Private Credit and Financial Stability*

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Abstract

We analyze the ability of private credit funds to withstand a period of extreme stress similar to the Global Financial Crisis and the Federal Reserve's severely adverse stress test scenario. In our stress simulations, as long as funds can sell portfolio loans, none of the funds default on their bank credit facilities, suggesting limited risk to banks. Drawdowns by funds on their bank credit facilities are also limited, as funds try to delever to remain in compliance with contractual and regulatory leverage restrictions. Funds delever by about 10% of their initial assets. They do so by selling assets, drawing down cash buffers, and using free cash flow to repay debt instead of reinvesting in new or existing portfolio companies. If funds cannot sell portfolio loans due to contractual restrictions or illiquidity, then 20–35% of funds go into technical default on their bank credit facilities. As long as banks exercise forbearance, almost all funds cure technical default by the end of the stress test exercise period, and banks do not suffer any losses. Finally, to gain further insight into fund behavior under stress, we examine deleveraging and distress during the Global Financial Crisis.

Keywords: private credit, financial stability, middle market lending, business development companies, BDCs, stress tests, deleveraging

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1 Introduction

The past decade has witnessed tremendous growth in private credit, broadly defined as lending by nonbank financial institutions (NBFIs) to borrowers such as consumers, nonfinancial firms, and commercial real estate entities. Given that NBFIs are typically more lightly regulated than banks, there is growing concern about the financial stability implications of such lending. This paper examines financial stability in the largest segment of private credit: lending by private credit funds to middle market firms, typically those invested in by private equity funds.

We analyze this segment – usually referred to as direct lending – using detailed data on business development companies (BDCs), a type of private credit fund with aggregate assets of about \$440 billion in 2024Q4, comprising roughly 20% of all private credit and approximately 40% of all direct lending.[1] BDCs are regulated by the Securities and Exchange Commission under the Investment Company Act of 1940 and are thus required to file quarterly financial statements that detail their portfolio holdings and funding structure. The main portfolio holdings of BDCs are senior secured loans in private equity sponsored middle market firms, but they also hold more junior loans, some equity, and subordinated tranches of collateralized loan obligations (CLOs) backed by middle market loans. The typical BDC finances its portfolio with about 50% equity and 50% debt (of which there is roughly an equal mix of bank debt and bonds).

Given the aggregate size of BDCs, it is worth examining their financial stability as a distinct type of direct lender. However, BDCs also provide a useful lens into direct lending more broadly for three reasons. First, because asset managers that sponsor BDCs also sponsor other types of private credit funds and typically co-invest in the same company across multiple funds, BDC portfolio holdings provide visibility into the exposures of all direct lenders.[2] Second, as documented by Block et al. (2024), the leverage of non-BDC private credit funds is broadly similar to that of BDCs, allowing us to infer how leverage affects the financial stability of non-BDC private credit funds. Finally, because term (finite-life) non-traded BDCs closely resemble the structure of private credit funds on all key dimensions, including finite life, closed-end fund structure, leverage, and capital commitments, our separate analysis of term non-traded BDCs gives us particular insight into how non-BDC private credit funds would react to a severely stressed environment. In general, term BDCs – and thus direct lending private credit funds more broadly – are more robust to stresses than other types of BDCs. These other types of BDCs include publicly traded closed-end BDCs and perpetual-life non-traded BDCs. Comparing the behavior of these different types of BDCs also illuminates how different fund structures affect the resilience of direct lenders.

We focus on two main sources of financial instability. One is the possibility that BDCs default

[1] PitchBook's 2024 Global Private Debt Report estimates private credit AUM, inclusive of BDCs, at \$2.2 trillion and direct lending AUM, exclusive of BDCs, at \$678.5 billion. Assuming that almost all BDC assets are direct loans, their share of direct lending is around 40%.

[2] Appendix provides more systematic evidence on the similarity in holdings of different types of affiliated funds.

on their bank loans and bond issues, which could impair the portfolios of banks and bondholders (often mutual funds and insurance companies). The second source of instability is the contraction in credit that could arise when BDCs are under stress and have to limit their leverage to avoid violating regulatory and lender constraints on indebtedness.

To examine financial stability issues in private credit, we build a model of BDC behavior during periods of extreme stress. Our model updates the analysis in an early draft of Chernenko, Ialenti, and Scharfstein (2025) and incorporates many new features, including shocks to industry default rates, redemptions from perpetual BDCs, rollover of BDC debt, drawdowns on credit facilities by portfolio firms and the inability of BDCs to sell assets The model also includes potentially stabilizing aspects of BDCs, namely that almost all have dividend reinvestment plans (DRIPs) and some have uncalled capital commitments. In our simulations, default rates and credit spreads of portfolio companies are assumed to rise to levels comparable to those experienced by similarly risky firms during the Global Financial Crisis (GFC). As a result, the fair value of BDC assets falls, which leads to an increase in leverage. This could result in a violation of SEC leverage restrictions, specifically the requirement that assets must be at least 150% of debt in order for BDCs to issue more debt. It could also lead to a violation of covenants in bank loan agreements that specify maximum leverage ratios that are similar and often stricter than the SEC leverage restrictions. In addition, the model assumes that during stress periods portfolio firms are more likely to draw down on credit facilities provided by BDCs, which could increase BDC leverage if they have to borrow to fund these drawdowns. The model also incorporates the possibility that investors in so-called perpetual life BDCs could redeem up to 5% of their shares on a quarterly basis, putting further stress on BDCs to fund those redemptions. BDCs could have difficulty rolling over debt financing that matures during the stress period. Finally, we consider the possibility that some loans may be particularly hard to sell for reasons we explain below.

In our model, BDCs have a number of levers they can pull to manage stress. They can use proceeds of debt repayment by portfolio companies to pay down their own debt and thus remain in compliance with leverage restrictions. They may also be able to sell assets and pay down debt. Some BDCs will also receive equity infusions from DRIPs and term non-traded BDCs can call capital to reduce leverage and maintain investment. Finally, BDCs can draw down on their cash buffers and on their own credit facilities provided that doing so does not violate leverage restrictions. If these levers prove inadequate, BDCs could end up defaulting on their debt.

In implementing this model, we allow firms in different industries to have different default rates and credit spreads in the stress scenario based on the historical relationship between industry default rates and aggregate default rates – what we call "default beta." While default realizations are independent conditional on the expected industry default rate, we allow there to be shocks to industry default rates above or below the expected default rate derived from our estimate of default beta. For each realization of industry default rate, we simulate the evolution of BDC assets, leverage, defaults, and deleveraging over ten quarters following the initial shock. We then run this simulation 50 times for different realizations of industry defaults. This allows us to analyze how a BDC would behave across different possible stress scenarios.

Our stress test sample is composed of 116 BDCs with data on portfolio holdings and debt structure, and which primarily invest in loans. Our data include 71% of all BDCs and 94% of aggregate BDC assets. The median (mean) BDC has \$1.4 (\$3.6) billion in assets. The largest BDC, Blackstone Credit Fund, has assets of \$71.3 billion.

The median BDC starts out with an asset coverage ratio (ACR) – i.e., assets less non-interest bearing liabilities divided by debt – of 208%, above the 150% ACR threshold set by the SEC and the level often used by lenders as negative covenants. In our baseline simulations, the median BDC reaches a minimum ACR of 161% after four quarters, then starts to recover and eventually reaches 201% by quarter 10. However, 43 BDCs (37%) hit the 150% threshold at some point. The median default rate of portfolio firms reaches 12.1% by the end of the stressed period.

BDCs manage their ACR constraint by drawing down their cash buffers, using free cash flows to repay debt, and then selling assets. The free cash flows come largely from repayment of portfolio loans. The median BDC deleverages by 9.6% of initial BDC assets by quarter 8. The 75th percentile deleverages by 18.6%. About 40% of aggregate deleveraging is due to asset sales. Cash buffers and free cash flow each explain roughly 30%.

The key determinants of deleveraging are the initial ACR of the BDC and the risk of the portfolio. BDCs that start with an ACR below 200% deleverage by considerably more than those with ACR above 200%. BDCs with an investment portfolio with higher industry default beta, more joint ventures and more equity in CLOs deleverage more. Controlling for ACR and portfolio risk, perpetual non-traded BDCs, which are subject to redemptions, delever by 5–12 percentage points more than term non-traded and publicly traded BDCs.

In Section 5.5, we explore the sensitivity of deleveraging by different types of BDCs to alternative assumptions and scenarios. In particular, we model drawdowns by portfolio firms, DRIP, and uncalled capital commitments to BDCs. We also explore a stagflationary scenario in which interest rates stay high and another scenario that models stickiness in the valuation of portfolio firms and the less-than-perfect pass-through from market yields to discount rates used by private credit funds to value their investments. Finally, we ask what happens when, because of contractual restrictions and other frictions, BDCs cannot sell portfolio loans to remain in compliance with restrictions on leverage. When funds are unable to sell loans, about half of publicly traded and perpetual non-traded BDCs enter technical default on their credit facilities from banks. Nevertheless, banks do not suffer any credit losses as all BDCs eventually repay their bank loans. Because BDCs are able to wait for spreads to decline and valuations to recover, there is less aggregate deleveraging in this alternative scenario.

Finally, in Section 6, we examine the deleveraging behavior of BDCs during the period around the GFC – from 2007Q4 through 2009Q4. Although the industry is much larger now, the period around the GFC can help us understand how private credit might react in practice to a significant shock and whether our model reflects actual behavior.

We start by analyzing 20 BDCs with assets of at least $100 million as of 2007Q4, loan portfolio shares of at least 50%, and initial ACR of at most 400%. Although there were 33 other BDCs at the time, these 20 BDCs accounted for 91% of aggregate BDC assets as of 2007Q4. The median BDC in this sample had an ACR of 255%, above the SEC threshold of 200% then in effect before it was reduced to 150% in 2018. Over the course of the GFC, median ACR falls to 224% in 2008Q4 and remains around that level for a couple of quarters before increasing. The decline in ACR followed by an increase reflects the pattern we see in our simulations. Importantly, BDCs that start out with a lower ACR tend to deleverage more, also consistent with our simulations. We do not have enough data to identify an effect of portfolio risk on deleveraging.

To provide more granular insights into how BDCs responded to the GFC, we present brief case studies of the five largest BDCs, comprising 74% of BDC assets. Two of these BDCs entered the GFC with high ACR levels, resulting in modest deleveraging and compliance with leverage restrictions. One BDC briefly violated an ACR covenant, which was waived, until quickly returning to compliance. However, two BDCs – Allied Capital and American Capital – performed very poorly during the GFC in large part because they had very risky portfolios with a high share of assets invested in junior securities. Both went below the 200% ACR threshold for several quarters as lenders waived covenants. Ultimately, however, the BDCs deleveraged and brought their ACRs back over 200%.[3] In late 2009, Allied Capital announced that it would be acquired by Ares Capital Corporation, which was better capitalized (and Ares would later also acquire American Capital in 2017). Banks did not incur losses on their loans to these BDCs. The fact that banks were willing to waive covenants suggests that banks believed that they were well protected or that forcing more asset sales or a liquidation would be inefficient. This is consistent with our simulations in which BDCs are not allowed to sell assets to remain in ACR compliance. The BDCs in our simulations ultimately recover and pay off their loans despite violating ACR covenants.

2 BDC Background and Data

BDCs are actively managed closed-end investment funds registered as such under the Investment Company Act of 1940.[4] They are required to make at least 70% of their investments in US-based private companies or public companies with equity values below $250 million. BDCs are treated as registered investment companies (RICs), which means they are pass-through entities for tax purposes. As such, they are required to pay out 90% of income as dividends, which are taxed as ordinary income to shareholders. BDCs can be internally managed, meaning the firm directly

[3]

[4] Cai and Haque (2024) provide an overview of private credit and BDCs.

employs a team responsible for managing the BDC's assets, or externally managed, in which a separate entity is tasked with portfolio management, financing decisons, and fund administration. Most BDCs are managed externally. BDCs can also be organized as traded or non-traded entities, depending on whether their stock trades on an organized exchange. Whether traded or not, all BDCs are required to reports financial statements and schedules of investments in 10-Q and 10-K filings with the SEC. Non-traded BDCs can be perpetual or finite life (term). As noted in the introduction, term BDCs are similar to non-BDC private credit funds. Investment managers often offer term BDCs rather than limited liability partnerships to foreign investors so that they do not have to withold tax for these investors.

Most BDCs describe themselves as "direct lenders" or "middle market lenders" in their regulatory filings, with many of the remaining entities operating as venture capital funds or real estate investment trusts (REITs). BDCs engaged in direct lending account for nearly all BDC assets as the BDCs that do not engage in direct lending are typically very small.

BDCs are limited in the amount of leverage they can employ. When incurring new debt or making dividend payments, BDCs must have at least a 200% asset coverage ratio, defined as assets less noninterest bearing liabilities divided by debt, where a ssets are calculated on a fair value basis. Since 2018, however, BDCs meeting certain conditions can choose to operate with an asset coverage ratio of 150%. Most chose to do so.

As of 2024Q4, there were 164 active BDCs with a total of $441 billion in assets.[5] While BDCs comprise about a fifth of the private credit industry and 40% of direct lending, and remain small relative to banks, they have grown into particularly important providers of credit to middle market firms.[6]

2.1 Financial Statements

An entity electing to be treated as a BDC is required to file form N-54A with the SEC. When an entity decides to stop being treated as a BDC, it files form N-54C. We use these filings to assemble the population of BDCs that were active over the 1996–2024 period.[7] Because some BDCs file Form N-54A but never launch, we require BDCs to file at least one quarterly or annual report with the SEC after electing to be regulated as a BDC.

We gather financial data for traded and non-traded BDCs from CRSP/Compustat and S&P's SNL database, respectively. For non-traded BDCs whose financials are not available through SNL,

[5] BDCs with a 10-Q or 10-K filing during 2024Q4.

[6] Middle market firms are loosely defined, but typically include businesses with annual revenues of between $10 million and $1 billion.

[7] We separately add two BDCs that were launched prior to the availability of the SEC's EDGAR system: Capital Southwest Corp (CIK 17313) and Equus Total Return Inc (CIK 878932).

we use the SEC API to extract and standardize financial information from 10-Q and 10-K filings.[8]

2.2 Portfolio Holdings

We obtain BDC portfolio holdings data from PitchBook. As of 2024Q4, PitchBook has portfolio holdings data for 146 out of 164 BDCs. By assets, PitchBook has 97% coverage. PitchBook also reports portfolio holdings data for 10 joint ventures.

For each asset holding, PitchBook data include issuer name, industry, fair value, amortized cost, principal or number of shares, and maturity date. It also provides information about a loan's terms, including whether it is fixed or variable rate, its spread over SOFR, and whether the loan includes additional features such as an interest floor.

We use instrument descriptions along with issuer names and industry information to classify investments into the following asset classes: joint ventures (JVs), collateralized loan obligations (CLOs), equity (other than JVs and CLOs), and loans.

2.3 Financing

We gather instrument-level financing data from S&P Capital IQ and SEC filings. We start with S&P Capital IQ which has data on the debt structure of publicly traded BDCs. For BDCs without debt structure in Capital IQ, we extract the debt disclosure note[9] and use Claude AI to extract information on the instrument names, amount outstanding, interest rate, and maturity.

Separately, we hand collect data on the interest rate swaps that BDCs have entered into.

2.4 Sample

We start with the population of BDCs active as of 2024Q4. After excluding six BDCs without any debt, we limit the sample to BDCs with holdings data in PitchBook such that the ratio of the fair value of their investments to total assets is in the $[0.8, 1.2]$ range. We also exclude four BDCs with loans accounting for less than 50% of total assets and two BDCs with missing financial statements. Because SBA debentures do not count towards the asset coverage ratio and because we currently model only aggregate debt, we exclude six BDCs with SBA debentures.

Our final sample consists of 116 BDCs with data on portfolio holdings and debt structure. These BDCs account for 71% of all BDCs and 94% of aggregate BDC assets.

[8] https://sec-api.io

[9] XBRL tag `us-gaap:DebtDisclosureTextBlock`

3 Summary Statistics

Table 1 reports summary statistics, as of 2024Q4, for the sample of 116 BDCs in our financial stability exercise. As discussed above, the sample consists of BDCs with valid portfolio holdings data that invest primarily in loans. The median (mean) BDC has $1.4 ($3.6) billion in assets. The largest BDC, Blackstone Private Credit Fund, has assets of $71.3 billion.

Table 1
Summary Statistics

This table reports summary statistics as of 2024Q4 for the sample of 116 BDCs studied in the financial stability exercise. Characteristics of loan portfolio are value-weighted averages across all loans in a BDC's portfolio. Asset Coverage Ratio is the ratio of assets net of non-debt liabilities to total debt. The spread on BDC credit facilities from banks is the value-weighted average across all of a BDC's facilities, weighted by the committed amount.

				Percentile			
	Mean	SD	Min	25th	50th	75th	Max
Assets	3589.79	7898.22	102.92	682.40	1444.51	3218.83	71283.57
Asset shares							
Loans	87.77	23.35	50.27	78.11	89.06	93.47	305.47
Equity	5.86	7.45	0.00	0.70	2.51	7.70	32.28
CLO equity	0.69	3.44	0.00	0.00	0.00	0.00	33.48
JVs	0.46	2.10	0.00	0.00	0.00	0.00	15.83
Cash	4.70	5.00	0.00	1.86	3.04	5.04	26.68
Commitments to lend	12.49	8.10	0.00	6.24	12.05	16.94	39.74
Characteristics of loan portfolio							
Loan size	30.51	43.70	0.82	9.86	18.78	32.74	381.68
Spread (bps)	593.32	96.65	330.03	537.27	575.36	639.90	922.64
Maturity (years)	3.99	0.97	1.15	3.33	3.95	4.76	5.77
Industry default beta	1.10	0.15	0.75	0.99	1.09	1.19	1.52
Portfolio HHI across borrowers	213.22	157.49	42.37	101.02	161.17	273.29	823.20
Share of syndicated loans	2.11	3.20	0.00	0.00	0.76	3.16	17.31
Leverage							
Debt/Assets	0.47	0.09	0.22	0.41	0.48	0.53	0.68
Asset Coverage Ratio	2.17	0.53	1.45	1.85	1.99	2.31	4.46
Spread (bps)	233.53	38.86	112.50	215.00	225.00	250.00	360.00

Table 1 next reports the shares of different types of assets: loans, equity in portfolio firms, JVs, CLO equity, and cash. We also report the value of credit commitments extended by BDCs to portfolio firms, also scaled by BDC's assets. BDCs invest predominantly in loans. The median (mean) share of loans is 89% (88%). Most of the rest is equity in portfolio firms. Equity in CLOs and JVs is uncommon. The means are below 1%, but when they are present, such equity investments can account for a large share of assets. Maximum values of equity in CLOs and JVs are 33% and 16%, respectively. Cash buffers are about 3–5% of assets.

BDCs have substantial commitments to lend to portfolio firms. The average BDC has committed to extend loans valued at 12% of the BDC's assets. There is significant heterogeneity across BDCs.

The interquartile range is from 6% to 17%, while the maximum is 40% of assets.

The next set of variables reports the characteristics of portfolio loans. We calculate the value-weighted average across all portfolio loans. For the median BDC, the average loan position is around \$19 million.[10] The distribution of loan size is skewed: the mean across BDCs is \$30.5 million and the maximum average loan size is \$382 million.

For the median BDC, portfolio loans have a spread to SOFR of 575 basis points. Median maturity is four years. BDC portfolios are fairly diversified across borrowers. For the median BDC, portfolio HHI across borrowers is 161.

