Active Loan Trading

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Abstract

Analyzing a novel dataset of leveraged loan trades executed by managers of collateralized loan obligations (CLOs), we document the importance of "active loan trades" – trades executed at a manager's discretion. Active loan sales are conducted at better prices than non-active sales and before rating downgrades. More active CLOs trade at better prices than less active CLOs, selling leveraged loans earlier and before they get downgraded. More active trading also increases the returns to equity investors and lowers collateral portfolio default rates. In contrast, tests with a placebo variable, capturing passive turnover, lead to insignificant results.

Keywords: Active management, Collateralized loan obligations (CLOs), Market efficiency, Structured finance, Syndicated loans

JEL: G11, G12, G23, G24

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Introduction

Leveraged loans – loans in which a lead bank arranges a syndicate of lenders – are a primary source of financing for low-rated corporations. These loans are traded over the counter (OTC) and in contrast to other OTC transactions, there is no systematic post-trade reporting for leveraged loan transactions. In this paper, we investigate trading patterns in this market by utilizing a novel dataset of loan transaction prices reported by collateralized loan obligations (CLOs). CLOs are structured finance products with an actively managed collateral pool comprised of leveraged loans and are one of the largest leveraged loan investors. Besides purchasing new loans from arranging banks, the CLO collateral manager can enhance the CLO performance by trading parts of the existing loan portfolio on the secondary market. This active loan trading by CLO managers is the focus of our paper.

We define active loan trading as transactions a CLO manager executes to rebalance the collateral portfolio. Distinguishing active loan sales from other sales (henceforth non-active sales), we find that active loan sales are conducted at better prices than non-active sales. Furthermore, active sales predict rating downgrades. Motivated by this finding, we investigate if CLOs with different levels of active turnover, measured as the ratio between active sales and CLO size, execute loan transactions at different prices and find that CLOs with a higher active turnover trade loans at better prices than less active CLOs. In addition, active CLOs sell leveraged loans earlier than less-active CLOs and before rating downgrades. Turning to the implications of more active turnover for CLO performance, more active trading increases the returns to equity investors and, at the same time, lowers the default rate of the CLO's collateral portfolio. By contrast, using a placebo variable that captures non-active turnover (the ratio between non-active sales and CLO size), we find that non-active turnover predicts higher CLO collateral default rates.

The leveraged loan trading of CLOs provides an interesting laboratory for studying the impact of active portfolio management on loan transaction prices and managerial performance. In contrast to other active portfolio managers, CLOs face complex portfolio constraints which can prevent less-skilled managers from portfolio rebalancing. Contractually imposed performance-based tests for the collateral enforce a specific structure on the collateral portfolio, thereby limiting the risk-taking capability of CLOs. In rebalancing the collateral portfolio, a CLO needs to comply with these tests – it needs to find a potential buyer for part of the loan portfolio and find new loans that ensure compliance with the collateral tests. Given these challenges for portfolio rebalancing, we hypothesize that more of this active trading indicates good collateral management.

As a starting point of our analysis, after splitting the sample of loan trades into active sales, and non-active sales, we find that active sales are conducted at better prices than non-active sales. Moreover, active sales predict rating downgrades. Next, we investigate the drivers of active turnover and find that CLO-specific characteristics (e.g. CLO age and size) have more explanatory power for active turnover than collateral portfolio characteristics (e.g. diversification and average time to maturity), refuting a mechanical link between active turnover and the liquidity of the CLO collateral portfolio.

Given the higher transaction prices for active sales and their predictive power for rating downgrades, we next investigate if more active and less active CLOs differ in their trading patterns. To that end, we split the sample of CLOs into three portfolios, based on their quarterly active turnover, and rebalance the portfolios every quarter. Comparing the average transaction prices of the most active and least active CLOs, we find that more active CLOs, on average, sell loans at \$5.47 higher prices (relative to \$88.60) than less active CLOs. In addition, more active CLOs purchase cheaper loans than less active CLOs, but the average difference of \$0.37 (relative to \$96.93) is small compared to the difference in sales prices. We next compare active and less active CLO manager's transaction prices of the same loan, for trades executed within the same month. Studying these matched transactions, we find that high turnover CLOs earn 9 cents (on a 94 dollar transaction) more when selling the same loan in the same month as low turnover CLOs, and pay 5 cents less (on a 98 dollar transaction) when purchasing the same loan at the same time. Despite the lower economic magnitude, both price differences are statistically significant at a 1% level. In line with our intuition that finding a potential loan buyer is more difficult than simply purchasing a loan on the primary market (where price differences across loan buyers are smaller), the difference in sales prices is considerably larger than the difference in purchase prices for both tests. Hence, we focus our next tests on loan sales.

Comparing the findings for raw transactions and matched transactions, we note that the average difference between sale prices executed by active and less active CLOs is almost 100 times larger for the raw transaction sample. Hence, we next investigate if more active CLOs are better capable of timing the leveraged loan market by selling non-performing loans earlier. To that end, we compare transaction prices of the same loan without controlling for the timing of the transaction and find that high turnover CLOs earn 95 cents more (relative to a \$94.59 principal) when they sell the same loan as a low turnover CLO. Investigating our timing hypothesis, we find that high turnover CLOs sell 111 days earlier than low turnover CLOs. In addition, when high turnover CLOs sell a loan, the loan rating is significantly higher than when low turnover CLOs sell the same loan, suggesting that more active CLOs are better in anticipating deteriorating loan conditions.

Motivated by the large differences in transaction prices between active and less active CLOs, we next investigate if more active trading impacts the overall CLO performance. To that end, we compare the performance of the most active and least active CLOs, where we form portfolios using information from the previous quarter. We find that more active CLOs generate higher returns to their equity investors and have lower collateral default rates. Most noticeably, the percentage of defaulted loans is over 50% higher for the least active CLOs, compared to the most active CLOs, suggesting that the most active CLOs are better capable of avoiding defaults in their loan portfolios. As a placebo test, we also sort CLOs into portfolios based on their non-active turnover, measured as sales without matching purchases within a 7-day time window, and find no significant difference in equity returns but a significantly higher default rate for CLOs with more passive turnover.

To conclude our investigation of the CLO managers' performance, we check if CLO investors could utilize our active turnover measure to guide their investment choices. We compute the average active turnover of each CLO in the first observed year and split the CLO sample into three portfolios, based on first-year active turnover. Similar to the previous portfolio splits, we find that more active CLO managers outperform less active managers. Most notably, using a subset of closed CLOs for which we observe all available cash flows, we compute the internal rate of return (IRR) and find that CLOs with a high initial active turnover have an IRR of 14% compared to an IRR of 2% for the less active CLOs.

The drawback of comparing portfolios of CLOs with different levels of active turnover is that it does not allow us to control for other effects. Hence, as a robustness test, we run panel regressions of transaction prices and CLO performance on active turnover. We find that, even after controlling for transaction size, loan time to maturity and rating, as well as various CLO and collateral portfolio characteristics, CLOs with higher active turnover sell leveraged loans at higher prices than CLOs with a lower active turnover. Similarly, CLOs with a higher active turnover in the previous quarter have higher equity payments and lower collateral default rates, even after controlling for CLO and collateral portfolio characteristics.

Related Literature

We study the link between active portfolio management by CLOs and the quality of their leveraged loan transactions. In that, our research relates to the literature on CLOs and structured finance, the literature on leveraged loans and trading in OTC markets, and the literature on active portfolio management. Structured finance issuance data from Bank of America illustrate the growing importance of CLOs: Between 2006 and 2016 there was an increase in both the absolute CLO issuance (from $64 billion $83 billion) and the share of CLOs in the overall structured finance issuance (from 26% in 2006 to 98%). Given this recent surge in popularity, investigating CLOs and their active portfolio management is crucial. Benmelech and Dlugosz (2009) give a detailed overview of rating practices in the CLO market and find that most CLOs have a similar "boiler-plate" structure. More recently, Liebscher and Mählmann (2016) find that the best CLO managers (measured by their past returns) keep outperforming their peers despite of new capital inflows. This finding contradicts the cash flow-performance relationship documented for mutual funds by Chevalier and Ellison (1997) and challenge the theory by Berk and Green (2004) on active management. Our finding that CLOs with more active trading get better transaction prices explains why an increase in assets under management does not weaken future CLO performance.

