Specialization in Non-Bank Lending

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Abstract

Using SEC filings data on Business Development Company (BDC) investments, I document that these non-bank lenders specialize by concentrating their lending in selected industries, and they are more concentrated than banks; however, they diversify over time. BDCs offer more generous and flexible credit terms within their specialization sectors, leveraging informational advantages from their industry focus. I also show that BDC industry specialization improves loan performance within their focus industries. To identify drivers of specialization, I employ changes in aggregate bank C&I lending standards from the Senior Loan Officer Opinion Survey (SLOOS) as an instrument, showing that tighter overall bank credit conditions make BDCs more concentrated. I provide new evidence on the growth of these non-banks as they have become substitutes for bank financing. These findings extend bank specialization theories to non-bank intermediaries and highlight the recent growth in direct lending.

Motivation

Post-crisis, private credit has expanded significantly, increasing the role of non-bank lenders in firm financing

- The private credit market has grown rapidly, reaching $1.7 trillion , with Business Development Companies (BDCs) now serving as the main source of lending and managing $438 billion in assets as of 2024. (JP Morgan, 2024)
- BDCs act as substitute for traditional bank financing, stimulating firm employment growth and innovation. (Davydiuk et al., 2024)
- Banks often specialize by concentrating their lending disproportionately in a few industries, which shapes loan contracts and improves performance (Blickle et al., 2024; Giometti et al., 2025; Paravisini et al., 2023).

The effects of industry specialization among non-bank lenders are not yet fully understood.

Institutional Background and Data

- Business Development Companies (BDCs):
  - U.S.-based closed-end investment vehicles (Investment Company Act of 1940; formalized 1980).
  - Provide financing to small and mid-sized firms lacking traditional bank credit access.
  - Raise capital from public/private investors; must distribute ≥90% of taxable income.
  - Not deposit-taking; less regulated than banks, allowing flexibility in private credit markets.
- Dataset (2004-2024):
  - **Sources:** SEC EDGAR filings (Forms 10-K, 10-Q, consolidated investment statements) complimented by Factset, Orbis and Fred.
  - **Structure:** BDC–quarter–loan level panel dataset for 178 BDCs
  - **Loan Details:** Loan amounts, terms, interest rates, collateral, and performance.

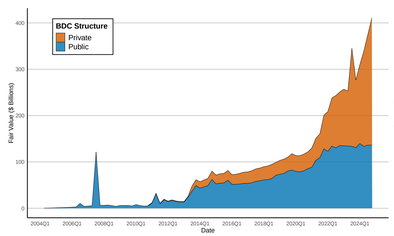

Figure 1. BDC Total AUM

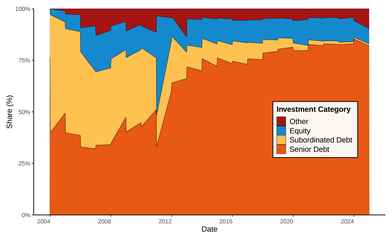

Figure 2. BDC investment instruments

Measuring BDC Specialization

Four complementary measures following Blickle et al. (2024) and Paravisini et al. (2023):

1. Portfolio Share Specialization	2. Excess Specialization (vs. Market)
$Specialization_{b,s,t} = \frac{LoanAmt_{b,s,t}}{\sum_s LoanAmt_{b,s,t}}$	$ExcessSpec_{b,s,t} = Special_{b,s,t} - MarketShare_{s,t}$
3. Market-Level Specialization	**4. Portfolio Concentration (HHI)**
$MarketShare_{s,t} = \frac{\sum_b LoanAmt_{b,s,t}}{\sum_s \sum_b LoanAmt_{b,s,t}}$	$HHI_{b,t} = \sum_s (Specialization_{i,s,t})^2$

Note: b denotes BDC (lender), s denotes industry share, and t denotes time period.

BDC Specialization and Loan Performance

$$NonAccrual_{l,i,b,s,T} = \alpha + \beta \cdot \text{ExcessSpec}_{b,s,t} + \gamma \cdot \mathbf{X}_{l,t} + \delta_{\text{BDC}\times t} + \delta_{\text{Industry}\times t} + \epsilon_{l,i,b,s,T} \quad (1)$$

	Loan ever becomes Non-Accrual			
	(1)	(2)	(3)	(4)
Excess Specialization	−0.085***	−0.081***	−0.086***	−0.064***
	(0.016)	(0.014)	(0.015)	(0.014)
Payment in Kind (PIK) Loan × Specialization				−0.242***
				(0.053)
Payment in Kind (PIK) Loan				0.128***
				(0.005)
General FE	Time			
Specific FE	BDC	Industry×Time, BDC×Time		
Controls	No	No	Interest, Loan Amount	
R^2	0.03	0.07	0.081	0.11
N	397,943			

Table 1. BDC Specialization and Loan Performance. Robust standard errors in parentheses.

BDC Specialization and Loan Characteristics

$$Y_{l,i,b,s,T} = \alpha + \beta \cdot \text{ExcessSpec}_{b,s,t} + \gamma \cdot \mathbf{X}_{l,t} + \delta_{\text{BDC}\times t} + \delta_{\text{Industry}\times t} + \delta_{\text{LoanType}} + \epsilon_{l,i,b,s,T} \quad (2)$$

	Log Loan Amount	Initial Interest Rate	Term	PIK Option Option	Unitranche Loan
Excess Specialization	1.311***	0.575***	-0.141*	0.041*	0.044**
	(0.043)	(0.106)	(0.071)	(0.019)	(0.015)
Fixed Effects Controls	Bank*Time, Industry*Time, Loan Type Size, Term				
R^2	0.42	0.55	0.28	0.14	0.42
N	397,943	397,943	397,943	397,943	397,943

Table 2. BDC Specialization and Loan Characteristics. Robust standard errors in parentheses.

Identification via SLOOS: Effects on BDC Fair Value and Specialization

Identification Strategy:

- I use changes in bank credit standards (measured by SLOOS) to identify the impact of bank lending shocks on BDCs.
- When banks tighten lending (SLOOS goes up), firms turn to BDCs, increasing BDC lending and allowing me to examine whether this leads to increased specialization (concentration) in the industries where BDCs lend.

First Stage:

$$\underbrace{\text{Outstanding loans}_{b,t}}_{\text{BDC Lending}} = \alpha_0 + \alpha_1 \underbrace{SLOOS_t}_{\text{Credit Supply Shock}} + \delta_b + u_{b,t} \quad (3)$$

Second Stage:

$$\underbrace{Y_{b,t}}_{\text{BDC Specialization}} = \beta_0 + \beta_1 \widehat{\text{Outstanding loans}}_{b,t} + \delta_b + \epsilon_{b,t} \quad (4)$$

	First Stage	Second Stage		
	Log(Fair Value)	HHI	Favorite Industry	Other Industry
SLOOS Net Percent Tightening	0.487***			
	(0.11)			
Log(Outstanding Loans)		0.05*	0.081**	-0.011**
		(0.026)	(0.035)	(0.005)
Lender FE	Yes	Yes	Yes	Yes
R^2	0.74	0.55	0.68	0.62
First-stage F-test	35.00			
N	3,776			

Table 3. Instrumental Variable Results. Robust SE in parentheses.

Conclusion

This paper investigates specialization in non-bank lending by using Business Development Companies (BDCs) as a primary case study.

- On average, non-bank lenders such as BDCs have more concentrated (less diversified) lending portfolios than banks.
- Loans made by specialized banks are less likely to become non-performing over time, showing the benefits of industry focus.
- Specialized BDCs tend to make larger loans, but their loans are more expensive (higher interest rates) and longer in maturity; however, they do offer more flexible loan structures, such as payment-in-kind and unitranche loans, especially in the industries they specialize in.
- BDC lending increases when banks tighten lending standards for commercial & industrial (C&I) loans, but as non-banks lend more, they tend not to diversify their portfolios, rather get more concentrated.

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Specialization in Non-Bank Lending

First Draft

Abstract

This paper uses SEC filings data on Business Development Company (BDC) investments to provide the first comprehensive evidence on industry specialization in non-bank lending. BDCs concentrate their lending disproportionately within specific industries. Within their preferred industries, specialized BDCs leverage informational advantages to offer more flexible and generous credit terms and, importantly, achieve superior loan outcomes compared to non-specialized lenders. To identify drivers of specialization, I employ changes in aggregate bank CI lending standards from the Senior Loan Officer Opinion Survey (SLOOS). As an instrument, it shows that tighter overall bank credit conditions make BDCs more concentrated. I provide new evidence on the growth of these non-banks as they have become substitutes for bank financing. These findings extend bank specialization theories to non-bank intermediaries, highlighting the recent growth in direct lending.

1 Introduction

Traditional financial intermediation theory emphasizes the benefits of diversification in banks, positing that institutions can manage risk by lending across multiple sectors, borrowers, and geographies, thus limiting exposure to idiosyncratic shocks (Diamond (1984); Boyd and Prescott (1986)). However, the literature also identifies potential advantages of specialized lending strategies, where financial institutions, such as banks, maintain concentrated portfolios in specific industries or markets. Banks that repeatedly lend to borrowers in specific sectors can develop comparative advantages based on their knowledge of business models, collateral valuation, industry characteristics, and borrower quality (Petersen and Rajan (1994); Berger and Udell (1995)). This accumulated knowledge may lead to better ex-ante screening and ex-post monitoring of borrowers, resulting in lower defaults and improved risk-adjusted returns. By focusing on particular industries, institutions can achieve economies of scale and accumulate relevant knowledge (Blickle et al. (2025b); Levy and Livingston (1995a)).

The literature identifies three primary channels by which specialization creates value. First, specialized lending enables lenders to develop informational advantages that help alleviate asymmetric information problems (Sharpe (1990); Rajan (1992)). Second, specialization allows banks to develop industry-specific knowledge for evaluating collateral, understanding business cycles, and assessing credit risk (Boot and Thakor (2000)). Third, concentration in lending facilitates economies of scale in information production and monitoring costs, since the fixed cost of learning about an industry can be amortized across multiple borrowers from that sector.

While numerous studies examine specialization in bank lending, there is limited research on specialization among non-bank lenders (Blickle et al. (2025b);Paravisini et al. (2023);Acharya et al. (2006). Several factors contribute to this gap. First, the non-bank commercial and industrial (C&I) lending market encompasses a diverse range of insti-

tution types, including finance companies, Business Development Companies (BDCs), and private debt funds. Second, aggregate C&I lending from non-bank lenders was relatively limited before the Global Financial Crisis (GFC). Third, loan-level data for non-bank lenders has historically been scarce and difficult to obtain. This paper addresses this gap by providing comprehensive evidence of specialization in non-bank lending using SEC quarterly filings of Business Development Companies. Business Development Companies (BDCs), established through the Small Business Investment Incentive Act of 1980, provide an ideal setting for examining specialization in non-bank lending as their portfolio primarily comprises senior and subordinated loans (Figure 2).

First, I document substantial and persistent specialization using both 2-digit and 4-digit North American Industry Classification System (NAICS) codes, among BDCs. The average BDC is over-invested by 14 percentage points in its preferred industry than would be expected under perfect diversification, representing a relative over-investment factor of 4.59 times the market benchmark. This excess specialization persists over time and across different market conditions, suggesting that concentration represents a deliberate strategic choice rather than an incidental outcome of portfolio management.

Second, I provide evidence that specialized lenders have better loan outcomes. Loans originated by specialized BDCs are 0.45 percentage points less likely to become non-accrual, representing a 20% reduction relative to the sample mean non-accrual rate of 2.23%. This effect is economically substantial and is most pronounced for borrowers with payment-in-kind (PIK) characteristics, where specialized lenders demonstrate unique advantages in managing complex debt structures. The performance benefits remain consistent across multiple robustness checks and alternative specialization measures. Third, I demonstrate that specialized non-bank lenders attract high-quality borrowers and therefore offer more favorable terms, such as larger loan sizes and longer maturities. The impact of interest rate is positive, as BDC financing is more expensive due to floating interest rates. Unfortunately, the observation includes only originated loans and not loan

applications; therefore, the results reflect ex-post equilibrium outcomes., I account for a host of loan characteristics and fixed effects in all regressions to ensure that they are not the result of omitted variables.

