# Portfolio Performance Manipulation in Collateralized Loan Obligations*

**Maria Loumioti**
Naveen Jindal School of Management
The University of Texas at Dallas
800 W Campbell Road,
Richardson, TX 75080, USA
Maria.Loumioti@utdallas.edu

**Florin P. Vasvari**
London Business School
Regents Park, London, NW1 4SA
United Kingdom
fvasvari@london.edu

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**Abstract**

We examine the discretionary activities that the managers of Collateralized Loan Obligations (CLOs) engage in to pass monthly overcollateralization (OC) tests. These tests require the value of a CLO's loan portfolio, scaled by the principal balance of the CLO's notes, to be above a certain threshold. Taking advantage of CLOs' granular disclosures, we develop model-free estimates for discretionary loan fair valuation and transaction-based proxies for strategic loan trading. Strategic trading involves shifting a CLO's portfolio to riskier loans or selling loans to affiliated CLOs to increase OC test scores. We find a positive association between discretionary loan fair values and strategic trading and the probability of avoiding an OC test violation. We show that this association varies predictably with junior noteholders' influence and CLO market conditions. We further document that strategic trading – but not discretionary loan fair valuation – relates to worse future CLO portfolio performance. Overall, our analyses provide evidence on the interplay between discretionary loan fair valuation and real activities management and their economic consequences.

***Keywords***: Collateralized loan obligation, CLO, securitization, managerial discretion, loan fair valuation, strategic loan trading.

*JEL Classification:* M41, G23

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## 1. Introduction

Over the past fifteen years, the massive growth of the U.S. private debt market has been fueled by Collateralized Loan Obligations (CLOs) that facilitate the securitization of corporate loans. CLOs are bankruptcy-remote special-purpose vehicles that purchase tranches of corporate loans and use their payments as collateral to issue new securities. CLOs hold about 70% of high-yield corporate loans outstanding, with the annual issuance of CLO securities exceeding $100 billion (Standard and Poor's 2015). Despite CLOs' importance in the credit market, there is surprisingly no research on their reporting requirements and disclosures of performance measures.

In this paper, we explore how the managers of CLOs engage in discretionary activities to circumvent reported capital adequacy tests, commonly referred to as overcollateralization tests (OC tests).[1] The OC tests reflect a CLO's solvency by requiring that the ratio of its loan portfolio value, scaled by the CLO notes' principal balance, exceed a certain threshold. The CLO's portfolio value is measured as the sum of five components: (1) the fair value or the recovery value of defaulted loans, whichever is smaller; (2) the fair value of excess CCC-rated loans; (3) the purchase price of deep-discount loans; (4) the principal balance of performing loans (i.e., loans not classified in the above categories) and (5) the cash generated by loan trading and held by the CLO.[2] A typical CLO issues both junior notes which are first to be affected by a decrease in the portfolio value and senior notes which incur losses only after the junior notes are wiped out. An OC test violation can have severe consequences for both CLO noteholders and managers (e.g., managers' fees decrease significantly, junior noteholders cannot be paid and notes may be downgraded).

[1] The CLO manager is usually a large asset management firm who administers the CLO portfolio aiming to mitigate credit risks and increase portfolio returns.

[2] Excess CCC-rated are loans that are in excess of the maximum level of loans rated CCC or below that a CLO is allowed to hold. This maximum threshold is determined by the CLO prospectus. Deep-discount loans are loans purchased at 80%-85% of par value or below. The definitions of defaulted, excess CCC-rated and deep-discount loans are highly standardized and explicitly described in CLO prospectuses. Section 2 describes in detail the CLO reporting and the overcollateralization tests.

A study of CLO managers' discretionary activities is relevant for several reasons. First, CLOs are required to report monthly loan-level information on their portfolio structure and performance, trading activity and fair value estimates for defaulted and CCC-rated loans. Taking advantage of these granular disclosures, we are able to develop model-free estimates for discretionary loan fair valuation and transaction-based proxies for real activities management that CLO managers can employ to meet an OC test. We can also directly measure managers' pressure to engage in discretionary activities, since CLOs report the slack of the OC tests. Thus, CLO disclosures allow us to distinguish between situations in which managerial discretion is exercised by either inflating loan fair values or rebalancing the loan portfolio. In contrast, prior studies largely rely on aggregate financial accounting numbers that capture both managers' valuation choices and asset composition, providing confounding inferences about the source of managerial discretion (e.g., Barth and Taylor 2010). Second, CLOs' reporting is gaining the attention of regulators. The SEC has recently initiated investigations on the extent to which CLO reports misinform investors about loan portfolio quality and performance.[3] An investigation of CLO managers' discretionary activities can offer additional evidence on the source of agency costs related to CLOs' disclosures.

We predict a positive association between CLO managers' choices to inflate loan fair values and trade strategically and the probability of avoiding an OC test violation, given the significant costs related to missing an OC test. We capture inflation in loan fair values if the CLO reports greater fair values for defaulted or excess CCC-rated loans than the average fair values reported by other CLOs for the same loans in the same month. We focus on two strategic trading activities that can help managers pass an OC test. First, we measure portfolio risk shifting that is reflected in the selling of loans priced above par and retaining underperforming loans whose market price

[3] For example, some recent highly publicized cases include the SEC's investigations into Patriarch Partners, Aladdin Capital Management and KCAP Financial Inc.

has significantly decreased below par value. Cash gains from selling above-par priced loans improve OC test scores, while retained underperforming loans are still accounted at par in OC test computations. Second, we capture the sale of loans to affiliated CLOs (i.e., CLOs administered by the same manager) which can allow managers to realize greater cash inflows from trading and thereby increase test scores.

The way in which managers use this set of discretionary activities is not clear ex ante. Although CLO managers can use discretionary loan fair valuation as a relatively low cost way to avoid an OC test violation without changing the underlying loan portfolio structure and future cash flows, monthly reports and OC test calculations are prepared by the CLO's trustee. The trustee, typically a large investment bank, may unravel managerial discretion with respect to loan fair values. Furthermore, CLO managers can rebalance their loan portfolios without being subject to trustee's checks, potentially exercising greater discretion. Strategic trading can however have an adverse impact on future CLO performance and note prices. This impact can be especially large for junior noteholders, who are the first to suffer from portfolio losses and may thus redeem their notes, forcing the liquidation of the CLO. Strategic trading may also not be effective in increasing OC test scores when the loan market liquidity is low and trades are affected by high transaction costs.

We test our hypothesis using a sample of 6,012 CLO-month observations for 415 CLOs over the 2008-2013 period. We obtain data on CLO portfolio holdings, loan trades, and OC test scores from CLO-i, a new database provided by Creditflux. We also retrieve 3,726 monthly CLO reports from CLO-i and hand-collect the loan fair value estimates used in calculating the OC test scores.

Consistent with our prediction, we document a positive association between a CLO manager's discretionary activities and the probability of just meeting an OC test. In univariate analyses, we show that about 88% of the CLOs that just meet an OC test would have violated it in that month

if their managers had not inflated the loan fair values and traded strategically. In comparison, the probability of an OC test violation by high performing CLOs absent managerial discretion ranges from 5% to 26%. These initial findings support our inference that discretionary activities are more important for CLOs that just meet an OC test and have greater pressure to improve reported OC test scores compared to CLOs without such motives.

Our multivariate tests yield similar results. We find that discretionary loan valuation, portfolio risk shifting and loan sales to affiliates are positively related to the probability of just meeting an OC test, controlling for CLO portfolio performance as well as time, CLO manager and trustee fixed effects. Economically, an interquartile increase in discretionary loan fair valuation, portfolio risk shifting and loan sales to affiliates increases the probability of a CLO just meeting an OC test by about 7.8%, 12.3% and 5.1%, respectively.

We conduct additional tests that support our arguments on the relation between discretionary activities and the avoidance of OC test violations. First, we show that discretionary loan fair valuation is particularly prominent for non-traded loans, consistent with the fact that fair values are more likely to be subject to managerial manipulation when they cannot be easily verified (Kothari et al. 2010). Second, we find that CLOs with binding OC tests realize greater cash gains from selling loans to an affiliate compared to those realized by CLOs without binding tests. Third, we document that increases in discretionary activities over the previous month are positively associated with the probability of just meeting an OC test score, suggesting that managers are more likely to engage in discretionary activities when an OC test violation is imminent. Related, we show that the managers of CLOs that just meet an OC test are more likely to increase the sales of above-par priced loans and loans to affiliated CLOs just before the reporting date. In sum, these tests suggest a robust association between a CLO manager's discretionary activities and the

probability that an OC test is met.

We next examine several factors that likely affect the use of discretionary activities when the OC tests are binding. We find that the relation between discretionary loan fair valuation (strategic trading) and the probability of just meeting an OC test is stronger (becomes weaker and close to zero) when junior noteholders have greater influence or can redeem their notes, suggesting that CLO managers choose less costly discretionary activities when junior noteholders are more active. We also document that when market liquidity is high (i.e., when managers can potentially generate greater gains from selling loans), the relation between portfolio risk shifting (loan sales to affiliates) and the probability of just meeting an OC test becomes stronger (weaker). We further find that the association between discretionary activities and OC test violation avoidance is stronger for CLOs that have a weaker portfolio performance (i.e., for CLOs with managers that are under greater pressure to meet an OC test) relative to other CLOs. Overall, these findings suggest that managerial discretion varies predictably with the CLO's capital structure and market conditions.

Finally, we test whether discretionary activities are related to future CLO portfolio performance. Focusing on the sample of CLOs that just meet an OC test, we find that portfolio risk shifting is associated with lower OC test scores and a larger probability of a CLO note credit rating downgrade six months ahead. Our results are similar when we also include a control sample of CLOs that just miss an OC test. We show that CLO note prices decrease with strategic trading when OC tests are binding, suggesting that noteholders can unravel managerial discretion to some extent. We find that discretionary loan fair valuation does not affect future CLO performance or note prices, consistent with this activity providing a relatively less costly way to meet an OC test.

Our paper makes several contributions to the literature. First, prior research on agency costs in corporate loan securitization has focused on the loan screening and adverse selection problems of banks that arrange loans for CLOs, providing contradicting evidence on the existence of these problems (e.g., Shivdasani and Wang 2011, Benmelech et al. 2012, Bord and Santos 2015, Kara et al. 2015). We complement this work by examining how CLO managers manipulate reported OC test scores thus introducing a previously unexplored source of agency costs in the corporate loan securitization setting. Specifically, our study indicates that such costs can also arise from the periodic reporting of CLOs' portfolio performance rather than just from banks' screening of securitized loans.

Second, we contribute to the well-established banking literature which has primarily examined the impact of reporting discretion with respect to loan loss provisions or asset sales' gains on earnings and capital adequacy tests (e.g., Beatty 1995, Collins et al. 1995, Kim and Kross 1998, Ahmed et al. 1999, Beatty et al. 2002, Dechow et al. 2010). We discern the extent to which CLO managers' discretion arises from manipulating fair value estimates or loan trading. These activities are jointly reflected in aggregate numbers on banks' financial statements and are thus usually hard for researchers to disentangle (Barth and Taylor 2010). We therefore extend recent papers that also use loan-level fair value estimates or transaction-based proxies for real activities management (e.g., Dechow and Shakespeare 2009, Ertan 2016, Hanley et al. 2016). In this respect, we provide important evidence on the interplay of discretionary activities by documenting that CLO managers' discretion is influenced by junior creditors and market conditions, two aspects not widely explored in bank research (e.g., Beatty et al. 1995, Beatty and Liao 2014).[4] Moreover, our

[4] It is worth noting that the interplay between the manipulation of accounting estimates and real transactions (i.e., accruals and real activities management) has been studied extensively in corporate settings (e.g., Barton 2001, Cohen et al. 2008, Cohen and Zarowin 2010, Badertscher 2011, Zang 2012).

results indicate that strategic trading – not discretionary loan fair valuation – is related to lower future CLO portfolio performance, supporting theoretical arguments on the distorted risk shifting incentives and inefficient asset sales that arise when reported loan values do not change with market signals (e.g., Plantin et al. 2008).

Finally, our paper is relevant to the incomplete debt contracting literature, which has examined how customized covenants in bank lending alleviate agency problems (e.g., Leftwich 1983, Beatty et al. 2002, Beatty et al. 2008, Armstrong et al. 2010, Christensen et al. 2016). In particular, prior studies find that covenant definitions are adjusted by lenders to mitigate the effect of managerial discretion, such as excluding gains from asset sales or asset fair values (e.g., Li 2010, Demerjian et al. 2016). In contrast to loan covenants, OC tests have highly standardized definitions across CLOs. While standardization may enhance CLO performance comparability, our evidence suggests that OC test standardization allows managers to engage in discretionary activities that adversely affect future CLO performance. This result complements recent papers that examine the benefits of covenant standardization (Bozanic et al. 2017).

## 2. CLO structure, performance reporting and hypothesis development

CLOs are bankruptcy-remote special-purpose vehicles set up and managed by an asset management firm (CLO manager) to facilitate the securitization of corporate loans. The CLO manager engages with a bank (CLO arranger) that provides short-term ("bridge") financing to the CLO and helps structure the loan portfolio. A typical CLO buys tranches of primarily high-yield corporate loans (CLO assets or securitized loans) and uses their payments as collateral to issue new securities (CLO notes and equity) that are sold to banks and other institutional investors.[5] The

[5] We focus on "cash flow" CLOs, which represent the vast majority of CLOs issued over the past 15 years. "Market value" CLOs, in which portfolio loans are fair valued, are much less common. Based on Moody's Structured Credit Market Outlook report (2016), there are currently only three market value CLOs outstanding in the CLO market.

total principal value of the securities issued by a CLO is usually about $450-$500 million. Appendix 1 presents details on CLO issuance.

The average CLO portfolio consists of about 200-250 different loan tranches issued by borrowers in about 20-25 industries.[6] The average tranche size is about $2.5 million with an average allocation to an individual borrower of only 2%. Given the portfolio's large size and wide diversification, about 70%-75% of the CLO notes are classified as senior and receive investment grade ratings (at least two credit rating agencies rate both the loans in the CLO's portfolio and the notes). Junior notes (CLO equity) provide about 15%-20% (5%-10%) of a CLO's capital structure.

CLO managers actively manage the loan portfolio and can rebalance up to 20% of the loans therein without explaining their investment strategy to CLO note investors ("noteholders" going forward). On average, a CLO trades about 15 times per month and the average loan face amount traded is about $1.3 million. CLO managers thus have considerable discretion in selecting the portfolio structure after its origination and over the life of the CLO (about 10-12 years). The average CLO manager manages about 13 CLOs. While there are 108 managers in the CLO market, the largest six of them manage CLOs with a principal value of roughly $100 billion.

