LUISS

Master's Degree in Corporate Finance

Course of Equity Markets and Alternative Investments

# Private Debt Performance in a Multi Asset Portfolio: Empirical Evidence from the US Market


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# 1. Introduction

The financial landscape has undergone profound transformations over the past few decades. The Global Financial Crisis ("*GFC*") has impacted heavily the economy leading to tighter regulations aimed at reducing the possibility for crisis of such magnitude to occur again.

Historically, banks served as the primary source of corporate lending, providing capital to businesses through conventional loan structures. The regulatory interventions, enacted after the GFC, aimed at reducing systemic risk imposed stringent capital requirements and lending constraints on banks. These restrictions led to a contraction in traditional bank lending, particularly for middle-market firms that lacked access to public debt markets.

Alternative asset managers have occupied this empty space by developing massively their "private debt" investing strategies. Private debt comprises a variety of investment strategies, including direct lending, mezzanine financing, distressed debt, venture debt, and asset-backed lending. Unlike public fixed-income instruments, private debt investments are typically illiquid, bespoke, and structured to meet the specific financial needs of borrowers. The absence of public trading also allows for higher yields and greater control over loan terms for lenders, which has made private debt increasingly attractive to institutional investors such as pension funds, insurance companies, and endowments.

The objective of this thesis is to provide a throughout examination of private debt as an asset class, focusing on its historical development, key investment strategies, risk factors, and valuation methodologies. Additionally, this research will present an empirical analysis of private debt's performance in diversified portfolios, with a specific emphasis on Business Development Companies ("BDCs") as a publicly accessible investment vehicle for US direct lending.

The study aims to answer the following critical questions:

1) How does private debt compare to traditional fixed-income instruments (e.g., high-yield bonds and leveraged loans) in terms of risk and return?
2) What factors influence the performance of private debt investments?
3) Can private debt serve as an effective diversification tool for institutional and retail investors in a multi-asset portfolio?

To address these questions, the research integrates existing literature with empirical research, employing statistical methodologies, financial performance metrics and risk-adjusted return models to assess the performance and risks of private debt as an investment. Given the

increasing role of BDCs in facilitating direct lending, this study utilizes publicly available BDC data to construct an index-based analysis of private debt performance and test its performance in multi-asset portfolio.

The thesis is structured as follows:

- Chapter 1 provides a historical overview of loan markets, examining banking business models, their evolution in response to the GFC and the emergence of private debt as an alternative way of financing for borrowers.
- Chapter 2 explores the investment strategies employed by private debt funds, detailing fund organizations, loan structuring, valuation techniques, and strategies used in private debt transactions.
- Chapter 3 presents an empirical analysis of private debt performance, focusing on BDC investments and their potential usage in a diversified portfolios, synthetizing the findings and offers insights into the potential benefits and limitations of private debt.

By analyzing both the available literature and empirical evidence, this research contributes to the growing body of literature on alternative credit markets and provides valuable insights for investors, policymakers, and financial practitioners seeking to understand the evolving role of private debt in the global economy.

# 2. What is Private Debt?

## 2.1. History of Loan Markets

Credit is a cornerstone of the global economy, facilitating individual and corporate financial activities and being a key element in fostering economic activity. Consumers typically secure mortgages to buy houses or loans to afford expensive goods. At the same time, companies often borrow money to expand in new geographies, launch new product lines, or acquire other businesses growing inorganically. In exchange for the amount lent to borrowers, lenders usually earn a consistent income stream through fixed or floating interest coupons paid periodically by the borrower. Since the Middle Ages, the primary providers of loans to corporations and individuals have been banks, which gather funds (i.e., deposits) from the surplus of funds holders, who are willing to deposit their funds into a bank for safety reasons or to earn a return on the deposit and lend to those in need of capital. This intermediary role involves converting short-term deposits into long-term loans, a process known as maturity transformation, which is crucial for meeting the demand for liquidity with the supply of funds. This business model in which banks originate a loan holding it until maturity is known as "originate-to-hold" (Lalafaryan, 2024).

To understand the growth of the leveraged loan market, it is essential to analyze a key change in the banks' business model. Since the early '90s, banks have moved towards the so-called "originate-to-distribute" business model, where loans are originated by a leading bank and distributed to other syndicating banks. Initially, the distribution entailed exclusively mortgages, credit cards, and loans, but over time, the key business segment has become corporate lending activities. Firstly, banks started distributing corporate loans through syndication, with other banks selling portions of the loans in the secondary market. Subsequently, the invention of collateralized loan obligations (CLO) further evolved these activities as it increased the availability of buyers for syndicated loans. Consequently, between 1988 and 2007, the syndicated loan market grew from $339 billion to $2.2 trillion in 2007 (pre-GFC) with a CAGR of approximately 10% per annum (Bord & Santos, 2012).

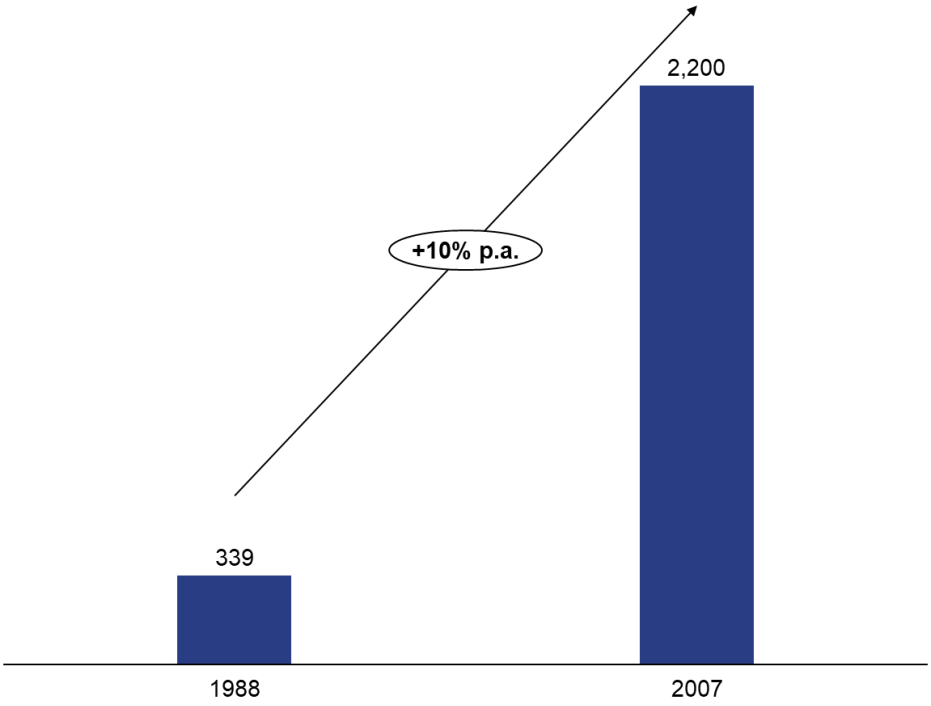


*Figure 1 - Evolution of Leveraged Loan Market (1988-2007) ($B)*

As the GFC negatively impacted banks, there was a reduction in the supply of credit to corporates. By the third quarter of 2008, the dollar volume of lending in the US was 49% lower than the peak reached in the second quarter of 2007, and number of loans issued was down by 32% (Ivashina & Scharfstein, 2010).

In the aftermath of the GFC, regulators started implementing new regulations aimed at reducing the risk-taking of financial intermediaries and diminishing the possibility of another financial crisis of the same magnitude with a subsequent increase in the cautiousness of banks in corporate lending (Naceur et al., 2018).

The evolution in regulations created a gap in the market for corporate loans, particularly for middle-market companies lacking the creditworthiness or scale to access broadly syndicated loans. The contraction of traditional bank lending has been particularly pronounced in segments where the risks are perceived to be higher and regulatory capital requirements have become more stringent. Considering this evolution, middle-market companies have had

difficulty accessing liquidity or capital to run their operations or grow organically and inorganically (Ares, 2018).

In this environment, private debt funds have emerged as a critical provider of liquidity and funds for the abovementioned middle-market firms through direct lending (Ares, 2024; Cai & Haque, 2024).

According to Preqin, a private markets financial data provider, private debt, "is the provision of debt finance to companies from funds, rather than banks, bank-led syndicates, or public markets. In established markets, such as the US and Europe, private debt is often used to finance buyouts, though it is also used as expansion capital or to finance acquisitions". According to Blackrock, the largest asset management company worldwide, private debt refers to lending (mainly to corporations and small businesses) outside the traditional bank lending channels and the public (syndicated) debt markets. The broad term "private debt" encapsulates a wide range of strategies such as direct lending – which is the largest by assets under management (AUM) – as well as distressed, opportunistic, mezzanine, and venture (among others). Pitchbook (2024), a leading financial data provider for investors and market participants, defines private credit, or direct lending, as directly originated loans to corporate borrowers that are not broadly syndicated. They are typically unrated small to midsized companies, and lenders are usually non-bank lenders or a small group of lenders in a club deal. In the context of this thesis, "private debt" will refer to the broad universe of debt strategies explored by private debt funds, whereas "direct lending" (or private credit) will refer to a particular strategy of the private debt universe in which a private debt fund or a private credit fund originates loans to corporate borrowers, which are usually non-rated and small to mid-sized companies.

The main drawback for borrowers from private debt funds is the higher cost of funding compared to bank loans, as private debt fund investors demand higher returns than depositors (i.e., the main provider of funding for banks) (Nesbitt, 2023).
Like private equity funds, private debt funds are generally funded by institutional investors such as pension funds, asset managers, and family offices, who participate as limited partners (LPs). These investors are attracted to private debt due to its potential for higher returns in a low-interest-rate environment, favorable risk/reward profiles, potential for cash yields with inflationary protection, and low correlation with other portfolio assets. Furthermore, private

debt offers a liquidity premium over traditional fixed-income investments, making it an appealing choice for enhancing returns while managing portfolio risk. The role of institutional investors has been pivotal in driving the growth of private debt, as they have increasingly sought out alternative investments that can deliver stable income streams while offering diversification benefits (IMF, 2024; Ares, 2018).

The strategy of private credit loans typically comes at a higher cost to borrowers than leveraged loans arranged by banks, such as higher interest rates. However, it offers greater flexibility and customized solutions, especially during financial distress. Private credit providers are often better equipped than traditional banks to manage bad loans, leading to lower default probabilities, easier restructurings, and reduced financial distress costs. This ability to navigate complex financial situations has made private credit an attractive option for borrowers who need capital and an expert partner who can work with them through challenging times.

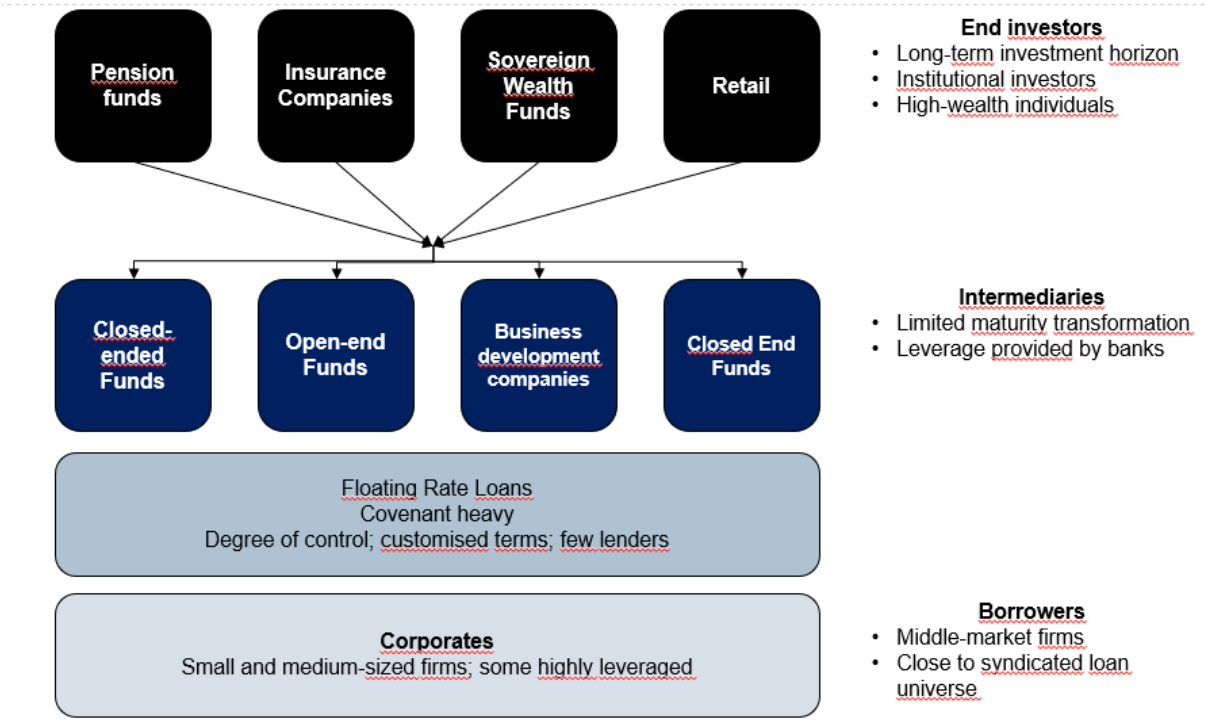


*Figure 2 - Private Credit Structure (IMF, 2024)*

According to Blackrock (2023), using the Cliffwater Direct Lending Index (CDLI), a reference rate for returns of private loans made by private credit funds, as a proxy of returns of private

credit instruments, it is possible to note the lower percentage of credit loss compared to high-yield bonds and leveraged loans in the period from 2005 to the second quarter of 2023.

