CLOs' Trading Activity and Performance *

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Abstract:

We explore the extent to which loan trading by collateralized loan obligations (CLOs), the dominant type of institutional lenders in the syndicated loan market, reveals private information about borrowers and how this trading activity affects CLOs' future performance. Using detailed CLO trading data, we develop proxies for CLOs' private information about borrowers and validate these measures by documenting that they predict future loan and borrower performance. Controlling for current performance, we find that our proxy for CLOs' private information predicts the CLO's asset quality and market value of assets one year ahead. The positive relation between information–based trading and future performance is higher for CLOs whose managers execute more timely trades and receive higher management fees. However, we find that CLOs with large managers underperform. Our evidence highlights that CLOs not only collect, produce and disseminate private information about loan borrowers but they also actively use this information to trade strategically and enhance their performance.

Keywords: Collateralized loan obligations, syndicated loans, private information, market efficiency, sell-side analysts.

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1. Introduction

In August 2013, five regulatory bodies, including the Securities Exchange Committee (SEC), re-proposed credit risk retention rules under the Dodd–Frank Act on Collateralized Loan Obligations (CLOs), which require CLO collateral managers to hold CLO securities with a value equal to at least 5 percent of the fair value of the CLO.[1] While the risk retention rule intends to align CLO investors' and collateral managers' interests by restricting lax credit standards and risk shifting to low quality loans, the re-proposal has raised significant concerns by collateral managers, banks and the US Chamber of Commerce.[2] Indeed, the Loan Syndicate and Trading Association (LSTA) asserts that this rule will result in a reduction of CLO issuance by 75 percent which will increase interest costs for companies by $3.2 billion (LSTA, 2013). The LSTA posits that CLO managers already maintain "skin in the game" by actively managing CLOs through the life of the securitization, and because they are required to meet strict performance standards.

In this paper, we attempt to contribute to this discussion by exploring how CLOs deal with credit risk in their portfolio and which CLO characteristics predict effective risk management. CLO managers use their experience in collateral sourcing, credit research and risk management to generate significant private information on the quality and performance of a syndicated loan and the issuing borrower. In addition, they are entitled to receive proprietary information from borrowers as a result of their membership in bank lending syndicates. Although

[1] CLOs are special purpose vehicles typically set up by an investment bank that transfers a pool of syndicated loans to the balance sheet of the CLO. The CLO finances itself by issuing notes and equity to capital markets. These notes are divided into different classes (i.e., tranches) with each tranche entitled to different levels of interest payments and exposures to losses in the collateral loan pool. CLOs have been the largest buyers of speculative grade (or leveraged) corporate loans with a market share of above 50 percent over the last few years: Standard and Poor's (2014) indicates that CLOs have been investing annually in syndicated loans about $100 billion before the credit crisis and over $50 billion after the crisis.

[2] For example, in March 2014 the US Chamber of Commerce in its letter to SEC argues that "the proposed risk retention rule could hamper the future formation of collateral loan obligations (CLO) and consequently raise financing costs for businesses" and "call(s) regulators to reconsider the proposed rule and work with the industry to develop a form of risk retention that would work for CLOs." Thirty–one leveraged borrowers, including Community Health, HCA, and West Corporation, signed the letter.

prior work has provided significant evidence on the quality of securitized loans (Benmelech, Dlugosz and Ivashina, 2012), there is no empirical evidence on whether CLO managers' informational advantage enhances the effectiveness of their credit management activities and determines CLOs' future performance. We measure the extent to which CLOs' trading activities reveal private information about borrowers and investigate how CLO managers use their proprietary information flow to enhance CLOs' future performance.

We overcome the empirical challenge of capturing CLOs' use of private information and when this information is released by using a novel dataset which provides details on the trading activities initiated by CLOs in the secondary loan market. The data allows us to observe the exact date as well as the size and the direction of a trade (i.e., a sale or purchase of a syndicated loan). It also provides monthly information on important characteristics of the CLOs, the CLO manager and the CLOs' portfolio structure and credit quality. Our sample includes 1,233 unique syndicated loans, issued by 720 US public companies, which are actively traded by CLOs between 2008 and 2013 and have loan specific data available.

We expect that CLO collateral managers trade strategically and their activity reveals significant private information about the loan issuing firms. CLOs have been historically the dominant institutional investor in the corporate loan market thus allowing their managers to acquire private information on a large and diversified pool of borrowers. They are likely to use this information when trading to improve the performance of the CLOs they manage and obtain higher fees. Also, unlike other institutional investors in the syndicated loan market, CLO managers obtain unrestricted access to the full set of information provided by the borrower to the lead bank in the syndicate due to the fact that most CLOs do not invest in public securities.[3]

[3] Lead banks typically require material non-public information on an ongoing basis, such as company projections and future earnings. Banks in the syndicate together with CLOs that only invest in loans are bound by confidentiality

Moreover, some of the CLO managers are backed by large private equity firms giving them access to these firms' screening, transactional and operational expertise. Such access increases CLO managers' information set on a significant proportion of the loans in the CLO pools, especially on the leveraged loans which finance private equity transactions.

However, several factors are likely to limit the informativeness of CLO trades. First, CLO managers might struggle to timely and efficiently process the large amount of information they receive. A CLO includes a large number of loans issued by 100 to 150 loan issuers from 15-25 industries and the average CLO manager controls 16 CLO vehicles. Second, CLO managers might have limited access to private information relative to loan originating banks. The informational advantage of the lead banks in a syndicate over junior syndicate participants, including CLOs, has been highlighted by prior work (e.g., Sufi, 2007; Ball, Bushman and Vasvari, 2008). This advantage is often due to banks' long-term relations with borrowers or related to banks' incentives in disposing low quality loans to securitized loan pools. Thus, CLO collateral managers may "free-ride" on banks' information collection and monitoring effort without conducting their own search to root out credit problems early. Third, previous studies suggest that CLO managers may primarily rely on loan ratings issued by credit rating agencies when trading individual loans or managing the credit risk of the loan portfolio instead of engaging in their own screening and information collection activities (e.g., Benmelech, Dlugosz and Ivashina, 2012; Ayotte and Bolton, 2009; Benmelech and Dlugosz, 2009). These ratings reflect the judgment and analysis of rating agencies which have developed common rating

agreements and have access to additional information that can be used to perform credit analysis and manage portfolios (e.g., Coffey, 2007). Institutional investors that participate in syndicated loans but also invest in public markets receive only a subset of the borrower information available. If these investors are involved in the origination or renegotiation of a loan, then trading restrictions are enforced with respect to that loan or borrower ("Chinese walls" should be in place between teams that are involved in the loan origination/amendment and trading teams). Also, these institutional investors are restricted from trading on borrower's stock for a certain time period.

methodologies for corporate loans.[4] Finally, CLO managers might just trade loans for liquidity reasons, to pass collateral quality tests and covenants, without relying on borrower specific information. In sum, these arguments indicate that CLOs might be less sophisticated and informed lenders, raising questions whether CLO managers actively trade syndicated loans based on private information.

We start our analysis by measuring the private information underlying CLO trades. We develop predictive models of CLOs' decision to either purchase or sell a syndicated loan where we control for public information available prior to the trade date such as recent changes in the credit quality of the loan traded or the borrower, violations of CLO covenants, traded loan characteristics, borrower stock returns prior to the loan trading month, debt market conditions as well as CLO manager, month and industry fixed effects. We aggregate the residuals of these two models, which are at the CLO-loan-month level, at either the loan-month or CLO-month level depending on our analyses. Our first private information proxy captures the total private information released at the CLO-month level and is the sum of the absolute residuals in the purchase and sale predictive models. Our second measure is the difference between the residual in the sales model minus the residual in the purchase model and reflects the extent of bad private information underlying the trade. Negative private information is likely to be more relevant to investors in the syndicated loan market given their asymmetric payoffs (e.g., Easton, Monahan and Vasvari, 2009). [5]

[4] Credit rating agencies correlate the rating categories they use with the banks' internal credit rating systems while taking into account the loan underwriting criteria and loan's unique characteristics (Kohler, 1998).

[5] Consistent with our expectations, the residuals from the loan sale and purchase predictive models are negatively correlated (-0.40), suggesting that CLO loan trades reveal either good or bad information for borrowers in a given month. Also, the standard deviation of private information on a loan is 0.06, thus, does not significantly vary across CLOs in a given month.

We provide a battery of tests to validate our private information proxies. First, we find that CLOs are more likely to trade during the 30-day period before borrowers announce their quarterly earnings performance. Second, we document that our proxy for bad private information, which captures the direction of the information, predicts future changes in the performance of the loan traded and is positively (negatively) associated with future loan rating downgrades (upgrades), defaults and price decreases. We also find that this proxy for private information predicts borrower's subsequent profitability and interest coverage ratio, controlling for current performance. Overall, these analyses indicate that our empirical measures capture private information about the borrower that is available to CLO managers on a timely basis in advance of public disclosures.

In our next set of analyses, we investigate whether CLOs' private information and timeliness of trading is positively related to CLO future performance. We focus on two performance dimensions of a CLO: the riskiness of the loan collateral pool and the changes in the market value of the loan portfolio. We first document that CLOs that trade on more private information have fewer loans in default or in the very risky CCC rated group, greater collateral cushions for the senior and junior notes and better average loan ratings one year ahead. Similarly, CLOs that trade on more private information have greater market value one year ahead. We also find that CLOs that trade more timely relative to other CLOs trading the same loans during the same month, show better performance one year ahead (higher quality and market value of the loan pool). Also, the positive relation between the private information used to trade and future performance metrics is stronger when a CLO trades more timely.

We further investigate whether the impact of private information-based trading on future performance is a function of CLO manager's characteristics. We first look at CLO managers'

level of sophistication which we proxy by the level of senior and junior fees paid to the manager. We expect that managers that charge higher fees have greater reputation and sophistication relative to the other managers. We find that CLO managers that receive higher fees outperform one year ahead and, most importantly, show incremental performance improvements when trading on more private information. We also assess whether the magnitude of assets under management affects CLO managers' performance and find that large manager deals underperform consistent with their limited ability to process the large information set about their borrowers. Also, we do not find any evidence that the assets under management impact the association between private information underlying CLO trades and future CLO performance.

Our findings add to the current literature across few dimensions. First, we provide and validate novel measures of proprietary information about borrowers which suggest that CLOs are trading timely on information that is not available to public market participants. We thus contribute to the prior research on price discovery mechanisms in equity markets (Acharya and Johnson, 2007; Bushman, Smith and Wittenberg-Moerman, 2010), by offering direct evidence on the importance of CLOs' trading activities as a source of private information for equity markets. Further, while previous studies have documented that institutional investors that are members of lending syndicates use borrowers' proprietary information to trade in stock markets (e.g., Massoud et al., 2011; Ivashina and Sun, 2011), we show that CLOs use private information in the syndicated loan market to trade strategically and enhance their performance. In particular, our study complements Bushman, Smith and Wittenberg-Moerman (2010) who show that early access to private information by syndicate lenders accelerates price discovery in the stock market. We add to their study by identifying direct measures that capture both the timing of the release and the extent of private information that CLO managers possess. In addition, our

findings suggest that capturing the directional effect of the private information released by CLO trades could significantly improve the success of an equity trading strategy relying on this information.