*2.1. CLO reporting and the overcollateralization tests*

CLOs are required to provide monthly disclosures of detailed loan-level information on CLO portfolio structure and performance to noteholders. CLO performance is assessed based on several compliance tests specified in the prospectus and related to the CLO portfolio's characteristics and riskiness (e.g., industry diversification tests, average loan portfolio credit rating, maximum amount of low-rated portfolio loans). The thresholds of these tests are also determined in the CLO

[6] The CLO-specific statistics in the section are based on the population of CLOs covered by Creditflux CLO-i over the 2008-2013 period. CLO portfolio diversification requirements are explicitly determined in CLO prospectuses and are based on industry and borrower characteristics. Geographic diversification is not part of these requirements.

prospectus and typically do not change over the life of the CLO.[7] Among these tests, the overcollateralization tests (OC tests) are considered the most important, as they assess the CLO's solvency and capital adequacy. CLOs are required to meet two OC tests on a monthly basis: the senior and the junior OC tests. They are calculated as follows:

$$Senior\ OC = \frac{[Principal\ balance\ of\ performing\ loans + Cash + Recovery\ value\ of\ defaulted\ loans + Fair\ value\ of\ excess\ CCC\ rated\ loans + Purchase\ price\ of\ deep\ discount\ loans]}{Principal\ balance\ of\ senior\ notes}$$

$$Junior\ OC = \frac{[Principal\ balance\ of\ performing\ loans + Cash + Recovery\ value\ of\ defaulted\ loans + Fair\ value\ of\ excess\ CCC\ rated\ loans + Purchase\ price\ of\ deep\ discount\ loans]}{[Principal\ balance\ of\ senior\ notes + Principal\ balance\ of\ junior\ notes]}$$

*Principal balance of performing loans* is the sum of the principal balance of all performing loans in the portfolio. These loans usually represent the majority of a CLO's assets (i.e., more than 90% of portfolio loans). *Cash* is cash generated from trading activities and loan payments that is expected to be reinvested in new loans or disbursed to noteholders. *Recovery value of defaulted loans* is the aggregate expected recovery of loans in default. Defaulted loans are those that do not pay principal and/or interest, are D-rated or whose borrower filed for bankruptcy. The recovery values for these loans are computed as the lower of their fair values or the recovery values provided by credit rating agencies such as S&P and Moody's. *Fair value of excess CCC-rated loans* is the aggregate fair value of CCC-rated loans above the maximum CCC-rated loan balance that a CLO is allowed to hold in the portfolio. Defaulted and excess CCC-rated loans account on average for about 3% and 4% of a CLO loan portfolio, respectively. For traded loans, fair values are based on loan market prices retrieved from Intex, Loan Pricing Corporation or Markit. For non-traded loans,

[7] The CLO noteholders' trustee (a large investment bank) is responsible for calculating the compliance test scores as well as preparing and distributing the CLO reports. The CLO manager usually works with the trustee to help prepare the reports. In addition, the structured finance team of a Big 4 public accounting firm verifies the accuracy of these calculations by checking loans' holdings and cash flows.

CLO managers seek bids from usually three independent broker-dealers to determine the loans' fair values. If such bids cannot be obtained, CLO managers set the loan fair values themselves.[8] *Purchase price of deep-discount loans* is the aggregate purchase price of portfolio loans purchased at 80% - 85% of par value or below.[9] *Principal balance of senior (junior) notes* is the total principal balance of senior (junior) notes issued by the CLO. These definitions are standardized across CLOs and explicitly described on CLO prospectuses.

An OC test violation has significant adverse consequences. First, managers cannot use loan principal and interest payments to buy new portfolio loans. Second, CLO junior noteholders cannot receive payments, as cash flows are diverted to senior noteholders and they are thus likely to redeem their notes early (about 13% of CLOs were liquidated by noteholders over the 2008-2013 period). Relatedly, CLO notes are likely to be downgraded by credit rating agencies (Gapstow Capital Partners 2014). Third, CLO managers cannot receive their performance-linked compensation, which is, on average, about 40 basis points of a CLO portfolio's par value. Given these costs, managers likely try to avoid an OC test violation. Consistent with this idea, CLOs report an OC test violation in only about 12% of their monthly reports (Figure 1). In addition, reported OC scores are close to the OC test triggers, mainly due to the tight slack on the junior OC test. Indeed, while senior noteholders seem to be well-protected by a high senior OC slack of about 20% above the senior OC test threshold (except during the credit crisis), the reported junior OC slack is narrower, around 4% above the junior OC test trigger (Figure 2).

To better understand how CLO managers engage in discretionary activities to manage the OC test scores, we provide three examples of a CLO experiencing: (1) an improvement in portfolio

[8] CLOs do not report the names of the broker-dealers that provide the loan fair values or whether these values were set by the manager.

[9] CLOs usually avoid purchasing deep-discount loans, since they permanently erode OC test scores. Looking at a sample of 80 CLO reports, we find only four reports in which CLOs report deep-discount loans.

quality; (2) a deterioration in portfolio quality that leads to a violation of the OC tests; and (3) a deterioration in portfolio quality with the manager using her discretion to avoid a violation. In all three examples, we assume that the CLO buys 100 loans at par (i.e., purchase price = 100%), each with a principal value of $1 million. The CLO issues $68.6 million senior notes and $19.6 million junior notes. The senior (junior) OC threshold is set at 136% (107%) and the maximum amount of CCC-rated loans the CLO is allowed to hold is $5 million. The CLO's life and average loan maturity are ten years, and its notes and loans are repaid at maturity.

Under the first example detailed in Appendix 2A, the performance of ten loans improves significantly, trading at an average price of 120% of par. The CLO manager decides to sell them, receiving $12 million. The manager uses $10 million of these proceeds to buy 10 new loans at par and retains the remainder in cash for future investments. In this example, the portfolio loan value is $102 million, i.e., the sum of the loans' principal balance ($100 million) and cash holdings ($2 million). Thus, the senior OC score is 149% [=102/68.6], and the junior OC score is 116% [=102/(68.6 + 19.6)], i.e., the CLO passes both tests.

Under the second example, detailed in Appendix 2B, we assume that the performance of ten loans improves (trading at 120% of par) but the performance of several other loans deteriorates: (1) 8 loans with $8 million in total principal value go into default; (2) the credit rating of 10 loans is downgraded to CCC; (3) the market price of 10 loans drops to 85% of par but their credit ratings are not downgraded and (4) the CLO manager does not rebalance the portfolio. We describe in detail how fair values are computed in sections 2B.1 and 2B.2 of Appendix 2B. The total value of the defaulted loans is $3 million. The fair value of excess CCC-rated loans is assessed by ranking the market values of all CCC-rated loans and taking the values of the *lowest* priced loans over and above the maximum threshold, i.e., $2.05 million. The principal balance of the performing loans

is $87 million (i.e., $100 million – $8 million in default – $5 million in excess CCC [=$10 million – $5 million maximum CCC-rated loan threshold]), with a total CLO portfolio value of $92.05 million. The senior OC score is 134% [=92.05/68.6] and the junior OC score 104% [=92.05/(68.6 + 19.6)]. Under these conditions, both tests are violated.

Under the third example detailed in Appendix 2C, we make the same assumptions as in Appendix 2B and further assume that the CLO manager: (1) inflates the fair values of excess CCC-rated and defaulted loans (e.g., by strategically choosing broker-dealers with higher bids or overstating fair value estimates for loans without bids); (2) trades strategically by keeping the underperforming loans to avoid realizing losses and selling the 10 loans that trade at 120% of par to cash the gains (the manager can also sell loans to other CLOs under her management to get better sale prices and cash in more gains). Therefore, the manager observes that the CLO is going to report OC scores lower than the thresholds and tries to avoid a violation. Given these actions, the fair value of excess CCC-rated loans increases to $2.85 million, and the recovery value of the defaulted loans to $3.45 million (see sections 2C.1 and 2C.2 of Appendix 2C for more details). The cash inflow from selling the well-performing loans is $12 million, and the principal balance of performing loans in the CLO portfolio is $77 million (i.e., $100 million – $8 million in default – $5 million in excess CCC – $10 million of loans sold). The CLO portfolio value is $95.30 million, the senior OC score is 139% [=95.30/68.6], and the junior OC score is 108% [=95.30/(68.6 + 19.6)]. Thus, in this scenario, manager's discretion in valuing and trading loans allows the CLO to pass marginally both tests.

*2.2. Hypothesis development*

We predict a positive association between CLO managers' activities to inflate loan fair values and trade strategically and the probability of just meeting an OC test, given the significant costs of

an OC test violation. However, the interplay between different discretionary activities is not clear ex ante. First, on the one hand, discretionary loan fair valuation can offer managers a relatively low cost way to pass the OC tests compared to strategic trades that change portfolio cash flows and composition. On the other hand, monthly reports and OC test calculations are prepared by the CLO's trustee that can potentially unravel and correct any managerial reporting discretion. Also, the fair values of defaulted and excess CCC-rated loans that trade are based on their market prices recorded by independent data providers, potentially limiting managers' discretionary adjustments.

Second, with regard to trading decisions when OC tests are binding, CLO managers can rebalance their loan portfolios without disclosing their investment strategy to the CLO's noteholders and their trustees, i.e., trading decisions are not subject to CLO trustees' checks. However, trading strategically to meet OC test thresholds can adversely affect future CLO performance. Relatedly, granular disclosures on CLO trades can allow noteholders to benchmark strategic trading choices across CLOs and unravel managerial discretion, contributing to lower CLO note prices. While senior noteholders' returns are well-protected against portfolio losses given the cushion the junior notes and the CLO's equity provide, the returns of junior noteholders are more likely to be negatively affected by a decrease in the portfolio quality. As a result, they may redeem their notes, forcing the early liquidation of the CLO. Moreover, CLO managers may not be able to cash significant market gains by selling above-par priced loans to meet an OC test when the loan market liquidity is low and trades are adversely affected by high transaction costs. In conclusion, how CLO managers exercise discretion to comply with binding OC tests is an open empirical question.

## 3. Sample selection

We obtain loan-level data on CLOs' portfolio structure, performance, and trades from the

Creditflux CLO-i database, which retrieves information from CLOs' monthly reports starting from January 2008. The CLO portfolio data includes loan-level information on loan type, maturity, face amount held, Moody's and S&P credit ratings, default status and default date, as well as the borrower's name and industry. The CLO monthly performance data includes the percentage of CCC-rated and defaulted loans, as well as the senior and junior OC test slack and triggers.

Our primary sample covers the loan-level portfolio data of 493 CLOs reported in 9,045 CLO reports over the 2008-2013 period.[10] We exclude CLOs that do not report defaulted or excess CCC-rated loans (i.e., 2,591 monthly reports and 59 unique CLOs), as OC scores are not eroded in the absence of such loans and thus the tests are mechanically passed. We also exclude 442 monthly reports and 19 unique CLOs whose manager administers only one CLO, since these CLOs are recently issued and their coverage in CLO-i is limited. This exclusion is also necessary given the measurement of strategic trading based on loan sales to affiliated CLOs (i.e., administered by the same manager). Our final sample includes 6,012 monthly reports of 415 CLOs. We note that our sample includes CLOs that pass and those that violate the OC tests. Since CLO-i does not cover the OC test calculations, we hand-collect data on fair value estimates for the defaulted and excess CCC-rated loans from the 3,726 monthly reports by 145 CLOs that Creditflux posts on its website.[11] Table 1 summarizes the sample selection.

We examine CLOs' trading behavior by obtaining information on which specific loans a CLO trades, trade dates, prices and face amount traded. There are 248,612 unique trades by 493 CLOs over the 2008-2013 period (all CLOs in our sample are actively managed). Since the loan trade

[10] The primary sample includes 4,912 unique loan tranches and 1,788,280 observations at the CLO-loan tranche-month level. Because CLO-i does not code unique portfolio loans, we identify unique loans based on the borrower name, Moody's industry, country, loan type (e.g., term loan B, etc.) and maturity. This identification has been used in prior studies (Benmelech et al. 2012).

[11] CLO-i does not make available all the CLO reports it uses to retrieve data, which explains the drop in sample size.

dates and CLO reporting dates differ, we match the loan trade dates to the first CLO reporting month end date after the loan trade date to estimate a CLO's monthly portfolio rebalancing.

## 4. Variable definitions

### *4.1. Proxies for CLO performance*

We test whether CLO managers' discretionary activities are related to the probability of avoiding an OC test violation using an indicator variable that equals one if the CLO just meets an OC test and zero otherwise (*OC test violation avoidance*). As discussed in section 2, the size of the slack for the senior and junior OC tests is very different: the senior OC test slack is, on average, five times greater than that of the junior OC test. Thus, defining "just meeting" an OC test using an absolute percentage (e.g., 3% slack) will bias the measure towards the junior OC test (e.g., a 3% senior OC test slack is reported in only 214 CLO reports, while a 3% junior OC test slack is reported in 2,725 reports). To account for these differences, we rank the reported senior and junior OC test slack across all CLOs that passed the tests. We classify a CLO as just meeting an OC test if its senior or junior OC slack are in the bottom quartile of their distribution.[12] Panel A of Table 2 reports the summary statistics of the variables we use in the empirical analyses. The mean probability of a CLO just meeting an OC test is 28%. There are twice as many CLOs' reporting a low OC slack (1,714 CLO reports) than those that just miss an OC threshold (806 CLO reports) (untabulated summary statistic), consistent with CLOs' avoiding missing OC test thresholds and similar to managers' earnings management behavior in the corporate setting (e.g., Burgstahler and Dichev 1997).

We further include several CLO performance characteristics in our multivariate analyses that

[12] Our results are robust to defining *OC test violation avoidance* as an indicator variable that equals one if a CLO's senior or junior OC slack is positive but below 1% or 3% and zero otherwise (Table 9).

are likely related to the probability of a CLO just meeting an OC test: the percentage of defaulted (*Defaulted loan bucket*) and CCC-rated (*CCC-rated loan bucket*) loans in a CLO portfolio; the average rating of portfolio loans (*Average portfolio rating*), where a loan's rating is defined as a discrete variable that takes the value of 1 for AAA (or Aaa), 2 for AA+ (or Aa1), and so forth; the natural logarithm of the senior (*Senior OC*) and junior (*Junior OC*) OC test score in percentage points; and the natural logarithm of the CLO loan portfolio principal balance (*Portfolio size*). Detailed variable definitions are reported in Appendix 3. The mean CLO portfolio size is 19.51 or about $360 million. The mean senior OC test score is 4.81 or 129%, and the mean junior OC test score is 4.63 or 104%. The mean percentage of defaulted (CCC-rated) CLO loans is 4.05% (7.57%), and the mean loan credit rating in a CLO portfolio is about 15 or B.