The median BDC has portfolio-level industry default beta of 1.09. Industry default beta, described in more detail below, is the slope coefficient from the regression of the Moody's industry default rate on the aggregate default rate. Industry default beta is the slope from the annual regression of industry default rate on the aggregate default rate. Annual default rates for 35 industries over 1970–2024 are from Exhibit 44 in Moody's Annual Default Study. [11]

The median BDC has a debt-to-assets ratio of of 48%. The interquartile range is 41–53%. The minimum in our sample is 22%, while the maximum is 68%.We also report the asset coverage ratio (ACR), which is calculated as the value of assets net of non-debt liabilities, all divided by the value of debt. Because non-debt liabilities are generally small, ACR is close to the inverse of the debt-to-assets ratio. Finally, Table 1 reports the financing spread on bank lines of credit. The median spread is 225 basis points.

3.1 Summary Statistics by BDC Type

Table 2 reports summary statistics for different types of BDCs: perpetual non-traded, term non-traded, and publicly traded BDCs.

Perpetual and publicly traded BDCs are similar in size, with median assets of about \$1.9 billion. Perpetual BDCs, however, have a longer right tail and include the largest BDC — Blackstone Private Credit Fund (BCRED) with \$71.3 billion in assets. The size difference between BCRED and the largest publicly traded BDC — Ares Capital with \$28.3 billion in assets — explains most of the difference in the aggregate assets of perpetual non-traded BDCs and publicly traded BDCs. Term non-traded BDCs tend to be significantly smaller. The median term non-traded BDC has

[10] This understates the size of private credit loans for two reasons. First, because asset managers can allocate a single loan across multiple funds under management, the typical loan to a middle-market firm is much larger. Second, within a BDC we do not aggregate across multiple loans to the same firm.

[11] Appendix Table A2 reports industry default beta, the average annual default rate, and the standard deviation of the annual default rate for each industry. Industries with the lowest default beta are Insurance (0.01), Utilities: Electric (0.09), Utilities: Oil & Gas (0.11), and Utilities: Water (0.22). Industries with the largest default beta are Media: Advertising, Printing & Publishing (3.59), Hotel, Gaming, & Leisure (3.19), and Media: Broadcasting & Subscription (2.73).

Table 2
Summary Statistics by BDC Type

This table reports summary statistics for different types of BDCs in the sample of 116 BDCs studied in the financial stability exercise. Data are as of 2024Q4. Characteristics of loan portfolio are value-weighted averages across all loans in a BDC's portfolio. The spread on BDC credit facilities from banks is value-weighted average across all of a BDC's facilities, weighted by the committed amount.

	Perpetual non-traded ($N = 40$) Assets = $218 billion			Term non-traded ($N = 39$) Assets = $55 billion			Publicly traded ($N = 37$) Assets = $143 billion		
	Min	Median	Max	Min	Median	Max	Min	Median	Max
Assets	102.92	1890.19	71283.57	144.51	893.31	8513.44	192.67	1925.99	28254.00
Asset shares									
Loans	69.59	91.47	128.42	66.44	90.82	305.47	50.27	77.12	96.39
Equity	0.00	1.17	22.16	0.00	1.60	20.17	0.32	9.77	32.28
CLO equity	0.00	0.00	3.55	0.00	0.00	2.17	0.00	0.00	33.48
JVs	0.00	0.00	2.69	0.00	0.00	0.01	0.00	0.00	15.83
Cash	0.19	2.92	17.28	0.10	3.69	26.68	0.00	2.47	20.51
Commitments to lend	0.00	14.22	38.26	0.00	12.34	39.74	0.00	9.31	29.68
Characteristics of loan portfolio									
Loan size	0.82	16.64	381.68	2.74	16.58	145.04	5.10	22.54	121.29
Spread (bps)	330.03	544.64	786.16	450.11	573.47	922.64	426.81	646.35	904.21
Maturity (years)	2.87	4.63	5.45	1.15	4.32	5.77	1.95	3.23	4.50
Industry default beta	0.90	1.09	1.36	0.75	1.12	1.50	0.88	1.08	1.52
Portfolio HHI across borrowers	42.37	107.52	513.17	66.68	216.55	823.20	58.52	160.70	612.87
Share of syndicated loans	0.00	3.02	17.31	0.00	0.97	16.49	0.00	0.18	7.51
Leverage									
Debt/Assets	0.24	0.43	0.62	0.22	0.46	0.65	0.29	0.53	0.68
Asset Coverage Ratio	1.58	2.17	3.93	1.53	2.10	4.46	1.45	1.82	3.45
Spread (bps)	150.00	220.23	360.00	177.63	228.29	325.00	192.90	225.00	330.00

just short of $900 million in assets.

Perpetual and term non-traded BDCs are more similar to each other in their allocation across asset types. Both have more than 90% of their assets in loans, with commitments to lend being 12–14% of assets. Term non-traded BDCs tend to have slightly larger cash buffers compared to perpetual non-traded BDCs, which may be due to differences in size.

Compared to non-traded BDCs, publicly traded BDCs allocate a significantly larger share of their assets to equity: almost 10% for the median publicly traded BDC. The median share of loans for publicly traded BDC is 77%. Publicly traded BDCs are also more likely to invest in JVs or CLO equity. However, their loan commitments relative to assets are lower.

The differences in loan portfolios between BDC types are somewhat subtle. While they have similar industry default beta, loans of publicly traded BDCs tend to have larger spreads: median spread of 646 bps for publicly traded BDCs versus 545 bps for perpetual and 573 bps for term non-traded BDCs. Loans held by publicly traded BDCs also have shorter remaining maturity: 3.23 years versus 4.63 years for perpetual non-traded and 4.32 years for term non-traded. These differences could be due to differences in portfolio age. Since publicly traded BDCs have been around for longer, loans on their balance sheets may be older. These loans are likely to have higher spreads and shorter remaining maturity. Portfolios of non-traded BDCs may be tilted towards more recently originated loans; these loans are likely to have lower spreads and longer remaining maturity. Finally, it is worth noting that term non-traded BDCs have somewhat more concentrated loan portfolios. The median HHI is 217 for term non-traded BDCs versus 161 for publicly traded and 108 for perpetual non-traded BDCs.

The last section of Table 2 reports statistics on leverage. Publicly traded BDCs have somewhat higher leverage than non-traded BDCs: 53% debt-to-assets ratio for publicly traded versus 43% for perpetual non-traded and 46% for term non-traded BDCs. One reason perpetual non-traded BDCs have lower leverage than term non-traded BDCs is that the former allow for redemptions. This may also explain why perpetual non-traded BDCs invest a larger share of their loan portfolio in syndicated loans, which are easier to sell than direct loans.

Finally, despite differences in size and some differences in portfolio composition, spreads on credit facilities from banks are quite similar across different types of BDCs: 220 bps for perpetual non-traded, 228 bps for term non-traded, and 225 bps for publicly traded BDCs.

4 Stress Test Methodology

To evaluate the financial stability risks of private credit funds and estimate the magnitude of deleveraging that could occur in a severely adverse stress scenario similar to the GFC, we conduct a dynamic simulation of BDC lending and debt management subject to compliance with asset coverage ratio minimums specified in the Investment Company Act of 1940 and in the credit agreements with banks that lend to BDCs. Our framework draws on some of the scenario inputs from the Federal Reserve's bank stress tests. The main difference is that because we do not have firm performance data we are limited in our ability to measure underlying default risk for each portfolio firm. Instead, we use historical data on defaults during the GFC as an estimate of the aggregate default rate in our severely adverse scenario, and we randomly shock portfolio firms with default, while accounting for differences in exposures as described below.

4.1 Severely adverse scenario

Figure 1 plots the time series of the key scenario variables: stock market returns, default rates, and changes in yield spreads. Stock market returns are taken from the Fed's 2023 severely adverse scenario. Because the Fed's stress test scenarios do not specify default rates, we model default rates using the combination of annual default rates from Moody's and quarterly bankruptcy filings.[12]. We first calculate the peak default rate as a simple average of the 2009 default rates for B (6.80%) and Caa–C (26.39%) credit ratings. To model quarterly time series of default rates, we use the number of Chapter 11 bankruptcy filings around the GFC. Starting in 2008Q1, we calculate the ratio of the number of bankruptcy filings during the quarter relative to the 2009Q2 peak of 3,965 filings. We then multiply this ratio by the peak default rate of 16.60% to calculate the quarterly default rate.

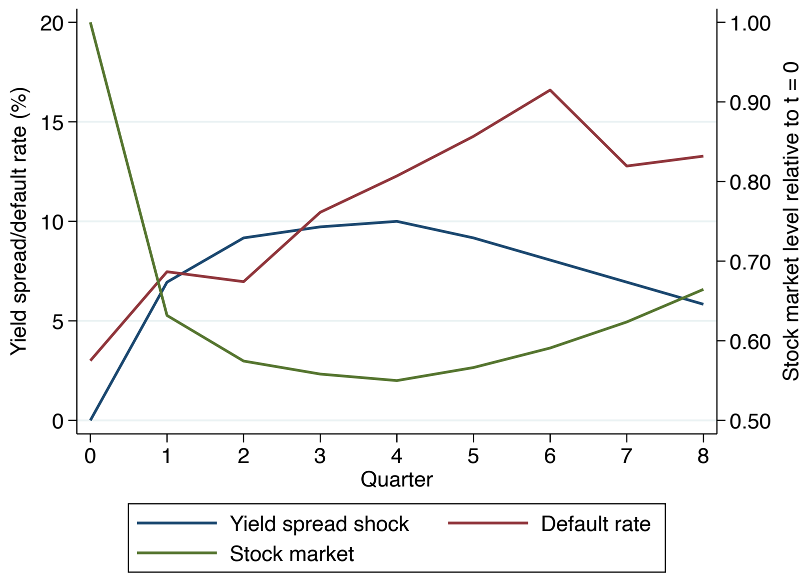
The Fed's 2023 severely adverse scenario assumes that the yield spread on BBB-rated corporate bonds increases by 3.6 percentage points, from 2.2% to 5.8%. However, the scenario does not specify yields on lower rated bonds or loans. To model the change in yield spreads on BDC portfolio loans, we use the GFC as our benchmark. Over the course of 2008, the increase in the option-adjusted yield spread on B-rated corporate bonds was 2.4 times the increase in the option-adjusted yield spread on BBB-rated corporate bonds. The increase in the yield spread on CCC and lower rated bonds was 3.9 times the increase in the spread on BBB-rated bonds. Taking a simple average between the two, the average yield spread on B, CCC and lower rated bonds increased by about 3.15 times the increase in the yield spread on BBB-rated bonds. Given that the severely adverse scenario assumes about a 3.6 percentage point increase in the yield spread on BBB-rated bonds, the average increase in the yield spread on B, CCC, and lower rated bonds is likely to be on the order of 11.3 percentage points. However, because loans have higher recovery values than bonds, we assume a slightly smaller peak increase in yield spreads of 10 percentage points. Thus, the yield spread shock in our stress test exercise is the BBB yield spread assumed in the Fed's severely adverse scenario scaled up by 2.78 times.

Not shown in the figure is the assumed rapid fall in the federal funds rate and SOFR to 0.5%. As we show in Section 5.5.4, holding the aggregate default rate and shock to yield spreads fixed,

[12] https://www.uscourts.gov/statistics-reports/analysis-reports/bankruptcy-filings-statistics

Figure 1
Severely Adverse Scenario

This figure plots the time series of key variables in the severely adverse scenario: the shock to yield spreads, default rate, and the stock market index relative to time 0. Stock market returns are from the Fed's 2023 severely adverse scenario. The shock to yield spreads is constructed based on the yield on BBB-rated corporate bonds assumed by the Fed's 2023 severely adverse scenario and the relationship between BBB and B/CCC spreads during the GFC. Default rate is constructed based on the annual default rates for B and CCC credit ratings and the time series of quarterly bankruptcy filings during the GFC.



the path of SOFR makes little difference to the results. While it does affect net income, it has much smaller effects on the balance sheet, which consists mostly of floating rate loans and floating rate liabilities.

4.2 Portfolio company defaults

Every quarter in the simulation, there are two shocks to a BDC's portfolio value: 1) portfolio company defaults and 2) changes in the fair value of portfolio assets. Figure 1 shows that the aggregate default rate is assumed to increase to about 16%. At the start of each quarter, performing companies default at a rate determined by their industry and the aggregate default rate specified by the scenario. We first use Moody's data on annual industry-level default rates going back to 1970 to estimate industry default beta for each of the 35 industries tracked by Moody's. Industry default beta is the slope coefficient from the regression of industry default rate on the aggregate default rate. Appendix Table A2 reports the estimated betas.

To account for uncertainty in the industry default beta, at the start of each simulation we draw each industry's default beta from a normal distribution whose mean is equal to the estimated beta and whose standard deviation is equal to the standard error of the estimated beta. The industry default rate in each quarter of the simulation is then calculated as

$$Default\ rate_{i,t} = \beta_i \times Aggregate\ default\ rate_t + \varepsilon_{i,t} \tag{1}$$

where $\varepsilon_{i,t}$ is i.i.d. normal with standard deviation equal to the root mean-squared error from the regression of industry default rate.

Once a company defaults, its equity value is assumed to go to zero. BDCs are assumed to stop receiving interest on these loans and to recover 60% of their par value at default.[13] Our benchmark simulation assumes that it takes six quarters for default to be resolved and for BDCs to realize the recovery value. Recovery value is assumed to be in cash. Once default is resolved and recovery value is realized, defaulted firms disappear from the simulation. Finally, note that because multiple BDCs may hold loans and equity of a given company, default shocks are a source of cross-sectional correlation in changes in portfolio values.

4.3 Changes in fair value

The second shock to BDC portfolio values stems from the widening of yield spreads and the decline in the stock market, both of which affect the fair market value of portfolio assets. At each point in time, we value loans by forecasting their remaining promised payments and discounting them at the prevailing yield. We estimate the remaining promised payments using the current value of the benchmark rate and the cash and PIK spreads on the loan. In estimating the remaining payments, we assume that the benchmark rate remains constant.

The discount rate used to value loan payments is the sum of three components: i) the benchmark rate, ii) the initial yield spread, and iii) the aggregate shock to yield spreads. We calculate the initial yield spread using our forecasts of the remaining cash flows as of 2024Q4 and the reported loan prices. The third component is the product of the loan's industry default beta and the average increase in yield spreads specified by the macroeconomic scenario.

To value equity instruemts other than JV equity, we calculate their returns by multiplying the return on the Dow Jones index specified by the Fed's severely adverse scenario by the industry default beta. Given that CLO equity is estimated to suffer similar losses over the course of the stress test exercise, we assume that the timing of the returns on CLO equity matches the timing of the returns on the other equity instruments.

To value investments in JVs, we first value JV portfolio holdings. Because we have limited data on the debt structure of JVs, we assume that they borrow through lines of credit that pay interest at SOFR plus 250 basis points. The interest rate on JV credit facilities tends to be a bit higher than the interest rate on BDCs' own credit facilities because JVs tend to have smaller and less

[13] The par value at default can be different from the par value at the beginning of the simulation due to payment-in-kind (PIK) interest. This is one way in which the simulation captures the greater riskiness of PIK debt.

diversified portfolios. We assume that JVs maintain a constant debt amount and distribute their free cash flows to the JV partners according to their economic stakes. Thus, JVs do not reinvest in their portfolios. JVs without portfolio holdings in PitchBook are treated as equity securities with beta of one.

4.4 Cash flows

We next calculate each BDC's income and cash flow. Income is the sum of interest income, including PIK, dividend income, and other income such as various fees charged to portfolio companies. We model dividend and other income in each quarter as a fixed percentage of the fair value of BDC assets in the quarter. This percentage is assumed to be equal to the percentage in 2024Q4 at the start of the stress scenario. In practice, these income sources are a relatively small fraction of BDC income, and thus have little impact on the simulation results.

Total expenses are the sum of interest expense, base management and incentive fees, and other expenses. We use information on the debt structure of BDCs and on their interest rate swaps to calculate interest expense. Base management fees and other expenses are assumed to be a constant percentage of assets. We assume that because of weak performance during the severely adverse scenario, BDCs do not incur any incentive management fees.

To maintain their pass-through status as Registered Investment Companies (RICs), BDCs are required to distribute at least 90% of their net income. We therefore calculate free cash flow as

$$\begin{aligned} FCF &= \textit{Net income} - 0.9 \times \textit{Net income} - \textit{PIK interest} + \textit{Repayment of portfolio loans} \\ &- \textit{Redemptions} - \textit{Debt maturities} \end{aligned} \tag{2}$$

Equation 2 subtracts PIK income because it is included in the calculation of net income but does not generate any cash flow. Redemptions from perpetual BDCs are assumed to be 5% per quarter for the first four quarters. As yield spreads start to decline after quarter four, we assume that redemptions subside to zero. We assume that BDCs first satisfy redemptions and debt maturities, and then decide whether to accommodate these with cash balances, changes in debt, or asset sales. In the baseline simulation, we do not allow BDCs to raise new equity financing. In Section 5.5, we consider alternative models that account for dividend reinvestment plans (DRIPs) and uncalled equity commitments.

4.5 BDC behavior

We specify BDC behavior as a function of the asset coverage ratio (ACR), the ratio of total assets minus noninterest-bearing liabilities to debt.[14] We calculate pro forma ACR assuming that

[14] Because we do not separately model non-debt liabilities, which are generally small, we calculate ACR as total assets divided by total debt.

all positive cash flow and cash balances are used to repay debt. When the pro forma ACR is more than 50 percentage points above its minimum, which for most BDCs is 150%, BDCs reinvest positive free cash flow pro rata into their existing portfolio positions. Although, in reality, BDCs would reinvest into new loans, assuming reinvestment into the existing portfolio positions is a simple way to maintain the correlation structure in portfolio holdings across BDCs. The main weakness of this approach to modeling reinvestment is that it results in the weighted average maturity declining over time.[15]

As the ACR declines, we assume that BDCs direct an increasing share of their free cash flow to paying off debt so that by the time the ACR drops to 1.1 times its minimum (165% for BDCs with 150% minimum and 220% for BDCs with 200% minimum), BDCs use all of their free cash flow to reduce their debt. This assumption is a simple way to capture the fact that paying off debt has a larger effect on the asset coverage ratio than reinvesting in portfolio assets, but that without constraints asset managers would prefer to reinvest and maintain larger assets under management.

Finally, when the ACR drops below the regulatory minimum, BDCs liquidate portfolio holdings to bring the ACR back to the regulatory minimum.[16] We think of the yield spreads assumed by the scenario as effectively capturing fire sale discounts and thus assume that portfolio holdings are sold at their fair market value. Note that if loans cannot be sold, the BDC could violate the regulatory minimum and violate covenants in its own bank borrowing. In this case, the lender could choose to waive the covenant or take possession of the loan, which is typically pledged as collateral. For the moment, we are assuming that loans can be sold to generate cash and pay down debt. Below, we report results of simulations in which BDCs cannot sell loans.

When FCF in Equation 2 is negative, BDCs first use their cash buffers. If cash buffers are not large enough, funds could increase their leverage under certain conditions. We first check whether there is availability under the existing lines of credit and whether the ACR will be above the threshold after borrowing. If so, BDCs use their existing lines of credit. In calculating availability under the existing lines of credit, we use the committed amount as of 2024Q4 and do not adjust for the fact that the borrowing base may have declined during the stress period.

If there is no availability under the existing lines of credit, we allow BDCs to enter into new facilities. As a simple way to model the fund's ability to incur new debt during a period of market dislocations, we assume that lenders extend new facilities only if the resulting ACR is above 175%. Furthermore, the spread on such new facilities is equal to the BB-rated bond spread.

[15] This approach may underestimate the eventual recovery in asset values once spreads start to decline.