Second, our research provides unique evidence on the determinants of CLOs' performance. According to a report by JP Morgan (Laughlin, 2013), CLO equity holders received annual returns of 17 percent over the period from 2006 to 2011. Similarly, Standard and Poor's (2014) highlights that CLOs have experienced solid performance over the last 20 years reporting only small losses.[6] Despite this impressive performance statistics, there is no empirical evidence we are aware of that investigates drivers of these returns. We demonstrate that one reason why some CLO vehicles perform well is their informational advantage relative to other investors in the syndicated loan market. Our results highlight that CLO managers are actively managing their portfolio risks by taking advantage of the private information they possess. We also provide new evidence on CLO manager's characteristics that are associated with better performance. Overall, we do not find support of lax credit management standards by CLOs whose trades reveal more private information about borrowers. We provide evidence that managers of these CLOs focus on maximizing asset quality and minimizing credit risk exposure and are able to effectively deal with credit problems before they are reflected in loan ratings and prices.

The rest of the paper is organized as follows. Section 2 provides an overview of CLO trading activities and strategies. Section 3 describes the data and sample selection. Section 4 describes our proxy for CLO private information and presents the validation tests. Section 5 presents the research design and the results. Section 6 concludes the paper.

[6] According to Loan Syndications and Trading Association and Bloomberg, CLO net losses accounted for less than 6% during the 2008-2010 credit crisis, and only 1% of the underlying CLO collateral defaulted.

2. Institutional background on CLOs and their trading activities

A cash flow collateralized loan obligation (CLO) is a structured finance product that invests in a diversified pool of highly leveraged, non-investment grade corporate loans ("CLO assets or loans") and issues multiple classes of notes ("CLO notes") collateralized by the cash payments generated from these loans. Given this structure, CLOs allow banks to enhance credit risk exposure, manage their balance sheet and reduce regulatory capital requirements.

Structuring a CLO involves several key periods. In the first stage, an investment bank or commercial bank with an investment arm ("CLO arranger") enters into an agreement with an investment management firm ("CLO collateral manager") to structure the CLO vehicle and syndicate the underlying loan pool. During the pre-closing period, the arranging bank together with the CLO collateral manager initiates the "warehousing" process. Warehousing may involve the purchase of leveraged loans from the open market or the transfer of a loan portfolio from the bank's balance sheet. Warehousing takes place prior to the CLO closing date and, very often, the loan pool acquisition is financed using a bridge facility from the sponsoring bank. The CLO set up process is often completed after the CLO closing date (i.e., the date the CLO becomes effective) and the issuance of the CLO notes.

Next follows the "ramp-up period" which can last between 60 and 180 days. In this period, the CLO arranger contacts credit rating agencies to evaluate the credit risk of the corporate loan pool used as collateral and confirm the rating and pricing of the CLO notes and equity tranches issued to outside investors. Some forms of credit enhancement in a CLO structure are necessary to obtain the desired credit ratings for the most highly rated notes issued. The types of credit enhancements used by CLOs are essentially "internal" credit enhancements provided by the underlying assets themselves via subordination, asset diversification, excess

spread, cash collateral accounts, debt cushion and interest coverage, however, CLOs might also rely on external parties to provide financial guarantees. CLO notes typically have different interest rates and projected weighted average lives, thus, different credit ratings to appeal to different investors' risk preferences.

Once a CLO structure becomes effective, it enters the "reinvestment period," which usually lasts between five to seven years (the average life of a typical CLO is about twelve years). During this period, the cash flows received from interest and principal repayments or loan sales can be reinvested by purchasing additional loans. CLO managers are expected to actively manage the credit risk of their portfolio and use their discretion in trading loans both to take advantage of relative value opportunities but also to realize capital gains in relation to the evolving credit quality of the loans in the pool. There are certain significant constraints that limit a CLO's flexibility to trade. First, a CLO can trade only up to twenty percent of the portfolio par value per year, which alleviates investors' reinvestment risks related to asset substitution. Second, CLO managers' trading decisions are constrained by certain covenants and compliance tests, which determine the minimum value and quality of the underlying assets based on loan ratings from credit rating agencies (Appendix A). Finally, the remaining years in a CLO's life cover the "amortization period" during which all cash flows received are used to pay down CLO notes. Some anecdotal evidence suggests that even after the CLO reinvestment period ends, CLO managers keep changing the portfolio structure and reinvest (e.g., Barclays Capital, 2002).

CLO managers receive flat senior management fees, paid before the most senior tranche of debt receives a return or is paid, and junior management fees which are paid after the debt tranches are paid but before the equity tranche. One of the junior management fees (i.e., the incentive fee) is typically paid only once the equity tranche achieves a certain hurdle rate. This

fee incentivizes the CLO manager to deliver a minimum level of returns to the equity investors. Violation of CLO's compliance tests is a sign of a drop in the collateral quality and will likely have negative consequences with respect to the returns obtained by junior classes of CLO note investors and equity holders.[7] It also affects negatively CLO managers' reputation and, to some extent, their compensation. As a result, CLO managers may seek to maintain a high level of diversification and asset quality throughout the reinvestment period (exposures to different borrowers, industries, regions or types of loans) to limit the impact of defaults in the pool that trigger covenant violations.

In sum, CLO managers can use discretion in the implementation of their investment objectives by determining the loans sold and purchased, timing transactions, choosing the quality of the collateral and deciding whether a defaulted loan should be worked out or not. Thus, the expertise and quality of a CLO manager is a key determinant of the magnitude of investors' returns.

3. Data and Sample selection

We hand-collect data on securitized CLO loans from the CLO-i database provided by Creditflux. Creditflux is a global news platform covering structured investment issuance and performance in the corporate loan market since January 2008. Creditflux retrieves this information from monthly CLO trustee reports that disclose CLO vehicles and collateral performance to investors. We focus on three datasets that CLO-i covers: CLO monthly holdings, CLO monthly performance and CLO transactions.

[7] The major or controlling equity holders can ask the CLO trustee to require the manager to liquidate collateral assets and thus can force a payback. They can also request liquidation of the entire CLO portfolio. However, in distressed markets, when the covenants are more likely to be violated, the market value of the collateral assets is significantly below their par value making investors reluctant to force a suboptimal liquidation.

Our primary dataset of CLO holdings includes 7,723 unique borrowers, 571 CLOs and 5,791,930 observations at the CLO-loan tranche-reporting month level covering the period from January 2008 to December 2013.[8] The average CLO size is $400 million, and the average CLO exposure to an individual securitized corporate loan is less than one percent. The average coverage length of a CLO in our sample is 38 months. CLO-i provides complete information on CLO managers, bank arrangers, closing and reinvestment dates, CLO notes and monthly collateral portfolio structures. The data on CLO collateral portfolio structure cover borrowers' names as well as loan types, ratings, balances, maturities and default events.

The CLO monthly performance dataset includes information on compliance tests for 536 unique CLO vehicles, such as senior and junior overcollateralization tests, weighted average rating factors as well as CCC-rated and default loan buckets. CLO-i provides detailed information on covenant triggers that allows us to estimate compliance test violations.

The dataset of CLO transactions covers 355,250 loan sales and purchases initiated by 539 CLOs from January 2008 to December 2013. These are not unique loan-date transactions since CLOs may sell tranches of the same loan to different institutional investors or buy tranches of the same loan within the same day or short window from different sellers. We omit multiple sales or purchases of the same loan from a CLO that occur within a four-day window, and are left with 302,233 unique trades. Data on CLO transactions cover loan or tranche characteristics, the trade direction, the transaction date, the face amount and the price.

To identify syndicated loans and obtain details on loan and borrower characteristics, we hand match CLO-i with LPC DealScan and Compustat. This process yields a sample of 3,557 unique syndicated corporate loans issued by 2,018 unique borrowers. When we require complete

[8] CLO-i does not provide unique identifiers for loan tranches. Coding loan tranches at the borrower – loan type (primary and/or secondary) – loan maturity level yields between 47,160 (lower bound) and 133,541 (upper bound) unique loan tranches. CLOs in our sample hold less than five percent of their assets in bond securities.

information on loan ratings and that the borrower is a publicly listed firm, our sample drops to 1,882 unique loans (938 unique borrowers). This process restricts our CLO holdings sample to 1,174,334 observations at the CLO-loan-reporting month level. We merge our CLO holdings sample with the population of CLO trades and exclude 649 loans that are never traded in the period 2008-2013 or are not uniquely identified in the CLO transaction dataset. Since loan trade and CLO portfolio reporting dates are different, we match loan trades to the most recent portfolio reporting date after the actual trading date. Our final sample of CLO monthly holdings includes 1,233 loans issued by 720 publicly listed borrowers in the period between January 2000 and March 2013 and held by 536 unique CLO vehicles (1,106,584 observations at the CLO-loan-month level). Our sample of CLO trades includes 123,045 unique transactions (80,916 purchases and 42,129 sales). While our sample selection criteria significantly restrict the number of observations, our final sample includes 66 percent of the securitized corporate loan volume disclosed by CLOs in trustees' reports. We summarize the sample selection process in Table 1, Panel A.

Panel B of Table 1 reports univariate statistics for securitized loan trading and holdings. The average loan is traded 6 times per month, i.e. tranches or sub-tranches of the same loan are traded six times per month. The average CLO trades about 9 times per month. The mean (median) loan amount traded is $1.5 (1) million per transaction, the mean (median) selling price is 94.6 (99.8) and the mean (median) purchase price is 96.6 (99.1), suggesting that CLOs sell loans that underperform and buy better quality loans, i.e. loans that trade closer to par. The mean (median) holding period of a loan in a CLO portfolio is 10 (7) consecutive months, and the mean (median) CLO includes 93 (90) loans in its monthly portfolio.

Figure 1 shows CLOs' trading behavior over time. Fifty-two percent of the loans in our sample are traded on average every month. Loan trading by CLOs is relatively stable over time, but drastically drops around August 2011 and August 2012 in response to the low liquidity of financial institutions and the heightened concerns about a potentially severe market crash caused by the European sovereign credit crisis. Loan pricing has significantly increased over our sample period with eighty percent of securitized loans trading at distress levels during the credit crisis (i.e. loans priced below 90) and about ninety percent of loans trading close to par in the following years (i.e., loans priced above 98 and below 102).

