

# CLO Performance – Internet Appendix\*

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This appendix provides supplementary analysis for “CLO Performance.” First, we provide details on the sample construction. Second, we present time-series figures on tranche distributions and credit ratings. Third, we report some additional analysis of CLO equity, collateral, and debt performance. The latter section also describes the computation of synthetic floating-rate corporate bond returns. Finally, we present an analysis of CLO managers and the cross-sectional determinants of relative performance.

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\*The views expressed in this appendix are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

## A1 Detailed Information on the Sample

Table A1: Sample Selection

This table presents the steps involved in the sample selection described in Section 1.1 of the paper. Panel A is based on the full sample of CLOs issued from 1997 to 2019. To highlight differences in the nature of excluded observations over the sample period, we split the sample into CLO 1.0 (1997 to 2009) and 2.0 (2010 to 2019) in Panels B and C. Basic data requirements include the manager’s identity and a history of tranche-level distributions. Term loan collateral excludes deals that invest in lines of credit. Standard liability structure restricts to deals with at least one equity tranche and leverage of at least 50%. U.S. dollar denominated excludes deals with non-U.S. dollar tranches. Non-zero equity payout excludes deals with no equity distributions. No missing principal payments excludes deals that lack the principal payments that correspond to the deal’s final debt balance. No long gaps in history excludes deals with more than 18 months from closing to the first payment and deals with gaps of more than 12 months between payments. Non-missing liquidation payment excludes deals that appear to be missing the final liquidation payment to equityholders. We measure the final liquidation value as the difference between the total collateral value and the face value of CLO debt in the last period with non-zero debt outstanding. We drop deals with total equity cash flows less than the final liquidation value and deals that are called before the reinvestment date without repaying the initial equity investment.

Panel A: Full Sample

Selection Criteria	Deals Excluded	Deals in Sample
All deals in Intex		2,265
Basic data requirements	2	2,263
Term loan collateral	8	2,255
Standard liability structure	29	2,226
U.S. dollar denominated	10	2,216
Non-zero equity payout	11	2,205
No missing principal payments	70	2,135
No long gaps in history	2	2,133
Non-missing liquidation payment	2	2,131

Panel B: CLO 1.0 (before 2010)

Selection Criteria	Deals Excluded	Deals in Sample
All deals in Intex		615
Basic data requirements	2	613
Term loan collateral	0	613
Standard liability structure	16	597
U.S. dollar denominated	10	587
Non-zero equity payout	10	577
No missing principal payments	66	511
No long gaps in history	2	509
Non-missing liquidation payment	2	507

Panel C: CLO 2.0 (2010 onward)

Selection Criteria	Deals Excluded	Deals in Sample
All deals in Intex		1,650
Basic data requirements	0	1,650
Term loan collateral	8	1,642
Standard liability structure	13	1,629
U.S. dollar denominated	0	1,629
Non-zero equity payout	1	1,628
No missing principal payments	4	1,624
No long gaps in history	0	1,624
Non-missing liquidation payment	0	1,624

## Adjustments to the Intex Data

- We exclude 41 securitization deals that have CLO tranches for collateral.
- We exclude 391 revolving tranches, representing 1.6% of tranches in the sample, because the revolving drawdown/payback option leads to a different cash flow profile than standard CLO bonds.
- We combine 64 reset (or reissued) deals with their original transactions.
- We correct some individual errors in the historical tranche cash flows provided by Intex. These corrections affect 0.02% of the 474,662 tranche-month observations with non-zero cash flows in the raw data.
  - We fill in missing principal payments for 51 debt tranches that had zero principal repayment in the raw Intex data but ended their history with zero par balance and were supported by sufficient collateral value to pay down the debt.
  - We fill in 36 liquidation payments to equity tranches using the implied balance based on collateral writedowns tabulated by Intex; 26 of these tranches meet our data quality criteria, which means these imputed payments affect 3.2% of deals that are fully paid down and qualify for the sample.
  - We correct 7 erroneous interest payments and 3 missing principal balances.
- We manually fill out the panel of cash flows for Monument Park CDO, KKR Financial CLO 2005-1, and GE Commercial Loan Trust 2006-3, which had missing payments in the raw Intex history. The latter two deals defaulted on their debt.
- We identify 26 deals that paid down their debt but continue to hold assets and make equity payouts as of March 2021 and exclude them from the sample of completed deals.
- Please visit <https://sites.google.com/site/mwschwert/data-and-code> for supporting data on these patches for the historical tranche cash flow data.

Table A2: Detailed Statistics on CLO Size

This table summarizes initial deal balance of CLOs from Intex in millions of dollars.

Vintage	Mean	Min	p10	p25	p50	p75	p90	Max	Obs.
1997-2002	493.9	66.7	250	300.0	436.5	523.3	875.0	1,500	30
2003	424.6	250.0	285.9	300.2	350.1	455.0	610.8	1,196	31
2004	469.2	39.0	300.0	336.7	400.0	500.8	600.0	2,000	65
2005	490.6	162.0	300.7	350.0	411.3	549.4	846.0	1,278	99
2006	514.3	104.5	301.8	372.5	450.0	523.5	732.9	2,811	175
2007	566.3	61.0	350.0	400.8	500.0	600.0	838.0	3,530	169
2008	745.8	100.0	230.7	370.9	450.0	626.3	1,004	10,500	41
2009	944.6	238.7	238.7	255.9	869.8	1,521	1,987	1,987	5
2010	372.5	80.0	218.9	300.0	375.0	461.7	538.2	597.6	12
2011	487.6	225.0	300.9	353.8	409.1	507.0	678.2	1,792	30
2012	465.3	173.9	313.2	362.2	416.8	518.3	628.1	1,174	114
2013	497.7	174.2	365.1	414.4	476.1	548.6	664.5	944.4	171
2014	537.3	156.7	392.4	415.5	516.0	618.6	721.7	1,542	239
2015	536.8	170.0	407.9	415.4	512.6	610.0	746.7	1,123	192
2016	481.1	200.2	357.7	407.9	459.9	520.3	655.7	822.3	171
2017	579.0	26.2	406.0	455.7	512.0	612.3	814.3	2,292	197
2018	525.9	18.2	406.4	410.0	508.9	605.5	714.7	1,075	272
2019	483.5	263.3	360.5	404.2	477.8	508.4	608.0	1,003	252
CLO 1.0	533.4	39.0	300.0	359.4	450.0	542.1	812.9	10,500	615
CLO 2.0	515.1	18.2	368.7	410.0	505.1	578.5	708.9	2,292	1,650
Full Sample	520.1	18.2	348.4	407.3	500.0	568.3	718.9	10,500	2,265

Table A3: Detailed Statistics on CLO Leverage

This table summarizes the ratio of initial debt to deal balance for CLOs in Intex.

Vintage	Mean	Min	p10	p25	p50	p75	p90	Max	Obs.
1997-2002	0.916	0.806	0.892	0.911	0.922	0.930	0.939	0.950	30
2003	0.902	0.749	0.856	0.900	0.916	0.922	0.925	0.972	30
2004	0.902	0.550	0.860	0.903	0.916	0.926	0.940	0.990	65
2005	0.910	0.750	0.881	0.905	0.920	0.925	0.930	0.986	97
2006	0.910	0.732	0.882	0.909	0.920	0.923	0.928	0.994	171
2007	0.910	0.385	0.899	0.915	0.922	0.925	0.930	1.000	169
2008	0.852	0.656	0.750	0.764	0.867	0.925	0.958	0.992	41
2009	0.734	0.628	0.628	0.657	0.784	0.795	0.801	0.801	5
2010	0.766	0.556	0.597	0.727	0.786	0.836	0.866	0.867	12
2011	0.846	0.450	0.636	0.869	0.895	0.905	0.918	0.929	30
2012	0.881	0.562	0.860	0.885	0.895	0.902	0.909	0.933	114
2013	0.882	0.640	0.847	0.880	0.894	0.906	0.914	0.931	171
2014	0.893	0.603	0.870	0.892	0.903	0.911	0.916	0.928	239
2015	0.897	0.696	0.861	0.895	0.908	0.916	0.921	0.950	192
2016	0.887	0.648	0.813	0.893	0.903	0.911	0.921	0.958	171
2017	0.894	0.686	0.863	0.898	0.903	0.910	0.921	0.960	197
2018	0.890	0.536	0.845	0.896	0.902	0.912	0.923	0.933	272
2019	0.888	0.651	0.809	0.899	0.907	0.913	0.920	0.945	252
CLO 1.0	0.903	0.385	0.859	0.905	0.920	0.924	0.932	1.000	608
CLO 2.0	0.888	0.450	0.845	0.892	0.902	0.911	0.919	0.960	1,650
Full Sample	0.892	0.385	0.847	0.894	0.905	0.917	0.925	1.000	2,258

Table A4: CLO Debt Tranche Spreads

This table summarizes the spreads on floating-rate CLO tranches by rating category. Spread refers to the annual coupon rate in excess of three-month LIBOR, reported in percentage terms. For deals that have multiple tranches with the same credit rating, we compute the value-weighted spread by principal value. The row labeled All Debt Tranches reports the value-weighted average spread of all debt tranches issued in a deal. The three sections report statistics for the CLO 1.0 and 2.0 sub-periods as well as the full sample. CLO 1.0 refers to issuance from 1997 to 2009, while CLO 2.0 refers to issuance from 2010 onward.