[16] We are implicitly assuming that the loan sale occurs at the fair market value recorded by the BDC. If the loan is sold below the BDC's reported loan value

5 Results

We run the simulation 50 times and report the results in Figure 2. Panel (a) plots the 25th, 50th, and 75th percentiles, as well as the mean of gross assets relative to their 2024Q4 value. For the median BDC, assets decline about 32% by quarter 4 and start to recover slowly afterwards, reaching about 71% of their initial value by the end of the stressed period. The bottom size quartile of BDCs experiences larger and more persistent declines in asset values of 42%.

Panel (b) of Figure 2 plots the 25th, 50th, and 75th percentiles and the mean of the distribution of the asset coverage ratio (ACR). The median BDC starts with an asset coverage ratio of 208%, reaches a minimum of 161% during quarter 4, then starts to recover, and eventually reaches 201% by quarter 10.[17] Not shown in the figure is the fact that 43 BDCs hit their ACR constraint in at least one quarter.

In panel (c) we plot the distribution of the portfolio share of defaulted loans. The numerator is the fair value of defaulted loans, while the denominator is the fair value of all loans in the portfolio. The share of defaulted loans increases gradually from around 1% to 8%. By the end of the stressed period, the interquartile range of the share of defaulted loans is 11.0–13.6%.

Finally, panel (d) tracks active deleveraging relative to initial assets Active deleveraging is the sum of asset sales, free cash flows that are used to repay debt instead of being reinvested in the portfolio, and declines in the cash buffer. The median BDC deleverages by 6.4% of its initial assets by quarter 4 and by 9.6% by quarter 8. However, the 75th percentile deleverages by 18.6% by quarter 8.

For completeness, Figure A1 reports equity returns in a severely adverse scenario. By quarter 4, the median BDC loses 50% of its equity. The interquartile range is a loss of 42–58%. Equity values start to recover after the fourth quarter, but by quarter eight, the median BDC is still down 36%.

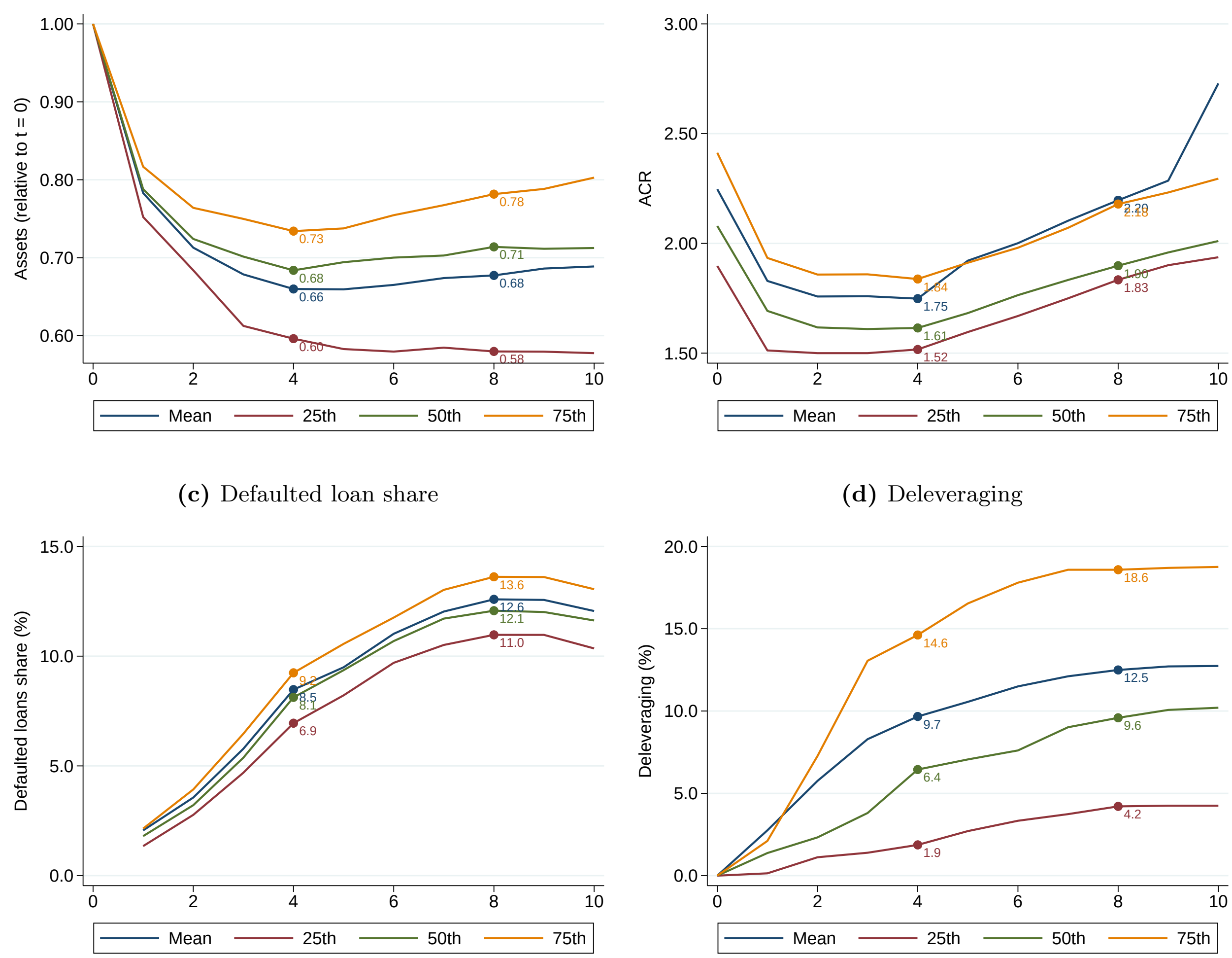
5.1 Results across BDC types

Figure 3 reports the results of the stress test exercise for different types of BDCs: perpetual private BDCs, finite-life private BDCs, and publicly traded BDCs. We plot the median for each type. Because all types hold relatively similar portfolios, the defaulted loan share plots in panel (c) is very similar across different types. At the same time, publicly traded BDCs delever by much more than other BDCs. By quarter 8, publicly traded BDCs delever by 15.7% versus 8.8% for perpetual BDCs and 4.2% for finite-life private BDCs. This is because publicly traded BDCs start with

[17] Median ACR in the simulation is a little bit lower than 225% reported in Table 1. The difference stems from how we handle other assets and liabilities and calculate ACR in the simulation. Rather than modeling the dynamics of other assets and liabilities, we scale portfolio investments to equal total assets, and we calculate ACR simply as the ratio of total assets to debt.

Figure 2
Deleveraging under a Severely Adverse Scenario

This figure reports the results of the stress test exercise modeling deleveraging under a severely adverse scenario. Details of the exercise are described in Section 4. Panel (a) plots the distribution of assets indexed to their initial value. Panel (b) plots the distribution of the asset coverage ratio (ACR). Panel (c) plots the distribution of the portfolio share of defaulted loans. Panel (d) plots the distribution of active deleveraging — the sum of asset sales, free cash flow used to repay debt instead of being reinvested in the portfolio, and declines in cash buffers, scaled by the initial assets.



(a) Assets

(b) ACR

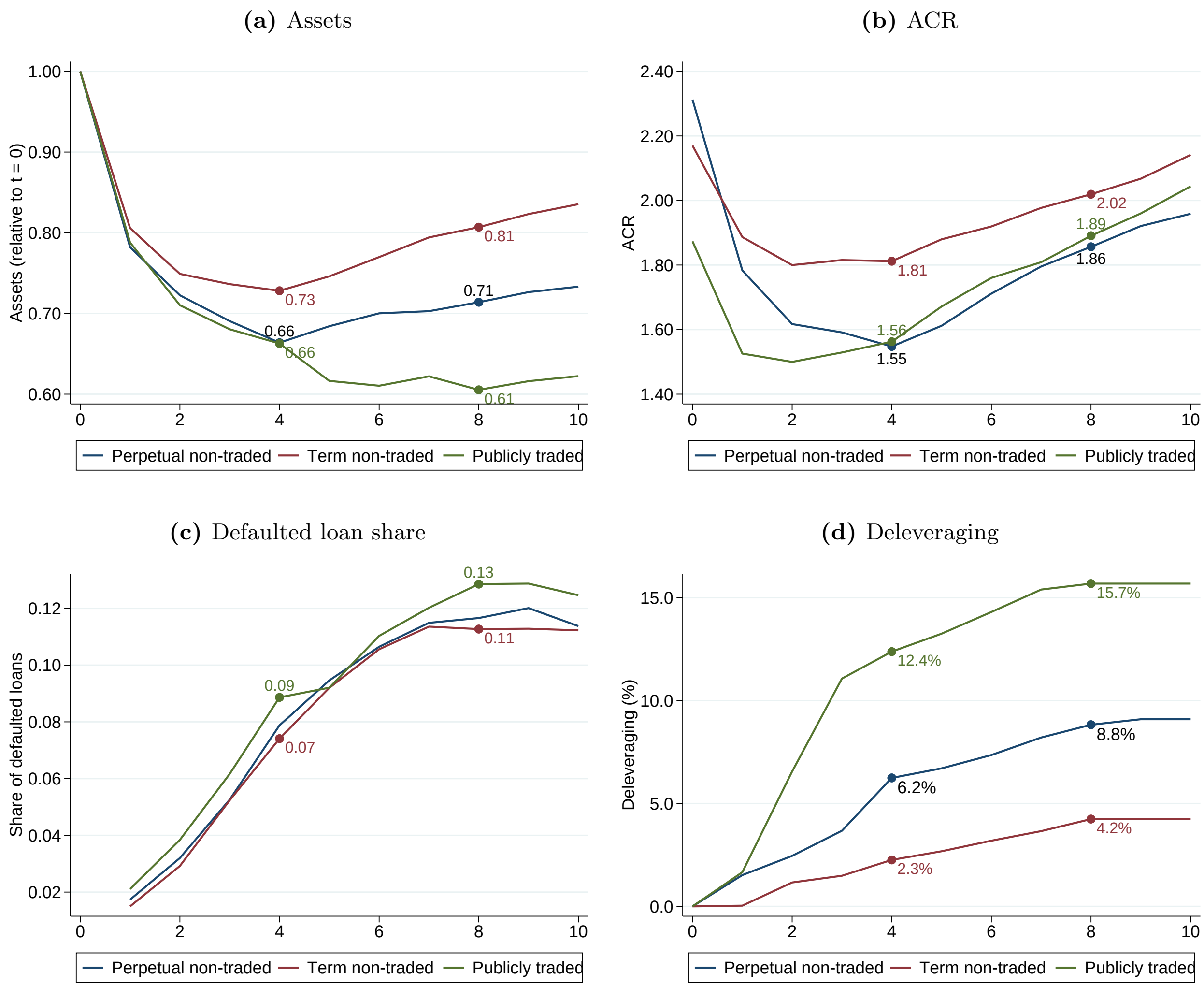
(c) Defaulted loan share

(d) Deleveraging

significantly lower asset coverage ratios. Perpetual and finite-life private BDCs start with similar asset coverage ratios, but because perpetual BDCs allow redemptions, they delever by much more than finite-life private BDCs. Interestingly, while assets of perpetual and finite-life private BDCs start to recover after four quarters, assets of publicly traded BDCs continue to decline.

Figure 3
Median Outcomes for Different Types of BDCs

This figure reports median outcomes for different types of BDCs: perpetual non-traded, term non-traded, and publicly traded BDCs. Details of the exercise are described in Section 4. Panel (a) plots assets indexed to their initial value. Panel (b) plots the asset coverage ratio (ACR). Panel (c) plots the portfolio share of defaulted loans. Panel (d) plots active deleveraging — the sum of asset sales, free cash flow used to repay debt instead of being reinvested in the portfolio, and declines in cash buffers, scaled by the initial assets.

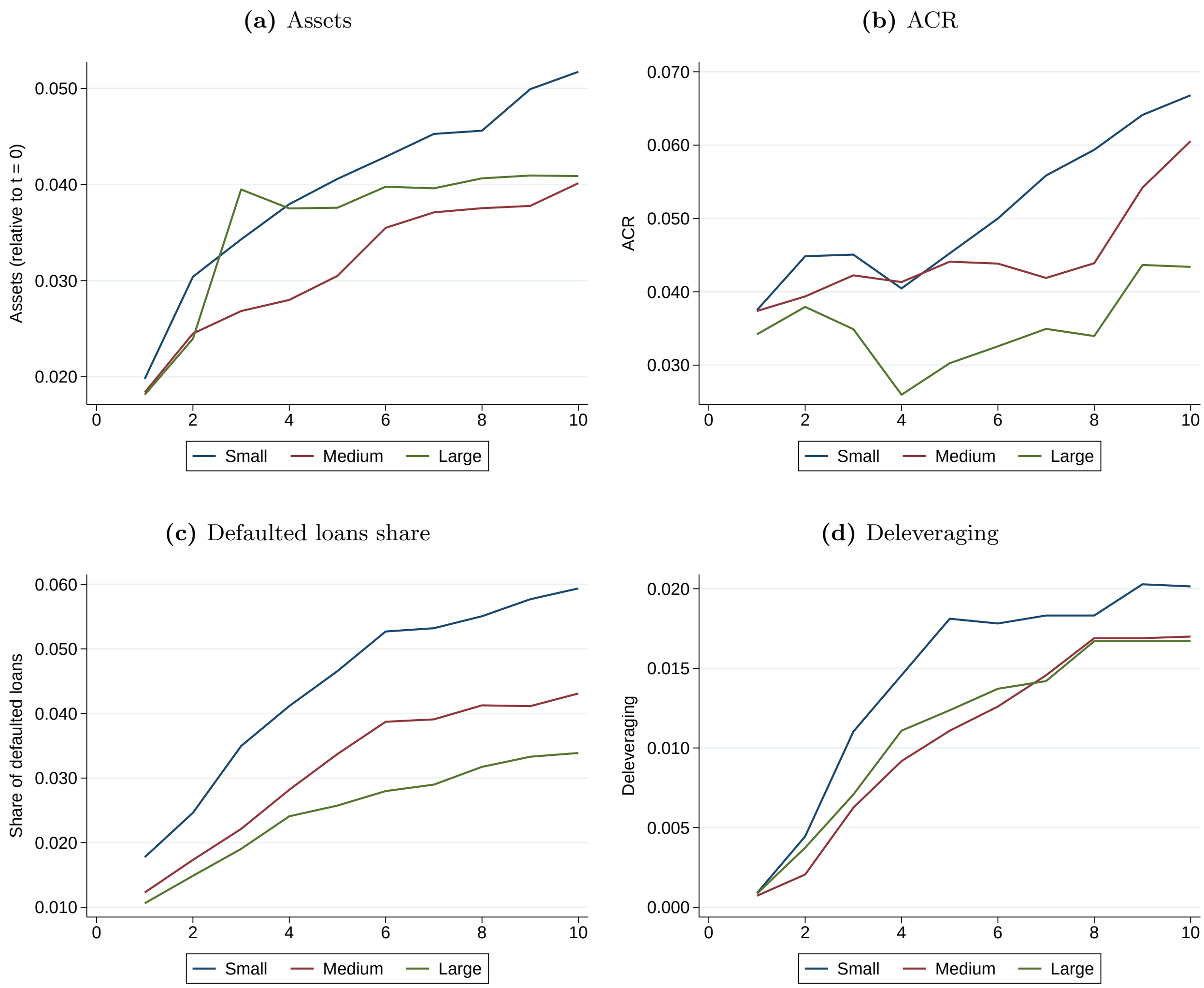


5.2 Variability in outcomes

While Figure 2 reports the cross-sectional distribution in typical outcomes across BDCs, it does not show the variability in outcomes for a given BDC. Figure 4 summarizes the variation in outcomes across simulations for a given BDC. We first calculate the standard deviation of a given outcome — for example cumulative deleveraging through quarter 4 or ACR as of quarter 8 — across all simulations of the same stress scenario for a given BDC. We then split BDCs into terciles based on their initial size. Figure 4 plots the median across BDCs in a given tercile of the standard deviation of outcomes across all simulations.

Figure 4
Variability in Outcomes

This figure shows the variability in outcomes across simulations of the same stress scenario. For each BDC and quarter in the exercise, we calculate the standard deviation of a given outcome across all simulations. We then split BDCs into tercile based on their initial size and plot the median of the standard deviation within each tercile.



There are a few interesting takeaways from Figure 4. First, smaller BDCs experience greater variability in outcomes across simulations. This is especially notable in the portfolio share of defaulted loans, plotted in panel (c). By quarter 8, the standard deviation of the defaulted loan share is 5.7% for small BDCs, 4.2% for medium BDCs, and 3.2% for large BDCs. Furthermore, variation in the share of defaulted loans appears to flatten for large and medium BDCs after quarter 6 but continues to increase for small BDCs.

Along with higher variation in the share of defaulted loans, small BDCs have greater variation in their ACR. By quarter 8, ACR varies by 0.062 for small BDCs, 0.047 for medium BDCs and 0.035 for large BDCs. Higher variation in ACR for smaller BDCs is likely because they having smaller portfolios and thus greater variation in the share of defaulted loans.

There is less variation in deleveraging across simulations and also much smaller differences between small and large BDCs. By quarter 8, the standard deviation of deleveraging across simulations varies from 0.0 to 0.013 for large BDCs to 0.020 for small BDCs.

5.3 Composition of deleveraging

Figure 5 decomposes aggregate deleveraging into asset sales, use of cash buffers, and use of free cash flow to repay debt instead of reinvesting in the portfolio. Panel (a) reports the results for all BDCs, while panels (b)–(d) report the results for publicly traded, perpetual non-traded, and term non-traded BDCs.

During the first quarter of the severely adverse scenario, BDCs rely primarily on cash buffers to repay debt. Cash buffers are mostly exhausted by the second quarter, at which point asset sales become the main channel of deleveraging. Asset sales abate after quarter four, but BDCs continue to deleverage by using FCF to repay debt instead of reinvesting in new loans. By the end of two years, asset sales contribute about 40% while cash buffers and FCF each contribute about 30% to aggregate deleveraging.

Panels (b)–(d) display notable variation in the dynamics of deleveraging across different types of BDCs. Publicly traded BDCs delever primarily through asset sales and later on through the use of FCF. Perpetual non-traded BDCs rely on asset sales and to a smaller extent on cash buffers. Term non-traded BDCs rely primarily on their cash buffers.