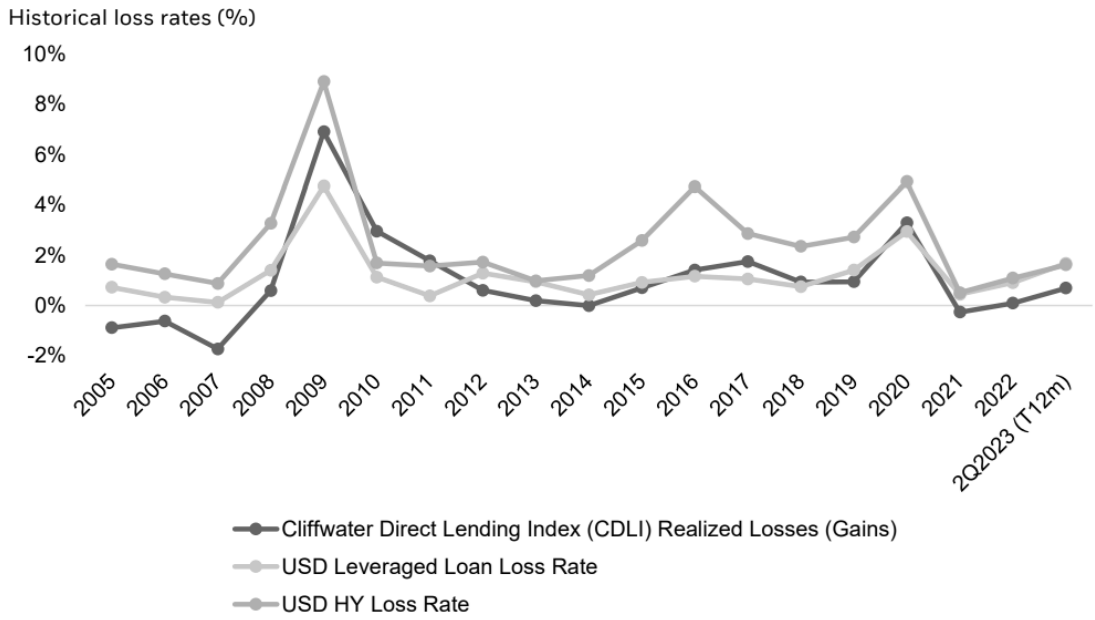


*Figure 3 - Historical Loss Rates by Asset Class*

Over the past two decades, private credit has become one of the fastest-growing segments within the alternative investments industry. The growth of private credit can be attributed to three main drivers:

a) Regulatory Changes: Banks retreated from lending to specific potential borrowers after the GFC due to new regulatory restrictions, such as leverage lending caps and capital requirements. These cuts allowed new credit providers to emerge and obtain market share (Davydiuk et al., 2024; Lalafaryan, 2023). The current financial landscape, compounded by the regional banking crisis of early 2023, has expanded this trend, with private lenders increasingly stepping in to fill the lending gap. This shift has allowed private credit funds to thrive. Besides, it has led to the development of new financial products and services tailored to meet the evolving needs of borrowers in a more regulated environment.

b) Investor Demand: The prolonged period of low interest rates has driven investor demand for credit investments offering higher returns. Alternative asset managers have responded by developing new products that capitalize on liquidity premiums and priced

risk premiums. The rising interest rate environment of 2022-2023 has led to market dislocations, creating attractive risk-return opportunities for private debt. These market conditions have underscored the importance of flexibility and innovation in product development as managers strive to meet the demands of a more sophisticated and yield-hungry investor base (BlacRock, 2023; Lalafaryan, 2024).

c) Innovation and Sophistication: As the alternative credit ecosystem has expanded, investors have become more sophisticated, developing niche strategies offering attractive risk-return profiles. Examples of these innovative strategies include NAV lending, credit secondaries, sector-specialized funds, and the growth of specialty finance areas such as litigation finance. The ability of private credit managers to tailor their offerings to specific investor needs and market conditions has been a critical factor in the continued growth and diversification of the sector.

The subsequent paragraphs of this thesis chapter will explore these drivers in more detail, including the impact of new regulations post-GFC, the advantages of private debt and direct lending over bank loans for borrowers, and their usefulness as an asset class for institutional investors. This comprehensive exploration will provide a deeper understanding of how private debt and direct lending have evolved and their strategic role in modern investment portfolios.

## 2.2. Global Financial Crisis and its Impact on Bank Lending

The Global Financial Crisis (GFC) is often considered one of the most devastating global economic crises since the Great Depression. It exposed significant shortcomings in market mechanisms and regulatory frameworks, leading to the collapse or nationalization of some of the world's most prominent financial institutions and a sharp decline in international trade. The crisis began with the burst of the U.S. housing bubble, driven by the proliferation of subprime mortgages and complex financial products tied to these risky loans. As mortgage defaults increased, financial institutions heavily invested in these products faced severe instability, leading to the collapse of major firms like Bear Stearns and Lehman Brothers (Helleiner, 2011). The crisis quickly spread globally, affecting financial institutions and markets worldwide.

Market failures played a critical role in the crisis as excessive risk-taking and speculative behavior fueled by new financial innovations like mortgage-backed securities (MBSs), collateralized debt obligations (CDOs), and credit default swaps (CDSs) created the basis for the crisis. While initially celebrated for dispersing risk, these products concentrated it by interconnecting different financial assets, leading to systemic failure when the housing market collapsed (Gennaioli et al., 2010). The opacity and complexity of these instruments made it difficult for investors and regulators to assess the proper level of risk, leading to widespread mispricing and incorrect ratings issued by rating agencies. The crisis highlighted the inherent dangers of financial innovation without adequate regulatory oversight and the risks associated with excessive leverage and inadequate capital buffers (Hossain & Kryzanowski, 2019).

Regulatory failures were also significant, as regulations failed to keep pace with rapid financial innovation and growing market complexity. The crisis underscored the dangers of relying too heavily on market mechanisms without adequate oversight (Hossain & Kryzanowski, 2019) and the risk of liberalizing excessively financial markets. The concentration of risks among a few considerable financial institutions further magnified the crisis's impact, as their failure had detrimental consequences for the global financial system. The collapse of these institutions revealed the interconnectedness of global financial markets as localized financial distress created a global financial and economic crisis.

Regulatory reforms were discussed, drafted, and approved in response, focusing on strengthening monitoring frameworks and enhancing international cooperation to prevent future global crises.

Key reforms included:

a) Basel III Implementation: Stricter capital requirements, including capital buffers, were introduced to improve the quality and quantity of bank capital. Basel III aimed to enhance the resilience of financial institutions by increasing their capacity to absorb shocks from financial and economic stress.
b) Stress Testing: This statistical tool became central in assessing the resilience of financial institutions under adverse scenarios. Stress testing allowed regulators to identify financial institutions' vulnerabilities and ensure they had sufficient capital to withstand economic downturns.
c) Leverage and Liquidity Ratios: The introduction of leverage and liquidity ratios like LCR[1] and NSFR[2] aimed to reduce procyclicality and ensure banks maintain sufficient liquidity. These ratios strengthened the banking sector's ability to absorb financial and economic shocks.
d) Resolution Mechanisms: New resolution frameworks were established for managing crises and bankruptcies of large, systemically important institutions deemed "too big to fail." These mechanisms aimed to mitigate the risks of such institutions' failure to the broader financial system and minimize the need for taxpayer-funded bailouts.
e) Regulation of Nonbank Financial Institutions: New regulations targeted systemic risks in the nonbank financial sector. The regulatory framework for nonbank financial institutions was expanded to include requirements for capital and liquidity, as well as enhanced supervision and oversight.
f) Macroprudential Policy Development: Tools were expanded to address systemic risks across the financial system. Macroprudential policies were developed to address the

[1] The Liquidity Coverage Ratio (LCR) refers to the proportion of highly liquid assets that financial institutions must hold to ensure that they can meet their short-term obligations and weather market disruptions.
[2] The Net Stable Funding Ratio calculates the ratio of Available Stable Funding ("ASF") over Required Stable Funding ("RSF")
Sources of Available Stable Funding include: customer deposits, long-term wholesale funding (from the interbank lending market), and equity.
"Stable funding" excludes short-term wholesale funding (also from the interbank lending market).

interconnectedness of financial institutions and markets and to mitigate the risks posed by the buildup of systemic vulnerabilities.

These reforms reduced banks' risk-taking, favoring financial stability but, at the same time, making these financial institutions less willing to lend, particularly to middle-market firms or companies without a strong creditworthiness history (Chernenko et al., 2020). Private debt funds have increasingly filled this gap and have stepped in to provide the necessary capital. The retreat of traditional banks from certain lending activities has opened significant opportunities for private debt funds to expand their presence in the market and offer more flexible and tailored financing solutions.

## 2.3. The Rise of Private Debt and Direct Lending

As explained above, the expansion of private debt is closely tied to the evolution of the global economy and the shifting dynamics of the banking sector. Following the GFC, regulatory changes imposed stricter lending standards on banks, particularly regarding leverage lending and capital requirements. These restrictions created gaps in the lending market, particularly for riskier, high-yield loans, which private debt providers were quick to close. The ability of private debt providers to step in with direct lending where traditional banks have retreated has been a critical factor in the sector's growth, particularly in the middle-market segment, where the need for flexible and customized financing solutions is greatest (Nesbitt, 2019).

This growth is reflected in the increasing private debt assets under management (AUM) owned by institutional investors, with a total AUM exceeding $1.6 trillion by the end of 2023, considering dry powder[3] and remaining value[4] (Pitchbook, 2024).

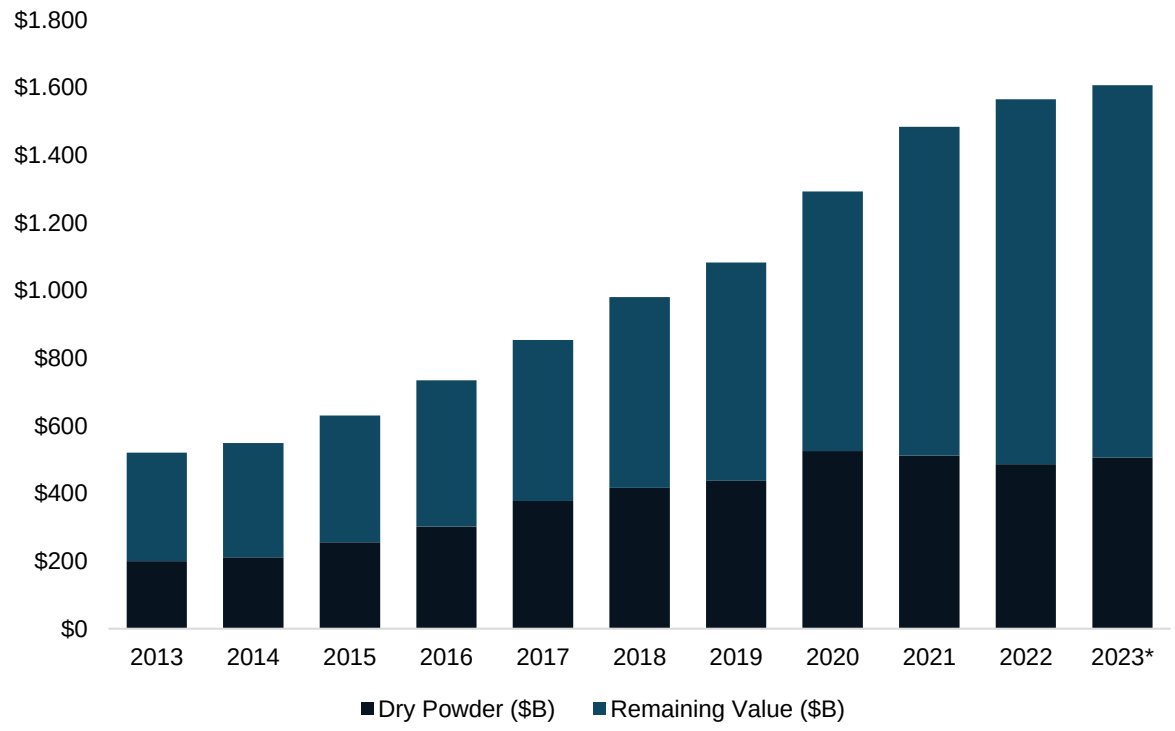


*Figure 4 – Evolution of Private Debt Assets under Management (2013 – 2023)*

[3] Dry powder refers to the amount of committed, but unallocated capital a firm has on hand (Pitchbook, 2024)

[4] Remaining value refers to the capital committed that has already been allocated (PitchBook, 2024)

The growth in private debt is not only due to the increase in AuM but also the consistent rise in the amount of funds raised in the last ten years. According to data provided by PitchBook (2024), in 2013, total private debt fundraising was equal to $97.6 B, and the number of funds involved in this asset class was equal to 233. Moving forward by ten years, annual private debt fundraising has almost doubled, reaching an amount of $190.9 B, whereas the number of funds has slightly decreased to 196 funds involved in private debt. In addition, in 2021, a peak of deal flow in activity due to recovery after the COVID-19 pandemic and the government support to boost economic growth, the total capital raised reached an all-time high of $287.5B. Overall, the current trend demonstrates that not only has the total fundraising almost doubled but also that the average size of each fund has increased drastically.

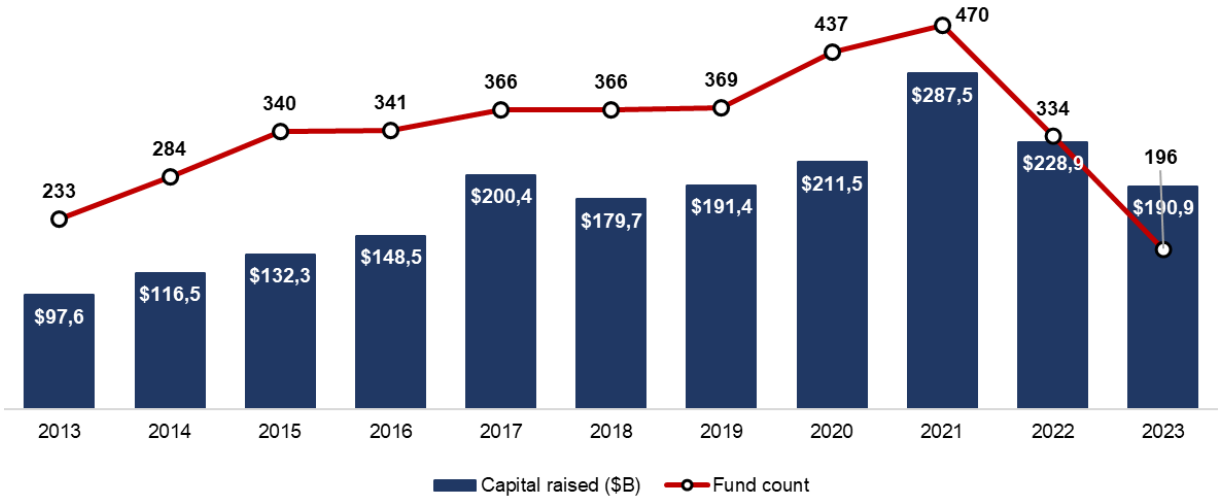


*Figure 5 - Private Debt Fundraising ($B) and Number of Funds (PitchBook, 2024)*

This trend is confirmed by the data shown in Figure 6: In 2013, the number of funds with committed capital greater than $1B was approximately 60%, with funds greater than $5B equal to approximately 20% of the total number of funds. Ten years later, in 2023, the number of funds with committed capital greater than $1B reached 80%, and the number of funds with committed capital greater than $5B reached almost 40%, highlighting the increase in the number of "megafunds[5]" in relative terms.