The CLO collateral portfolio comprises leveraged loans, which are syndicated loans to credit-risky corporations. Unlike stocks, these loans trade in an opaque OTC market where it is crucial to pick the right loans. Benmelech, Dlugosz, and Ivashina (2012) and Bord and Santos (2015) debate whether CLOs differ from other securitizations in the sense that there is no adverse loan selection problem for CLOs. The effects of securitization on leveraged loan prices are studied by, among others, Ivashina and Sun (2011), Nadauld and Weisbach (2012), and Shivdasani and Wang (2011). Ivashina and Sun (2011) show that institutional demand for buying leveraged loans by CLOs can decrease loan prices. Nadauld and Weisbach (2012) and Shivdasani and Wang (2011) study the influence of securitization on corporate debt and leveraged buyouts, respectively. Loan sales have been studied by Gatev and Strahan (2009) who find that banks are a primary investor in illiquid loans and by Drucker and Puri (2008) who study the link between loan characteristics and its propensity to be sold. We contribute to this literature by investigating trade-level data of leveraged loan transaction on the secondary market.

Our findings suggest an inefficiency in the leveraged loan market that enables more active CLOs to outperform less active CLOs by selling deteriorating loans early. Thereby, we contribute to the current debate on whether active portfolio management can improve the investor returns. For example, Pastor, Stambaugh, and Taylor (2017) find that more active mutual fund managers outperform less active managers. We find a similar result for CLOs, where more active CLOs have higher equity returns and lower collateral default rates. In addition, Busse, Tong, Tong, and Zhang (2016) find a positive relationship between trading frequency and portfolio returns for institutional equity investors. Our findings add to this literature by showing that the effects of more active management are even more pronounced in the leveraged loan market. To the best of our knowledge, our paper is the first one to investigate leveraged loan transactions, executed by CLOs.

The remainder of the paper is organized as follows. We provide a brief background about CLOs in Section 1 and describe our dataset and variable construction afterwards in Section 2. Section 3 provides motivating evidence for investigating active turnover. Section 4 contains our main analysis and we present additional regression analysis in Section 4. Section 6 concludes.

1 CLOs and Leveraged Loans

We now summarize the relevant CLO features for our analysis, focusing on the CLO manager and the underlying collateral portfolio. Like other structured finance products, the securities issued by the CLO have a strict seniority ranking. The equity tranche takes the first losses of the underlying portfolio and the senior tranche only suffers losses if all other tranches have already defaulted. The securities issued by the CLO are backed by an asset portfolio, which mainly consists of leveraged loans. These loans are tradable on a secondary market and allow for a manager who, besides the initial selection and purchase of the loan portfolio, purchases and sells leveraged loans throughout the CLO's lifetime.

A leveraged loan is defined as "a syndicated loan given to a non-investment-grade company or a loan that exceeds a certain interest threshold, for instance, LIBOR + 125 basis points" (LSTA, 2013). As we can see from the definition, leveraged loans are loans to risky corporations.[1] In addition, leveraged loans are syndicated, meaning that a lead bank, called

[1]Lower-rated corporations who need to raise large amounts of debt that exceed normal loan volumes have

the arranger, organizes the loan issuance with several counterparties to raise the required volume. At issuance, the arranger searches for investors to co-finance the loan, which makes it relatively easy for CLOs to purchase leveraged loans. On the other hand, selling a leveraged loan is more difficult. While the notional amount of leveraged loans outstanding is huge, there is a small secondary market for leveraged loans, which makes finding a counterparty difficult. Hence, as we explain in more detail in the next section, a high CLO turnover can point to better managerial skill.

To understand the typical CLO and leveraged loan size, note that CLOs only invest in a small fraction of a leveraged loan. The average leveraged loan notional is approximately USD 523 million (e.g. Benmelech et al. (2012)) while, in our sample that we describe in the following section, the average number of leveraged loans in a CLO portfolio is 352 and the average CLO balance of USD-denominated CLOs is approximately USD 510 million. Hence, a CLO manager only invests in a small fraction of a leveraged loan. The large number of leveraged loans is because the CLO manager is required to hold a diversified loan portfolio that mitigates the default risk of the senior tranches. We next discuss the CLO manager's incentives and constraints in more detail.

1.1 The Manager's Incentives and Constraints

The CLO manager receives a compensation in the form of three different fees. First, a senior fee, which is around 15 basis points of the CLO balance. Usually, this fee has the highest priority in the cash flow waterfall and is paid to the manager before the interest on the senior tranches. Second, a junior fee of approximately 30 basis points if all cash flows to

two financing options, issuing bonds or syndicated loans. See Denis and Mihov (2003) and Altunbas, Kara, and Marques-Ibanez (2010) for more details on this trade-off.

senior and mezzanine tranches are made and the collateral tests (described below) are met. Finally, an incentive fee, which is paid to the manager if all the criteria for the junior fees are fulfilled and the CLO equity returns exceed a pre-specified threshold. The incentive fee is approximately 20% of the payment to the equity investors but can vary significantly across CLOs. This complex compensation structure, combined with the fact that junior and senior tranche holders might have different incentives, distinguishes CLOs from other actively managed portfolios such as mutual funds.

Besides the complex compensation structure, the CLO manager has to comply with a variety of constraints.[2] As described by Aufsatz (2015) in an industry-research note, there are three major constraints. First, the loan portfolio must fulfill a pre-specified diversity score, avoiding concentration in specific issuers or industries. Second, managers can only invest in "eligible" assets, which are assets that are consistent with the structure of the CLO. For example, a manager of a U.S. CLO must allocate most of the collateral portfolio to U.S. dollar denominated assets. Third, the amount invested in risky loans that are rated as triple-C or below may not exceed a pre-specified threshold. Hence, high portfolio turnover could also be due to rating deteriorations in the loan portfolio, which force the CLO manager to sell triple-C rated loans. We label forced trades as "non-active trading" and next describe the different reasons for non-active trading.

[2] In general, the CLO manager's portfolio constraints are tighter in CLOs issued after the financial crisis. Further, with the Volker rules becoming effective, CLO managers are also required to retain 5% of the CLO risk on their own books.

1.2 Active Trading and Non-Active Trading

The simplest reason for a non-active trade occurs when a loan in the collateral portfolio matures. In that case, the manager uses the proceeds from the matured loan to invest in new loan(s). Other non-active trades occur in the first 3-6 months after closing of the CLO (referred to as the ramp-up period). In this period, the manager still needs to purchase part of the initial collateral portfolio. Together with the the potential difficulties in selling leveraged loans, these simple reasons for non-active trading highlight that loan sales are more informative for constructing a measure of active trading than loan purchases.

As described above, one reason for non-active loan sales are binding portfolio restrictions. In addition to these portfolio restrictions, the CLO's performance is monitored through a variety of collateral tests, which ensure the safety of the senior debt tranches. The most common collateral test is the over-collateralization (OC) test which measures the cushion of the par value of the CLO assets relative to the par value of the senior CLO tranche(s):

$$\frac{Asset\ Par}{CLO\ Tranche\ Par} \geq Limit. \tag{1}$$

The asset par value is the sum of the notional value of all performing loans and the notional value of all non-performing loans, which enter at a haircut. The CLO tranche par value is the current par amount of outstanding principal for the respective CLO tranche. If the tranche is not the most senior one, the CLO tranche par is the sum of the tranche par and all tranches above it in seniority. If the test result (1) is below the limit, the OC test is breached, which forces the CLO manager to sell part of the loan portfolio and repay a fraction of the debt tranches to comply with the test limit again. This is another reason for a non-active loan sale.

Overall, a large amount of non-active transactions is an indicator of poor collateral management rather than managerial skill. Therefore, to rule out that a sale was enforced to repay debt tranches, we construct our measure of active trading as one where loan sales and loan purchases occur within a small time window. Matching a loan sale with a loan purchase ensures that the manager is selling the loan to purchase new loans instead of selling the loan to repay tranche holders. In contrast to non-active trades, these trades are more likely based on the manager's view about the underlying credits regarding rating changes or changes in credit spreads.

While a simultaneous sale and purchase of different leveraged loans is more likely to positively influence the CLO performance, the CLO manager might simply sell loans with a high market value and buy loans with a lower market value but a higher principal value instead. This transaction is called "par building". A CLO manager engaging in par building avoids an OC test breach because the transaction increases the par value of the asset portfolio, thereby increasing the test cushion. In contrast to active trading based on managerial insights, it is not obvious that par building affects collateral default rates or CLO equity returns.

