portfolio firms for their new deals. First, acquiring and producing information about loan quality may be costly, so managers may incline towards purchasing the loans of firms for which they have already examined through their previous purchases. If costly information acquisition or production drives the continuation of relationships, then the effect is likely to be stronger for more opaque firms. Second, CLO managers often purchase their loans

[10] Once a manager decides to launch a new CLO, it finalizes a portfolio of loans that will go into the fund over the course of three to six months. This period is called the *ramp-up* period of the CLO. "Effective date" of a fund signifies the end of this formation period, at which point the fund becomes active. From that point, the manager actively trades in the secondary loan market, the fund runs monthly compliance tests to ensure good standing on contractual covenants, and periodic payouts to debt and equity-holders commence.

after consultation with their underwriter bank. The underwriter bank may themselves have a relationship with borrowing firms, thus, creating a link between CLO managers and a certain set of firms. The bank may induce the CLO manager to invest in these firms (by transferring soft information or by any other means) if it benefits the bank in securing higher loan underwriting fees. These two reasons for the continuation of relationships may operate simultaneously.

To examine how relationships affect the initial portfolio formation in new CLO deals, we focus on the loans chosen by a manager during the ramp-up period, ignoring the loans that are bought and sold later in the secondary market. While forming the initial portfolio, the manager can choose among the leveraged loans already trading in the secondary market, or acquire them directly through active participation in the leveraged loan syndication process.

For CLO c launched by manager m in year-quarter t, we define a consideration set of firms whose loans can be chosen by the manager. The consideration set consists of all firms with leveraged loans outstanding over a look-back period of 20 quarters and ending in quarter $t, [t-20, t]$.[11] Essentially, we allow the possibility that a manager purchases either an outstanding loan or a new loan taken out in quarter t by such a firm. This method ensures that only firms with an active presence in the leveraged loan market enter our consideration set. To test the extent to which existing relationships between firms and fund managers impact their likelihood of being selected in the new fund, we estimate the following specification and present results in Table 5:

$$1(\text{Loan Included in CLO})_{f,c(m,t)} = \beta \times \text{Firm-Manager Relation}_{f,m,t-1} + \alpha_c + \alpha_{f,t} + \varepsilon_{f,c(m,t)}$$

Observations are at the CLO-firm level. Each observation is a CLO c matched to one of the firms in its consideration set. $1(\text{Loan Included in CLO})_{f,c(m,t)}$ is an indicator which assumes a value of one if loans issued by firm f are included in a new CLO c launched by the manager m in year-quarter t, and zero otherwise. $\text{Firm-Manager Relation}_{f,m,t-1}$ is

[11] Dahiya et al. (2003) adopt a similar look-back strategy to quantify bank-firm relationships. Our results are also robust to using the entire set of firms in the CLO database as the consideration set.

an indicator assuming the value one if loans from firm f were also held by existing CLOs of manager m during year-quarter $t-1$.

We employ CLO fixed effects (α_c) and year-quarter (α_t) fixed effects in Column (1) and firm-year-quarter fixed effects in Column (2) to ensure that the relationship effect is not driven by the large presence of certain firms in the leverage loan market. We double cluster the standard errors by CLO and launch year-quarter.

The estimated coefficients on Firm-Manager Relation are positive and statistically significant. The estimate in Column (1) indicates that CLO managers are 7.73 times (25.57/3.31) more likely to purchase loans of firms they previously invested in relative to loans of an average firm in their consideration set. Thus, there appears significant persistence in CLO managers' portfolio choices across their subsequent deals. The estimate in Column (2), where we control for firm-year-quarter fixed effects, is very similar.

The interaction term, Firm-Manager Relation$_{f,m,t-1}$ $\times$ Manager Exposure$_{m,t-1}$, has a positive and statistically significant estimated coefficient. This suggests that when managers experience high insurer cash flows through their past relationship with insurers, they disproportionally buy loans taken by firms that were in their past portfolios. This additional effect is small. However, for our identification purpose, as long as the manager-borrower relationship does not disappear when manager exposure is high, we can obtain variations of the insurers' effect on firms through firms' relationship with managers.

We conjecture earlier in this section that information acquisition costs and the influence of mediating banks may result in the stickiness of firm-manager relationships in the CLO business. We add the interaction between Firm-CLO Manager Relation$_{f,m,t-1}$ and Firm-Underwriter-CLO Manager-Relation$_{f,m,t-1}$, which is an indicator for when a bank has simultaneous relationships with firm f and manager m during year-quarter $t-1$. When Firm-Underwriter-CLO Manager Relation equals one, it implies that a bank that is a lead arranger of any of firm f's outstanding loans at time $t-1$ is also an underwriter of any of manager m's outstanding CLOs at time $t-1$. The coefficient on the interaction term is positive and statistically significant. The estimate implies that the relationship

effect for firms linked to CLO managers through a common bank is 15% stronger than the average firm. These results suggest that both information acquisition costs and the influence of mediating banks may result in the stickiness of firm-manager relationships in the CLO business.

7 Effect of Investor Capital Supply to CLOs on Firm Borrowing

Our results above suggest that when investors' capital supply to CLO securities increases, CLO managers respond by launching new deals. In this section, we analyze how investors' capital supply to CLOs affects firms' decisions on taking out new loans. In a naive approach, one would analyze the relation between new CLOs being launched and firms' financing outcomes, assuming that CLOs are launched due to increased investor capital supply. We start our analysis with this naive approach before turning to our instrumental variable approach.

Results in Table 5 indicate that CLO formation increases the demand for leveraged loans issued by portfolio firms in managers' past deals. Thus, we hypothesize that when a firm's relationship managers launch new deals, the firm is more likely to take new loans. We test this hypothesis by studying firms' borrowing activities in response to a new deal launched by one of their related managers. We use the LPC Dealscan data from 2002 to 2020 to identify new leverage loans. Column (1) of Table 6 shows the results of the following OLS specification:

$$\begin{aligned} 1(\text{Loan Issuance})_{f,t} = &\beta \times \text{ Relation Manager \# CLO}_{f,t-1} \\ &+ \Gamma \times \text{Controls}_{f,t-1} + \alpha_f + \alpha_{ind,t} + \varepsilon_{f,t} \end{aligned}$$

$1(\text{Loan Issuance})_{f,t}$ is an indicator that equals one if firm f issues a new leveraged loan during year-quarter t (multiplied by 100). Relation Manager # $\text{CLO}_{f,t-1}$ is the relationship-weighted average number of funds launched by firm f's related CLO man-

agers during the year-quarter $t-1$. $\text{Controls}_{f,t-1}$ is a vector of firm-level control variables including total volume and average spread, rating, and maturity of firm f's outstanding loans during year-quarter $t-1$. We control for firm fixed effects and industry-year-quarter fixed effects. We double cluster the standard errors by firm and year-quarter.