4. Proxy for CLO private information and Validation tests

4.1. CLO private information

We attempt to capture CLOs' private information by exploring their trading activity at the CLO–loan–month level. We develop a probabilistic model of a CLO's decision to sell or buy securitized loans where we control for a comprehensive set of characteristics about loans, borrowers and CLOs as well as conditions in the syndicated loan market:

$$\begin{aligned}\text{Probability}(\textit{Sale}=1) = {} & \alpha + \beta_1 * \textit{Loan Rating} + \beta_2 * \textit{Loan Rating Downgrades\_180dayslag} \\ & + \beta_3 * \textit{Loan Rating Upgrades\_180dayslag} + \beta_4 * \textit{Borrower Defaults\_180dayslag} + \beta_5 * \textit{Distressed Loan} + \beta_6 * \textit{CLO WARF Violation} \\ & + \beta_7 * \textit{CLO OC Violation} + \beta_8 * \textit{CLO CCC Bucket} + \beta_9 * \textit{CLO Manager FE} \\ & + \beta_{10} * \Delta(\textit{Borrower CFO})_{q\text{-}5,q\text{-}1} + \beta_{11} * \Delta(\textit{Borrower Leverage})_{q\text{-}5,q\text{-}1} \\ & + \beta_{12} * \textit{Loan Spread} + \beta_{13} * \textit{Loan Maturity} + \beta_{14} * \textit{Loan Financial Covenants} \\ & + \beta_{15} * \textit{Stock Returns\_180dayslag} + \beta_{16} * \textit{Bid-ask spread\_180dayslag} \\ & + \beta_{17} * \textit{Industry FE} + \beta_{18} * \textit{Month FE}\end{aligned}$$

(Model 1a)

$$\text{Probability}(\textit{Purchase}=1) = \alpha + \beta_1 * \textit{Loan Rating} + \beta_2 * \textit{Loan Rating Downgrades\_180dayslag} + \beta_3 * \textit{Loan Rating Upgrades\_180dayslag} + \beta_4 * \textit{Borrower Defaults\_180dayslag} + \beta_5 * \textit{Distressed Loan} + \beta_6 * \textit{CLO WARF Violation} + \beta_7 * \textit{CLO OC Violation} + \beta_8 * \textit{CLO CCC Bucket} + \beta_9 * \textit{CLO Manager FE} + \beta_{10} * \Delta(\textit{Borrower CFO})_{q\text{-}5,q\text{-}1} + \beta_{11} * \Delta(\textit{Borrower Leverage})_{q\text{-}5,q\text{-}1} + \beta_{12} * \textit{Loan Spread} + \beta_{13} * \textit{Loan Maturity} + \beta_{14} * \textit{Loan Financial Covenants} + \beta_{15} * \textit{Stock Returns\_180dayslag} + \beta_{16} * \textit{Bid-ask spread\_180dayslag} + \beta_{17} * \textit{Industry FE} + \beta_{18} * \textit{Month FE}$$

(Model 1b)

The dependent variable *Sale* (*Purchase*) is a binary variable that equals one if a loan is sold (purchased) by a CLO in the month, and zero if a loan is kept by the CLO (if the manager of a CLO manages loans from a borrower in another CLO vehicle, but decided not to purchase these loans).

We use various proxies for observed loan performance and riskiness. First, we control for loan rating in the reporting month prior to the loan trade (*Loan Rating*) as a proxy for loan riskiness. The rating is defined as the most conservative loan rating among S&P, Moody's or Fitch ratings and we set it equal to 1 for AAA, the highest rating, and 25 for D the lowest rating in our sample. Second, we use past loan performance captured by loan rating downgrades (*Previous Loan Rating Downgrades)* or upgrades (*Previous Loan Rating Upgrades*). These variables take the value one if the loan was downgraded (or upgraded) by two or more notches in the 180-day period before the CLO reporting month with the loan trade, and zero otherwise. We also control for past borrowers' defaults on their securitized loans (*Previous Borrower Defaults*), defined as one if a borrower defaulted on his securitized loans in the 180-day period before the CLO reporting month with the loan trade, and zero otherwise. Third, we control for loan price, defined as one if the loan was priced below 90, and zero otherwise (*Distressed Loan*). We expect that the probability of loan sales is positively (negatively) related to previous loan rating downgrades (upgrades), defaults and distress. Also, we expect that the probability of a loan

purchase is negatively (positively) related to previous loan rating downgrades and defaults (upgrades and distress).

We control for CLO's performance using CLO compliance test violations (overcollateralization and the weighted average rating factor) and portfolio credit risk in the CLO reporting month. More specifically, the overcollateralization test violation measure is defined as a binary variable that equals one if the senior overcollateralization test is violated in the reporting month, and zero otherwise (*CLO OC Violation*). We use the weighted average rating factor (WARF) violations to proxy for the collateral quality test compliance, which is defined as a binary variable that equals one if the portfolio weighted-average rating is above the WARF trigger, and zero otherwise (*CLO WARF Violation*). Further, we use the percentage of CCC-rated loans in the CLO portfolio in the reporting month as a proxy for portfolio credit risk (*CLO CCC Bucket*). We expect that the probability of a loan sale will be positively related to compliance test violations and the percentage of CCC-rated loans in a CLO's portfolio. Finally, CLO manager's portfolio management objectives and philosophy significantly affect CLO's trading strategy. We attempt to capture these different qualitative characteristics across CLOs in our model by including CLO manager fixed effects.

We also expect that CLO managers' secondary trade activity is influenced by developments in the primary loan market, such as institutional loan issuance and demand pressure. We attempt to capture primary loan market characteristics over time in our model by including month fixed effects.

We use two proxies for borrower's financial performance: (i) the change in operating cash flows to total assets (*Borrower CFO*) between the last fiscal quarter prior to the CLO

reporting month and four quarters before, and (ii) the change in total liabilities to total assets (*Borrower Leverage*) between the last fiscal quarter prior to the CLO reporting month and four quarters before. We expect that loans issued by borrowers with deteriorating financial performance are more likely to be sold by CLOs. We control for CLOs' trading on public signals using two proxies to capture borrowers' public information environment and transparency: (i) market-adjusted stock returns in the 180 days period prior to the loan trade (*Stock Returns_180dayslag*), and (ii) the average daily bid-ask equity spread in the 180 days period prior to the loan trade (*Bid–ask spread_180dayslag*).

Finally, we control for the following loan characteristics: (i) the natural logarithm of loan maturity in months (*Loan Maturity*), (ii) the natural logarithm of the original loan LIBOR-spread (*Loan Spread*), and (iii) the number of financial or net worth covenants (*Loan Financial Covenants*). A detailed description of the variables we use in our predictive models of loan trading is included in Appendix A.

Panel A of Table 3 reports the results of the tests on the determinants of CLO loan sales and purchases. Consistent with our expectations, we find that loan rating, past loan performance and CLO compliance tests are important drivers of collateral managers' decision to sell or purchase a loan, suggesting that collateral managers are more likely to sell underperforming loans. In addition, collateral managers are likely to trade by selling distressed loans. We find no statistically significant evidence that borrowers' public information environment and transparency affect collateral managers' decision to buy or sell a loan. Overall, the results suggest that CLO managers use their discretion in selling off bad quality loans to manage credit risk in line with the interests of CLOs' investors.

Using the residuals from *Model 1a* and *Model 1b*, we develop two variations of the proxy for CLO private information. First, we aggregate the absolute values of the residuals at the CLO-month level to proxy for total private information that a CLO acquires in a reporting month (*CLO Private Information –Total Information*). To alleviate the concern that our proxy is driven by the size of the CLO, we deflate total private information by the number of loans held in the CLO's monthly portfolio (*CLO Private Information –Total Information by collateral*). Second, since high values of the residual from *Model 1a* (*1b*) reflects bad (good) news arrival, we develop a proxy for the direction of private information (good vs. bad news) by subtracting from the residual in *Model 1a* the residual from *Model 1b* (*CLO Private Information –Bad news*). High positive values in *CLO Private Information –Bad news* reflect bad information arrival, whereas low negative values in *CLO Private Information –Bad news* reflect good information arrival. We then average the *CLO Private Information –Bad news* at the loan–month and borrower–quarter level when running validation tests predicting future loan and borrower performance.[9]

Panel B of Table 3 reports the summary statistics for our CLO private information proxies. The mean (median) total information at the CLO–month level is 54.7 (51.5), while when we deflate total information to the number of loans in the CLO collateral monthly portfolio the mean (median) total information by collateral asset is 0.74 (0.77). The mean (median) CLO private information at the loan–month level is -0.03 (0.05), suggesting that while CLO trading activity reveals good information on securitized loans there is significant variation in the type of private information that CLOs own or acquire from borrowers.

[9] The standard deviation of *CLO private information –Bad news* at the loan–month level is 0.06. Moreover, current month private information for a loan predicts 70 percent of the variation of next month's private information, suggesting that our proxy does not significantly varies across CLOs and by month.

Finally, an important point is that we do not attempt to delineate key channels that CLOs use to acquire private information. While CLOs will have access to borrowers' private information as participants in the loan syndicate, CLOs are likely to use alternative proprietary channels to acquire private information and root out credit problems before they are reflected in loan prices and ratings.

4.2. Proxy validation

To validate our proxy for CLO private information we test whether it predicts future loan and borrower performance. We use several proxies for loan performance: (i) a binary variable that equals one if the loan rating was downgraded by two or more notches within a 90-day period after the CLO reporting month, and zero otherwise (*Future Loan Rating Downgrade*), (ii) a binary variable that equals one if the loan rating was upgraded by two or more notches within a 90-day period after the CLO reporting month, and zero otherwise (*Future Loan Rating Upgrade*), (iii) a binary variable that equals one if the borrower defaulted on the loan within a 90-day window after the CLO reporting month, and zero otherwise (*Future Loan Default*), and (iv) the difference between the loan price in the 90 days period following the trade date minus the price on the trade date, divided by the loan price on the trade date (*Future Loan Returns*). We employ two proxies for borrower's financial performance: (i) the operating income (EBITDA) to total assets in the fiscal quarter immediately after the CLO trade quarter (ROA_{q+1}), and (ii) the interest coverage defined as operating income (EBITDA) to interest expense in the fiscal quarter immediately after the CLO trade quarter ($Interest\ Coverage_{q+1}$).

Panel A of Table 4 reports the results of the tests on the relation between CLO private information and future loan performance. We find that our proxy for bad news arrival predicts

future loan downgrades and upgrades, defaults and loan returns after controlling for loan rating, previous rating changes, borrower's financial performance and loan characteristics. More specifically, an increase by one standard deviation in our proxy for CLO private information increases (decreases) the probability of a material loan rating downgrade (upgrade) by 1 percent (1.6 percent). The unconditional probability of a material loan rating downgrade (upgrade) in the 90 day period after the trade reporting month is 10 percent (6 percent). If a loan rating is downgraded by two or more notches in the period before the trade, the probability of a material loan rating downgrade (upgrade) in the future increases (decreases) by 13 percent (9 percent). Moreover, we find that our proxy for CLO private information predicts future loan defaults, controlling for past loan performance. An increase by one standard deviation in our proxy for bad news arrival increases the probability of a loan default in the 90 day period after the trade by 1 percent. The unconditional probability of a loan default is 4 percent. Finally, our proxy for bad news arrival predicts future loan returns: an increase by one standard deviation in our proxy for bad news arrival decreases future loan returns by 0.2 percent. The mean value of loan returns in the 90 day period after the trade is 1.3 percent. We control for net sales in our specifications, defined as total monthly loan sales minus purchases that could be considered as an alternative proxy for CLO private information. The assumption is that a loan being purchased more times than sold is a signal of good news arrival. However, we find that our proxy for CLO private information is likely a better measure for CLO private information.

Panel B of Table 4 reports the results of the tests on the relation between CLO private information and borrower's future financial performance. We find that our proxy for CLO private information revealing bad news for borrowers predicts the next two quarters' return on assets and interest coverage. An increase by one standard deviation in our proxy for bad news

arrival decreases next quarter's ROA and interest coverage by 0.3 and 0.1 percent respectively. The mean ROA and interest coverage is 2 percent and 1.3. An increase by one standard deviation in our proxy for bad news arrival decreases ROA and interest coverage two quarter's after the CLO trade by 0.4 and 0.1 percent.