Panel B of Table 2 reports the Spearman correlations among the variables we use in the empirical analyses. The probability of a CLO just meeting an OC test is positively correlated to the percentage of defaulted and CCC-rated loans in a CLO portfolio (3% and 15%, respectively) and portfolio size (12%) and negatively correlated to the senior and junior OC tests' performance (-53% and -62%, respectively) and the average portfolio loan rating (-3%).[13]

*4.2. Proxies for CLO manager's discretion*

We measure discretionary loan fair valuation using the difference between the fair value that a CLO reports for a defaulted or excess CCC-rated loan and the average fair value of this specific loan reported by other CLOs in the same month, averaged at the CLO-month level (*Discretionary loan fair values*).[14] We use two proxies for strategic trading. *Portfolio risk shifting* is the ratio of

[13] The summary statistics of our variables are economically similar across the samples of 6,012 CLO-month and 3,726 CLO-month observations (untabulated).

[14] Our variable compares loan fair values to the average fair values for the same loans reported by other CLOs in the same month, not to the loans' market price. Since defaulted and CCC-rated loans are not frequently traded, we are not able to observe their market prices every month. Our results are robust to different measures for discretionary loan fair valuation (see Panel A of Table 8).

the sum of the number of above-par loans that are sold and underperforming loans that are held over a reporting month to the total number of loans in the CLO portfolio. Underperforming loans are those present in the portfolio at both the beginning and end of a reporting month whose market price has deteriorated over the previous six months but are not in default or in the excess CCC-rated bucket.[15] The mean market price of loans classified as underperforming is 88% of par value (untabulated). Our second proxy for strategic trading is the ratio of the number of loans sold to an affiliated CLO (i.e., managed by the same manager) to the total number of loans sold by the CLO over the reporting month (*Loan sales to affiliates*). To identify loan sales to affiliates, we create a sample of loan transactions between CLOs by merging loan purchases and sales using the borrower's name as well as the loan type, face amount, trade date, and price. About 90% of loan sales to affiliated CLOs are priced equal to or higher than the market price for the same loan (untabulated). [16]

The mean *Discretionary loan fair values* is low (0.25%), potentially because large fair value deviations from the reported mean may trigger CLO trustees' attention. The standard deviation of the variable is about 6%, suggesting that some CLOs report very different fair value estimates in the same month for the same loan than others do. On average, CLOs report inflated fair values for about 38% of their defaulted and excess CCC-rated loans, i.e., about 2.7% of their portfolio loans (untabulated). The mean *Portfolio risk shifting* is 4.56% of total CLO portfolio size, and the mean of *Loan sales to affiliates* is 5.42% of total CLO loan sales. In Panel B of Table 2, we show the probability of a CLO just meeting an OC test to be positively correlated to *Discretionary loan fair values* (33%), *Portfolio risk shifting* (4.21%) and *Loan sales to affiliates* (41%). The correlation

[15] If the specific loan is not traded, we use the average market price of loans issued by the same borrower.
[16] Gaspar et al. (2006) provide evidence of cross-subsidization among mutual funds belonging to the same fund family which indirectly suggests that these transactions may not take place at market prices. We are not only able to identify loan sales to affiliated CLOs, but also to observe the price of these transactions.

of discretionary activity measures is relatively low (less than 13%), suggesting that managers potentially engage in these activities interchangeably.

## 5. Research design and empirical results

### *5.1. Discretionary loan fair values, strategic trading and OC test violation avoidance*

We first test whether the probability of an OC test violation absent managerial discretion differs across CLOs that just meet an OC test and those that report higher OC scores. To do so, we modify the reported OC test scores by subtracting from their numerator: (1) the *Discretionary loan fair values* multiplied by the defaulted and excess CCC-rated loan principal balance (i.e., we reverse the discretionary component of reported fair values); (2) the difference between the sale proceeds and the face value of loans sold above par and the difference between the face value and the average market price of underperforming loans estimated over a 30 day period around the CLO reporting date (i.e., we reverse the sales of above-par loans and assume the CLO sells all underperforming loans) and (3) the difference between the price of loans sold to affiliates and the average market price of the same loan estimated over a 30 day period around the sale (i.e., we reverse the discretionary pricing component of loan sales to affiliates).

Table 3 reports the results of the univariate tests. We show that about 88% of the CLOs that just meet an OC test would have violated it if their managers did not engage in discretionary loan fair valuation and strategic trading. More specifically, 60% (81% and 49%) of the CLOs that just meet an OC test would have violated it if their managers did not inflate loan fair values (did not shift CLO portfolios to riskier loans or trade with affiliates, respectively).[17] These probabilities

[17] We assume that CLOs will sell all underperforming portfolio loans, which significantly explains the high impact of portfolio risk shifting on just meeting an OC test. If we assume that CLOs continue to hold their underperforming loans but do not sell above-par valued loans, the probability of violating an OC test for CLOs that just pass it drops to 54%. Also, the probability of an OC test violation for CLOs that just pass it is 74%, if managers do not inflate loan fair values and sell above-par valued loans (untabulated).

drop drastically when we focus on CLOs reporting higher OC test performance. For those with a slack ranked in the second and third quartiles of OC test scores (the upper quartile), the probability of a violation absent managerial discretion is only 26% (5%). Overall, the results support our inference that discretionary activities are more important for CLOs that just meet an OC test compared to those that do not have the same pressures.

We complement the univariate tests with multivariate analyses that test the relation between the CLO manager's discretionary activities and the probability of just meeting an OC test. We use a probabilistic model, where the dependent variable is an indicator variable that equals one if the CLO just meets a test and zero otherwise (*OC test violation avoidance*):

$$\begin{aligned}\text{Probability (}\textit{OC test violation avoidance} = 1) = {} & \alpha + \beta_1 \textit{Discretionary loan fair values} \\ & + \beta_2 \textit{Portfolio risk shifting} + \beta_3 \textit{Loan sales to affiliates} \\ & + \beta_4 \textit{Defaulted loan bucket} + \beta_5 \textit{CCC-rated bucket} \\ & + \beta_6 \textit{Average portfolio rating} + \beta_7 \textit{Senior OC} \\ & + \beta_8 \textit{Junior OC} + \beta_9 \textit{Portfolio size} + \textit{CLO manager FE} \\ & + \textit{CLO trustee FE} + \textit{Reporting month FE}. \end{aligned} \quad \text{(Model 1)}$$

We expect the coefficient on the variables of interest (*Discretionary loan fair values*, *Portfolio risk shifting*, *Loan sales to affiliates*) to be positive. The variables are described in detail in Appendix 3. We also include reporting month, CLO manager (73 unique managers) and trustee fixed effects (12 unique trustees) in the analyses to control for changes in CLO performance over time as well as for CLO managers' and trustees' characteristics (e.g., style, skills).[18]

Panel A of Table 4 reports the results. Consistent with our expectations, we find that inflating loan fair value estimates or trading strategically is positively related to a CLO's avoiding a test violation (column I). An interquartile increase in *Discretionary loan fair values*, *Portfolio risk shifting* and *Loan sales to affiliates* increases the probability of a CLO just meeting an OC test by

[18] To alleviate potential estimation bias when using a probit model with a large number of fixed effects, we repeat the analyses using an OLS model (e.g., Madalla 1987, Greene 2004). Our results (untabulated) remain unchanged.

about 7.8%, 12.3% and 5.1% , which respectively represent about 23.6%, 37.27% and 15.5% of the mean value of the dependent variable.

Our results hold when focusing separately on the senior and junior OC tests (columns II and III). An interquartile increase in *Discretionary loan fair values* and *Portfolio risk shifting* increases the probability of a CLO avoiding a senior (junior) OC test violation by 1.9% (16.6%) and 7.1% (19.3%), respectively. An interquartile increase in *Loan sales to affiliates* leads to a 15.8% increase in the probability of a CLO avoiding a junior OC test violation; there is no statistically significant relation between trading with affiliated CLOs and just passing the senior OC test. These results suggest that meeting the junior OC test is particularly important for CLO managers, potentially because the senior OC test is, on average, not binding. Also, CLO managers are more incentivized to receive the junior fee that is larger than the senior one (about 40 basis points of a CLO's par value, while the mean senior fee is about 17 basis points).

To mitigate concerns that our results are driven by our choices for the control sample of CLOs, we restrict our control group to CLOs that just miss an OC test (column IV). Similar to *OC test violation avoidance*, we identify CLOs that just miss an OC test by ranking the OC test scores of CLOs that violate an OC test in a reporting month. We classify that a CLO just misses an OC test if its OC test scores rank in the top quartile of this distribution. As mentioned earlier, we note that twice as many CLOs just pass an OC test compared to those that just miss the threshold (i.e., out of the sample of monthly reports where CLOs marginally pass or miss an OC test, 68% of CLOs just meet the test and only 32% just miss it). Our results continue to hold in this specification. We find that an interquartile increase in *Discretionary loan fair values*, *Portfolio risk shifting* and *Loan sales to affiliates* increases the probability of a CLO just meeting an OC test by 11%, 10% and 6.5%, respectively. However, the results for strategic trading are only significant at the 10% level.

We conduct additional tests that also support our arguments regarding CLO managers' discretionary activities (Panel B of Table 4). First, regarding discretionary loan fair valuation, we re-estimate Model 1 by including the *Discretionary loan fair values* variable separately for traded (i.e., loans that traded at least once over the prior six months) and non-traded loans (i.e., loans that did not trade over the prior six months). We expect that discretionary fair valuation is more likely for non-traded loans, since CLO managers have greater discretion in estimating these loans' fair values by selecting the brokers that provide the loan bids or by determining the values themselves. The remaining controls are the same as those employed in Model 1. Consistent with our arguments, we find that inflating fair value estimates of non-traded loans is positively related to the probability of a CLO just meeting an OC test. We find no evidence that the discretionary fair valuation of traded loans is associated with binding OC tests, potentially because these values are determined by loan market prices on data platforms and thus are harder to manipulate.[19]

Second, we measure *Discretionary loan sale price to affiliates* using the difference between the price of the loans sold to affiliated CLOs and the average market price for the same loans over the ±30 day period around affiliated trade dates, averaged at the CLO-month level. The discretionary price component is, on average, 1.8% (Panel A of Table 2). We test whether the discretionary price component is greater when an OC test is binding by re-estimating Model 1 with *Discretionary loan sale price to affiliates* as the main independent variable and including the same control variables. We find that the discretionary sale price to affiliates is positively related to the probability of a CLO just passing an OC test. An interquartile increase in *Discretionary loan sale price to affiliates*

[19] In untabulated tests, we find that our results are similar when looking separately at the discretionary fair value estimates of defaulted and excess CCC-rated loans. Also, since the values of defaulted loans used in the OC score calculations are the lower of the fair values or the recovery values provided by Moody's and S&P (see section 2.2), we further test and find that CLOs that just pass an OC test report defaulted loan fair values that are greater than their recovery rates.

increases the probability of a CLO just passing an OC test by about 0.5%.[20]

Third, we examine whether the managers of CLOs that just meet an OC test are more likely to trade strategically just before the CLO reporting day. We expect that such managers exert greater effort in seeking to avoid an OC test violation as the reporting date approaches. Since we observe the specific dates of CLOs' loan trades, we calculate the ratio of the sales of above-par priced loans per day of the reporting month to the total monthly above-par priced sales, thus capturing the daily portfolio risk shifting over the reporting cycle. Then, we estimate the daily percentage differences of the above variable to measure changes in CLO managers' efforts. In Figure 3, we report changes in portfolio risk shifting over the 20 day period leading to the reporting date for CLOs that just meet an OC test, CLOs that just miss an OC test, CLOs with OC scores around the median OC score value (ranked in the second and third quartiles of CLOs' monthly OC score distribution) and CLOs with high OC scores (ranked in the upper quartile of CLOs' monthly OC score distribution). We show that while managers have overall similar trading behavior with respect to their above-par priced loan sales over the [-20,-5] day period prior to the reporting date, the managers of CLOs that just meet an OC test increase their trading activity by about 40% in the five days prior to the reporting date, significantly more than other CLOs. Moreover, we find that loan sales to affiliates is a more prominent trading activity for CLOs that just meet an OC test compared to other CLOs, particularly as the reporting date approaches (Figure 4).

Finally, we test whether CLOs that significantly increase their discretionary activities are more likely to just meet an OC test. To do so, we re-estimate Model 1 using the monthly changes in *Discretionary loan fair values*, *Portfolio risk shifting* and *Loan sales to affiliates* as the main independent variables and include the same control variables. CLO-i does not always cover CLO

[20] Our sample size drops, since we do not always observe market prices of these loans around the affiliated trade date.

reporting across consecutive months, which leads to a smaller sample in these analyses. In Table 5, we report results that are consistent with our expectations. The results are similar overall when we use the senior and junior OC test violation avoidance as our dependent variable (columns II and III). Restricting our sample to CLOs that just meet or miss an OC test (column IV), we find no relation between changes in strategic trading and the probability of avoiding an OC test violation; the coefficient of the changes in discretionary loan fair values is only significant at the 10% level.

Overall, our results suggest that CLO managers trade strategically and inflate loan fair values when OC tests are binding. However, we acknowledge that we cannot establish a causal link between discretionary activities and managers trying to avoid an OC test violation because we cannot fully observe their effort.

*5.2. Discretionary activities, CLO junior noteholders and OC test violation avoidance*

We next examine the factors that affect how CLO managers exercise their discretion in inflating loan fair values and trading strategically. Embedded in our hypothesis are the arguments that managers' discretionary behavior changes with: i) the influence of junior noteholders and ii) CLO market conditions. We expect that the association between inflated loan fair values (strategic trading) and the probability of avoiding an OC test violation is greater (lower) when junior notes constitute a significant part of a CLO's capital structure or junior noteholders can be more active in redeeming their notes. Such noteholders are the first to suffer from portfolio losses, and discretionary loan fair values may offer a less costly way to improve OC test scores compared to strategic trading.

We augment Model 1 with the measures for CLO junior noteholders' influence and their interaction terms with the proxies for managerial discretion:

Probability (*OC test violation avoidance* = 1) =
$$\alpha + \beta_1 Discretionary\ loan\ fair\ values$$

$$+\beta_2 Portfolio\ risk\ shifting + \beta_3 Loan\ sales\ to\ affiliates$$
$$+\beta_4 Junior\ noteholders\ (Call\ period)$$
$$+\beta_5 Discretionary\ loan\ fair\ values \times Junior\ noteholders\ (Call\ period)$$
$$+\beta_6 Portfolio\ risk\ shifting \times Junior\ noteholders\ (Call\ period)$$
$$+\beta_7\ Loan\ sales\ to\ affiliates \times Junior\ noteholders\ (Call\ period)$$
$$+Controls + CLO\ manager\ FE + CLO\ trustee\ FE + Reporting\ month\ FE. \quad \text{(Model 2)}$$

*Junior noteholders* is an indicator variable equal to one if the ratio of a CLO's junior notes current balance to the senior notes current balance ranks in the upper quartile of the distribution of the ratio in our sample, zero otherwise. *Call period* is an indicator variable equal to one if a CLO passed its reinvestment period, after which noteholders can usually withdraw their capital, zero otherwise. The variables of interest are the interaction terms between the proxies for discretionary activities and those that capture CLO junior noteholders' influence. The CLO performance measures, control variables and model specifications are similar to those used in Model 1.