[5] Megafunds refers to private debt funds with more than $5B capital raised (PitchBook, 2022. https://pitchbook.com/blog/what-are-mega-funds-in-private-equity)

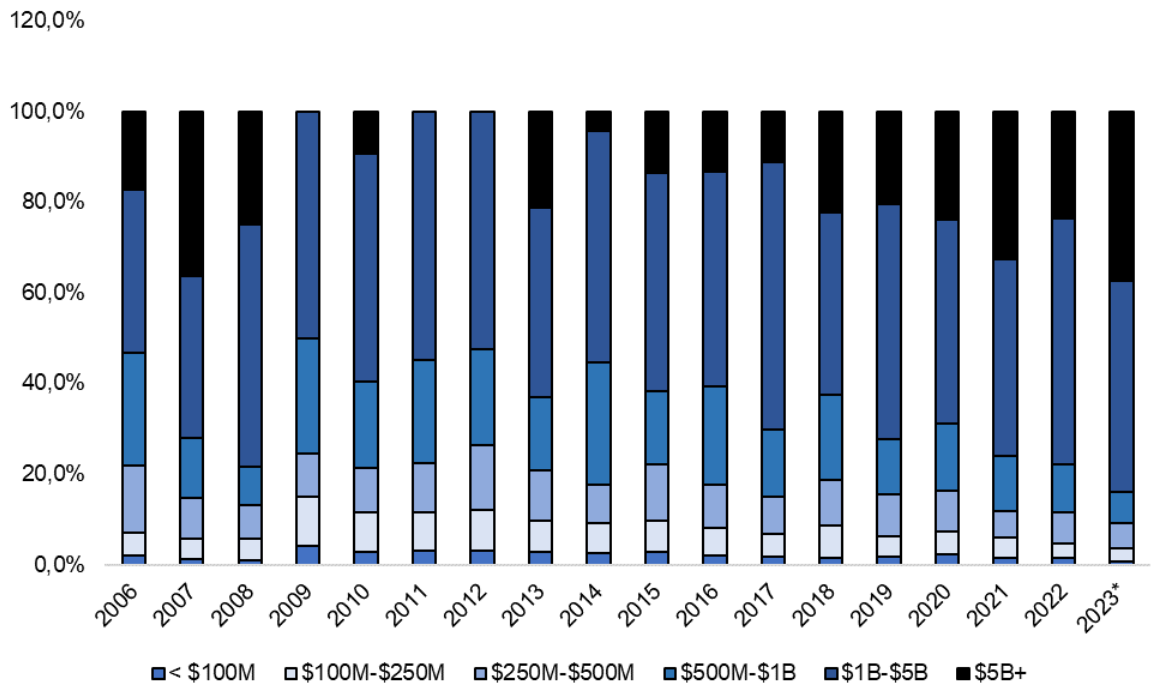


*Figure 6- Fundraising by size bucket (Pitchbook, 2024)*

The most significant growth within private debt funds has been in the direct lending segment, which is the largest sub-strategy in private debt.

Direct lending fundraising surpassed $60 billion in 2023, a substantial increase from $6.1 billion of 10 years ago, reflecting a compound annual growth rate (CAGR) of 22.7% (PitchBook, 2024)

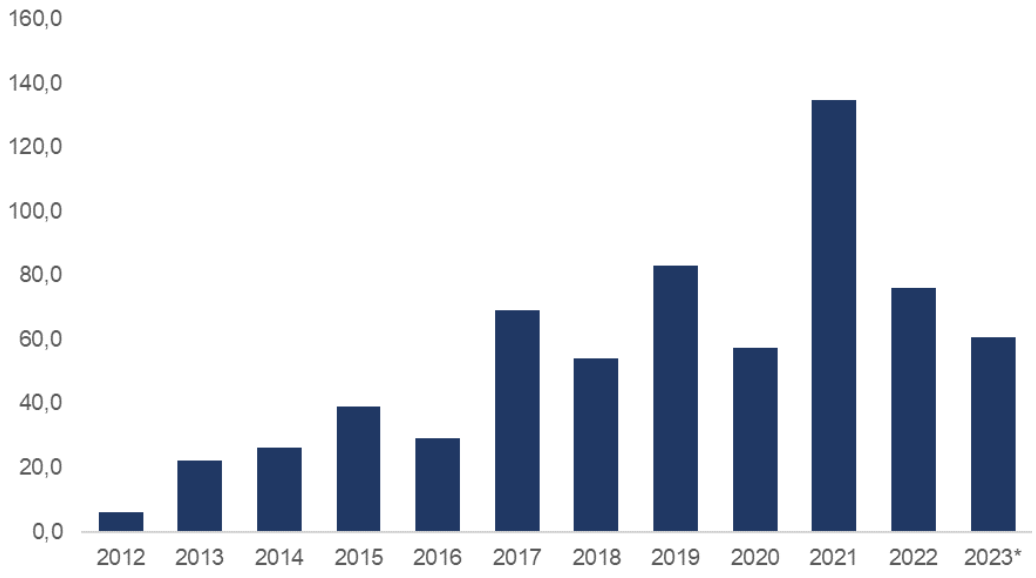


*Figure 7 - Direct Lending Fundraising by Year (PitchBook, 2024)*

Direct lending remained the leading fundraising sub-strategy within private debt, holding 31.8% of the market. However, its share has slightly declined over the past two years as the asset class becomes more diversified. In 2021, direct lending accounted for nearly half of all private debt fundraising. Other strategies, particularly mezzanine and infrastructure debt, are gaining significant traction.

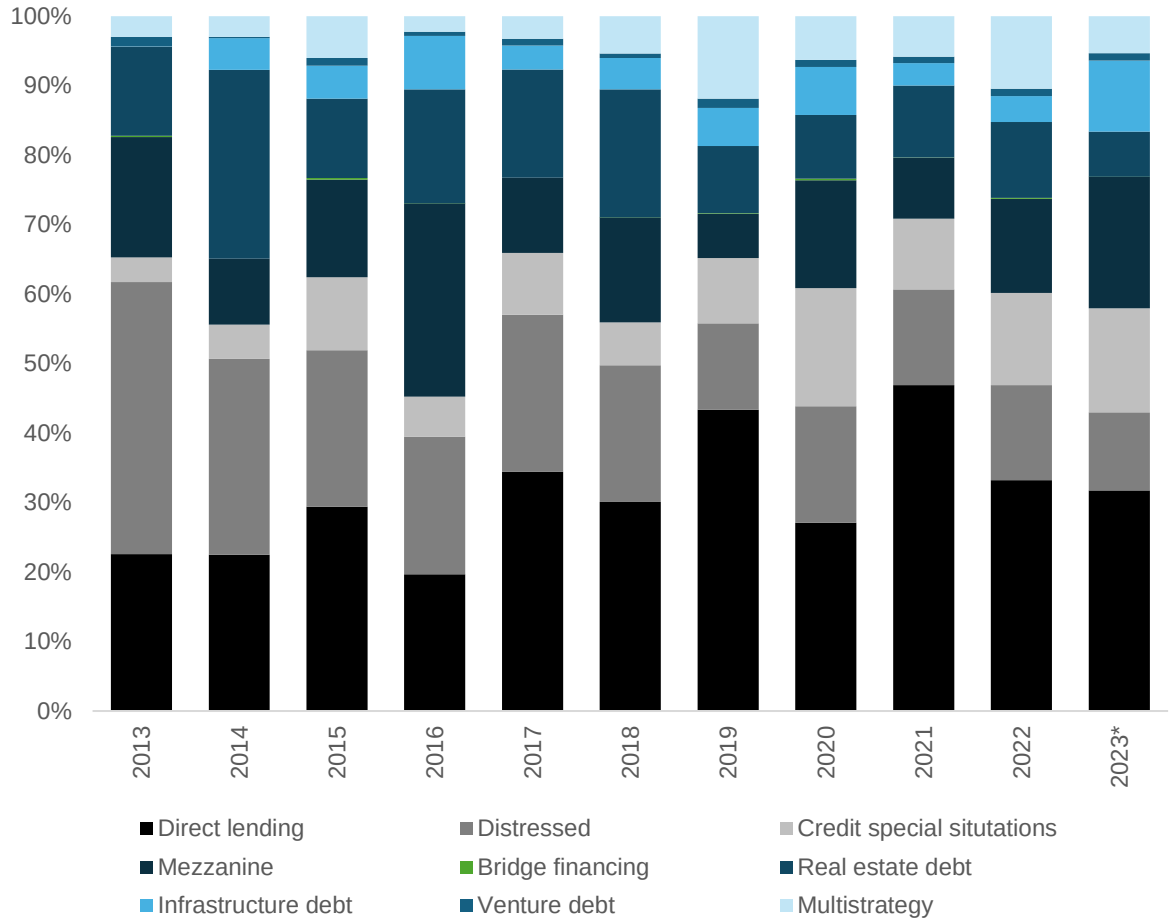


*Figure 8 - Share of private debt capital raised by strategy in relative terms (PitchBook, 2024)*

The rapid expansion of direct lending is an evidence of its growing importance as a fundamental source of capital for middle-market companies.

The secular trend of banks retreating from lending can also be seen in the data provided by research made by Ares (2024), which highlights a reduction in the value of C&I loans as a percentage of bank total assets from 29% in 1980 to 16% in 2023.

Another interesting trend highlighted in Ares white paper is that banks increasingly prefer lending money to non-bank financial institutions (including private debt funds) rather than directly to commercial and industrial companies. Between 2015 and 2023, the growth rate of

loans to non-depository financial institutions was five times higher than that of commercial and industrial (C&I) loans.

Similarly, by looking at the US corporate debt market with a total size of $12.6 trillion as of 31st March 2022, direct lending US middle market loans accounted for $1.0 trillion (approximately 8% of the total). In contrast, the bank commercial lending market, which targets the same middle market companies targeted by direct lending, was equivalent to $2.6 trillion in size (approximately 21% of the total). Direct lending has grown by 250% from a value of $250B in 2019, gaining market share of the total addressable market composed of middle market companies as the C&I loans segment has grown only by 40% (Nesbitt, 2023).

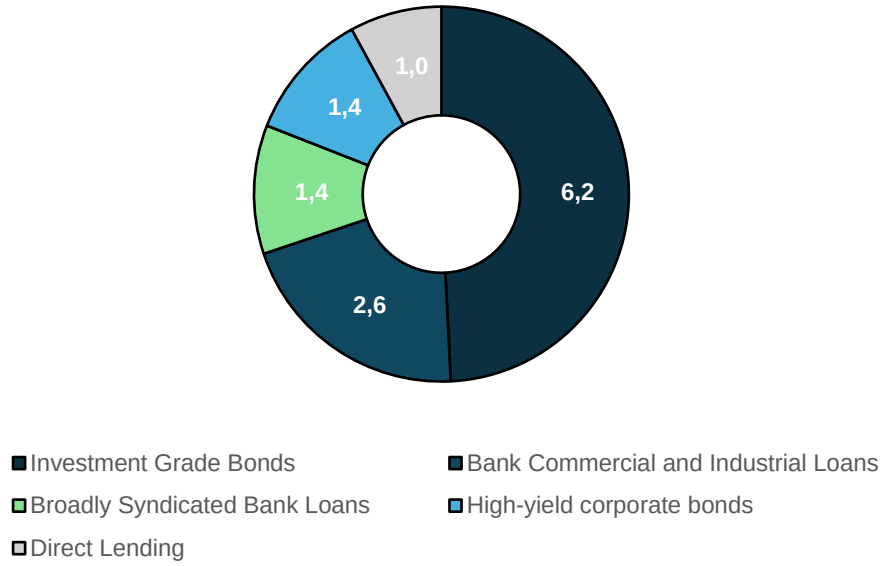


*Figure 9 – Breakdown of the loan market in the US ($Trillion) (Nesbitt, 2023)*

Apart from the regulatory changes enacted for banks, other factors have driven the rapid growth of direct lending.

To understand why borrowers appreciate the characteristics and features of private loans, it is crucial to analyze the business model of private credit funds further compared to banks. Contrary to the current business model of banks based on the "originate-to-distribute" model, private credit funds have a strong interest in "suiting-and-fitting the portfolio" of the market in which they are carrying out activities and often self-originate their loans by keeping them until the redemption of capital. Contrary to what banks do, private credit funds do not fund their operations using deposits, which are usually covered by insurance on losses until a certain

threshold, but raise funds from institutional investors, among which it is possible to include pension funds, foundations, family offices, and banks. Using these funds, they typically purchase high-risk loans with low liquidity. Given that the average holding period of a loan is superior to 5 years, it is efficient for the fund to establish a long-term profitable relationship with the borrower so that borrowers can obtain flexibility when needed. In contrast, the fund reduces default risk, enhancing risk-adjusted returns.

Another key difference between banks and private credit funds lies in the flexibility and structures available to borrowers. Private credit funds offer a faster way of obtaining resources thanks to a shorter due diligence and underwriting process compared to banks; besides, they offer enhanced flexibility that can be tailor-made for the needs of the borrower. On the other hand, private credit funds demand higher interest rates for borrowers as well as heavy covenant contracts, which usually also include financial maintenance covenants.

Overall, these features are highly valued by borrowers and allow middle-market companies that do not have the scale or the creditworthiness to obtain funds from the banking channel to access financing quickly and flexibly. Given the importance of middle market firms in Europe and the US, private credit funds have an essential role in sustaining the development of the economy through loans.