We find that when the weighted number of funds launched by related managers increases by one standard deviation (0.30), the firm's likelihood of issuing a new leveraged loan increases by 0.252 (0.84×0.30) percentage points. The unconditional probability is 3.5%, indicating a 7% jump in loan issuance. Figure 3, Panel (a) is a scatter plot of the outcome variable against the independent variable, both twice demeaned according to our fixed effects. The scatter plot also shows a positive correlation between the two.

Instrumental Variable Analysis An important concern in estimating the causal impact of CLO funding and new CLO launches on firms' borrowing decisions is that CLOs are not created randomly. In our setting, the primary identification concern is that new CLO formation is driven by firms' demand for credit. When firms' demand for loans increases, they are more likely to take new loans and CLO managers may respond by launching more deals as banks try to distribute these loans to the CLO market. This can lead to a positive correlation between new CLO deal formation and firms' loan issuances.

To address the concern with the OLS regression, we use an instrumental variable approach, which relies on our previous two findings: (1) insurers' operating cash flows affect the CLO formation of exposed CLO managers (2) the relationship between CLO managers and their portfolio borrowing firms is sticky. We calculate firm-level exposure to insurers' cash flows, $\text{Firm Exposure}_{f,t}$. Formally, we calculate $\text{Firm Exposure to Insurers}_{f,t}$ for firm f in year-quarter t as:

$$\text{Firm Exposure to Insurers}_{f,t} = \sum_{m} \left(\frac{\text{Holding}_{f,m,t-4}}{\text{Outstanding Loan}_{f,t-4}} \times \text{CLO Manager Exposure to Insurers}_{m,t} \right)$$

$\frac{\text{Holding}_{f,m,t-4}}{\text{Outstanding Loan}_{f,t-4}}$ is the share of firm f's outstanding loans held by manager m during year-quarter $t-4$. $\text{Manager Exposure to Insurers}_{m,t}$ is manager m's exposure to related

insurers' cash flows in year-quarter t, as defined in Section 5. Note that Manager Exposure$_{m,t}$ depends on managers' relationship with insurers in quarter $t-4$ and insurers' cash flows between $t-3$ and t. A firm has a higher exposure to insurer cash flows if it has more relationships with managers that are exposed to insurer cash flows.

We use Firm Exposure to Insurers$_{f,t}$ as an instrument for CLO launches by firm f's related managers. The exclusion restriction we assume is that, after absorbing time-invariant firm-level factors using firm fixed effects and industry fluctuations using industry-year-quarter fixed effects, insurers' operating performance affects firms' borrowing decisions in the leveraged loan market only by increasing new CLO formations. Since life insurance companies' cash flows depend mainly on policy premiums, payouts, and investment income,[12] they are unlikely to correlate with the economic prospects and financing outcomes of non-financial firms through other channels after including our fixed effects.

The first stage [13] in Column (2) of Table 6 evaluates the relevance assumption that exposure to insurer cash flows affects new CLO formations by firms' relation CLO manager. We estimate the following specification:

$$\text{Relation Manager \# CLO}_{f,t} = \beta \times \text{Firm Exposure to Insurers}_{f,t-1} + \alpha_f + \alpha_{ind,t} + \varepsilon_{f,t}$$

Relation Manager # CLO$_{f,t}$ is the relationship-weighted average number of CLOs launched by the firm f's related managers during year-quarter $t-1$. Firm Exposure to Insurers$_{f,t-1}$ if firm f's exposure during year-quarter $t-1$. α_f and $\alpha_{ind,t}$ denote fixed effects at firm and industry-year-quarter level, respectively. We double cluster standard errors by firm and year-quarter.

We find that a one-standard-deviation increase in the firms' exposure increases the average number of CLO fund issuance by related managers by 0.14, a large magnitude compared to the mean of 0.09. Figure 3, Panel (b) is a scatter plot of the endogenous variable against the instrument, both twice demeaned according to our fixed effects. The

[12] Note that we exclude income related to insurers' CLO investments.

[13] The estimation of the two stages are run simultaneously using standard estimation procedure.

scatter plot shows a positive correlation between the two.

Column (3) shows the results of the second-stage instrumental variable specification given by:

$$1(\text{Loan Issuance})_{f,t} = \beta \times \text{Relation } \widehat{\text{Manager}} \text{ Launch CLO}_{f,t-1} + \alpha_f + \alpha_{ind,t} + \varepsilon_{f,t}$$

Relation $\widehat{\text{Manager}}$ # $\text{CLO}_{f,t}$ denotes the predicted value from the first-stage regression. The estimated coefficient on Relation $\widehat{\text{Manager}}$ # CLO suggests that firms' probability of taking a leveraged loan is 0.35 percentage points higher when the number of funds launched in the previous quarter increases by one standard deviation (0.3). This magnitude is 10% of the unconditional probability of taking a leveraged loan. The Kleibergen-Paap Wald F statistic is 6012, passing the threshold for weak-instrument test suggested by Stock and Yogo (2002) and Andrews et al. (2019). Figure 3, Panel (c) is a scatter plot of the outcome variable against the predicted endogenous variable, both twice demeaned according to our fixed effects. The scatter plot also shows a positive correlation between the two.

Our interpretation of the results so far in this section relies on the idea that CLO managers can play a significant role to the borrowing firms' financing. In other words, CLO managers need to buy siginicant shares of firms' loans. Figure 2 plots the histogram of the share of firms' outstanding securitized loans held by each CLO manager.Based on the histogram, CLO managers often hold a significant share of firms' securitied loans with the mean being 7.36%.