Finally, the CLO trading activity can vary over its lifetime, which comprises the following three periods. First, the first 3–6 months after issuance, called ramp up period. As mentioned above, the CLO manager still purchases parts of the loan portfolio in this period. However, given that we measure active turnover by matching loan sales to loan purchases, we do not expect this period to affect our active turnover measure. Second, the reinvestment period starts, which follows after the ramp up period and lasts for 3–6 years. In this period, the CLO manager can reinvest the proceeds from maturing loans and loan sales in new loans. Finally, in the amortization period, which starts after the reinvestment period, the CLO manager must dedicate most cash flows from maturing loans and loan sales to debt repayments. In this period, we expect active loan trading to be significantly lower than in the first two periods. Overall, this discussion shows that CLO age is an important control variable.

2 Data and Variable Construction

We describe the data underlying our analysis in this section. Our dataset contains information on the CLO structure and performance, the underlying collateral portfolios, and collateral transactions conducted by the CLO managers. The datasource is the Creditflux CLO-i database and we focus our analysis on U.S. CLOs and the period from January 2009 to December 2016. In this section we first describe the sample of CLOs we use in our analysis and summarize our sample of loans transactions, executed by CLOs. Afterwards, we construct our active and non-active turnover measures.

2.1 CLO Data

We apply the following four filters to the CLO-i database. First, we require the CLOs to report both tranche information and equity returns. These are the minimum information necessary to understand the CLO structure. Second, we drop CLOs where we are unable to identify the equity tranche, which is important to compute the CLO's leverage ratio and annualized equity payment. Third, we remove observations where the CLO's original tranche balance deviates from the median original balance of the CLO. If over 20% of the original balance observations deviate from the median, we deem that we are unable to determine the true original balance of the CLO and remove the CLO from the sample.[3] Finally, to avoid strong outliers driving our results, we remove observations where the CLO repaid over 50% of the original balance. CLOs that have repaid half of their original balance, tend to report extremely high default rates and/or high equity payments.[4] Our final sample comprises 892 CLOs.

The two main performance measures in our analysis are the payments to the most junior tranche holders, called equity payments, and collateral default rates, which measure the percentage of loans in default for each CLO. Panel A of Table 1 reports summary statistics of the different CLO characteristics and performance measures in our filtered database. As we can see from the table, the average annualized equity payment is 19.72% with a standard deviation of 8.30%. While annual equity payment is the annual percentage return CLO equity investors receive on their initial investment, these numbers are not the return on equity because the equity payment also includes return of principal. We address this potential issue in Section 4.2.1, where we compute the IRR for a subsample of closed CLOs and test the impact of active turnover on these figures. Finally, the average collateral default rate in our CLO sample is 1.65%, with a high standard deviation of 4.59%.

[**Table 1 about here**]

Panel A of Table 1 also shows that the percentage of CCC or below rated loans is, on average, 5.95%, and almost four times as high as the percentage of defaulted loans. The average CLO size is USD 510 million and CLOs hold, on average, 352 different leveraged

[3] Changes in the original balance are a clear mistake and happen, for example, when the reports for some tranches are missing in some months. This filter is relatively harsh and leads us to drop 77 CLOs. In addition, we remove outliers in another 186 CLOs, where the original balance deviates in some months.

[4] Our results are robust to using other cut-off values, such as 20% or 90%.

loans in their potfolio, which is in line with Benmelech et al. (2012). Family size shown in Table 1 gives the number of CLOs under the same CLO manager. On average, a CLO manager handles 12.62 CLOs, although there is a large cross-sectional variation in family size, ranging from a 10% quantile of 2.54 to a 90% quantile of 24.88. On average, CLOs have an equity share of 10.53% and are 41.94 months old. Finally, for a small subsample of CLOs, we have information on the fee structure. For a subset of CLOs, we also have information on the fee structure and note that the median senior and junior fees are 20 basis points and 30 basis points, respectively.

2.2 Transaction Data

We next describe the sample of CLO collateral transactions, which enable us to obtain insights into leveraged loan transactions. The observations include information on the loan in question, the transaction price, and the transaction date. The dataset comprises purchases and sales made by CLOs in our filtered sample and we focus on term leveraged loans, denominated in USD, which comprise over 90% of the transaction data sample. We delete observations with obvious reporting mistakes in the price or the size of the transaction, namely zero or negative values or prices above \$120 or below \$15.[5] Finally, 14% of the transactions have a price equal to \$100, which is most likely a default value used when the actual transaction price is not observed. We delete these observations from our sample but note that the results are robust to including transactions with a price equal to \$100.

We report summary statistics of transaction prices, trade size, loan rating, and loan maturity in Panel B of Table 1. The sample comprises almost half a million transactions

[5]Most of these misreportings occur in the early part of the sample.

with 196,312 sales and 280,612 purchases, indicating that approximately one third of the purchased loans are held until the loan either matures or defaults. The average transaction size is USD 1.06 million, ranging from a 10% quantile of USD 0.13 million to a 90% quantile of 2.45 million. Splitting these numbers into loan purchases and sales, the average transaction size is USD 1.2 million and USD 0.8 million, respectively (we do not report these separate numbers in the table to conserve space). The credit rating and loan maturity are available for a subsample of 245,179 and 343,870 of the traded loans and the average traded loan has a rating of B+ and a time to maturity of 4.98 years. Again, splitting these numbers into purchases and sales, the loans in our sample have an average 5.2 years to maturity and an average B+ rating when purchased, and an average of 4.5 years to maturity and an average B rating when they are sold.

2.3 The Active Trading Measure

As noted in section 1.2, a CLO manager can be forced to sell loans (e.g. after a collateral test breach) or to purchase new loans if part of the collateral portfolio matures. Hence, we need to distinguish between these non-active trades and active trades which occur at the CLO manager's discretion. To distinguish active from non-active trades, we first identify active sales by matching the cash-flows from loan sales at day i (CF_i^{Sales}) to the cash-flows of loan purchases (CF_i^{Purch}) exectuted within a 3-window:

$$\text{ActiveSale}_{i,3} := \min\left(CF_i^{Sales}, CF_{k\in[i-3,i+3]}^{Purch}\right). \tag{2}$$

Equation 2 identifies transactions where the manager has sold part of the loan portfolio to purchase new loans.

We then construct our measure of active turnover as follows. On each day we compute $\text{ActiveSale}_{i,3}$, where we remove any previously matched purchases to avoid double-counting of loan purchases. Afterwards, we aggregate all active sales within quarter t and divide this figure by the total CLO liabilities in quarter t. In summary, our measure of active turnover is defined as:

$$\text{ActiveTurnover}_t := \sum_{i \in t} \frac{\text{ActiveSale}_{i,3}}{CLO\ Tranche\ Par_t}. \tag{3}$$

Next, we construct a measure of non-active turnover that comprises all sales without matching expenses from loan purchases. As before, we take the sum of all non-active transactions in quarter t and divide by the total CLO liabilities in quarter t. In contrast to the 3-day window for active trades, we use a 7-day window to identify non-active trades to ensure that there is no matching purchase withing a short time window.[6] Our measure for non-active trading is defined as:

$$\text{PassiveTurnover}_t := \sum_{i \in t} \frac{CF_i^{Sales} - \text{ActiveSale}_{i,7}}{CLO\ Tranche\ Par_t}. \tag{4}$$

Panel C of Table 1 provides summary statistics for the active and non-active turnover measures. Active turnover is on average 1.38%. It varies from a 10% quantile of 0.22% to a 90% quantile of 2.66%, illustrating that there is a large variation in trading activity across CLOs. Non-active turnover is on average 0.78%, ranging from a 10% quantile of 0.05% to a 90% quantile of 1.53%. The median active turnover is 0.99% and the median non-active turnover is 0.45%, indicating that approximately two thirds of the loan sales are classified

[6] Our results are robust to using different time windows, like using the same 3-day window for both active and non-active turnover or using the same 7-day window for both active and non-active turnover.

as "active."

3 Understanding Active and Non-Active Turnover

In this section, we explore the loan transaction data in two steps. First, we compare active and non-active loan sales and test if the nature of the transaction affects the sale price and has predictive power for the future credit rating of the sold loan. Afterwards, we investigate the drivers of active turnover and non-active turnover, testing if the trading behavior of a CLO is linked to its characteristics or its collateral portfolio.