Finally, in support of the results above, we find that CLOs' trading clusters in the 30 day period prior to quarterly earnings announcements (see Figure 2). This finding suggests that CLOs obtain and exploit private information about borrowers before some of it publicly disclosed via earnings announcements. Overall, the tests in this section provide strong evidence consistent with the residuals from the predictive models on CLO trading capturing CLOs' private information about borrowers.

5. Research design and Results

5.1. Research Design for CLO performance tests

To test whether CLOs' trade informativeness predicts future CLO performance we use an OLS model, where the dependent variable is CLO performance one year ahead.

$$\begin{aligned} \textit{CLO Performance}_{m+12} = {} & \alpha + \beta_1 * \textit{CLO Total Information}_m + \beta_2 * \textit{CLO Private Information} - \textit{Bad News}_m + \beta_3 * \textit{Default Bucket}_m + \beta_4 * \textit{CCC Bucket}_m + \beta_5 * \textit{JnrOC}_m \\ & + \beta_6 * \textit{SnrOC}_m + \beta_7 * \textit{WARF}_m + \beta_8 * \textit{Month FE} \end{aligned}$$

(Model 2)

The variable of interest is *CLO Total Information*, defined as the sum of the absolute values of the residuals from Model 1a and 1b at the CLO–month level divided by the number of loans in the collateral portfolio. The coefficient of interest is β_1, and we expect CLO total

information to be positively related to CLO future performance. We control for the direction of the news (good vs. bad) to alleviate the concern that our primary effect of interest is driven by the different type of information acquired by CLO managers.

We use a battery of proxies related to asset quality and riskiness to measure CLO performance at the CLO –reporting month level one year after the CLO trade: (i) the percentage of monthly collateral assets in default (*Default Bucket*), (ii) the percentage of CCC rated loans in the collateral portfolio (*CCC Bucket*), (iii) the junior overcollateralization score, defined as the excess of the par amount of loan collateral available to secure junior CLO notes over the par amount of those notes (*JnrOC*), (iv) the senior overcollateralization score, defined as the excess of the par amount of loan collateral available to secure senior CLO notes over the par amount of those notes (*SnrOC*), and (v) the weighted average rating factor, i.e. the mean loan rating of the underlying collateral in the portfolio (*WARF*).

We also test whether our proxy for CLO total private information predicts market value of collateral portfolio using an OLS model where the dependent variable is the natural logarithm of market value of assets (*MAV*). Since market value is unobservable in our data, we use the face amount of the loan balance in the CLO portfolio multiplied by the average monthly price of similarly rated traded loans.

$$MAV_{m+12} = \alpha + \beta_1 * CLO\ Total\ Information_m + \beta_2 * CLO\ Private\ Information\ –Bad\ News_m + \beta_3 * Default\ Bucket_m + \beta_4 * CCC\ Bucket_m + \beta_5 * JnrOC_m + \beta_6 * SnrOC_m + \beta_7 * WARF_m + \beta_8 * MAV_m + \beta_9 * Month\ FE$$

(Model 3)

The variable of interest is *CLO Total Information*, and the coefficient of interest is β_1 which we expect to be positive.

We explore cross-sectional variations in the relation between CLO private information and future performance focusing on timeliness of trades and collateral manager's reputation and size. We focus on CLO WARF, Senior OC, market asset value and default bucket as proxies for CLO performance. We proxy timeliness of trades with a binary variable that equals one if the CLO trades on average before the median trading date in a calendar month, and zero if it trades after this date (*Timeliness of Trades*). We expect that CLOs with more private information that execute more timely trades will outperform their peers. We use the sum of collateral manager's junior and senior management fees as proxy for CLO reputation (*Total Fees*). We expect that CLOs with more informative trades run by reputable managers will outperform their peers, since managers will have higher incentives to conduct due diligence on the underlying loan pool and acquire proprietary information. We use the natural logarithm of total CLOs' principal balance managed by a collateral manager as proxy for CLO manager size (*Assets under Management*). We expect that large manager CLOs with more informative trades will outperform their peers, since managers are likely to have greater experience and have developed more private information channels in the corporate loan market.

5.2 Summary statistics

Table 2 reports the summary statistics for the variables used in the estimation of CLO private information, in the validation tests of our proxy for CLO private information, and in the analyses of CLOs' future performance. The mean (median) probability of a loan sale and purchase is 0.04 (0.00) and 0.09 (0.00) respectively, suggesting that the CLO portfolio structure is relatively stable over time. The mean (median) loan rating is B (B), the mean (median) LIBOR-spread is 296 b.p. (308 b.p.) while the mean (median) loan maturity is approximately 6 (6.1) years. The average number of financial covenants is 2.14 for the loans in our sample.

Consistent with credit rating agencies' becoming more conservative during the recent financial crisis, loan rating downgrades are more frequent than loan rating upgrades in our sample, with 19 and 11 percent (10 and 6 percent) of securitized loans on average being downgraded and upgraded respectively by two or more notches in the 180-day period preceding CLO trades (in the 90-day period following a CLO trade). Further, the mean (median) probability of a borrower's default is 0.10 (0.00) during the 180-day period before the CLO trade. As a result of the recent financial turmoil, 34 (38) percent of the CLOs in our sample violated the senior overcollateralization (WARF) compliance test. The mean (median) percentage of CCC-rated loans in a CLO portfolio is 0.07 (0.06). In terms of borrower specific information, the average size of the companies in our sample is $2.5 billion. The mean (median) return on assets is 0.02 (0.02), the mean (median) interest coverage is 1.32 (0.54), the mean (median) quarterly leverage is 0.83 (0.84) while the mean (median) market-to-book value of equity is 3.74 (5.00). Thus, the average borrower in our sample is highly leveraged and exhibits low profitability. The mean (median) volatility of operating cash flows is 0.35 (0.38).

In terms of CLO performance metrics, the mean (median) percentage of loans in the defaulted and the risky CCC-rated bucket is 2 percent and 7 percent (1 percent and 6 percent) respectively. The mean (median) senior overcollateralization, i.e. cash flows in excess of the par value of CLO senior notes, is 11 percent (10 percent) while the mean (median) junior overcollateralization, i.e. cash flows in excess of the par value of CLO junior notes, is 4 percent (3 percent). The mean (median) weighted average rating score is 2601 (2598) and the mean (median) fair value of CLO assets is $257 million ($205 million). The mean (median) managers' fees are 53 basis points (50 basis points), which consists of senior fees of 30-40 basis points and junior fees of 10-20 basis points. The mean (median) collateral managers' assets under

management are $6.7 billion ($5.9 billion). Finally, the probability of a CLO's trading timely in advance of other CLOs is 33 percent.

Untabulated univariate correlations between the CLO total private information proxy and CLO performance metrics suggest that our proxy is negatively correlated to future percentage of CCC-rated loans (-0.16) and loans in default in the collateral portfolio (-0.35) as well as to the WARF score (-0.28). Our proxy is positively correlated to future junior and senior overcollateralization score (0.08 and 0.29 respectively) and to CLO fair asset value (0.10). Moreover, our proxy for total private information is positively correlated to collateral managers' fees (0.05) and trading timeliness (0.09) and negatively correlated to collateral manager's size (-0.02).

5.3 CLO performance results

Panel A of Table 5 presents the results for tests on the relation between CLO private information and the quality and riskiness of loans owned by CLOs one year ahead. In the first two columns, we use the percentage of defaulted and CCC rated loans in the loan portfolio to proxy for the quality of collateralized assets. We find that a higher level of private information leads to a lower percentage of defaulted and CCC rated loans at one year ahead. This is consistent with the argument that CLOs use private information to their own advantage by trading strategically and reducing the riskiness of loans in their portfolios. In the next two columns, we investigate whether the total amount of private information affects the junior and senior overcollateralization score at one year ahead. The coefficient of *Total Information* is positive and insignificant for the test on junior overcollateralization score, however, its coefficient is positive and statistically significant when the senior overcollateralization score is

used as the dependent variable (p–value<0.01). In the last column, we find that the total amount of private information is also negatively related to CLOs' weighted average rating factor at one year ahead, suggesting that CLOs actively use private information to improve the credit quality of the loans in their portfolios. Interestingly, the coefficient of *CLO Private Information –Bad News* is insignificant throughout our specifications, suggesting that managers are able to effectively manage credit risks, i.e. it is the total amount of private information rather than the direction of private information that predicts future CLO performance.

Panel B of Table 5 reports the results for the effect of CLO private information on the market value of loans managed by CLOs one year ahead. We find that the amount of total private information that CLOs trade on is positively associated with the market value of their loans at one year ahead. An increase by one standard deviation in the total amount of private information increases by 3 percent portfolio market value one year ahead, suggesting that CLOs' trading on private information increases investors' returns. Overall, our results suggest that CLOs use their informational advantage to enhance their performance.

5.4 CLO performance and Timeliness of trades

Table 6 reports the results for the tests on the effect of the timeliness of trading on CLOs' future performance. Similar to Table 5, we use the quality and the market value of loans managed by CLOs to proxy for CLO performance. We find that CLOs executing more timely trades exhibit lower portfolio riskiness and higher asset value and quality one year ahead. More importantly, when we interact *Total Information* with *Timeliness of Trading*, we find that the effect of private information on CLOs' future performance is stronger for CLOs that also trade

fast on their information, suggesting that timing trading decisions further allows CLOs to benefit from their informational advantage.

5.5 CLO performance and CLO manager's characteristics

We investigate the extent to which CLO collateral managers' reputation and size determine the relation between private information and future CLO performance. We expect that more sophisticated and reputable CLO managers, i.e. managers that receive higher fees, are likely to exert greater effort in collecting private information and trade on their informational advantage. Moreover, we expect that large manager CLOs are likely to outperform their peers and trade on more private information, since their managers have greater experience and access to multiple information channels.

Table 7 presents the results for the tests on the relation between collateral managers' fees, private information and CLO future performance. The results suggest that CLOs that offer higher management fees have lower percentage of defaulted loans, greater senior overcollateralization score and asset quality and higher asset market value. In addition, we find that management fees amplify the effect of CLOs' private information on future performance, presumably because managers have higher incentives to collect, verify and trade on private information about their borrowers, thus, enhance CLO performance. The findings are consistent with the fact that senior and junior fees are likely to provide strong incentives to CLO managers to prevent the deterioration of credit quality of the non-equity tranches of CLOs (Jacobs and Radomyslsky, 2012).

Table 8 reports the results for the tests on the relation between collateral manager's size, CLO private information and its future performance. The variable *Assets under Management* is

the size of CLO vehicles managed by collateral managers. CLO managers that are trusted with larger CLO vehicles are more likely to collect and trade on private information to enhance future CLO performance, thus, their reputation. However, our findings suggest that large manager CLOs underperform their peers, presumably because these managers are less likely to timely collect and process private information for a large and highly diversified set of loans and borrowers. Also, the coefficient of the interaction term between *Total Information* and *Assets under Management* is insignificant throughout all columns. Thus, we provide evidence that collateral managers managing a small number of CLOs are more likely to exhibit higher performance and trade strategically using their informational advantage.