As direct lending and, more generally, the private debt market has matured, they have become more sophisticated, with managers developing niche strategies offering attractive risk-return profiles. Innovations in the sector, such as NAV lending and credit secondaries, have become appealing to specific market segments and investor preferences, further driving the growth of private debt. The ability of private debt managers to innovate and adapt to changing market conditions has been a critical factor in the sector's continued expansion and its ability to attract new capital.

The macroeconomic environment has also been crucial in shaping the private debt market. The rising interest rates environment of 2022-2023 created market dislocations, leading to increased opportunities for private debt investors. Direct lending will continue to dominate the market and is expected to persist as long as macroeconomic conditions favor private lending over traditional bank loans. The ability of private debt providers to offer flexible and tailored financing solutions in a rapidly changing economic environment as well as its floating rate structure have been critical factors in the sector's resilience and growth.

After analyzing the current trends of the private debt industry and direct lending strategy, the paragraph chapter will investigate why investors are becoming highly interested in investing large percentages of their portfolios in private debt funds.

## 2.4. Private Debt as an Asset Class

After analyzing trends in the private debt industry and the direct lending segment and explaining why borrowers view private debt as a very convenient way to access capital, it is crucial to understand why several institutional investors have been highly interested in providing funds to private debt funds.

According to Preqin, 28% of the ownership of private debt funds is in the hands of pension funds (considering both private and public ones), whereas foundations own 12%. Besides, banks own 6% of private debt AuM even if they compete in the same market with private debt funds (Figure 10).

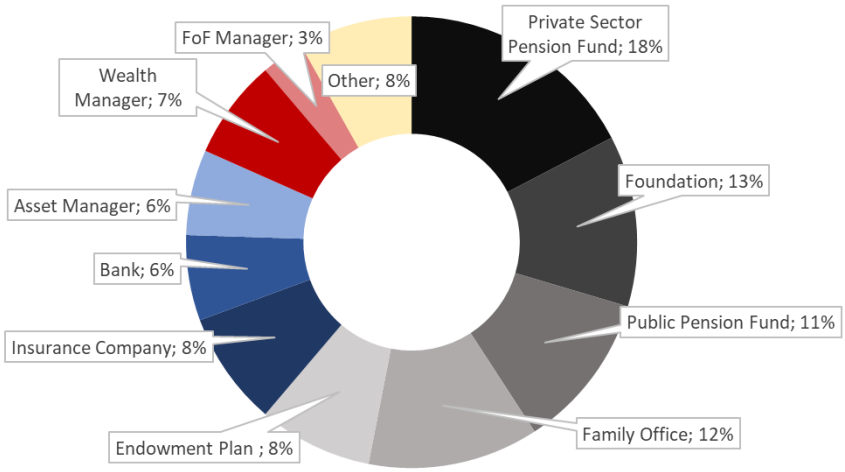


*Figure 10 - Ownership of Private Debt Assets by Institutional Investor (Preqin, 2023)*

According to a survey made available by Preqin (2023) to participants in private debt markets in June 2023, 45% of respondents were willing to increase their holdings in private debt in the next 12 months compared to a value of approximately 25% when the survey was made in June 2022. In addition, only 10% of respondents in 2023 were willing to reduce their investments in private debt in the short term (Figure 11).

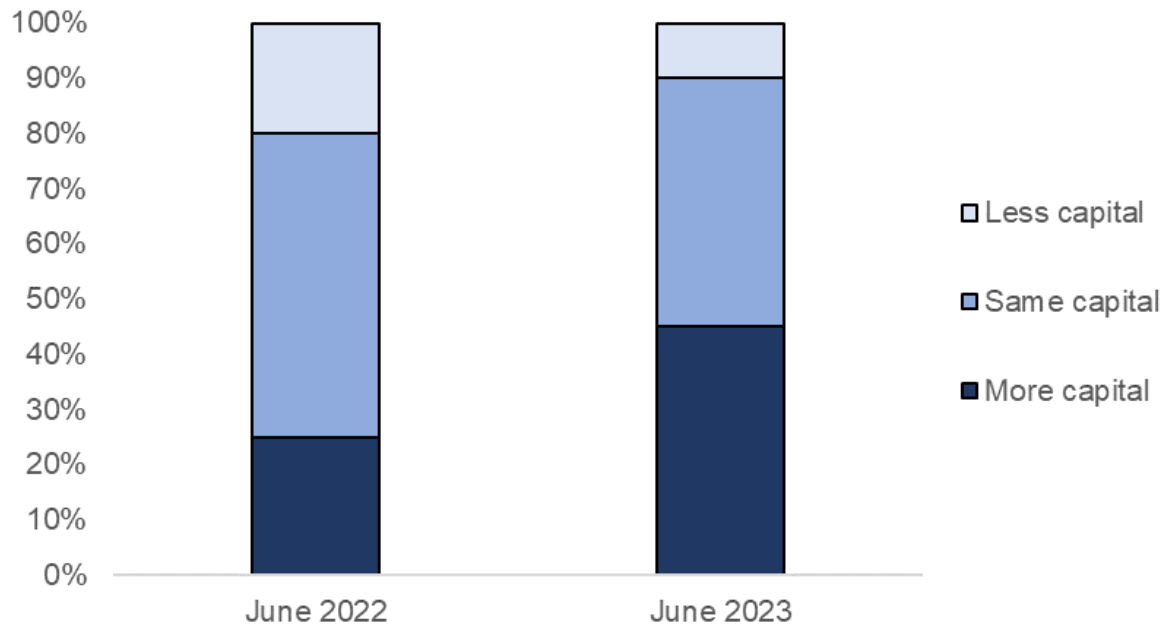


*Figure 11 - Survey: "How much capital will you commit to private debt in the next 12 months?" (Preqin, 2023)*

Different factors have been crucial to increasing the appetite of investors for this asset class, including:

a) *Higher returns compared to similar asset classes:* Returns of direct lending as an asset class vary consistently depending on the different strategies considered. Nonetheless, in this current market environment, where reference rates are historically high due to restrictive central banks' monetary policies and high interest rates, yields are pretty attractive, ranging from 5% for least risky senior loans to 20% for distressed loans. Similar asset classes have returns ranging from 2-3% of investment-grade bonds to 9% of high-yield bonds (IMF, 2024; Deloitte, 2024).

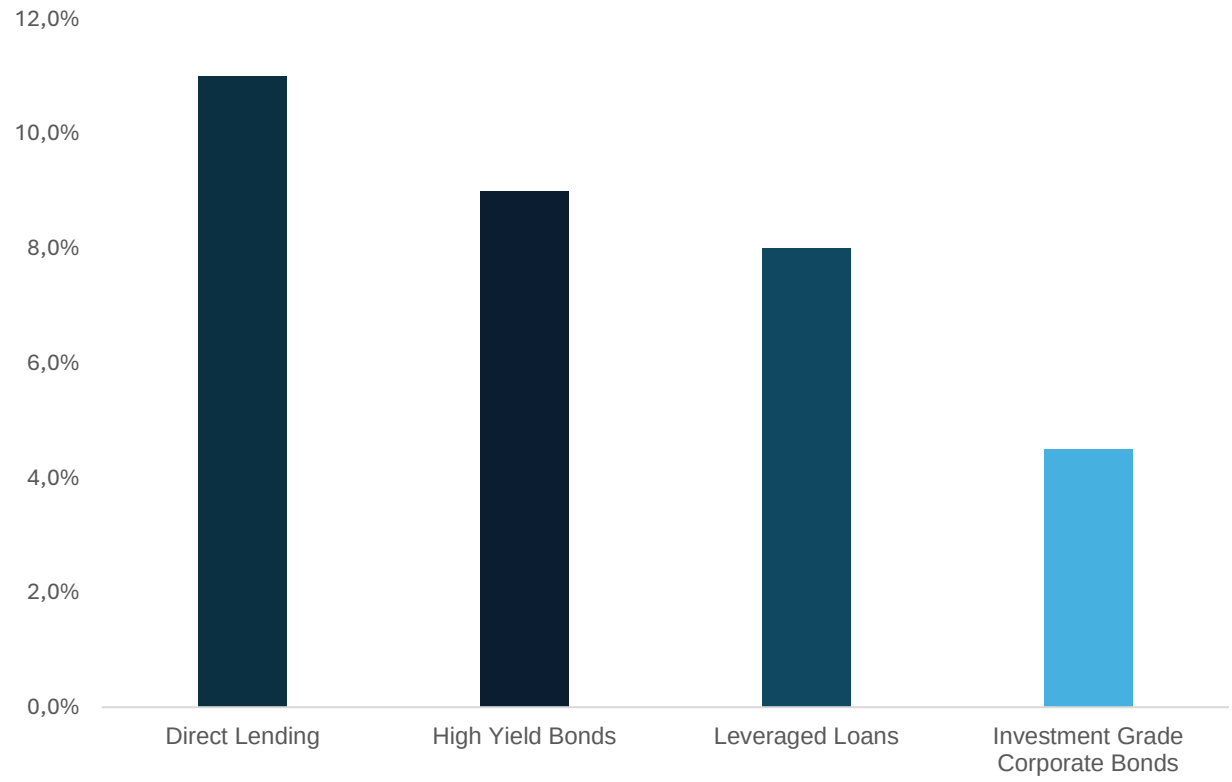


*Figure 12 - 10Y Returns on Selected Credit Assets (IMF, 2024)*

Besides, during the period of low-interest environment that lasted from 2010 to 2022, private debt strategies' higher yields were very sought out by institutional investors not willing or not allowed to invest in equity instruments but interested in obtaining higher returns than the ones offered by government bonds or high-yield bonds.

| Fund strategy | Description | Target return (Gross IRR) | Investment period | Fund term | Management fee | Preferred return | Carried interest |
|---|---|---|---|---|---|---|---|
| Direct senior lending | Invest directly into corporate credit at senior levels of the capital structure | 5-10% | 1-3 years | 5-7 years (plus 1-2 optional one year extensions) | Typically around 1% on invested capital | 5-6% | 10% |
| Specialty lending/credit opportunities | Opportunistic investments across the capital structure and/or in complex situations<br><br>Typically focused on senior levels of the capital structure | 12-20% | 3-5 years | 8-10 years (plus 2-3 optional one year extensions) | Typically 1.25 – 1.50% on invested capital or less than 1% on commitments | 6-8% | 15%-20% |
| Mezzanine | Primarily invest in mezzanine loans and other subordinated debt instruments | 12-18% | 5 years | 10 years (plus 2-3 optional one year extensions) | 1.50 – 1.75% on commitments during investment period, on a reduced basis on invested capital thereafter | 8% | 20% |
| Distressed | Invest in distressed, stressed and undervalued securities<br><br>Includes distressed debt-for-control | 15-25% | 3-5 years | 7-10 years (plus 2-3 optional one year extensions) | Various pending target return and strategy: 1.50 – 1.75% on commitments or 1.50% on invested capital | 8% | 20% |

*Figure 13 – Direct lending returns and fee structure by strategy (Deloitte, 2024)*

b) *Variable interest rate coupons:* Another feature investors appreciate is that coupon payments made by borrowers are tied to changes in interest rates. Direct loan interest payments are set to a "reference rate" or "base rate" such as the Libor or Euribor plus a fixed spread based on the seniority of the loans and the creditworthiness of the company (IMF, 2024). This feature is particularly attractive during rising interest rates, similar to what happened after the breakout of the Russian invasion in Ukraine, where commodities prices have increased, leading to high inflation, which ultimately obliged central banks to raise interest rates to stabilize price levels. As reference rates have increased, the yields on private loans have also risen. On the contrary, this feature does not apply to standard loans or bonds, which have a fixed coupon based on a predetermined interest rate. As the interest rate goes up, the price of bonds decreases, leading to capital losses for the investor and a reduction in the investor's total yield.

c) *Tailore-made covenants:* Unlike bank financing, where debt covenants are often pre-designed and standardized, private credit, including unitranche loan facilities, allows for more customized covenants. Private debt funds typically negotiate for stricter financial maintenance covenants. Examples of these covenants include requirements for the borrower to maintain a maximum leverage ratio (a specified ratio of debt to EBITDA or another cash flow measure), a maximum interest coverage ratio (a specified ratio of EBITDA or another cash flow measure to interest expense), or a minimum fixed charge coverage ratio (a specified ratio of EBITDA or another measure). These leverage covenants are crucial, requiring the borrower to reduce their debt over time. In senior debt facilities, breaching a financial covenant constitutes an event of default under the financing agreement, enabling the debtholder to accelerate the debt repayment. Since 2017–2018, there has been a trend toward covenant-lite financing in bank loans, contrasting with the more stringent financial maintenance covenants in private credit (Lalafaryan, 2024). Unlike incurrence covenants, standard in high-yield bonds, and covenant-lite loans, which only trigger compliance with a financial ratio when the borrower takes specific actions (such as issuing more debt or taking on an additional loan), private debt funds typically secure more comprehensive financial covenants and extensive information rights to monitor the borrower. Moreover, unlike bank financing, where standardized documentation is commonly used as a starting point

for negotiations, private credit financing often involves loan documentation specifically tailored to reflect the objectives of the relationship between the borrower and the lender and is bilaterally negotiated between the parties. This customization grants debtholders greater scope for *ex-ante* negotiation of control and monitoring rights. Covenants will be explored in-depth in the next chapter.

d) *Participation in extra returns and profits:* Greater upside potential is possible thanks to the nature of term sheets between borrowers and lenders. Thanks to the flexibility of contracts and the relationship between borrowers and lenders, middle-market loans can include warrants and other equity-like clauses, providing private debt funds the possibility to obtain equity upside in the company's performance. This evolution in private credit challenges the traditional view of debt investment in corporate finance and corporate governance. Traditionally, debt providers are seen as focused on value-maintaining activities, while shareholders seek value maximization. In conventional loan finance, there is no gain in capital growth for debt providers. However, in private credit, debt investors' participation in profit-sharing through returns on their debt investment contradicts this orthodox view. Private credit investors typically engage in long-term relationships, investing in the firm's success to ensure repayment of the principal, interest, and an extra return on their investment. In addition to profit-sharing at the fund level, private credit investors also gain control and upside potential through equity stakes and warrants. When they acquire these instruments, they benefit as shareholders rather than debtholders. However, their contractual bargaining as debtholders allows them to secure this level of control.

e) *Greater diversification and lower volatility*: Private debt performance shows a low level of correlation with other types of asset classes or with the business cycle in general; besides, thanks to the large number of middle market companies operating in the economy, private debt funds can create a more diversified portfolio of private loans as they have access to a broader range of opportunities compared to those of investors in publicly traded high yield bonds. Lower volatility is also achieved as the valuation of direct lenders' investments is usually mark-to-market and it is not as volatile as those of similar asset classes such as high-yield bonds or leveraged loans.

f) *Participation in the management of the company:* Another essential factor to consider for investors relates to the involvement of GPs who manage the private debt fund in the day-to-day activities of the company's management. Debtholders' participation on the borrower

firm's board adds value to the firm and supports GPs in achieving their investment strategy. This involvement also benefits the firm by ensuring that it knows and trusts those who hold the risk of its debt while granting debtholders enhanced information rights. These debt investors engage in formal and informal meetings with the board of their portfolio (i.e., borrowing) firms. Due to the relational nature of the financing provided in this market, private creditors actively participate in the firm's operations and offer sophisticated monitoring. They gain access to the management team, closely observing the actions of the borrower firm's managers. This access fosters the creation of strong relationships, facilitating a continuous flow of information that allows private credit funds to perform dynamic valuations of the firm.