We next examine whether our results hold for public or private firms in Table 7. In Column (1), we use the sample of public firms, while in Column (2), we use private firms. The results indicate that the effect on loan financing is only present for private firms, but not for public firms. This is consistent with the idea that private firms are more financially constrained, for example, more likely to facing credit rationing by banks. When banks can more easily sell the loans, they may become more likely to offering loans to firms. Private firms are more sensitive to such changes in loan supply.

In Column (3) of Table 7 we examine the probability of firms' taking out a revolver loan as a falsification test. CLOs generally do not purchase revolver loans. If investors' capital supply drives firms to take out more debt through the CLO market, we should not observe effects on firms' probability of taking revolver loans. Column (3) repeats the second-stage IV regression in Table 6, replacing the dependent variable with an indicator for whether a firm takes out a revolver loan in a quarter. The estimated coefficient on the instrumented *Relation Manager # CLOs* is negative and stastistically indistinguishable from zero. This result suggests that investors' capital inflow through the CLO market has little effect on firms' probability of taking revolver loans, consistent with our hypothesis.

Effects on Loan Characteristics, Spreads, and Purpose We next investigate the effect of investor capital supply to CLOs through relation managers on the charateristics and spreads of the new leveraged loans taken by borrowing firms. We use data at the loan level and look at how loan characteristics and spreads vary with the instructed launch of new CLOs by relationship managers. As before, we instrument CLO launches using firm exposure to insurer cash flows and present the results of the instrumental variable specification in Table 8. We find that the influx of institutional capital lowers loan maturity and spreads. A one-standard-deviation increase in the weighted number of CLOs by relationship managers (0.37), new loan maturities decline by 0.18 years or around two months, 3% of the average maturity of 5.3 years. We do not observe significant changes to loan size and the number of covenants. In addition, we find that loan spreads decline with the instrumented *Relation Manager # CLOs*. In Column (5), where we control for loan characteristics, a one-standard-deviation increase in the weighted number of CLOs by relationship managers leads to a reduction in loan spreads by 10.3 basis points, 3% of the mean.

Table 9 examines the purpose of the new loans as an outcome variable. In Panel (A), we use the linear instrumental variable framework as in the previous tables. The outcome variable is an indicator for whether a new loan is designated for (1) "General Purpose" and other investment purposes; (2) either refinancing or dividend payouts; (3) leveraged

buyouts; (4) other purposes. In Panel (B), we use a multinomial logit regression. Due to the lack of standard estimation procedure of instrumenting endogenous variables in a multinomial logit model, we use the instrument (rather than our endogenous variable) in the regression. Due to econometric problems associated with including a large number of fixed effects in nonlinear models, we only include year-quarter fixed effects. Panel (B) reports the marginal effects estimated at the mean of the independent variables. The results in both panels suggest that when investor demand for leveraged loans increases, new loans are more likely to be for general purposes/investment or refinancing/payouts, and less likely to be for leveraged buyouts.

8 Conclusion

The market for securitizing loans has grown drastically over the last two decades. One may suspect that by securitizing and distributing loans to a wide range of investors, the CLO market can insulate firms from not only idiosyncratic shocks to banks but also idiosyncratic shocks to investors in the CLO market. We study the effect of idiosyncratic shocks to investors' capital supply on CLO creation and on borrowing firms' financing outcomes. Using detailed data from an important group of investors, i.e. insurance companies, We establish three main findings. First, insurers' cash flows are positively related to their capital supply to the CLO market. Second, CLO managers launch new deals in response to increased investor capital supply. Third, these new deals cause affected firms to take more leveraged loans.

Our results have three important implications. First, by having their loans securitized and distributed across a wide set of investors, firms may become more insulated from shocks to banks, however, they become susceptible to shocks to non-bank investors in the CLO market. Second, increased investor capital supply to the CLO market can affect firm financing rather than merely allowing banks to offload more loans. Third, they suggest that investors' demand is likely a key driving force behind the growth of the CLO market.

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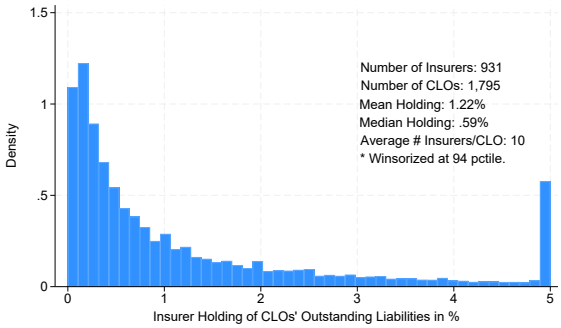
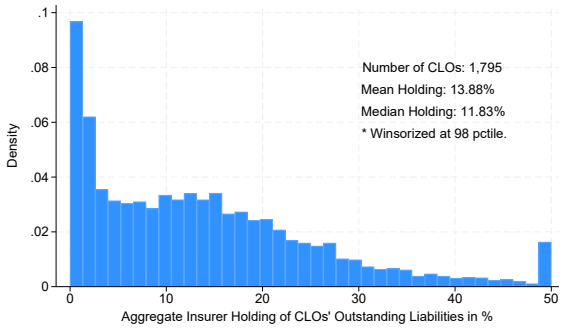
Figures and Tables

Figure 1. Histogram: Percent of CLO liabilities (deal-level and manager-level) held by insurers

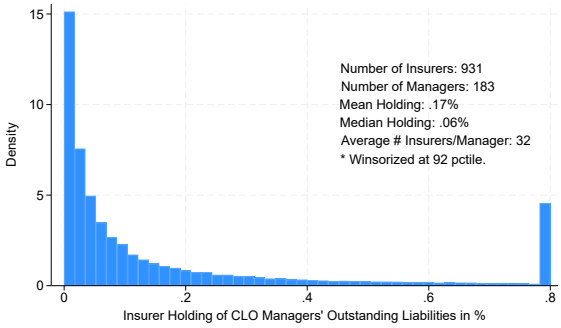
(a) Deal level (Per Insurer)