5.6 Robustness tests

We perform a series of robustness tests to investigate the sensitivity of our main results. First, we use the net number of notch changes in loan ratings (notch upgrades minus downgrades) to proxy for loan rating downgrades and upgrades. Second, we control for S&P credit-watch issues ("positive", "negative", and "no material change") from Capital IQ that proxy for borrowers' future credit outlook. Third, we split our sample in trades during the credit downturn (2008-2010) and trades in the credit upturn (2011-2013) to alleviate any bias from the different levels of risk tolerance that investors and collateral managers had in these periods. Finally, our results hold when we derive our proxies for CLO private information after controlling for CLO fixed effects in Model 1. Overall, we find that our results remain similar after performing all these tests.

6. Conclusions

In this paper, we explore the extent to which CLOs, the most important type of institutional investors in the leveraged loan market, trade on borrower–specific private information and whether their trading activity predicts future CLO performance. We overcome the empirical challenge of capturing private information and when this information is released by using a novel dataset which provides complete information on CLO monthly portfolio holdings, CLO compliance tests and loan transactions. While we expect that CLO managers are likely to trade strategically and use their informational advantage to generate higher investors' returns, CLOs' highly diversified and large structures, overreliance on credit ratings and on banks' monitoring effort are likely to deter CLO managers from collecting or timely trading on private information.

We develop predictive models of CLOs' decision to either purchase or sell an individual loan where we control for observable loan, CLO and borrower performance in the period before the trade. We use the residuals from the predictive models and we develop two proxies for private information: bad news arrival and total information available. We validate our proxies and find that our proxy for bad news private information predicts future deterioration in loan ratings, defaults and prices. Further, our proxy for private information related to bad news predicts worse future borrower's financial performance, controlling for current performance. In addition, we find that CLOs are more likely to trade in the 30-day period before quarterly earnings announcements. We then explore the effect of trading on private information on future CLO performance, proxied by asset quality and riskiness. We find that total private information predicts higher future CLO performance one year ahead controlling for current performance, and this effect is greater for CLOs that trade more timely, offer higher management fees and are managed by small investment management firms.

Overall, we provide evidence that CLOs trade strategically on private information and use their informational advantage to enhance their performance and comply to covenant tests. However, there is significant cross-sectional variation in CLO characteristics that determine the relation between trading on private information and future performance. Interestingly, management fees and collateral managers' scope play a significant role in how effectively managers deal with credit risk. The findings add to the debate on the recently introduced risk retention requirements by CLO managers, showing that CLOs use their informational advantage to comply to covenant tests and effectively manage the credit risk of their portfolios. Also, market–driven mechanisms, such as management fees, are likely to mitigate moral hazard between investors and collateral managers.

Our study has certain limitations. While we provide evidence consistent with the interpretation that CLOs' trading activities capture private information about borrowers over future loan and borrower performance, we cannot directly observe whether CLO managers acquired this information directly from loan lead arrangers, used alternative means of acquiring such information, or they uncover this information through a more superior analysis of publicly available information compared to other investors. While we try to delineate channels of private information acquisition by controlling for CLO's reputation and sophistication, we refrain from making suggestions on the source of the private information that CLOs use when trading in the secondary loan market. In addition, since data coverage starts in 2008, we cannot observe CLO trades during the securitization boom. While we attempt to provide evidence on the trades during the economic upturn between 2011 and 2013, we will not be able to infer that CLO trading activities were informative during the credit bubble, when CLO managers had more incentives to speculate.

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APPENDIX A

Glossary for CLO terms

CCC bucket: Percentage of loans in the CLO portfolio rated as CCC by certified rating agencies.

Collateral: Highly leveraged syndicated loans in CLO portfolio whose cash flows are used as collateral to CLO bonds. Also referred to as "CLO assets."

Interest coverage: Ratio of the amount of interest collected from a CLO's loan assets to the amount of interest due on a note class and the note classes senior to it. The ratio is computed for each class of notes issued by the CLO.

Overcollateralization (OC): The excess of the par amount of loan collateral available to secure one or more classes of notes over the par amount of those notes. For each note class, the OC ratio is estimated as the ratio of the par amount of a CLO's assets to the outstanding par amount of that note class and the note classes senior to it.

WAS (Weighted average spread): Weighted average of the loan spreads over LIBOR with the weights being the loan par amounts.

Waterfall: Sequence in which payments must be made to the holders of various note classes and to other parties in the CLO. The payments are usually separated into collections from interest and collections from principal. Payments are made first from interest and then from the loan principal if collections from interest are insufficient. When interest coverage tests are breached, the priority of payments changes to divert any available cash to either pay down the notes or reinvest in collateral until all interest coverage tests are met. The typical sequence of payments in a CLO waterfall schedule in the order or priority is as follows: taxes (if any), administrative expenses, trustee fee, senior management fee, senior note holders, mezzanine note holders, subordinated note holders, subordinated management fee, equity investors.

WARF (Weighted averaged recovery rating factor): It is a collateral quality test calculated based on the loan recovery ratings assigned by credit rating agencies on the loans that are included in the underlying CLO collateral base. The collateral manager needs to meet a minimum average recovery rate which is greater than or equal to the number set forth at the time of the CLO setup.

Weighted average maturity: It is a collateral quality test calculated based on the loans' amortization schedule which captures the expected remaining average life of the collateral pool, and not the legal final maturity. The expected remaining average life may change significantly, due to changes in interest rates or the performance of the underlying collateral. The collateral manager needs to make sure that, on the measurement date, the weighted average maturity of the collateral interests is less than a stated maturity (typically of five years or less).

APPENDIX B

Variable Definition

Variable	Definition
Assets under Management	The natural logarithm of CLOs' total principal balance managed by the same collateral manager.
Bid-ask spread_180dayslag	The average bid-ask spread in the 180 period before the CLO reporting month.
Borrower D(CFO)	The difference in operating cash flows to total assets between the quarter before CLO reporting date and four quarters before.
Borrower D(Leverage)	The difference in total liabilities to total assets between the quarter before CLO reporting date and four quarters before.
Borrower Defaults_180dayslag	Binary variable that equals one if the borrower defaulted on securitized loans 180 days before the last CLO reporting month, and zero otherwise.
Cash Flow Volatility	The standard deviation of operating cash flows in the previous four fiscal quarters to total assets.
CLO CCC Bucket	The percentage of CCC rated loans that the CLO reports (by reporting month).
CLO Default Bucket	The percentage of defaulted loans that the CLO reports (by reporting month).
CLO Jnr OC	CLO junior overcollateralization score in the reporting month.
CLO OC Violation	Binary variable that equals one if the CLO violated the overcollateralization compliance test in the reporting month, and zero otherwise.
CLO Private Information -Bad News	The average (Residual Model 1+(-Residual Model 2)) from CLOs decision to trade a loan in a certain month.
CLO Private Information -Total News	Abs(Residual Model 1)+Abs(Residual Model 2)
CLO Private Information -Total News by collateral	[Abs(Residual Model 1)+Abs(Residual Model 2)]/ number of loans in the CLO monthly portfolio.
CLO Snr OC	CLO senior overcollateralization score in the reporting month.
CLO WARF	CLO weighted average rating factor in the reporting month.
CLO WARF Violation	Binary variable that equals one if the CLO violated the WARF compliance test in the CLO reporting month, and zero otherwise.
Total Fees	Senior plus Junior Fees.
Distressed Loan	Binary variable that equals one if the loan was traded below 90 at the reporting month, and zero otherwise.
Financial Loan Covenant	The number of loan financial covenants (incl. net worth covenants).
Future Loan Default	Binary variable that equals one if the borrower defaulted on the loan in a 90 day period after the CLO reporting month, and zero otherwise.

APPENDIX B –cont.

Variable	Definition
Future Loan Rating Downgrade	Binary variable that equals one if the loan was downgraded by two or more notches 90 days after the CLO reporting month, and zero otherwise.
Future Loan Rating Upgrade	Binary variable that equals one if the loan was upgraded by two or more notches 90 days after the CLO reporting month, and zero otherwise.
Future Loan Returns	The ratio of the loan price 90 days after the loan sale or purchase minus the loan price at the time of the sale or purchase, deflated by the loan price at the time of the sale or purchase.
Interest Coverage	EBITDA to Interest Expense.
Leverage	Total liabilities to total assets.
Loan Maturity	The natural logarithm of loan maturity (in months).
Loan Rating	The most conservative loan rating (S&P, Moody's or Fitch) in the reporting month that is set equal to 1 for AAA, the highest rated loan, and 25 for D the lowest rated loan.
Loan Rating Downgrades_180dayslag	Binary variable that equals one if the loan was downgraded by two or more notches 180 days before the last CLO reporting month, and zero otherwise.
Loan Rating Upgrades_180dayslag	Binary variable that equals one if the loan was upgraded by two or more notches 180 days before the last CLO reporting month, and zero otherwise.
Loan Spread	The natural logarithm of all-in-drawn LIBOR-spread (average at the loan level).
Market-to-Book	Market to book value of borrower's equity.
MAV	Market Asset Value: the natural logarithm of loan balance in the CLO portfolio*market price of a similarly rated loan in the same month.
Net Sales	Number of sales minus number of purchases.
Purchase	Binary variable that equals one if the loan was purchased in the CLO reporting month, and zero if the CLO manager manages different tranches or loans from the same borrower in other CLOs and did not purchase these tranches.
ROA	EBITDA to Total Assets.
Sale	Binary variable that equals one if the loan was sold in the CLO reporting month, and zero if the loan was kept by the CLO.
Size	The natural logarithm of total assets.
Stock Returns_180dayslag	Market-adjusted returns in the 180 period before the CLO reporting month.
Timeliness of trading	Binary variable that equals one if the CLO trades on average before the median collateral trading date each month, and zero if the CLO trades on average after the median trading date.