5.4 Cross-sectional variation in deleveraging

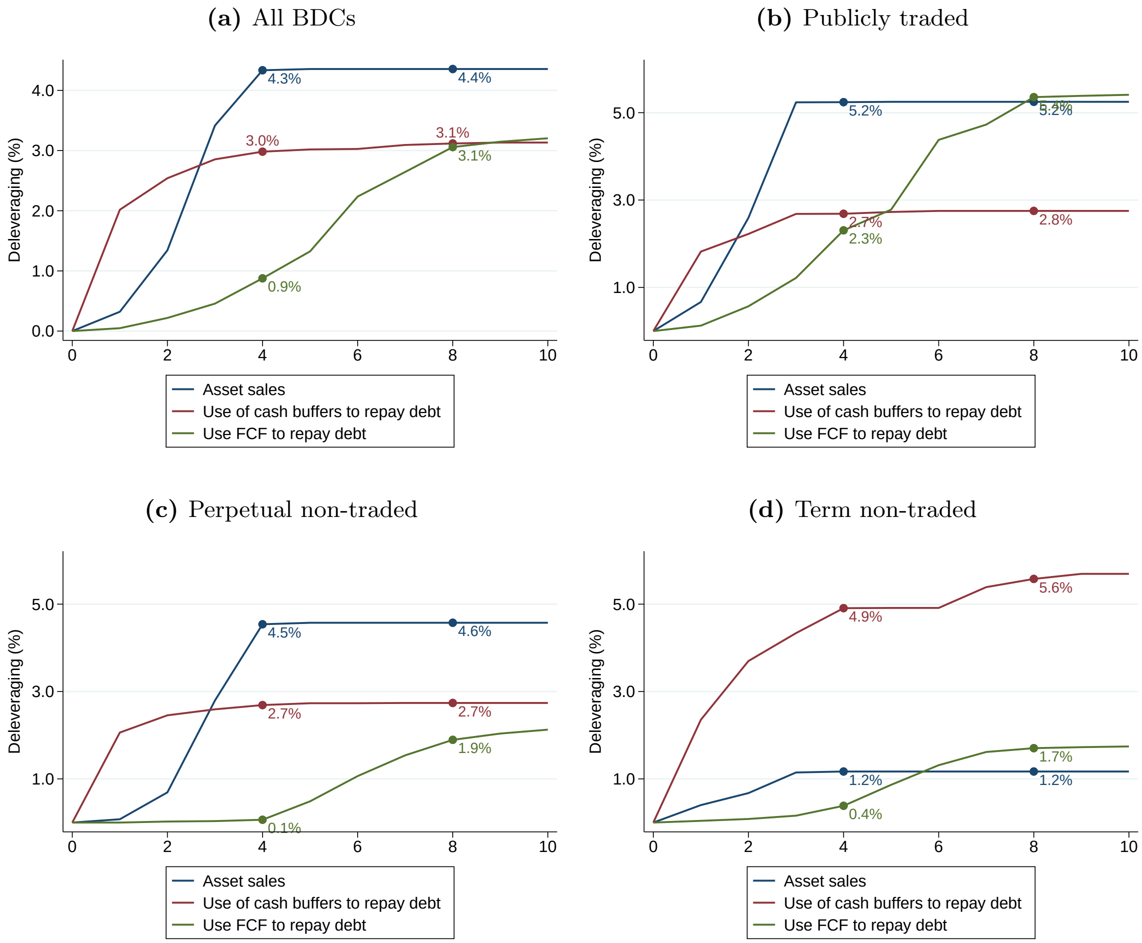
We next explore the cross-sectional variation in deleveraging. In Figure 6 we plot cumulative deleveraging through quarter 8 against the initial ACR. We do this separately for publicly traded (blue dots), perpetual non-traded (maroon dots), and term non-traded BDCs (green dots). The results in Figure 6 suggest that publicly traded BDCs delever more but this is mostly because they start with lower ACR. Most of the blue dots in Figure 6 are to the left of 200% ACR. Conditional on their initial ACR, publicly traded BDCs may delever less than non-traded BDCs.

Another pattern that emerges in Figure 6 is that given the same initial ACR, perpetual BDCs delever significantly more than other types of BDCs. This is largely because perpetual BDCs have to meet investor redemptions.

To examine the variation in deleveraging more systematically, Table 3 reports the results of regressions of deleveraging on BDC characteristics. In column 1, the explanatory variables are

Figure 5
Composition of Deleveraging

This figure decomposes aggregate deleveraging into i) assets sales, ii) use of cash buffers to repay debt, and iii) use of FCF to repay debt. All are scaled by the initial assets.



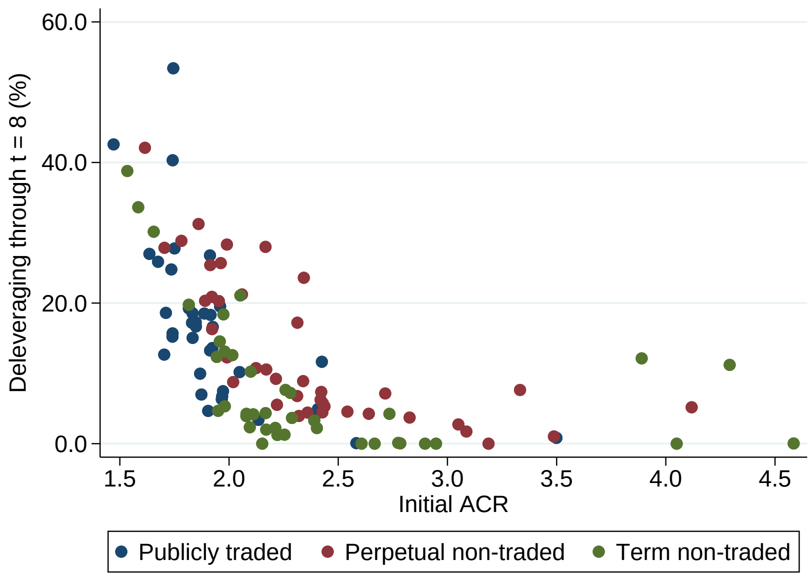
indicators of deciles of the initial ACR. BDCs in the bottom decile delever by 29.5%. BDCs with higher ACR delever significantly less. BDCs in the top decile delever by only 3.5%.

Column 3 adds variables that capture the riskiness of the BDC portfolio: industry default beta, as well as the share of portfolio assets other than loans: equities, JVs and CLOs. Controlling for the initial leverage, all of these except for equity share are positively correlated with deleveraging. For example, an increase in default beta of 0.20, which corresponds to a movefrom the 25th to the 75th percentile of default beta, is associated with about 2.8 percentage point greater deleveraging. Adding portfolio characteristics to the regression increases the adjusted R^2 from 0.562 to 0.656.

In column 3 we add indicators for public and term non-traded BDCs, with perpetual non-traded BDCs as the omitted category. Controlling for leverage and portfolio characteristics, term non-traded and publicly traded BDCs delever by 5.2 and 11.6 percentage points less than perpetual

Figure 6
Cross-Sectional Variation in Deleveraging

This figure explores the cross-sectional variation in deleveraging by plotting cumulative deleveraging through quarter 8 against the initial ACR. We do this separately for publicly traded, perpetual non-traded, and term non-traded BDCs.



BDCs. Interestingly, once we control for BDC type, the coefficient on equity share turns positive and statistically significant. In addition, the coefficient on CLO share increases significantly in magnitude.

In column 4, we omit the deciles of ACR; the only explanatory variables are portfolio characteristics and indicators for BDC types. The coefficients on equity and CLO share are much smaller in magnitude than in column 3 and lose their statistical significance. The coefficient on publicly traded BDCs is zero. These results reflect the fact that BDCs with higher equity and CLO share tend to have somewhat higher ACR to compensate for the riskiness of their portfolios. Without controlling for ACR, the coefficients on equity and CLO share proxy for offsetting effects and are therefore not significant. The R^2 in column 5 of 0.191 is only one-third of the R^2 in column 1 of 0.562. It appears that leverage is much more important in explaining deleveraging than portfolio risk.

5.5 Alternative scenarios and assumptions

5.5.1 Drawdowns

Figure 7 examines the effect of drawdowns by portfolio companies on deleveraging by BDCs. Drawdowns could be quite large during a stress scenario, as evidenced during the GFC and COVID pandemic (Ivashina and Scharfstein, 2010; Chodorow-Reich et al., 2022; Greenwald, Krainer, and

Table 3
Cross-Section of Deleveraging

This table reports the results of regressions of deleveraging on BDC characteristics.

	(1)	(2)	(3)	(4)
ACR decile 1	29.459***	14.029**	20.308***	
	(2.821)	(5.406)	(4.443)	
ACR decile 2	24.029***	5.173	13.250***	
	(3.439)	(5.438)	(4.593)	
ACR decile 3	17.465***	−1.154	6.211	
	(2.513)	(5.307)	(4.116)	
ACR decile 4	14.789***	−0.733	4.153	
	(1.872)	(4.796)	(3.920)	
ACR decile 5	13.555***	−2.403	2.042	
	(2.121)	(4.604)	(4.221)	
ACR decile 6	7.274***	−7.922**	−3.708	
	(2.346)	(3.825)	(3.707)	
ACR decile 7	6.238***	−8.835**	−6.172*	
	(1.286)	(4.099)	(3.546)	
ACR decile 8	7.073***	−8.895*	−5.844	
	(1.812)	(4.598)	(3.774)	
ACR decile 9	2.452***	−13.672***	−10.223**	
	(0.768)	(4.598)	(3.906)	
ACR decile 10	3.541***	−12.811***	−9.804**	
	(1.292)	(4.680)	(3.827)	
Industry default beta		14.219***	13.152***	12.033**
		(3.919)	(3.367)	(5.114)
JV share		135.700***	159.389***	170.328***
		(50.641)	(46.498)	(61.598)
Equity share		−3.042	23.439***	11.156
		(7.887)	(8.579)	(14.178)
CLO share		21.965***	37.463***	11.858
		(7.369)	(10.764)	(12.351)
Term non-traded			−5.152***	−5.034**
			(1.130)	(2.268)
Publicly traded			−11.645***	−0.073
			(1.971)	(2.567)
Constant				−0.676
				(5.881)
N	116	116	116	116
Adjusted R^2	0.562	0.656	0.762	0.191

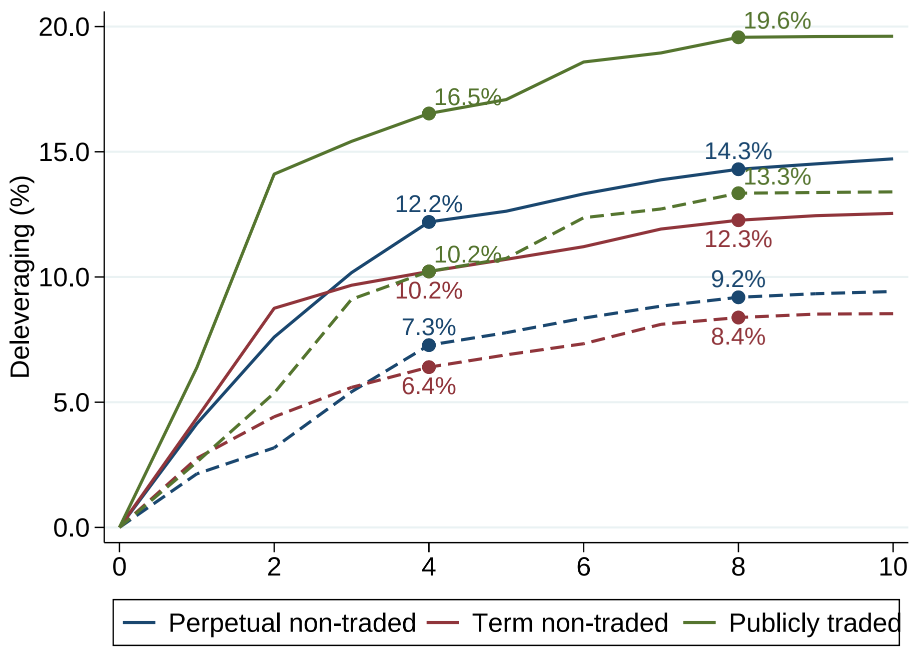
Paul, forthcoming). Such drawdowns could limit the capacity of BDCs to extend credit to other firms as they try to comply with the asset coverage requirements. Drawdowns also drain the liquidity of banks that provide the credit lines, which could limit their ability to lend to other borrowers, as shown in Greenwald, Krainer, and Paul (forthcoming).

In principle, firms may be more likely to draw down lines of credit than delayed-draw term loans, which may have stricter conditions attached to them. Because we only have data on aggregate commitments to lend, we assume that at $t = 1$, portfolio companies draw down half of the lines of credit and delayed-draw term loans extended to them. Figure 7 plots the aggregate deleveraging by different types of BDCs under the baseline model (dashed lines) versus the alternative model that accounts for drawdowns by portfolio firms (solid lines). It is important to note that, consistent with the baseline model, deleveraging is the sum of asset sales, use of cash buffers to repay debt, and use of FCF to repay debt. Thus, the deleveraging in Figure 7 does not net out the value of drawdowns themselves.

Figure 7

Deleveraging with Drawdowns by Portfolio Firms

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a model that accounts for drawdowns by portfolio firms. The alternative model assumes that half of each BDC's commitments to lend to its portfolio companies are drawn down at $t = 1$. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.



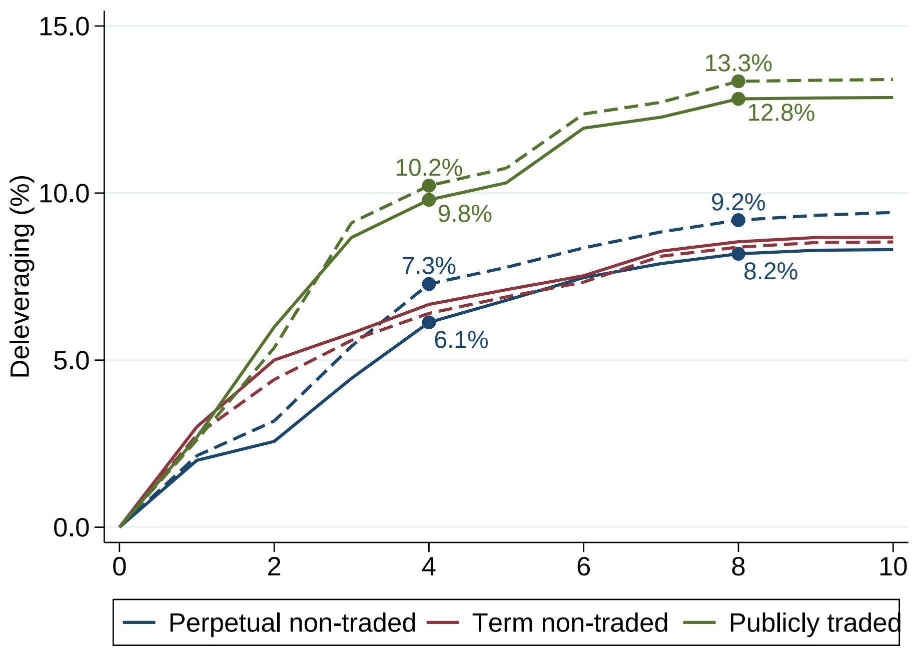
With drawdowns by portfolio firms, BDCs delever by 3.9–6.3 percentage points more than under the baseline model that does not account for drawdowns. The effect is largest for perpetual BDCs, which by $t = 8$, delever by 19.6% under the alternative model versus 13.3% under the baseline. The effect is smallest for finite-life private BDCs, whose deleveraging increases from 8.4% to 12.3%.

5.5.2 DRIP

We next examine the potential effects on deleveraging of dividend reinvestment plans (DRIPs). Almost all BDCs have an opt-out DRIP. By reinvesting dividend distributions, DRIPs may allow BDCs to avoid forced deleveraging. Our baseline model is conservative in assuming that in a severely adverse scenario, investors will opt out of DRIPs and elect to receive their distributions in cash. The alternative model reported in Figure 8 assumes that DRIP reinvestment rates are unaffected and remain at their 2024 values. This alternative assumption is motivated by the experience of Blackstone Real Estate Income Trust (BREIT) and Starwood Real Estate Income Trust (SREIT). These structure of these two REITs is similar to that of perpetual non-traded BDCs in that they allow periodic redemptions that are capped at 5% of NAV and are at the discretion of the board of trustees. As shown in the Appendix Figure A3, BREIT and SREIT experienced large redemptions starting in the second half of 2022. For SREIT, the share tendered for redemption peaked at 80% in 2024Q2. Despite spikes in redemptions, dividend reinvestment rates for the two REITs have been remarkably constant.

Figure 8
Deleveraging with DRIP

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a model that accounts for dividend reinvestment. The alternative model assumes that each BDC's dividend reinvestment rate stays constant at its 2024Q4 value. Dividend reinvestment rate is the value of stock issued under DRIP divided by the value of dividends paid. The distribution of DRIP rates for different types of BDCs is reported in the Appendix Table A2. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.



Consistent with perpetual BDCs having significantly higher DRIP rates, dividend reinvestment has a larger effect on the deleveraging of perpetual BDCs than other types of BDCs. Aggregate deleveraging of perpetual BDCs declines from 9.2% to 8.2%. For publicly traded BDCs aggregate deleveraging decreases from 13.3% to 12.8%.

5.5.3 Uncalled capital commitments

Our next model accounts for the uncalled capital commitments that BDCs may be able to call on. Figure A4 in the Appendix reports the distribution of uncalled capital commitments and provides details on data collection. A little less than a third of all BDCs active as of 2024Q4 had uncalled capital commitments. Conditional on having uncalled capital, the median ratio of such uncalled capital commitments to total assets is 27%.

We assume that BDCs call all their uncalled capital at $t = 1$. New capital is included in the calculation of free cash flow, which is reinvested according to the rules in Section 4.5. Specifically, BDCs with pro forma ACR of at least 200%, reinvest all of their positive FCF. As pro forma ACR declines, a larger share of FCF is used to repay debt.

Figure 9
Deleveraging with Uncalled Capital Commitments

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a model that accounts for uncalled capital commitments. The alternative model assumes that BDCs call all of their uncalled capital commitments at $t = 1$. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.

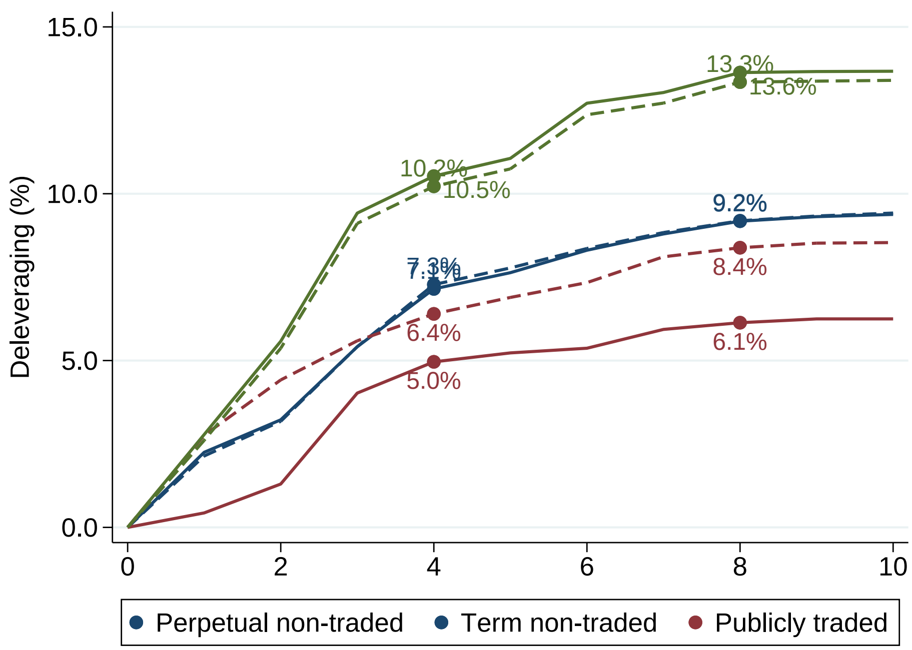


Figure 9 shows that only the deleveraging of finite-life private BDCs is affected by uncalled capital commitments. Publicly traded and perpetual BDCs generally do not have uncalled capital commitments. Although conditional on being positive, capital commitments are a large fraction of assets, incorporating uncalled capital commitments in our simulations has relatively modest effects on deleveraging. Finite-life private BDCs delever by 6.1% under the alternative model versus 8.4% in the baseline model. Note, however, that the effect on deleveraging would be larger if we allowed

BDCs with high ACR to increase their leverage and calculated aggregate deleveraging as the sum of net deleveraging across all BDCs rather than as gross deleveraging.