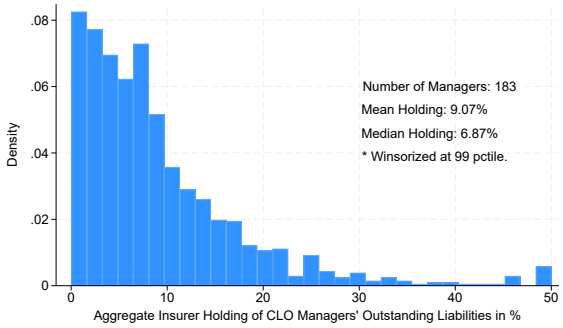
(b) Deal level (All Insurer)



(c) Manager level (Per Insurer)

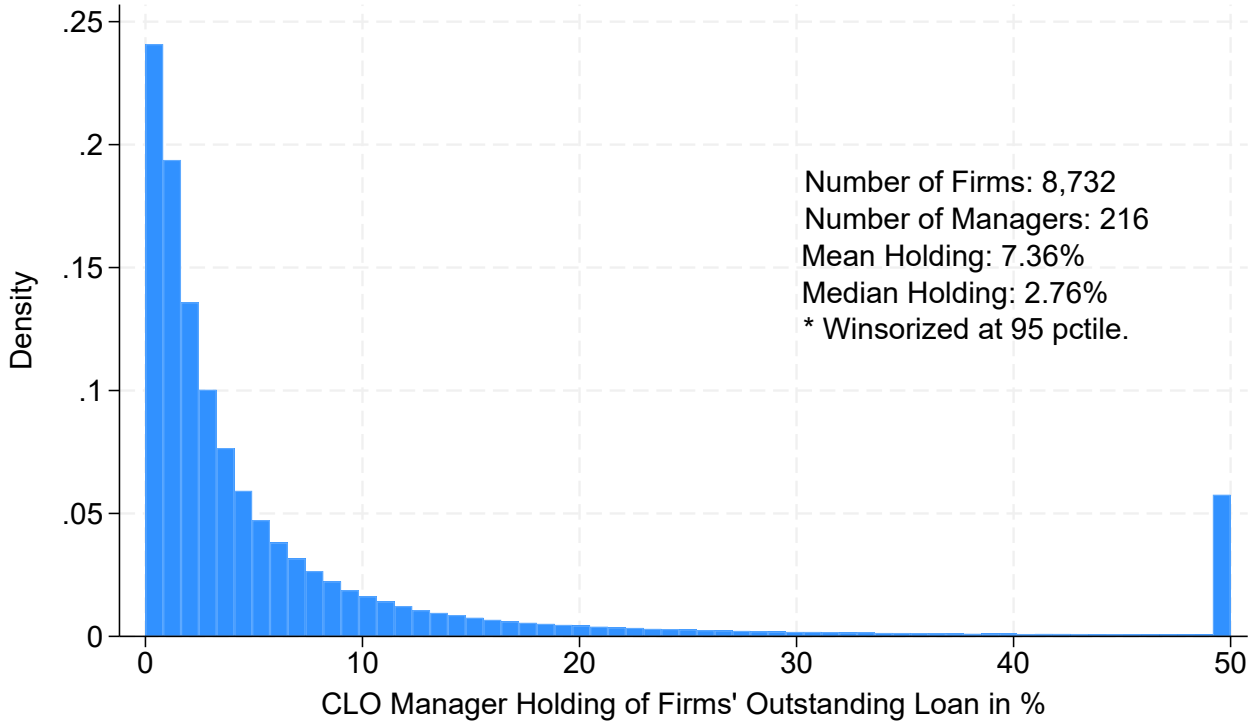


(d) Manager level (All Insurer)



Note: Figure 1 shows the fraction of CLO liabilities held by each insurer in our sample. Panel (a) shows deal-level holding for each insurer and Panel (b) shows the same aggregated across all insurers. Panel (c) shows manager-level holding for each insurer and Panel (d) shows the same aggregated across all insurers.

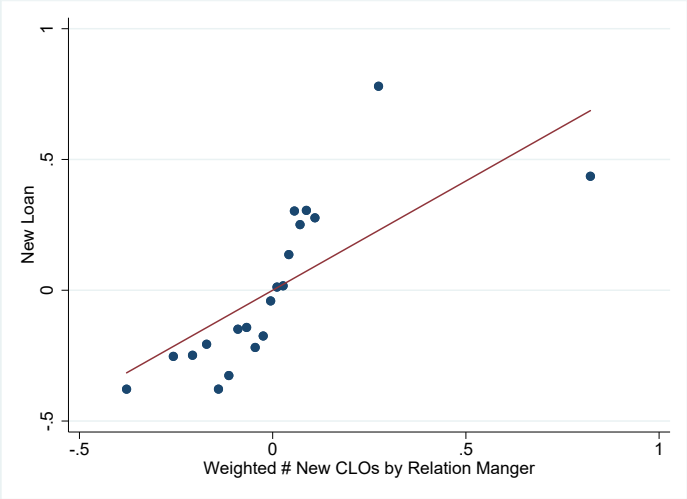
Figure 2. Histogram: Percent of firm loans held by each CLO manager



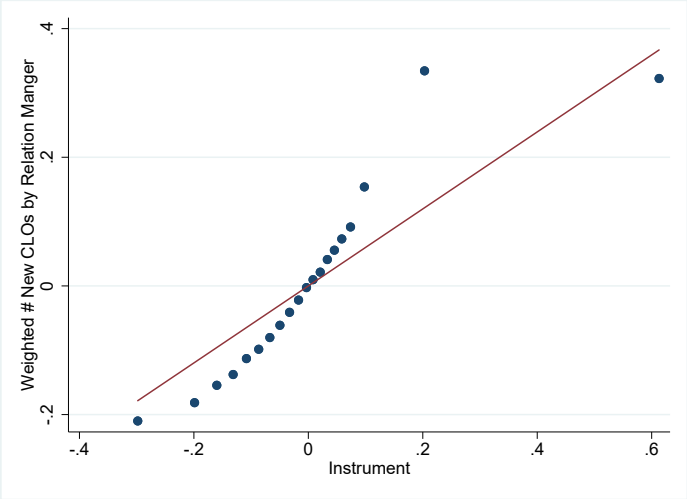
Note: Figure 2 plots the distribution of the percent of firms' outstanding securitized loans held by each CLO manager.