Fourth, using the Senior Loan Officer Opinion Survey (SLOOS) and the Net tightening of lending standards by major banks, I provide new evidence on the growth of BDC lending and causal evidence on the drivers of specialization. An increase in the tightening of bank credit by one standard device leads to a 11% increase in the volume of BDC lending, with this additional lending concentrated in specialized sectors. Specifically, lending to preferred industries increases by 15 percentage points while lending to other industries decreases by two percentage points, demonstrating that BDCs strategically focus on sectors where they possess informational advantages during periods of financial stress.

Finally, I examine the relationship between specialization and BDC returns. Using factor-adjusted abnormal returns, I find that a one-standard-deviation increase in specialization (measured by the Industry Concentration Index) generates quarterly abnormal returns of 9.7 basis points, equivalent to approximately 39 basis points annually. Importantly, this effect is significant only for Net Asset Value (NAV)-based returns, which better reflect actual portfolio performance. In contrast, market-based returns show no significant relationship, consistent with the notion that market prices are influenced by factors unrelated to fundamental specialization benefits.

This paper makes several important contributions across multiple strands of literature. First, this paper makes a significant contribution to the literature on relationship lending and financial intermediation theory. While previous studies focus primarily on bank specialization (Paravisini et al. (2023); Blickle et al. (2025b), Acharya et al. (2006)), this paper provides the first comprehensive analysis of specialization in non-bank lending. The findings support information-based theories of financial intermediation (Diamond (1984); Levy and Livingston (1995a), Blickle et al. (2025a)) by showing that specialized lenders achieve superior screening and monitoring outcomes even in markets without deposit

insurance or regulatory safety nets.

Second, it contributes to the rapidly growing literature on non-bank lending and the transformation of credit markets following the Global Financial Crisis. The findings complement recent work by Davydiuk et al. (2024), Gopal and Schnabl (2022),Buchak et al. (2018), and others by providing new evidence on the growth of non-bank lenders in the post-GFC environment. BDCs have not simply substituted for bank lending but have developed distinct competitive advantages through specialization strategies. Finally, this paper also contributes to specialization and asset pricing literature by testing the abnormal performance of private credit funds. (Kacperczyk et al. (2005), Ivković et al. (2008))

The rest of the paper is organized as follows. Section 2 provides an institutional background on BDCs and details the data sources used. Section 3 outlines all the measures of specialization and summary statistics. Section 4 examines the relationship between specialization and loan performance, while Section 5 describes loan terms offered to borrowers. Section 6 identifies the causal drivers of specialization, using an instrumental variable approach. Section 7 examines the relationship between specialization and BDC returns, and Section 8 concludes.

2 Background and Data

2.1 Background

Business development companies (BDCs) were established under the Small Business Investment Incentive Act of 1980 to alleviate restrictions imposed by the Investment Company Act of 1940 and enhance the flow of capital to small and mid-sized private companies. Although their initial adoption in the 1980s was limited, the sector experienced significant growth in the early 2000s, marked by a notable increase in both the number of BDCs and their assets under management (Figure 1). Davydiuk et al. (2024) shows growth in BDC by exploiting three exogenous shocks to credit supply, including new banking regulations and a major finance company collapse, to establish that BDC capital acts as a substitute for traditional financing. A BDC is a specialized form of closed-end investment company that integrates features of commercial banks and private equity funds. The 1980 Amendments afforded BDCs greater flexibility than traditional closed-end funds, including more lenient requirements for external debt issuance and investor compensation. However, BDCs are subject to several regulatory constraints. At least 70% of assets must be held in "eligible assets," which are defined as cash, gov Securities, or investments in portfolios. Eligible portfolio firms include private companies and public U.S. companies with equity market capitalizations not exceeding $250 million.

BDCs are also known to provide "managerial assistance" to their portfolio firms, typically in the form of operational guidance, and BDC funding stimulates their employment growth and patenting activity (Davydiuk et al. (2024)). BDCs raise capital in both private and public markets. Following initial private funding rounds, many BDCs become publicly listed through an initial public offering (IPO) and rely on equity markets for ongoing financing. Unlike banks, BDCs do not have access to short-term deposits; instead, they finance their investments through long-term debt instruments, such as senior secured

loans, convertible bonds, and hybrid securities (Chernenko et al. (2025)). Their leverage rules are situated between those of banks and investment firms. Prior to 2018, BDCs were restricted to a 1:1 debt-to-equity ratio, equating to a 50% minimum capital ratio, considerably stricter than banks, which must maintain a Tier 1 capital ratio of at least 4–5%. In 2018, this restriction was relaxed to permit a 2:1 debt-to-equity ratio or a 33% minimum capital ratio. BDCs also benefit from advantageous tax treatments. By electing to be regulated as investment companies (RICs), they avoid corporate-level taxation, provided that they distribute at least 90% of their taxable income to investors. This pass-through structure enables investors to receive high dividend yields while benefiting from single-level taxation.

Another distinguishing characteristic of BDCs is their capacity to provide retail investors with exposure to private market credits. Historically, this form of illiquid investment was restricted to institutional investors and high-net-worth individuals through private equity or venture-capital funds. Suhonen (2024) showed that returns produced by Business Development Companies (BDCs) can be explained mainly by leveraged loan and small-cap value equity returns; furthermore, the alpha of BDCs is zero when measured on a market-value basis, but is a statistically significant 2.74% per annum when based on net asset value (NAV) valuations. As registered issuers under the Securities Exchange Act of 1934, BDCs are required to file periodic reports (Forms 10-Q, 10-K, and 8-K) and proxy statements, providing shareholders with insights into portfolio composition, strategy, and fund performance.

2.2 Data

The primary data are source of data is FactSet Specialty Finance Industry BDC Holdings, compiled using the 10-K and 10-Q filings of Business Development Companies (BDC) submitted to the Securities Exchange Commission (SEC). During the sample period from 2004:Q1 to 2025:Q1, I examined 207 BDCs, which collectively report approx-

imately 750,000 investment observations. The dataset includes detailed information on BDC investment portfolios, covering data on borrowers, industries, and loan characteristics such as principal, fair value, interest rate, maturity, accrual status, payment-in-kind options, and spreads. Observations are retained where complete information on the amount, interest, and maturity is available. Following data cleaning, I observed 121,000 loans, resulting in more than 412,000 loan-quarter observations. I employ borrowers' 2-digit and 4-digit NAICS industry classifications to define specialization.

The borrowers' NAICS codes are not directly available in the FactSet data; however, there is a description of the industry sector, group, and code. Based on these descriptions, I match them with NAICS descriptions to obtain the codes for each borrower. Additionally, I was able to obtain industry classification codes from Moody's Orbis for almost 10,000 borrowers out of the total 11,113 borrowers in the sample. The average loan size in the sample is $17.1 million, exhibiting a right-skewed distribution due to a few huge loans. The data are reported in millions of dollars and are logged.

As indicated in table 1, the average size of the logged loans was 2.02. The average interest rate for loans during the sample period was 9.05%. A non-performing loan is identified by a dummy variable that assumes a value of 1 if a loan is flagged as either non-accruing or in default by BDC. Slightly over 2% of all loan types became non-performing during the sample period, while less than 1% of the loans were unsecured. Additionally, 10% of loans include payment-in-kind options. There are a total of 22 different sectors at the 2-digit level and 106 at the 4-digit level NAICS codes represented in the sample.

3 Measuring Specialization

In this section, I introduce the measures used to capture industry specialization among BDCs and show how they reflect differences in portfolio concentration. I then present summary statistics for these measures, documenting how specialization varies across BDCs and over time.

3.1 Measuring Specialization

To quantify industry specialization in BDC lending portfolios, I employ a set of complementary measures that capture both absolute concentration and deviations from market-wide benchmarks. The most direct measure is the share of a BDC's commercial and industrial (C&I) loan portfolio allocated to a given industry, defined at either the 2-digit or 4-digit NAICS level. Formally, specialization is calculated as the fraction of total loan principal (or fair value) outstanding in a specific industry during a given quarter:

$$Specialization_{b,s,t} \equiv \frac{\text{LoanAmount}_{b,s,t}}{\sum_s \text{LoanAmount}_{b,s,t}}, \tag{1}$$

where $\text{LoanAmount}_{b,s,t}$ is the fair value of loans that BDC b holds in industry s during period t. This metric indicates how lending activities are spread across the portfolio but does not account for the fact that certain industries are naturally larger and tend to receive a larger portion of loans in the market. For instance, in Q42024, Goldman Sachs BDC has allocated up to 44% of its portfolio to software and related services, whereas the next largest allocation, healthcare services, is only 9%, indicating a preference and also larger loan amounts.

To account for differences in industry size, follow Blickle et al. (2025b) and use 'Excess specialization' metric. This measure subtracts the aggregate market share of lending to a given industry from the BDC's own portfolio share:

$$ExcessSpec_{b,s,t} \equiv \frac{\text{LoanAmount}_{b,s,t}}{\sum_s \text{LoanAmount}_{b,s,t}} - \frac{\text{LoanAmount}_{s,t}}{\sum_s \text{LoanAmount}_{s,t}}. \tag{2}$$

A positive value indicates that a BDC is overinvested in an industry relative to the market, while a negative value implies underinvested. An alternative but related measure is the 'Relative Specialization ratio (Paravisini et al., 2023), defined as the ratio of a BDC's portfolio share in a given industry to the corresponding market share:

$$RelativeSpec_{b,s,t} \equiv \frac{\frac{\text{LoanAmount}_{b,s,t}}{\sum_s \text{LoanAmount}_{b,s,t}}}{\frac{\text{LoanAmount}_{s,t}}{\sum_s \text{LoanAmount}_{s,t}}}. \tag{3}$$

Similar to Blickle et al. (2025b), I classify the industry in which a BDC is most overinvested as its "favorite," thereby defining specialization in a binary manner. In addition to these industry-specific measures, I employ portfolio-level indices that summarize overall concentration. The first is the Herfindahl–Hirschman Index (HHI), which aggregates the squared shares of a BDC's industry exposures:

$$HHI_{b,t} \equiv \sum_{s=1}^{N} \left(w_{b,s,t}\right)^2, \tag{4}$$

where $w_{b,s,t}$ is the share of BDC b's total portfolio in industry s during quarter t, and N is the number of industries. The HHI ranges from $1/N$, where a BDC is fully diversified across industries, to 1, where the portfolio is entirely invested in a single sector.

To complement this, I calculate the Industry Concentration Index (ICI) (Kacperczyk et al., 2005), which measures the how much a BDC portfolio deviates from the market portfolio

$$ICI_{b,t} \equiv \sum_{s=1}^{N} \left(w_{b,s,t} - \bar{w}_{s,t}\right)^2, \tag{5}$$

where $\bar{w}_{s,t}$ is the market-wide share of lending to industry s in quarter t. By construc-

tion, the market portfolio has an ICI of zero, and higher values indicate greater deviation from the benchmark. The ICI can be viewed as a market-adjusted HHI, since it incorporates time-varying shifts in the overall market composition.

Taken together, these measures provide a comprehensive picture of specialization. Portfolio shares capture the raw allocation of lending activity, excess and relative specialization identify deviations from the market baseline, and HHI and ICI summarize the overall degree of concentration at the fund level. In practice, the measures are highly correlated, but they capture distinct dimensions of specialization that are important for linking portfolio structure to loan terms, performance, and risk-adjusted returns.

3.2 Documenting Specialization

I begin by documenting patterns of specialization among Business Development Companies (BDCs). BDCs lend to a relatively small number of industries, and one way to measure that specialization is by benchmarking against complete diversification. Figure 3 shows the average excess specialization between sectors with the highest preference, industry with the second highest preference, and all others at the two-digit NAICS level. Figure 3 shows that BDCs' lending is substantially larger in their favorite industry than in a diversified portfolio. On average, BDCs invest 14 percentage points more in their preferred sector than a diversified benchmark. BDCs' portfolios are concentrated in one or two industries, and they are significantly over-invested in them. This also has a relative over-investment factor of 4.59, indicating that it is at least four times over the amount invested in its favorite industry than was expected under complete diversification. At a 4-digit classification, the average excess specialization is 11 percentage points, with the relative specialization factor of 8.52 for the most preferred industry.