5.5.4 High interest rates

Our baseline model assumes that in a severely adverse scenario, the Federal Reserve will cut short-term interest rates to almost zero. We now consider a stagflationary scenario where the Fed keeps interest rates high in order to fight inflation, while output falls and spreads and default rates increase?

Figure 10
Deleveraging in a Stagflationary Scenario

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a stagflationary scenario in which short-term interest rates stay high. The stagflationary scenario has exact same dynamics of all parameters — spreads, default rates, stock returns — as the baseline scenario except that SOFR stays at its 2024Q4 value. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.

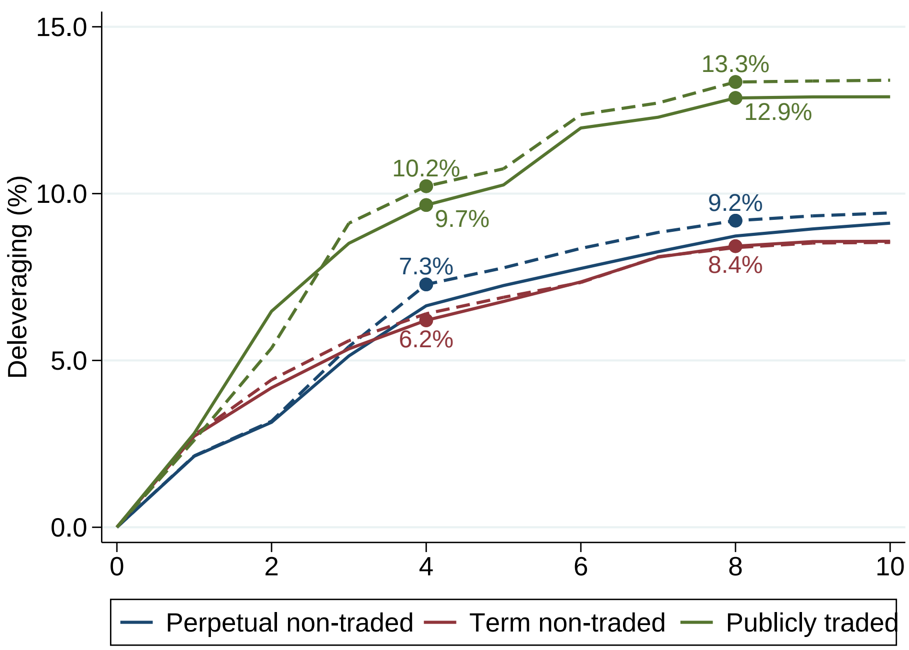


Figure 10 shows that such a stagflationary scenario results in about 0.4–0.5 percentage points less deleveraging. With the same aggregate default rate as under the baseline scenario, high interest rates boost net investment income, ten percent of which is assumed to be retained.[18] However, this does not account for the possibility that higher interest rates exert more pressure on portfolio

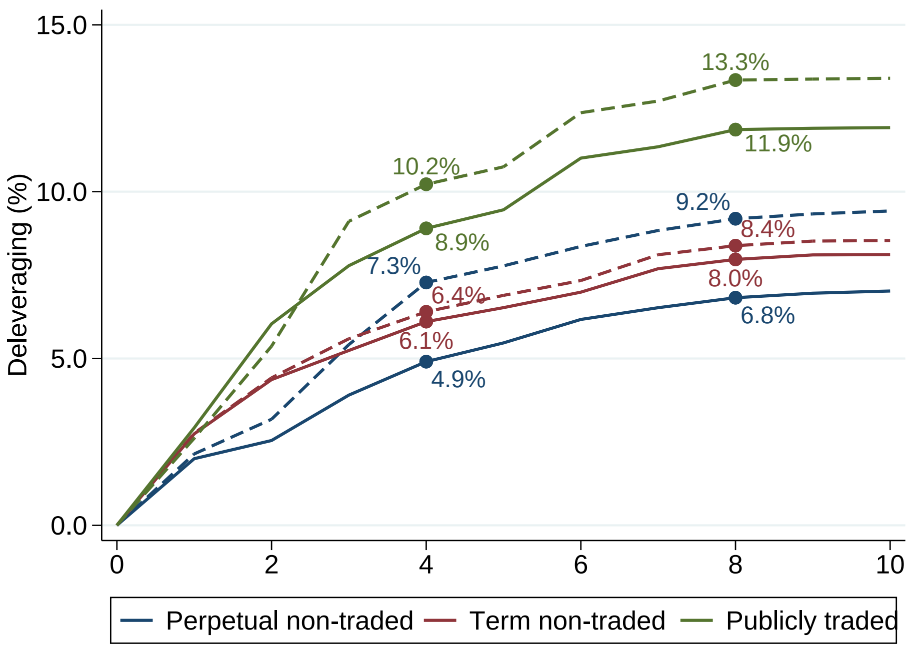
[18] The rough calculation here is that with interest rates about 4% higher and about 1:1 debt-to-equity ratio, BDCs generate incremental annual net investment income of 2% of assets. If 10% of net investment income is retained, then the effect over ten quarters is about 0.5% of assets.

companies, resulting in higher default rates and thus greater deleveraging.

Holding fixed default rates, high interest rates should have a stronger effect when we account for dividend reinvestment. We report the results of such an exercise in Figure 11, where similar to the model in Figure 8 we assume that the DRIP rate stays at its 2024Q4 value (instead of dropping to zero). In the model with high interest rates and constant DRIP rate, deleveraging is 0.4–2.4% smaller.

Figure 11
Deleveraging in a Stagflationary Scenario with Constant DRIP

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a stagflationary scenario in which short-term interest rates stay high and DRIP rates stays at its 2024Q4 value. The stagflationary scenario has exact same dynamics of all parameters — spreads, default rates, stock returns — as the baseline scenario except that SOFR stays at its 2024Q4 value. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.



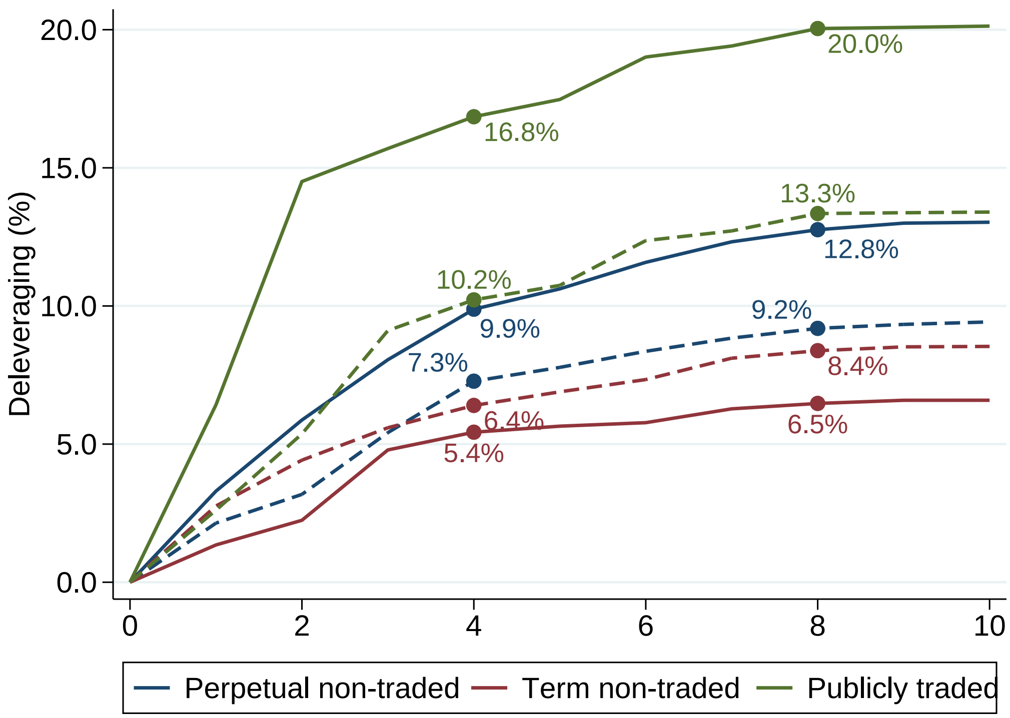
5.5.5 Kitchen-sink model

We next report in Figure 12 the results of a simulation that incorporates drawdowns by portfolio firms, uncalled capital commitments, and DRIP. Publicly traded and perpetual non-traded BDCs delever by more than in the baseline model, while term non-traded BDCs delever by less. Publicly traded BDCs in particular delever by 20.0% in this model compared to 13.3% under the baseline model. Perpetual non-traded BDCs delever by 12.8% versus 9.2% in the baseline model. Term non-traded BDC delever by less than in the baseline model: 6.5% versus 8.4%. This reduction in deleveraging is because of their large uncalled capital commitments.

Figure 12

Deleveraging with Portfolio Drawdowns, Uncalled Capital Commitments, and DRIP

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a model that incorporates drawdowns by portfolio firms, uncalled capital commitments, and DRIP. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.



5.5.6 Incomplete mark-to-market

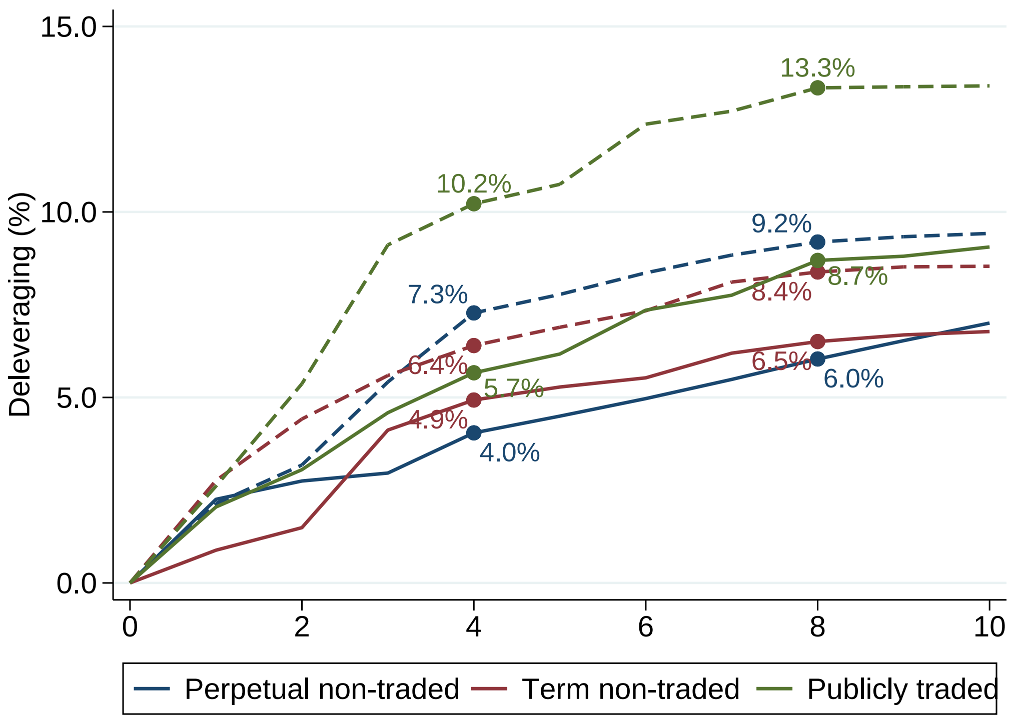
Loans held by private credit funds are considered level 3 assets given their high degree of illiquidity and lack of traded market prices. As such, fair-value accounting rules allow funds to base their valuations on models with subjective inputs. This flexibility enables funds to use granular borrower information to forecast defaults and recoveries, but it could also enable them to overstate fair value during periods of significant stress. To mitigate concerns about strategic valuation, funds often use third parties to value their portfolios. Jang and Kim (2025) finds that funds rarely override third-party valuation and that when they do it is when the fund likely has more information.

Our approach to loan valuation during periods of stress differs from what funds do in practice. As noted above, we assume that loan prices fall to levels consistent with our forecast of market yields on comparable loans during a severely adverse scenario – an increase of approximately 10 percentage points relative to the baseline. This may overstate the decline in reported loan values if the assumed increase in yields is based on yields of traded loans; their prices may fall more than fundamentals would warrant given forced selling by holders of these loans. Moreover, funds and third-party valuation firms may be reluctant to aggressively write down loans given uncertainty about the duration and ultimate serverity of distress. There may also be incentives for them to smooth reported fair values.

Thus, we consider a model in which loan values are not marked down as aggressively as our baseline model. As a way to model deleveraging under incomplete mark-to-market valuation, we consider a scenario where the average yield spread increases by only half of its increase in the baseline model. Otherwise the models are identical. Note that we are assuming that any asset sales occur at the incomplete mark-to-market valuation. Figure 13 reports the results.

Figure 13
Deleveraging with Incomplete Mark-to-Market

This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a scenario in which average yield spreads increase by only half as much as in the baseline model. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model.



Not surprisingly, when there is incomplete mark-to-market valuation, there is significantly less deleveraging. In the aggregate, publicly traded BDCs delever by 8.7% under the alternative versus 13.3% under the baseline model. Perpetual and finite-life private BDCs delever by 6.0% and 6.5% under this alternative model as compared to 9.2% and 8.4% under the baseline model.Nevertheless, even under the alternative of incomplete mark-to-market, there is significant deleveraging.

5.5.7 No asset sales

Our simulations so far have assumed that to comply with contractual and regulatory limits on their leverage, funds can always sell portfolio loans. Indeed, Figure 5 shows that in the baseline simulation, approximately 40% of aggregate deleveraging is achieved through asset sales. However, currently there is no active market for trading direct loans. Bloomberg, for example, reports that JPMorgan has been trying in vain to jumpstart trading in private credit loans.[19] In one notable case, JPMorgan offered to pay more than 90 cents on the dollar for a loan to educational software company Pluralsight. Even though Pluralsight was in severe distress and some lenders had already marked down the value of their loans to 50 cents on the dollar, lenders turned down JPMorgan's offer. There are a number of factors that may limit asset sales. First, some loan contracts may prohibit loan sales. Second, standard confidentiality agreements limit the ability of a potential seller to provide borrower information to a potential buyer, thus effectively limiting loan sales to other exiting lenders to the firm. Third, if a loan sale has to occur at a significant discount to its reported fair market value, it may not increase the asset coverage ratio and thus help the BDC comply with regulatory and contractual leverage constraints.[20] Finally, a BDC may be reluctant to sell a loan given that one of the fundamental propositions for borrowers is that the private credit lender is a long-term partner rather than transactional lender.

What happens if private credit funds are unable to delever through asset sales? Figure 14 reports the results of two alternative scenarios in which there are no asset sales. Funds behave similarly to the baseline model, except that they never sell assets to stay in compliance with the minimum asset coverage ratio. Instead, when the ACR falls below the regulatory minimum, funds are considered to be in technical default on their loans. Banks exercise forbearance and do not require immediate repayment, and instead increase the spread on their lines of credit by two percentage points.[21] We chose this increase because it is consistent with the interest rate increase stated in the revolving credit agreements when firms default. In the simulation, banks also allow BDCs to draw down existing lines of credit up to the maximum committed amount. If there is no availability under the existing lines of credit, BDCs can take out new lines at the prevailing BB-rated spread. In practice, SEC regulations would prohibit BDCs from incurring new debt when their ACR is below the regulatory minimum; however, allowing BDCs to borrow in the simulation is the simplest way to implement the no-asset-sales restriction. Since maturing BDC debt is a major source of negative cash flow for BDCs, one can think of the simulations modeling forbearance by banks on maturing debt rather than incurrance of completely new debt.

[19] https://www.bloomberg.com/news/features/2025-06-24/private-credit-rejects-jpmorgan-trading-push

[20] Specifically, one can show that as long as debt is less than the mark-to-market value of assets, (i.e. the value of assets at the actual sale price), then an asset sale would increase the asset coverage ratio and loosen leverage constraints.

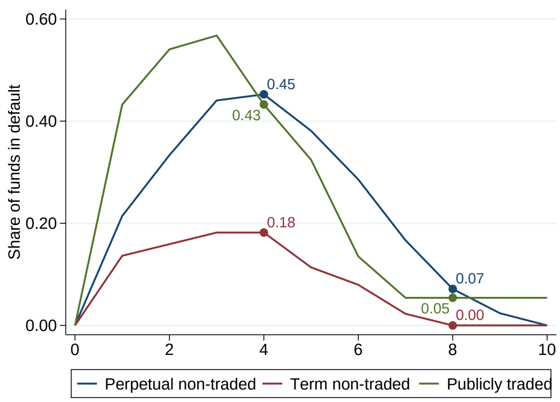
[21] There is no change in the interest rate on fixed-rate bonds.

Figure 14
Deleveraging when Asset Sales are not Allowed

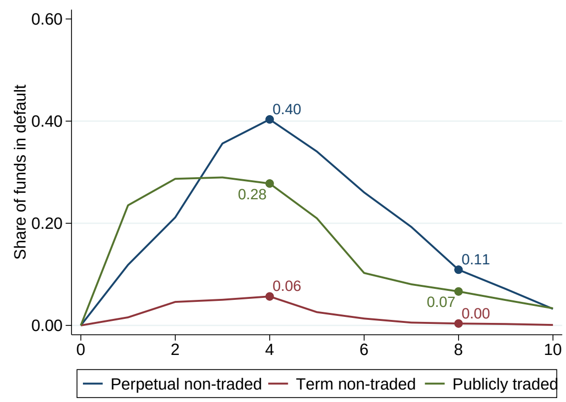
This figure compares aggregate deleveraging by different types of BDCs under the baseline model versus a model in which there are no asset sales. Panels (a), (c), and (e) on the left assume 100% mark-to-market. Panels (b), (d), and (f) on the right assume 50% mark-to-market. Panels (a) and (b) plot the share of BDCs in technical default, i.e., with ACR below the regulatory minimum. We first calculate the median of each BDC's default across all simulations; we then calculate the mean across BDCs of a given type. Panels (c) and (d) plot aggregate deleveraging under the baseline and alternative models. Dashed lines plot outcomes under the baseline model, while solid lines plot outcomes under the alternative model. Panels (e) and (f) plot the share of BDCs with different values of ACR for BDCs with ACR below 150%.