Vintage	Mean	StDev	p10	p25	p50	p75	p90	Obs.
<i>CLO 1.0 (1997-2009)</i>								
AAA-Rated	0.38	0.33	0.24	0.25	0.26	0.37	0.62	500
AA-Rated	0.67	0.68	0.38	0.40	0.45	0.58	1.02	430
A-Rated	1.16	0.99	0.68	0.71	0.80	1.20	1.93	485
BBB-Rated	2.24	1.16	1.45	1.60	1.90	2.40	3.25	484
BB-Rated	4.87	1.49	3.50	3.75	4.50	5.50	7.02	368
B-Rated	8.20	0.67	7.50	7.50	8.50	8.63	9.00	5
All Debt Tranches	0.65	0.42	0.41	0.45	0.52	0.69	1.05	506
<i>CLO 2.0 (2010-2019)</i>								
AAA-Rated	1.38	0.24	1.10	1.23	1.40	1.50	1.65	1,567
AA-Rated	2.02	0.38	1.60	1.75	2.00	2.25	2.50	1,537
A-Rated	2.77	0.54	2.00	2.40	2.80	3.10	3.40	1,523
BBB-Rated	3.76	0.64	2.95	3.40	3.71	4.07	4.50	1,513
BB-Rated	5.96	0.96	4.75	5.25	5.90	6.70	7.22	1,458
B-Rated	6.51	1.09	5.35	5.60	6.30	7.30	8.10	445
All Debt Tranches	1.98	0.39	1.57	1.77	1.97	2.12	2.33	1,588
<i>Full Sample (1997-2019)</i>								
AAA-Rated	1.14	0.51	0.26	0.95	1.30	1.48	1.59	2,067
AA-Rated	1.73	0.72	0.45	1.50	1.85	2.15	2.45	1,967
A-Rated	2.38	0.97	0.75	1.80	2.65	3.00	3.30	2,008
BBB-Rated	3.39	1.03	1.80	2.85	3.55	3.96	4.50	1,997
BB-Rated	5.74	1.17	4.25	4.95	5.70	6.56	7.20	1,826
B-Rated	6.53	1.10	5.35	5.60	6.35	7.35	8.13	450
All Debt Tranches	1.66	0.69	0.49	1.37	1.86	2.07	2.27	2,094

Table A5: Summary Statistics on Benchmark Returns

This table presents summary statistics on the benchmark returns used in the public market equivalent analysis. All returns are in percentage terms. Each series has 275 monthly observations running from January 1998 to March 2021, except for the Pastor and Stambaugh (2003) illiquidity series, which ends in December 2019. The debt tranche benchmarks are synthetic floating-rate corporate bond returns, with the AAA category including both AAA and AA-rated bonds, as described above. We thank Ken French (Fama and French (1993)), Asaf Manela (He, Kelly, and Manela (2017)), and Rob Stambaugh (Pastor and Stambaugh (2003)) for providing factor returns on their websites. Bloomberg-Barclays U.S. Corporate High Yield Bond Index returns are downloaded from Bloomberg. Put-Write Index returns are provided by the Cboe and downloaded from Bloomberg.

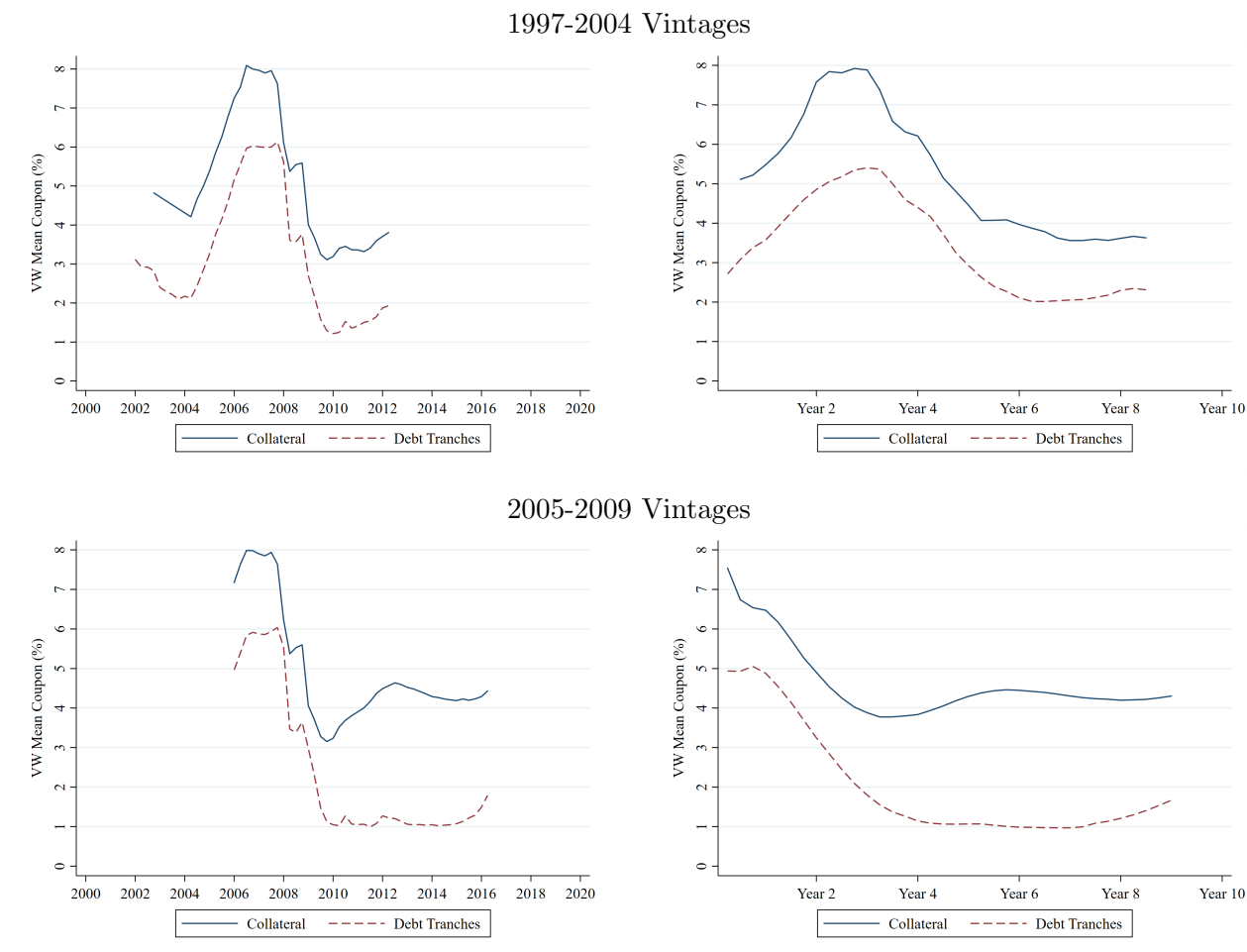
	Mean	Min	p10	p25	p50	p75	p90	Max
<i>Collateral Benchmarks</i>								
LSTA Index	0.40	-13.22	-0.68	0.10	0.48	0.85	1.49	8.70
Loan Mutual Funds	0.32	-13.77	-0.60	0.08	0.41	0.68	1.48	7.18
<i>Debt Tranche Benchmarks</i>								
AAA Corporates	0.27	-10.20	-1.03	-0.29	0.30	0.98	1.62	7.46
AA Corporates	0.27	-10.13	-0.95	-0.32	0.27	1.00	1.68	7.49
A Corporates	0.31	-11.54	-1.06	-0.25	0.39	0.98	1.67	9.60
BBB Corporates	0.36	-19.77	-1.94	-0.33	0.47	1.31	2.27	10.88
BB Corporates	0.45	-21.26	-2.49	-0.80	0.65	2.03	3.45	17.26
B Corporates	0.29	-25.20	-3.85	-1.17	0.49	2.03	4.41	17.58
CCC Corporates	0.26	-31.63	-6.38	-1.96	0.59	3.07	6.23	35.74
CC Corporates	0.33	-79.63	-13.22	-6.14	0.76	7.18	16.10	61.95
<i>Equity Tranche Benchmarks</i>								
S&P 500 Index	0.72	-16.80	-5.43	-1.67	1.28	3.61	5.89	12.82
S&P 500 Banks	0.55	-36.59	-7.37	-3.20	1.03	4.21	8.27	28.69
<i>GPME Factor Returns</i>								
Fama-French RF	0.15	0	0	0.01	0.10	0.27	0.41	0.56
Fama-French MKT-RF	0.62	-17.23	-5.77	-2.02	1.19	3.44	6.08	13.65
Bloomberg-Barclays High Yield	0.57	-15.91	-2.09	-0.58	0.70	1.75	2.88	12.10
Put-Write Index	0.61	-17.65	-2.98	-0.19	1.07	2.01	3.67	8.98
He-Kelly-Manela	0.67	-28.06	-6.99	-3.11	1.14	4.87	8.09	30.55
Pastor-Stambaugh	0.56	-14.71	-3.73	-1.38	0.53	2.72	4.92	13.15



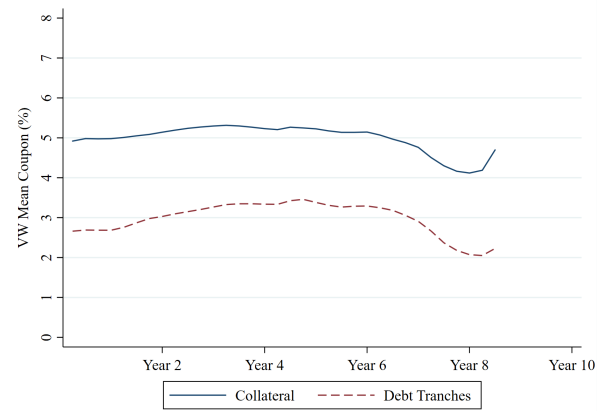
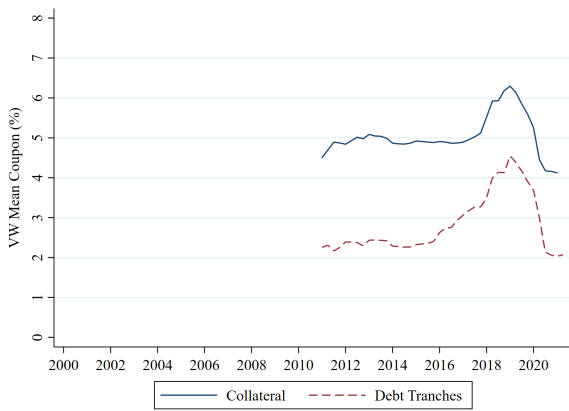
## A2 Time-Series Plots of Payouts and Credit Ratings

Figure A1: History of CLO Collateral and Tranche Interest Rates

This figure presents the history of equity tranche distributions by vintage. For ease of exposition, we sort vintages into four groups: 1997-2004, 2005-2009, 2010-2016, and 2017-2019. Each plot reports the value-weighted mean coupon rates on loans in the collateral pool and debt tranches. The lefthand plot in each row is in calendar time and the righthand plot is in event time relative to the issuance quarter. The sample is restricted to vintage-quarter observations with at least five deals and at least 25% of the initial debt outstanding. Distributions and tranche information are from Intex. Collateral coupon rates are computed using LIBOR rates from Bloomberg and loan spreads and LIBOR floors from IHS Markit for loans we can match to Intex. We fill in unmatched observations, primarily occurring before 2005, using loan spreads from Intex under the assumption of no LIBOR floor.