This chapter introduced key trends shaping private debt and direct lending by analyzing the most interesting and appealing features of direct lending for borrowers and investors.
Investigating how private debt funds are organized, their main investment strategies, which clauses are discussed during the deal, and the investment process is crucial for asset managers to choose the right private debt fund to invest in. These factors are fundamental to allocating capital efficiently and obtaining returns consistent with the risk-reward profile sought.
Consequently, the next chapter of the thesis will explore in more detail these factors from the perspective of an asset manager or investor willing to allocate the private debt asset class to its portfolio focusing on key characteristics of private asset class including organization of funds, covenants, contractual terms as well as valuation methodologies.

# 3. Investing in the private debt asset class

After analyzing the main trends and advantages related to private debt investments, this chapter of the research thesis will focus on thoroughly understanding how private debt investments work. The main objective of this chapter is to gain an overview and a robust knowledge of the options available to institutional and retail investors willing to invest in the private debt asset class in the US market.

Firstly, the chapter will focus on the organization of private debt funds and the different legal structures available to GPs. Secondly, there will be a deep dive into the different investment strategies private debt funds use, outlining rationales, features, main players, and return-risk profiles related to each strategy analyzed. Furthermore, to gain essential foundations on private loan agreements, the analysis will deeply investigate the key terms discussed in private debt contractual agreements and their importance for the success of the investment. Final paragraphs will detail the primary private loan valuation methodologies and other key factors to include in a comprehensive and exhaustive private debt valuation.

## 3.1. Organization of Private Debt Funds

This paragraph focus on various investment legal structures available for private debt fund managers, providing investors with unique opportunities to manage their portfolios, tailored to specific objectives and needs. The focus spans different legal structures, from commingled funds, which pool assets and are managed collectively, to Separately Managed Accounts (SMAs), which offer direct ownership and customization. Additionally, Business Development Companies (BDCs) and Collateralized Loan Obligations (CLOs) are explored as structured solutions for investors seeking access to private lending and leveraged loan markets. Each investment structure presents distinct advantages, regulatory considerations, and limitations that adapt to different investment needs. These insights aim to provide a comprehensive understanding of their roles in portfolio strategies.

a) A commingled or pooled fund includes assets from various accounts. Typically, individual investors do not have direct access to these funds; on the contrary, their funds are pooled with those from other investors. The available liquidity is usually managed by one or more

fund managers who actively originate and execute investments, having a fundamental role in deciding investment strategies. Commingled funds can be made of various assets like stocks, bonds, and other securities, similar to traditional mutual funds (Bundrant & Gallegos, 2017). Commingled funds can be compared to mutual funds, as both pool assets are managed by fund managers responsible for investment decisions. Nonetheless, there are significant differences between them. Firstly, mutual funds are regulated by the Securities and Exchange Commission (SEC), while commingled funds are not. This difference leads to divergent regulatory standards where mutual funds have higher scrutiny than commingled ones. Secondly, access to commingled funds for retail investors is generally restricted to employer-sponsored retirement plans, unlike mutual funds, which are accessible through various investment accounts, including 401(k)s, individual retirement accounts, and taxable brokerage accounts. Consequently, commingled funds tend to be addressed mainly to institutional investors, whereas mutual funds obtain resources from both institutional and retail investors. Thirdly, mutual funds offer greater transparency and data availability than commingled funds. Investors can review a mutual fund's prospectus to understand its investment strategies, holdings, and associated costs. In contrast, commingled funds do not always provide such detailed disclosures, which may affect the transparency of your investment information.

Besides, investors in commingled funds can benefit from the know-how of active fund managers, whose proven track records could lead to higher abnormal returns (Guggenheim, 2024). Additionally, these funds might provide easier access to certain complex investments because of the minimum investment ticket required. These funds often invest in a mix of stocks, bonds, and other assets, enhancing returns and reducing the risk inside the investor's portfolio. As stated above, one disadvantage of commingled funds is their lack of transparency and low information disclosure. Since they are not traded on public exchanges, monitoring a commingled fund's performance consistently is challenging.

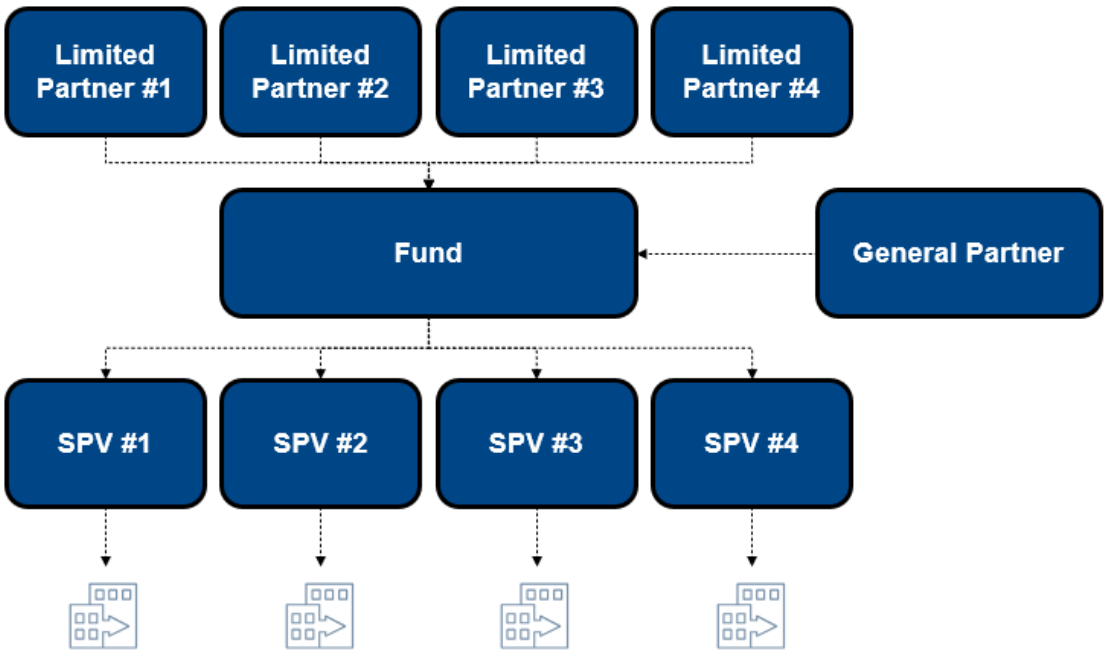


*Figure 14-Commingled Fund Structure in Private Debt (Preqin, 2024)*

b) Separately Managed Accounts ("SMAs"): SMAs are specific investment portfolios managed by asset managers. Unlike mutual funds, where assets are gathered in a unique portfolio, and investors own shares of the collective fund, SMAs allow investors to own individual securities within their portfolios directly (J.P. Morgan Asset Management, 2024). This specific legal structure allows the owner to obtain tailor-made investments that fit their needs and to control all the phases of the investment process, making SMAs particularly sought out by large institutional investors such as asset management firms or family offices with specific needs in asset allocation.

As stated above, SMAs are extremely useful when the investor has specific objectives or needs in terms of asset allocation. For instance, an LP committed to incorporating ESG factors heavily into its investment can ask the fund manager to restrict investments in loans from corporations operating in the fossil fuel or tobacco industries. Besides, the institutional investor can obtain from the manager an allocation that better fits the investor's needs in terms of strategy or geography.

Another advantage of SMAs is that they offer greater transparency than pooled investment vehicles. Investors receive detailed reports listing each holding, its performance, and the costs of managing the account. Thanks to this level of detail, investors can clearly oversee the performance and trend of the assets inside the SMAs. Notwithstanding these benefits, SMAs generally require a higher minimum investment ticket as they are addressed towards

institutional investors, limiting the possibility for retail and medium-sized investors to access SMAs. The minimum investment ticket for SMAs is usually around $100k, varying with the GP requests and the investment strategies involved. Consequently, to invest in SMAs, it is necessary to have sufficient capital to meet the minimum ticket size. Another distinctive feature of SMAs is that their fee structure is directly agreed with the investor based on the complexity and customization of the strategy developed (Guggenheim, 2024). This characteristic usually leads to higher transparency over fee structure than mutual funds. Because of the customization of the investment strategy, SMAs' fees are usually higher than mutual funds. Overall, SMAs offer several advantages for large institutional investors who are willing to have greater control over their investments and tailor-made investment strategies that fit their needs and objectives. On the contrary, the minimum ticket required for investing in SMAs and the potentially higher fees make this legal structure less suitable for investors looking for low costs and having small funds to invest.

c) Business Development Companies (BDCs): BDCs are one of the main alternatives to private partnerships for investors seeking simplified access to private loans. The main advantage of BDCs, similar to REITs (in real estate) and MLPs (for energy assets), is the potential tax advantages investors exploit. BDCs were created by the US Congress in 1980, under section 54 of the Investment Company Act of 1940, to foster access to financing for middle-market companies (Nesbitt, 2023). BDCs obtained by Congress the advantage of choosing between being private or exchange-traded with a tax-free pass-through of investment income: the primary obligations for BDCs to fill registration with the SEC, at least 70% of their investment should be in nonpublic debt and equity in US corporations, a maximum leverage equal to 2.0x net asset value (NAV), annual distribution of at least 90% of income to shareholders and constraints on portfolio diversification. BDCs are SEC-registered investment companies subject to requirements similar to US mutual funds. SEC oversights allow BDC investors to lower risks compared to private partnerships. Given that 70% of the portfolio must be composed of nonpublic assets, BDCs focus primarily on providing loans and equity to mid-market companies, with the former being the predominant choice for BDCs. Before 2018, the maximum leverage was equal to 1.0x of NAV; after the approval of the Small Business Credit Availability Act, BDCs may decide to increase their leverage up to 2.0x of the NAV. Several BDCs can create and invest in small business investment companies (SBICs). BDCs can be elected to be treated as a regulated investment company (RIC) so that investments pass through to investors without

tax. In addition to the previously mentioned requirements, to be qualified as RIC, BDC must respect the following criteria: 90% of gross income should come from interest, dividends, and realized gains of security, passing a quarterly asset diversification test, distribution greater than 90% of taxable income, equal to ordinary income plus short-term capital gains. The last point entails that BDCs must not generate unrelated business taxable income (UBTI). The tax advantage feature is highly sought by private institutional investors who are unwilling to pay taxes on private investments. Additionally, BDCs present another tax advantage for non-US investors as they generate effectively connected income (ECI), representing taxable income for foreign institutional investors. Ad many BDCs are public companies, retail investors can have access to their returns. Consequently, several non-US institutional investors are willing to choose BDCs as a preferred legal structure to invest in direct lending funds (Grant Thornton, 2017). BDCs will be explored in more detail in the subsequent chapter, as buying shares in public BDCs is the primary way of investing in direct loans to mid-market companies for small and medium-sized investors. The empirical research will be using public BDCs to construct a direct lending index and test the performance of private in a multi-asset portfolio.

d) Collateralized Loan Obligations (CLOs): CLOs are legal structures designed to provide investors access to the economic benefits of a diversified portfolio of leveraged loans. Contrary to other legal structures, CLOs allow investors to choose different levels of risk-return profiles rather than the pooled average (Nesbitt, 2023). CLOs are composed of a portfolio of leveraged loans, where a portfolio manager selects a portfolio of leveraged loans serving as the unique collateral to cover principal repayments and coupon payments of notes issued by the CLOs. CLOs arrangers also provide for various administrative functions, including trustee, custodian, administrator, and underwriter. Notes and other CLO securities are generally exempt from SEC registration. The advantage of CLOs is that both loans in which the manager invests, and the notes issued by the manager are floating rate instruments, so changes in interest rates do not affect the investors. There are four steps in creating a CLO: firstly, the collateral manager and the selected bank make a credit facility to build a portfolio of leveraged loans. Using a mix of equity provided by the manager and debt provided by the bank, the manager creates a portfolio of leveraged loans. In 6 months, the facility should have reached a size equal to 70% of the final CLO structure. If the underwriter can place all the notes, the CLO invests all assets in a diversified portfolio. After this stage of the process, there is a reinvestment phase ranging from 3 to 6 years, long enough to give noteholders and equity holders a sufficient cash return on their investment.

Principal proceeds from loan maturities and prepayments are usually reinvested to maintain approximately constant vehicle size. When the reinvestment period ends, the amortization period begins, and all cash flows are distributed to noteholders and equity holders according to the priority of their claims.