Figure 1

Loan Trading and Loan Prices

Figure 1A: Loan Trading by Month

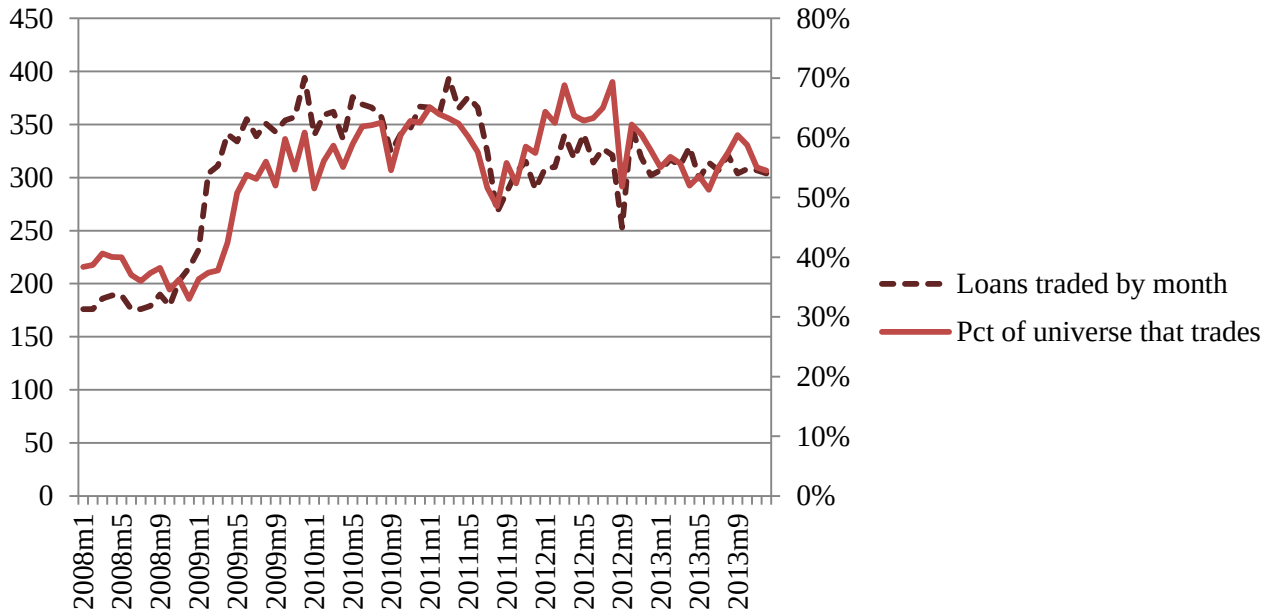


Figure 1B: Number of Trades by Loan

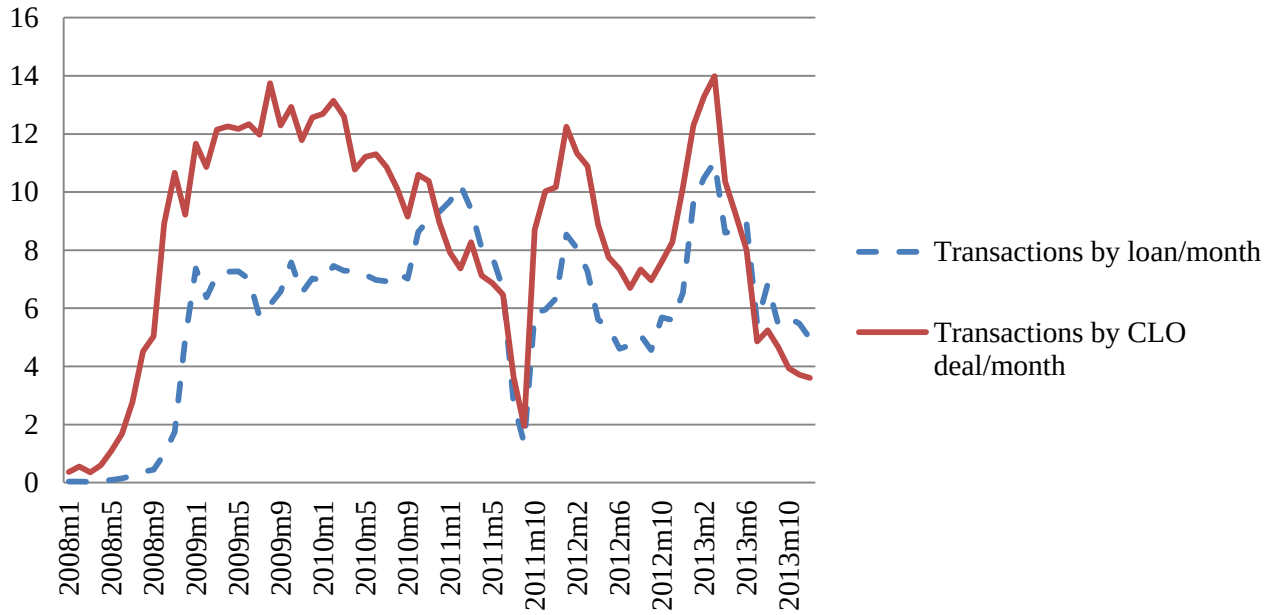
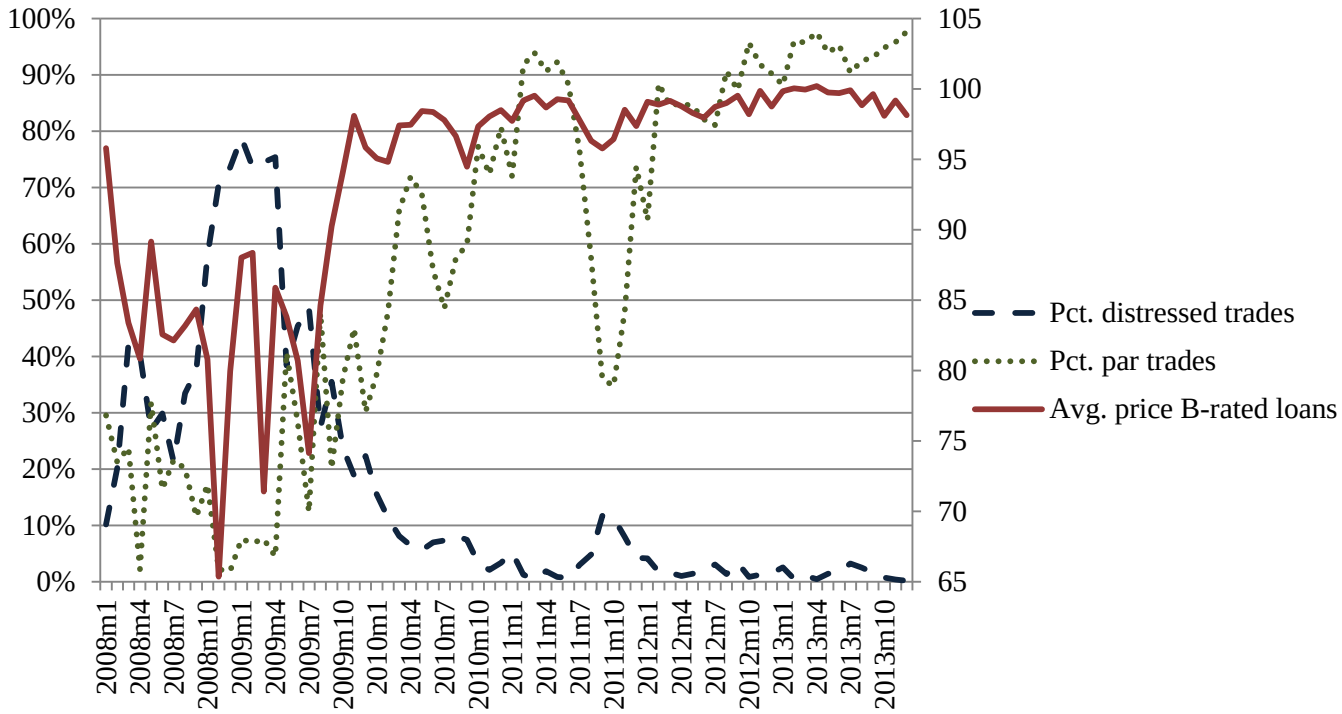


Figure 1C: Loan Prices by Month



Panel A presents the number of loans traded (primary axis) on a monthly basis and the ratio of loans traded to total number of securitized loans in CLO monthly portfolios (secondary axis) over the sample period of 2008-2013. Panel B shows the number of transactions at the loan –month and CLO–month level. Panel C presents the ratios of (i) loans traded close to par (98<price<102) and (ii) distressed loans (price<90) to total number of trades (primary axis) as well as the average monthly price of B-rated loans (secondary axis).

Figure 2

CLO Trading around Quarterly Earnings Announcements

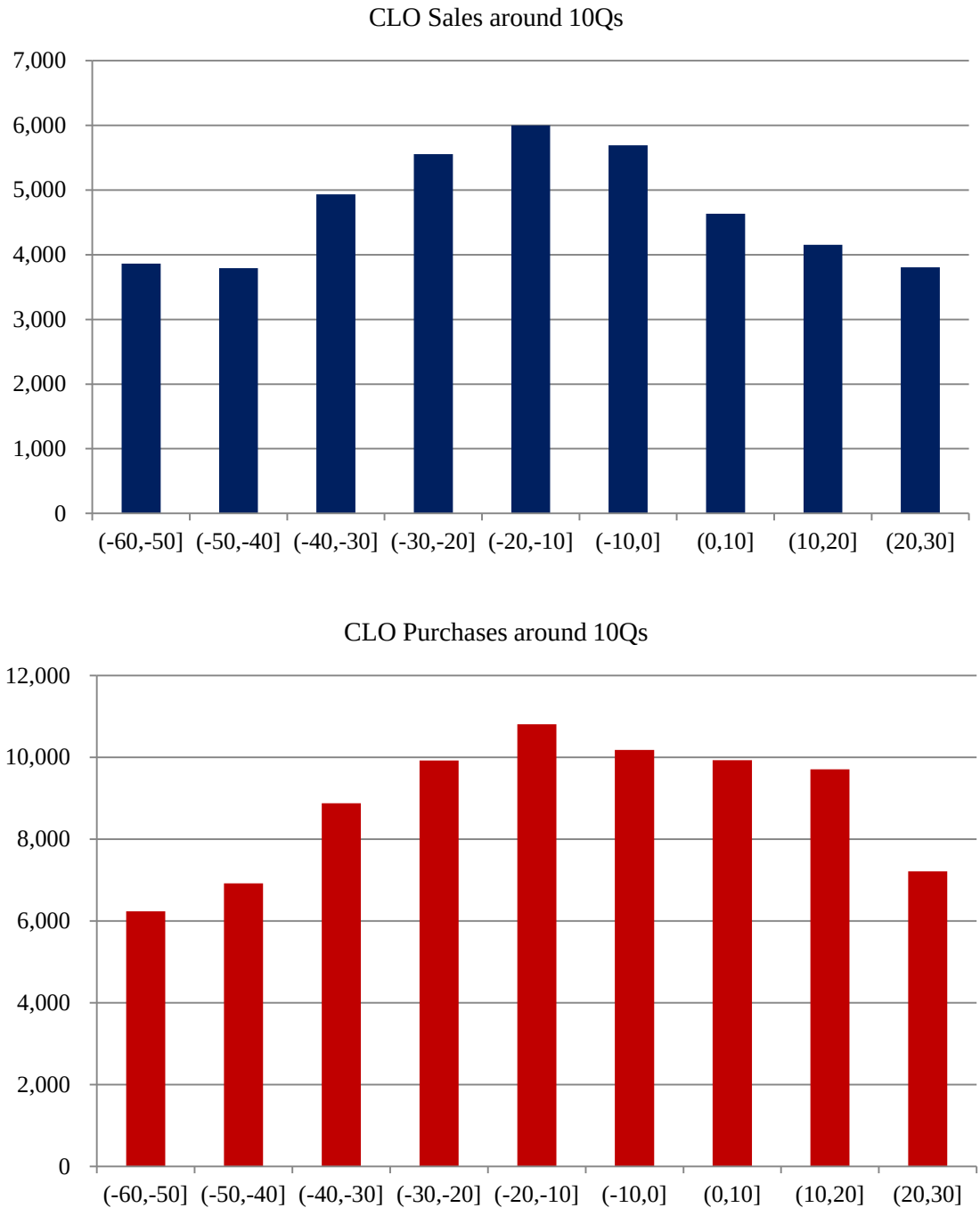


Figure 2 presents the frequency of CLO trading activity around quarterly earnings reporting date for a sample of 123,045 unique transactions of 1,233 loans issued by 720 unique borrowers.