## 2010-2016 Vintages



## 2017-2019 Vintages

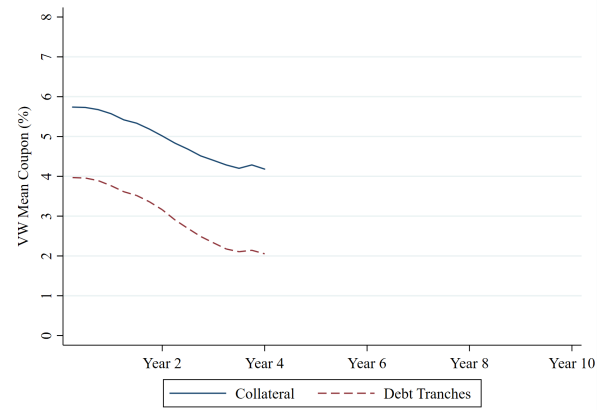
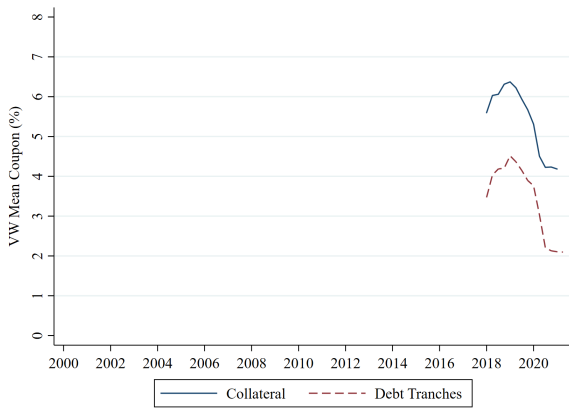
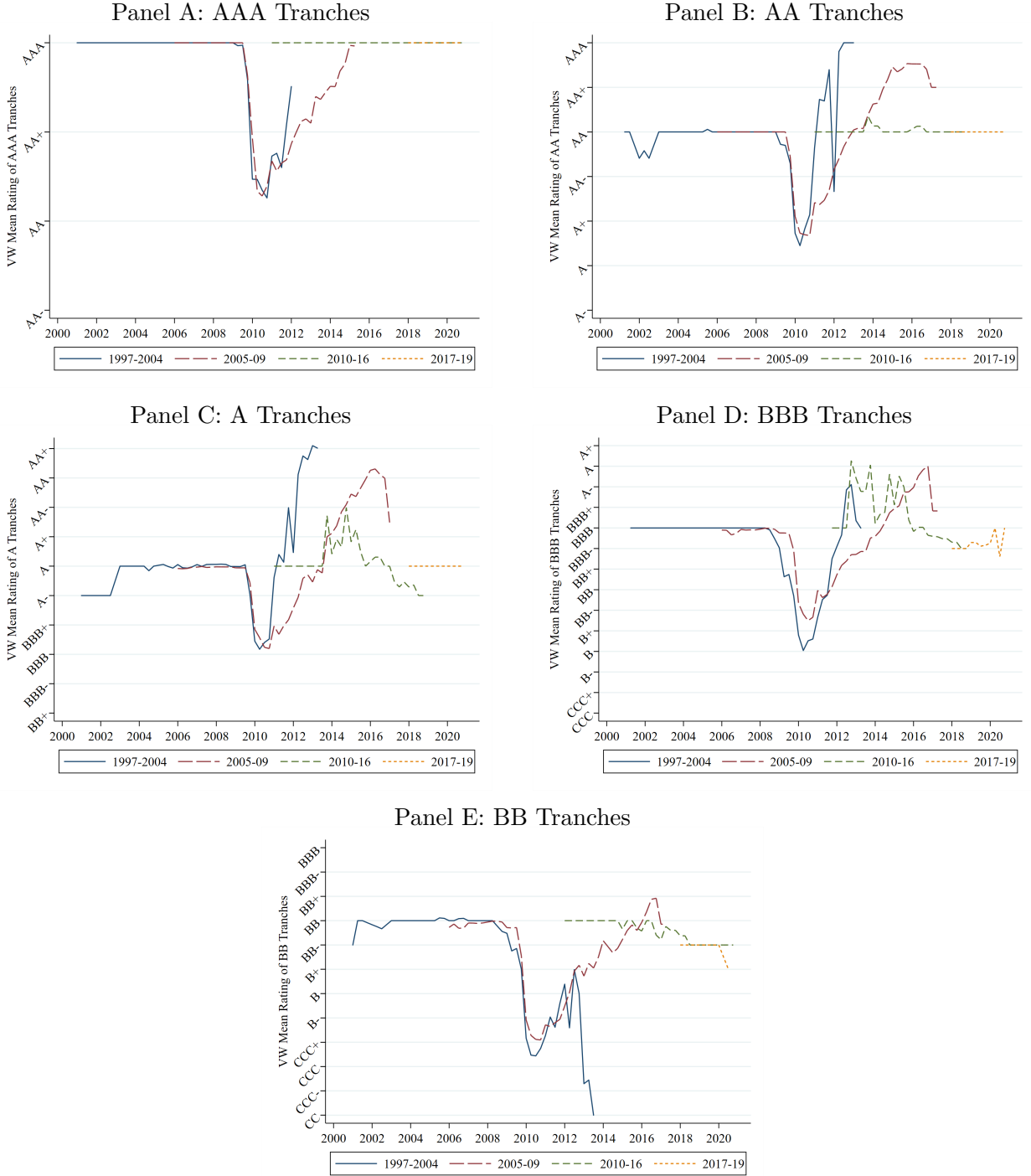


Figure A3: History of Tranche Credit Ratings by Vintage Group

This figure presents the history of tranche credit ratings by vintage. For ease of exposition, we sort vintages into four groups: 1997-2004, 2005-2009, 2010-2016, and 2017-2019. Each panel reports the value-weighted average rating for a different initial rating category. The sample is restricted to vintage-quarter observations with at least 25% of the initial debt outstanding. We omit the B category due to its low observation count. Historical credit ratings are from Bloomberg.



## A3 Supplementary Evidence on Equity Performance

Table A6: Comparison of Broadly Syndicated Loan and Middle-Market Transactions

This table compares the performance of broadly syndicated loan (BSL, also known as open-market) and middle-market (MM) CLOs. Panel A reports the mean internal rate of return (IRR) and public market equivalent (PME) over the full sample period (1997 to 2019). Cash flows for equity tranche and collateral cash flows are net of fees. Debt tranche cash flows are computed as the sum of individual debt tranche cash flows. PME's are computed relative to the S&P 500 for equity tranches; a portfolio of loan mutual funds for collateral; and a portfolio of investment-grade corporate bonds swapped from floating to fixed for debt tranches. Diff. (with FE) is the coefficient in a regression of the performance metric on an indicator for BSL CLOs, controlling for the deal's initial leverage ratio and vintage quarter fixed effects. The associated  $t$ -statistic based on standard errors clustered by vintage quarter and manager is reported in brackets. Panel B reports generalized public market equivalent (GPME) estimates following Korteweg and Nagel (2016). The GPME is the expected sum of cash flows discounted using an exponential CAPM SDF with parameters chosen to price the factor payoffs exactly. Cash flows are normalized to an initial investment of \$1 so the reported GPME is interpreted as the NPV of a \$1 investment in CLO equity, collateral, or debt tranches. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Panel A: Deal-Level Performance Metrics

	BSL CLOs		MM CLOs		Diff. (with Time FE, Leverage Control)	$t$ -stat
	Mean	Obs.	Mean	Obs.		
<i>Equity Performance</i>						
IRR (%)	9.94	758	8.94	50	-8.58**	[-2.57]
PME	1.34	758	1.21	50	-0.21**	[-2.03]
<i>Collateral Performance</i>						
IRR (%)	3.50	758	3.97	50	-1.79***	[-3.33]
PME	1.02	757	1.04	50	-0.06**	[-2.55]
<i>Debt Performance</i>						
IRR (%)	3.08	758	3.44	50	-0.52**	[-2.18]
PME	1.01	758	1.03	50	-0.02**	[-2.44]

Panel B: GPME Estimates Based on CAPM SDF

	BSL CLOs ( $N = 758$ )	MM CLOs ( $N = 50$ )
<i>After-Fee GPME Estimates</i>		
Equity	0.664*** [0.000]	0.720** [0.012]
Collateral	-0.037 [0.683]	0.056 [0.577]
Debt Tranches	-0.093 [0.429]	-0.041 [0.712]
Implied Equity	0.468	0.933
<i>Before-Fee GPME Estimates</i>		
Equity	1.114*** [0.000]	1.019*** [0.000]
Collateral	0.001 [0.988]	0.096 [0.332]
Debt Tranches	-0.093 [0.429]	-0.041 [0.712]
Implied Equity	0.852	1.329