Table 2 shows the summary statistics of different specialization measures. I calculate all three specialization measures at 2-digit and 4-digit NAICS codes and split the data into BDC's favorite industry and other industries for each measure. On average, the BDC

concentrates 40 percent of lending to the preferred industry, while the other industries collectively take about 6 percent, excluding the second most preferred. These statistics show that BDCs also specialize similarly to banks, but the numbers are more pronounced.

Figure 5 shows the distribution of excess specialization. Panel (a) is a histogram of BDCs' specialization in the most favorable industry, while panel (b) shows the specialization in all other industries. The distribution of top-industry specialization is positively skewed, where some BDCs emphasize an extreme concentration while others have markedly more diversified portfolios. Specialization in other industries is roughly normal and centered around zero. The contrast between the distributions suggests that concentration is not a uniform phenomenon across all BDCs, but instead reflects distinct strategic decisions by some lenders.

Table 1 shows that specialization is associated with differences in loan terms and loan performance. while Figures 6–8 highlight how loans in specialized versus non-specialized industries differ. Loans in favored industries are systematically larger, the interest rates are overall higher, and have longer maturities. The share of non-accrual loans in specialized industries is nearly half that observed in non-specialized sectors.

Finally, Figures 9 and 10 show that the portfolio concentration is persistent and grows over time, indicating that the BDC lending is not evenly spread between industries. The ICI moves broadly in line with the HHI, but is especially sensitive to periods when lending becomes more heavily concentrated in the top industries, highlighting shifts in industry focus rather than broad-based diversification.

4 Specialization and Loan Performance

4.1 Empirical Specification

In the previous section, I documented that Business Development Companies (BDCs), which are financial institutions that invest in small and mid-sized businesses, exhibit specialization patterns over time, concentrating disproportionately in selected industries. The first hypothesis aims to investigate the impact of Specialization in BDCs on loan performance. I follow the Blickle et al. (2025b) approach to test the hypothesis that specialized BDCs can also select or ex post monitor loans ex ante, and it affects the performance of those loans. To test the hypothesis, I estimate the following specification,

$$NonAccrual_{l,i,b,s,T} = \beta_0 + \beta_1 Specialization_{b,s,t} + \beta_2 X_{l,b} + \gamma_{b,t} + \sigma_{s,t} + \phi_{type} + \varepsilon_{l,i,b,s,t}, \quad (6)$$

Where $NonAccrual_{l,i,b,s,t}$ is an indicator equal to one if the loan l becomes non-accrual anytime in our sample, granted by BDC b to firm i in industry s over its maturity T. A loan is considered non-accrual when collection of principal, interest, or dividends is unlikely or payments have already stopped under the contract. The focal variable, $Specialization_{b,s,t}$, captures the degree of excess Specialization of BDC b in industry s relative to the aggregate market at time t, measured at the 2-digit NAICS level (where NAICS stands for North American Industry Classification System) at a baseline. I also corroborate the results, using relative and portfolio share specialization measures (portfolio share refers to the portion of a BDC's commercial and industrial (C&I) loan portfolio in a particular industry).

The control vector $X_{l,i,t}$ includes loan-specific characteristics such as the logarithm of loan size, contractual remaining maturity (in years), and interest rate. All regressions include BDC–Time and Industry–Time fixed effects. BDC–Time fixed effects show loan performance differences within a BDC by comparing loans to industries where BDC spe-

cialization varies. With Industry–Time fixed effects, we compare loan performance within an industry for banks specialized to different extents. I also add a loan type fixed effect (Senior, unsecured, subordinated, others) to account for differences by loan type.

4.2 Results

Table 3 shows that loans from more specialized BDCs are less likely to become non-accrual. Across all specifications, the Excess Specialization coefficient is negative and significant. Column (1), the baseline without controls, shows that loans in a specialized industry are about 0.45 percentage points less likely to become non-accrual. The average non-accrual rate is 2.23%, so this effect is meaningful. This number comes from the difference in the mean of excess Specialization between preferred (0.14) and other industries (-0.01), multiplied by the coefficient of 3%. In column (2), the coefficient increases slightly with BDC×Time and Industry×Time fixed effects. In column (3), adding loan principal and interest rate controls has little impact, showing robustness.

Column (4) highlights an important interaction between BDC specialization and the presence of payment-in-kind (PIK) options. PIK features allow borrowers to defer interest by adding it to the loan principal. This offers short-term relief but signals higher risk. Consistent with this, the PIK_l coefficient is positive and significant, reflecting higher default risk. High PIK use often signals portfolio stress Rintamäki and Steffen (2025). However, the interaction $Specialization \times PIK$ is strongly negative, showing specialized BDCs manage these risks better.

In Table 4, I use all alternative measures of Specialization, where each cell represents an individual regression. First, I use relative as well as excess Specialization at the 2-digit industry and 4-digit sector levels. I complement the results by adding portfolio share of a BDC's C&I portfolio in an industry, also at the 2- and 4-digit NAICS level. I include loan type, BDC*Time, and Industry*Time fixed effects in all columns. Columns (1) have no controls for all the specifications, and in column (2), I include interest rate and loan

amount as controls.

These findings are consistent regardless of how Specialization is defined. Similar to Table 3, the 2-digit portfolio share measure is linked to a 0.66% reduction in the probability of a loan becoming non-performing, which closely matches the excess specialization estimate of 0.68%. The significance of these effects persists at the four-digit level, both statistically and economically. The impact of relative Specialization is reduced at the more detailed 4-digit NAICS level. This reduction occurs because lenders often have multiple favored sectors within a single 2-digit industry, resulting in broader lending across related subsectors. Overall, results are robust across specifications and specialization measures. Non-bank lenders like BDCs also show Specialization, affecting loan performance as banks do. These findings highlight the strategic value of Specialization in private credit and extend the literature on banking informational advantages to non-bank intermediaries.

5 Specialization and Loan Characteristics

In addition to loan performance, it is important to explore whether specialization affects the contractual terms of loans made by BDCs. Specialized lenders may attract borrowers that belong to their preferred industry and design contracts allowing more favorable terms (Giometti and Pietrosanti (2022)). To test this, I relate a BDC's specialization in an industry to the observable characteristics of the loans granted by the BDC in that industry. Specifically, I look at the association between specialization and loan terms such as size, pricing, maturity, and other flexible terms in the contract. Similar to equation (1), I run the following specification

$$Y_{l,i,b,s,t} = \alpha + \beta\, Specialization_{b,s,t} + \Gamma X_{l,i,t} + \gamma_{b,t} + \sigma_{s,t} + \phi_{type} + \varepsilon_{l,i,b,s,t}, \tag{7}$$

where $Y_{l,i,b,s,t}$ denotes a loan characteristic for loan l to firm i in industry s, originated

by BDC b at time t. As dependent variables, I consider: (i) Log Loan Amount, (ii) interest rate in percentage terms, (iii) contractual maturity in years, (iv) an indicator for Payment-in-Kind (PIK) features, and (v) an indicator for unitranche structures. The key explanatory variable is $Specialization_{b,s,t}$. This variable is defined as the excess share of BDC b's lending in industry s relative to the aggregate market at the 2-digit NAICS code.

The control set $X_{l,i,t}$ includes the remaining loan characteristics not serving as dependent variables in a given regression. For instance, when studying loan size, I control for the loan's rate and maturity. All regressions include BDC*Time and Industry*Time fixed effects, as well as loan type fixed effects. This ensures identification comes from within-BDC and within-industry variation. Importantly, these specifications describe correlations in equilibrium outcomes, not causal effects, since both supply and demand jointly determine loan contracts.

5.1 Results

Table 5 reports the results. From column (1), it is evident that excess specialization is strongly and positively associated with loan size. The estimated coefficient of 1.305 implies that loans made to borrowers in a BDC's preferred industry would be larger by 20%, all else equal. Put differently, loans in industries where BDCs are more specialized tend to be substantially larger in dollar terms. This finding supports the notion that informational advantages allow specialized lenders to take on larger exposures within their preferred industry.

In column (2), I find a positive correlation between specialization and higher interest rates. This finding contrasts with the traditional bank lending literature, where specialization is often linked to lower pricing. The coefficient of 0.639 indicates that BDCs charge meaningfully higher spreads when operating in their favored industries. There could be several explanations for this result. One interpretation is that specialized lenders extend financing to riskier or more opaque firms, resulting in higher pricing. Another expla-

nation comes from their financing model. About 98% of BDC lending is structured as floating-rate loans, and most BDCs rely on revolving bank credit lines. As a result, their cost of capital is relatively high, which translates into higher loan pricing. Alternatively, BDCs may use their industry focus to extract informational rents, leading to higher loan pricing and as pricing might not be impacted as shown by Petersen and Rajan (1994).

Results in column (3) reveal that specialized lenders structure contracts with longer maturities, with a coefficient of 0.174 (0.7 quarters). In column (4), specialization is positively associated with the inclusion of PIK features. The coefficient of 0.013, though modest, suggests that specialized lenders are slightly more likely to extend loans with flexible payment provisions. This supports the view that informational advantages permit BDCs to manage the elevated risks in PIK structures.

Finally, specialization is negatively associated with unitranche structures. The coefficient of -0.033 (s.e. 0.008) implies that specialized lenders are significantly less likely to offer unitranche loans, which blend senior and subordinated debt into a single facility. Loans made by specialized banks are also less likely to be unsecured. I complement the results by using a portfolio share specialization measure in table 6 and find similar results to our main findings.

6 What Drives BDCs' Specialization?

So far, I have documented how BDCs specialize in lending and concentrate their portfolios in the preceding sections. I have also examined how specialized lenders impact performance and loan terms. As shown in Figure 3, 4, and 9, BDC portfolios are not only concentrated but also exhibit persistence over time. In this section, I investigate the factors that drive BDC specialization by using an instrumental variable approach that exploits exogenous changes in bank credit supply conditions.

6.1 SLOOS as an instrument for non-bank specialization

This paper's empirical strategy involves using the Senior Loan Officer Opinion Survey (SLOOS) on bank lending practices. The Federal Reserve's SLOOS has been conducted quarterly since 1967, surveying loan officers at major U.S. commercial banks about changes in their lending standards and practices. The survey covers approximately 60-80 domestic banks, which account for about 70% of all U.S. bank commercial loans and roughly 60% of total bank assets (Bassett et al. (2014), Lown and Morgan (2006)). SLOOS asks participating banks whether they have tightened or eased their credit standards for various loan categories, including commercial and industrial (C&I) loans to large and medium-market firms as well as small firms. The survey responses are aggregated into diffusion indices that represent the net percentage of banks reporting tightening or easing standards. As documented by Lown and Morgan (2006), these reported changes in lending standards are highly correlated with subsequent fluctuations in commercial loan growth and economic activity. Since these measures reflect bank-side supply conditions that are plausibly exogenous to the strategic choices of individual BDCs, they provide a source of variation that enables the identification of causal effects of specialization.

This implies some requirements for instrument validity. First, when SLOOS Net tightening standards indicate banks are restricting lending, this acts as an exogenous contractionary shock to aggregate bank credit supply. In the post-Global Financial Crisis regulatory environment, increased bank capital requirements from Basel III have made certain lending less attractive for banks. As a result, when banks tighten standards, less credit is available to middle-market firms. This reduction in supply creates opportunities for non-bank lenders such as BDCs. Empirical evidence from Davydiuk et al. (2024) indicates that BDCs increase lending to these firms when bank standards tighten, thereby acting as substitutes for bank lending. This substitution effect is particularly pronounced for middle-market firms that rely on banks and have limited access to capital markets

(Chernenko, 2025). Thus, tighter standards lead to increased BDC lending, supporting the use of SLOOS as a valid instrument for exogenous changes in bank credit supply.