3.1 Active and Non-Active Loan Sales

In this section, we focus our analysis on loan sales because our construction of the active turnover measure allows for an easy identification of "active sales," i.e. sales for the purpose of portfolio rebalancing. By contrast, loan purchases are more frequent and distinguishing "active purchases" from purchases that occur, say, to replace a maturing loan, is difficult. To explore the difference between active and non-active loan sales, we run panel regressions of the following form:

$$\begin{aligned} Price_{i,t} = \alpha + \beta^{Active} FracActive_{i,t} + \\ + \beta^{TTM} TTM_{i,t} + \beta^{Principal} \log(Principal)_{i,t} + \beta^{Rating} Rating_{i,t} + \varepsilon_{i,t}. \end{aligned} \tag{5}$$

In a first step, we regress the sale price of loan i at time t on $FracActive_{i,t}$ – the fraction of notional for each sale that we can match to a purchase within a 3-day window – which is defined as:

$$FracActive_{i,t} := \frac{ActiveSale_{i,t}}{CF^{Sales}_{i,t}}.$$

We assign the same $FracActive$ if multiple sales occur at the same day. In that specification, the intercept α corresponds to the average sales price and β^{Active} can be interpreted as the difference between a non-active and an active sale. As shown in the first panel of Table 2, active sales are executed at significantly higher prices compared to non-active sales. On average, an active sale is conducted at a \$1.612 higher price (relative to a price of \$93.475) compared to a non-active trade. The difference between active and non-active trades is statistically significant at a 1% level. In a second step, we add year-month fixed effects, the loan time to maturity, loan transaction principal, and loan rating, as controls. As shown, in the second panel of Table 2, the difference between active and non-active sales remains significant at a 1% level, despite a drop in the economic significance of active trading.

[Table 2 about here]

In addition to the price tests, we investigate if more active sales contain more information about the future credit quality of a loan issuer by testing their predictive power for rating downgrades. To that end, we compute the rating change for each transaction as change from current rating to the credit rating six months, which we compute as the average credit rating among all available transactions of that loan after six months of the transaction date. We then replace $Price_{i,t}$ in Equation (5) with $Rating\ Change_{i,t}$ and repeat our analysis. The last two panels of Table 2 exhibit the results of the rating change test. The third panel shows the results without adding controls and we can again interpret the intercept as the average rating change and β^{Active} as the difference between active and non-active loan sales. While the intercept is not significantly different from zero, $FracActive_{i,t}$ is significantly negative, suggesting that the loan quality tends to deteriorate after an active sale. Taken together, the results in the third panel suggest that, approximately, one out of 11 actively sold loans is downgraded within six months of the loan sale. The results remain robust to adding time to maturity, principal amount, current rating, and time fixed effects as controls.

Overall, these findings suggest that active CLO trades are executed at better prices and before the credit quality of an underlying deteriorates. Next, we investigate the drivers for active and non-active CLO turnover.

3.2 The Drivers of Active and Non-Active Turnover

We run a panel regression of active CLO turnover and non-active CLO turnover of the following form:

$$\begin{aligned} Turnover_{i,t} = \alpha + \beta^{Size}\log(Size_{i,t}) + \beta^{Age}Age_{i,t} + \beta^{Reinv}1_{\{t\leq Reinv_{i,t}\}}(t) + \beta^{Fam}Family\ Size_{i,t} \\ + \beta^{Ret}Equity\ Ret_{i,t} + \beta^{ES}Equity\ Share_{i,t} + \beta^{Test}1_{\{\text{Test breach}_{i,t}\}} + \beta^{Def}Perc\ Def_{i,t} + \\ \beta^{TTM}AvgTTM_{i,t} + \beta^{Diversif}Diversif_{i,t} + \varepsilon_{i,t}. \end{aligned} \tag{6}$$

The first set of explanatory variables is related to the CLO characteristics and lifetime. They include the CLO size ($Size_{i,t}$) and Age ($Age_{i,t}$), a dummy variable that is equal to one if the CLO is still in its reinvestment period ($1_{\{t\leq Reinvest_i\}}$), the number of CLOs under the same management firm ($Family\ Size_{i,t}$), the annualized payments to equity investors in the current period ($Equity\ Ret_{i,t}$), and the ratio between equity tranche balance and total CLO balance ($Equity\ Share_{i,t}$). In a second step, we add control variables that capture the quality of the CLO collateral portfolio. These variables include a dummy variable that is equal to one if a senior OC test has been breached ($1_{\{Test\ breach_{i,t}\}}$), the percentage of defaulted loans in the collateral portfolio ($Perc\ Def_{i,t}$), the average time to maturity of the loan portfolio ($AvgTTM_{i,t}$), a measure of portfolio diversification ($Diversif_{i,t}$).[7] The results from this panel regression are exhibited in Table 3.

[**Table 3 about here**]

We examine active CLO turnover in the first two panels and non-active turnover in the last two panels. In both cases, we first use explanatory variables capturing CLO characteristics and add controls for the portfolio holdings in a second step. Examining the results, the adjusted R^2 values suggest that CLO characteristics explain more of the variation in active turnover compared to non-active turnover. The additional portfolio holding controls double the explanatory power of our regressions for non-active turnover but only leads to a small increase in adjusted R^2 for active turnover.

Turning to the regression coefficients, we first observe a higher active turnover and a lower non-active turnover for larger CLOs, indicating that a larger portfolio enables a collateral manager to trade more. Age and Reinvestment Dummy suggest that younger CLOs and CLOs still in their reinvestment period engage in more active trading, while there is a significant increase in non-active trading after the reinvestment period. Interestingly, the CLO family size is an insignificant explanatory variable which tends to lower active and non-active turnover, suggesting that CLOs under the same manager do not trade significantly more with each other. Higher equity returns increase both active turnover and non-active

[7] The measure of portfolio diversification is constructed as follows: First, we compute the percentage of loans within a certain industry held by the CLO. Second, we compute an Herfindahl-Hirschman Index (HHI) of the portfolio holdings, that is, we compute the sum of squared industry percentages. Finally, we use $1 - \frac{HHI}{10{,}000}$ as our proxy for portfolio diversification, where we divide by the highest possible HHI, which is $10,000$.

turnover and we explore the relationship between active turnover and equity returns in more detail in the following section. Finally, CLOs with a larger equity share exhibit both more active trading and more non-active trading.

Inspecting the results after afdding CLO collateral portfolio controls reveals that CLOs with a worse quality of collateral do less active trading. Active turnover drops after test breaches and is lower for CLOs with more defaulted collateral. The opposite is true for non-active turnover which increases if a test breach occurs and if collateral default rates increase. The remaining two controls are only significant for active turnover. CLOs that have a collateral portfolio with a longer average time to maturity have a higher active turnover. Portfolio time to maturity tends to have the opposite effect for non-active turnover. Finally, better diversified CLOs have more active trading and less non-active trading.

4 Analyzing CLOs with Different Trading Activity

Motivated by the results from the previous section, we next test our main hypothesis: CLOs with high active turnover trade at better prices and outperform CLOs with low active turnover. To test this hypothesis, we split the overall sample of CLOs into three buckets (high active turnover, medium active turnover, and low active turnover) and run two sets of tests. First, we test whether CLOs with higher active turnover trade loans at better prices than CLOs with a lower turnover. Afterwards, we form the portfolios based on turnover in the previous quarter and test if active turnover or non-active turnover can predict CLO performance in the next quarter.

4.1 More Active CLOs Trade at Better Prices

We first compare loan transactions by high and low turnover CLOs. To get CLO portfolios with significantly different active turnover, we use the quarterly active turnover measure described in Section 2.3 and form three portfolios: High turnover, medium turnover, and low turnover. The portfolio formation is based on the active trading measure within the same quarter and we rebalance the portfolios every quarter. Figure 1 shows that high turnover CLOs buy and sell leveraged loans at better prices than low turnover CLOs. As shown in the figure, more active CLOs sell more leveraged loans above par value and while less active CLOs sell more loans with a market value below 55%. Panel (b) of Figure 1 shows that the picture is reversed for purchases, where less active CLOs tend to purchase loans at par value.

[**Figure 1 about here**]

Overall, Figure 1 suggests that high turnover and low turnover CLOs exhibit different trading patterns, both when purchasing loans, where more active CLOs pay less, and, even more so, when selling loans, where more active CLOs are able to sell loans at much higher prices. In Panel A of Table 4 we test if there is a significant difference between the transaction prices that more active and less active managers obtain. We first compare the transactions of the most active and least active CLOs and find that more active CLOs, on average, sell loans at 5.47% higher prices (t-statistic of 5.15) than less active CLOs. More active CLOs also purchase cheaper loans than less active CLOs, but the average difference of -0.37% (t-statistic of -2.54) is small compared to the difference in sale prices. Note that these results do not control for type of loans and the timing of the loan trade. That is, we cannot yet claim that more active investors get better prices when they trade assets with a similar risk.