Table A7: GPME Analysis of CLO Performance with Liquidity Factor

This table presents estimates of the generalized public market equivalent (GPME) from Korteweg and Nagel (2016) for CLO equity, collateral, and debt tranches. The GPME is the expected sum of cash flows discounted using the SDF

$$M_{t+h}^h = \exp \left( ah - b_1 r_{m,t+h}^h - b_2 r_{l,t+h}^h - b_3 r_{x,t+h}^h \right),$$

where the parameters  $a$  and  $b$  are chosen to price the factor payoffs exactly. Cash flows are normalized to an initial investment of \$1. In each column,  $r_m$  is the excess return of the CRSP value-weighted index and  $r_l$  is the Pastor and Stambaugh (2003) liquidity factor. The sample ends in December 2020 due to the availability of the Pastor and Stambaugh (2003) factor returns and consists of 799 completed deals. The remaining columns substitute the total return on the following benchmarks for  $r_x$ : the S&P/LSTA U.S. Leveraged Loan 100 Index, the Bloomberg-Barclays U.S. Corporate High Yield Bond Index, the CBOE S&P 500 Put-Write Index, and the value-weighted portfolio of primary dealer equities from He, Kelly, and Manela (2017). Implied Equity is the weighted average of collateral and debt GPMEs. Standard errors of the SDF parameter estimates are in parentheses. We report  $p$ -values of the  $J$ -test that the GPME equals zero in brackets. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

	CAPM	CAPM+LL	CAPM+HY	CAPM+PUT	HKM
<i>After-Fee GPME Estimates</i>					
Equity	0.617*** [0.001]	0.566*** [0.000]	0.397*** [0.000]	0.485*** [0.000]	0.455*** [0.000]
Collateral	-0.054 [0.530]	0.015 [0.785]	0.016 [0.863]	-0.048 [0.280]	-0.055 [0.291]
Debt Tranches	-0.109 [0.383]	-0.030 [0.707]	-0.012 [0.932]	-0.094 [0.116]	-0.096 [0.225]
Implied Equity	0.445	0.418	0.269	0.364	0.311
<i>Before-Fee GPME Estimates</i>					
Equity	1.046*** [0.000]	0.956*** [0.000]	0.718*** [0.000]	0.859*** [0.000]	0.856*** [0.000]
Collateral	-0.016 [0.849]	0.050 [0.380]	0.045 [0.628]	-0.015 [0.750]	-0.020 [0.699]
Debt Tranches	-0.109 [0.383]	-0.030 [0.707]	-0.012 [0.932]	-0.094 [0.116]	-0.096 [0.225]
Implied Equity	0.819	0.763	0.558	0.694	0.659

Table A8: Cross-Sectional Analysis of Pre-Crisis CLO Performance

This table reports regressions of CLO performance metrics on characteristics of the liability structure prior to the financial crisis. The sample is restricted to deals that were issued by December 2007 and paid down 99% of their senior debt by March 2021. Each column includes a different performance metric as the dependent variable. 1(Failed Test) is an indicator for deals that failed a coverage test at some point, requiring them to divert cash flows to pay down senior tranche principal. Years to Reinvestment is the time from December 31, 2007, to the end of the reinvestment period. Book OC Ratio is the par value of collateral divided by the face value of debt, in percentage terms, in the fourth quarter of 2007. Initial Leverage is the face value of debt divided by the deal balance at the time of issuance, in percentage terms. Debt Tranche Spread is the principal-weighted spread of debt tranches over LIBOR, in percentage terms.  $t$ -statistics based on standard errors clustered by manager and quarterly vintage are in parentheses. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Dependent Variable	IRR (%)	PME Market	PME Bank	1(Failed Test)
Years to Reinvestment	0.442 (1.68)	0.047** (2.51)	0.164*** (3.85)	-0.023* (-1.77)
Book OC Ratio (%)	0.065*** (2.90)	0.005*** (3.05)	0.014*** (3.36)	-0.007*** (-3.53)
Initial Leverage (%)	0.972*** (3.40)	0.072*** (4.53)	0.163*** (5.19)	-0.000 (-0.00)
Debt Tranche Spread (%)	-11.694*** (-6.17)	-0.655*** (-5.44)	-1.926*** (-6.27)	0.270*** (3.92)
Constant	-75.796*** (-2.84)	-5.211*** (-3.71)	-12.232*** (-4.42)	1.242 (0.91)
Adj. R <sup>2</sup>	0.267	0.258	0.374	0.088
Observations	410	410	410	410

## A4 Supplementary Evidence on Collateral Performance

Table A9: Excess Returns after CLO Collateral Purchases and Sales

This table presents an analysis of abnormal loan returns after CLO loan purchases and sales. We use data on collateral transactions after closing from Intex and loan-level quote data from IHS Markit. The cumulative abnormal return after a trade is computed as the difference between the realized loan return based on the transaction price and the future bid price, including accrued interest and coupon payments, and the predicted return from a market model over a specified window (one week, one month, or three months). The market model is estimated using a regression of daily returns over the trailing year, requiring at least three months of returns, relative to the value-weighted return of the leveraged loan market (the benchmark). The predicted return is then equal to the sum of the market model intercept and the product of the market model beta and the realized benchmark return over the specified window. Panel A reports the mean abnormal returns after purchases and sales and the associated  $t$ -statistics for the different post-trade windows. Panel B estimates a regression of abnormal returns on an indicator for purchases, controlling for deal-month fixed effects. This panel also includes an interaction between the purchase indicator and an indicator for middle-market (MM) CLOs.  $t$ -statistics based on standard errors clustered by manager and year-month are in parentheses. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Panel A: Abnormal Returns after Collateral Transactions

	(1)	(2)	(3)	(4)	(5)	(6)
Mean Abnormal Return (%)	0.145*	0.319	0.173	-0.109	0.031	0.225
$t$ -statistic	(1.83)	(1.48)	(0.66)	(-1.10)	(0.27)	(1.11)
Trade Direction	Purchase	Purchase	Purchase	Sale	Sale	Sale
Post-Trade Window	1 Week	1 Mo.	3 Mo.	1 Week	1 Mo.	3 Mo.
Observations	989,838	989,838	989,838	1,048,807	1,048,807	1,048,807

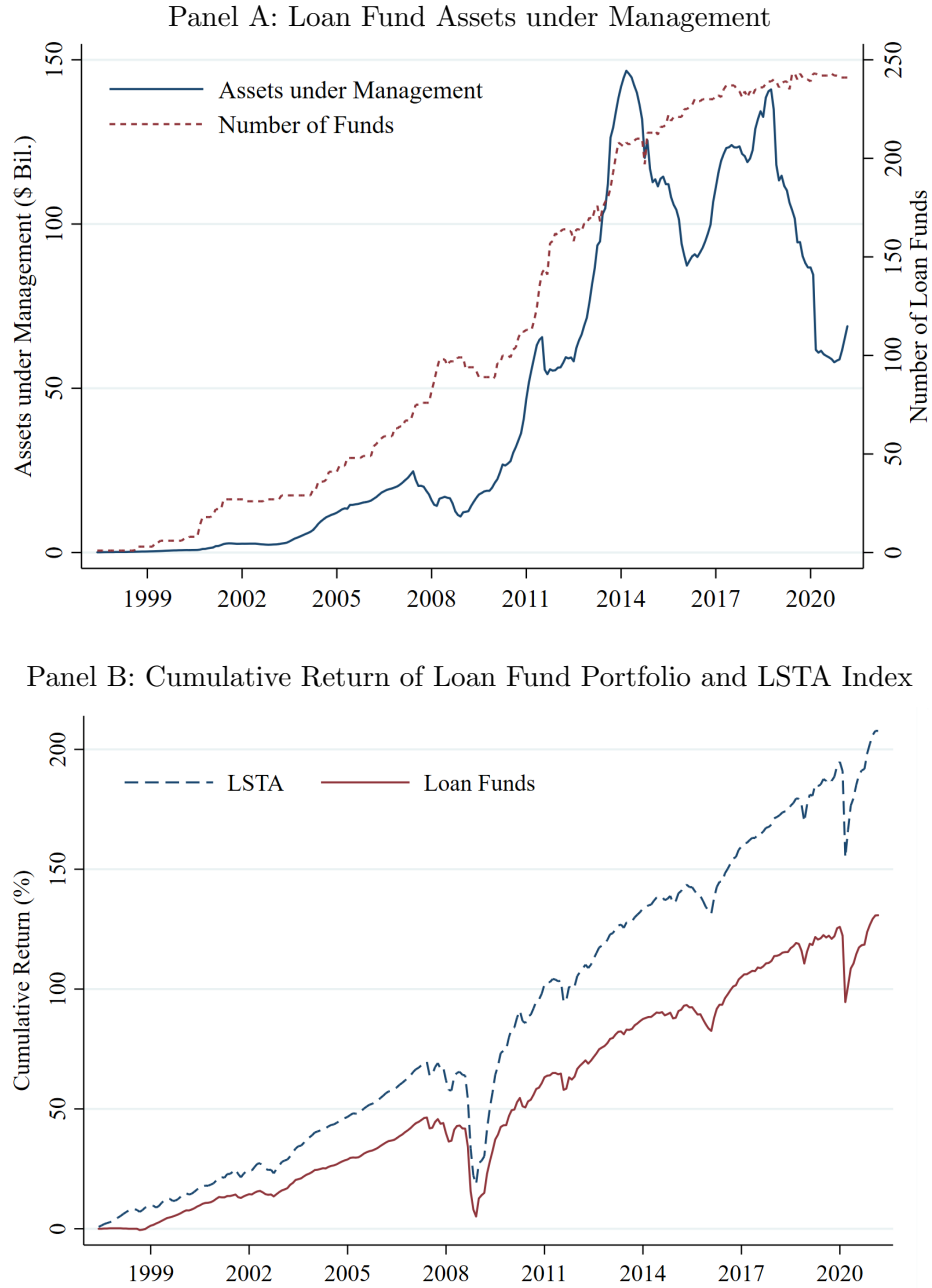
Panel B: Comparison of Purchases and Sales in the Same Deal-Month