We report the results in Panel A of Table 6. Consistent with our expectations, we find a positive and significant coefficient on *Discretionary loan fair values* × *Junior noteholders* and *Discretionary loan fair values* × *Call period*. Economically, when junior noteholders' influence is proxied by *Junior noteholders* (*Call period*), an interquartile increase in discretionary loan fair valuation further increases the probability of avoiding an OC test violation by 9% (18%). Moreover, we find a negative and significant coefficient on *Portfolio risk shifting* × *Junior noteholders* and *Portfolio risk shifting* × *Call period.* Economically, when junior noteholders' influence proxied by *Junior noteholders* (*Call period*) is strong, an interquartile increase in portfolio risk shifting decreases the probability of avoiding an OC test violation by 5% (6%). In addition, we document a negative and significant coefficient on *Loan sales to affiliates* × *Call period*. When noteholders can withdraw their capital, an interquartile increase in loan sales to

affiliates decreases the probability of avoiding an OC test violation by about 3.4%.[21] Overall, these findings suggest that when junior noteholders' influence is stronger, managers shift towards less costly discretionary activities.

*5.3. Discretionary activities, OC test violation avoidance and CLO market conditions*

The market conditions under which a CLO operates likely affect the relation between OC test violation avoidance and manager's discretionary activities. We first assess that when a CLO's portfolio quality is lower than that of its peers, its manager may be under greater pressure to inflate loan fair values and trade strategically to meet an OC test, as credit rating agencies and noteholders compare managers' performance across CLOs. We also expect that when market liquidity is high, managers can potentially trade portfolio loans more easily and at a lower cost. This can facilitate larger gains from the sales of well-performing loans that improve OC test scores.

We measure relative portfolio quality by ranking in quartiles the difference between the number of a CLO's defaulted and excess CCC-rated loans and the average number of defaulted and excess CCC-rated loans reported by other CLOs in the same month. *High defaulted/excess CCC-rated loans* is an indicator variable equal to one if the above difference is ranked in the upper quartile, zero otherwise. We measure loan market liquidity by ranking in quartiles the total number of CLOs' loan trades over a reporting month. *High market liquidity* is an indicator variable equal to one if the monthly market liquidity is ranked in the upper quartile and zero otherwise. We re-estimate Model 2 by substituting *Junior noteholders* with *High defaulted/excess CCC-rated loans* and *High market liquidity*. The variables of interest are the interaction terms between the proxies for discretionary activities and the market condition variables.

[21] To interpret the coefficient in the interaction terms we re-compute the probit models using the inteff command in Stata (Norton et al. 2004). Untabulated results indicate that the coefficient on the interaction terms are statistically significant and maintain their signs. The same applies to all probit models that include an interaction term.

We present the results of these tests in Panel B of Table 6. The positive and significant coefficients on the interaction terms in columns I and II suggest that when CLOs perform poorly relative to their peers, managers are more likely to behave discretionarily and beat an OC test. Economically, an interquartile increase in *Discretionary loan fair values* and *Portfolio risk shifting* when a CLO underperforms its peers further increases the probability of a CLO just meeting an OC test by 9% and 7%, respectively. Moreover, the positive and significant coefficient on *Portfolio risk shifting* × *High market liquidity* suggests that in months of high market liquidity, CLO managers are more likely to risk shift their portfolios to meet an OC test (columns III and IV). Economically, an interquartile increase in *Portfolio risk shifting* when loan market liquidity is high further increases the probability of a CLO just meeting an OC test by 9%. Related, the negative and significant coefficient (at the 10% level) on *Loan sales to affiliates* × *High market liquidity* is consistent with the fact that in months of strong market liquidity managers do not choose to sell loans to affiliated CLOs to beat an OC test. Overall, these findings further support our inference that the relation between discretionary activities and just meeting an OC test varies with the market conditions under which a CLO operates.

*5.4. Discretionary activities, OC test violation avoidance and future CLO performance*

The cross-sectional analyses above suggest that some discretionary activities (particularly strategic trading) are likely more costly. We next examine whether inflating loan fair values and trading strategically are indeed related to subsequent CLO portfolio performance. We measure future portfolio performance using the natural logarithm of the senior and junior OC score six months ahead (*Senior* $OC_{m+6}$ and *Junior* $OC_{m+6}$) and the probability of a note credit rating downgrade over the following six months (*CLO note* $downgrade_{m+6}$).[22] We employ an ordinary

[22] Our results are robust when we capture future portfolio performance by measuring senior and junior OC and the probability of a CLO note credit rating downgrade three months ahead (untabulated robustness tests).

least square (OLS) model where the dependent variable is *Senior* $OC_{m+6}$ or *Junior* $OC_{m+6}$, as well as a probabilistic model where the dependent variable is *CLO note* $downgrade_{m+6}$.

$$\begin{aligned} CLO\ performance_{m+6} = \quad & \alpha + \beta_1 Discretionary\ loan\ fair\ values_m + \beta_2 Portfolio\ risk\ shifting_m \\ & + \beta_3 Loan\ sales\ to\ affiliates_m + Controls_m + CLO\ manager\ FE \\ & + CLO\ trustee\ FE + Reporting\ month\ FE. \end{aligned} \tag{Model 3}$$

The measures for discretionary activities and control variables are similar to Model 1. To mitigate the concern that the results are driven by the selection of the control group, we restrict our sample to CLOs that just meet an OC test this month. Given that the CLO-i database does not always cover CLOs' reporting across consecutive months, the sample size in these analyses drops. We report the results in columns I-III of Table 7. In all three specifications, we find that *Portfolio risk shifting* is associated with lower future portfolio performance. Economically, an interquartile increase in *Portfolio risk shifting* decreases (increases) future senior and junior OC scores (the probability of a CLO note credit rating downgrade) by about 3% and 0.5% (11%), respectively. We find no evidence that trading with affiliated CLOs or inflating loan fair values affects future CLO performance.

We further investigate whether managers' discretionary activities in CLOs that just meet an OC test are associated with worse future performance than are those that just miss a test. We augment Model 3 with *OC test violation avoidance*$_m$ and the interaction term between *OC test violation avoidance*$_m$ and the measures of managerial discretion. The CLO performance measures, control variables and model specifications are similar to Model 3. We report the results in columns IV-VI of Table 7. In all three specifications, we find that portfolio risk shifting by CLOs that just meet an OC test is associated with worse future performance relative to the control group of CLOs that just miss an OC test. Economically, relative to CLOs that miss an OC test, an interquartile increase in *Portfolio risk shifting* by CLOs that just meet an OC test further decreases (increases) future

senior and junior OC scores (the probability of a CLO note credit rating downgrade) by about 6% and 3% (10%), respectively. Also, relative to CLOs that miss an OC test, an interquartile increase in *Discretionary loan fair values* further decreases the junior OC score by about 0.04%. Overall, our results provide further evidence on the adverse effects of strategic trading and suggest that discretionary loan fair valuation is likely a relatively low cost way to avoid an OC test violation.

### *5.5. Supplemental analyses*

#### *5.5.1. Discretionary activities, OC test violation avoidance and CLO note prices*

Managerial discretion may be unraveled by CLO noteholders who receive granular disclosures about individual portfolio loans and can benchmark managers' activities across CLOs. Such unravelling is likely to be reflected in lower CLO note prices. In supplemental analyses, we investigate whether CLO noteholders price managerial discretion when trading in the secondary market. We collect a sample of 1,078 unique trades of CLO notes with complete data on the trade price, size, date, and credit rating covered by CLO-i (503 CLO-month observations).

In Table 8, we report the results on the relation between discretionary activities to meet an OC test and the pricing of CLO notes.[23] The dependent variable is the natural logarithm of the monthly average CLO note price over the next reporting month (*CLO note price*). Our independent variables of interest are the interaction terms of *OC test violation avoidance* with *Discretionary loan fair values*, *Portfolio risk shifting* and *Loan sales to affiliates*. We further control for the average CLO note rating, face amount traded and the control variables included in Model 1. We document that CLO managers' strategic trading choices (primarily portfolio risk shifting) are associated with lower CLO note prices (columns II and III), while discretionary loan fair valuation when OC tests are binding is not priced (columns I and III). These findings can be potentially

[23] Due to the small sample size for CLO note trades, we are not able to follow similar specifications to the ones used in Model 3.

attributed to the different effects of these discretionary activities on CLO performance or noteholders' inability to unravel discretionary loan fair valuation.[24]

*5.5.2. Sensitivity analyses*

Finally, we perform several robustness tests to provide additional credibility to our findings. First, we redefine discretionary loan fair valuation using: (1) the percentage of defaulted and excess CCC-rated loans for which reported fair values are higher than the fair values that other CLOs report for the same loans in the same month, averaged at the CLO-month level (*Pct. of overvalued loans*), (2) the difference between the fair value of defaulted or excess CCC-rated loans and the median fair value of the same loan reported by other CLOs in the same month, averaged at the CLO-month level (*Loan fair value –median loan fair value reported by other CLOs*), (3) the mode of the differences between reported loan fair values and the average of the loan fair values reported for the same loans by other CLOs in the same month (*Mode(Discretionary loan fair values)*) and (4) the difference between the fair value of a defaulted or excess CCC-rated loan reported by a CLO and the average market price of below CCC-rated loans traded in the same month, averaged at the CLO-month level (*Loan fair value –average market price of below CCC-rated loans).* The mean *Pct. of overvalued loans* is 0.38 and the mean *Loan fair value –median loan fair value reported by other CLOs* is 0.10. The mean *Mode(Discretionary loan fair values)* is 0.58, and the mean *Loan fair value –average market price of below CCC-rated loans* is -0.51.[25] The correlation

[24] In untabulated supplemental analyses, we find that the association between just meeting an OC test and managerial discretion is greater in the presence of greater performance-linked compensation (i.e., junior fees that a CLO manager gains if both the senior and junior OC tests are met). We are not able to examine how CLO managers' incentives from holding CLO equity affect their discretionary activities, since information on CLO equity ownership is not reported. Moreover, we test whether CLOs delay loan default recognition when OC tests are binding by using the percentage of loans reported as performing which other CLOs report as defaulted in the same month. We find no evidence of such discretionary activity.

[25] Defaulted and CCC-rated loans are not frequently traded and thus market prices for a specific loan are not always observable. The ideal variable would compare the fair value of a loan with the quotes of that loan provided by the Loan Pricing Corporation, Intex or Markit. However, such information is unavailable to us. Thus, we compare the reported fair value of a defaulted or excess CCC-rated loan with the average market price of loans rated CCC or below

between *Discretionary loan fair values* and the proxies above ranges from 20% to 70%, suggesting that all proxies seem to capture the same underlying construct. We re-estimate Model 1 using these alternative proxies for discretionary loan fair valuation and report the results in Panel A of Table 9. Consistent with our primary analyses, the coefficients on the discretionary loan fair valuation proxies are positive and significant across all specifications.

Second, to mitigate concerns about the definition of the dependent variable *OC test violation avoidance* using the distribution of the senior and junior OC test slack, we employ two additional proxies for CLOs' just meeting an OC test score: (1) an indicator variable equal to one if the senior or junior OC slack is positive and below 1% (*OC test slack 1%*), zero otherwise and (2) an indicator variable equal to one if the senior or junior OC slack is positive and below 3% (*OC test slack 3%*), zero otherwise. We re-estimate Model 1 by using *OC test slack 1%* or *OC test slack 3%* as the dependent variable. We report the results in Panel B of Table 9. While we fail to find that *Loan sales to affiliates* is related to a CLO just meeting the OC tests using *OC test slack 1%* as the dependent variable, the remaining results continue to hold in these specifications, suggesting that the dependent variable definition is unlikely to drive our results.

Last, given that our sample period covers the 2008-2010 credit crisis, we re-estimate Model 1 restricting our sample to the credit crisis and the credit expansion years (2011-2013). Panel C of Table 9 reports the results. We find that our results hold across both sample periods, suggesting that a CLO manager's discretionary activities are not only relevant to the credit crisis.

## 6. Conclusion

We explore how CLO managers use their discretion to avoid violating overcollateralization

in the same month. The negative mean value of this variable is driven by the fact that in some months we compare the fair value of a defaulted loan to the market price of CCC- or C-rated loans, which is marginally higher.

(OC) tests, which require that the value of a CLO's loan portfolio scaled by the principal balance of its notes is above a certain threshold. We predict and find a positive and significant relation between the probability of just meeting an OC test and CLO managers' discretionary loan fair valuation and strategic trading (which is reflected in selling well-performing and retaining underperforming loans or in selling loans to CLOs administered by the same manager). Moreover, we document that the relation between a CLO avoiding an OC test violation and inflating loan fair values (trading strategically) increases (decreases) when junior noteholders' influence is stronger. Looking at CLO market conditions, we show that the relation between managerial discretion and meeting OC tests is amplified when a CLO's relative portfolio performance is weak, i.e., when a CLO manager is under greater pressure to manipulate. Also, the relation between the probability of avoiding an OC test violation and shifting the CLO portfolio to riskier assets (trading with CLO affiliates) is stronger (weaker) when loan market liquidity is high, i.e., when CLOs can cash in greater market gains from loan sales. Lastly, we find that portfolio risk shifting –but not discretionary loan fair valuation– deteriorates future CLO performance, which may explain the trade-off between discretionary activities documented in the cross-sectional tests. Overall, we provide evidence supporting our inference that CLO managers use different discretionary activities interchangeably to meet OC tests and that these activities vary with the CLOs' capital structure and market conditions.

Our findings provide insights to both standard setters and regulators who currently investigate the extent to which CLO disclosures are informative to their noteholders. These insights are particularly relevant given that the Dodd-Frank Act largely ignores CLO reporting standards. Regulators could consider requesting disclosures on the sources of fair value estimates and the reasons behind individual loan trades. In addition, disclosures on the extent to which managers

own equity in the CLO are important to better understand their incentives.

We acknowledge that our findings preclude us from drawing conclusions on the optimality of managers' behavior, since we do not observe CLO noteholders' realized returns. Also, CLO managers may engage in additional discretionary activities that this paper leaves unexplored. More research is required to understand the moral hazard in CLO reporting and investing.