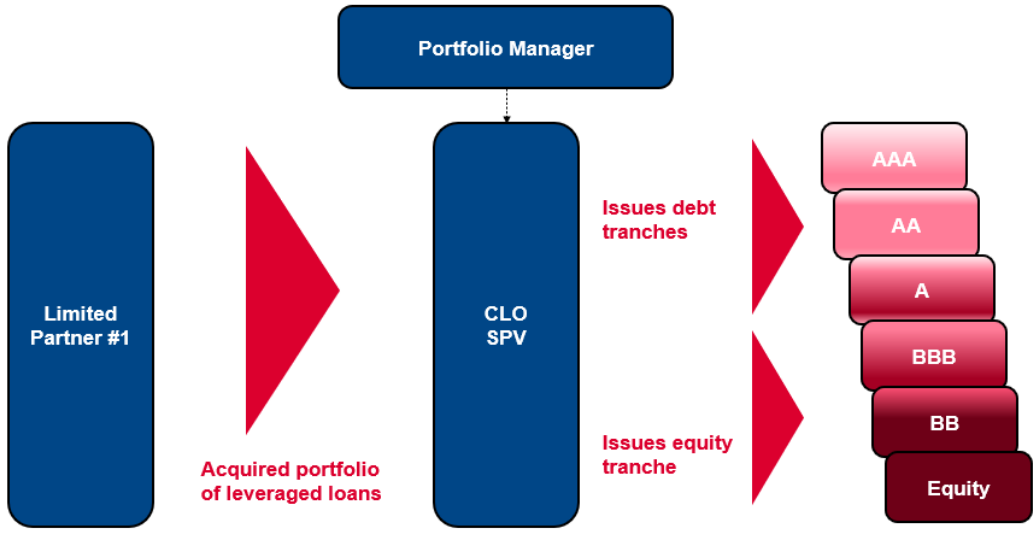


*Figure 15 - Typical CLO structure overview (Nesbitt, 2023)*

## 3.2. Main Investment Strategies

Apart from direct lending, which was thoroughly investigated in the first chapter, private debt funds utilize a wide range of investment strategies to allocate liquidity. These strategies are tailored to address various investor demands and needs for several risk profiles and financial objectives. This paragraph will focus on these strategies, providing a thorough analysis across critical dimensions such as risk-return profiles, target investments, typical use cases, and average returns, offering a comprehensive understanding of the strategic landscape of private debt investment.

a) Mezzanine debt: Mezzanine debt represents a hybrid form of financing combining debt and equity elements. It is typically used in leveraged buyouts, recapitalizations, and other transactions where senior debt alone cannot cover the totality of financing needs (Pitchbook, 2024). Mezzanine loans are often structured to be subordinated to senior debt but senior to equity in the capital structure. The position of mezzanine debt in the capital structure allows lenders to obtain higher returns, typically through a combination of interest payments, fees, and equity-like participation in the form of warrants or options. These loans are usually negotiated directly between the lender and borrower, with flexibility in the terms agreed including payment-in-kind (PIK) options, where interest payments are deferred and added to the principal (Rosenbaum & Pearl, 2021). Loan sizes in the mezzanine landscape vary widely, ranging from $5 million to $100 million, with most of the transactions valued between $10 million and $50 million. Private equity fund uses this form of financing in leveraged buyout, representing a significant portion of the funds used. In these cases, mezzanine debt might account for 10% to 20% of the total capital structure, supplementing senior debt that covers a more substantial portion of the transaction. Specialized funds, insurance companies, and specialty finance firms have traditionally provided mezzanine financing. These lenders issue mezzanine financing to middle-market companies that require capital but may not have access public markets because of small size or low creditworthiness. Mezzanine debt is crucial when businesses need to finance growth initiatives, such as acquisitions, expansions, or shareholder buyouts. Over time, the market for mezzanine financing has evolved, with a clear division emerging between smaller, specialized firms that focus on lower middle-market deals and larger financial institutions, including affiliates of major investment banks, that handle larger transactions. One key benefit of mezzanine financing is its flexibility. Mezzanine lenders can tailor the loan terms

to meet the borrower's specific needs, providing a bespoke capital solution that senior lenders may not be willing or able to offer. The flexibility embedded in this strategy allows the borrower to customize repayment terms, interest structures, and to obtain equity participation, making mezzanine debt a valuable form of financing for companies looking to minimize equity dilution while securing necessary capital. Nonetheless, mezzanine debt flexibility is counterbalanced by some disadvantages. Because of the higher risk associated with being subordinated to senior debt lenders demand higher returns, which can increase the borrower's overall cost of capital. Additionally, the complex structuring of mezzanine loans can make them more challenging to manage, particularly for companies that are already operating under significant financial distress. Returns comprise 9-12% gross unleveraged return plus 3-5% returns from equity co-investments, with different levels of equity co-investments for each strategy. Overall, mezzanine debt is a critical financing option for companies needing flexible capital without immediately diluting equity holders. While it carries higher costs and risks, the benefits of tailored, subordinate financing often outweigh the drawbacks, making it an essential component in many financial transactions.

b) Structured capital is a tailored financing solution that fills the gap between traditional debt and equity. Often termed hybrid capital, structured capital typically involves a mix of junior debt—such as mezzanine debt—and equity features, subordinated to senior debt but structurally senior to common equity. This type of capital is increasingly used in complex financial transactions where traditional forms of financing are either inefficient or unsuitable. It has become a prevalent form of solutions capital because, for borrowers, it is more flexible than traditional debt and less dilutive than conventional equity. Traditionally, structured capital borrowers are EBITDA-positive and use proceeds for growth initiatives such as M&A or expansion in new markets. Structured capital providers are specialized investment firms that raise private, closed-end vehicles like private equity or private credit funds. Private equity funds often need to obtain hybrid capital solutions to finance their investments, whereas private credit funds are entering this segment of the debt market as it is a growing profitable space to enhance returns. Private credit structured capital funds usually have a three-to-five-year investment period and an eight-to-ten-year final term. Contractual returns for structured capital financing range from 10-14% interest income together with equity upside of 3-5% return for a total of 13-17% total gross return. Limited partners and institutional investors are willing to invest in private credit funds specialized

in structured capital because of the mix between the downside protection typical of debt instruments and the upside optionality typical of equity strategies.

c) Venture debt is a financing option specifically tailored for startups and early-stage companies typically offered by specialized venture debt lenders. These lenders are generally interested in startups with significant growth potential and a strong track record of funding. Venture debt is often considered by founders who have already raised VC funding but want to avoid diluting their ownership further. Unlike traditional loans, venture debt features terms designed to address the unique risks associated with startups. While traditional lending focuses on businesses with stable cash flows and tangible assets that can serve as collateral, startups frequently lack these characteristics. As a consequence, venture debt strategy has limited competition from traditional lending sources and high barriers to entry due to the relationship needed with startup founders, belonging to the venture capital ecosystem to originate the transaction, and the expertise required to evaluate small, rapidly growing companies in new technology sectors. Lenders seek a borrower with characteristics similar to those sought by venture capital funds, including a good outlook and a well-thought-out business plan and model. The significant advantage for investors in this strategy is the potential upside from the possibility of exercising options to buy shares of the company participating in the growth of the equity value of startups. Usually, companies looking for venture debt financing have already raised a series A round of funding. The primary rationale behind choosing debt over equity is the willingness to avoid diluting ownership. The lender will seek to limit its exposure to a modest, perhaps 10-15% LTV, with value based on the lender's estimate of the company's enterprise value. The interest rate on venture debt is typically set between 8 and 12% per annum and a back-end fee of up to 10% of the loan amount. The lender will seek warrants with an estimated 5 to 15% value and target a cash yield of 10-15% on the loan. Loans may have fixed or floating interest rate with three to five years of maturity.

d) Rescue Financing is a form of lending occurring when a company has a critical near-term liquidity issue that cannot be solved through traditional channels. Rescue financing may avoid the risk of bankruptcy, providing borrowers with immediate cash needs and enabling lenders to improve their loans' economic and collateral position. Among rescue financing strategies, debtor in possession ("DIP") financing refers to financing a company for business initiatives needed to execute a turnaround plan. Historically, commercial banks

have been the leading providers of DIP financings. As commercial banks have been retreating from this segment, the leading providers of rescue financing have become private debt funds, hedge funds, and private equity funds. These investors are typically involved in stressed and/or distressed companies before bankruptcy, obtaining board seats during the restructuring. Loans typically have shorter duration relative to corporate bonds and loan issuance. DIP loan maturities can range between six months to two years, but most loans mature in less than 12 months. A typical exit for rescue financing involves the company refinancing its debt at better terms with longer maturities. DIP financing can range from a reference rate plus 600 bps to a reference rate plus 2100 bps. In addition to high returns, lenders can negotiate highly favorable terms due to the distressed situation and the company's urgent need for rescue financing. DIP financings are extremely useful for distressed companies and can generate high returns, but they represent a niche strategy suitable for portfolio managers willing to bear higher risk.

e) Asset-based lending (ABL): Asset-based lending encompasses various corporate- and consumer-oriented financing strategies where tangible or financial assets back the consumer credit directly or indirectly. Contrary to traditional leveraged loans, ABL is supported predominantly by the value of specific assets that serve as collateral for the loan. Sub-strategies include working capital finance, which small and mid-sized companies use to finance the growth of their inventories and accounts receivable. Besides, equipment finance is used to finance the acquisition of complex assets such as equipment, whereas financial asset lending provides financing to the expansion of the portfolio of consumer or commercial finance companies. Loan sizes tend to be extremely small, so funds generally have less than $1B AuM. Private ABL funds are usually structured as private equity funds, although they frequently employ shorter term funds, usually equal to a five- to eight-year total fund life with a two to three-year investment period. Expected return ranges for different strategies as many lenders offer working capital finance with a competitive pricing, with a spread ranging from 300 to 600 bps. On the contrary, financial asset lending is a specialized niche strategy that requires a spread from 800 to 1200 bps. In this case, lenders try to reach a 12-15% gross IRR. Fixed assets lending has a pricing between the previously mentioned strategies and a loan period equal to the useful life of the fixed asset used as collateral.

f) Real estate debt is used by a wide range of market participants to provide loans and execute investment strategies covering real estate. Property owners and developers use real estate debt to finance the acquisition or development of a property or construction project and leverage the equity invested. Real estate loans are used for refinancing, acquiring, or constructing real estate properties, with loan sizes varying between $5 million and $1 billion, although most transactions are between $10 million and $100 million. Private debt real estate funds are typically structured similarly to private equity real estate funds with eight-to-ten-year fund terms, including three-to-five-year investment periods. IRR varies consistently with the strategies considered: senior loans are usually priced at reference rates +300 bps to 500 bps, whereas mezzanine loans and other subordinated types are priced at reference rate + 700 to 1000 bps. Annual management fees range between 1 to 1.5% on committed capital. Institutional investors considering private debt real estate strategies are willing to participate in investment in the real estate sector without having to bear the risk of equity instruments.

g) Infrastructure debt refers to loans arranged to finance infrastructure assets' development, expansion, and maintenance. Usually, debt financing in infrastructure sectors is given to companies running assets in a monopolistic market due to regulatory constraints or high barriers to entry. Infrastructure assets are characterized by predictable and stable cash flows derived from long-term regulated contracts, inflation-linked revenues as cash flows are generally connected with the behavior of inflation or economic growth, and low probabilities of default. Moreover, infrastructure debt features solid downside protection and capital preservation compared to fixed-income securities. Managers that offer infrastructure debt strategies are usually globally diversified infrastructure institutional investors. These firms have started offering credit strategies to increase fee generation and diversify their portfolio of assets. Usually, infrastructure debt strategies are global and multisector in scope in order to reduce country-specific risk and benefit from diversification. Infrastructure debt funds are similar to private equity funds operating with similar timeframe having a 10 to 12-year term, including a four to five-year investment period. Infrastructure debt strategies usually have IRR ranging from 4-6% of senior secured infrastructure debt to 7-10% of mezzanine/subordinated debt. The incremental returns stem from the lower seniority of the mezzanine being subordinated to senior debt in case of default of the loan. Annual management fees are usually equal to 1.0-1.5% and, like most private credit strategies, are charged on invested capital.

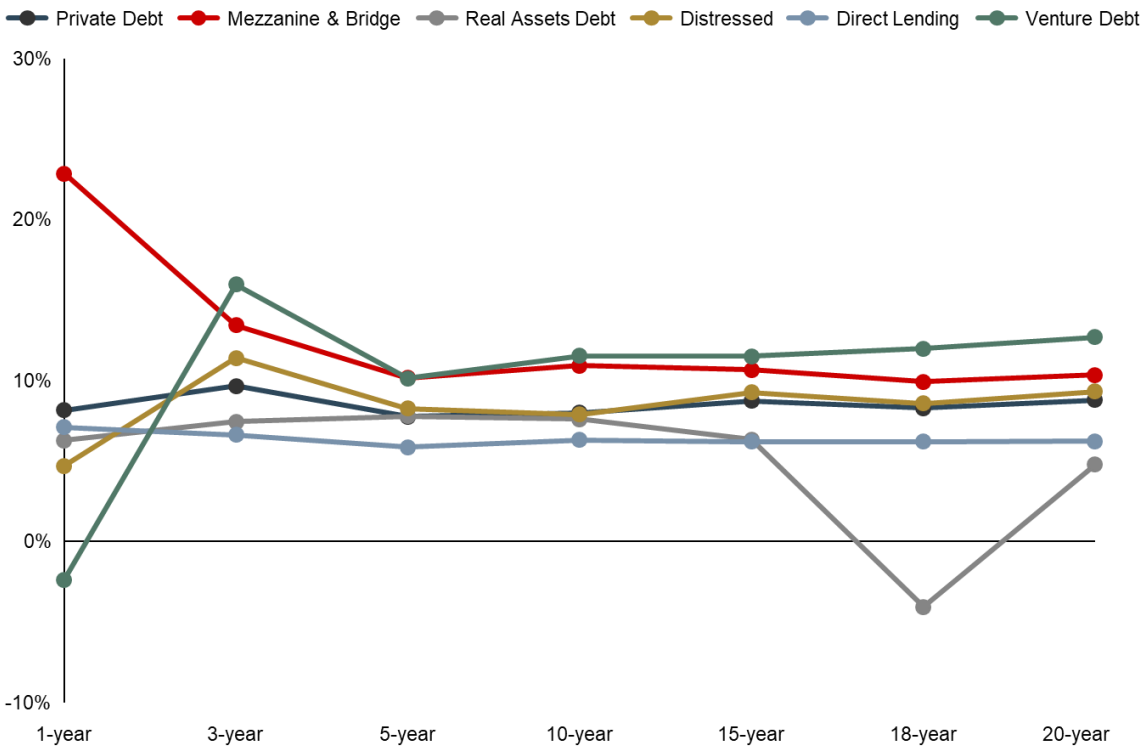


*Figure 16 - Private debt performance by asset class over different time horizons (PitchBook, 2024)*

## 3.3. Private Debt Contracts: Main clauses Used to Structure Loan Agreements

In this paragraph, the thesis aims to provide a comprehensive overview of the taxonomy of private debt's critical legal and financial terms discussed in drafting private debt contractual agreements. A clear picture of how various aspects and specific details of lending agreements are structured is crucial for thoroughly understanding the clauses and terms of potential investments in private debt. By delving into the key elements of private debt, investors can be equipped with the knowledge required to navigate the complex landscape of this asset class effectively. The paragraph will explore four principal areas of legal terms discussed in drafts of agreements: offering terms, credit support, representation and conditions to the loan (with a particular focus on covenants), and loan governance.

a) Offering terms include the general terms regulating the key elements of the agreement between the lender and the borrower. The key terms are purpose of the loan, the name of the two parties involved in the transaction, the amount of the loan, and other key financial terms of the offering (e.g., interest rate).
    a. Loan Summary & Purpose: Describes how the lending agreement will be structured and how the borrower will be using the proceeds.
    b. Borrower. It includes the legal name and location of incorporation of the borrower. The information provided in this part needs to be accurate for the effectiveness of the agreement.
    c. Investor: Name of the legal entity that invests in the loan.
    d. Loan Amount: It includes the amount of funds the borrower is willing to raise, including the maximum amount obtainable.
    e. Interest Rate: This section specifies the level of interest rate, the frequency of coupon payments, and the calculation to be carried out to compute the amount of each payment.
    f. Maturity: the date by which the total amount of the principal must be repaid.
    g. Amortization: how the payment of the principal is structured: the principal could be repaid in installments containing both principal repayments and interest coupons or entirely at maturity (bullet loan).
    h. Call Protection: This policy limits the borrower's ability to repay the loan early by imposing penalties in case of early repayments. Call protection prevents repayment

for a specific time. Afterward, it may offer the lender agreed-upon compensations, mitigating the negative effects to the lender if a borrower chooses to repay the loan before it matures.

i. Prepayment Option: Optional prepayment could be available to the borrower; the borrower receives the option, not the obligation, to reduce its indebtedness by repaying the entire or partial amount of the loan before it expires.

j. Offering Period: It indicates the targeted closing date by which the borrower and lender should find an agreement regarding the terms of the loan contract.