Mean Abnormal Return (%)	(1)	(2)	(3)	(4)	(5)	(6)
1(Purchase)	0.242** (2.25)	0.358* (1.84)	0.098 (0.58)	0.246** (2.20)	0.360* (1.84)	0.104 (0.61)
1(Purchase) $\times$ 1(MM)				-0.823 (-1.26)	-0.221 (-1.55)	-1.078 (-1.56)
Post-Trade Window	1 Week	1 Mo.	3 Mo.	1 Week	1 Mo.	3 Mo.
Deal-Month FE	X	X	X	X	X	X
R <sup>2</sup>	0.349	0.207	0.228	0.349	0.207	0.228
Observations	2,033,502	2,033,502	2,033,502	2,033,502	2,033,502	2,033,502



Figure A4: Loan Mutual Fund Assets under Management and Returns

This figure summarizes the sample of loan mutual funds used as a benchmark for CLO assets. The sample consists of U.S. mutual funds in the Bank Loan category on Morningstar Direct that have nonmissing monthly return data in CRSP. Panel A plots the assets under management and number of funds in the sample. Panel B plots the cumulative returns of the value-weighted portfolio of loan funds and the S&P LSTA Leveraged Loan 100 Index.



## A5 Supplementary Evidence on Debt Performance

Table A10: Performance of AAA-Rated CLO Tranches Relative to Other ABS

This table reports statistics on the performance of AAA-rated CLO tranches relative to AAA-rated tranches from other classes of asset-backed securities (ABS). The sample contains completed deals that paid down 99% of their senior debt by March 2021. CLO 1.0 refers to issuance from 2005 to 2009, while CLO 2.0 refers to issuance from 2010 onward. We report the public market equivalent (PME) versus the Bloomberg U.S. ABS Floating-Rate AAA-Rated Total Return Index along with the Auto, Credit Card, and Student Loan components of the index. The index returns are available beginning in May 2005, so we exclude CLOs issued before 2005 from the sample. We report the performance of AAA-rated tranches against each benchmark, with the sample split into CLO 1.0 (before 2010), CLO 2.0 (2010 and later), and the full sample of completed deals (1997 to 2016). For each sub-period, we construct a  $J$ -test of the null hypothesis that the PME equals one using the spatial GMM covariance matrix from Korteweg and Nagel (2016), which accounts for correlated performance across deals by assuming that correlation declines with the degree of overlap in their time windows. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Vintage	Mean	StDev	p10	p25	p50	p75	p90	Obs.
<i>CLO 1.0 (1997-2009)</i>								
All ABS	1.05***	0.05	1.03	1.05	1.05	1.06	1.06	381
Auto	1.12***	0.05	1.11	1.11	1.12	1.12	1.13	381
Credit Card	0.99	0.05	0.98	0.99	0.99	0.99	1.00	381
Student Loan	1.04***	0.05	1.02	1.04	1.04	1.05	1.05	381
<i>CLO 2.0 (2010-2016)</i>								
All ABS	1.04	0.08	1.01	1.02	1.03	1.04	1.05	307
Auto	1.05	0.08	1.03	1.03	1.04	1.05	1.06	307
Credit Card	1.05***	0.09	1.03	1.04	1.05	1.06	1.06	307
Student Loan	1.02	0.08	0.99	1.00	1.01	1.02	1.03	307
<i>Full Sample (1997-2016)</i>								
All ABS	1.04***	0.07	1.02	1.03	1.05	1.05	1.06	688
Auto	1.09***	0.08	1.03	1.05	1.11	1.12	1.12	688
Credit Card	1.02	0.07	0.98	0.99	1.00	1.05	1.06	688
Student Loan	1.03***	0.07	1.00	1.01	1.03	1.04	1.05	688

Figure A5: Comparison of CLO and Other ABS Market Sizes

This figure plots the total amount of CLOs and non-CDO asset-backed securities (ABS) outstanding in the U.S. by year. Aggregate market data are from the Securities Industry and Financial Markets Association (SIFMA).

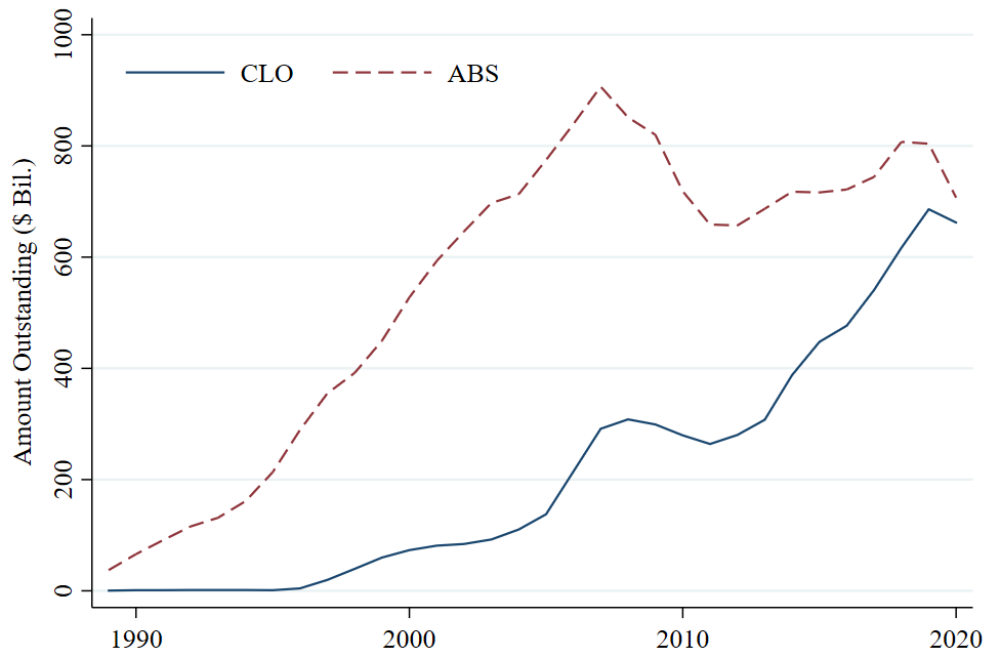


Table A11: Debt Performance – Accounting for Potential Rating Inflation

This table reports statistics on the performance of CLO debt by initial rating category, accounting for potential rating inflation in the determination of benchmark returns. The sample contains completed deals that paid down 99% of their senior debt by March 2021. CLO 1.0 refers to issuance from 1997 to 2009, while CLO 2.0 refers to issuance from 2010 onward. We report the public market equivalent (PME) versus synthetic floating-rate corporate bonds from one rating category below the debt tranche. Floating-rate corporate bond returns are based on swapping the fixed-rate cash flows using the maturity-matched swap rate at issuance. Each panel reports the performance of tranches by initial rating category, with the sample split into CLO 1.0 (before 2010), CLO 2.0 (2010 and later), and the full sample of completed deals (1997 to 2016). For each sub-period, we construct a  $J$ -test of the null hypothesis that the PME equals one using the spatial GMM covariance matrix from Korteweg and Nagel (2016), which accounts for correlated performance across deals by assuming that correlation declines with the degree of overlap in their time windows. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Vintage	Mean	StDev	p10	p25	p50	p75	p90	Obs.
<i>CLO 1.0 (1997-2009)</i>								
AAA-Rated	1.03***	0.05	1.01	1.02	1.03	1.03	1.05	492
AA-Rated	1.00	0.06	0.96	0.97	0.99	1.02	1.04	423
A-Rated	1.01	0.08	0.94	0.96	0.99	1.04	1.08	479
BBB-Rated	1.01	0.13	0.93	0.96	1.00	1.05	1.12	476
BB-Rated	1.44***	0.19	1.31	1.36	1.43	1.51	1.60	369
B-Rated	1.47**	0.77	0.32	1.30	1.52	1.69	2.49	6
<i>CLO 2.0 (2010-2016)</i>								
AAA-Rated	1.02***	0.09	0.98	0.99	1.01	1.03	1.04	307
AA-Rated	1.06***	0.12	0.99	1.02	1.05	1.07	1.10	300
A-Rated	1.06***	0.13	0.98	1.02	1.05	1.07	1.11	298
BBB-Rated	1.00	0.11	0.93	0.96	0.99	1.01	1.04	287
BB-Rated	1.06***	0.13	0.98	1.01	1.05	1.09	1.14	273
B-Rated	1.20***	0.28	1.05	1.09	1.14	1.21	1.33	95
<i>Full Sample (1997-2016)</i>								
AAA-Rated	1.02***	0.07	0.99	1.01	1.02	1.03	1.04	799
AA-Rated	1.02**	0.09	0.96	0.98	1.02	1.05	1.08	723
A-Rated	1.03**	0.10	0.94	0.97	1.02	1.06	1.09	777
BBB-Rated	1.01	0.12	0.93	0.96	0.99	1.03	1.10	763
BB-Rated	1.28***	0.25	1.01	1.06	1.33	1.45	1.54	642
B-Rated	1.21***	0.33	1.05	1.09	1.15	1.22	1.41	101

## Synthetic Floating-Rate Corporate Bond Benchmark

Corporate bonds are a natural benchmark for CLO debt, but there is a duration mismatch between floating-rate CLO debt tranches and corporate bonds, which are fixed-rate instruments with an average duration of about seven years. To illustrate the effect of this mismatch on our analysis, Table A12 reports public market equivalent (PME) estimates for CLO debt tranches using corporate bonds in the same rating category as a benchmark. It appears that debt tranches from the CLO 1.0 period earn significantly lower returns than corporate bonds, while CLO 2.0 debt tranches offer similar returns to their benchmarks.