Figure 3. The Effect of Investor Demand on New Loans: Scatter Plots

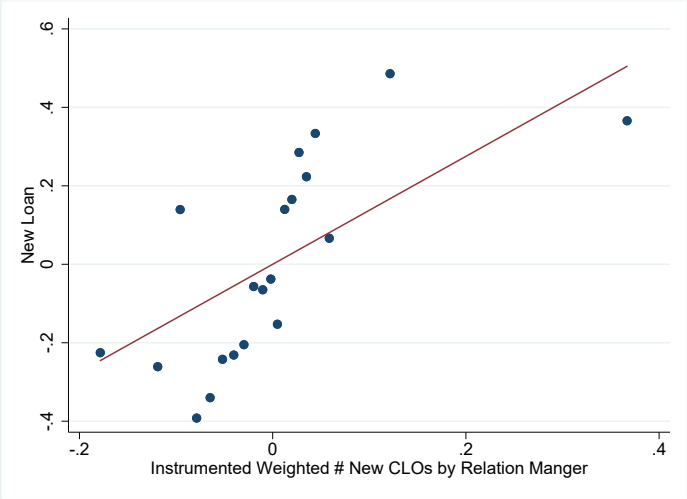
(a) New Loan vs New CLOs by Relation Manger



(b) New CLOs by Relation Mange vs Instrument (Relation Manager Exposure to Insurer)



(c) New Loan vs Instrumented New CLOs by Relation Manger



Note: Figure 3 presents several scatter plots. Panel (a) is a scatter plot of the outcome variable against the independent variable, both twice demeaned according to our fixed effects. Panel (b) is a scatter plot of the endogenous variable against the instrument, both twice demeaned according to our fixed effects. Panel (c) is a scatter plot of the outcome variable against the predicted endogenous variable, both twice demeaned according to our fixed effects.

Table 1. Summary Statistics

	(1) Mean	(2) SD	(3) 5%tile	(4) Median	(5) 95%tile
Insurance Companies					
Insurer CF (scaled by Assets)	0.04	0.09	-0.1	0.03	0.23
Log(1+CLO Purchase)	1.09	1.41	0.00	0.00	4.21
CLO Deals					
Deal Size ($ Millions)	507.04	197.75	303.09	468.87	814.88
Senior Tranche (% of Liabilities)	63.33	9.43	52.56	63.12	77.73
Mezzanine Tranche (% of Liabilities)	25.10	7.45	11.77	27.14	32.39
Tranche Coupon (%, Wtd. Average)	1.73	0.67	0.55	1.82	2.60
No. of Portfolio Firms	192.72	91.86	62.70	187.53	333.89
Loan Spread (%, Wtd. Average)	3.85	0.77	3.04	3.68	5.31
Loan Rating Score (Wtd. Average)	11.42	0.61	10.35	11.48	12.13
Loan Maturity (Months, Wtd. Average)	56.46	9.14	40.81	59.05	64.14
Insurer Holdings (%, Wtd. Average)	14.06	12.62	0.44	11.81	37.83
CLO Managers					
1(CLO Launched) (per Quarter)	16.44	37.07	0.00	0.00	100.00
# CLO Launched (per Quarter) (×100)	18.33	45.19	0.00	0.00	100.00
Log(1 + Launched Volume) (×100)	93.42	221.69	0.00	0.00	624.18
CLO Manager Exposure to Insurers	0.23	0.53	0.00	0.00	1.28
Manager Size ($ Billions)	2.50	3.80	0.07	0.95	9.82
Manager Age (in Quarters)	34.64	19.44	4.00	34.00	67.00
Firm Borrowing					
1(Loan Issuance) (per Quarter)	3.50	18.38	0.00	0.00	0.00
Relation Manager # CLO (per Quarter)	0.17	0.37	0.00	0.00	1.00
Log(Deal Amount)	5.99	1.25	4.00	5.99	8.04
All In Spread Drawn (in bps)	379.97	176.70	175.00	350.00	750.00
Maturity (in Years)	5.30	1.72	2.00	5.00	8.00
# Covenants	1.30	2.90	0.00	0.00	9.00
Firm Exposure to Insurers	0.08	0.24	0.00	0.00	0.58

Notes: Table 1 shows the summary statistics of key variables used in the empirical analysis.

Table 2. Effect of Insurers' Operating Performance on Their CLO Investments

	(1) Log(1+CLO Purchase)	(2) Log(1+CLO Purchase)
Insurer CF	1.22***	0.78***
	(0.28)	(0.30)
$\overline{y}$	1.09	1.09
SD(x)	.09	.08
Insurer FE		Y
Year FE		Y
Obs	3,389	3,208
Adj. R-squared	0.01	0.40

Notes: Table 2 shows the relationship between insurers' CLO investments and their operating performance. The specification corresponding to Column (2) is:

$$\mathrm{Y}_{i,t} = \beta \times \text{Insurer CF}_{i,t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t}$$

$\mathrm{Y}_{i,t}$ denotes outcomes for insurer i in year t: $\text{Log(1+CLO Purchase)}_{i,t}$ is the U.S. dollar value (in millions) of CLO tranches purchased, expressed in natural logarithm. Insurer $\text{CF}_{i,t-1}$ is insurer i's cash flows over assets in year $t-1$. α_i and α_t denote insurer and year fixed effects, respectively. We cluster standard errors at the insurer level.