100% mark-to-market | **50% mark-to-market**

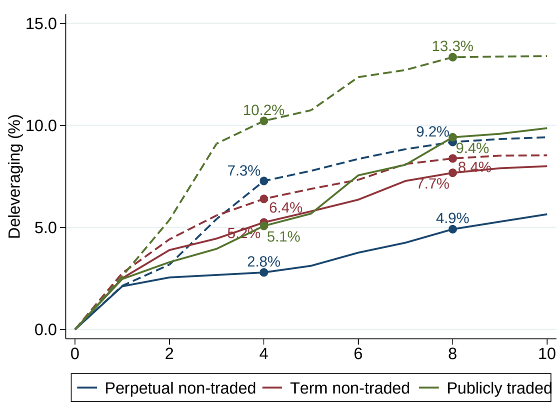
(a) BDCs in default



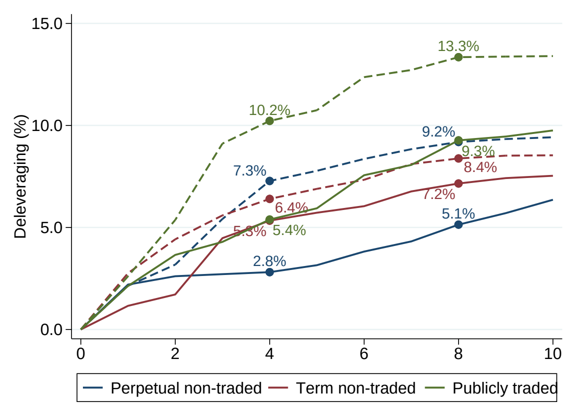
(b) BDCs in default



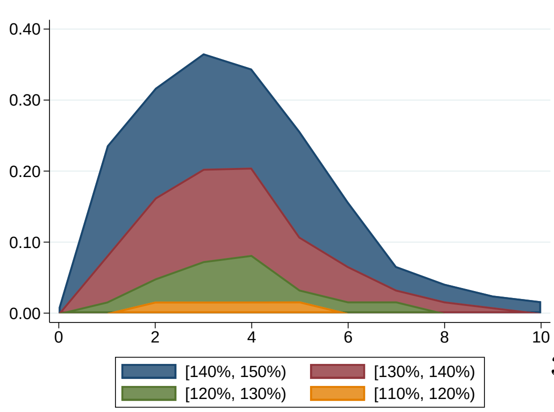
(c) Deleveraging (%)



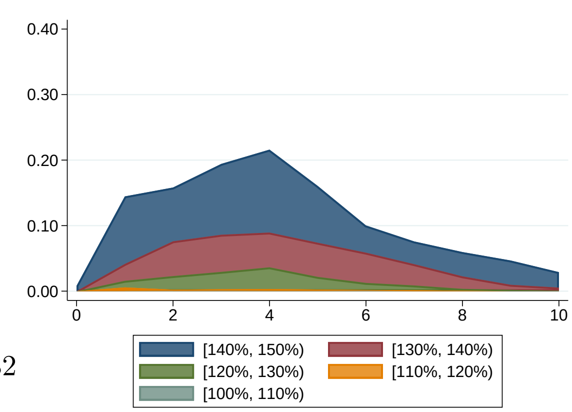
(d) Deleveraging (%)



(e)
Distribution of ACR among BDCs in technical default



(f)
Distribution of ACR among BDCs in technical default



The two columns in Figure 14 report the results of two alternative scenarios in which there are no assets sales. In the column on the left, there is 100% mark-to-market, i.e., the discount rate that funds use to value portfolio loans changes one-for-one with the assumed yield spread shock. In the column on the right, there is 50% mark-to-market, i.e., the discount rate that funds use to value portfolio loans changes by only half as much as the assumed yield spread shock. Otherwise, the two models are identical.

Panels (a) and (b) of Figure 14 reports the fraction of different types of BDCs in technical default, specifically with with ACR below the 150% minimum. Panel (a) shows that, with 100% mark-to-market, the share of publicly traded BDCs in default spikes rapidly, reaching 57% by quarter 3. It then declines rapidly to 5% by quarter 8. The share of perpetual non-traded BDCs that are in default increases a little bit more gradually, reaching a peak of 45% in quarter 4. The primary difference between publicly traded and perpetual non-traded BDCs is that publicly traded BDCs typically start with a low ACR and quickly drop below the minimum. Perpetual non-traded BDCs start with a higher ACR, which is eroded more gradually through quarterly redemptions. The default rate for term non-traded BDCs peaks at 18% in quarter 4. Term non-traded BDCs are much less likely to default on their debt because they start with significantly higher ACR and do not suffer redemptions.

Panel (b) of Figure 14 shows that with 50% mark-to-market, default rates are significantly lower. After four quarters, 28% of publicly-traded, 40% of perpetual non-traded, and 6% of term non-traded BDCs are in technical default. With 100% mark-to-market, the shares are 43%, 45%, and 18%. Incomplete mark-to-market has less of an effect on the technical default of perpetual non-traded BDCs. The reason is that for perpetual non-traded BDCs an important driver of ACR is redemptions, whose value actually increases with incomplete mark-to-market since redemptions are modeled as a fraction of NAV.

Panels (c) and (d) of Figure 14 reports aggregate deleveraging under the baseline model (dashed lines) versus the alternative model with no asset sales (solid lines). When asset sales are not allowed, there is much less deleveraging. Focusing on panel (c), which reports the results under 100% mark-to-market, by quarter 8, publicly traded BDCs delever by 9.4% versus 13.3% under the baseline model, while perpetual non-traded BDCs delever by 4.9% versus 9.2% under the baseline model. The difference in deleveraging is much smaller for term non-traded BDCs, which delever by 7.7% versus 8.4% under the baseline mode. Despite large differences in technical defaults between the 100% and 50% mark-to-market models, aggregate deleveraging is very similar between the two scenarios. Since there are no asset sales, all of the deleveraging is happening through using cash buffers and free cash flow to reduce debt. Whether funds are below or slightly above the ACR threshold makes little difference for how much cash buffers and free cash flow they use to delever.

Finally, panels (e) and (f) of Figure 14 report the share of BDCs in different bands of ACR: 100–110%, 110–120%, . . . , 140–150%. The vast majority of BDCs, especially in the 50% mark-to-market scenario, have ACR of at least 130%, and thus, from a lender's pespective, continue to maintain decent cushion of assets that protects their position in the loan. This suggests that bank's assumed forebearance is indeed justified.

Overall, the results in Figure 14 highlight an important trade-off. If banks are willing to exercise forbearance, there is much less deleveraging by private credit funds. But at the peak, about half of BDCs are in technical default on their bank loans.

5.5.8 Summary and limitations

We summarize the results of alternative scenarios in Table 4. The scenarios are in rows. The columns report aggregate deleveraging through $t = 4$ and $t = 8$ by different types of BDCs.

Table 4
Summary of Deleveraging under Alternative Scenarios

This table reports summary statistics on aggregate deleveraging by different types of BDCs under alternative scenarios. We report cumulative deleveraging through quarters $t = 4$ and $t = 8$ relative to the initial assets.

	Perpetual non-traded		Term non-traded		Publicly traded	
	$t = 4$	$t = 8$	$t = 4$	$t = 8$	$t = 4$	$t = 8$
Baseline	7.3%	9.2%	6.4%	8.4%	10.2%	13.3%
Uncalled capital	7.1%	9.2%	5.0%	6.1%	10.5%	13.6%
Drawdowns	12.2%	14.3%	10.2%	12.3%	16.5%	19.6%
DRIP	6.1%	8.2%	6.7%	8.5%	9.8%	12.8%
High rates	6.6%	8.7%	6.2%	8.4%	9.7%	12.9%
High rates + DRIP	4.9%	6.8%	6.1%	8.0%	8.9%	11.9%
Kitchen sink	9.9%	12.8%	5.4%	6.5%	16.8%	20.0%
50% mark-to-market	4.0%	6.0%	4.9%	6.5%	5.7%	8.7%
Sales not allowed						
100% mark-to-market	2.8%	4.9%	5.2%	7.7%	5.1%	9.4%
50% mark-to-market	2.8%	5.1%	5.3%	7.2%	5.4%	9.3%

It is also worth summarizing some of the limitations of our deleveraging exercise. First, our modeling of drawdowns on commitments to portfolio companies is incomplete. Because we have only BDC-level commitments data, we allocate drawdowns pro-rata across all portfolio firms. However, distressed firms may be more likely than healthy firms to draw down on their facilities, and draw larger amounts when they do so (Ivashina and Scharfstein, 2010). In that case, our results may underestimate the decline in BDC assets.[22]

Second, the results are contingent on the parameters of the severely adverse scenario. While we used mostly the same parameters as the Fed's 2023 severely adverse stress test scenario, we had to make our own assumptions about the increase in yield spreads and in default rates. Our peak default rate of 16.6% reflects the historical experience of B and lower rated issuers during the GFC. Similarly, our assumption about the increase in yield spreads combines information from the

[22] On the other hand, our commitments data include both lines of credit and delayed draw terms loans. The latter may have stricter covenants and precedent conditions that have to be met before borrowers can draw on the loan. Firms may therefore be restricted in their ability to draw down these commitments as a precaution.

severely adverse scenario with the behavior of yield spreads during the GFC. Specifically, we use the ratio of the increases in the yield spreads on BBB versus B and lower rated bonds during the GFC to scale up changes in the yield spread on BBB-rated bonds assumed in the severely adverse scenario. Finally, there is some ambiguity on the extent to which BDCs can sell loans, whether they will violate ACR covenants, and whether banks will be willing to defer calling loans in technical default. THe next section explores the nature of deleveraging, asset sales, covenant violations and forbeearance during the GFC.

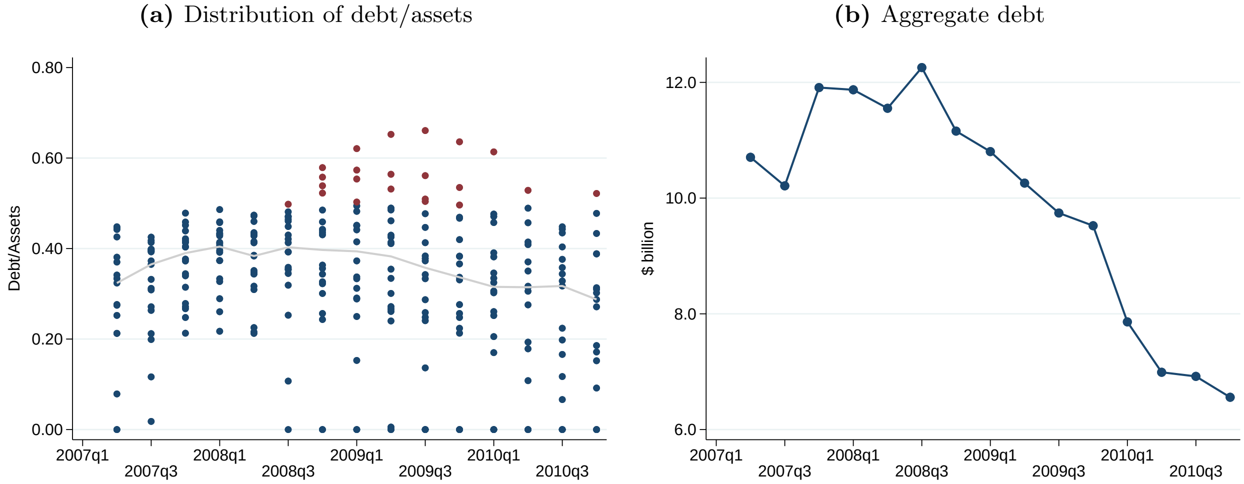
6 BDCs during the Global Financial Crisis

This section examines the experience of BDCs during the GFC. Although the industry has evolved significantly since then, with aggregate assets growing more than ten times, it is informative to examine how leverage and portfolio risk affected the response of BDCs to the GFC. As of 2007Q4, there were 53 BDCs with aggregate assets of about $34 billion. Most of these BDCs were very small. Only 27 had at least $100 million in assets. Together, these 27 BDCs account for more than 99% of aggregate assets. Out of these 27 BDCs with at least $100 million in assets, two did not have any debt, and one — Medallion Financial Corp — had very high consolidated leverage because it had an industrial bank subsidiary. Another four BDCs employed little leverage and had asset coverage ratios in excess of 400%. Given their low initial leverage, these four BDCs were very unlikely to be forced to delever during the GFC. We are therefore left with 20 BDCs with at least $100 million in assets and leverage that may put them at risk of having to delever. Out of these, the top five — American Capital, Allied Capital, Appollo Investment, Ares Capital and MCG Capital — accounted for 73% total BDC assets. For these twenty BDCs we manually collect data on the value of their investments and portfolio composition. We track their asset coverage ratios over time and examine how the asset coverage ratio affects deleveraging. We then present brief case studies of the five largest BDCs to demonstrate the varied ways that BDCs managed through the GFC. Our findings are generally consistent with what emerges from our model.

Figure 15 reports statistics on the BDC leverage around the GFC. Panel (a) plots the distribution of leverage (debt-to-assets) in each quarter between 2007Q2 and 2010Q4. We report the debt-to-assets ratio rather than ACR because the latter is not defined for funds that reduce their debt to zero. Each dot represents a BDC. Red dots correspond to BDCs with ACR less than 200%. The gray line plots the median during each quarter. Median leverage is fairly flat at around 40% (ACR of 250%) throughout 2008, then declines gradually throughout 2009–2010 to 30%. However, a stable median during 2008 masks an increasing dispersion in outcomes. Starting with Triangle Capital Corporation in 2008Q3, a number of BDCs drop below 200% ACR. Allied Capital, American Capital, and Triangle Capital stay below 200% ACR for almost all of 2009. Others like MCG Capital and Kohlberg Capital experience shorter spells below the cutoff. Panel (b) plot the value of aggregate debt of these 20 BDCs. It peaks at $12.3 billion in 2008Q3 and then declines sharply

Figure 15
Changes in BDC Leverage Around the GFC

This figure plots the distribution of leverage (debt-to-assets ratio) in panel (a) and aggregate debt in panel (b) for 20 BDCs with assets of at least \$100 million and ACR between 200% and 400% as of 2007Q4. In panel (a), each dot represents a BDC; maroon dots correspond to BDCs with ACR less than 200%.



to \$9.5 billion by 2009Q4 and \$6.6 billion, or a bit more than half of its peak, by 2010Q4.

Figure 16 looks at which BDCs delever more. We measure deleveraging as the difference between debt in 2007Q4 and 2009Q4, scaled by assets as of 2007Q4. Figure 16 presents a scatter plot of deleveraging versus the initial ACR. Although our sample is small, there is evidence of a strong negative relation — BDCs with lower initial ACR delever by more. BDCs with a high initial ACR, in particular with values above 275%, increase their investments during this period. A one standard deviation increase in the initial ACR of 0.59 is associated with almost 14 percentage points less deleveraging.

6.1 Brief case studies

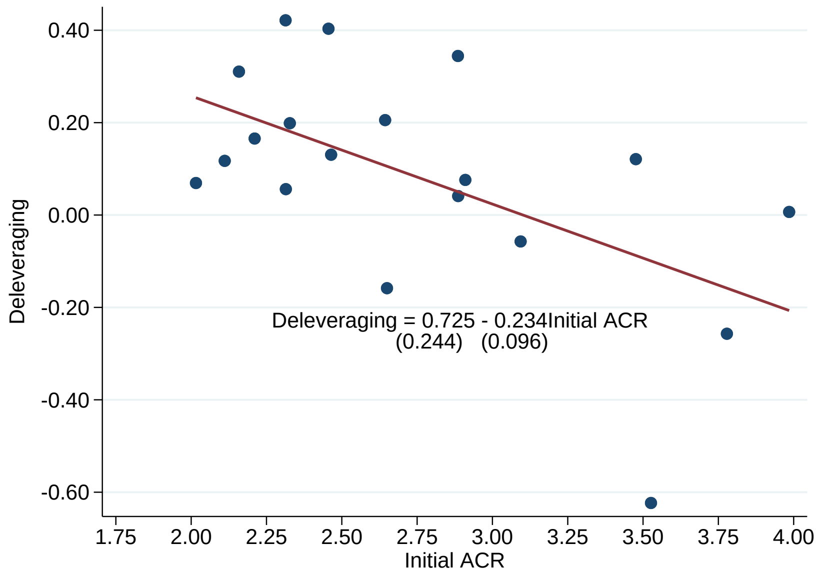
In this subsection, we summarize the experience of the five largest BDCs during the GFC. Together, these BDCs accounted for almost three-quarters of aggregate BDC assets as of 2007Q4.

6.1.1 MCG Capital

In June 2007, MCG Capital had an investment portfolio with a fair value of \$1.46 billion, a discount of 5.8% to the historical cost of its portfolio. By June 2009, the value of the portfolio had decreased 27% to \$1.06 billion due to a decline in asset valuations, asset sales and net loan payments by portfolio companies. The size of the investment portfolio on a historical cost basis fell by 4.6% and the ACR dipped below 200% in March 2009. MCG renegotiated with lenders to

Figure 16
Deleveraging versus initial ACR during the GFC

This figure plots deleveraging versus initial ACR for the sample of BDCs active around the Global Financial Crisis. Deleveraging is the difference between total debt in 2007Q4 and total debt in 2009Q4, scaled by the initial assets as of 2007Q4. We report the OLS regression estimates along with the standard errors in parentheses.



reduce their minimum net worth covenants in the first quarter of 2009. On a historical cost basis, the portfolio went from \$1.55 billion to \$1.38 billion, a decline of \$197 million, about equal to its asset sales during this period. Debt was reduced from \$693 million to \$584 million. Given average asset valuations of 73% of cost, asset sales were more than enough to cover the reduction in debt, enabling MCG to achieve an ACR in excess of 200%.

6.1.2 American Capital

Just before the GFC in June 2007, American Capital had \$12.2 billion of assets, debt of \$5.4 billion and an ACR of 221%. It was the largest BDC, accounting for 35% of aggregate BDC assets. In addition to direct lending, American Capital was a private equity investor, an asset manager and an investor in securitized products. Its investment portfolio was considerably riskier than a pure direct lender. In 2007Q4, the reported fair value of the investment portfolio, \$11.5 billion, exceeded the historical cost of the portfolio, \$10.7 billion. By March 2009, the fair value of the investment portfolio had fallen to \$6.8 billion even as the historical cost of \$10.7 billion had changed little since June 2007.

By December 2008, American Capital went below the ACR minimum and was in violation of covenants on its various debt agreements, including its unsecured revolving credit facility, other private financings, its public bond issues, and its securitizations. Although creditors had the right to call the loans, they chose not to do so even though American Capital continued to be in covenant violation from 2008Q4 through much of 2010Q2. However, in the second half of 2009, American Capital began to accumulate cash from prepayments of loans in its portfolio, sale of private equity assets in its portfolio, and loan syndications.

In June 2010, it restructured its debt using cash to pay down $1.1 billion of debt and exchanging its remaining debt for new debt with the same face value, but with shorter maturity and more security. At this time, its ACR increased above 200% and continued to increase in subsequent quarters. All told, from September 2008 to June 2010, American Capital reduced its debt from $4.6 billion to $3.0 billion, and it reduced its assets (recorded at historical cost) from $10.8 billion to $8.4 billion, a very significant deleveraging of the balance sheet. In January 2017, American Capital was acquired by Ares Capital Corporation, another BDC, which we discuss below.

6.1.3 Allied Capital

Allied Capital was the second largest BDC with assets of $5.05 billion and ACR of 256%.[23] A relatively large share of Allied's investment portfolio was in junior securities, making it riskier than a pure direct lender. By March of 2009, the fair value of Allied's investment portfolio had fallen to $2.91 billion, a 39% discount to historical cost. Allied's ACR fell to 171%. With its ACR below 200%, Allied was in violation of covenants on its revolving credit facility and its private notes. It was also prohibited from issuing more debt due to SEC restrictions under the 1940 Act. The administrative agent for the revolving credit facility prohibited additional borrowing from the facility. Although the administrative agent for the facility and private note holders had the right to call the loans, they did not initially do so. In October 2009, Allied announced that it had agreed to merge with with Ares Capital Corporation, another BDC. Before completion of the merger, over the course of 2009 and into January 2010, Allied realized proceeds of asset sales and portfolio loan repayments of $1.07 billion, using the proceeds to reduce debt from $1.9 billion to under $1 billion. Assets fell by 29% on a historical cost basis. In April 2010, Allied and Ares completed the merger.

6.1.4 Ares Capital Corporation

In June 2007, Ares Capital Corporation had an investment portfolio largely composed of senior loans worth $1.6 billion with an ACR of 300%. The portfolio grew to over $2.1 billion and the ACR fell to 257% in June 2008. In March 2009, the portfolio value declined to $1.97 billion, a 13% discount to historical cost and the ACR fell to 220%.

As noted above, Ares Capital was in a strong enough financial position to acquire Allied Capital in a merger, which was completed in April 2010. By December 2010, Ares Capital had an investment

[23] Beginning in 2002, David Einhorn of Greenlight Capital, had been shorting Allied stock, arguing that Allied was significantly overstating the value of its assets.

portfolio of $4.3 billion, approximately equal to historical cost, and an ACR of 320%. As noted above, in January 2017, Ares Capital acquired American Capital, which struggled through the GFC like Allied Capital.