Table 1

Sample Selection and Descriptive Statistics

Panel A: Sample selection

	Number of observations by CLO reporting month	Number of unique trades	Number of loans
CLO-i universe	5,791,930	302,233	
CLO-i –DealScan merge	3,644,767	190,736	3,557
CLO-i –DealScan – Compustat merge	1,106,584	123,045	1,233

Panel B: Descriptive statistics on CLO portfolio holdings and trading activity

Variables (per month)	N	Mean	S.D.	Min	0.25	Median	0.75	Max
Loan holdings								
CLO principal amount (in $m)	536	399.56	299.37	26.14	143.00	400.50	500.00	3,529.75
Number of loans in CLO portfolio	1,106,582	92.93	36.86	21.00	67.00	90.00	113.00	241.00
Mean holding period (months)	1,106,582	9.89	9.38	1.00	2.00	7.00	15.00	41.00
Loan trading								
Number of trades by loan	1,106,582	5.89	10.04	0.00	0.00	3.00	8.00	38.00
Number of sales by loan	1,106,582	2.11	3.26	0.00	0.00	1.00	3.00	12.00
Number of purchases by loan	1,106,582	3.78	6.89	0.00	0.00	1.00	5.00	26.00
Number of trades by a CLO	1,106,582	8.48	6.19	0.00	5.00	9.00	13.00	45.00
Number of sales by a CLO	1,106,582	3.06	3.38	0.00	1.00	2.00	5.00	13.00
Number of purchases by a CLO	1,106,582	5.42	4.46	0.00	3.00	4.00	10.00	17.00
Mean face amount –Sales (in $m)	42,129	1.47	1.37	0.08	0.50	1.00	2.00	6.28
Mean price –Sales	42,129	95.70	8.28	71.50	96.00	99.75	100.00	101.00
Mean face amount –Purchases (in $m)	80,916	1.56	1.36	0.08	0.55	1.00	2.00	6.28
Mean price -Purchases	80,916	96.79	5.57	71.50	96.13	99.13	100.00	101.00

Table 2

Summary Statistics

Panel A: Predictive model

Variable	N	Mean	S.D.	Min	P25	Median	P75	Max
Sale	1,106,582	0.04	0.19	0.00	0.00	0.00	0.00	1.00
Purchase	892,005	0.09	0.29	0.00	0.00	0.00	0.00	1.00
Loan Rating	1,106,582	14.74	2.22	1.00	14.00	15.00	15.00	25.00
Loan Rating Downgrades_180dayslag	1,106,582	0.19	0.39	0.00	0.00	0.00	0.00	1.00
Loan Rating Upgrades_180dayslag	1,106,582	0.11	0.25	0.00	0.00	0.00	0.00	1.00
Borrower Defaults_180dayslag	1,106,582	0.10	0.13	0.00	0.00	0.00	0.00	1.00
Distressed Loan	1,106,582	0.11	0.31	0.00	0.00	0.00	0.00	1.00
CLO WARF Violation	1,106,582	0.38	0.48	0.00	0.00	0.00	1.00	1.00
CLO OC Violation	1,106,582	0.34	0.47	0.00	0.00	0.00	1.00	1.00
CLO CCC Bucket	1,106,582	0.07	0.06	0.00	0.03	0.06	0.10	3.61
Borrower D(Leverage)	1,106,582	0.00	0.09	-0.27	-0.03	-0.01	0.02	0.28
Borrower D(CFO)	1,106,582	0.01	0.05	-0.15	-0.02	0.00	0.02	0.12
Loan Spread	1,106,582	5.69	0.35	3.86	5.42	5.73	5.93	6.40
Loan Maturity	1,106,582	4.26	0.17	1.79	4.20	4.29	4.37	5.58
Financial Loan Covenants	1,106,582	2.14	1.10	0.00	2.00	2.00	3.00	7.00
Stock Returns_180dayslag	1,106,582	0.02	0.15	-0.59	0.02	0.02	0.02	0.61
Bid–ask spread_180dayslag	1,106,582	-3.17	1.20	-6.46	-3.54	-3.54	-2.10	0.60

Panel B: Validation tests

Variable	N	Mean	S.D.	Min	0.25	Median	0.75	Max
Future Loan Default	36,795	0.04	0.32	0.00	0.00	0.00	0.00	1.00
Future Loan Rating Downgrade	36,795	0.10	0.25	0.00	0.00	0.00	0.00	1.00
Future Loan Rating Upgrade	36,795	0.06	0.37	0.00	0.00	0.00	0.00	1.00
Future Loan Returns	36,795	1.32	7.01	-24.00	0.90	2.35	3.50	18.00
Interest Coverage	8,449	1.32	2.57	-1.74	-0.34	0.54	2.28	6.82
ROA	10,683	0.02	0.01	-0.02	0.02	0.02	0.02	0.10
Leverage	10,683	0.83	0.19	0.45	0.76	0.84	0.84	1.40
Net Sales (by month)	36,795	-0.76	4.07	-21.00	-1.00	0.00	0.00	8.00
Net Sales (by quarter)	10,683	-1.82	6.99	-23.00	-2.00	0.00	0.00	10.00
Cash Flow Volatility	10,683	0.35	0.13	0.10	0.27	0.38	0.38	0.70
Market-to-Book	10,683	3.74	1.73	0.00	1.92	5.00	5.00	5.00
Assets	10,683	7.91	0.83	6.15	7.72	7.93	7.96	9.81

Panel C: CLO performance

Variable	N	Mean	S.D.	Min	0.25	Median	0.75	Max
CCC Bucket	7,345	0.07	0.05	0.01	0.04	0.06	0.10	0.18
Junior OC	7,345	0.04	0.04	0.01	0.02	0.03	0.05	0.17
Senior OC	7,345	0.11	0.06	0.03	0.08	0.10	0.13	0.32
Default Bucket	7,345	0.02	0.03	0.00	0.00	0.01	0.04	0.09
WARF	7,345	7.87	0.16	4.36	7.80	7.87	7.94	9.75
Collateral Manager's Fees	5,350	0.53	0.1	0.20	0.50	0.50	0.50	1.00
Assets under Management	7,345	8.50	0.89	5.70	7.88	8.59	9.30	9.59
MAV	8,756	5.07	0.44	2.67	4.78	5.05	5.33	6.60
Timeliness of trading	7,467	0.33	0.47	0.00	0.00	0.00	1.00	1.00

Variables are described in Appendix B. The values of continuous variables are winsorized at 1% and 99%.

Table 3

CLO Collateral Transactions – Predictive Model

Panel A: Securitized loan sales and purchases – predictive model

	Sale			Purchase		
Variable	**dF/dx**		**z-stat.**	**dF/dx**		**z-stat.**
Loan Rating	0.005	***	12.60	-0.021	***	-16.67
Loan Rating Downgrades_180dayslag	0.009	***	3.95	-0.006	***	-2.73
Loan Rating Upgrades_180dayslag	-0.005		-1.21	-0.001		0.67
Borrower Defaults_180dayslag	0.019	***	3.97	0.002		1.58
Distressed Loan	0.011	***	4.22	-0.033	***	3.89
CLO WARF Violation	-0.001		-1.45	-0.011	***	-8.63
CLO OC Violation	0.004	***	6.48	0.004	***	3.84
CLO CCC Bucket	0.012	***	2.61	0.005		0.48
Borrower D(Leverage)	-0.005		-0.48	0.084	***	2.46
Borrower D(CFO)	-0.022	*	-1.89	-0.004		-0.08
Loan Spread	-0.010	***	-2.93	-0.007		-0.99
Loan Maturity	-0.010	**	-2.05	-0.006		-0.44
Financial Loan Covenants	0.002	*	1.73	0.001		0.43
Stock Returns_180dayslag	-0.008		-1.64	-0.006		-0.42
Bidask spread_180dayslag	0.000		-0.44	0.000		-0.09
CLO Manager –Month –Industry FE	YES			YES		
	N= 1,106,582			N= 892,005		
	pseudo-R^2= 0.12			pseudo-R^2= 0.06		

Table 3 – cont.

Panel B: Descriptive statistics of proxies for CLO private information

Variable	N	Mean	S.D.	Min	P25	Median	P75	Max
CLO Private Information -Bad News	36,795	-0.03	0.54	-4.10	-0.13	0.05	0.17	4.08
CLO Private Information -Total News	13,926	54.74	35.7	0.79	25.55	51.52	78.81	141.33
CLO Private Information -Total News by collateral	13,926	0.74	0.33	0.00	0.56	0.77	0.94	3.05

Panel A reports the results for the effect of CLO, loan, credit market and borrower characteristics on a CLO's decision to sell or purchase a loan, using probit models. In the first specification, the dependent variable is *Sale*, defined as a binary variable that equals one if the loan was sold in the CLO reporting month, and zero if the loan was kept by the CLO. In the second specification, the dependent variable is *Purchase* defined as binary variable that equals one if the loan was purchased in the CLO reporting month, and zero if the CLO manager manages different tranches or loans from the same borrower in other CLOs and did not purchase these tranches. Marginal effects are reported. Independent variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroskedasticity and clustered at the loan level. ***Significant at 1%, ** 5% and * 10% level, two-tailed tests. Panel B provides the univariate statistics of the proxies for CLO private information obtained from the predictive model presented in Panel A.

Table 4

Validation Tests

Panel A: CLO private information and future loan performance

	Future Loan Rating Downgrade		Future Loan Rating Upgrade		Future Loan Default		Future Loan Returns	
Variable	**dF/dx**	**z-stat.**	**dF/dx**	**z-stat.**	**dF/dx**	**z-stat.**	**Coeff.**	**t-stat.**
CLO Private Information -Bad News	**0.019** ***	**2.51**	**-0.030** ***	**-10.40**	**0.014** ***	**3.61**	**-0.292** **	**-2.13**
Net Sales	0.005 ***	4.47	0.000	-1.18	-0.001 ***	-2.80	0.005	0.25
Loan Rating	0.028 ***	4.99	0.014 ***	5.21	0.015 ***	8.09	-0.950 ***	-4.75
Previous Loan Rating Downgrades	0.136 ***	6.06	-0.065 ***	-3.15	0.154 ***	6.28	-3.193 ***	-6.15
Previous Loan Rating Upgrades	-0.089 ***	-7.50	0.095 ***	9.37	-0.025 ***	-8.21	7.197 ***	9.42
Borrower D(CFO)	-0.034	-0.45	-0.055	-0.91	-0.027	-0.69	-0.725	-0.46
Borrower D(Leverage)	-0.023	-0.59	-0.060 ***	-2.66	-0.008	-0.43	-0.102	-0.10
Loan Spread	0.001	0.09	-0.001	-0.09	0.000	0.05	-0.337	-1.58
Loan Maturity	-0.086 ***	-5.75	-0.009	-0.68	-0.002	-0.29	1.448 ***	2.71
Financial Loan Covenant	0.001	0.24	-0.001	-0.43	0.001	0.53	-0.009	-0.13
Constant							1.089 ***	3.97
Month –Industry FE	YES		YES		YES		YES	
	N= 36,795		N= 36,795		N= 36,795		N= 36,795	
	pseudo-R^2= 0.21		pseudo-R^2= 0.15		pseudo-R^2= 0.51		R^2= 0.26	

Table 4 – cont.