Table 3. Evidence of Sticky Relationship between Insurers and CLO Managers

	(1)	(2)	(3)	(4)
	1(Insurer Investment)			
CLO Manager-Insurer Relation	0.84***	0.60***	2.79***	3.09***
	(0.11)	(0.11)	(0.33)	(0.32)
CLO Manager-Insurer Relation × Insurer CF		5.27***	5.13***	3.24***
		(1.01)	(1.01)	(1.07)
CLO Manager-Insurer Relation × Large Manager			-1.61***	-1.65***
			(0.36)	(0.35)
CLO Manager-Insurer Relation × Old Manager			-1.50***	-1.48***
			(0.32)	(0.31)
Insurer CF		1.25***	1.26***	
		(0.15)	(0.15)	
$\overline{y}$	1.21	1.21	1.21	1.21
CLO FE	Y	Y	Y	Y
Insurer FE	Y	Y	Y	
Closing Year FE	Y	Y	Y	
Insurer × Closing Year FE				Y
Manager × Closing Year FE				Y
Insurer × CLO Size Qtile FE				Y
Insurer × CLO Coupon Qtile FE				Y
Obs	1,202,492	1,202,492	1,202,492	1,202,443
Adj. R-squared	0.05	0.05	0.05	0.07

Notes: Table 3 shows how insurers' pre-existing relationships with CLO managers affect their decision to invest in new CLOs of those managers. The specification corresponding to Column (2) is:

$$\begin{aligned}1(\text{Insurer Investment})_{i,c(m,t)} = {} & \beta \times \text{CLO Manager-Insurer Relation}_{i,m,t-2} + \lambda \times \text{Insurer CF}_{i,t-1} \\ & + \gamma \times \text{CLO Manager-Insurer Relation}_{i,m,t-2} \times \text{Insurer CF}_{i,t-1} \\ & + \alpha_i + \alpha_c + \alpha_t + \varepsilon_{i,c(m,t)}.\end{aligned}$$

$1(\text{Insurer Investment})_{i,c(m,t)}$ is an indicator for whether insurer i invested in CLO c launched by manager m in year t (multiplied by 100). We focus on investments made within one year of deal formation. For each CLO, the data contains one observation for each potential investor, where the set of potential investors are insurers with CLO holdings during year t and before. $\text{CLO Manager-Insurer Relation}_{i,m,t-2}$ indicator is one if insurer i held a CLO of manager m in year $t-2$. $\text{Insurer CF}_{i,t-1}$ is insurer i's operating cash flow over assets in year $t-1$. $\text{Large Manager}_{m,t-1}$ and $\text{Old Manager}_{m,t-1}$ are indicators for when manager m's CLO assets and age are higher than the sample mean during year $t-1$. α_i, α_c, and α_t are insurer, CLO, and launch year fixed effects. Standard errors are clustered at the CLO level.

Table 4. Manager Exposure to Investor Demand and New CLO Creation

	(1) 1(CLO Launched)×100	(2) # CLO Launched×100	(3) Log(1 + Launched Volume)×100
CLO Manager Exposure to Insurers	3.71***	3.95***	23.46***
	(1.06)	(1.36)	(6.43)
$\overline{y}$	16.44	18.33	93.42
SD(x)	.53	.53	.53
Manager FE	Y	Y	Y
Year-Quarter FE	Y	Y	Y
Obs	13,634	13,498	13,427
Adj. R-squared	0.30	0.29	0.27

Notes: Table 4 shows the relation between CLO managers' exposure to relationship insurers' cash flows and their decision to launch a new CLO. The specification is:

$$\text{Y}_{m,t} = \beta \times \text{CLO Manager Exposure}_{m,t-1} + \alpha_m + \alpha_t + \varepsilon_{m,t}$$

$\text{Y}_{m,t}$ denotes outcomes of manager m in year-quarter t - (i) $\text{1(CLO Launched)}_{m,t}$ is an indicator for CLO issuance (multiplied by 100), (ii) $\text{\# CLO Launched}_{m,t}$ is the number of CLOs launched (multiplied by 100), and (iii) $\text{Log(1 + Launched Volume)}_{m,t}$ is the CLO issuance volume (in logs, multiplied by 100). $\text{Manager Exposure}_{m,t-1}$ is m's exposure to relationship insurers' cash flows in year-quarter $t-1$. α_m and α_t are the manager and year-quarter fixed effects. Standard errors are clustered at the manager level.

Table 5. Sticky Relationship Between Borrowing Firms and CLO Managers

	(1)	(2)	(3)
	1(Loan Included in CLO)×100		
Firm-CLO Manager Relation	25.570***	27.429***	24.474***
	(0.489)	(0.488)	(0.610)
Firm-CLO Manager Relation			0.682*
× CLO Manager Exposure to Insurers			(0.412)
Firm-CLO Manager Relation			-0.212
× Private Firm			(0.239)
Firm-Underwriter-CLO Manager Relation			3.754***
			(0.157)
Firm-CLO Manager Relation			3.699***
× Firm-Underwriter-CLO Manager Relation			(0.507)
$\overline{y}$	3.31	3.19	3.19
CLO FE	Y	Y	Y
Firm FE	Y		
Year-Quarter FE	Y		
Firm × Year-Quarter FE		Y	Y
Obs	6,599,186	6,576,474	6,576,474
Adj. R-squared	0.29	0.37	0.38

Notes: Table 5 documents the degree of stickiness exhibited by a fund manager at the inception of a new CLO. The specification is:

$$
\begin{aligned}
\text{1(Loan Included in CLO)}_{f,c(m,t)} = {} & \beta_1 \times \text{Firm-Manager Relation}_{f,m,t-1} \\
& + \gamma_1 \times \text{Firm-CLO Manager Relation}_{f,m,t-1} \times \text{Manager Exposure to Insurers}_{m,t-1} \\
& + \gamma_2 \times \text{Firm-CLO Manager Relation}_{f,m,t-1} \times \text{Firm-Underwriter-CLO Manager Relation}_{f,m,t-1} \\
& + \gamma_3 \times \text{Firm-CLO Manager Relation}_{f,m,t-1} \times \text{Private Firm}_{f,t-1} \\
& + \beta_2 \times \text{Firm-Underwriter-CLO Manager Relation}_{f,m,t-1} \\
& + \alpha_c + \alpha_{f,t} + \varepsilon_{f,c(m,t)}
\end{aligned}
$$

$\text{1(Loan Included in CLO)}_{f,c(m,t)}$ is an indicator which assumes a value of one if loans taken by firm f are included in a new CLO c launched by the manager m in year-quarter t, and zero otherwise (multiplied by 100). $\text{Firm-Manager Relation}_{f,m,t-1}$ is an indicator that equals one if loans from firm f were also held by existing CLOs of manager m during year-quarter $t-1$. $\text{Manager Exposure to Insurers}_{m,t-1}$ is m's exposure to relationship insurers' cash flows in year-quarter $t-1$. $\text{Firm-Underwriter-Manager Relation}_{f,m,t-1}$ is an indicator for when a bank has simultaneous relationships with firm f and manager m during year-quarter $t-1$. This implies that a bank that is a lead arranger on (one or more) outstanding loans of f is also an underwriter of (one or more) outstanding CLOs of m at time $t-1$. $\text{Private Firm}_{f,t-1}$ is an indicator which assumes a value of one for private firms, and zero for publicly listed firms. α_c, α_f, and α_t are CLO, firm, and launch year-quarter fixed effects, respectively. Standard errors are clustered at the CLO level.