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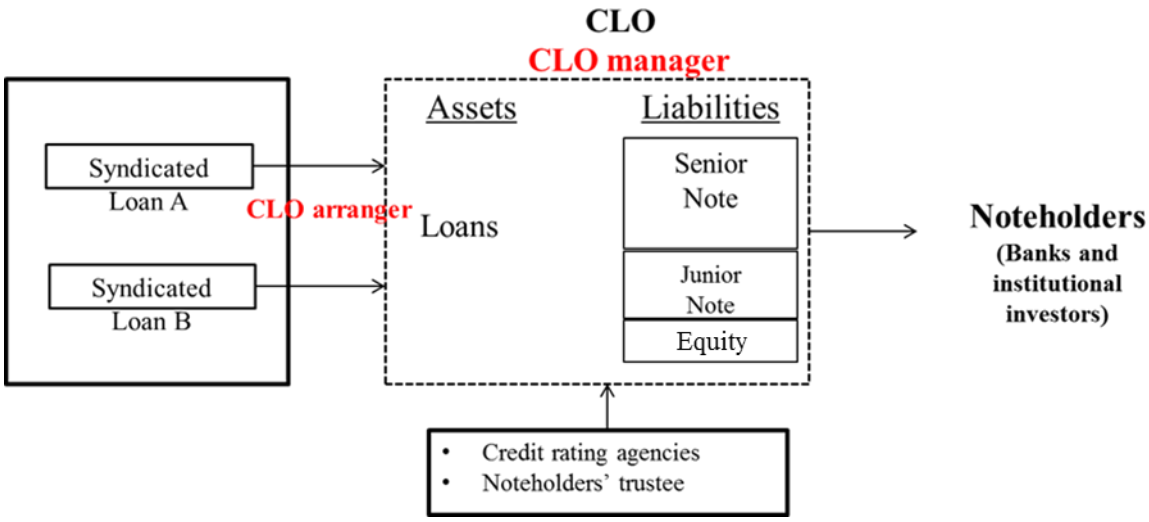
## APPENDIX 1

## CLO structure



## APPENDIX 2

## Example of calculating OC scores under different CLO performance scenarios

**CLO characteristics**

| (in $million) | | | |
|---|---|---|---|
| Principal balance of loans: | $100.00 | | |
| Principal balance of senior notes: | $68.60 | | |
| Principal balance of junior notes: | $19.60 | | |
| Principal balance of the equity tranche: | $11.80 | | |
| Max. principal balance of CCC-rated loans: | $5.00 | | |
| Average maturity: | 10 years | | |
| Senior OC trigger: | 136% | | |
| Junior OC trigger: | 107% | | |

**2A: Positive scenario**

| Principal balance of loans (in $million) | | | |
|---|---|---|---|
| Beg. balance: | $100.00 | | |
| Minus: Principal balance of loans sold at 120% of par: | $10.00 | (cash received = $12.00 m) | |
| Plus: Principal balance of loans bought at par: | $10.00 | | |
| Plus: Cash holdings: | $2.00 | = $12.00m - $10.00m | |
| Total portfolio value: | $102.00 | (A1) | |
| Principal balance of senior notes: | $68.60 | (B) | |
| Principal balance of junior notes: | $19.60 | (C) | |
| Senior OC score: | 149% | (A1)/(B) | PASSED |
| Junior OC score: | 116% | (A1)/[(B) + (C)] | PASSED |

**2B: Negative scenario**

| Principal balance of performing loans (in $ million): | $87.00 | | |
|---|---|---|---|
| Plus: | | | |
| Value of defaulted loans: | $3.00 | Section 2B.1 | |
| Value of excess CCC-rated loans: | $2.05 | Section 2B.2 | |
| Total portfolio value: | $92.05 | (A2) | |
| Principal balance of senior notes: | $68.60 | (B) | |
| Principal balance of junior notes: | $19.60 | (C) | |
| Senior OC score: | 134% | (A2)/(B) | FAILED |
| Junior OC score: | 104% | (A2)/[(B) + (C)] | FAILED |

## APPENDIX 2 (Continued)

**Section 2B.1: Value of defaulted loans**

| Defaulted loans | Principal balance (in $m) | Market price (% of par) | Recovery rate by S&P | Recovery rate by Moody's | Lower market or recovery | Defaulted loan value (in $m) |
|---|---|---|---|---|---|---|
| 1 | $1.00 | 30% | 40% | 40% | 30% | $0.30 |
| 2 | $1.00 | 40% | 50% | 45% | 40% | $0.40 |
| 3 | $1.00 | 50% | 50% | 45% | 45% | $0.45 |
| 4 | $1.00 | 50% | 60% | 60% | 50% | $0.50 |
| 5 | $1.00 | 20% | 40% | 40% | 20% | $0.20 |
| 6 | $1.00 | 50% | 50% | 45% | 45% | $0.45 |
| 7 | $1.00 | 30% | 40% | 40% | 30% | $0.30 |
| 8 | $1.00 | 60% | 40% | 40% | 40% | $0.40 |
| Total | $8.00 | | | | | $3.00 |

**Section 2B.2: Value of excess CCC-rated loans**

| CCC-rated loans | Principal balance (in $m) | Market price (% of par) | Excess CCC-rated | Principal balance of excess CCC-rated loans (in $m) | Market value of excess CCC-rated loans (in $m) |
|---|---|---|---|---|---|
| 1 | $1.00 | 30% | YES | $1.00 | $0.30 |
| 2 | $1.00 | 35% | YES | $1.00 | $0.35 |
| 3 | $1.00 | 40% | YES | $1.00 | $0.40 |
| 4 | $1.00 | 45% | YES | $1.00 | $0.45 |
| 5 | $1.00 | 55% | YES | $1.00 | $0.55 |
| 6 | $1.00 | 59% | NO | | |
| 7 | $1.00 | 70% | NO | | |
| 8 | $1.00 | 70% | NO | | |
| 9 | $1.00 | 80% | NO | | |
| 10 | $1.00 | 80% | NO | | |
| Total | $10.00 | | | $5.00 | $2.05 |

**2C: Negative scenario with discretionary loan fair values and strategic trading**

| (in $million) | | | |
|---|---|---|---|
| Principal balance of performing loans: | $77.00 | | |
| Plus: | | | |
| Cash from selling 10 loans at 120% of par: | $12.00 | | |
| Value of defaulted loans: | $3.45 | Section 2C.1 | |
| Value of excess CCC-rated loans: | $2.85 | Section 2C.2 | |
| Total portfolio value: | $95.30 | (A3) | |
| | | | |
| Principal balance of senior notes: | $68.60 | (B) | |
| Principal balance of junior notes: | $19.60 | (C) | |
| | | | |
| Senior OC score: | 139% | (A3)/(B) | PASSED |
| Junior OC score: | 108% | (A3)/[(B) + (C)] | PASSED |

## APPENDIX 2 (Continued)

**Section 2C.1: Value of defaulted loans**

| Defaulted loans | Principal balance (in $m) | Market price (% of par) | Recovery rate by S&P | Recovery rate by Moody's | Lower market or recovery | Defaulted loan value (in $m) |
|---|---|---|---|---|---|---|
| 1 | $1.00 | 40% | 40% | 40% | 40% | $0.40 |
| 2 | $1.00 | 50% | 50% | 45% | 45% | $0.45 |
| 3 | $1.00 | 50% | 50% | 45% | 45% | $0.45 |
| 4 | $1.00 | 50% | 60% | 60% | 50% | $0.50 |
| 5 | $1.00 | 40% | 40% | 40% | 40% | $0.40 |
| 6 | $1.00 | 50% | 50% | 45% | 45% | $0.45 |
| 7 | $1.00 | 40% | 40% | 40% | 40% | $0.40 |
| 8 | $1.00 | 60% | 40% | 40% | 40% | $0.40 |
| Total | $8.00 | | | | | $3.45 |

**Section 2C.2: Value of excess CCC-rated loans**

| CCC-rated loans | Principal balance (in $m) | Market price (% of par) | Excess CCC-rated | Principal balance of excess CCC-rated loans(in $m) | Market value of excess CCC-rated loans (in $m) |
|---|---|---|---|---|---|
| 1 | $1.00 | 50% | YES | $1.00 | $0.50 |
| 2 | $1.00 | 50% | YES | $1.00 | $0.50 |
| 3 | $1.00 | 50% | YES | $1.00 | $0.60 |
| 4 | $1.00 | 60% | YES | $1.00 | $0.60 |
| 5 | $1.00 | 65% | YES | $1.00 | $0.65 |
| 6 | $1.00 | 70% | NO | | |
| 7 | $1.00 | 70% | NO | | |
| 8 | $1.00 | 70% | NO | | |
| 9 | $1.00 | 80% | NO | | |
| 10 | $1.00 | 80% | NO | | |
| Total | $10.00 | | | $5.00 | $2.85 |

## APPENDIX 3

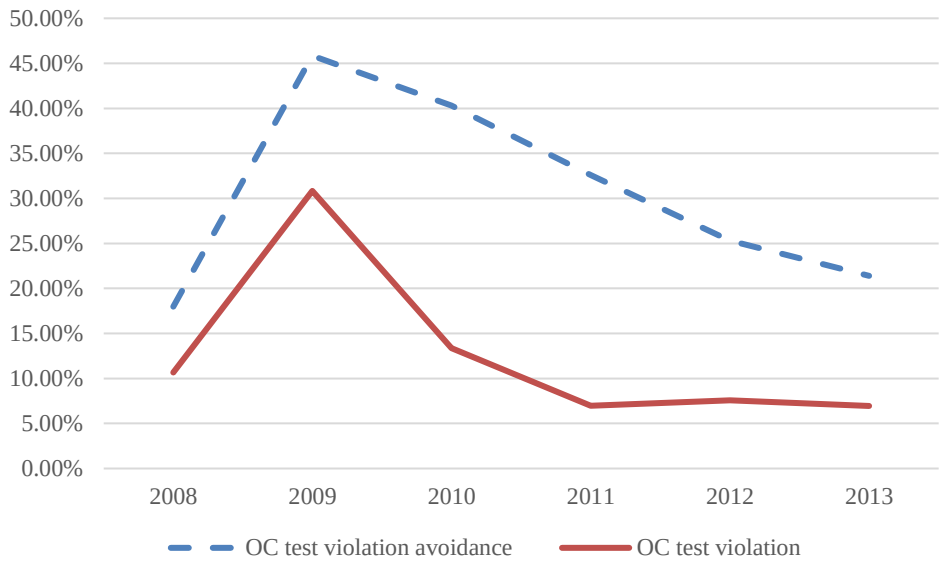
## Variable definitions

| Variable | Definitions |
|---|---|
| **CLO performance** | |
| *OC test violation avoidance* | Binary variable that equals one if a CLO just passes the senior or junior OC test and zero otherwise. We assess that a CLO just passes an OC test if the reported senior (junior) OC test slack is ranked in the bottom quartile of the senior (junior) OC test slack distribution across all CLOs that pass the test in a reporting month. |
| *Defaulted loan bucket* | The number of defaulted loans scaled by the total number of loans in a CLO portfolio (stated as a percentage). |
| *CCC-rated loan bucket* | The number of loans rated CCC or lower scaled by the total number of loans in a CLO portfolio (stated as a percentage). |
| *Average portfolio rating* | The average (S&P or Moody's) credit rating of the loans in a CLO portfolio. A loan's credit rating is defined as a scale variable that equals 1 for AAA (or Aaa), 2 for AA+ (or Aa1), and so forth. For loans where Moody's and S&P's ratings differ, we use the most conservative rating. |
| *Senior OC* | The natural logarithm of a CLO's senior overcollateralization score (stated in percentage points). |
| *Junior OC* | The natural logarithm of a CLO's junior overcollateralization score (stated in percentage points). |
| *Portfolio size* | The natural logarithm of a CLO's loan portfolio total principal balance outstanding. |
| *CLO note price* | The natural logarithm of the price of traded CLO notes, averaged at the CLO-month level. |
| *CLO note downgrade* | Binary variable that equals one if a CLO note's credit rating is downgraded by at least a notch over the following six months and zero otherwise. |
| **CLO discretionary activities** | |
| *Discretionary loan fair values* | The difference between the fair value of a defaulted or excess CCC-rated loan reported by a CLO and the average fair value of the same loan reported by other CLOs in the same reporting month, averaged at the CLO-month level. |
| *Discretionary fair values_ traded loans* | The difference between the fair value of a defaulted or excess CCC-rated traded loan (i.e., a loan that has traded at least once over the prior six months) and the average fair value of the same loan reported by other CLOs in the same reporting month. |
| *Discretionary fair values_ non-traded loans* | The difference between the fair value of a defaulted or excess CCC-rated non-traded loan (i.e., with no trade over the prior six months) and the average fair value of the same loan reported by other CLOs in the same reporting month. |

## APPENDIX 3 (Continued)

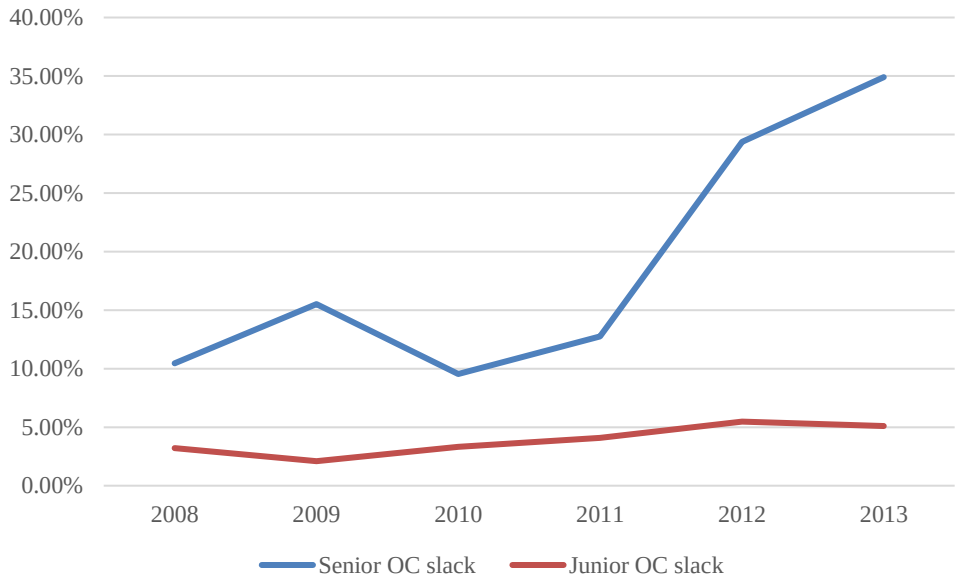
| | |
|---|---|
| *Portfolio risk shifting* | The percentage of the number of loans sold above par value and the number of underperforming loans retained by a CLO, divided by the total number of portfolio loans. To identify loans retained by a CLO over a reporting month, we compare the CLO portfolio structure with its structure in the previous reporting month. We define portfolio loans as underperforming if (1) they are not in default or in the excess CCC-rated bucket and (2) they experience negative market returns over a 180 day period prior to a CLO-reporting month. If the loan is not traded, we use the average market returns of all securitized loans issued by the same borrower. |
| *Loan sales to affiliates* | The number of loan sales to affiliated CLOs divided by the total number of portfolio loan sales over the reporting month (stated as a percentage). Affiliated CLOs share the same manager. |
| *Discretionary loan sale price to affiliates* | The average price of portfolio loans sold to affiliated CLOs minus the average market price of these loans over the (±30 days) period around the loan sale date to an affiliated CLO. |
| **CLO characteristics** | |
| *Junior noteholders* | Binary variable that equals one if the ratio of a CLO's junior notes current balance to its senior notes current balance ranks in the upper quartile of the distribution of this ratio and zero otherwise. |
| *Call period* | Binary variable that equals one if a CLO passed its reinvestment period, after which noteholders can withdraw their capital and zero otherwise. |
| *High defaulted/excess CCC-rated loans* | Binary variable that equals one if the difference between the number of defaulted and excess CCC-rated loans reported by a CLO and the average number of defaulted and excess CCC-rated loans reported by other CLOs in the same month is ranked in the upper quartile of the distribution of this difference and zero otherwise. |
| *High market liquidity* | Binary variable that equals one if the monthly secondary securitized loan market liquidity (estimated as the number of loan sales and purchases that CLOs report in a month) is ranked in the upper quartile of its sample distribution and zero otherwise. |