However, this comparison ignores the fact that interest rates fell dramatically during the financial crisis, which boosted the returns on fixed-rate corporate bonds while CLO tranches were unaffected because their coupon payments fell along with interest rates. When we use synthetic floating-rate corporate bond returns to discount CLO debt payments instead, as Table 6 of the paper shows, this time-series pattern goes away, and we instead observe that CLO debt tranches offer higher returns than corporate bonds in both sub-periods.

To construct the synthetic floating-rate corporate bond benchmark, we swap a bond's fixed coupon payments into floating payments using interest rate swaps. We use daily bond-level quotes from Bank of America Merrill Lynch (BAML) and vanilla interest rate swap data from Bloomberg to construct these benchmarks. We restrict the BAML sample to nonconvertible bonds issued by nonfinancial firms.

This calculation assumes an investor buys the corporate bond at issuance and enters into a payer swap. The fixed leg of the swap is the maturity-matched swap rate from the bond's offering date. For simplicity, we assume the swap makes floating payments of six-month LIBOR on a semi-annual basis instead of making semi-annual fixed payments and quarterly floating payments. Therefore, the semi-annual coupon payments on the swapped bond are equal to the one-half of the bond's fixed annual coupon plus the six-month LIBOR rate minus the swap's fixed rate.

On a given date after issuance, the value of the swapped bond is equal to the bond's all-in

price plus the mark-to-market value of the payer swap per \$100 face value. The market value of a payer swap is equal to the difference between the present values of the floating and fixed legs. On a coupon date, the floating leg is worth par, while between coupon dates, it is worth the present value of par plus the floating payment owed on the next coupon date. The value of the fixed leg is equal to the present value of the future fixed coupon payments discounted at the current fixed rate on a swap with a tenor equal to the bond's remaining maturity.

We calculate daily returns on the synthetic floating-rate bonds using the actual returns of fixed-rate corporate bonds and mark-to-market payer swap returns based on changes in the interest rate swap curve. For bonds that default or exit the sample, the swap is unwound at its mark-to-market value on the exit date. After constructing a series of swapped returns for each individual bond, we compute benchmark indices by computing the value-weighted portfolio return of outstanding bonds in each rating category.

Figure A6 plots the cumulative returns of these synthetic floating-rate benchmark portfolios against the realized returns on fixed-rate corporate bonds to illustrate the effect of adjusting for duration on the discount rates used to calculate PME's for CLO debt tranches.

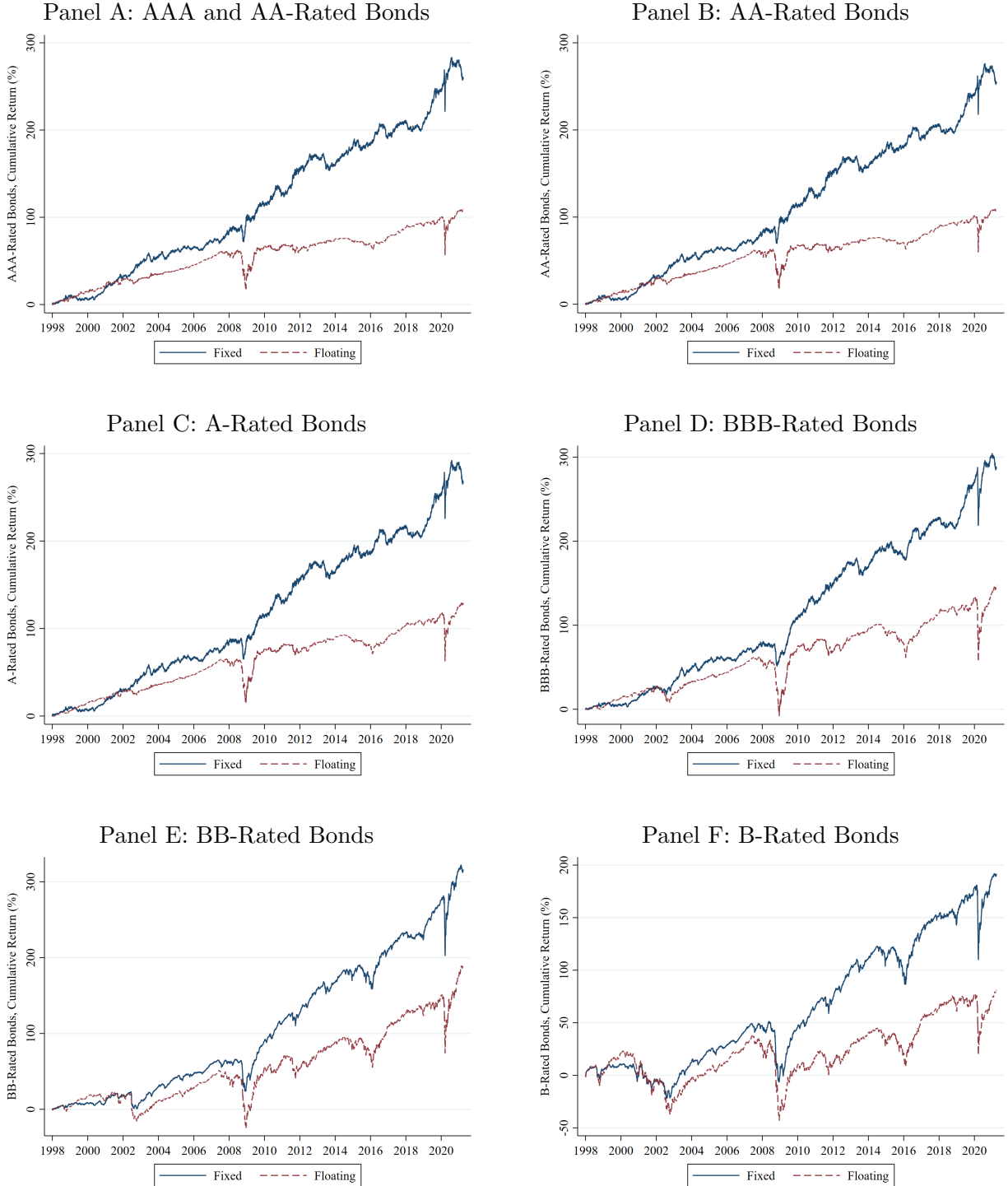
Table A12: Debt Performance of Completed Deals – PME vs. Fixed-Rate Bonds

This table reports statistics on the performance of CLO debt by initial rating category. The sample contains completed deals that paid down 99% of their senior debt by March 2021. We measure performance using the public market equivalent (PME) benchmarked by fixed-rate corporate bonds in the same rating category. Each panel reports the performance of tranches by initial rating category, with the sample split into CLO 1.0 (before 2010), CLO 2.0 (2010 and later), and the full sample of completed deals (1997 to 2016).

Vintage	Mean	StDev	p10	p25	p50	p75	p90	Obs.
<i>CLO 1.0 (1997-2009)</i>								
AAA-Rated	0.78	0.07	0.71	0.73	0.77	0.82	0.87	492
AA-Rated	0.77	0.07	0.70	0.71	0.75	0.80	0.85	423
A-Rated	0.80	0.08	0.72	0.74	0.78	0.84	0.89	479
BBB-Rated	0.84	0.11	0.76	0.78	0.82	0.90	0.94	476
BB-Rated	0.97	0.14	0.87	0.90	0.94	1.03	1.13	369
B-Rated	1.23	0.61	0.30	1.11	1.26	1.42	2.03	6
<i>CLO 2.0 (2010-2016)</i>								
AAA-Rated	0.97	0.08	0.91	0.94	0.96	0.98	1.00	307
AA-Rated	1.00	0.09	0.93	0.97	1.00	1.02	1.04	300
A-Rated	1.03	0.09	0.95	0.99	1.03	1.05	1.07	298
BBB-Rated	1.04	0.09	0.97	1.00	1.04	1.07	1.10	287
BB-Rated	1.04	0.10	0.97	1.01	1.04	1.07	1.09	273
B-Rated	1.13	0.19	1.05	1.08	1.11	1.14	1.17	95
<i>Full Sample (1997-2016)</i>								
AAA-Rated	0.85	0.12	0.72	0.76	0.83	0.95	0.98	799
AA-Rated	0.87	0.14	0.71	0.74	0.83	0.99	1.03	723
A-Rated	0.89	0.14	0.73	0.76	0.86	1.01	1.05	777
BBB-Rated	0.92	0.14	0.77	0.81	0.91	1.02	1.07	763
BB-Rated	1.00	0.13	0.89	0.93	1.00	1.06	1.11	642
B-Rated	1.13	0.23	1.05	1.08	1.11	1.14	1.18	101

Figure A6: Comparison of Fixed- and Floating-Rate Corporate Bond Returns

This figure reports the returns of corporate bonds by rating category. Each panel plots the cumulative realized return of fixed-rate corporate bonds (blue solid line) and the synthetic floating-rate corporate bonds (dashed red line) that serve as a benchmark for CLO tranches in the paper.





## A6 Analysis of CLO Managers

There are 2,265 CLO deals issued over our sample period, but only 281 unique CLO managers. Figure A7 shows that the distribution of deals per manager is highly skewed. While the plurality of managers are one-time issuers, the majority of deals are handled by managers with previous experience. Coupled with the active role that managers play in constructing and managing the asset portfolio, these findings raise the following questions: Do managers affect equity performance, and if so, how?