Table 6. Effect of Investor CLO Demand on Loan Issuance

	(1) 1(Loan Issuance)	(2) Relation Manager # CLO	(3) 1(Loan Issuance)
Relation Manager # CLO	0.85***		1.17***
	(0.13)		(0.26)
Firm Exposure to Insurers		0.60***	
		(0.01)	
$\overline{y}$	3.5	.09	3.5
SD(x)	.3	.24	.3
Firm FE	Y	Y	Y
Industry-Year-Quarter FE	Y	Y	Y
F-statistic			6,012
Obs	536,028	536,028	536,028

Notes: Table 6 shows that firms take new loans when their relationship CLO managers launch a new CLO. The OLS specification is:

$$1(\text{Loan Issuance})_{f(j),t} = \beta \times \text{Relation Manager \# CLO}_{f(j),t-1} + \alpha_f + \alpha_{j,t} + \varepsilon_{f(j),t}$$

The first-stage IV specification is:

$$\text{Relation Manager \# CLO}_{f(j),t} = \beta \times \text{Firm Exposure to Insurers}_{f(j),t-1} + \alpha_f + \alpha_{j,t} + \varepsilon_{f,t} \quad (1)$$

The second-stage IV specification is:

$$1(\text{Loan Issuance})_{f(j),t} = \beta \times \text{Relation } \widehat{\text{Manager}} \text{ \# CLO}_{f(j),t} + \alpha_f + \alpha_{j,t} + \varepsilon_{f(j),t} \quad (2)$$

$1(\text{Loan Issuance})_{f(j),t}$ is an indicator for when firm f in industry j takes a new leveraged loan during year-quarter t (multiplied by 100). Relation Manager # $\text{CLO}_{f,t}$ is the relationship-weighted-average number of CLO deals launched by f's related managers during year-quarter t. It is calculated as:

$$\text{Relation Manager \# CLO}_{f(j),t} = \sum_m \frac{\text{Holding}_{f,m,t-4}}{\text{Outstanding Loan}_{f,t-4}} \times \text{\# CLO Launched}_{m,t} \quad (3)$$

$\frac{\text{Holding}_{f,m,t-4}}{\text{Outstanding Loan}_{f,t-4}}$ is the share of firm f's outstanding loans held by manager m during year-quarter $t-4$. Relation $\widehat{\text{Manager}}$ # $\text{CLO}_{f(j),t}$ denotes the predicted value estimated in the first-stage regression. $\text{Firm Exposure}_{f,t-1}$ is firm f's exposure to insurers' cash flows during year-quarter $t-1$. It is calculated as:

$$\text{Firm Exposure to Insurers}_{f(j),t} = \sum_m \frac{\text{Holding}_{f,m,t-4}}{\text{Outstanding Loan}_{f,t-4}} \times \text{Manager Exposure to Insurers}_{m,t} \quad (4)$$

$\text{Manager Exposure}_{m,t}$ is manager m's exposure to related insurers' cash flows in year-quarter t. α_f and $\alpha_{j,t}$ denote fixed effects at firm and industry-year-quarter level, respectively. We cluster standard errors at the firm level.

Table 7. Effect of Investor CLO Demand on Loan Issuance: Public/Private and Revolvers (IV Specification)

Sample	(1) Public	(2) Private	(3) All Firms
	1(Loan Issuance)		1(Revolver Issuance)
Relation Manager # CLO	-0.28	0.59**	-0.35
	(0.89)	(0.29)	(0.23)
$\overline{y}$	5.27	3.12	3.71
SD(x)	.29	.3	.3
Firm FE	Y	Y	Y
Industry-Year-Quarter FE	Y	Y	Y
F-statistic	861	4,767	6,012
Obs	78,732	442,321	536,028

Notes: Table 7 shows how new CLOs launched by relationship managers affect leveraged loan issuance in public (Column (1)) and private (Column (2)) firms. Column (3) shows the impact on revolvers that are typically retained on the bank balance sheet and not sold to CLOs. The IV specification is analogous to that in Table 6.

Table 8. Effect of Investor CLO Demand on Loan Characteristics (IV Specification)

	(1) Log(Loan Size)	(2) Maturity	(3) # Covenants	(4) Spreads	(5)
Relation Manager # CLO	-0.05	-0.49***	0.24	-45.43***	-27.76*
	(0.09)	(0.16)	(0.25)	(15.36)	(15.67)
Log(Loan Size)					-21.07***
					(3.76)
Maturity					38.77***
					(1.85)
# Covenants					0.55
					(1.06)
$\overline{y}$	5.99	5.3	1.3	379.97	379.97
SD(x)	.37	.37	.37	.37	.37
Firm FE	Y	Y	Y	Y	Y
Industry-Year-Quarter FE	Y	Y	Y	Y	Y
F-statistic	246	246	246	246	245
Obs	33,861	33,861	33,861	33,861	33,861

Notes: Table 8 studies how characteristics of borrowing firms' new loans change following new fund originations of relationship managers. Each observation corresponds to a leveraged loan in our sample and the IV estimation follows the analysis in Table 6. We cluster standard errors at the firm level.