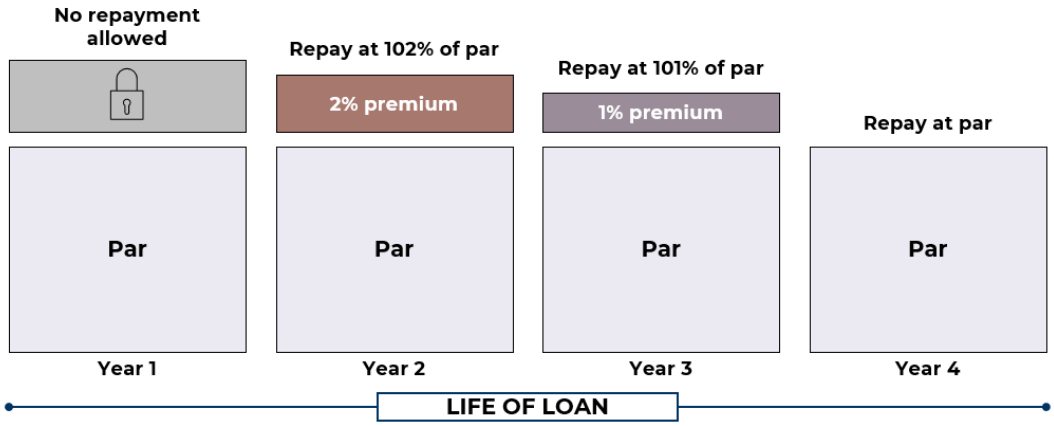


*Figure 17 - Example of prepayment option (Blacktone, 2022)*

b) Credit support clauses are integral components of loan agreements, designed to mitigate risk and enhance the security of lenders. These provisions aim to ensure that borrowers remain committed to fulfilling their repayment obligations while safeguarding the lender's financial interests. By addressing various aspects such as borrower guarantees, loan seniority, collateralization, representations and warranties, conditions precedent to funding, and covenants, these clauses collectively create a framework that promotes financial stability and reduces default risk. Each clause serves a specific purpose, whether providing repayment assurance, prioritizing claims in bankruptcy, or maintaining the borrower's financial discipline. Together, credit support clauses create a robust structure that balances the needs of both borrowers and lenders in private debt agreements.

a. Guarantees: The owner or shareholders of the borrowing entity are required to guarantee that the company will repay the loan interest and principal. This clause allows lenders to be more specific about the borrower's commitment to repay all its liabilities fully.

b. Seniority describes the loan's position relative to other debt incurred by the borrower; in the event of bankruptcy, the loan's position is critical as it illustrates which lender is entitled to receive higher priority in receiving proceeds from liquidation.

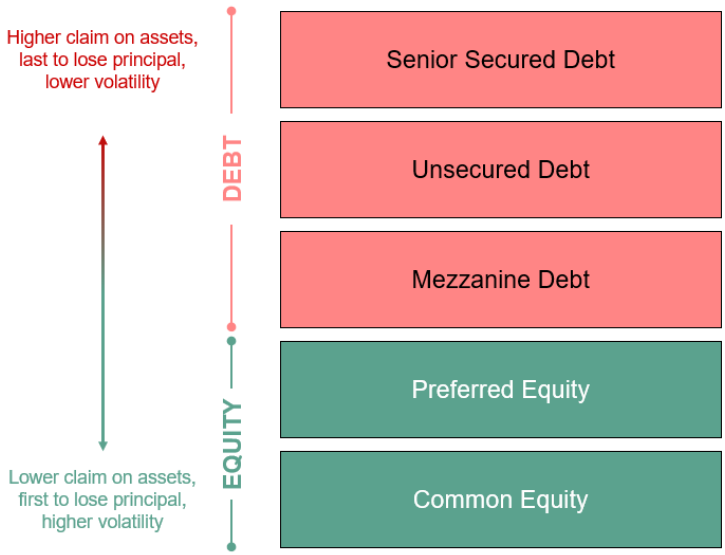


*Figure 18 Example of capital structure and its seniority (Blackstone, 2022)*

c. Collateral: If assets are used to secure the loan, the debt is collateralized, and lenders can use collateral as an alternative source of repayment; usually, an advance rate will be specified against the collateral's current market value; typical collateral includes accounts receivable, PP&Es, cash, and other liquid assets.

d. Representations and warranties: Borrower illustrates to the lender its current business status with respect to several potential business factors including accuracy of financial statements, absence of ongoing litigations, compliance with laws, accuracy of information and compliance with environmental matters.

e. Conditions precedent to initial funding: it includes the satisfaction with all legal and financial due diligence relating to the borrowers.

f. Covenants are critical clauses designed to reduce the risk of borrowers' defaults and consequent losses for lenders. It is possible to distinguish affirmative covenants from negative covenants. Lenders use covenants to ensure the borrower remains financially stable, which can help lower overall investment risk. Although covenants are designed to safeguard the lender, it is important to evaluate the type, nature, and impact of these covenants (or the absence of them) in the context of the entire loan agreement (Rosenbaum, 2021).

Affirmative covenants include:

- Maintaining organized and correct corporate books and producing management reports monthly or quarterly;
- Demonstrating payments on obligations towards suppliers and other lenders;
- Demonstrating compliance with current law.

Negative covenants include:

- Limiting the borrower's possibility to take on additional debt;
- Limiting the ability of the borrower to lend to a subsidiary or limitations on subsidiary debt;
- Constraining the possibility of the borrower to issue dividends or distributing other form of compensations to equity holders;
- Restricting the possibility of the firm to incur in capital expenditures or investments in associates.

Financial covenants include:

- Minimum fixed charge coverage ratio: it is mandatory for the borrower to maintain a minimum of fixed charge coverage ratio (FCCR) according to the following formula:

*Equation 1 - Fixed Charge Coverage Ratio*

$$FCCR = \frac{\begin{array}{c} After\ tax\ cash\ income + \\ interest\ expense + lease\ \ rental\ expense \end{array}}{\begin{array}{c} Interest\ expense + lease\ \ rental\ expense \\ +contractual\ long - term\ debt\ retired \\ +preferred\ stock\ dividend\ payments \end{array}}$$

The fixed charge coverage ratio can be used as a proxy for how much cash flows the company produces to support fixed charge obligations. A low level of the ratio may signal potential financial distress and the potential incapability of the company to meet interest service payments and maintain financial stability. Thus, private debt investors oblige borrowers to maintain high levels of the ratio to reduce the risk of insolvency.

- Maximum leverage debt to EBITDA ratio:

*Equation 2 - Leverage Ratio*

$$Leverage\ ratio = \frac{Net\ debt}{EBITDA}$$

Using EBITDA as a proxy for cash flow, a high level of the ratio may indicate that the company has a high level of indebtedness compared to cash flows generated in a single fiscal period, whereas a low level indicates that the amount of cash flows generated by the company are sufficient to sustain coverage of financial short- and long-term obligations; secondly, it approximates the number of years it would take a company to repay its net debt using EBITDA. The ratio is used as an indicator for private debt investors to measure a company's leverage and debt-servicing capabilities, providing a picture of its capability to sustain its financial obligations. Maintaining minimum level of cash reserves on the balance sheet:

- **Minimum level of cash reserves:** Having a minimum level of cash reserves on the balance sheet is crucial for the company to ensure solvency and liquidity to meet everyday expenses and cash obligations and to have a liquidity buffer against uncertainties and emergencies; in addition, it is crucial to manage cash flow fluctuations and maintain operational flexibility. Private debt investors value this covenant as a way to make the company less exposed to the risk of running out of liquidity and becoming insolvent.

Moreover, financial covenants can be divided into maintenance and incurrence covenants. The former are stricter requirements for borrowers as they oblige the borrower to constantly meet requirements of continuous financial tests (e.g., not exceeding a specific debt-to-EBITDA ratio). On the contrary, incurrence covenants are violated only if the borrower incurs specific actions exceeding the limit established in the covenant. Based on the number and strictness of covenants used, it is possible to distinguish two main archetypes of agreements:

- Covenant-lite are agreements in which covenants are either reduced or eliminated as lenders believe that covenants do not reduce the risk of default and do not increase the return of the loan issued. This agreement aims to improve the relationship between lenders and borrowers, enhancing the mutual trust between the two parties.
- On the other hand, covenant-loose agreements have more stringent requirements compared to cov-lite, including maintenance coverage, but with a very high threshold so that only in

extreme cases of bad performance will the covenant be breached (De la Bastide & al., 2024).

c) Loan governance: Loan governance encompasses the mechanisms and provisions that regulate the relationship between borrowers and lenders, ensuring the proper management and repayment of loans. It includes clauses such as events of default, which outline triggers for bankruptcy, and default rates, which penalize borrowers for non-compliance. In private debt funds, governance extends beyond borrower agreements to address conflicts of interest between fund managers (GPs) and investors (LPs). Alignment of interests is achieved through structured management contracts that provide incentives, typically following the "2/20/1" rule. By regulating fees, carried interest, and hurdle rates, loan governance terms balance risk and returns while fostering accountability among all parties involved.
    a. Events of default usually comprises all events that trigger bankruptcy, including non-payment of interest and principal (subject to grace period), cross-default, bankruptcy, material judgments, change of ownership, and invalidity of guarantees.
    b. Default Rate: If the lender does not pay interest or incur in another event of default, the loan will start carrying a Default Rate (or Penalty Rate) that is applied on both principal and outstanding interest until the default has been remedied.
    c. Fee structure: Given the structure of private market funds, conflicts arise between fund managers (GPs) and investors in the fund (LPs) as the two parties have divergent objectives. In order to mitigate the risk of severe conflict of interest, the agency relationship between fund managers (GPs) and investors (LPs) is governed by a management contract specifying the agreement's terms. The typical private fund equity follows the well-known "2/20/1" rule: 2% management fee, 20% carried interest and 1% GP ownership. Asset managers usually charge management fees on the investor's committed capital. The amount to be paid yearly by the investor is equal to the fee rate times the committed capital. Carried interest is the share of the profit generated by the fund that GPs obtain. The fees have usually been closer to 20% of the profits generated by the fund to align the interests of GPs and LPs. Often, before receiving a part of the profit, the fund must obtain a prespecified return on investment of the fund higher than the so-called "hurdle rate"

Focusing specifically on private debt funds, research carried out by Callan Institute (2024) showcases the differences and similarities of private debt managers' fee structure compared to

the one charged by private equity fund managers to their investors. Typically, management fees are not constant but tend to decrease over the maturity of the fund: During the investment period, both the percentage value and the capital on which the fees are calculated are higher, whereas after the investment period, both the percentage value and capital amount drop. In a period analyzed between 2016 and 2022, the median management fee during the investment period was equal to 1.15%, 85bps lower than the typical fee structure found in private equity. Focusing on the asset class, direct lending charges the lowest fee as direct lending funds have more committed capital. On the other hand, more sophisticated strategies (e.g., opportunistic lending) charge higher management fees, given the expertise required to manage capital following these conditions. Niche strategies charge the lowest fees to attract more capital and investors. Moving to carry interest average fees charged, most funds charge a carry interest equal to 15%; sophisticated strategies such as distressed charge carry interest as high as 20%, particularly those funds with higher return targets. Considering the hurdle rate, the median hurdle rate to be surpassed by private credit funds to obtain "carry interest" has been equal to 6-7%. However, this data has been influenced by the low interest rate environment that prevailed until 2022; in the future, it should be expected that a higher average hurdle rate will be charged to compensate for higher returns achievable with other asset classes available in the financial market.