We investigate this hypothesis next.

[Table 4 about here]

4.1.1 Trading and Prices

We now investigate the link between active trading and trade prices, proceeding in four steps. First, we test if high turnover CLOs and low turnover CLOs trade at different prices when trading the same loan in the same month. Second, we compare the transaction prices of loans traded by high and low turnover CLOs at any point in time. Third, we repeat our analysis on the CLO manager level instead of comparing individual CLOs. Finally, we use a subset of transaction with the same principal balance to control for transaction size.

Investigating trades of the same loan, executed in the same month, we compare the average transaction prices for high turnover, medium turnover and low turnover CLOs in Panel B of Table 4. For each loan and each month, we compute the median sale and purchase price for high, medium, and low turnover CLOs. We then use the subset of loan-months where both high and low turnover CLOs sell the same loan in the same month and report the average sale price of high turnover, medium turnover, and low turnover CLOs. We find that high turnover CLOs, on average, get 9 cents more on a $94 transaction when selling the same loan in the same month as low turnover CLOs. This difference of 9 cents is statistically significant at a 1% level despite its low economical significance. For loan purchases, we find that high turnover CLOs, on average, pay 5 cents less buying the same loan in the same month as low turnover CLOs. As for sales, the difference in price is statistically significant at a 1% level despite its low economic significance.

So far, these results document that high turnover CLOs get better prices than low turnover CLOs when trading the same loan in the same month. However, compared to the average price difference (without matching loan-months) of $5.47 for loan sales that we document in Section 3, the small difference of 9 cents for trades matched on the loan-month level trades seems surprising. Hence, we next consider the subset of loans sold by both high and low turnover CLOs without requiring that the transactions occurred within the same month. We focus on loan sales because the difference in unmatched transaction prices is more than 50 times larger than for the matched transactions. As explained above, a higher difference for loan sales is intuitive because finding a potential loan buyer is more difficult than purchasing a new loan on the primary market.

Turning to our second test, for each of the loan transactions and for each CLO turnover group, we compute the median sale price, sale date, and credit rating at the median sale date of all sales. We report the averages of these values across loans for each turnover group in Panel B of Table 4 (last three rows). We find a difference of $0.95 in transaction prices when a high turnover CLO sells the same loan as a low turnover CLO. Moreover, a high turnover CLO sells 111 days earlier than a low turnover CLO and the average numerical rating of the loans at the time they are sold is 7.4 for high turnover CLOs and 7.31 for low turnover CLOs. Though both numerical ratings correspond to a credit rating of B, there is a statistically significant difference in credit ratings for the two groups. Hence, high turnover CLOs tend to sell loans with better ratings than low turnover CLOs. Taken together, the results in Panel B suggest that more active CLOs get better prices when high and low turnover CLOs trade the same loan simultaneously. Furthermore, when we compare transactions without matching the transaction month, we find that active CLOs sell earlier, at a better price, and while the loan has a better credit rating.

4.1.2 Alternative Explanations?

As we have seen in Table 1, the average CLO manager is in charge of 12 different CLOs, which raises two potential concerns. First, industry practitioners indicated to us that several of the trades executed by individual CLOs could occur within the same family, for example, when a CLO manager wants to sell the same loan in various CLOs he would first transfers the loans to one CLO to sell them as one bundle. We alleviate this concern by excluding transactions executed at a price of $100, which is the most common price for these transactions. Second, Eisele, Nefedova, and Parise (2016) find that, for mutual funds, trades within the same fund family are more likely executed at a different price than the market price. They hypothesize that mutual fund managers use transactions within the same family to improve the performance of one "star fund." Hence, we next analyze whether our results remain intact if we compare CLO families instead of individual CLOs.

Hence, we investigate the results on the manager level in our third test. We first aggregate CLO turnover at the manager level and define manager turnover as the weighted average of the turnover of all CLOs under the same manager. We then sort CLO managers into high turnover, medium turnover, and low turnover buckets. Panel C of Table 4 exhibits the results for the manager level tests, following the same logic we used for individual CLOs in Panel B. As before, for each loan in the sample, we determine the median sale price, median sale date, and rating at the median sale date. We find that, on average, the high turnover managers earn $0.59 more on a transaction of $95 when they sell the same loan as a low turnover manager. Moreover, active managers sell, on average, 73 days earlier than the passive managers and tend to sell loans with a better rating. Overall, the manager level results are consistent with the individual CLO level tests: Compared to less active managers, more active managers trade earlier, at better prices, and while the loans have a higher credit rating. Hence, we can rule out that the better transaction prices are only driven by a spurious manager effect, arising, for example from managers' shifting loans across CLOs.

In our analysis up to this point, we did not control for transaction size even though it might influence prices. In stock markets larger transactions have a higher price impact and therefore a large sale drives the price down. The opposite is true in corporate bond markets where large participants, who are typically behind the large transactions, are better negotiators and therefore capable of obtaining tighter bid-ask spreads (see, for example, Feldhütter (2012)) and higher sale prices. Hence, the transaction volume can influence the sale price, although it is not a priori clear in which direction. To control for transaction size, we next analyze a subset of transactions with a similar volume.

CLOs execute sales at a wide range of transaction sizes but one large transaction cluster is around \$1,000,000. We therefore use a subset of transactions within the range of \$900,000 to \$1,100,000 to test the impact of transaction size. The results are exhibited in Panel D of Table 4. We report the same results as before but only include transactions with a size between \$900,000 and \$1,100,000, consider loans sold at least once by both high and low turnover CLOs at the appropriate transactions size. For each loan we compute the median price, the median transaction date and the loan rating at the median date, again only considering transactions of the appropriate size, and report averages across loans.

We find that, in this subsample, high turnover CLOs earn \$1.19 more when selling the same loan as low turnover CLOs. High turnover CLOs sell 139 days earlier and when the leons are 0.19 notches higher rated. Overall, Panel D of Table 4 suggests that the positive relation between high trading activity and favorable prices is even stronger when focusing on large transactions with a similar volume (recall that the average transaction size for loan sales is \$0.8 million). Hence, Panel D suggests that the benefit of being more active is stronger when the CLO sells larger shares of the loan portfolio.

4.2 More Active CLOs Perform Better

Next, we investigate whether the payments to equity tranche holders and the collateral default rates differ between high and low turnover CLOs. As before, we form portfolios based on active turnover now using the turnover in quarter $t-1$ to classify CLOs as high turnover, medium turnover, or low turnover and to predict CLO performance in quarter t. First, we use the active turnover measure constructed in Section 2.3 and test if there is a significant difference between the equity returns and default rates of high active turnover and low active turnover CLOs. We then run a placebo test with the non-active turnover measure, described in Section 2.3. In this placebo test, we form three CLO portfolios based on their non-active trading activity in quarter $t-1$ and analyze the difference between equity returns and default rates in the three portfolios.

As we can see from Panel A of Table 5, there is a significant difference between active turnover in quarter t for CLOs with a high turnover in quarter $t-1$ and CLOs with a low turnover in quarter $t-1$. Moreover, annualized equity payments decrease monotonically from CLOs with high turnover to CLOs with low turnover and there is a difference of 2.20% (t-statistic of 2.27) between the high- and low-turnover groups. Similarly, default rates increase monotonically from high turnover to low turnover CLOs and the difference between the high and low turnover groups is -0.76% (t-statistic of -5.93). Overall, these findings suggests that more active turnover predicts better CLO performance.

[Table 5 about here]

Turning to our placebo test with non-active turnover, we first note that more non-active turnover should not improve the CLO performance. If anything, a higher non-active turnover can indicate that the CLO is in financial distress which forces it to sell part of the loan portfolio to redeem senior note holders. In line with this intuition, Panel B of Table 5 shows that more non-active turnover does not predict a significant difference in equity returns. However, CLOs with more non-active turnover have significantly higher default rates with a difference of 1.79% (t-statistic 2.40), compared to less-active CLOs. Hence, more non-active turnover is indeed an indicator for deteriorations in the credit quality of the loan portfolio.

4.2.1 Making Money with Investments in Active CLOs

In this subsection, we investigate whether CLO investors could use our active turnover measure to guide their investment choices. To that end, we compute the average active turnover of each CLO in the first observed year and split the CLO sample into three portfolios, based on first-year active turnover. We then form three portfolios, using the remaining performance data. This split ensures that, in theory, an investor capable of observing the active turnover of CLO managers and the follow a buy and hold strategy in the most active CLOs.