**Figure 1. OC test violations**



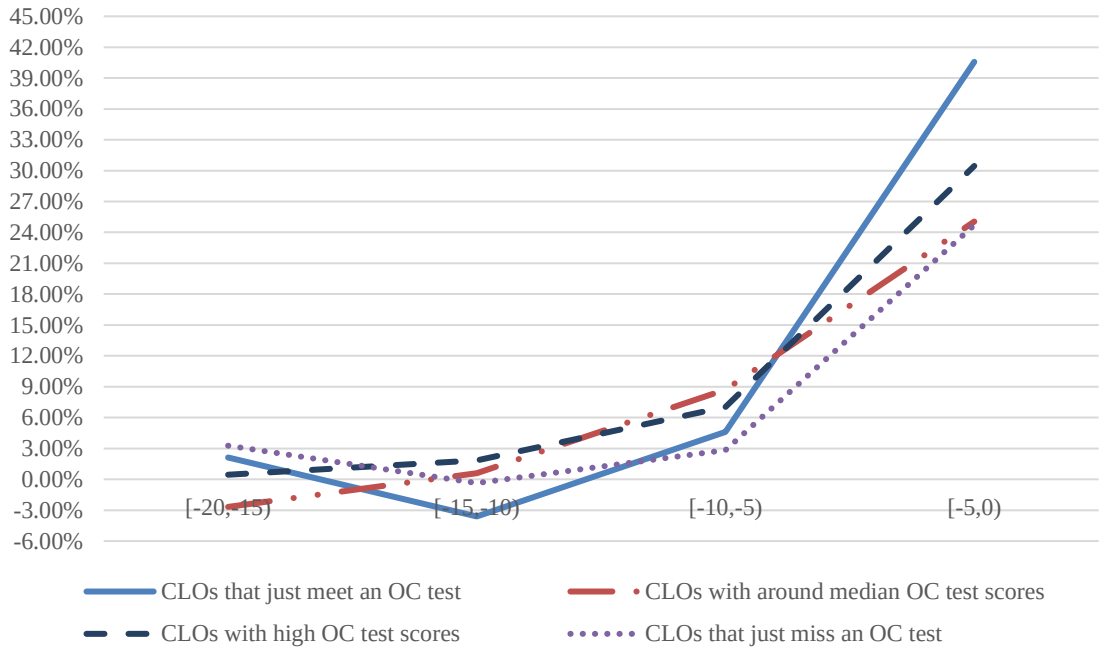

The figure presents the percentage of CLOs that just passed an OC test and thus avoided an OC test violation and the percentage of CLOs that violated an OC test over the 2008-2013 period.

**Figure 2. The slack on OC tests**



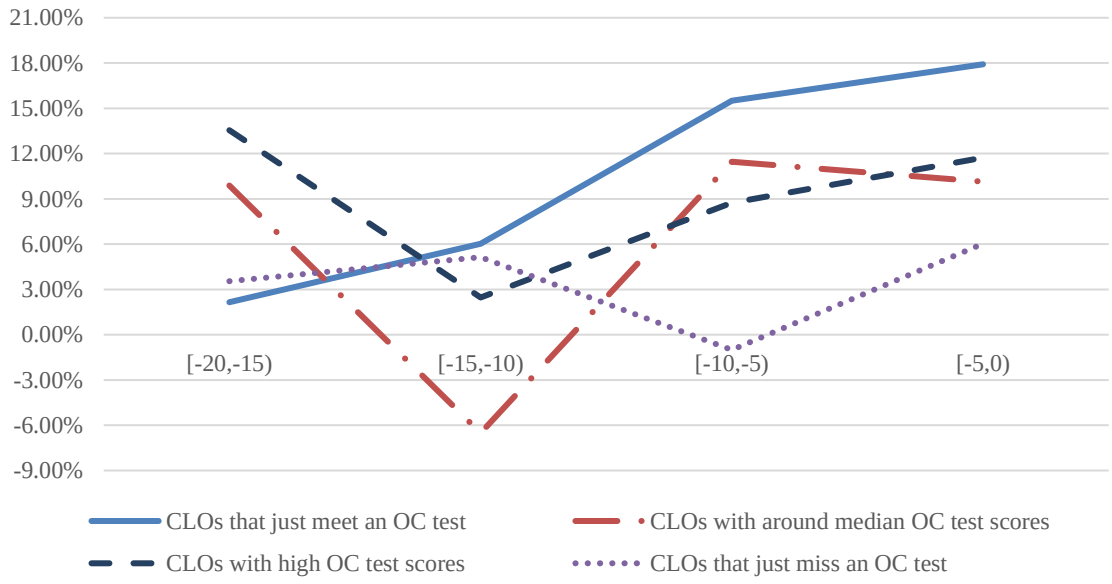

The figure presents the reported senior and junior OC tests' slack (in percentage points) over the 2008-2013 period.

## Figure 3. Intra-month sales of loans that trade above par




The figure presents intra-month daily percentage changes in above-par loan sales averaged for CLOs that just miss an OC test, CLOs that just meet an OC test, CLOs with around median OC test scores and CLOs with high OC test scores. Day 0 is the day of the monthly CLO report.

## Figure 4. Intra-month loan sales to affiliated CLOs




The figure presents intra-month daily percentage changes in loan sales to affiliated CLOs for CLOs that just miss an OC test, CLOs that just meet an OC test, CLOs with around median OC test scores and CLOs with high OC test scores. Day 0 is the day of the monthly CLO report.

## TABLE 1

## Sample selection

**Panel A: Sample selection**

| | Number of CLOs | Number of CLO -reporting months |
|---|---|---|
| I. CLO-i population | 493 | 9,045 |
| II. CLOs with defaulted and excess CCC-rated loans | 434 | 6,454 |
| III. CLOs with defaulted and excess CCC-rated loans whose manager administers at least two CLOs | 415 | 6,012 |
| IV. CLOs in (III) with complete data on loan fair values | 145 | 3,726 |

**Panel B: Number of CLO-reporting months by year**

| Year | Full sample | CLOs with complete data on loan fair values |
|---|---|---|
| 2008 | 157 | 138 |
| 2009 | 1,307 | 840 |
| 2010 | 1,471 | 935 |
| 2011 | 1,170 | 671 |
| 2012 | 1,148 | 670 |
| 2013 | 759 | 472 |
| Total | 6,012 | 3,726 |

This table presents the sample selection filters (Panel A) and the sample composition over time (Panel B).

## TABLE 2

## Descriptive statistics

**Panel A: Summary statistics of the main variables**

| Variable | Obs. | Mean | S.D. | Q1 | Median | Q3 |
|---|---|---|---|---|---|---|
| **CLO performance** | | | | | | |
| *OC test violation avoidance* | 6,012 | 0.28 | 0.47 | 0.00 | 0.00 | 1.00 |
| *Defaulted loan bucket (%)* | 6,012 | 4.05 | 3.76 | 1.41 | 2.81 | 5.34 |
| *CCC-rated loan bucket (%)* | 6,012 | 7.57 | 4.31 | 4.80 | 6.95 | 8.40 |
| *Average portfolio rating* | 6,012 | 15.06 | 0.66 | 14.58 | 14.91 | 15.41 |
| *Senior OC* | 6,012 | 4.81 | 0.33 | 4.76 | 4.80 | 4.90 |
| *Junior OC* | 6,012 | 4.63 | 0.09 | 4.50 | 4.62 | 4.71 |
| *Portfolio size* | 6,012 | 19.51 | 1.01 | 18.16 | 19.81 | 20.03 |
| *CLO note downgrade* | 6,012 | 0.17 | 0.37 | 0.00 | 0.00 | 0.00 |
| *CLO note price* | 503 | 4.41 | 0.21 | 4.32 | 4.49 | 4.57 |
| **CLO discretionary activities** | | | | | | |
| *Discretionary loan fair values* | 3,726 | 0.25 | 6.08 | -1.25 | 0.25 | 3.11 |
| *Portfolio risk shifting (%)* | 6,012 | 4.56 | 2.62 | 2.74 | 4.48 | 6.01 |
| *Loan sales to affiliates (%)* | 6,012 | 5.42 | 8.96 | 0.00 | 2.00 | 6.57 |
| *Discretionary loan fair values_traded loans* | 3,726 | 0.14 | 2.99 | 0.00 | 0.00 | 0.00 |
| *Discretionary loan fair values_non-traded loans* | 3,726 | 0.29 | 3.07 | -2.55 | 0.37 | 4.00 |
| *Discretionary loan sale price to affiliates* | 2,253 | 1.80 | 1.98 | 0.10 | 0.80 | 1.60 |
| **CLO characteristics** | | | | | | |
| *Junior noteholders* | 6,012 | 0.23 | 0.41 | 0.00 | 0.00 | 0.00 |
| *Call period* | 6,012 | 0.27 | 0.43 | 0.00 | 0.00 | 1.00 |
| *High defaulted/excess CCC-rated loans* | 6,012 | 0.25 | 0.43 | 0.00 | 0.00 | 0.00 |
| *High market liquidity* | 6,012 | 0.25 | 0.43 | 0.00 | 0.00 | 1.00 |

**TABLE 2 (Continued)**

**Panel B: Spearman correlation among the proxies for CLO performance and CLO manager's discretionary activities**

| | Obs.= 3,726 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | *OC test violation avoidance* | 1.00 | | | | | | | | | | | |
| (2) | *Discretionary loan fair values* | 0.33 | 1.00 | | | | | | | | | | |
| (3) | *Portfolio risk shifting* | 0.04 | 0.04 | 1.00 | | | | | | | | | |
| (4) | *Loan sales to affiliates* | 0.41 | 0.09 | 0.12 | 1.00 | | | | | | | | |
| (5) | *Discretionary loan fair values_traded loans* | 0.02 | 0.43 | 0.02 | 0.00 | 1.00 | | | | | | | |
| (6) | *Discretionary loan fair values_non-traded loans* | 0.29 | 0.55 | 0.05 | 0.05 | 0.09 | 1.00 | | | | | | |
| (7) | *Defaulted loan bucket* | 0.03 | 0.04 | -0.05 | -0.09 | 0.01 | 0.05 | 1.00 | | | | | |
| (8) | *CCC-rated loan bucket* | 0.15 | 0.12 | -0.07 | -0.04 | 0.05 | 0.01 | 0.36 | 1.00 | | | | |
| (9) | *Average portfolio rating* | -0.03 | 0.01 | -0.02 | -0.02 | 0.04 | 0.04 | 0.55 | 0.52 | 1.00 | | | |
| (10) | *Senior OC* | -0.53 | -0.19 | 0.17 | -0.25 | 0.00 | 0.01 | 0.03 | -0.04 | 0.11 | 1.00 | | |
| (11) | *Junior OC* | -0.62 | -0.23 | 0.07 | -0.21 | 0.00 | -0.01 | -0.26 | -0.30 | -0.16 | 0.43 | 1.00 | |
| (12) | *Portfolio size* | 0.12 | 0.12 | -0.03 | 0.05 | 0.06 | 0.02 | 0.24 | 0.32 | 0.25 | -0.22 | -0.15 | 1.00 |
| (13) | *CLO note downgrade* | 0.13 | 0.04 | -0.02 | 0.01 | -0.06 | 0.00 | 0.38 | 0.35 | 0.29 | -0.16 | -0.20 | 0.24 |

This table presents sample descriptive statistics. Panel A reports the summary statistics of the variables used in the empirical analyses. Panel B reports the Spearman correlation among the measures for CLO performance and discretionary activities. All variables are defined in Appendix 3. Continuous variables are winsorized at the 1% and 99% levels.