Table 9. Effect of Investor CLO Demand on Purpose of New Leveraged Loans

	(1) General Purpose/Investments	(2) Refinance/Payouts	(3) LBO	(4) Others
Panel (A): Instrumental Variable Specification				
Relation Manager # CLO	0.11**	0.05*	-0.12**	-0.04**
	(5.42)	(3.11)	(5.05)	(2.00)
$\overline{y}$	0.45	0.09	0.39	0.07
SD(x)	.37	.37	.37	.37
Firm FE	Y	Y	Y	Y
Industry-Year-Quarter FE	Y	Y	Y	Y
F-statistic	273	273	273	273
Obs	38,290	38,290	38,290	38,290
Panel (B): Multinomial Logit—-Marginal Effect at Mean				
Firm Exposure to Insurers	0.17***	0.05***	-0.20***	-0.01
	(0.02)	(0.01)	(0.02)	(0.01)
$\overline{y}$	0.45	0.09	0.39	0.07
SD(x)	0.27	0.27	0.27	0.27
Year-Quarter FE	Y	Y	Y	Y

Notes: Table 9 shows the purpose of new loans issued when their relationship CLO managers launch a new CLO. The IV specification is analogous to that in Table 6. The outcome variables are indicator variables that equal one if the firm issued a leveraged loan with a stated purpose of Capital Investment (column (1)), Refinance (column (2)), LBO (column (3)), or Others (column (4)). α_f and $\alpha_{j,t}$ denote fixed effects at firm and industry-year-quarter level, respectively. We cluster standard errors at the firm level.

Online Appendices

A Additional Tables

Table A1. Heterogeneity in Insurers' CLO Investments

	(1) Senior	(2) Mezzanine	(3) Senior	(4) Mezzanine	(5) Senior	(6) Mezzanine
	1(CLO Purchase)		Log(1+CLO Purchase)		CLO Purchase/Assets	
Insurer CF	1.967**	2.470***	5.427***	7.571***	0.000	0.005***
	(0.778)	(0.778)	(2.012)	(2.161)	(0.002)	(0.002)
$\overline{y}$	5.05	4.23	9.43	9.24	.01	.01
SD(x)	.11	.11	.11	.11	.11	.11
Insurer FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Obs	57,605	57,605	57,605	57,605	55,909	55,897
Adj. R-squared	0.34	0.38	0.38	0.39	0.13	0.18

Notes: Table A1 shows the relationship between insurers' CLO investments and their operating performance. The specification is:

$$\text{Y}_{i,t} = \beta \times \text{Insurer CF}_{i,t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t}$$

$\text{Y}_{i,t}$ denotes outcomes for insurer i in year t: (i) $\text{1(CLO Purchase)}_{i,t}$ is an indicator for a CLO purchase transaction (multiplied by 100), (ii) $\text{Log(1+CLO Purchase)}_{i,t}$ is the U.S. dollar value of CLO tranches purchased, in natural logarithm (multiplied by 100), and (iii) $\text{CLO Purchase}_{i,t}/\text{Assets}_{i,t-1}$ is the value of CLO tranches purchased as a fraction of lagged assets excluding separated cells (multiplied by 100). Each outcome is separately shows for Senior tranches and Mezzanine tranches in a CLO deal. Insurer $\text{CF}_{i,t-1}$ is insurer i's cash flows over assets in year $t-1$. α_i and α_t are the insurer and year fixed effects. Standard errors are clustered at the insurer level.

Table A2. Robustness: New CLO Issuance

	(1) 1(CLO Launched)	(2) # CLO Launched	(3) Log(1 + Launched Volume)
CLO Manager Exposure to Insurers	2.30**	2.31*	15.64**
	(1.06)	(1.26)	(6.33)
L5.1(CLO Launched)	0.13***		
	(0.02)		
L5.# CLO Launched		0.14***	
		(0.02)	
L5.Log(1 + Launched Volume)			0.13***
			(0.02)
$\overline{y}$	17.05	18.34	93.5
SD(x)	.54	.54	.54
Obs	13,070	12,833	12,711
Adj. R-squared	0.31	0.29	0.27
Manager FE	Y	Y	Y
Year-Quarter FE	Y	Y	Y

Notes: Table A2 shows the relation between CLO managers' exposure to relationship insurers' cash flows and their decision to launch a new CLO after controlling for possible confounding factors. We control for past deal-making activity. The specification corresponding to Column (1) is:

$$\begin{aligned} \text{1(CLO Launched)}_{m,t} = \beta_1 \times \text{CLO Manager Exposure to Insurers}_{m,t-1} \\ + \beta_2 \times \text{L5.1(CLO Launched)}_{m,t-5} + \alpha_m + \alpha_t + \varepsilon_{m,t} \end{aligned}$$

where $\text{L5.1(CLO Launched)}_{m,t-5}$ is the indicator for CLO issuance for manager m in year-quarter $t-5$. We control for issuance in $t-5$ because the manager exposure measure is calculated using manager-insurer relationships as of $t-5$. α_m and α_t are the manager and year-quarter fixed effects. Standard errors are clustered at the manager level.

Table A3. Relationship between Insurer Share and CLO characteristics

	(1) Insurer Share	(2) MezzCoupon	(3) SenCoupon	(4) AvgCoupon	(5) Mezz/Total	(6) Senior/Total	(7) # Borrowers	(8) Spread	(9) Rating	(10) Maturity
Manager Exposure	0.05	0.78	0.46	0.75**	-4.01	0.02	-0.48	0.12	-0.00	0.01
	(0.15)	(0.67)	(0.38)	(0.29)	(4.25)	(0.09)	(0.33)	(0.46)	(0.00)	(0.05)
$\overline{y}$	6.28	297.04	113.37	174.45	2626.82	59.55	195.27	384.78	11.43	56.57
SD(Insurer Share)	1.88	1.9	1.89	1.89	1.88	1.88	1.93	1.93	1.93	1.93
Manager FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Closing Year-Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Obs	2,993	2,914	2,914	2,946	2,981	2,981	2,779	2,777	2,773	2,779
Adj. R-squared	0.24	0.65	0.62	0.57	0.27	0.23	0.61	0.52	0.58	0.63

Notes: Table A3 shows the relation between Insurer participation in the deal and deal characteristics. The specification is:

$$\mathrm{Y}_{c(m,t)} = \beta \times \text{Insurer Share}_{c(m,t)} + \alpha_m + \alpha_t + \varepsilon_{m,t}$$

$\mathrm{Y}_{c(m,t)}$ denotes several characteristics of CLO c launched by manager m in year-quarter t.