Secondly, BDCs primarily lend to middle-market companies across various industries, including healthcare, software, and manufacturing. Since commercial banks responding to SLOOS are not BDC borrowers, these banks' actions do not directly influence BDC specialization measures. BDCs enter these markets as ex-ante specialized lenders, with expertise that reduces their fixed costs of due diligence and monitoring compared to diversifying into new sectors. Financial intermediation theories (Levy and Livingston (1995a); Winton (1999)) emphasize these fixed costs. When tighter bank credit supply is identified via SLOOS, BDCs respond by funneling increased capital toward their existing specialized sectors, where they operate more efficiently. Evidence (Acharya et al. (2006)) also suggests that diversification does not confer greater returns or safety. Moreover, BDCs face rising financing costs when SLOOS-tightening also affects their access to bank credit (Chernenko et al. (2025)). Consequently, BDCs maximize returns by directing investment primarily to established areas of expertise. The observed link is thus: bank tightening reduces supply to firms, BDCs step in where they are most efficient, reinforcing the channel from SLOOS shocks to specialization.

6.2 Empirical Methodology

The empirical strategy follows a two-stage least squares (2SLS) framework. In the first stage, I estimate the relationship between SLOOS and BDC lending over time:

$$\ln\left(\text{Outstanding Loans}\right)_{b,t} = \alpha + \beta\,\text{SLOOS}_t + \mu_b + \varepsilon_{b,t}, \tag{8}$$

Where $\text{Outstanding Loans}_{b,t}$ are the total fair value of loans reported in the BDC b, filings at time t, SLOOS_t is the net percentage of domestic Banks Tightening Standards for C&I loans to both the large and medium market firms and small firms. The second

stage regressions are as follows,

$$Y_{i,b,t} = \delta + \theta \ln \widehat{(\text{Outstanding Loans})}_{b,t} + \phi Z_{i,b,t} + \mu_b + \eta_{i,b,t}, \tag{9}$$

Where $Y_{i,b,t}$ is the outcome variable that includes the Herfindahl-Hitchman Index (HHI), BDC lending to favor the industry, and BDC lending to other industries for BDC b in period t. I include BDC fixed effects in all regressions.

The identification relies on the assumption that quarterly changes in aggregate bank lending standards provide exogenous variation in credit market conditions that affects BDCs through the substitution channel, but does not directly influence BDC specialization decisions except through changes in lending activity.

6.3 Results

The estimates of the first stage reported in Table 7 show that tighter bank credit conditions, as measured by the Senior Loan Officer Opinion Survey (SLOOS) net tightening index for large and medium firms, are positively associated with increased Business Development Company (BDC) lending. Specifically, a one-standard-deviation increase in the SLOOS net tightening standards for large and middle-market firms (0.217) corresponds to an average increase of 11% in BDC lending. This effect is both economically and statistically significant. The F statistics for the first-stage regressions are reported alongside the estimates and exceed the Staiger and Stock (1994) threshold of 10, a common benchmark indicating a strong instrumental variable,in all cases, confirming the strength of the instrument. In the second stage, the instrumented BDC lending volume exhibits a positive and statistically significant effect on market concentration, as measured by the Herfindahl-Hirschman index (HHI), which quantifies market concentration with higher values indicating less competition. The coefficient estimate of 0.050 implies that an increase of one standard deviation in BDC lending results in a 0.09-point increase in HHI.

Furthermore, results show that when Business Development Company (BDC) lending increases, lending to the firm's preferred industry increases by 15 percentage points, while lending to other industries decreases by an average of 2 percentage points over time. These findings are further corroborated in Table 8, which uses the SLOOS (Senior Loan Officer Opinion Survey) net tightening index for small firms. The results remain consistent in direction and exhibit even larger coefficient estimates.

7 Specialization and Performance

The relationship between portfolio specialization and performance has been a central question in the asset pricing literature for decades. The empirical motivation to test this relationship comes from the theoretical foundation of diversification benefits, articulated in modern portfolio theory Markowitz (1952). Levy and Livingston (1995b) demonstrates in a mean-variance framework that managers with superior information should have relatively concentrated portfolios. Similarly, Nanda (2004) provides evidence that fund families following more focused investment strategies across funds perform better, probably due to their informational advantages. Building on this, the seminal work of Kacperczyk et al. (2005) makes a fundamental contribution to understanding how industry specialization affects mutual fund performance. Using data from actively managed equity mutual funds from 1984 to 1999, they show that funds with greater industry concentration consistently outperform their diversified counterparts after controlling for risk and style differences. The mechanism underlying the link between specialization and performance operates through several interconnected channels. First, specialized fund managers develop informational advantages within their focus industries, enabling them to select securities more effectively and monitor their portfolio companies more closely. This information-based theory of financial intermediation suggests that intermediaries with superior screening abilities and industry-specific knowledge can extract

greater value from their investments Bethune et al. (2022). Second, concentrated portfolios enable managers to allocate attention more effectively, as the cognitive and resource constraints inherent in investment management make it challenging to maintain expertise across multiple, disparate sectors (Kacperczyk et al. (2008)).

Although the mutual fund literature has extensively studied specialization in investment strategies, there is less focus on how these findings apply to alternative investment vehicles, especially those operating in private markets. Business Development Companies (BDCs) are a type of closed-end investment company created by U.S. Congress to facilitate capital access for small and medium-sized private businesses. BDCs uniquely combine features of both public mutual funds and private credit funds. Unlike traditional mutual funds that invest primarily in publicly traded securities, BDCs are direct lenders to small and medium-sized private companies, making investments often in the form of direct loans and equity. The theoretical case for specialization benefits in the BDC context is strong. Private credit investments require extensive due diligence, ex-ante screening, and ex-post monitoring—activities that necessitate significant information and active management. Information asymmetries are more pronounced in private credit because of limited public information about firms and their history. Relationship lending is especially valuable in middle-market lending, where deal sourcing often depends on established networks within specific industries and prior knowledge. Following the literature on mutual fund performance (Jensen (1968); Carhart (1997); Ferson and Schadt (1996)), I assess BDC performance using factor-adjusted abnormal returns. The approach incorporates the distinct characteristics of BDCs, which are listed publicly, by investing in private credit markets and evaluating both market-based and net asset value (NAV)-based performance measures. Following Suhonen (2024) to assess BDC performance, for market-based total returns, I first run.

For BDC i in quarter t,

$$\left(R_{i,t}^{\text{MKT}} - R_t^f\right) = \alpha_i^{\text{MKT}} + \beta_M \left(MKT - RF\right)_t + \beta_S \, SMB_t + \beta_H \, HML_t + \beta_{LL} \, LL_t + \beta_{HY} \, HY_t + \varepsilon_{i,t}^{\text{MKT}}, \tag{10}$$

For BDC i in quarter t, $(MKT - RF)$ is the total return (price and dividend), SMB and HML are size and value factors, and LL and HY are the return on Morningstar LSTA US Leveraged Loan and ICE BofA US High Yield Index Option-Adjusted Spread index returns, respectively. To address appraisal smoothing in private asset valuations, I allow for lags in risk factors, as follows Suhonen (2024):

$$\left(R_{i,t}^{\text{NAV}} - R_t^f\right) = \alpha_i^{\text{NAV}} + \sum_{k=0}^{1} \left(\gamma_{M,k} \left(MKT - RF\right)_{t-k} + \gamma_{S,k} \, SMB_{t-k} + \gamma_{H,k} \, HML_{t-k}\right) + \delta_{LL} \, LL_{t-1} + \delta_{HY} \, HY_{t-1} + \varepsilon_{i,t}^{\text{NAV}}. \tag{11}$$

The lag structure allows reported NAV changes to catch up with underlying value movements when marks occur infrequently. The lagged structure in the NAV model addresses the well-documented issue of appraisal smoothing in private market valuations, where reported NAV changes may lag actual value fluctuations due to infrequent mark-to-market adjustments.

Rather than estimating static alphas for each, following the approach of Bollen and Busse (2005) and Kaniel et al. (2022), compute abnormal returns as residuals from factor models to generate a panel of period-by-period performance measures. This methodology is particularly suitable for quarterly data, allowing for time-varying analysis of the specialization-performance relationship.

$$Perf_{i,t}^{\text{MKT}} = \left(R_{i,t}^{\text{MKT}} - R_t^f\right) - \widehat{R}_{i,t}^{\text{MKT}}, \tag{12}$$

$$Perf_{i,t}^{\text{NAV}} = \left(R_{i,t}^{\text{NAV}} - R_t^f\right) - \widehat{R}_{i,t}^{\text{NAV}}, \tag{13}$$

where $\widehat{R}_{i,t}^{\text{MKT}}$ and $\widehat{R}_{i,t}^{\text{NAV}}$ are the fitted factor-implied excess returns from (10) and (11).

This design yields one observation per BDC per quarter, facilitating panel regressions with time-fixed effects that absorb common macroeconomic shocks.

Finally, to test whether specialization predicts performance, I run the following regression:

$$Perf_{i,t} = \alpha + \beta\, Spec_{i,t-1} + \lambda_t + u_{i,t}, \tag{14}$$

where $Spec_{i,t-1}$ is a lagged specialization measure, i.e., either the Herfindahl–Hirschman Index (HHI) or our Industry Concentration Index (ICI); λ_t are quarter fixed effects. I also add BDC level ex-ante controls (lagged log assets, leverage, expense ratio, and BDC age) following Kacperczyk et al. (2005) as using the lagged explanatory variables mitigates potential endogeneity problems.

Table 10 shows a significant and economically meaningful relationship between specialization and BDC performance, with results varying between market-based and NAV-based performance measures. The first column displays the coefficients from the panel regression, which is based on the abnormal return using the unconditional factors. An increase in the Industry Concentration Index by 1.3 percentage points, which corresponds to about one standard deviation, increases the quarterly abnormal return of a BDC by 9.7 basis points (=1.382 × 7 = 9.7). This equals approximately 0.39 percentage points per year. This effect is economically and statistically significant. On average, management fees and leverage have a statistically significant positive effect on the abnormal returns of the BDCs.

Building on these NAV-based findings, market-based measures reveal a different pattern. Specialization does not significantly explain the abnormal returns of BDCs. These results are consistent with Suhonen (2024), who argues that NAV-based performance more accurately represents actual portfolio cash flows and investment outcomes. Market prices, in contrast, are subject to fluctuations in discount rates, liquidity conditions, and investor sentiment, which can obscure the effects of specialization. The gap between

market-based and NAV-based returns is especially evident in closed-end fund structures such as BDCs, where market prices incorporate investor sentiment, trading liquidity, and macroeconomic influences in addition to fundamental value. During periods of market stress or exuberance, BDC shares may trade at substantial discounts or premiums to NAV. For instance, some BDCs traded at discounts to NAV of up to 50% during the COVID-19 market turmoil in March 2020, whereas in stable periods, they may trade at modest premiums. Since BDCs primarily hold illiquid, privately negotiated loans that are marked quarterly using fair value accounting methods, their NAVs are less affected by daily market volatility than stock prices.

This distinction between NAV- and market-based measures is essential for evaluating manager skill and the true impact of specialization. NAV returns directly reflect changes in portfolio value and cash flow, including interest income, loan repayments, and non-accruals, after accounting for management fees and expenses. These measures are closely linked to managerial decisions regarding investment decisions and credit terms to the borrowers, and they demonstrate strong persistence in BDC performance over time. In contrast, volatility in market returns often results from temporary mispricing, liquidity constraints, or herding behavior among investors, factors potentially unrelated to the BDC specialization. Empirical studies indicate that market prices are typically more volatile than NAVs and may not reliably represent the long-term earning capacity of a BDC's portfolio, especially during periods of market disruption when trading liquidity declines and fundamental values diverge from exchange prices. Therefore, NAV-based abnormal returns are the preferred metric for assessing the influence of specialization and managerial skill in the BDC sector. Table 11 presents comparable results using an alternative definition of specialization, although these results are not statistically significant.

8 Conclusion

This paper provides the first comprehensive evidence that non-bank lenders are also specialized lenders just like banks, fundamentally extending information-based theories of financial intermediation beyond regulated depositories. Using investment portfolios of BDCs, I show that specialized BDCs concentrate their lending in specific industries, achieving superior loan outcomes and offering more favorable contract terms. This specilization in specific industries reflects deliberate information-based strategies rather than passive portfolio management, with specialized lenders demonstrating better ex-ante screening and ex-post monitoring borrowers and managing complex debt structures such as payment-in-kind options.