## TABLE 3

## Probability of an OC test violation absent managerial discretion

| | Probability of an OC test violation for CLOs that just meet the OC tests, if: | Probability of an OC test violation for CLOs with around median OC test scores, if: | Probability of an OC test violation for CLOs with high OC test scores, if: | Statistical significance in the differences of the mean probabilities: | Statistical significance in the differences of the mean probabilities: |
|---|---|---|---|---|---|
| | (I) | (II) | (III) | (I) -(II) | (I) -(III) |
| **CLOs do not inflate fair values and trade strategically** | **87.563%** | **26.127%** | **5.276%** | **51.059*** ** | **85.990*** ** |
| CLOs do not inflate fair values | 60.312% | 21.958% | 4.563% | 20.607*** | 35.071*** |
| CLOs do not sell above-par loans and do not retain underperforming loans | 81.369% | 23.233% | 4.109% | 51.164*** | 66.111*** |
| CLOs do not trade with affiliates | 48.914% | 19.741% | 1.553% | 11.744*** | 35.097*** |

This table reports the results of the univariate tests on the probability of a CLO violating an OC test if its manager did not engage in discretionary activities. We assess these probabilities by subtracting from the CLO total portfolio value (i.e., the numerator of the reported senior and junior OC tests) the following components: i) the difference between the reported fair value of defaulted and excess CCC-rated loans and the average fair value reported for the same loans by other CLOs over the same reporting month, multiplied by the principal balance of these loans (i.e., we reverse the discretionary component of reported fair values); ii) the difference between the sale proceedings and the face value of loans sold above par as well as the difference between the face value and the market price of underperforming loans (i.e., we reverse the sales of above-par traded loans and assume that the manager sells off underperforming loans) and iii) the difference between the sale price of a loan to an affiliated CLO and the trade price of the same loan during a [-30 days,+30 days] period around this sale (i.e., we reverse the discretionary component of a loan's sale price to affiliated CLOs). Column (I) reports the frequencies of an OC test violation if managers did not engage in discretionary activities for CLOs that just meet an OC test. Column (II) reports the frequencies of an OC test violation if managers did not engage in discretionary activities for CLOs with OC test scores ranked in the second and third quartiles of the distribution of OC performance. Column (III) reports the frequencies of an OC test violation if managers did not engage in discretionary activities for CLOs with OC test scores ranked in the top quartile. The last two columns report t-statistics for the differences in the probability means. All variables are defined in Appendix 3. Continuous variables are winsorized at the 1% and 99% levels. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

## TABLE 4

## Discretionary activities and OC test violation avoidance

**Panel A: Discretionary loan fair values, strategic trading and OC test violation avoidance**

| Dependent variable | (I) *OC test violation avoidance* | | | (II) *Senior OC test violation avoidance* | | |
|---|---|---|---|---|---|---|
| ***Discretionary loan fair values*** | **0.025*** ** | | **0.012*** ** | **0.007** ** | | **0.004*** ** |
| | **(4.922)** | | **(2.618)** | **(2.299)** | | **(2.580)** |
| ***Portfolio risk shifting*** | | **0.028*** ** | **0.036*** ** | | **0.016*** ** | **0.025*** ** |
| | | **(5.108)** | **(3.476)** | | **(6.230)** | **(4.851)** |
| ***Loan sales to affiliates*** | | **0.007*** ** | **0.009*** ** | | **0.000** | **-0.005** |
| | | **(4.402)** | **(2.947)** | | **(0.107)** | **(-0.785)** |
| *Defaulted loan bucket* | -0.024** | -0.004 | -0.034*** | -0.010 | -0.016** | -0.011* |
| | (-2.134) | (-0.467) | (-2.816) | (-1.035) | (-2.056) | (-1.700) |
| *CCC-rated loan bucket* | 0.101*** | 0.088** | 0.027 | 0.165* | 0.073 | 0.028 |
| | (2.430) | (1.985) | (1.239) | (1.875) | (0.160) | (1.493) |
| *Average portfolio rating* | -0.119 | -0.067 | -0.072* | -0.104* | -0.060* | -0.034 |
| | (-1.092) | (-1.556) | (-1.861) | (-1.885) | (-1.793) | (-1.543) |
| *Senior OC* | -0.152* | -0.153*** | -0.227 | -0.154*** | -0.110*** | -0.362*** |
| | (-1.623) | (-5.500) | (-0.902) | (-2.552) | (-9.931) | (-6.398) |
| *Junior OC* | -0.073*** | 0.160 | -0.069*** | -0.153*** | 0.158 | -0.165*** |
| | (-2.383) | (0.641) | (-3.046) | (-6.734) | (0.790) | (-3.055) |
| *Portfolio size* | 0.030 | -0.005 | 0.091 | -0.081 | 0.048 | -0.095 |
| | (0.243) | (-0.067) | (0.702) | (-0.487) | (0.626) | (-0.763) |
| Obs. | 3,726 | 6,012 | 3,726 | 3,726 | 6,012 | 3,726 |
| Pseudo $R^2$ | 39.09% | 34.82% | 41.30% | 49.16% | 40.16% | 52.88% |

| Dependent variable | (III) *Junior OC test violation avoidance* | | | (IV) *OC test violation avoidance* Subsample of CLOs that just pass or miss an OC test | | |
|---|---|---|---|---|---|---|
| ***Discretionary loan fair values*** | **0.013*** ** | | **0.038*** ** | **0.008** ** | | **0.025*** ** |
| | **(3.951)** | | **(4.268)** | **(2.207)** | | **(5.493)** |
| ***Portfolio risk shifting*** | | **0.033*** ** | **0.059** ** | | **0.027*** ** | **0.030*** |
| | | **(3.324)** | **(2.316)** | | **(2.842)** | **(1.931)** |
| ***Loan sales to affiliates*** | | **0.004*** ** | **0.024*** ** | | **0.005** ** | **0.010*** |
| | | **(3.046)** | **(3.561)** | | **(1.969)** | **(1.765)** |
| *Defaulted loan bucket* | -0.024*** | -0.003 | -0.017** | -0.040*** | -0.030*** | -0.047*** |
| | (-2.600) | (-0.434) | (-2.360) | (-2.635) | (-2.681) | (-3.114) |

## TABLE 4 (Continued)

| | | | | | | |
|---|---|---|---|---|---|---|
| *CCC-rated loan bucket* | -0.158 | -0.129 | -0.021 | 0.152 | -0.104 | 0.114*** |
| | (-0.703) | (-1.154) | (-0.948) | (0.387) | (-1.340) | (4.218) |
| *Average portfolio rating* | 0.029 | -0.024 | 0.015 | -0.019 | 0.017 | 0.027 |
| | (0.712) | (-1.329) | (0.234) | (-0.544) | (0.603) | (0.255) |
| *Senior OC* | -0.198 | -0.118*** | -0.003 | 0.043* | 0.148*** | 0.144*** |
| | (-1.103) | (-3.756) | (-0.010) | (1.775) | (2.396) | (2.584) |
| *Junior OC* | -0.132** | 0.148 | -0.075*** | 0.188*** | 0.171** | 0.185*** |
| | (-2.317) | (1.283) | (-2.807) | (2.669) | (2.306) | (7.240) |
| *Portfolio size* | -0.122 | 0.045 | 0.101 | 0.128** | 0.158*** | 0.497 |
| | (-1.020) | (1.203) | (0.259) | (2.144) | (2.833) | (0.903) |
| Obs. | 3,726 | 6,012 | 3,726 | 1,469 | 2,520 | 1,469 |
| Pseudo $R^2$ | 33.71% | 17.23% | 34.66% | 46.06% | 43.16% | 58.04% |

This table reports the results on the relation between discretionary loan fair values, strategic trading and the probability of a CLO just meeting an OC test. In Panel A, the independent variables of interest are: i) *Discretionary loan fair values*, defined as the difference between the fair value of defaulted or excess CCC-rated loans and the average fair value that other CLOs report for the same loans in the same month, averaged at the CLO-month level; ii) *Portfolio risk shifting*, defined as the percentage of the number of loans sold above their par value and the number of underperforming loans retained by a CLO, divided by the total number of portfolio loans and iii) *Loan sales to affiliates*, defined as the percentage of the number of loan sales to affiliated CLOs divided by the total number of portfolio loan sales over a reporting month. In column (I), the dependent variable equals one if a CLO passes its junior or senior OC test and the OC test slack is in the bottom quartile of the OC slack of CLOs that pass the tests, zero otherwise (*OC test violation avoidance*). In column (II) [(III)], the dependent variable equals one if a CLO passes its senior (junior) OC test and the senior (junior) OC test slack is in the bottom quartile of the senior (junior) OC slack of CLOs that pass the test, zero otherwise (*Senior* [*Junior*] *OC test violation avoidance*). In column (IV), we restrict our sample to CLOs that just pass an OC test and CLOs that just miss the OC test (i.e., CLOs that violated an OC test and the OC test slack is in the top quartile of the OC slack of CLOs that violate the tests). All other variables are defined in Appendix 3. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model across all columns, marginal effects are reported and z-statistics are in parentheses. CLO reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 4 (Continued)

**Panel B: Discretionary fair values of traded and non-traded loans, discretionary sale price to affiliates and the probability of avoiding an OC test violation**

| Dependent variable | (I) *OC test violation avoidance* | | (II) *Senior OC test violation avoidance* | | (III) *Junior OC test violation avoidance* | | (IV) *OC test violation avoidance* Subsample of CLOs that just pass or miss an OC test | |
|---|---|---|---|---|---|---|---|---|
| ***Discretionary fair values_traded loans*** | **0.004** | | **0.001** | | **0.001** | | **-0.001** | |
| | **(0.794)** | | **(0.267)** | | **(1.320)** | | **(-0.163)** | |
| ***Discretionary fair values_non-traded loans*** | **0.019*** ** | | **0.006** ** | | **0.011*** ** | | **0.010*** ** | |
| | **(3.330)** | | **(1.981)** | | **(3.176)** | | **(2.549)** | |
| ***Discretionary loan sale price to affiliates*** | | **0.003*** ** | | **0.002*** | | **0.020*** | | **0.003*** ** |
| | | **(3.238)** | | **(1.911)** | | **(1.855)** | | **(2.711)** |
| Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Obs. | 3,726 | 2,253 | 3,726 | 2,253 | 3,726 | 2,253 | 1,469 | 889 |
| Pseudo $R^2$ | 44.15% | 27.81% | 49.41% | 34.80% | 36.09% | 22.32% | 46.27% | 48.82% |

Panel B reports results that further corroborate the positive association between CLO managers' discretion in inflating loan fair values and loan sale prices to affiliated CLOs and the probability of just meeting an OC test. We categorize *Discretionary loan fair values* in discretionary fair value estimates related to traded loans, i.e., loans that traded at least once over the previous six months (*Discretionary fair values_traded loans*), and non-traded loans, i.e., loans with no trades over this period (*Discretionary fair values_non-traded loans*). *Discretionary loan sale price to affiliates* is the average price of portfolio loans sold to affiliated CLOs minus the average market price of these loans over the 30-day period around the loan sale to an affiliated CLO. The dependent variables and control variables (untabulated) are the same as in Panel A. All variables are defined in Appendix 3. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model across all columns, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 5

## Changes in discretionary activities and OC test violation avoidance

| Dependent variable | (I) *OC test violation avoidance* | | (II) *Senior OC test violation avoidance* | | (III) *Junior OC test violation avoidance* | | (IV) *OC test violation avoidance* Subsample of CLOs that just pass or miss an OC test | |
|---|---|---|---|---|---|---|---|---|
| ***d(Discretionary loan fair values)*** | | **0.005*** ** | | **0.002*** ** | | **0.006*** ** | | **0.005*** |
| | | **(3.489)** | | **(3.111)** | | **(3.595)** | | **(1.674)** |
| ***d(Portfolio risk shifting)*** | **0.002**** | **0.005*** | **0.001** | **0.003*** ** | **0.006**** | **0.006**** | **0.004**** | **0.007** |
| | **(2.303)** | **(1.627)** | **(0.701)** | **(3.050)** | **(1.972)** | **(2.459)** | **(2.374)** | **(1.290)** |
| ***d(Loan sales to affiliates)*** | **0.001*** ** | **0.002**** | **0.001*** | **0.000** | **0.002*** ** | **0.002*** ** | **0.002*** | **0.001** |
| | **(2.601)** | **(2.573)** | **(1.779)** | **(0.531)** | **(3.620)** | **(2.685)** | **(1.919)** | **(0.398)** |
| Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Obs. | 4,781 | 1,856 | 4,781 | 1,856 | 4,781 | 1,856 | 2,301 | 1,212 |
| Pseudo $R^2$ | 33.56% | 41.72% | 39.76% | 55.35% | 19.97% | 34.36% | 49.75% | 66.34% |

This table reports the results on the relation between monthly changes in discretionary loan fair values and strategic trading and the probability of a CLO's just meeting an OC test. d(*Discretionary loan fair values)* is the change in discretionary loan fair valuation compared to the prior month's discretionary loan fair valuation, defined as the difference between the fair value of defaulted or excess CCC-rated loans and the average fair value that other CLOs report for the same loans in the same month, averaged at the CLO-month level. d(*Portfolio risk shifting*) is the change in portfolio risk shifting compared to the prior month's portfolio risk shifting, defined as the percentage of the number of loans sold above their par value and the number of underperforming loans retained by a CLO, divided by the total number of portfolio loans. d(*Loan sales to affiliates*) is the change in affiliated CLO sales compared to prior the month's affiliated CLO sales, defined as the percentage of the number of loan sales to affiliated CLOs divided by the total number of portfolio loan sales over a reporting month. All other variables are defined in Appendix 3. Dependent variables and control variables (untabulated) are the same as in Table 3. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model across all columns, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 6

## Discretionary activities, CLO characteristics and OC test violation avoidance

**Panel A: Discretionary activities, CLO junior noteholders and OC test violation avoidance**

| Dependent variable | *OC test violation avoidance* | | | |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| *Discretionary loan fair values* | | 0.013*** | | 0.018*** |
| | | (4.445) | | (6.903) |
| *Portfolio risk shifting* | 0.023*** | 0.028*** | 0.021*** | 0.026*** |
| | (3.781) | (2.906) | (3.503) | (3.006) |
| *Loan sales to affiliates* | 0.007*** | 0.007*** | 0.011*** | 0.014*** |
| | (4.220) | (2.813) | (5.328) | (4.278) |
| *Junior noteholders* | 0.093 | -0.187 | | |
| | (1.079) | (-1.550) | | |
| ***Discretionary loan fair values*** | | | | |
| **× *Junior noteholders*** | | **0.019**** | | |
| | | **(2.132)** | | |
| ***Portfolio risk shifting*** | | | | |
| **× *Junior noteholders*** | **-0.020**** | **-0.014*** | | |
| | **(-2.121)** | **(-1.854)** | | |
| ***Loan sales to affiliates*** | | | | |
| **× *Junior noteholders*** | **-0.003** | **0.006** | | |
| | **(-0.768)** | **(1.168)** | | |
| *Call period* | | | -0.142*** | -0.133*** |
| | | | (-2.713) | (-5.221) |
| ***Discretionary loan fair values*** | | | | |
| **× *Call period*** | | | | **0.038***** |
| | | | | **(4.142)** |
| ***Portfolio risk shifting*** | | | | |
| **× *Call period*** | | | **-0.013***** | **-0.018*** |
| | | | **(-2.580)** | **(-1.883)** |
| ***Loan sales to affiliates*** | | | | |
| **× *Call period*** | | | **-0.005**** | **-0.008*** |
| | | | **(-1.946)** | **(-1.809)** |
| Controls | YES | YES | YES | YES |
| Obs. | 6,012 | 3,726 | 6,012 | 3,726 |
| Pseudo $R^2$ | 35.23% | 42.97% | 38.14% | 48.22% |

Panel A reports the results on the role of CLO junior noteholders in the use of discretionary activities to avoid an OC test violation. *Junior noteholders* is one if the ratio of the current balance of a CLO's junior notes to the current balance of the senior notes ranks in the upper quartile, zero otherwise. *Call period* is one if a CLO passed its reinvestment period, after which noteholders can usually withdraw their capital, zero otherwise. The dependent variable equals one if a CLO just passes an OC test, zero otherwise (*OC test violation avoidance*). All other variables are defined in Appendix 3. Controls (untabulated) include the same variables as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model across all columns, marginal effects are reported and z- statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 6 (Continued)