Panel B: CLO private information and future borrower performance

	ROA_{q+1}			ROA_{q+2}			$Interest\ Coverage_{q+1}$			$Interest\ Coverage_{q+2}$		
Variable	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**
CLO Private Information -Bad News	**-0.008**	*	**-1.68**	**-0.011**	**	**-2.34**	**-0.010**	**	**-2.18**	**-0.027**	***	**-3.88**
Net Sales	**0.000**		**-0.74**	**0.000**		**0.13**	-0.003		-1.15	-0.007	**	-2.19
ROA_q	0.533	***	13.50	0.405	***	7.83	0.455	*	1.88	0.590	**	2.10
$Interest\ Coverage_q$	0.003	***	3.91	0.002	***	2.69	0.761	***	5.11	0.689	***	9.00
$Leverage_q$	0.046	***	2.94	0.057	***	3.05	-0.482	***	-3.37	-0.593	***	-3.41
$Cash\ Flow\ Volatility_q$	-0.003	*	-1.81	-0.005	**	-2.22	0.754		1.23	1.477	*	1.81
$Market\text{-}to\text{-}Book_q$	0.110	***	4.78	0.144	***	4.75	0.028	***	2.11	0.023		1.34
Constant	0.013		0.81	0.012		0.65	0.746	***	5.59	0.891	***	5.35
Quarter –Industry FE	YES			YES			YES			YES		
	N= 10,683			N= 10,576			N= 8,325			N= 8,247		
	R^2= 0.45			R^2= 0.35			R^2= 0.62			R^2= 0.55		

Panel A reports the results for the relation between CLO private information and future loan performance. In columns 2-4, marginal effects are reported. Panel B reports the tests for the relation between CLO private information and future borrower performance. All variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroscedasticity and clustered at the loan (Panel A) and borrower level (Panel B). ***Significant at 1%, ** 5% and * 10% level, two-tailed tests.

Table 5: Impact of CLO Private Information on CLO Future Performance

Panel A: CLO private information and future asset quality

	Default Bucket$_{m+12}$		**CCC Bucket$_{m+12}$**		**Jnr OC Cushion$_{m+12}$**		**Snr OC Cushion$_{m+12}$**		**WARF$_{m+12}$**	
Variable	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**
Total Information$_m$	**-0.005** ***	**-5.05**	**-0.006** *	**-1.74**	**0.002**	**1.28**	**0.025** ***	**2.66**	**-0.017** ***	**-3.22**
CLO Private Information -Bad News$_m$	**0.002**	**0.86**	**-0.452**	**-0.84**	**0.001**	**0.32**	**-0.041**	**-1.56**	**0.013**	**1.26**
Default Bucket$_m$	0.661 ***	13.86	0.246 ***	3.19	-0.151 ***	-3.20	-0.824 **	-2.07	0.377 **	2.26
CCC Bucket$_m$	0.044 **	2.21	0.553 ***	13.38	-0.085 ***	3.14	-0.761 ***	-3.93	0.092	0.98
JnrOC$_m$	-0.106 ***	-4.68	5.270	0.95	-0.701 ***	14.79	0.055	0.14	0.028	0.19
SnrOC$_m$	-0.038 ***	-4.47	1.553	0.90	0.023 *	1.73	0.856 ***	5.86	-0.072 ***	-2.41
WARF$_m$	0.014 ***	3.00	-3.045	-1.11	0.002	0.20	-0.035	-0.57	0.472 ***	7.59
Constant	-0.078 **	-2.06	0.036	0.63	-0.028	-0.13	0.499	1.06	4.055 ***	8.65
Month FE	YES		YES		YES		YES		YES	
	N= 7,345		N= 7,345		N= 7,345		N= 7,345		N= 7,345	
	R^2= 0.61		R^2= 0.56		R^2= 0.53		R^2= 0.41		R^2= 0.49	

Table 5 – cont.

Panel B: CLO private information and future market asset value (MAV)

	MAV_{m+12}		
Variable	**Coeff.**		**t-stat.**
Total Information$_m$	**0.065**	***	**2.49**
CLO Private Information -Bad News$_m$	**-0.064**	*	**-1.80**
MAV_m	0.848	***	36.61
Loan Rating$_m$	0.019		0.96
CCC Bucket$_m$	-0.047		-0.20
Default Bucket$_m$	0.150		0.31
$WARF_m$	0.046		0.61
$JnrOC_m$	0.039		1.51
$SnrOC_m$	0.139	*	1.76
Constant	0.016		0.03
Month FE	YES		
	N= 8,756		
	R^2= 0.62		

Panel A of Table 5 reports the results for the impact of CLO private information at a given month on the quality of loans managed by CLOs at one year ahead. Panel B of Table 5 presents the results for the impact of CLO private information on the market asset value of loans owned by CLOs at one year ahead. All variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroskedasticity and are clustered at the CLO level. ***Significant at 1%, ** 5% and * 10% level, two-tailed tests.

Table 6

Timeliness of CLO Trading and CLO Future Performance

	Default Bucket$_{m+12}$		**Snr. OC Cushion$_{m+12}$**		**WARF$_{m+12}$**		**MAV$_{m+12}$**	
Variable	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**
Total Information$_m$	**-0.005** ***	**-5.12**	**0.063** ***	**4.57**	**-0.020** ***	**-2.58**	**0.055** ***	**2.42**
Timeliness of Trading	**-0.002** ***	**-2.61**	**0.035** ***	**5.62**	**-0.012** ***	**-4.70**	**0.030** ***	**3.52**
Total Information$_m$*Timeliness of Trading$_m$	**-0.003** ***	**-2.76**	**0.048** ***	**2.69**	**-0.014** **	**-1.94**	**0.034** ***	**3.21**
CLO Private Information -Bad News$_m$	0.002	0.64	-0.024	-0.99	0.017	0.91	-0.065 *	-1.89
Default Bucket$_m$	0.659 ***	13.83	-0.836 **	-2.21	0.452 ***	2.70	0.480	1.09
CCC Bucket$_m$	0.045 ***	2.26	-0.701 ***	-3.72	0.051	0.56	-0.082	-0.39
JnrOC$_m$	-0.106 ***	-4.71	-0.074	-0.20	0.045	0.31	-0.024 *	-1.73
SnrOC$_m$	-0.037 ***	-4.33	0.856 ***	5.77	-0.085 ***	-2.77	0.149 ***	2.76
WARF$_m$	0.014 ***	3.06	0.017	0.29	0.486 ***	7.72	0.090	1.37
MAV$_m$							0.819 ***	39.20
Constant	-0.081 **	-2.17	0.287	0.63	3.923 ***	8.39	-0.243	-0.45
Month FE	YES		YES		YES		YES	
	N= 6,160		N= 6,160		N= 7,345		N= 7,467	
	R^2= 0.63		R^2= 0.41		R^2= 0.49		R^2= 0.64	

Table 6 reports the results for the relation between timeliness of CLO trading and CLO performance at one year ahead. All variables are defined in the Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroskedasticity and are clustered at the CLO level. ***Significant at 1%, ** 5% and * 10% level, two-tailed tests.

Table 7

Collateral Management Fees and CLO Future Performance

	Default Bucket$_{m+12}$		**Snr. OC Cushion$_{m+12}$**		**WARF$_{m+12}$**		**MAV$_{m+12}$**	
Variable	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**
Total Information$_m$	**-0.017** **	**-2.08**	**0.040** ***	**4.14**	**-0.015** **	**-2.14**	**0.035**	**1.03**
Total Fees	**-0.036** **	**-2.28**	**0.235** ***	**3.12**	**0.013**	**0.31**	**0.355** ***	**2.86**
Total Fees*Total Information$_m$	**-0.048** **	**-2.07**	**0.400** **	**2.22**	**-0.180** **	**-2.03**	**0.160** **	**2.25**
CLO Private Information -Bad News$_m$	0.007	0.84	-0.037	-1.45	0.027	1.05	-0.093 *	-1.92
Default Bucket$_m$	0.813 ***	16.93	-0.479 *	-1.80	0.220	0.94	-2.125 ***	-2.85
CCC Bucket$_m$	-0.009	-0.17	-0.341 **	-2.21	-0.026	-0.27	0.333	1.43
JnrOC$_m$	0.086	0.95	0.093	1.11	-0.077	-0.32	1.982 ***	3.62
SnrOC$_m$	-0.044 *	-1.72	0.795 ***	13.54	-0.185 ***	-2.91	0.762 ***	3.51
WARF$_m$	0.027 **	2.33	0.061	1.25	0.465 ***	5.03	0.082	0.88
MAV$_m$							0.799 ***	22.68
Constant	-0.119	-1.07	0.524	1.29	3.911 ***	5.71	0.138 ***	0.21
Month FE	YES		YES		YES		YES	
	N= 5,350		N= 5,350		N= 5,350		N= 5,350	
	R^2= 0.63		R^2= 0.56		R^2= 0.50		R^2= 0.67	

Table 7 presents the results of how the level of collateral management fees influences the relation between CLO private information and CLO future performance at one year ahead. All variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroskedasticity and are clustered at the CLO level. ***Significant at 1%, ** 5% and * 10% level, two-tailed tests.

Table 8

Assets under Management and CLO Future Performance

	Default Bucket$_{m+12}$			**Snr. OC Cushion$_{m+12}$**			**WARF$_{m+12}$**			**MAV$_{m+12}$**		
Variable	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**	**Coeff.**		**t-stat.**
Total Information$_m$	**-0.003**	*	**-1.82**	**0.086**	***	**4.15**	**-0.027**	***	**-2.64**	**0.037**	**	**1.97**
Assets under Management	**0.001**	**	**2.00**	**-0.006**		**-0.99**	**0.012**	***	**4.55**	**-0.011**	**	**-2.03**
Assets under Management*Total Information$_m$	**-0.002**		**-0.96**	**0.006**		**0.45**	**-0.002**		**-0.40**	**0.000**		**-0.02**
CLO Private Information -Bad News$_m$	-0.001		-0.47	-0.077	***	-2.52	0.017		1.35	0.034		0.65
Default Bucket$_m$	0.679	***	14.65	-0.986	***	-2.43	0.475	***	2.87	0.468		1.02
CCC Bucket$_m$	0.043	**	2.08	-0.657	***	-3.12	0.084		0.89	0.129		0.58
JnrOC$_m$	-0.095	***	-3.83	-0.208		-0.51	0.096		0.67	-0.008		-1.52
SnrOC$_m$	-0.046	***	-5.30	0.921	***	5.58	-0.101	***	-3.20	0.155	***	2.78
WARF$_m$	0.022	***	3.87	0.050		0.81	0.475	***	7.00	0.075		1.05
MAV$_m$										0.816	***	36.51
Constant	-0.153	***	-3.89	0.418		0.84	3.933	***	7.81	0.104		0.18
Month FE	YES			YES			YES			YES		
	N= 7,345			N= 7,345			N= 7,345			N= 7,345		
	R^2= 0.63			R^2= 0.42			R^2= 0.50			R^2= 0.67		

Table 8 presents the results of whether the size of collateral asset under CLO's management affects the relation between CLO private information and CLO future performance. All variables are defined in Appendix B. The values of the continuous variables are winsorized at 1% and 99%. Standard errors are corrected for heteroskedasticity and are clustered at the CLO level. ***Significant at 1%, ** 5% and * 10% level, two-tailed tests.