6.1.5 Apollo Investment Corporation

Apollo Investment Corporation (now Midcap Financial Investment Corporation) had an investment portfolio of $3.3 billion by June 2008 with an ACR of 334%. With the crisis, Apollo saw significant declines in its portfolio valuation to $2.4 billion in March 2009, a 28% discount to historical cost. By December 2010, the investment portfolio and ACR rebounded in value to $2.9 billion and 290% respectively. Because Apollo started the GFC with a relatively high ACR, it was able to weather the GFC with deleveraging despite the large drop in portfolio valuation.

6.2 BDCs vs. other nonbank financial instutions

Of the five largest BDCs in 2007 and 2008, three of them — Allied Capital, American Capital and MCG Capital– experienced significant deleveraging due in part to their relatively low initial ACR. Renegotiation with lenders prevented a liquidation of the BDCs despite covenant violations, and lenders did not incur losses. The deleveraging at Allied and American was particularly severe as both had relatively risky portfolios that included a large share of junior securities. Ares Capital and Apollo Investment Corporation, experienced no meaningful deleveraging given their relatively high ACRs. Apollo avoided deleveraging despite its risky portfolio, because of its very high ACR going into the crisis.

The experience of these five BDCs – and the broader sample of BDCs that existed at the time of the GFC – differs substantially from the experience of CIT and GE Capital, the two largest nonbank lenders to small and medium-sized firms that existed at the time of the GFC.[24] Both CIT and GE Capital, were very highly leveraged firms that funded themselves by issuing a large number of bonds and commercial paper instruments. CIT, for example, with assets of $87 billion, had leverage of 85% in June 2008. At the end of 2008, it had 93 different publicly traded notes outstanding with various maturities between 2009 and 2012. As CIT's financial position eroded, hedge funds purchased the notes at significant discounts. While CIT received a capital infusion from the Troubled Asset Relief Program (TARP), when it was denied access to the Temporary Liquidity Guarantee Program (TLGP), it had a liquidity crisis that forced a debt renegotiation with large holders of the notes, resulting in a pre-packaged bankruptcy in November 2009. The company emerged from bankruptcy in December 2009 with a new board and CEO. Over time, CIT transitioned its nonbank lending over to the small bank it purchased in December 2008, and it later

[24] See Ivashina and Scharfstein (2013) and Coates, Dionne, and Scharfstein (2017) for more detailed case studies of CIT and GE Capital, respectively.

acquired OneWest, a $23 billion bank with 70 branches. In 2022, First Citizen acquired CIT, which then had assets of about $90 billion.

GE Capital, with over $500 billion in assets, very high leverage, and heavy reliance on commercial paper, faced a capital and liquidity crisis during the GFC. It survived the GFC by accessing TARP and the TLGP. In the aftermath of the GFC, the Financial Stability Oversight Council, designated GE Capital as a Systemically Important Financial Institution, which led General Electric, its parent, to exit GE Capital by selling its various lending businesses to banks and nonbank lenders.

There are three key takeaways from these case studies. First, there was deleveraging by BDCs during the GFC, although the extent of deleveraging depended on BDC leverage and portfolio risk. Second, while lenders may have pushed BDCs to deleverage, they appeared to be willing to waive or renegotiate covenants to avoid bankruptcy. To the extent that BDCs sold assets, they tended to be equity instruments rather than loans. None of the lenders in our case studies appear to have suffered losses on their loans to BDCs. Third, nonbank lenders CIT and GE Capital, which were much more leveraged and relied more heavily on publicly traded notes and commercial paper, faced much more pressing liquidity and capital crises. These could only be resolved with access to government support and the bankruptcy process.

7 Implications and further financial stability considerations

While our simulation model implies that there would be deleveraging during a severely adverse scenario, and our empirical analysis indicates that there was deleveraging during the GFC, these findings cannot tell us about the welfare implications of such deleveraging. One might argue that the demand for buyout financing – the main use of direct loans – would decline during severe stress to the economy, implying that the welfare effects of deleveraging would be modest. However, the demand for financing from existing portfolio firms would likely increase during periods of stress, as evidenced by the increase in drawdowns on credit lines that occurred during the GFC and COVID-19 Pandemic (Ivashina and Scharfstein, 2010; Chodorow-Reich et al., 2022). Moreover, borrowers without access to credit could experience significant financial difficulties. Indeed, Chodorow-Reich (2014) shows that borrowers from banks that were hit harder by the mortgage crisis during the GFC were less likely to get refinanced and were thus more likely to lay off workers. In our setting, BDCs under more strain from potential violations of ACR restrictions would be less likely to roll over existing loans and thus could impair the ability of their portfolio companies to manage through a stress scenario. Unfortunately, while our approach allows us to identify the factors that would affect the welfare implications of deleveraging, we cannot estimate the magnitude of the effects.

We are also not yet in a position to benchmark BDC deleveraging to the deleveraging that other types of financial intermediaries would undertake under similar stress conditions. For example, it is possible that banks might deleverage more than BDCs given their greater leverage and greater reliance on short-term funding. It is also possible that their diversified portfolios and use of loan allowances rather than fair value accounting could lead them to deleverage less than BDCs during a period of stress.

There are two other financial stability concerns related to private credit that are worth considering. One is that banks often lend to middle market firms alongside private credit funds, which could potentially expose banks to high levels of default in their portfolios. However, Haque, Mayer, and Stefanescu (2024) show that when banks lend to firms that also borrow from private credit funds, they typically offer credit lines that are shorter-term and more senior to private credit, thus mitigating this concern.

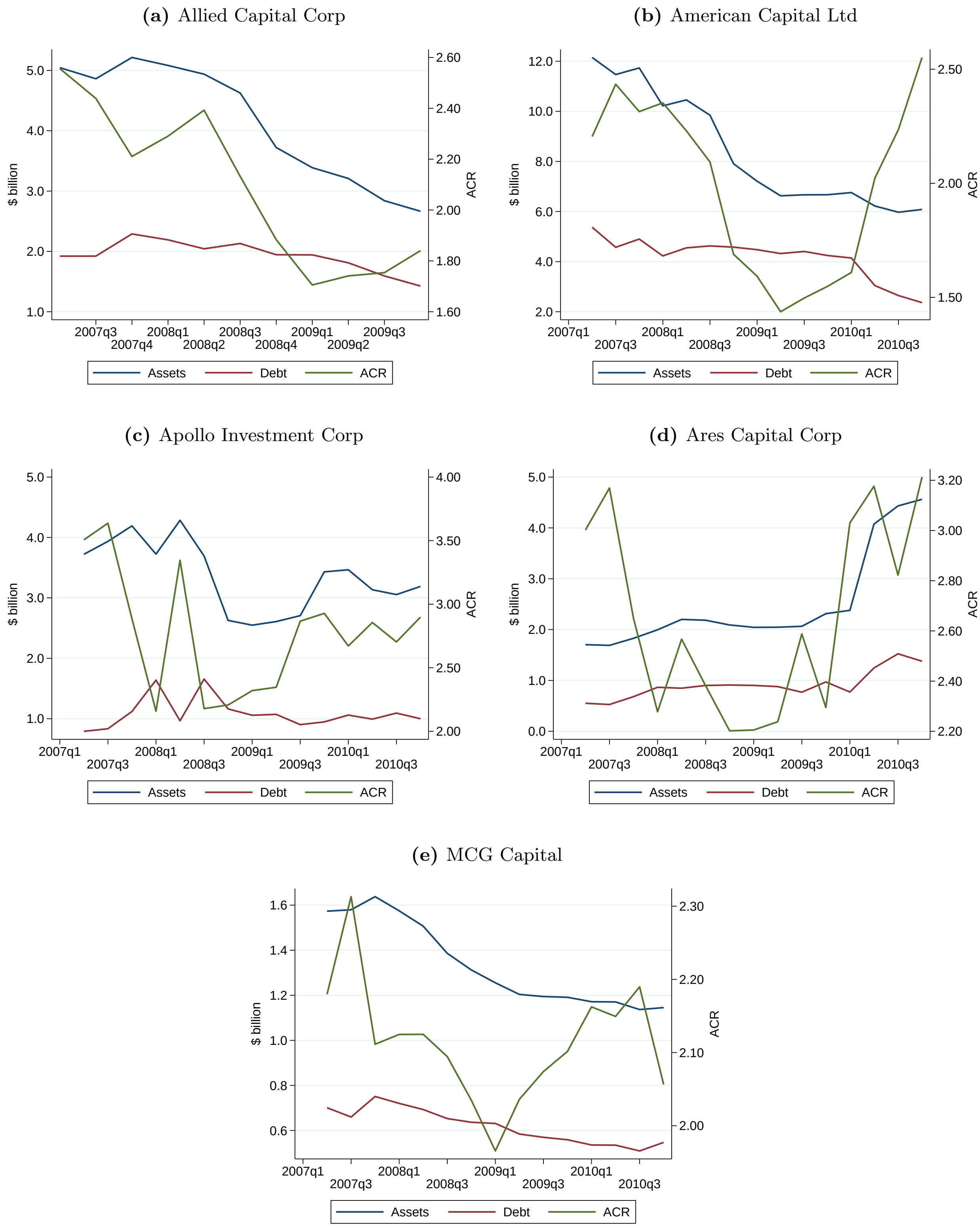
Another financial stability concern relates to the dramatic expansion of private credit in recent years and the possibility that private credit has become overheated. This may have led to excessive leverage at portfolio firms and a heightened risk of default. While our analysis suggests that lenders to BDCs are well protected against very significant losses at BDCs, if there is excessive leverage at portfolio firms due to an overheated market, it makes those firms more vulnerable to stress. The recent growth of private credit has been associated with a tightening of credit spreads, suggesting that this growth is driven by an expansion of supply rather than an increase in demand. Whether this growth is excessive or reflects a structural shift in the way firms are financed is an open question.

8 Conclusion

We conduct a stress test exercise to examine the likely performance of private credit funds in a severely adverse scenario that is similar to the Global Financial Crisis. While none of the BDCs in our exercise default on their debt, to comply with regulatory and contractual restrictions on leverage, BDCs deleverage and contract credit provision by about 10%. The deleveraging is funded through a combination of asset sales, free cash flow, and excess cash. Initial leverage and portfolio composition explain most of the variation in the extent of deleveraging. Our model is generally consistent with what we observe in a small sample of BDCs during the GFC, although we likely overstate the importance of assets sales relative to the experience during the GFC. Moreover, our analysis indicates that banks and bond investors are well protected by the equity cushion they have and the deleveraging that BDCs undertake to avoid default.

Figure 17
Performance of Select BDCs during the Global Financial Crisis

This figure plots assets, debt, and asset coverage ratio (ACR) of the five largest BDCs during the Global Financial Crisis. ACR is calculated as total assets minus liabilities other than debt, all divided by total debt. Allied Capital Corp was acquired by Ares Capital Corp on April 1, 2010.



References

Block, J., Y. S. Jang, S. N. Kaplan, and A. Schulze. 2024. A survey of private debt funds. *The Review of Corporate Finance Studies* 13:335–83. doi:10.1093/rcfs/cfae001.

Cai, F., and S. Haque. 2024. Private credit: Characteristics and risks. *FEDS Notes* doi:10.17016/2380-7172.3462.

Chernenko, S., R. Ialenti, and D. S. Scharfstein. 2025. Bank capital and the growth of private credit. *Working paper* doi:10.2139/ssrn.5097437.

Chodorow-Reich, G. 2014. The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *Quarterly Journal of Economics* 129:1–59. doi:10.1093/qje/qjt031.

Chodorow-Reich, G., O. Darmouni, S. Luck, and M. Plosser. 2022. Bank liquidity provision across the firm size distribution. *Journal of Financial Economics* 144:908–32. doi:10.1016/j.jfineco.2021.06.035.

Coates, J., J. Dionne, and D. S. Scharfstein. 2017. GE Capital after the crisis. Harvard Business School Case No. 9-217-071.

Greenwald, D., J. Krainer, and P. Paul. forthcoming. The credit line channel. *Journal of Finance* .

Haque, S., S. Mayer, and I. Stefanescu. 2024. Private Debt versus Bank Debt in Corporate Borrowing. *Working paper* doi:10.2139/ssrn.4821158.

Ivashina, V., and D. S. Scharfstein. 2010. Bank lending during the financial crisis of 2008. *Journal of Financial Economics* 97:319 – 338. doi:10.1016/j.jfineco.2009.12.001.

———. 2013. Oaktree and the restructuring of CIT (A). Harvard Business School Case No. 9-214-035.

Jang, Y. S., and G. Kim. 2025. Valuation Discipline in Private Credit. *Working paper* doi:10.2139/ssrn.5126860.

Appendix

for

Private Credit and Financial Stability

This appendix reports

1. Summary of the deleveraging simulation assumptions in Table A1.
2. Estimates of industry default beta in Table A2.
3. Information on BDC Joint Ventures in Table A3.
4. Equity returns in Figure A1.
5. List of all BDCs with at least $100 million in assets as of 2007Q4 in Table A4.

Data Notes section provides additional details on the measurement of dividend reinvestment rates, uncalled capital commitments, and portfolio similarity of affiliated funds.

Table A1
Summary of the Deleveraging Simulation Assumptions

This table summarizes the assumptions and features of the deleveraging simulation in Section 4 in the paper.

Feature	Summary
Default	Performing firms default at an annual rate that is a function of their industry and of the aggregate default rate specified in the stress test scenario and reported in Figure 1. At the beginning of each simulation, we draw industry default beta from a normal distribution whose mean is equal to the estimated beta and whose standard deviation is equal to the standard error of the estimated coefficient. Industry default rate in each quarter is the product of the industry default beta and the aggregate default rate, plus random normal shock whose standard deviation is equal to the root mean squared error from the regression of industry default rate on the aggregate default rate. Estimates of industry default rate are reported in Table A2. Once a firm defaults, its equity securities are wiped out. Loans stop accruing interest and recover 60% of their par value at default. Recovery is realized in cash six quarters after default.
Portfolio valuation	
Loans	We use each loan's spread information along with the level of the benchmark rate (SOFR) specified by the stress test scenario to forecast the remaining promised cash flows. Promised cash flows are then discounted at a rate that is the sum of three components: a) SOFR, b) loan's yield spread as of 2024Q4, and c) the aggregate shock to yield spreads (reported in panel (a) of Figure 1) scaled by the loan's industry default beta. Loan's yield spread as of 2024Q4 is the difference between the loan's IRR and SOFR as of 2024Q4. We do not model the term structure of the expected values of SOFR and of the yield spread shock. At each point in the simulation, we forecast and discount cash flows assuming that SOFR and the yield spread shock will remain at their current levels indefinitely. For loans with PIK option, borrowers are assumed to always max out the PIK component.

(Continued)

Table A1—*continued*

Feature	Summary
Equity in JVs	WE calculate the value of equity in JVs and distributions from JVs from the bottom-up using information on JV portfolio holdings and total debt. JVs are assumed to borrow at 250 basis point over SOFR. JVs distribute their free cash flow pro-rata and do not reinvest. If we do not have JV portfolio holdings data, we treat equity in JV as other equity with industry default beta equal to one.
Equity in CLOs	We use the quarterly stock market returns specified by the Fed's 2023 severely adverse scenario to track changes in CLO equity.
Other equity	We scale the quarterly stock market returns specified by the Fed's 2023 severely adverse scenario by the firm's industry default beta (reported in Table A2).
Free Cash Flow	
Interest income	Interest income is calculated using the benchmark rate (SOFR) and the stated spreads on portfolio loans. PIK income is included in total interest income but is subtracted from free cash flow.
Dividend income	Dividend income from JVs is calculated from the bottom-up. Dividend income from all other equity positions is calculated as a fixed percentage of the fair value of BDC assets. This percentage is assumed to be equal to the percentage in 2024Q4 at the start of the stress scenario. In calculating the ratio of dividend income to assets, we exclude dividend income from JVs, which is accounted for separately.
Other income	Other income, primarily fees charged to portfolio companies, is calculated as a fixed percentage of the fair value of BDC assets.
Interest expense	Interest expense on floating-rate debt is calculated using the benchmark rate (SOFR) and the stated spread as of 2024Q4. Interest expense on fixed-rate debt is calculated using the stated coupon rate. We account for the effects of interest rate swaps.

(Continued)

Table A1—*continued*

Feature	Summary
Management fees	Base management fees are calculated as a fixed percentage (2024Q4 value) of the fair value of BDC assets. Incentive fees are assumed to be zero during the stress scenario.
Other expense	Other expenses are calculated as a fixed percentage (2024Q4 value) of the fair value of BDC assets.
Free cash flow	FCF = Net income - 0.9 $\times$ Net income - PIK interest + Principal payments - Redemptions - Debt maturities
BDC behavior	BDCs distribute 90% of their net investment income.
	Positive free cash flow, which includes repayment of portfolio loans, is used to either reinvest in portfolio assets or repay debt. The split is determined based on the pro-forma asset coverage ratio, the ratio of total assets to debt, that assumes that FCF and cash blanaces are used to repay debt. If the pro-forma ACR is at least 200%, all FCF is reinvested pro-rata into portfolio loan at their fair values. If the pro-forma ACR is between 165% and 200%, we linearly increase the share of FCF that is used to repay debt so that when the pro-forma asset coverage ratio is 165%, all FCF is used to repay debt. If the pro-forma asset coverage ratio is below 150%, BDC engages in pro-rata liquidation of portfolio securities at their fair values. When BDCs have negative FCF, they first try to cover it using cash buffers. If cash buffers are not sufficient, resulting ACR will be above 150%, and there is availability under the existing lines of credit, BDCs draw down their lines of credit to cover negative FCF. If there is insufficient availability under the existing lines of credit, BDCs can take out a new line as long as the resulting ACR will be at least 175%. New lines of credit are priced at SOFR plus the spread on BB-rated bonds.

Table A2
Industry Default Beta

This table reports the results of regressions of industry default rate on the aggregate default rate. For each industry, we report the point estimate, its, standard error, root MSE, and the number of annual observations. Annual default rates for 35 industries over 1970–2024 are from Exhibit 44 in Moody's Annual Default Study. Aggregate default rate is from Exhibit 37. Coverage for some industries does not start until after 1970.