The paper shows the causal evidence of persistent in specialization using exogenous bank tightening of credit standards for firms systematically increases both the volume of outstanding loans and concentration of non-bank lending and increased lending in their preferred industries over other. This substitution effect highlights the evolving structure of credit markets, where specialized non-bank lenders serve as important counter parties during periods of banking sector stress. The performance benefits of specialization manifest most clearly in fundamental portfolio outcomes, with specialized BDCs generating meaningful risk-adjusted abnormal returns that reflect their informational advantages rather than market sentiment.

As private credit continues to grow, the analysis in this paper suggest that specialization rather than diversification may represent the optimal approach for non-bank lenders seeking to maximize value creation in lending market. However, similar to the banking sector, concentrated lending portfolios may pose risks during severe sector-specific downturns, highlighting the need for continued research into the systemic implications of specialization across different types of financial intermediaries. These results extend the theory of relationship lending and information-based intermediation to non-bank

lenders, incorporating their unique characteristics.

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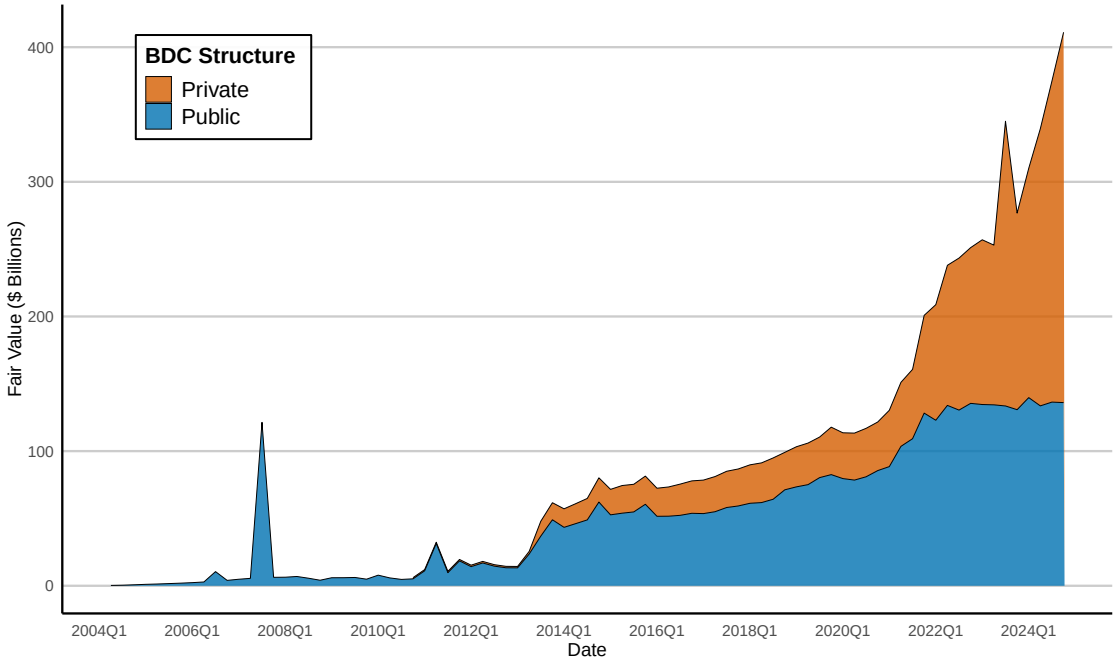
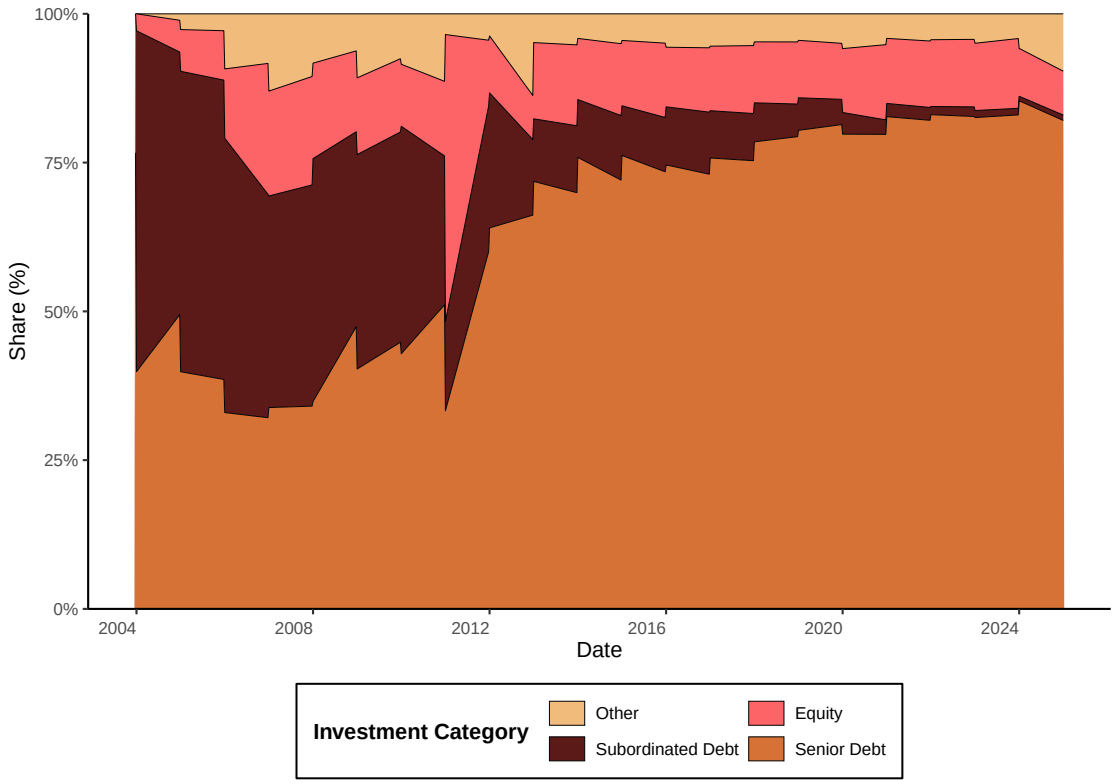
Figure 1: Total Fair Value of Investments



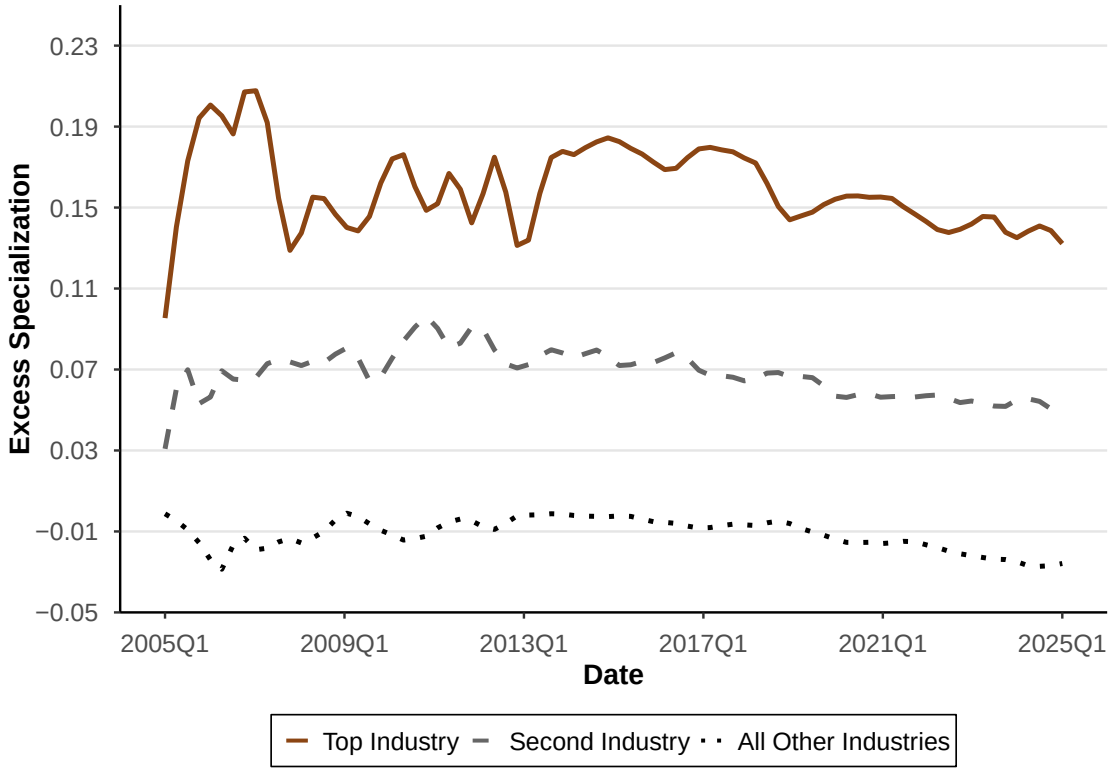
Notes: This figure shows the aggregate fair value of BDC portfolios over time reported in 10-K and 10-Q filings, distinguishing between private and public BDCs.

Figure 2: BDC Investment Instruments



Notes: This figure shows the shares of different investment instruments employed by BDCs. The investment instruments include senior debt, subordinated debt, equity, structured products, and other investments. The shares are calculated based on the fair values of investments. The data are quarterly observations from 2004:Q1 to 2025:Q1

Figure 3: Excess Specialization

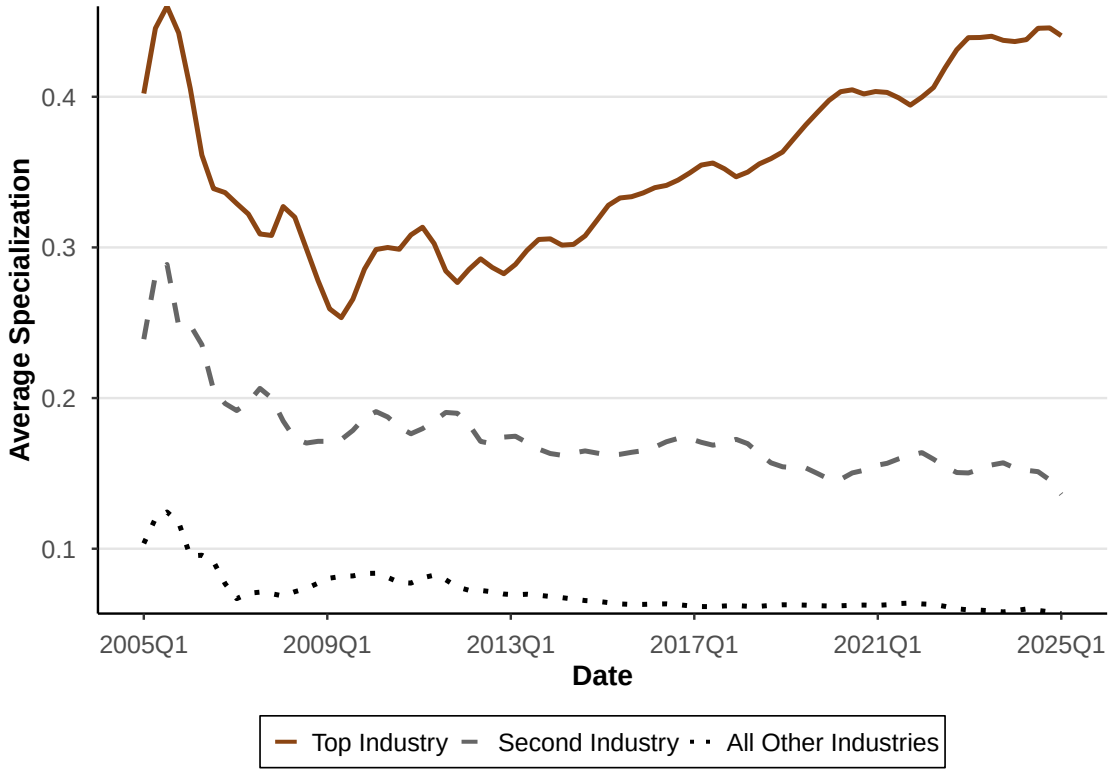


Notes: This figure shows the degree to which BDCs in the data are "over-invested" in their favorite, second favorite, and all other industries. I measure specialization using *excess specialization*, defined as

$$\text{ExcessSpec}_{b,s,t} = \frac{\text{LoanAmount}_{b,s,t}}{\sum_s \text{LoanAmount}_{b,s,t}} - \frac{\text{LoanAmount}_{s,t}}{\sum_s \text{LoanAmount}_{s,t}},$$

for term loans in our sample. A BDC's favorite industry is defined as the industry in which it is most over-invested relative to the benchmark of perfect diversification.