In line with our previous results, Panel C of Table 5 shows that more active CLOs outperform less active CLOs. CLOs with the most active turnover have an average equity payment of 24.99% while CLOs with the least active turnover only pay an average of 20.58%

to their investors. Similarly, the percentage of defaulted loans is almost twice as high for the least active CLOs when compared to the most active CLOs. In addition, we use a subset of closed CLOs for which we observe all cash flows to compute the internal rate of return (IRR). Using the IRR instead of equity payments enables us to obtain a cleaner measure of CLO performance which is not affected by notional repayments. Comparing the IRR for high active turnover and low active turnover CLOs, we find a striking difference: CLOs with a high initial active turnover have an IRR of 14% compared to an IRR of 2% for the CLOs with a low initial turnover.

5 Regression Analysis

The previous section shows that CLOs with a higher active turnover trade at better prices and outperform less active CLOs. We now test the robustness of this finding in a regression setting, which enables us to control for other CLO or loan-specific characteristics.

5.1 More Active Turnover and Better Transaction Prices

In this section we further investigate the link between transaction prices and active CLO turnover by running panel regressions of transaction prices – separately for sales and purchases – on the active turnover measure, controlling for the time to maturity ($TTM_{i,t}$), principal ($Principal_{i,t}$), and rating ($Rating_{i,t}$) of the transaction, as well as a variety of CLO and collateral portfolio characteristics:

$$Price_{i,t} = \alpha_i + \beta^{Active} Turnover_{i,t}^{Active} + \beta^{TTM} TTM_{i,t}$$

$$+\beta^{Principal} Principal_{i,t} + \beta^{Rating} Rating_{i,t} + \gamma Controls_{j,t} + \varepsilon_{i,t}. \tag{7}$$

In the above regression, the subscipt i, t refers to a specific loan trade while the subscript j, t refers to a specific CLO characteristic at the time of the trade. $Turnover_{j,t}^{Active}$ is the active turnover measure constructed in Section 2.3 and we add time and loan type fixed effects to all regressions. In a second step, we add $Controls_{j,t}$, which are at the CLO level and include the ten explanatory variables from Equation (6) that we used before to explain active turnover in Section 3.2.

[Table 6 about here]

As we can see from Table 6, active turnover is a significant explanatory variable for both sales and purchases. To interpret the coefficient on $Turnover_{j,t}^{Active}$ we note that the standard deviation of active turnover is 0.04 and, hence, a one standard deviation increase in active turnover corresponds to a $5.268 \times 0.04 = 0.211$ dollar increase in sale price, after controlling for other CLO characteristics. Similarly, a one standard deviation increase in $Turnover_{j,t}^{Active}$ corresponds to a \$0.242 drop in purchases prices.

5.2 More Active Turnover and Better CLO performance

In this section we further investigate the relationship between active turnover and CLO performance. As in Section 3, we use the payoffs to CLO equity holders as a proxy for CLO returns and the percentage of defaulted loans in the CLO collateral portfolio as a measure of the CLO's riskiness. We then test whether our measures of active and non-active turnover have any predictive power for equity returns and defaults rates. In contrast to Section 3, we now estimate the impact of active turnover on returns and portfolio defaults using a panel regressions with the following controls:

$$Perf_{j,t} = \alpha + \beta^{Active} Turnover^{Active}_{j,t-1} + \gamma^{CLO} Controls^{CLO}_{j,t} + \gamma^{Collat} Controls^{Collat}_{j,t} + \varepsilon_{j,t}. \quad (8)$$

The dependent variable in this regression is either equity payment (the annualized cash return to equity holders), or percentage default (the average quarterly collateral default rate). We regress these performance measures on $Turnover^{Active}_{i,t-1}$ which is the lagged quarterly active turnover measure we constructed in Section 2.3, gradually adding the ten explanatory variables from Equation 6 that we used before to explain active turnover in Section 3.2. In a first step we only use the controls related to the CLO structure and add controls related to the collateral portfolio and time fixed effects in a second step.

[**Table 7 about here**]

As shown in the Table 7, active turnover is statistically significant for all four model specifications. From the first two specifications, we can see that a higher active turnover predicts a lower percentage of defaulted loans in a CLO portfolio. In the baseline specification, a one standard deviation increase in active turnover, corresponding to 4%, predicts a decrease of 0.16% in the collateral default rate. Adding portfolio controls and time fixed effects approximately halves the economic and statistical significance of the coefficient. From the last two regression specifications in Table 7 we can see that a higher active turnover predicts higher equity payments. In the baseline specification, a one standard deviation increase in active turnover predicts a 1% increase in equity payments. The effect remains significant after adding collateral controls and time fixed effects.

Overall, Table 7 shows that more trading activity improves CLO performance. This improved performance is reflected in both higher equity returns, which benefit junior tranche holders and lower default rates, which tend to benefit junior tranche holders.

6 Conclusion

In this paper, we analyze a novel set of leveraged loan transactions executed by managers of CLOs. After constructing a measure for active portfolio turnover of CLOs, we find that active loan sales are executed at better prices and predict rating downgrades. In addition, CLOs with a higher trading activity trade at better prices than CLOs with a lower trading activity. This finding is robust to controlling for transaction size and tests on the manager level instead of the individual CLO level. Moreover, we document that more active CLOs trade earlier than less active CLOs and sell loans with a higher credit rating. In addition to these trade-level tests, we find that higher active turnover predicts higher equity returns and lower CLO portfolio default rates. This finding is in line with previous research on active versus passive management in the case of equities, showing that more active managers are capable of outperforming the market. Placebo tests with an alternative turnover measure which captures non-active trading lead to insignificant or qualitatively different results, suggesting that our measure of active turnover is capable of capturing a unique skill of CLO managers.

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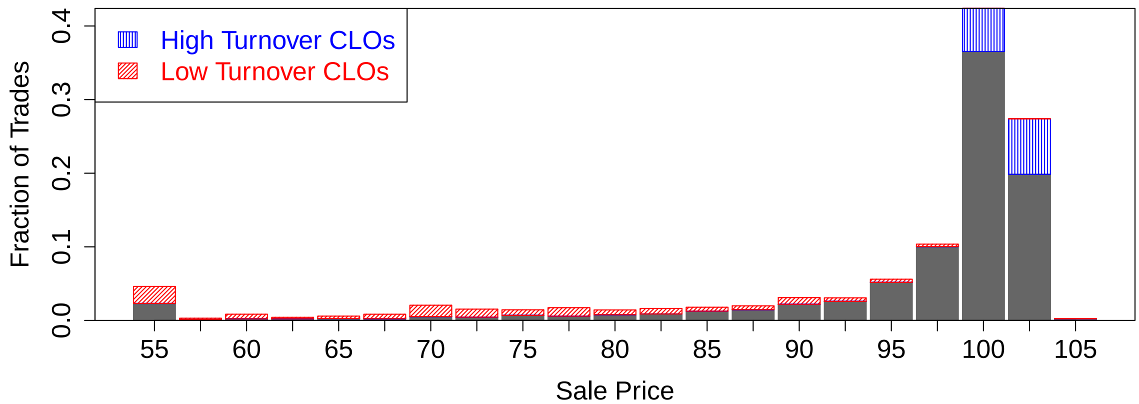
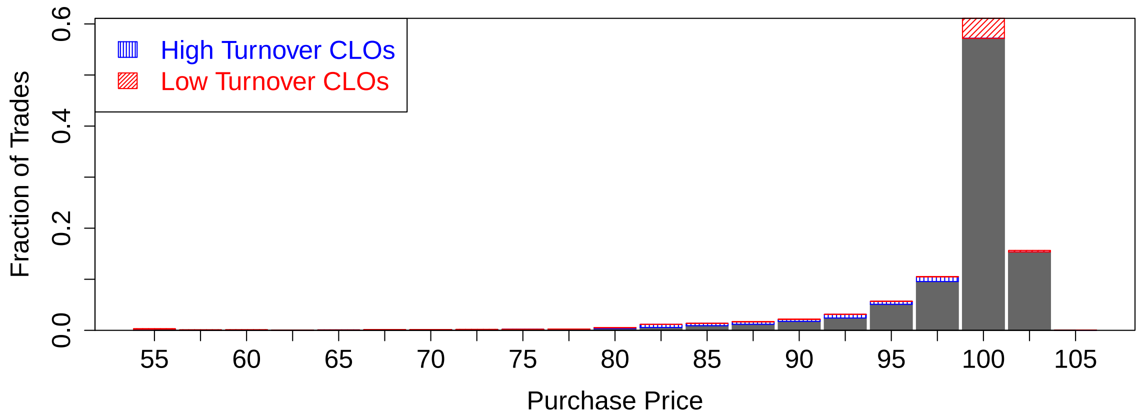


(a) Distribution of median prices



(b) Distribution of purchase prices

Figure 1: **Do CLOs with high active turnover trade at better prices?** We categorize transactions as high turnover, medium turnover, and low turnover based on the active turnover of the CLO which executed the transaction. The measure for active turnover is defined in Section 2.3. The figure shows the empirical distribution of the median sale price (panel (a)) or median purchase price (panel (b)), respectively. For each loan we find the median high turnover and low turnover price over the full sample period of transactions and include the median prices in the computation of the empirical density. The sample period is January 2009 to December 2016. The sample of transactions consists of loans that are sold by both high and low turnover CLOs in this period.