Industry	**Beta**	**Standard error**	**Root MSE**	**N**
Aerospace & Defense	0.89	0.15	0.01	55
Automotive	1.86	0.33	0.02	55
Banking	0.34	0.09	0.01	50
Beverage, Food, & Tobacco	0.74	0.11	0.01	55
Capital Equipment	1.18	0.19	0.01	55
Chemicals, Plastics, & Rubber	0.96	0.15	0.01	55
Construction & Building	2.49	0.32	0.02	55
Consumer goods: Durable	2.76	0.41	0.03	53
Consumer goods: Nondurable	2.31	0.36	0.03	55
Containers, Packaging, & Glass	1.34	0.51	0.03	38
Energy: Electricity	0.71	0.51	0.03	42
Energy: Oil & Gas	1.03	0.38	0.03	55
Environmental Industries	1.10	0.69	0.04	37
Finance	0.74	0.15	0.01	50
Forest Products & Paper	1.88	0.30	0.02	55
Healthcare & Pharmaceuticals	0.71	0.21	0.02	55
High Tech Industries	0.89	0.18	0.01	55
Hotel, Gaming, & Leisure	3.19	0.51	0.03	46
Insurance	0.01	0.10	0.01	45
Media: Advertising, Printing & Publishing	3.59	0.94	0.06	43
Media: Broadcasting & Subscription	2.73	0.58	0.04	42
Media: Diversified & Production	0.57	0.58	0.04	44
Metals & Mining	2.16	0.41	0.03	55
REIT	0.59	0.25	0.02	38
Retail	1.42	0.30	0.02	55
Services: Business	1.16	0.25	0.02	53
Services: Consumer	1.92	0.47	0.03	31
Sovereign & Public Finance	0.52	0.53	0.03	36
Telecommunications	1.62	0.29	0.02	55
Transportation: Cargo	1.41	0.34	0.03	55
Transportation: Consumer	1.96	0.72	0.05	55
Utilities: Electric	0.09	0.04	0.00	55
Utilities: Oil & Gas	0.11	0.06	0.00	55
Utilities: Water	0.22	0.13	0.01	37
Wholesale	1.69	0.43	0.03	46

Table A3
BDC Joint Ventures

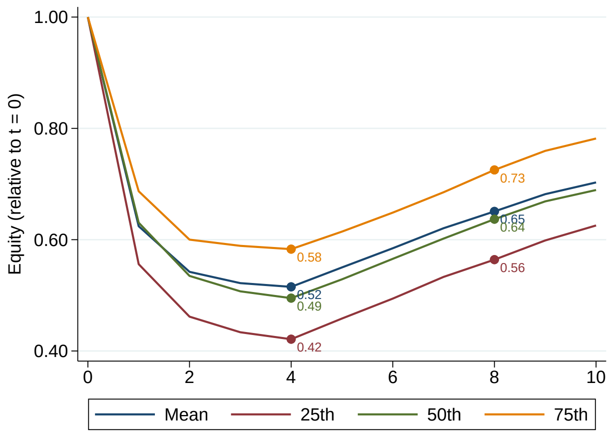
This table reports information on BDC joint ventures. For each BDC-JV pair, the table reports i) BDC's CIK, ii) JV name, iii) name of the JV partner, iv) BDC's stake in the JV (*JV share*), v) the value of BDC investment in the JV relative to BDC's total assets (*portfolio share*), vi) the value of JV assets (in millions), and vii) JV's debt-to-assets ratio. JV information is as of 2024Q4. JV debt-to-assets ratio excludes subordinated debt provided by BDC or its JV partner. Some JVs do not report all relevant information. Debt-to-assets ratio for BCRED Emerald JV LP includes $1.3 billion payable for investments purchased.

CIK	JV name	JV partner(s)	JV share	Portfolio share	JV Assets	JV D/A
1803498	BCRED Emerald JV LP	"a large North American pension fund"	75.0%	2.5%	5,909	59%
1287750	Senior Direct Lending Program LLC	Varagon Capital Partners	87.5%	4.22%	4,839	71%
1422183	Credit Opportunities Partners JV LLC	South Carolina Retirement Systems Group Trust	87.5%	9.59%	3,659	50%
1812554	OCIC SLF LLC	State Teachers Retirement System of Ohio	87.5%	1.1%	1,761	74%
1383414	PennantPark Senior Loan Fund LLC	Pantheon	57.1%	14.7%	1,397	69%
1655888	Blue Owl Credit SLF LLC	State Teachers Retirement System of Ohio	84.6%	2.1%	1,196	63%
1747777	Blue Owl Credit SLF LLC	State Teachers Retirement System of Ohio	0.3%	0.0%	1,196	63%
1812554	Blue Owl Credit SLF LLC	State Teachers Retirement System of Ohio	1.2%	0.0%	1,196	63%
1869453	Blue Owl Credit SLF LLC	State Teachers Retirement System of Ohio	0.3%	0.0%	1,196	63%
1825248	FBLC Senior Loan Fund LLC	Cliffwater Corporate Lending Fund	84.0%	9.7%	1,151	52%
1504619	PennantPark Senior Secured Loan Fund I LLC	Kemper	87.5%	12.2%	1,110	67%
1379785	Jocassee Partners LLC	South Carolina Retirement Systems Group Trust	9.1%	1.5%	1,095	70%
1803498	BCRED Verdelite JV LP		87.5%	0.2%	805	79%
1496099	NMFC Senior Loan Program III LLC	SkyKnight Income II LLC	80.0%	4.9%	746	69%
1544206	Middle Market Credit Fund LLC	Credit Partners USA LLC	50.0%	9.5%	601	31%
1496099	NMFC Senior Loan Program IV LLC	SkyKnight Income Alpha LLC	78.6%	3.5%	492	68%
1414932	Senior Loan Fund JV I LLC	Trinity Universal Insurance Company	87.5%	4.4%	345	51%
1552198	WHF STRS Ohio Senior Loan Fund	State Teachers Retirement System of Ohio	65.7%	15.8%	309	46%
1859919	CPCF BPCC LLC	Cresset Partners Private Credit Fund LLC	9.1%	0.3%	220	77%
1544206	Middle Market Credit Fund II LLC	Cliffwater Corporate Lending Fund	84.1%	3.3%	198	55%
1418076	SLR Senior Lending Program LLC	Sunstone Senior Credit LP	50.0%	2.0%	197	48%
1414932	OCSI Glick JV LLC	GF Equity Funding 2014 LLC	87.5%	1.6%	128	44%
1811972	Banff Partners LP	Alberta Investment Management Corporation	10.0%	1.1%	117	0%
1512931	MRCC Senior Loan Fund I LLC	Life Insurance Company of the Southwest	50.0%	6.67%	104	37%
2008748	SBLA Private Credit LLC	Stifel Bank & Trust	87.5%	5.6%	97	60%
1603480	TCW Direct Lending Strategic Ventures LLC	Security Benefit Corporation + accounts managed by Oak Hill Advisors	80.0%	6.64%	64	0%
1534254	CION/EagleTree Partners LLC	EagleTree Capital	85.0%	3.1%	60	0%
1675033	CLO Formation JV LLC	Green SPE LLC (23.75%) and Crown LB LLC (5%)	71.3%	11.7%	56	0%
1379785	Sierra Senior Loan Strategy JV I LLC	MassMutual Ascend Life Insurance Company	88.4%	1.5%	47	0%
1653384	Runway-Cadma I LLC	Cadma Capital Partners LLC	50.0%	0.5%	10	0%
1372807	KCAP Freedom 3 LLC	Freedom 3 Opportunities LLC	62.8%	2.87%		
1377936	Saratoga Senior Loan Fund I JV LLC	TJHA JV I LLC	50.0%	1.7%		
1372807	Great Lakes II Funding II LLC			9.1%		

Figure A1
Equity returns in a Severely Adverse Scenario

This figure supplements Figures 2 and 3 by reporting equity returns in a severely adverse scenario. Panel (a) plots the distribution of equity indexed to the 2024Q4 value. Panel (b) plots the median of equity index for different types of BDCs.

(a) Distribution



(b) Median by type

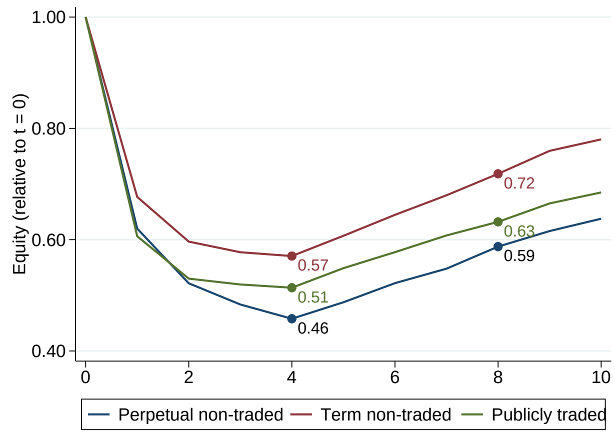


Table A4
List of BDCs as of 2007Q4

This table lists all BDCs with at least $100 million in assets as of 2007Q4.

CIK	Name	Assets	Debt	ACR
817473	American Capital Strategies Ltd	11,732	4,901	2.31
3906	Allied Capital Corp	5,215	2,289	2.21
1278752	Apollo Investment Corp	4,192	1,120	2.89
1287750	Ares Capital Corp	1,829	682	2.65
1141299	MCG Capital Corp	1,638	751	2.11
1326003	BlackRock Kelso Capital Corp	1,122	381	2.91
1000209	Medallion Financial Corp	721	543	1.32
17313	Capital Southwest Corp	546	0	
1280784	Hercules Technology Growth Capital Inc	542	134	3.99
1372807	Kohlberg Capital Corp	533	255	2.02
1297704	NGP Capital Resources Co	478	216	2.16
1287032	Prospect Capital Corp	475	107	4.23
1099941	MVC Capital Inc	471	80	5.61
1383414	PennantPark Investment Corp	430	92	3.78
1143513	Gladstone Capital Corp	430	162	2.64
1321560	Patriot Capital Funding Inc	398	165	2.35
1259429	TICC Capital Corp	396	136	2.89
1271808	Venture Lending & Leasing IV Inc	390	157	2.46
1321741	Gladstone Investment Corp	372	150	2.46
1363890	Kayne Anderson Energy Development Co	355	99	3.48
1377936	GSC Investment Corp	204	84	2.33
1396440	Main Street Capital Corp	175	55	3.09
1347652	Tortoise Capital Resources Corp	159	31	4.99
893739	Harris & Harris Group Inc	143	0	
1379785	Triangle Capital Corp	136	37	3.53
878932	Equus Total Return Inc	135	30	4.44
1376067	Venture Lending & Leasing V Inc	103	43	2.31

Data Notes

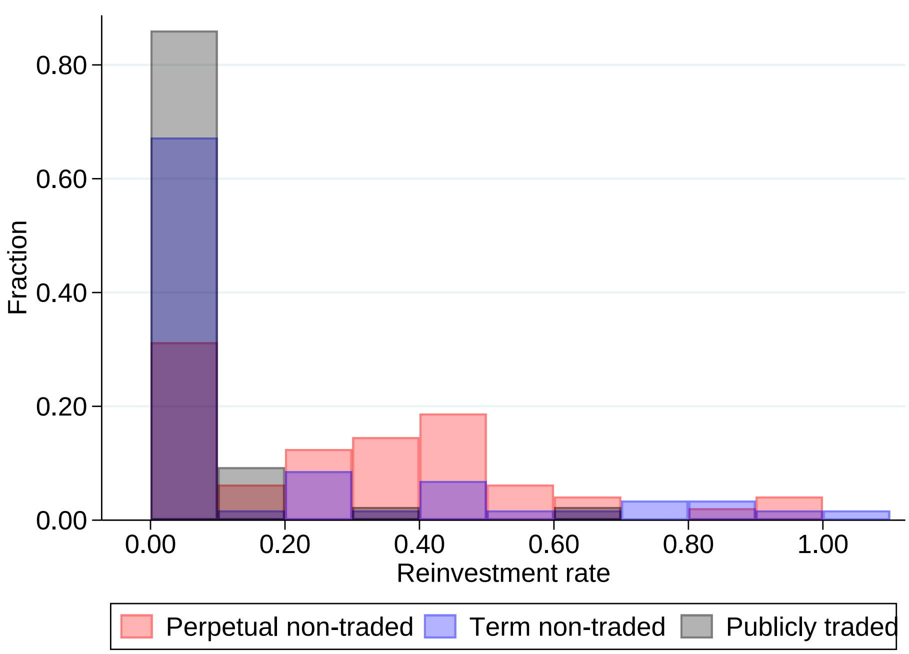
Dividend Reinvestment Plans (DRIP)

We measure dividend reinvestment rate as the value of stock issued under a dividend reinvestment plan (DRIP) divided by total distributions to shareholders. The former is usually tagged with XBRL tag `StockIssuedDuringPeriodValueDividendReinvestmentPlan`, the latter with XBRL tag `InvestmentCompanyDividendDistribution`. Because not all BDCs use these tags for their distributions and reinvestment under DRIP, we supplement XBRL with manually collected dividend reinvestment rates. Reinvestment rates are measured as of 2024Q4. Since the vast majority of BDCs have December fiscal year, reinvestment rates are generally measured using annual data. For the few BDCs with fiscal years that end in other months, we use year-to-date data from the 2024Q4 10-Q filing.

Figure A2 reports the histogram of reinvestment rates for different types of BDCs. Mean reinvestment rates are 5.2% for publicly-traded BDCs, 17.2% for finite-life private BDCs, and 29.8% for perpetual BDCs. While high reinvestment rate are unusual for publicly-traded BDCs, some perpetual and finite-life private BDCs have reinvestment rates that are close to 100%. One potential reason for the low reinvestment rates of publicly-traded BDCs is that many of them trade at a discount to NAV.

Figure A2
Distribution of Dividend Reinvestment Rates

This figure reports the histogram of dividend reinvestment rates for different types of BDCs. Reinvestment rate is the value of stock issued under a DRIP divided by total distributions to shareholders. Reinvestment rate is measured using 10-K or 10-Q filing from 2024Q4.



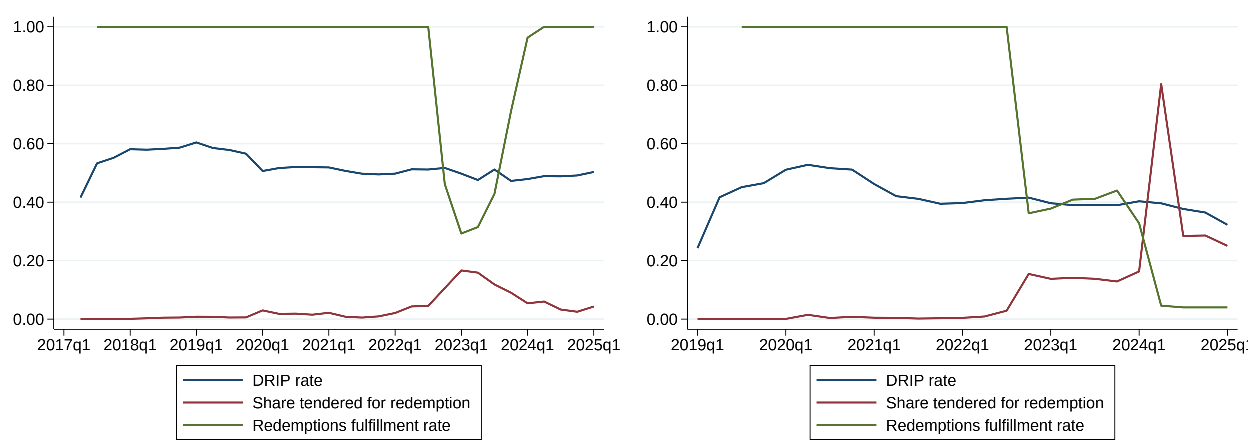
Dividend reinvestment rates are highly persistent. In addition to 2024Q4, we have data on dividend reinvestment rates as of 2023Q2. The correlation between the two is 0.84. If we exclude one BDC – FS Specialty Lending Fund – that eliminated its DRIP, the correlation rises to 0.88.

Although reinvestment rates are highly persistent during normal times, it is possible that in a severely adverse scenario shareholders will opt out and that reinvestment rates will decline significantly. Experience of Blackstone Real Estate Income Trust (BREIT) and Starwood Real Estate Income Trust (SREIT) however suggests that reinvestment rates are likely to hold up even in a stressed scenario. These two large REITs experienced large redemptions driven by investor concerns about the value of commercial real estate after COVID and increases in interest rates. Figure A3 shows that despite being forced to limit redemptions, DRIP rates for the two REITs were barely affected.

Figure A3
Dividend Reinvestment and Redemptions from BREIT and SREIT

This figure plots the time series of redemptions and dividend reinvestment rates for Blackstone Real Estate Income Trust (BREIT) and Starwood Real Estate Income Trust (SREIT). DRIP rate is calculated using year-to-date values. Share tendered for redemptions and redemptions fulfillment rates are quarterly values.

(a) BREIT **(b)** SREIT

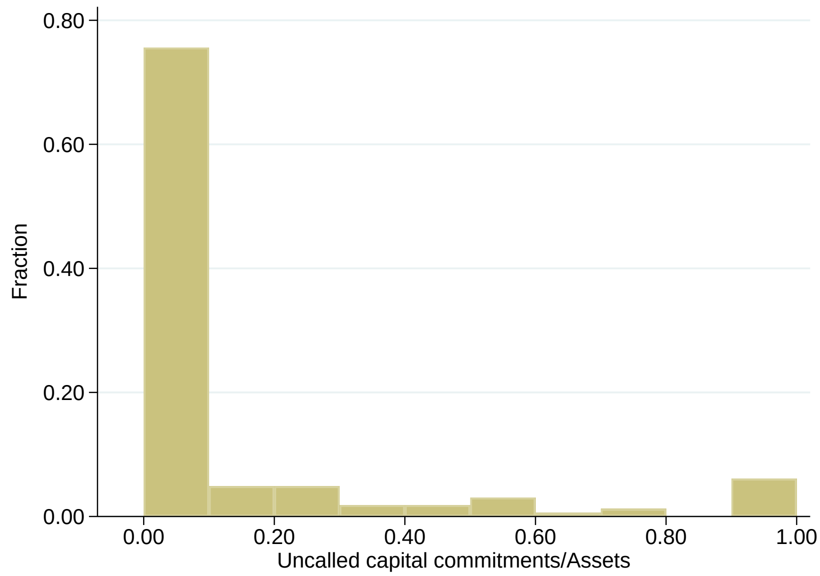


Uncalled Capital Commitments

Because of lack of standardized XBRL tagging of uncalled capital commitments, we manually gather data on uncalled capital commitments as of 2024Q4. Figure A4 shows the distribution of uncalled capital commitments relative to assets. To handle large outliers – the maximum value is 979% – we cap the ratio at 100%. Less than a third of BDCs – 52 out of 164 – have uncalled capital commitments. Conditional on having uncalled capital, the median ratio of such uncalled capital commitments to total assets is 27%. The aggregate value of uncalled capital commitments was \$19.5 billion, or about 4.4% of aggregate BDC assets.

Figure A4
Distribution of Uncalled Capital Commitments

This figure reports the distribution of uncalled capital commitments scaled by total assets as of 2024Q4. The ratio of uncalled capital commitments to total assets is capped at 100%. 52 out of 164 BDCs have uncalled capital commitments. Conditional on having uncalled capital, the median ratio of uncalled capital commitments to total assets is 27%.



Portfolio Similarity of Affiliated Funds

To provide more systematic evidence corroborating significant similarity in holdings between BDCs and other private credit funds, we measure cosine similarity of the portfolio holdings of affiliated BDCs managed by the same investment manager. We find pairs of BDCs where one BDC is publicly traded and another one is nontraded.

Although not very common, some BDCs change their investment managers or have subadvisers. When a new manager takes over, it can take the new manager a long time to change the fund's portfolio. Since loans trade rarely, the manager has to wait for the old loans to be repaid. In the meantime, holdings of such funds are unlikely to be similar to the holdings of other funds managed by the same manager. We therefore require BDCs to be managed by the same investment manager throughout.

We also exclude BDCs that are younger than two years or have less than $100 million in assets as these BDCs are unlikely to have fully ramped up their portfolios.

After applying these screens, we have 205 BDC pair-quarter observations across 11 unique investment advisers, 11 unique public BDCs, and 25 private BDCs. The median cosine similarity is 0.63, indicating significant though not perfect overlap.

Difference in holdings between affiliated BDCs are likely to be due to difference in fund age. Funds launched at different points in time would have invested in different loans, and these differences are likely to persist over time. When we require the difference in fund age to be less than five years, median cosine similarity increases to 0.85.

Instead of looking at the existing portfolio weights, we can look at the similarity in changes. When a given fund extends a new loan, do affiliated funds participate in the same loan? We determine the first time each fund invests in a given company and calculate the share of the new investment relative to fund assets. We then calculate cosine similarity of the values of such new positions. The median cosine similarity among funds that are at least two years old and have at least $100 million in assets is 0.80.