Figure 4: Specialization

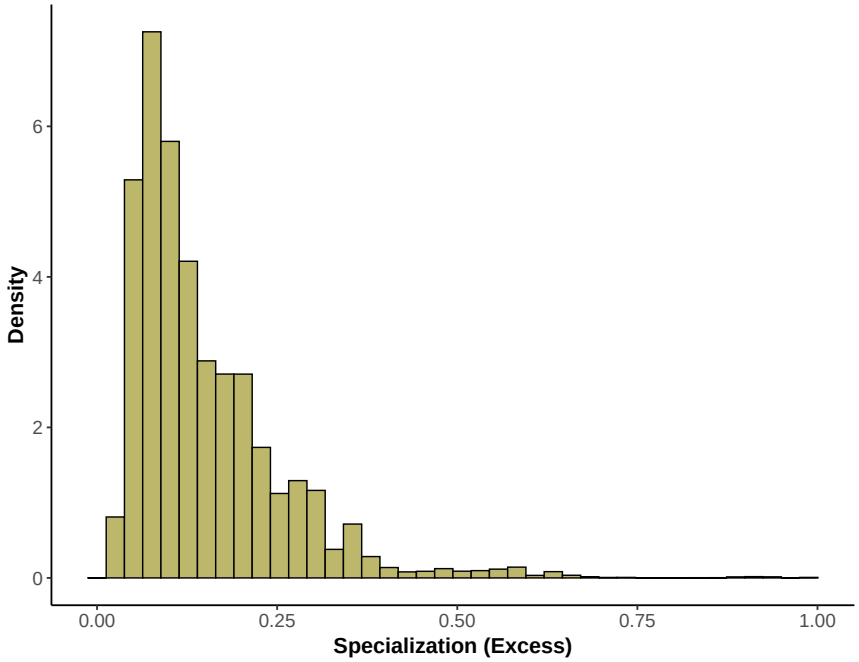


Notes: This figure shows the degree to which banks in our data allocate their lending portfolios across the favorite, second favorite, and all other industries. I measure specialization using *portfolio share*, defined as

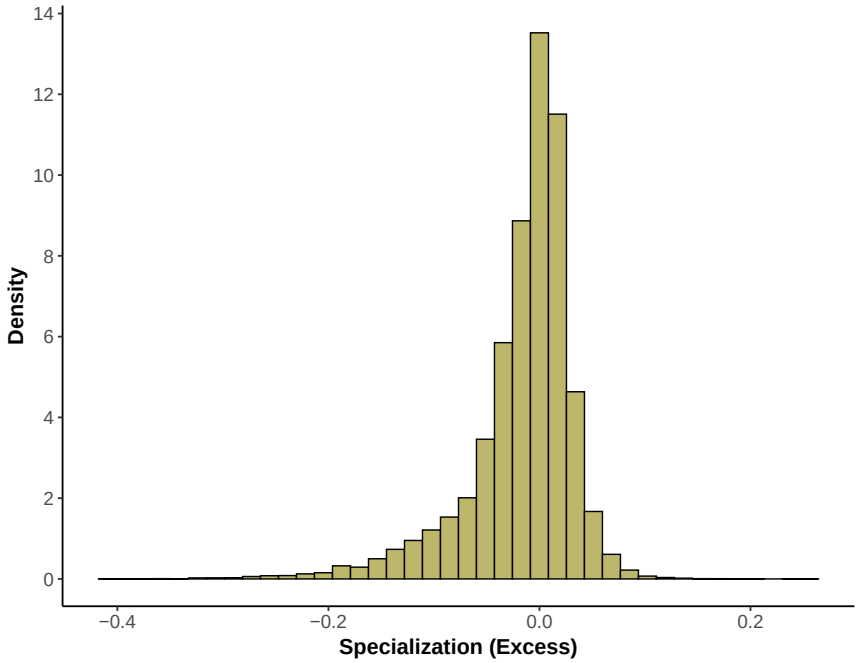
$$\text{PortfolioShare}_{b,s,t} = \frac{\text{LoanAmount}_{b,s,t}}{\sum_s \text{LoanAmount}_{b,s,t}},$$

for term loans in our sample. A BDC's favorite industry is defined as the industry to which it allocates the largest share of its C&I lending portfolio, with the second favorite identified analogously.

Figure 5: Excess Specialization



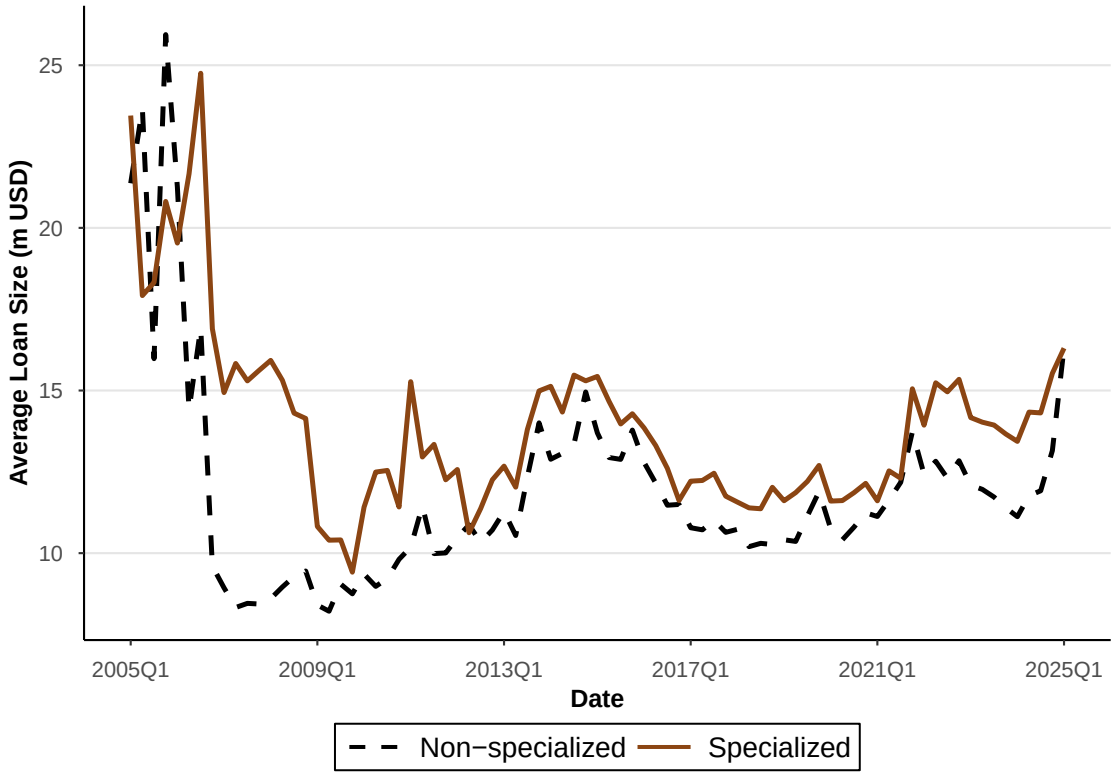
(a) Favorite Industry



(b) Other Industries

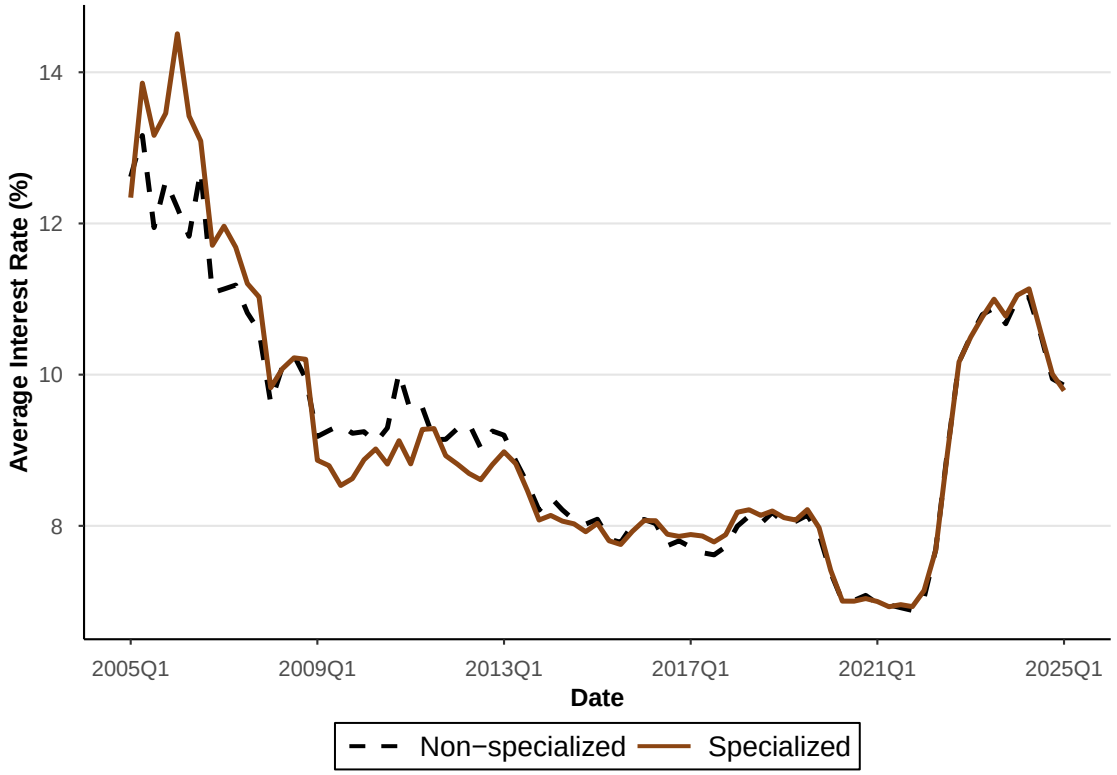
Notes: This figure plots the distribution of "excess" specialization for the BDCs in the sample. Excess specialization is measured as the degree to which a BDC is over-invested in an industry. Panel (a) shows the BDC's favored industry, and panel (b) shows all other industries.

Figure 6: Loan Amount - Specialized vs Non-Specialized



Notes: This figure plots the average loan size (USD millions) for loans originated each quarter, comparing borrowers in a BDC's *favorite* industry ("Specialized") to borrowers in all other industries ("Non-specialized"). The favorite industry at quarter t is the 2-digit NAICS sector with the highest excess specialization for that BDC. Loan size is measured as the loan's initial principal.

Figure 7: Interest Rate - Specialized vs Non-Specialized



Notes: This figure shows average interest rates (%) charged on loans for each quarter, again split by "Specialized" vs "Non-specialized." Both fixed and floating interest rate loans are included.