Table 1: **Summary Statistics.** This table reports summary statistics of our filtered CLO and loan trade sample. Panel A reports CLO performance measures and other characteristics. Panel B reports summary statistics for loan transactions executed by CLOs in our sample. Panel C reports the summary statistics for the active and non-active turnover measures constructed in Equations (3) and (4). We report mean, standard deviation (std), 10% quantile (10%), median, 90% quantile (90%), and the number of observations (N) for transaction price and transaction size. In Panels A and C, we first compute CLO lifetime averages of all variables and then use these averages to compute mean, standard deviation (std), 10% quantile (10%), median, and 90% quantile (90%). The number of observations in Panels A and C refer to the number of CLOs with available data. The sample period for all data is January 2009 to December 2016.

	Mean	std	10%	Median	90%	N
Panel A: CLO characteristics						
Equity pmt (%)	19.72	8.30	10.39	19.67	27.58	892
Default (%)	1.65	4.59	0.00	0.65	4.00	892
CCC bucket (%)	5.95	3.29	2.68	5.40	9.62	892
Original Size	509.48	201.78	333.79	499.45	712.19	892
Family size	12.62	10.04	2.54	10.19	24.88	892
# Loans	352.24	187.11	158.65	318.93	602.47	892
Equity Share (%)	10.53	5.11	7.90	9.45	13.17	892
Age (months)	41.94	29.74	8.26	32.05	80.89	892
Panel B: Transaction Data						
Sale price	94.57	12.16	83.12	99.01	100.50	196,312
Purchase price	97.36	5.48	92.50	99.00	100.25	280,612
Transaction size (mill $)	1.06	1.41	0.13	0.69	2.45	476,924
Rating	B+	1.67	B-	B	BB	245,179
Maturity (years)	4.98	1.60	2.70	5.12	7.00	343,870
Panel C: Turnover measures						
Active turnover (%)	1.38	1.65	0.22	0.99	2.66	855
Non-active turnover (%)	0.78	1.44	0.05	0.45	1.53	855

Table 2: **Comparing active and non-active trades.** This table exhibits the results of regressing sale prices and future rating changes on *FracActive*, the fraction of sales notional that can be matched to a purchase within a 3-day window. TTM, log(*Principal*), and Rating are the time to maturity, principal amount sold, and rating, of the loan transaction. Heteroskedasticity robust standard errors, clustered at the issuer level are reported in parentheses. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016.

	Sale Price		Rating Change	
Intercept	93.475***	36.582***	−0.035	0.078
	(0.633)	(4.484)	(0.045)	(0.681)
FracActive	1.612***	0.645***	−0.053*	−0.074**
	(0.300)	(0.184)	(0.031)	(0.030)
TTM		0.573***		0.019
		(0.157)		(0.022)
log(*Principal*)		0.504***		0.066***
		(0.159)		(0.018)
Rating		2.921***		−0.091***
		(0.238)		(0.029)
time FE	*No*	*Yes*	*No*	*Yes*
Observations	172,580	132,437	60,206	45,974
Adjusted R^2	0.004	0.415	0.000	0.080

Table 3: **What drives active and non-active trading?** This table exhibits the results of regressing active turnover and non-active turnover on the indicated variables. log(Size) is the logarithm of the total balance of the CLO debt tranche. Age is the age of the CLO in years. Reinvest Dummy is an indicator variable that equals one if the CLO is still in the reinvestment period and zero otherwise. Family Size is the number of CLOs under the same manager. Equity returns are the annualized payments to equity tranche holders. Equity Share is the ratio between the CLO equity tranche and the CLO debt balance. Test breach dummy is a dummy variable that equals one if the CLO had an OC test breach and zero otherwise. Perc Default is the percentage of defaulted loans in the collateral portfolio. Average TTM is the average time to maturity of the CLO loan portfolio in years. Diversification is a diversification score based on the Herfindahl-Hirschmann Index that is described in more detail in Section 3. The numbers in parentheses are Newey-West t-statistics. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016, including all CLOs from our filtered sample.

	Activer Turnover		Non-Active Turnover	
Intercept	-9.39^{***}	-11.94^{***}	5.76	11.69^{***}
	(2.15)	(2.25)	(3.51)	(4.25)
log(Size)	0.55^{***}	0.53^{***}	-0.34^{*}	-0.55^{**}
	(0.11)	(0.11)	(0.18)	(0.22)
Age (years)	-0.25^{***}	-0.14^{***}	-0.09^{**}	-0.24^{***}
	(0.02)	(0.03)	(0.04)	(0.09)
Reinvest Dummy	1.50^{***}	1.57^{***}	-0.97^{***}	-1.28^{***}
	(0.12)	(0.12)	(0.23)	(0.24)
Family Size	-0.33	-0.71^{**}	-0.22	0.83
	(0.32)	(0.33)	(0.44)	(0.59)
Equity Return (%)	1.22^{***}	0.62^{***}	4.89^{**}	6.70^{***}
	(0.29)	(0.23)	(2.08)	(2.45)
Equity Share	5.59^{***}	6.90^{***}	18.96^{**}	14.54^{**}
	(1.68)	(1.65)	(8.85)	(6.09)
Test Breach Dummy		-1.22^{***}		0.85
		(0.21)		(1.23)
Perc Default		-5.93^{***}		30.35^{**}
		(1.30)		(13.32)
Average TTM		0.36^{***}		-0.07
		(0.06)		(0.20)
Diversification		1.04^{***}		-1.22
		(0.26)		(1.08)
Observations	8,626	8,483	8,626	8,483
Adjusted R^2	0.15	0.17	0.06	0.12

Table 4: **CLOs with high active turnover trade at better prices.** We categorize transactions as high turnover, medium turnover, and low turnover based on the active turnover of the CLO which executed the transaction in Panels A,B and D, or based on the aggregate active turnover of the CLO manager in Panel C. The active turnover measure is defined in Section 2.3. Panel A shows the average transaction prices without matching the same loans. In Panels B – D we start with the sample of loans that are traded by both high turnover and low turnover CLOs. For each loan and for each turnover group we compute the median sale price over the full sample length, the median sale date, and numerical rating (defined in Sections 3) at the median sale date. We then report averages of the median values across loans and test if high and low turnover values are significantly different. The addition (same month) indicates that we match transactions by high turnover and low turnover CLOs of the same loan executed in the same month. Panel D shows the results for a subset of transaction with a transaction size between USD 900,000 and USD 1,100,000. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016.