We begin to answer this question by testing for the presence of manager fixed effects in equity performance. Specifically, we estimate the following error component model:

$$\text{Performance}_{i,v,m} = \beta_0 + v_v + \mu_m + \varepsilon_{i,v,m}, \quad (1)$$

where  $\text{Performance}_{i,v,m}$  is one of the three performance measures: IRR, PME Market, or PME Bank. The indices denote CLO  $i$  of quarterly vintage  $v$  managed by manager  $m$ . Vintage and manager fixed effects are denoted  $v_v$  and  $\mu_m$ , respectively.

Table A13 demonstrates the importance of managers in three ways. First, manager fixed effects are responsible for substantial increases in the adjusted  $R^2$  of the regression – from 8% for PME Bank to 20% for IRR. Second, an  $F$ -test of the null hypothesis that the manager fixed effects are jointly zero is rejected at conventional levels of statistical significance. Finally, the distribution of estimated manager fixed effects illustrates how much economic variation there is in performance across different managers. For example, the difference in average IRRs between the top (90th percentile) and bottom (10th percentile) performers is over 18% per year. The corresponding difference in PME Bank estimates is over 1.6.

In Table A14, we explore whether managerial performance is persistent, which would be an indication that the manager fixed effects are at least partly attributable to differences in skill. We find that the top one-third of managers, relative to other deals in the same vintage, are significantly more likely to be top performers on subsequent transactions. The

degree of persistence is similar to that shown by Kaplan and Schoar (2005) for private equity funds. This is somewhat surprising in light of the uniform structure of CLOs (Benmelech and Dlugosz (2009)) and the fact that leveraged loans trade in an active secondary market. The features of private equity that allow for consistent outperformance, such as access to deal flow and the ability to make operational changes, are not present in this setting. However, we should emphasize that this analysis has limited statistical power, due to overlap in holdings and the time windows covered by sequential CLOs.

Persistent differences in managerial performance must come from a limited number of economic channels. We identify these channels by estimating a two-stage regression system that restricts variation in the determinants of performance to the variation driven by time-invariant differences across managers. Specifically, we estimate the following model:

$$\begin{aligned} \text{Performance}_{i,v,m} &= \beta_0 + \beta X_{i,v,m} + v_v + \varepsilon_{i,v,m}, \\ X_{i,v,m}^{(k)} &= \gamma_0 + \mu_m + v_v + \xi_{i,m,v} \end{aligned} \tag{2}$$

where all variables and indices are as previously defined. The system in equation (2) has a simple interpretation. Managers can only affect CLO performance through the actions they take to affect the CLO structure. These actions are captured by the vector  $X_{i,v,m}$ . In other words, the exclusion restriction is that there are no other channels through which managers can affect the performance of the CLO but through their construction of the CLO assets and liabilities and their trading behavior.

Table A15 presents the results. As expected, CLOs with more leverage, lower funding costs, and higher coupon rates among the collateral earn higher equity returns. “Par building” refers to buying loans at a discount, or selling at a premium, to increase the par amount of collateral in the pool. Unsurprisingly, greater par building leads to greater equity returns. Finally, and perhaps less obvious, more turnover in the loan portfolio is associated with higher equity returns. Table A16 reports OLS regression estimates that are similar in magnitude to the two-stage regression estimates, which suggests that differences across

managers account for almost all of the variation that matters for equity performance.

To shed light on which of the deal characteristics are affected most by managers, Panel B of Table A15 summarizes the first-stage regression estimates in a manner similar to Table A13. Of the five regressions, only the coupon rate on debt tranches is insensitive to the identity of the collateral manager. This contrasts with anecdotal evidence from practitioners that suggests they consider the manager’s reputation and experience when investing in CLO debt tranches. However, it is consistent with our finding that debt performance exhibits little cross-sectional variation. In further support of this interpretation, Tables A17 and A18 present analogous results for CLO debt tranches which reveal that managers explain far less variation and exhibit insignificant persistence in debt performance.

The other channels affecting CLO performance, leverage, loan coupon rates, and trading behavior, all depend significantly on differences across managers. Manager fixed effects explain between 24% (loan coupon rate) and 38% (leverage) of cross-sectional variation in these deal characteristics. Ultimately, it appears that managers play an important role in determining the performance of CLO equity, primarily through the selection and trading of loan collateral, but also through the degree of leverage taken by the vehicle.

Finally, we explore the role of managers in determining the performance of CLO debt tranches. Though Table A15 indicates that the cost of debt financing is a channel through which managers impact equity performance, we find mixed evidence with respect to debt performance. Table A17 presents an analysis of manager fixed effects in debt performance, measured using the public market equivalent relative to synthetic floating-rate corporate bonds, and shows that managers explain meaningful variation in AAA, BBB, and BB-rated tranche performance, but have a statistically weak impact on the performance of mezzanine tranches rated AA and A. More strikingly, Table A18 shows that debt tranche performance is not persistent across transactions in any rating category. Thus, it appears that managers play less of a role in determining CLO debt performance as they do in equity performance, which is natural given that equity is more sensitive to collateral trading decisions.

Figure A7: Distribution of CLO Issuance by Manager

This figure plots histograms of the number of CLOs issued by each manager in the Intex sample. Panel A is based on all issued deals and Panel B is based on completed deals.

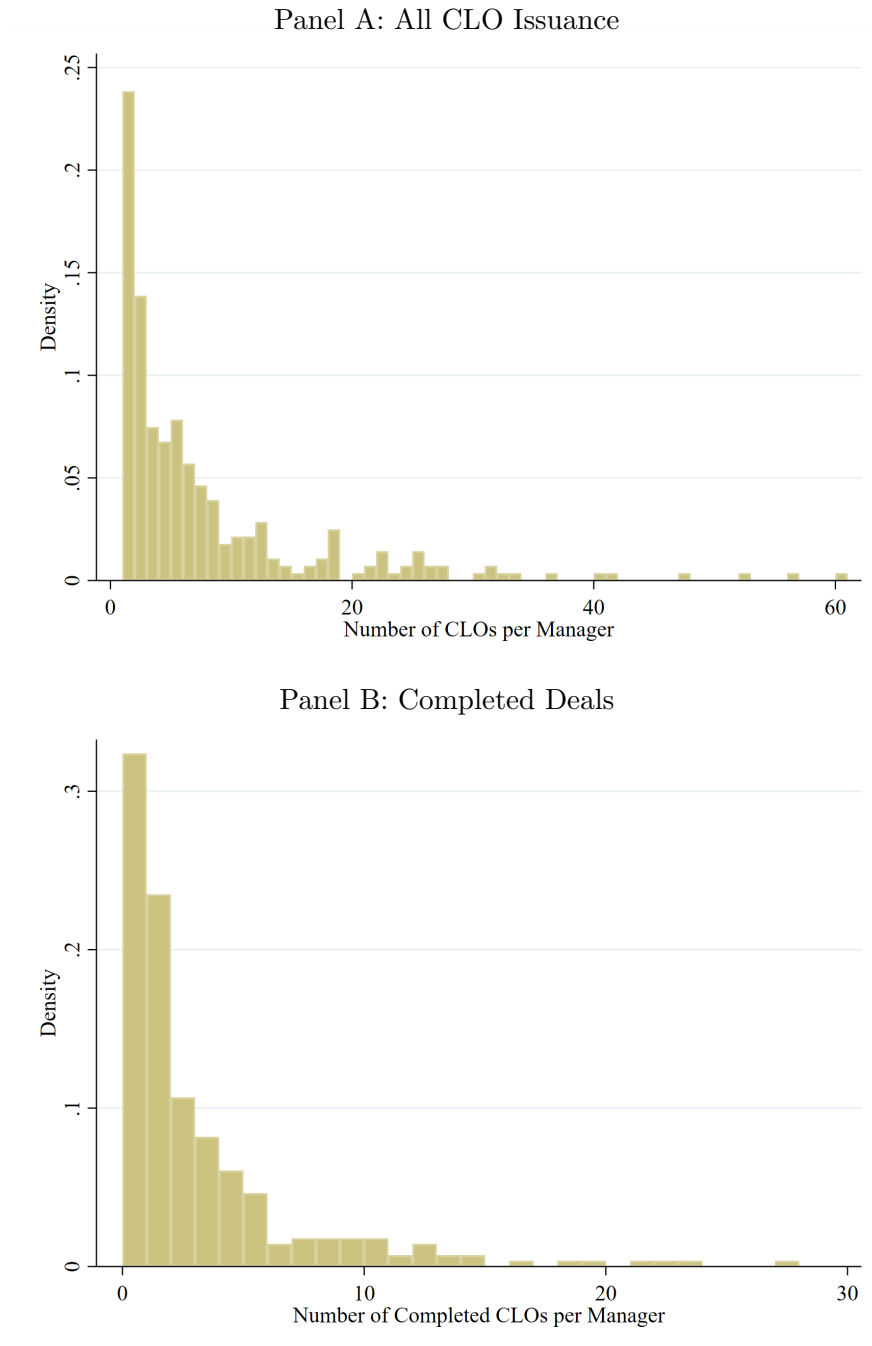


Table A13: Manager Fixed Effects in Equity Performance

This table presents estimates of manager fixed effects in performance following equation (1). Each column is based on a different measure of CLO equity performance as the regression's dependent variable. The performance metrics are winsorized at the 1% level to mitigate the influence of outliers. The first panel reports the number of observations and fixed effects in each regression. The second panel contains statistics including the adjusted  $R^2$  of a regression with manager and vintage fixed effects, the incremental adjusted  $R^2$  from adding manager fixed effects to a regression containing only quarterly vintage fixed effects, an  $F$ -test of the joint significance of the manager fixed effects, and the associated  $p$ -value. The bottom panel summarizes the distribution of manager fixed effects.