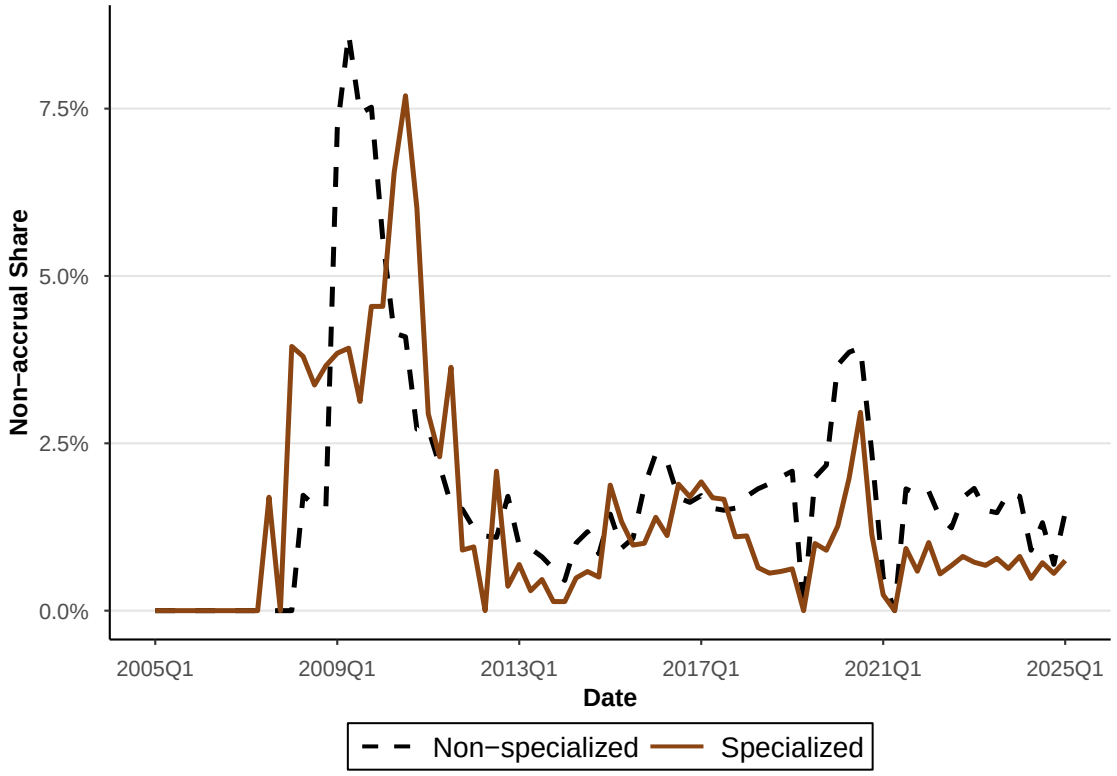
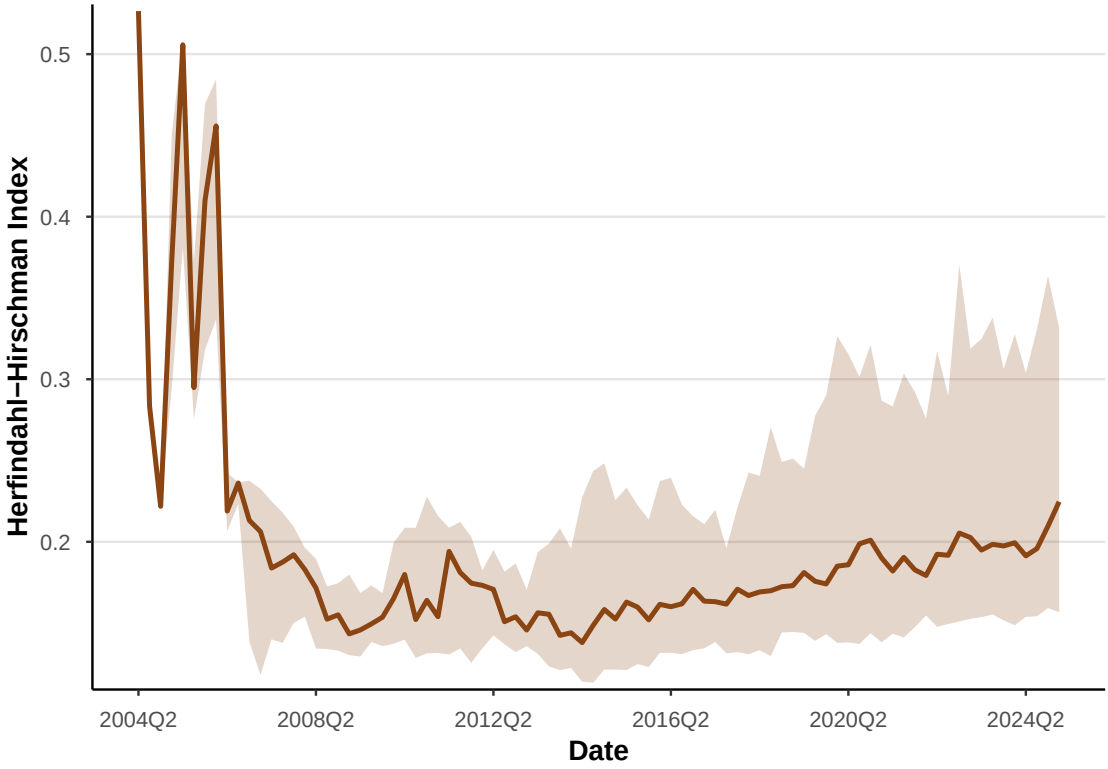


Figure 8: Specialization

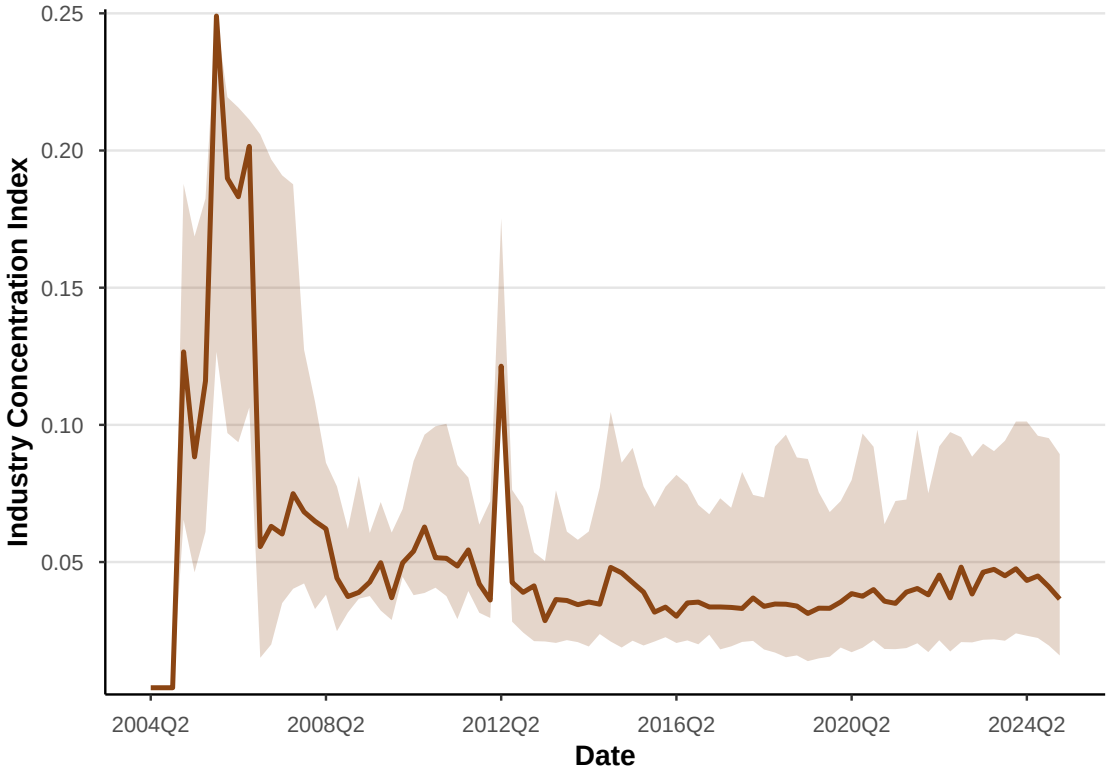
Notes: This figure reports, the share of loans that ever become non-accrual during each quarter, separately for "Specialized" and "Non-specialized" borrowers.

Figure 9: Median HHI across BDCs



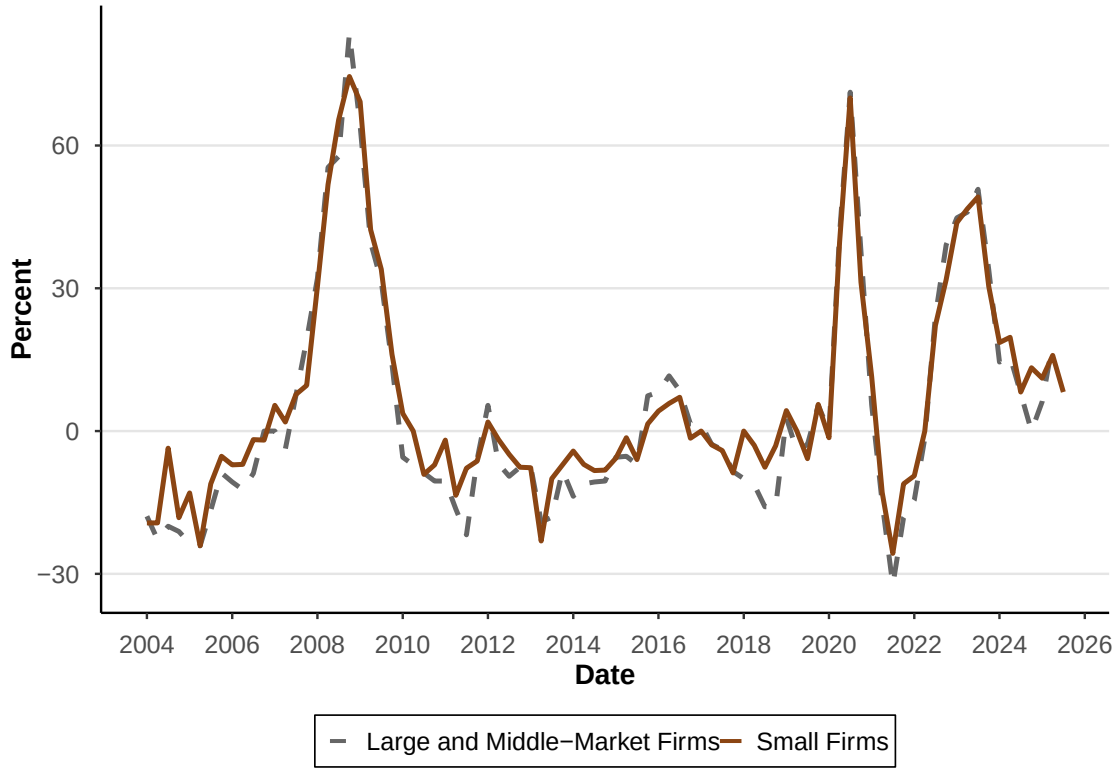
Notes: This figure plots the median Herfindahl–Hirschman Index (HHI) across BDCs at the two-digit NAICS industry level. The shaded band represents the interquartile range (25th–75th percentile), capturing cross-sectional dispersion in concentration. Higher HHI values indicate greater specialization of BDC lending portfolios.

Figure 10: Median ICI across BDCs



Notes: This figure plots the median Industry Concentration Index (ICI) across BDCs at the two-digit NAICS industry level. The shaded band shows the interquartile range (25th–75th percentile). The ICI adjusts for overall industry size and measures whether BDCs lend disproportionately relative to aggregate market lending. Higher ICI values capture stronger "excess specialization."

Figure 11: Net Percentage of Banks Reporting a Tightening of Credit Standards for Commercial and Industrial (C&I) Loans



Notes: This figure plots the net percentage of banks reporting a tightening of credit standards for commercial and industrial (C&I) loans, based on the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS). The solid line represents standards for small firms, while the dashed line represents standards for large and middle-market firms. Positive values indicate a net tightening of credit, while negative values indicate a net easing.

Table 1: Summary Statistics of Key Variables

	N	Mean	SD	Top-Industry	Other-Industry	Diff
Log Amount	121,234	2.02	1.23	2.1	1.99	0.1***
Interest Rate (%)	121,234	9.05	2.73	9.13	9.00	0.13***
Maturity Remaining	121,234	4.67	2.21	4.77	4.62	0.15***
Unsecured	121,234	0.01	0.07	0.00	0.00	0.00
Loan Becomes Non-Performing	121,234	0.024	0.15	0.02	0.03	-0.01***
PIK	121,234	0.10	0.30	0.10	0.10	0.00**

Notes: Each observation represents a unique loan and is included in the dataset as of the first quarter it appears in a BDC's filings. Log Amount is the natural logarithm of the initial principal commitment, expressed in millions of U.S. dollars. The interest rate is the all-inclusive contractual loan rate or cash rate, measured in percent. Maturity Remaining is the number of quarters until contractual maturity. Unsecured is a dummy equal to one if the loan is not backed by collateral. A loan becomes non-performing equals one if the loan ever transitions into non-accrual or default status. PIK is an indicator for whether the loan contains a payment-in-kind feature. "Top-Industry" identifies loans in the BDC's most concentrated two-digit NAICS sector in that quarter, while "Other-Industry" covers all remaining industries. The final column reports the difference in means between Top-Industry and Other-Industry loans.; *, **, *** denote 10%, 5%, 1% significance.