	High Turnover	Medium Turnover	Low Turnover	High - Low	[t-stat]
Panel A: Results without matching loans					
Sale price	94.07	91.57	88.60	5.47***	[5.15]
Purchase price	96.56	96.73	96.93	−0.37**	[-2.54]
Panel B: Results for individual CLOs					
Sale price (same month)	94.26	94.14	94.17	0.09***	[3.71]
Purchase price (same month)	97.80	97.78	97.85	−0.05***	[-6.47]
Sale price (anytime)	95.55	95.09	94.59	0.95***	[7.68]
Sale date	Jan 4, 2014	Apr 15, 2014	Apr 25, 2014	-111***	[-13.29]
Loan rating at Sale date	7.40	7.34	7.31	0.09***	[4.60]
Panel C: Results at manager level					
Sale Price (anytime)	95.64	95.28	95.05	0.59***	[4.39]
Sale date	Feb 6, 2014	May 9, 2014	Apr 20, 2014	-73***	[-8.18]
Loan rating at sale date	7.44	7.42	7.33	0.11***	[5.23]
Panel D: Transaction size between $900,000 and $1,100,000					
Sale price (anytime)	95.87	95.32	94.67	1.19***	[4.74]
Sale date	Dec 25, 2013	Jun 1, 2014	May 13, 2014	-139***	[-6.69]
Loan rating at sale date	7.59	7.56	7.40	0.19***	[3.78]

Table 5: **Analysis of different CLO subsamples split by turnover.** This table shows average CLO performance and transaction prices for different subsamples of the entire CLO sample. At the beginning of quarter t, the entire CLO sample is split into three portfolios based on their turnover in quarter $t-1$. In Panel A, the sample is split based on the active turnover measure, constructed in Section 2.3. Panel A reports average turnover, equity payments and collateral default rates for the different portfolios. Panel B reports results for portfolios sorted on the non-active turnover measure, constructed in Section 2.3. In Panel C, the average active turnover for the first 4 observed quarters are computed for each CLO and we split the entire CLO sample into three portfolios based on their average active turnover in the first year. IRR is the internal rate of return which is computed for the subset of closed CLOs for which we have complete payment information. High - Low tests if there is a significant difference between high and low turnover portfolios. Newey-West t-statistics are reported in parentheses. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016.

	High Turnover	Medium Turnover	Low Turnover	High - Low	[t-stat]
	Panel A: Results for active turnover				
Turnover_t	0.06	0.02	0.01	0.05***	[24.52]
Equity_t	23.20	22.26	21.00	2.20**	[2.27]
Default_t	1.34	1.61	2.10	−0.76***	[−5.93]
	Panel B: Results for non-active turnover				
Turnover_t	0.10	0.02	0.00	0.09***	[3.36]
Equity_t	25.57	19.00	20.90	4.91	[0.83]
Default_t	3.67	1.95	1.88	1.79**	[2.40]
	Panel C: Results for active turnover in the first 4 quarters				
Active Turnover	3.02	1.65	1.18	1.84 * **	[9.74]
Equity Pmt	24.99	23.65	20.58	4.41 * **	[4.08]
Perc Default	1.12	1.44	2.37	−1.25 * **	[−11.73]
IRR	0.14	0.11	0.02	−−	−−

Table 6: **Higher active turnover predicts better transaction prices.** This table shows regressions of sale prices (first two columns) and purchase prices (last two columns) regressed on the active turnover measure constructed in Section 2.3, controlling for the time to maturity ($\text{TTM}_{i,t}$) of the traded loan, the loan principal ($\log(Principal_{i,t})$), and the loan rating at the transaction date ($Rating_{i,t}$), as well as several CLO and CLO collateral controls that are described in the caption of Table 2. Heteroskedasticity robust standard errors, clustered at the issuer level, are reported in parentheses. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016, including all USD leveraged loan transactions executed by the CLOs from our filtered sample.

	Sale price		Purchase price	
Intercept	43.374***	46.647***	64.696***	69.240***
	(3.096)	(5.885)	(1.605)	(2.256)
$\text{Turnover}_{j,t}^{Active}$	9.129***	5.268**	−7.380***	−6.042***
	(2.367)	(2.333)	(1.167)	(1.050)
$\text{TTM}_{i,t}$	0.557***	0.506***	0.298***	0.373***
	(0.146)	(0.158)	(0.054)	(0.062)
$\log(Principal_{j,t})$	0.429***	0.438***	0.388***	0.405***
	(0.125)	(0.135)	(0.053)	(0.056)
$Rating_{i,t}$	2.614***	2.657***	0.720***	0.719***
	(0.241)	(0.244)	(0.068)	(0.066)
$\log(Size_{j,t})$		−0.291		−0.182*
		(0.325)		(0.101)
$Age_{j,t}$ (years)		0.032		0.124***
		(0.068)		(0.028)
Reinvest Dummy		1.236***		−0.483***
		(0.380)		(0.118)
Family Size		0.615		2.124***
		(0.859)		(0.467)
Equity Share		2.700*		0.889
		(1.544)		(0.789)
Test Breach Dummy		−2.323**		0.022
		(0.941)		(0.343)
Average TTM		0.256		−0.303***
		(0.286)		(0.098)
Diversification		0.296		0.414
		(0.517)		(0.252)
Equity Return (%)		0.012**		−0.007**
		(0.005)		(0.003)
Perc Default		0.025		−0.237***
		(0.018)		(0.035)
Time FE	yes	yes	yes	yes
Loan type FE	yes	yes	yes	yes
Observations	97,585	92,180	101,723	96,739
Adjusted R^2	0.379	0.383	0.410	0.415

Table 7: **Higher active turnover predicts better CLO performance.** This table shows regressions of collateral default rates (first two columns) and annualized equity returns (last two columns) regressed on the active turnover measure constructed in Section 2.3, controlling for the CLO and CLO collateral controls described in the caption of Table 2. Newey-West standard errors are reported in parentheses. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016, including all CLOs from our filtered sample.

	Perc Default		Equity Return (%)	
Intercept	−3.73	−4.18	−17.45**	−20.58**
	(2.52)	(3.94)	(7.61)	(9.03)
$\text{Turnover}_{i,t}^{Active}$	−0.04***	−0.02*	0.25***	0.11***
	(0.01)	(0.01)	(0.04)	(0.04)
log(Size)	0.18	0.32	1.05***	1.10**
	(0.12)	(0.21)	(0.39)	(0.45)
Age (years)	0.06	0.08*	0.50***	0.33*
	(0.04)	(0.05)	(0.10)	(0.20)
Reinvest Dummy	0.07	−0.00	1.46***	1.12*
	(0.13)	(0.07)	(0.47)	(0.62)
Family Size	−0.87*	−0.65*	−0.03	−1.49
	(0.47)	(0.37)	(1.11)	(1.15)
Equity Share	0.04**	0.06**	−0.17***	−0.24***
	(0.02)	(0.03)	(0.05)	(0.06)
Test Breach Dummy		2.24***		−4.14***
		(0.82)		(0.92)
Average TTM		−0.15**		0.79
		(0.07)		(0.71)
Diversification		−0.10		−6.27**
		(0.10)		(3.17)
lagged Perc Default	0.79***	0.67***		
	(0.14)	(0.18)		
lagged Equity Return			0.73***	0.64***
			(0.05)	(0.06)
Time FE?	*No*	*Yes*	*No*	*Yes*
Observations	8,214	8,151	7,740	7,653
Adjusted R^2	0.50	0.57	0.41	0.45

A Appendix: Characteristics of the Different CLO Portfolios

In this section, we investigate whether the difference in performance between high turnover and low turnover CLOs can be related to other CLO characteristics. To that end, we compare average CLO characteristics for high and low active turnover CLOs in Table 8. As we can see from the table, the most active and least active CLOs are comparable across most dimensions. In particular, there is no significant difference in their original size, CCC bucket, senior or junior fees, family size, or number of loans held in their portfolios. The only two characteristics that are significantly different are equity share and age. On average, more active CLOs tend to have a smaller equity share, indicating that they are using more leverage. However, the difference in equity share between active and less-active CLOs is not economically significant and below 0.005%. The more active CLOs are, on average, 14 months younger than less active CLOs. We attribute this difference in CLO age to the lifecycle of a CLO. As explained in Section1, older CLOs are more likely to enter their redemption period, in which they face tighter regulation on purchasing new loans.

Table 8: **Analysis of different CLO subsamples split by Turnover.** This table shows average CLO CLO characteristics of different subsamples of the entire CLO sample based on previous quarter turnover. At the beginning of quarter t, the entire CLO sample is split into three portfolios based on their active turnover in quarter $t-1$. ***, **, and * indicate significance at a 1%, 5%, and 10% level respectively. The sample period is January 2009 to December 2016.

	High Turnover	Medium Turnover	Low Turnover	High - Low	[t-stat]
OriginalSize	540.23	536.48	520.72	19.51	[1.44]
EquityShare	0.09	0.09	0.10	0.00**	[−2.02]
Age	44.31	50.26	59.10	−14.79***	[−2.99]
CCCBucket	0.07	0.07	0.07	0.00	[0.87]
SeniorFee	17.67	17.34	17.54	0.13	[0.28]
JuniorFee	34.50	32.65	34.36	0.14	[0.18]
CLO Family	12.35	12.63	12.60	−0.25	[−0.56]
# loans	385.06	408.91	376.23	8.83	[0.51]