	IRR (%)	PME Market	PME Bank
Number of CLOs	806	806	806
Number of Managers	189	189	189
<i>Statistics on Manager FEs</i>			
Overall Adj. $R^2$	0.498	0.748	0.838
Incremental Adj. $R^2$	0.196	0.130	0.077
Joint $F$ -Test	2.531	3.059	2.922
$p$ -Value	0.000	0.000	0.000
<i>Distribution of Manager FEs</i>			
p90	9.361	0.307	0.570
p75	3.564	0.154	0.297
p50	-0.312	-0.016	0.039
p25	-5.170	-0.259	-0.482
p10	-11.235	-0.493	-1.098

Table A14: Persistence in CLO Manager Performance – PME vs. S&P 500

This table presents transition probabilities for CLO manager performance across funds. We sort completed deals into terciles in each annual vintage based on PME relative to the S&P 500 Index (in the columns) and calculate the conditional probability that the manager's next fund (in the rows) is in the same relative performance tercile or moves to one of the other two terciles. Panel A is based on the next deal issued by the manager, and Panel B is based on the first deal issued at least than one year after the current deal's closing date. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively, for a statistical test of equality between the estimated transition probability and the random chance transition probability of 0.33 using standard errors clustered by manager.

Panel A: Next Deal in Sequence (607 observations)

	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.487***	0.321	0.192***
Middle tercile	0.342	0.380	0.237***
Upper tercile	0.171***	0.300	0.571***

Panel B: One-Year Minimum Gap (503 observations)

	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.469***	0.405	0.294
Middle tercile	0.317	0.297	0.187***
Upper tercile	0.214***	0.297	0.519***

Panel C: Seven-Year Minimum Gap (177 observations)

	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.612***	0.456	0.286
Middle tercile	0.184*	0.298	0.271
Upper tercile	0.204*	0.246	0.443

Table A15: Manager-Driven Determinants of CLO Performance

This table presents instrumental variables regressions of CLO performance on liability structure and collateral attributes. We instrument each of the five explanatory variables, defined in Table A16, using fixed effects for each of the 170 managers in the regression sample. The performance metrics and explanatory variables are winsorized at the 1% level to mitigate the influence of outliers. Vintage fixed effects are based on the calendar quarter in which the deal closed. Panel A reports the second-stage regression estimates.  $t$ -statistics are reported in parentheses and based on two-stage least squares standard errors clustered by manager. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively. Panel B reports statistics on the first-stage regressions including the adjusted  $R^2$  of a regression with manager and vintage fixed effects, the incremental adjusted  $R^2$  from adding manager fixed effects to a regression containing only quarterly vintage fixed effects, an  $F$ -test of the joint significance of the manager fixed effects and its  $p$ -value, and the distribution of manager fixed effects in the explanatory variables.

Panel A: Second-Stage Regression Estimates

Dependent Variable	IRR (%)	PME Market	PME Bank
Initial Leverage (%)	0.673*** (3.49)	0.018*** (3.07)	0.028** (2.47)
Debt Tranche Coupon (%)	-4.679 (-1.55)	-0.260** (-2.22)	-0.557** (-2.11)
Avg. Loan Coupon (%)	5.123*** (3.19)	0.203*** (3.02)	0.352** (2.44)
Turnover	0.448* (1.70)	0.026* (1.85)	0.062* (1.96)
Par Build (%)	1.661*** (5.72)	0.083*** (6.17)	0.166*** (5.37)
Quarterly Vintage FE	X	X	X
Adj. $R^2$	0.180	0.221	0.173
Observations	674	674	674

Panel B: Summary of First-Stage Regression

	Leverage	Debt Cpn.	Loan Cpn.	Turnover	Par Build
<i>Statistics on Manager FEs</i>					
Overall Adj. $R^2$	0.652	0.742	0.643	0.429	0.504
Incremental Adj. $R^2$	0.427	0.070	0.273	0.326	0.260
Joint $F$ -Test	5.544	2.001	3.822	3.110	2.936
$p$ -Value	0.000	0.000	0.000	0.000	0.000
<i>Distribution of Manager FEs</i>					
p90	1.742	0.578	0.948	2.138	2.174
p75	1.288	0.115	0.262	0.896	1.231
p50	0.626	-0.014	-0.109	-0.041	0.246
p25	-0.655	-0.140	-0.306	-1.121	-1.224
p10	-3.403	-0.276	-0.469	-2.437	-2.474

Table A16: Determinants of CLO Performance – OLS Regression

This table presents regressions of CLO performance on liability structure and collateral attributes. Initial leverage is the initial ratio of debt to deal balance. Debt Tranche Coupon is the value-weighted coupon rate for debt tranches in percentage terms. Avg. Loan Coupon is the value-weighted average coupon rate of loans in the collateral pool over the observed life of the deal. Turnover is the ratio of absolute transaction volume after closing to the original deal balance. Par Build is the total collateral value gained by purchasing loans at a discount, accounting for discounted sales and the discounted treatment of purchases below 80, scaled by the original deal balance. Vintage fixed effects are based on the calendar quarter in which the deal closed.  $t$ -statistics based on standard errors clustered by manager are reported in parentheses. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively.

Panel A: Pooled Regression

Dependent Variable	IRR (%)	PME Market	PME Bank
Initial Leverage (%)	0.761*** (4.34)	0.021*** (3.74)	0.033*** (2.95)
Debt Tranche Coupon (%)	-3.258** (-2.44)	-0.192*** (-3.60)	-0.428*** (-3.49)
Avg. Loan Coupon (%)	3.056*** (3.65)	0.137*** (3.44)	0.256*** (2.86)
Turnover	0.760*** (4.13)	0.039*** (3.40)	0.087*** (3.48)
Par Build (%)	1.468*** (9.55)	0.072*** (9.33)	0.141*** (7.96)
Quarterly Vintage FE	X	X	X
Adj. R <sup>2</sup>	0.527	0.770	0.852
Adj. Within R <sup>2</sup>	0.268	0.302	0.251
Observations	674	674	674

Panel B: Regression with Manager Fixed Effects

Dependent Variable	IRR (%)	PME Market	PME Bank
Initial Leverage (%)	1.152*** (5.75)	0.033*** (4.20)	0.055*** (2.98)
Debt Tranche Coupon (%)	-3.238*** (-3.31)	-0.174*** (-3.48)	-0.385*** (-3.24)
Avg. Loan Coupon (%)	0.334 (0.42)	0.054 (1.50)	0.133 (1.55)
Turnover	1.081*** (4.93)	0.052*** (4.82)	0.113*** (4.80)
Par Build (%)	1.089*** (7.15)	0.053*** (7.97)	0.105*** (6.23)
Quarterly Vintage FE	X	X	X
Manager FE	X	X	X
Adj. R <sup>2</sup>	0.686	0.857	0.902
Adj. Within R <sup>2</sup>	0.271	0.280	0.221
Observations	616	616	616



Table A17: Manager Fixed Effects in Debt Tranche Performance

This table presents estimates of manager fixed effects in performance following equation (2) of the paper. Each column is based on a different initial rating category of CLO debt tranches. Performance is based on the PME versus synthetic floating-rate corporate bonds in the same rating category, winsorized at the 1% level to mitigate the influence of outliers. The first panel reports the number of observations and fixed effects in each regression. The second panel contains statistics including the adjusted  $R^2$  of a regression with manager and vintage fixed effects, the incremental adjusted  $R^2$  from adding manager fixed effects to a regression containing only quarterly vintage fixed effects, an  $F$ -test of the joint significance of the manager fixed effects, and the associated  $p$ -value. The bottom panel summarizes the distribution of manager fixed effects.

Initial Tranche Rating	AAA	AA	A	BBB	BB
Number of CLOs	782	706	760	746	625
Number of Managers	189	179	184	183	172
<i>Statistics on Manager FEs</i>					
Overall Adj. $R^2$	0.460	0.358	0.463	0.356	0.618
Incremental Adj. $R^2$	0.065	0.037	0.021	0.059	0.039
Joint $F$ -Test	1.465	1.206	1.153	1.345	1.584
$p$ -Value	0.001	0.061	0.115	0.006	0.000
<i>Distribution of Manager FEs</i>					
p90	0.018	0.033	0.038	0.052	0.065
p75	0.006	0.014	0.016	0.019	0.026
p50	-0.001	0.0004	-0.001	-0.002	-0.001
p25	-0.006	-0.011	-0.015	-0.022	-0.027
p10	-0.014	-0.019	-0.030	-0.045	-0.059

Table A18: Persistence in Debt Tranche Performance by CLO Manager

This table presents transition probabilities for CLO manager performance across funds. We sort completed deals into terciles in each annual vintage based on the PME versus synthetic floating-rate corporate bonds in the same rating category (in the columns) and calculate the conditional probability that the manager's next fund (in the rows) is in the same relative performance tercile or moves to one of the other two terciles. \*, \*\*, and \*\*\* denote  $p$ -values less than 0.10, 0.05, and 0.01, respectively, for a statistical test of equality between the estimated transition probability and the random chance transition probability of 0.33 using standard errors clustered by manager.

AAA Tranches			
	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.346	0.370	0.324
Middle tercile	0.340	0.313	0.333
Upper tercile	0.314	0.318	0.343
AA Tranches			
	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.387	0.333	0.326
Middle tercile	0.315	0.359	0.320
Upper tercile	0.298	0.308	0.354
A Tranches			
	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.332	0.406*	0.321
Middle tercile	0.364	0.332	0.280
Upper tercile	0.304	0.262*	0.399*
BBB Tranches			
	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.323	0.371	0.348
Middle tercile	0.360	0.331	0.283
Upper tercile	0.317	0.297	0.369
BB Tranches			
	Lower tercile	Middle tercile	Upper tercile
Lower tercile	0.331	0.351	0.331
Middle tercile	0.331	0.299	0.345
Upper tercile	0.338	0.351	0.324

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