Table 2: Summary Statistics of Specialization

	Specialization Type	Top Industry				All Other Industries			
		Mean	SD	25-pct	75-pct	Mean	SD	25-pct	75-pct
Two Digit	Relative Specialization	4.59	2.44	2.62	6.28	1.28	0.78	0.81	1.54
	Excess Specialization	0.14	0.09	0.08	0.20	-0.01	0.05	-0.03	0.02
	Portfolio Share	0.40	0.14	0.08	0.33	0.04	0.04	0.01	0.06
Four Digit	Relative Specialization	8.52	9.12	2.92	9.74	2.5	4.02	0.86	2.39
	Excess Specialization	0.11	0.11	0.02	0.16	0.01	0.04	-0.01	0.02
	Portfolio Share	0.21	0.16	0.06	0.38	0.06	0.07	0.01	0.08

Notes: This table presents summary statistics for specialization measures constructed at both the 2-digit and 4-digit NAICS industry levels. For each measure, I distinguish between a BDC's most preferred "top" industry—identified as the industry in which the BDC is most specialized during a given period—and all other industries in the portfolio. All variables are winsorized at the 1% level.

Table 3: Specialization and Loan Performance (BDC sample)

	Loan ever becomes non-accrual			
	(1)	(2)	(3)	(4)
Excess Specialization	-0.030^{*}	-0.045^{***}	-0.046^{***}	-0.033^{***}
	(0.012)	(0.010)	(0.010)	(0.009)
Interest rate (%)			0.005^{***}	0.004^{***}
			(0.001)	(0.001)
Log loan amount			-0.004^{***}	-0.004^{***}
			(0.001)	(0.001)
Excess Specialization × PIK				-0.148^{***}
				(0.040)
PIK option				0.081^{***}
				(0.006)
General fixed effects	Time, Loan Type			
Specific fixed effects	BDC	BDC × Time, Industry × Time		
Mean of dependent variable	0.02	0.02	0.02	0.02
R^2	0.040	0.086	0.089	0.099
N	412,303	412,303	412,277	412,277

Notes: This table reports OLS regressions of loan performance on excess specialization. The dependent variable is an indicator equal to one if the loan ever becomes non-accrual. Excess Specialization is defined as the 2-digit excess share of a BDC's lending in the borrower's industry relative to the market. PIK is an indicator for the presence of payment-in-kind features. All specifications include time and loan-type fixed effects; specifications in columns (2)–(4) also include BDC × Time and Industry × Time fixed effects. Standard errors are clustered at the BDC × Industry × Year level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Loan Performance – Different Possible Specialization Measures

	Loan ever becomes non-accrual	
	(1)	(2)
Excess Specialization (2-digit)	-0.045^{***}	-0.045^{***}
	(0.009)	(0.009)
Excess Specialization (4-digit)	-0.057^{***}	-0.059^{***}
	(0.012)	(0.011)
Relative Specialization (2-digit)	-0.003^{***}	-0.003^{***}
	(0.000)	(0.000)
Relative Specialization (4-digit)	-0.0006^{***}	-0.0006^{***}
	(0.000)	(0.000)
Portfolio Share (2-digit)	-0.044^{***}	-0.044^{***}
	(0.009)	(0.009)
Portfolio Share (4-digit)	-0.056^{***}	-0.055^{***}
	(0.007)	(0.007)
Baseline FE	Loan type, BDC×Time, Industry×Time	
Controls	No	Interest rate, Loan amount
N	412,277	412,277

Notes: This table reports OLS regressions of loan non-accrual on specialization measures. Dependent variable is an indicator for whether a loan ever becomes non-accrual. Excess Specialization is defined as the excess share of a BDC's lending in the borrower's industry relative to the market. Relative Specialization and Portfolio Share are alternative measures of concentration. All regressions include loan-type fixed effects (column 1) and additionally BDC×Time and Industry×Time fixed effects with controls for interest rate and loan amount (column 2). Standard errors are clustered at the BDC×Industry×Year level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Specialization and Loan Terms

	Dependent variable					
	Log Loan Amount	Interest Rate	Maturity Remaining	PIK Options	Unitranche	Unsecured
Excess Specialization	1.305***	0.637***	0.172***	0.013*	−0.033***	−0.006***
	(0.032)	(0.047)	(0.040)	(0.012)	(0.008)	(0.001)
Fixed effects	BDC×Time, Industry×Time, Loan Type					
Controls	Term, Size, Rate					
R^2	0.40	0.60	0.24	0.169	0.731	0.12
N	410,819	410,819	410,819	410,819	410,819	410,819

Notes: This table reports OLS regressions of loan terms on excess specialization. The dependent variables are log loan amount, interest rate, maturity remaining (in years), an indicator for payment-in-kind (PIK) options, an indicator for unitranche structure, and an indicator for unsecured status. Excess Specialization is defined as the 2-digit excess share of a BDC's lending in the borrower's industry relative to the market. All regressions include BDC×Time, Industry×time, and loan-type fixed effects, as well as controls for loan term, size, and rate. Standard errors are clustered at the BDC×Industry×Year level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Alternative Specialization measure and Loan Terms

	Dependent variable					
	Log Loan Amount	Interest Rate	Maturity Remaining	PIK Options	Unitranche	Unsecured
Portfolio Share	1.208***	0.577***	0.107***	0.006	−0.033***	−0.006***
Specialization	(0.031)	(0.046)	(0.037)	(0.007)	(0.008)	(0.001)
Fixed effects	BDC×Time, Industry×Time, Loan Type					
Controls	Loan size, term, interest rate					
R^2	0.396	0.559	0.252	0.169	0.731	0.118
N	410,819	410,819	410,819	410,819	410,819	410,819

Notes: This table reports OLS regressions of loan terms on portfolio share specialization. The dependent variables are log loan amount, interest rate, maturity remaining (in years), an indicator for payment-in-kind (PIK) options, an indicator for unitranche structure, and an indicator for unsecured status. Portfolio share Specialization is defined as the share of BDC's lending in the borrower's industry. All regressions include BDC×Time, Industry×time, and loan-type fixed effects, as well as controls for loan size, term, and interest rate. Standard errors are clustered at the BDC×Industry×Year level. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7: IV Regression Results: First and Second Stage

	Dependent variable			
	First Stage:	Second Stage:		
	ln(Outstanding Loans)	HHI	Favorite Industry	Other Industries
SLOOS Tightening	0.487^{***}			
(Large and Middle-Market Firms)	(0.129)			
$\ln(\widehat{\text{Outstanding}}\ \text{Loans})$	—	0.050^{*}	0.081^{**}	-0.011^{**}
		(0.026)	(0.035)	(0.005)
BDC FE	Yes	Yes	Yes	Yes
First Stage F-test		45.4	45.5	51.4
R^2	0.72	0.40	0.32	0.57
N	3,731	3,731	3,731	3,731

Notes: This table reports two-stage least squares (TSLS) estimations. In the first stage, BDC outstanding loans are instrumented using the Federal Reserve's Senior Loan Officer Opinion Survey (SLOOS) measures of tightening credit standards for large and middle-market firms. The second stage regressions examine the effect of instrumented loan supply on specialization outcomes, measured by the Herfindahl–Hirschman Index (HHI), lending in the favorite industry, and lending in other industries. All regressions include BDC fixed effects. Standard errors, clustered at the BDC level, are reported in parentheses. The first-stage F-statistics are reported at the bottom of the table. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8: IV Regression Results: First and Second Stage

	Dependent variable			
	First Stage:	Second Stage:		
	ln(Outstanding Loans)	HHI	Favorite Industry	Other Industries
SLOOS Tightening (Small Firms)	0.623^{***}			
	(0.154)			
$\widehat{\ln(\text{Outstanding Loans})}$	—	0.047^{*}	0.077^{**}	-0.010^{**}
		(0.024)	(0.032)	(0.004)
BDC FE	Yes	Yes	Yes	Yes
First Stage F-test		58.6	58.7	63.4
R^2	0.73	0.43	0.35	0.57
N	3,731	3,731	3,731	3,731

Notes: This table reports the results of two-stage least squares (TSLS) estimations. In the first stage, BDC outstanding loans are instrumented using the Senior Loan Officer Opinion Survey (SLOOS) measures the tightening of credit standards for small firms. The second stage regressions examine the effect of instrumented loan supply on specialization outcomes, measured by the Herfindahl–Hirschman Index (HHI), lending in the favorite industry, and lending in other industries. All regressions include BDC fixed effects. Standard errors, clustered at the BDC level, are reported in parentheses. The first-stage F-statistics are reported at the bottom of the table. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Summary Statistics of Variables Used in Predictive Regressions

Variable	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Herfindahl-Hirschman Index	0.222	0.172	0.125	0.098	0.528
Industry Concentration Index	0.066	0.036	0.070	0.004	0.250
Log(Assets)	6.727	6.784	1.570	0.924	10.078
Debt/Equity	0.371	0.422	0.182	0.000	0.641
Log(Management fees)	1.235	1.104	1.019	0.000	4.042
Age (years)	10.702	9.000	9.970	0.000	58.000

Notes: This table reports summary statistics for the main variables used in the analysis. Herfindahl-Hirschman Index (HHI) and Industry Concentration Index are reported at two digit NAICS code for each BDC-Quarter Observation. Log(Assets) is the natural logarithm of total assets. Debt/Equity is the leverage ratio and Log(Mgmt Expenses) is the natural logarithm of reported management expenses. All variables are winsorized at the 1st and 99th per- centiles.

Table 10: Specialization (ICI) and Returns

	Net Asset Value Abnormal return	Price-based Abnormal return
ICI_{t-1}	1.382*	-0.8013
	(0.7467)	(0.7615)
$\log(\text{Assets})_{t-1}$	-0.2406*	-0.0090
	(0.1278)	(0.0338)
Debt/Equity_{t-1}	1.101*	-0.1923
	(0.5981)	(0.2603)
$\log(\text{Mgmt Expense})_{t-1}$	0.2525*	0.0070
	(0.1375)	(0.0336)
Age (years)_{t-1}	0.0079*	-0.001
	(0.0045)	(1.6e-05)
Quarter FE	Yes	Yes
R^2	0.689	0.028
N	1,545	1,545

Notes: The dependent variable is abnormal performance $\text{Perf}_{i,t}$ (residuals from pooled factor models with BDC fixed effects). NAV uses NAV excess returns; Price-Based uses total market excess returns. Factors: MKT–RF, SMB, HML, leveraged loan, and HY indices (quarterly). Quarter fixed effects included; standard errors clustered by BDC. Specialization (ICI) and all controls are lagged one quarter.
Significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 11: Specialization (HHI) and Returns

	Net Asset Value Abnormal return	Price-based Abnormal return
HHI_{t-1}	0.4373	-0.3047
	(0.2763)	(0.2996)
$\log(\text{Assets})_{t-1}$	-0.2418*	-0.0072
	(0.1345)	(0.0319)
Debt/Equity_{t-1}	0.9486*	-0.1088
	(0.5386)	(0.2014)
$\log(\text{Mgmt Expense})_{t-1}$	0.2309*	0.0176
	(0.1320)	(0.0401)
Age (years)_{t-1}	0.0072*	-0.0007
	(0.0001)	(0.0010)
Quarter FE	Yes	Yes
Observations	1,545	1,545
R^2	0.680	0.027
Within R^2	0.300	0.0003

Notes: The dependent variable is abnormal performance $\text{Perf}_{i,t}$ (residuals from pooled factor models with BDC fixed effects). NAV uses NAV excess returns; PRICE uses market excess returns. Factors: MKT–RF, SMB, HML, leveraged loan, and HY indices (quarterly). Quarter fixed effects included; standard errors clustered by BDC. Specialization (HHI) and all controls are lagged one quarter.
Significance: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.