**Panel B: Discretionary activities, CLO market conditions and OC test violation avoidance**

| Dependent variable | *OC test violation avoidance* | | | |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| *Discretionary loan fair values* | | 0.014*** | | 0.016*** |
| | | (5.054) | | (5.340) |
| *Portfolio risk shifting* | 0.015** | 0.022*** | 0.013** | 0.020** |
| | (2.458) | (2.679) | (2.279) | (2.395) |
| *Loan sales to affiliates* | 0.007*** | 0.009*** | 0.007*** | 0.008*** |
| | (4.542) | (3.286) | (4.267) | (3.383) |
| *High defaulted/excess CCC-rated loans* | -0.041 | -0.120 | | |
| | (-0.679) | (-1.294) | | |
| ***Discretionary loan fair values*** | | | | |
| ***× High defaulted/excess CCC-rated loans*** | | **0.018*** ** | | |
| | | **(2.593)** | | |
| ***Portfolio risk shifting*** | | | | |
| ***× High defaulted/excess CCC-rated loans*** | **0.023**** | **0.019*** | | |
| | **(2.182)** | **(1.886)** | | |
| ***Loan sales to affiliates*** | | | | |
| ***× High defaulted/excess CCC-rated loans*** | **-0.002** | **-0.004** | | |
| | **(-0.673)** | **(-0.894)** | | |
| *High market liquidity* | | | -0.120*** | -0.111 |
| | | | (-2.781) | (-0.852) |
| ***Discretionary loan fair values*** | | | | |
| ***× High market liquidity*** | | | | **0.002** |
| | | | | **(0.515)** |
| ***Portfolio risk shifting*** | | | | |
| ***× High market liquidity*** | | | **0.027***** | **0.026***** |
| | | | **(2.902)** | **(2.731)** |
| ***Loan sales to affiliates*** | | | | |
| ***× High market liquidity*** | | | **-0.003** | **-0.004*** |
| | | | **(-1.510)** | **(-1.663)** |
| Controls | YES | YES | YES | YES |
| Obs. | 6,012 | 3,726 | 6,012 | 3,726 |
| Pseudo $R^2$ | 36.01% | 42.86% | 35.90% | 42.67% |

Panel B reports the results on the role of CLO market conditions in the use of discretionary activities to just meet an OC test. *High defaulted/excess CCC-rated loans* is one if the difference between the number of defaulted and excess CCC-rated loans reported by a CLO and the average number of defaulted and excess CCC-rated loans reported by other CLOs in the same month is ranked in the upper quartile, zero otherwise. *High market liquidity* is one if the monthly secondary securitized loan market liquidity (estimated as the number of the loan trades that CLOs report in a month) is ranked in the upper quartile, zero otherwise. The dependent variable equals one if a CLO just passes an OC test, zero otherwise (*OC test violation avoidance*). All other variables are defined in Appendix 3. Controls (untabulated) include the same variables as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model across all columns, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 7

## Discretionary activities and future CLO portfolio performance

| | Subsample of CLOs that just pass an OC test | | | Subsample of CLOs that just pass or miss an OC test | | |
|---|---|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) | (V) | (VI) |
| Dependent variable | *Senior* $OC_{m+6}$ | *Junior* $OC_{m+6}$ | *CLO note* $downgrade_{m+6}$ | *Senior* $OC_{m+6}$ | *Junior* $OC_{m+6}$ | *CLO note* $downgrade_{m+6}$ |
| ***Discretionary loan fair values*** $_m$ | **-0.000** | **-0.000** | **0.001** | **-0.000*** | **-0.006** | **-0.001** |
| | **(-0.827)** | **(-0.199)** | **(1.061)** | **(-1.921)** | **(-0.405)** | **(-0.144)** |
| ***Portfolio risk shifting*** $_m$ | **-0.007*** ** | **-0.001*** ** | **0.025*** | **-0.009*** ** | **-0.001** ** | **0.028** ** |
| | **(-2.938)** | **(-2.955)** | **(1.830)** | **(-5.500)** | **(-2.463)** | **(2.534)** |
| ***Loan sales to affiliates*** $_m$ | **0.000** | **0.000** | **0.014** | **0.000** | **0.000** | **0.004** |
| | **(0.247)** | **(0.823)** | **(0.919)** | **(0.100)** | **(1.463)** | **(1.318)** |
| *OC test violation avoidance* $_m$ | | | | **0.008** | **-0.022** | **0.227*** ** |
| | | | | **(0.904)** | **(-1.221)** | **(2.723)** |
| ***Discretionary loan fair values*** $_m$ ***× OC test violation avoidance*** $_m$ | | | | **0.001** | **-0.001*** | **0.005** |
| | | | | **(1.084)** | **(-1.757)** | **(0.757)** |
| ***Portfolio risk shifting*** $_m$ ***× OC test violation avoidance*** $_m$ | | | | **-0.014*** ** | **-0.007** ** | **0.023*** |
| | | | | **(-2.834)** | **(-2.506)** | **(1.706)** |
| ***Loan sales to affiliates*** $_m$ ***× OC test violation avoidance*** $_m$ | | | | **0.000** | **-0.000** | **0.016** |
| | | | | **(0.300)** | **(-0.170)** | **(1.251)** |
| *Defaulted loan bucket* $_m$ | -0.001 | -0.002*** | 0.004 | 0.005** | 0.000 | 0.009 |
| | (-0.630) | (-3.522) | (0.297) | (2.593) | (0.011) | (1.321) |
| *CCC-rated loan bucket* $_m$ | -0.002** | 0.001 | 0.004 | 0.002** | -0.000 | 0.006 |
| | (-2.615) | (1.351) | (0.386) | (2.225) | (-0.026) | (1.069) |
| *Average portfolio rating* $_m$ | 0.014* | 0.002 | 0.199*** | 0.003 | 0.003 | 0.012 |
| | (1.839) | (0.838) | (2.714) | (1.548) | (0.549) | (0.712) |
| *Senior* $OC_m$ | 0.487*** | 0.105*** | -0.690* | 0.899*** | 0.154*** | 0.008 |
| | (4.563) | (4.083) | (-1.820) | (13.992) | (4.777) | (0.388) |

**TABLE 7 (Continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Junior* $OC_m$ | -0.053 | 0.586*** | -0.024 | 0.003 | 0.408** | -0.016** |
| | (-1.502) | (9.519) | (-1.447) | (1.933) | (2.156) | (-1.998) |
| *Portfolio size*$_m$ | -0.099*** | -0.010* | 0.023 | -0.015 | 0.024* | -0.094 |
| | (-6.452) | (-1.749) | (0.202) | (-1.267) | (1.742) | (-1.334) |
| Obs. | 647 | 647 | 647 | 1,104 | 1,104 | 1,104 |
| Adj. (Pseudo) $R^2$ | 73.48% | 60.06% | 52.71% | 53.40% | 58.41% | 61.14% |

This table reports the results on the relation between discretionary loan fair valuation and strategic loan trading and future CLO performance. In columns (I)-(III), we restrict our sample to CLOs that just meet the senior or junior OC tests. In columns (IV)-(VI), we restrict our sample to CLOs that just meet or miss the senior or junior OC tests in the current month and examine their relative future performance. The dependent variable in columns (I) and (IV) is the natural logarithm of the CLO senior overcollateralization ratio six months ahead (*Senior* $OC_{m+6}$). The dependent variable in columns (II) and (V) is the natural logarithm of the CLO junior overcollateralization ratio six months ahead (*Junior* $OC_{m+6}$). The dependent variable in columns (III) and (VI) is one if a CLO note's credit rating is downgraded over the following six months and zero otherwise (*CLO note downgrade*$_{m+6}$). All other variables are defined in Appendix 3. The values of the continuous variables are winsorized at 1% and 99%. We use OLS regressions to estimate columns (I), (II), (IV) and (V), and coefficients are reported and *t*-statistics are in parentheses. We use a probit model to estimate columns (III) and (VI), and marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 8

## Discretionary activities and CLO note prices

| Dependent variable | *CLO note price*$_{m+1}$ | | |
|---|---|---|---|
| | (I) | (II) | (III) |
| *Discretionary loan fair values*$_m$ | 0.002 | | -0.003 |
| | (1.19) | | (-1.052) |
| *Portfolio risk shifting*$_m$ | | 0.106 | 0.110 |
| | | (0.811) | (0.727) |
| *Loan sales to affiliates*$_m$ | | 0.002* | 0.000 |
| | | (1.735) | (0.023) |
| *OC test violation avoidance*$_m$ | -0.007 | -0.018 | 0.070 |
| | (-0.09) | (-0.956) | (1.014) |
| ***Discretionary loan fair values***$_m$ | | | |
| **× *OC test violation avoidance***$_m$ | **-0.004** | | **-0.004** |
| | **(-0.99)** | | **(-0.615)** |
| ***Portfolio risk shifting***$_m$ | | | |
| **× *OC test violation avoidance***$_m$ | | **-0.033*** | **-0.065**** |
| | | **(-1.869)** | **(-2.294)** |
| ***Loan sales to affiliates***$_m$ | | | |
| **× *OC test violation avoidance***$_m$ | | **-0.010*** | **-0.011** |
| | | **(-1.664)** | **(-0.655)** |
| *CLO note rating*$_m$ | -0.003 | -0.003** | -0.001 |
| | (-0.61) | (-2.154) | (-0.331) |
| *CLO note amount traded*$_m$ | 0.029 | 0.011* | 0.035** |
| | (1.08) | (1.895) | (2.122) |
| Controls$_m$ | YES | YES | YES |
| Obs. | 193 | 503 | 193 |
| Adj. $R^2$ | 70.80% | 66.92% | 78.28% |

This table reports the results on the relation between CLO note prices in the secondary market and discretionary activities when OC tests are binding. The dependent variable is the natural logarithm of the average note sale price in the month following a CLO report (*CLO note price*). *CLO note amount traded* is the natural logarithm of average note face amount traded. *Note rating* is a scale variable that equals to 1 if the average traded note's credit rating is AAA (or Aaa), 2 for AA+ (or Aa1), and so forth. All other variables are defined in Appendix 3. Controls include the same variables as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use an OLS model across all columns, coefficients are reported, and *t*-statistics are in parentheses. CLO-reporting month, manager, trustee and note seniority (senior, junior, equity) fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 9

## Sensitivity analyses

**Panel A: Redefining discretionary loan fair values**

| Dependent variable | *OC test violation avoidance* | | | |
|---|---|---|---|---|
| | (I) | (II) | (III) | (IV) |
| ***Pct. of overvalued loans*** | **0.150**** | | | |
| | **(2.531)** | | | |
| ***Loan fair value –median loan fair value reported by other CLOs*** | | **0.012**** | | |
| | | **(2.423)** | | |
| ***Mode(Discretionary loan fair values)*** | | | **0.009**** | |
| | | | **(2.403)** | |
| ***Loan fair value –average market price of below CCC-rated loans*** | | | | **0.029**** |
| | | | | **(2.096)** |
| *Portfolio risk shifting* | 0.024*** | 0.027*** | 0.025*** | 0.032** |
| | (2.822) | (3.221) | (3.197) | (2.474) |
| *Loan sales to affiliates* | 0.007** | 0.007*** | 0.007*** | 0.007* |
| | (2.547) | (2.895) | (2.958) | (1.942) |
| Controls | YES | YES | YES | YES |
| Obs. | 3,726 | 3,726 | 3,059 | 1,353 |
| Pseudo $R^2$ | 46.45% | 44.72% | 44.70% | 55.25% |

Panel A reports the results on the relation between discretionary loan fair values and the probability of a CLO just meeting an OC test under different definitions for discretionary loan fair valuation. *Pct. of overvalued loans* is the percentage of defaulted and excess CCC-rated loans with reported fair values that are higher than the fair values that other CLOs report for the same loans in the same month, averaged at the CLO-month level. *Loan fair value – median loan fair value reported by other CLOs* is the difference between the fair value of defaulted or excess CCC-rated loans and the median fair value of the same loan reported by other CLOs in the same month, averaged at the CLO-month level. *Mode(Discretionary loan fair values)* is the mode of discretionary loan fair values reported by a CLO. *Loan fair value –average market price of below CCC-rated loans* is the difference between the fair value of a defaulted or excess CCC-rated loan reported by a CLO and the average market price of below CCC-rated loans traded in the same month. The dependent variable equals one if a CLO just passes an OC test and zero otherwise (*OC test violation avoidance*). All other variables are defined in Appendix 3. Control variables (untabulated) are the same as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ∗∗∗, ∗∗ and ∗ denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

## TABLE 9 (Continued)

**Panel B: Redefining OC test violation avoidance**

| Dependent variable | *OC test slack 1%* | *OC test slack 3%* |
|---|---|---|
| ***Discretionary loan fair values*** | **0.003*** ** | **0.013*** ** |
| | **(2.965)** | **(4.669)** |
| ***Portfolio risk shifting*** | **0.006*** ** | **0.032*** ** |
| | **(2.752)** | **(3.287)** |
| ***Loan sales to affiliates*** | **0.001** | **0.013*** ** |
| | **(1.204)** | **(4.026)** |
| Controls | YES | YES |
| Obs. | 3,726 | 3,726 |
| Pseudo $R^2$ | 32.18% | 32.44% |

Panel B reports the results on the relation between discretionary loan fair values and the probability of a CLO just meeting an OC test when redefining OC test violation avoidance. *OC test slack 1%* is one if the senior or junior OC test slack is greater than zero and lower than 1%, zero otherwise. *OC test slack 3%* is one if the senior or junior OC test slack is greater than zero and lower than 3%, zero otherwise. All other variables are defined in Appendix 3. Control variables (untabulated) are the same as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.

**Panel C: Discretionary activities and OC test violation avoidance over the credit cycle**

| Dependent variable | *OC test violation avoidance* | |
|---|---|---|
| | Credit crisis (2008-2010) | Credit expansion (2011-2013) |
| ***Discretionary loan fair values*** | **0.014*** ** | **0.016*** ** |
| | **(2.829)** | **(4.669)** |
| ***Portfolio risk shifting*** | **0.023*** ** | **0.012** ** |
| | **(2.667)** | **(2.287)** |
| ***Loan sales to affiliates*** | **0.014*** ** | **0.005*** ** |
| | **(3.692)** | **(2.577)** |
| Controls | YES | YES |
| Obs. | 1,740 | 1,986 |
| Pseudo $R^2$ | 34.42% | 48.82% |

Panel C reports the results on the relation between discretionary loan fair values, strategic trading and the probability of a CLO just meeting an OC test over the credit crisis (2008-2010) and credit upturn (2011-2013). The dependent variable equals one if a CLO just passes an OC test and zero otherwise (*OC test violation avoidance*). All other variables are defined in Appendix 3. Control variables (untabulated) are the same as in Table 4. The values of the continuous variables are winsorized at 1% and 99%. We use a probit model, marginal effects are reported and z-statistics are in parentheses. CLO-reporting month, manager and trustee fixed effects are included but not tabulated. Standard errors are corrected for heteroskedasticity and clustered at the CLO level. ***, ** and * denote significance at the 1%, 5% and 10% (two-sided) levels, respectively. Coefficients of interest are in boldface type.