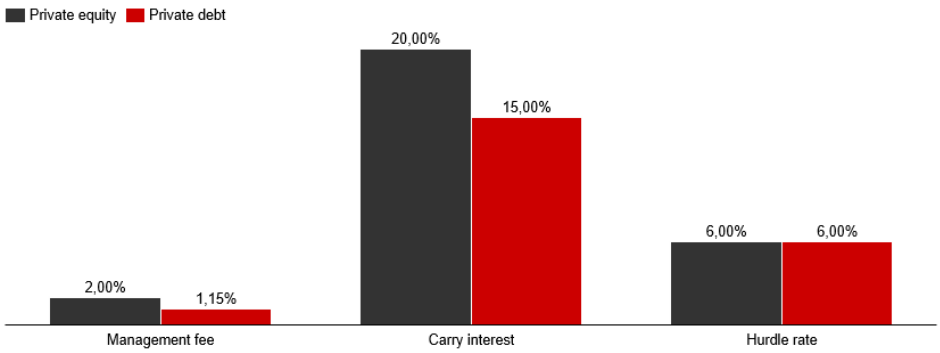


*Figure 19- Fee structure Private Equity vs Private Debt (Callan Institute, 2023*

## 3.4. Loan Valuation

Valuing loans owned by private debt funds presents unique challenges due to the absence of publicly available pricing data. Consequently, investors must possess a robust skillset in loan valuation to accurately assess the fair value of these instruments. This paragraph explores several methodologies used to value loans, each with distinct advantages and scenarios where they are most applicable.

a) Income approach: Similar to what happens with stocks, it is possible to value a loan using Income Approach by discounting the expected value of cash flows with a discount rate based on the level of risk of the cash flows associated with the loan. The income approach can be divided into 3 main steps:

- Step 1- Cash Flow Projection: When conducting a yield analysis, the initial step is to create a cash flow schedule outlining the expected cash flows from a debt security throughout its remaining estimated holding period (which might differ from the loan's full term). These projected cash flows are based on the terms specified in the credit documentation, such as coupon payment details, day count conventions, and the frequency of coupon payments. To better understand the income approach, a brief example is provided with the valuation of a loan having the following terms:

*Table 1 - Example of term loan*

| Type | Term Loan First Lien |
|---|---|
| Principal Amount | €100M |
| Issuing Company | MM Company |
| Interest Rate | SOFR + 3.00% |
| Amortisation | Bullet |
| Maturity Date | 31/12/2026 |
| Issue Date | 30/06/2021 |
| Payment Date | Semi-annually |

| | |
|---|---|
| Call Protection | None |
| Financial Covenants | None |
| Day Count Convention | ACT/360 |
| Valuation Date | 30/06/2021 |

| | 31/12/2021 | 30/06/2022 | 31/12/2022 | 30/06/2023 | 31/12/2023 | 30/06/2024 | 31/12/2024 | 30/06/2025 | 31/12/2025 | 30/06/2026 | 31/12/2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Outstanding Principal Balance | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € | 100,00 € |
| Reference rate | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% |
| Cash Margin | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% |
| ***Interest rate*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** | ***8,5%*** |
| Days outstanding | 184,00 | 181,00 | 184,00 | 181,00 | 184,00 | 182,00 | 184,00 | 181,00 | 184,00 | 181,00 | 184,00 |
| Coupon | 4,34 € | 4,27 € | 4,34 € | 4,27 € | 4,34 € | 4,30 € | 4,34 € | 4,27 € | 4,34 € | 4,27 € | 4,34 € |
| Repayment | | | | | | | | | | | 100,00 € |
| ***Total cash flow*** | ***4,34 €*** | ***4,27 €*** | ***4,34 €*** | ***4,27 €*** | ***4,34 €*** | ***4,30 €*** | ***4,34 €*** | ***4,27 €*** | ***4,34 €*** | ***4,27 €*** | ***104,34 €*** |

*Figure 20 - Cash flow projections - Income Approach (€M)*

Considering the coupon rate of 8,5% composed of reference rate plus a margin (e.g, 3.5%) and the semi-annual payment of coupons, the lenders is entitled to receive €4,34M each 6 months and the reimbursement of the principal at the end of the loan (€100M).

- Step 2- Discount rate calculation: The projected cash flows are then converted to their present value equivalent utilizing a rate of return commensurate with the risk of achieving those cash flows. Choosing the discount rate depends on both company-specific and economic factors. Investors add a spread to the base rate, which can be estimated through a calibration process. If the original debt issuance represents a fair market transaction, the implied spread from the issuance price can be used as a reference. This spread should be regularly reviewed and adjusted to reflect current conditions when valuing the instrument on the valuation date.

  When determining the appropriate credit spreads, key considerations include:

  - The issuer's financial performance and credit metrics from the original investment date to the valuation date.
  - The issuer's operational performance compared to budget and initial expectations at the time of origination.
  - Changes in spreads and yields of relevant debt indices, such as the Merrill Lynch High Yield Bond Index and S&P LCD Loan Index.
  - Changes in spreads and yields of similar corporate loans and bonds deemed comparable to the investment.

*Table 2- Parameters and factors to consider for computing credit spread*

| Parameters | Factors to consider |
|---|---|
| Financial Performance | • Company is performing above underwriting expectations.<br>• Company is ahead of budget for the year. |
| Leverage Ratio | Leverage ratio of investment is considered below market. |
| Asset Coverage | Enterprise value and/or value of tangible assets has improved relative to the debt balance, resulting in loan-to-value metrics that are below observed market levels |
| Current Loan Terms | Currently receiving what is considered at market returns given the credit profile of the investment, supported through a comparison of the risk and return profile relative to that of similar recent market issuance. |
| Key Events | • Company recently issued a pari passu security with pricing consistent with subject security being valued.<br>• Company is in the process of being sold, resulting in full repayment of the loan at par plus call protection, if any. |
| Composition of Benchmark Indices | Benchmark indices may have sizeable exposure to certain volatile industries (i.e. underlying oil and gas, retail). |

- Step 3 – Net Present Value Calculation: Once the above steps have been completed, the next step is to present value the cash flows and calculate the current value of the debt exposure.

| | 31/12/2021 | 30/06/2022 | 31/12/2022 | 30/06/2023 | 31/12/2023 | 30/06/2024 | 31/12/2024 | 30/06/2025 | 31/12/2025 | 30/06/2026 | 31/12/2026 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference rate | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% | 5,5% |
| Spread | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% | 6,7% |
| Discount rate | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% | 12,2% |
| Discount factor | 0,94 | 0,89 | 0,84 | 0,79 | 0,75 | 0,71 | 0,67 | 0,63 | 0,60 | 0,56 | 0,53 |
| Cash flows | 4,34 € | 4,27 € | 4,34 € | 4,27 € | 4,34 € | 4,30 € | 4,34 € | 4,27 € | 4,34 € | 4,27 € | 104,34 € |
| Discount factor | 0,94 | 0,89 | 0,84 | 0,79 | 0,75 | 0,71 | 0,67 | 0,63 | 0,60 | 0,56 | 0,53 |
| ***PV of cash flows*** | ***4,10 €*** | ***3,81 €*** | ***3,65 €*** | ***3,39 €*** | ***3,26 €*** | ***3,04 €*** | ***2,90 €*** | ***2,70 €*** | ***2,59 €*** | ***2,40 €*** | ***55,37 €*** |

| **Value of the loan** | **87,22 €** |
|---|---|

*Figure 21 - Net Present Value Calculation (€M)*

In our example, the discount rate was estimated as reference rate + 6.71% (i.e., the implied spread) leading to a market value of the lean equal to €87,22M (below par value). The spread on the discount rate is higher than the interest rate used to calculate coupon payments to account for higher risk factors embedded in the loan.

b) Net Recovery Approach – If a fair value assessment demonstrates that a loan is no longer performing or expected not to be completely recovered under the legal terms established in the term sheet, the net recovery approach should be used to compute the fair value of the loan.

The methodology used in this approach is to compute a waterfall on the enterprise value of the asset under scrutiny. Firstly, enterprise value or collateral value is computed using a market approach (e.g., multiples) or income approach (e.g., DCF). A waterfall of liquidating cash flow is applied to the estimated value, and debt tranches are valued on the amount recoverable based on the EV assignable to the debt tranche. Below, it is possible to find an example of the net recovery approach used to value an underperforming loan where EV is lower than total liability.

| Net recovery approach | Amount | % recoverable |
|---|---|---|
| Enterprise Value | € 80 | |
| Less | | |
| First Lien | € 70 | 100% |
| Second Lien | € 50 | 20% |
| **Excess/ (Deficit)** | **-€ 40** | |
| Implied value of second lien | € 10 | |

| Outstanding Debt (book value) | |
|---|---|
| First Lien | € 70 |
| Second Lien | € 50 |

*Figure 22 - Example of application of the Net Recovery Approach (€M)*

In the example provided, the company has an actual EV of €80M and has, as sources of funds, a first lien loan with book value equal to €70 and a second lien equal to €50. As the first lien loan is senior to the second lien, the second lien loan is not fully recoverable as EV's amount available after repaying the more senior first lien is only €10. Ultimately, only 20% of the second lien loan can be recovered.

c) Liquidation approach: When an issuer is in bankruptcy, liquidation analysis shall be used to estimate the value of the security. Contrary to the traditional approach, where assets are estimated on a fair value basis, in a liquidation approach, assets are deeply discounted to include the cost of liquidation. The example provided below illustrates how to use the liquidation approach for companies in bankruptcy procedure.

| Assets | Book value | Recovery rate | Recoverable amount |
|---|---|---|---|
| Short-term investments | 5 | 100% | 5 |
| Accounts receivable | 10 | 80% | 8 |
| Inventory | 20 | 85% | 17 |
| PPE | 100 | 50% | 50 |
| Intangibles | 50 | 40% | 20 |
| Goodwill | 15 | 0% | 0 |
| ***Total assets*** | ***200*** | | ***100*** |

| | |
|---|---|
| Book value of assets | 200 |
| Liquidation value of assets | 100 |
| ***Discount rate*** | ***50%*** |

| | Value | Coverage |
|---|---|---|
| Total recoverable value | € 100 | |
| First lien | € 90 | 100% |
| Second lien | € 50 | 20% |
| ***Surplus /(deficit)*** | ***-€ 40*** | |
| **Implied value of second lien** | **€ 10** | |

| Outstanding Debt (book value) | |
|---|---|
| First Lien | € 90 |
| Second Lien | € 50 |
| Outstanding debt | € 140 |

*Figure 23 - Application of liquidation approach (in €M)*

As provided in example in case of liquidation long-term assets may have lower recoverable rate (particularly for intangibles), whereas highly liquid assets (e.g., ST investments) might be completely recovered. After applying the recovery rate to the book value, liquidation value is equivalent to 50% of the book value (€100M). In this case, the second lien has a coverage ratio equal to 20% as after liquidating all assets previously owned by the company and repaying the first lien only €10M are available for the second lien borrower.

d) Broker Quotes: When evaluating credit exposure, broker quotes should be considered, especially when they are timely and reliable. Several factors help determine the reliability of a trade or quote, including:

- The date of issuance of the quote relative to the valuation date.
- The trading volume, as quotes for thinly traded securities may not accurately reflect fair value.
- The credibility of data sources

If broker quotes are unreliable or the security is not actively traded, assessing whether the loan is performing, or non-performing is important. In such cases, a supporting analysis, such as a yield analysis, might be helpful, mainly when the reliability of quote or trade data is uncertain. In practice, unreliable broker quotes are common, which can reduce the significance of the data they imply. When this occurs, alternative valuation methods must be used to estimate fair value.

e) Merton Option model: Merton showed that the Black-Scholes-Merton[6] option pricing formula can be applied in corporate credit valuation (Boulleys et al., 2023, Nesbitt, 2023). According to Merton, corporate lenders shall be considered as (i) a provider of a fixed amount of capital to the corporate borrower plus (ii) a seller of a put option receiving a premium and giving the borrower the right to repurchase the debt at maturity. Borrower's put option has value exclusively if value of corporate assets is less than value of corporate debt and debt can be settled in full by remaining corporate assets. In Merton's model, expected risk of default is absorbed by the corporate borrower through the premium cost of the put. Thus, principal value of debt becomes risk-free, and the interest is the risk-free rate as it is considered only as a compensation for the time value of money.

*Equation 3 - Black-Scholes-Merton formula for valuing loans*

$$Corporate\ Debt = Xe^{-rT} - Put_0$$

$$where$$

$$X = value\ of\ debt\ at\ maturity$$

[6] The Black-Scholes-Merton (BSM) model is a mathematical model used to price European-style options. It assumes a constant volatility, no arbitrage, and continuous trading, deriving the option price based on underlying asset dynamics modelled as a geometric Brownian motion. The formula allows to calculate the fair value of call and put options, accounting for factors like stock price, strike price, time to maturity, volatility, risk-free rate, and dividends.

$T = time\ to\ maturity$

$r = risk\ free\ rate$

$Put_0$

$= value\ of\ a\ put\ option\ at\ T\ on\ corporate\ value\ at\ exercise\ price\ equal\ to\ X$

Starting from Equation 3, Merton also proposed a mathematical equation to compute the implied credit risk premium:

*Equation 4 - Credit risk premium using Black-Scholes-Merton model*

$$Credit\ premium = R - r = -\frac{1}{T} l\, n\left\{\Phi(h_2) + \frac{1}{d}\Phi(h_1)\right\}$$

$R = yield$

$r = risk - free\ rate$

$\sigma = standard\ deviation\ of\ firm\ assets$

$\Phi = cumulative\ normal\ distribution\ function$

$$d = \frac{debt(e^{-rT})}{Total\ Assets} \approx present\ value\ of\ debt\ to\ assets \approx strike\ price$$

$$h_2 = -\left[\frac{1}{2}\sigma^2 T + \ln(d)\right] / \sigma\sqrt{T}$$

$$h_2 = -\left[\frac{1}{2}\sigma^2 T + \ln(d)\right] / \sigma\sqrt{T}$$

The terms within the brackets represent a weighted average of the current asset coverage ratio (expressed as $\frac{1}{d}$) for $h_1$and of an asset coverage ratio of 1.0 for $h_2$, which corresponds to the default threshold. The weights $h_2$ and $h_1$ are determined by time to maturity, the firm's risk, and the level of indebtedness with respect to total assets. As the debt increases, more emphasis is placed on the debt coverage ratio. The first term $\frac{1}{T}$ represents the amortization of the credit premium over the duration of the loan.

## 3.5. Complementary Factors to Consider before Investing in Private Debt

Other key elements need to be considered to refine the investment decision when deciding whether to invest in a specific private debt opportunity.

a) Price-to-NAV ratio: NAV is the value of an investment fund obtained by subtracting total liabilities from total assets. Private debt funds collect money from different investors and use them to invest in loans across different strategies. To value NAV, managers compute the value of each loan managed by the fund, calculating the total asset value. By subtracting total liabilities, it is possible to obtain the NAV. Usually, loans are valued quarterly by the private debt funds and annually by an independent valuation firm to ensure the correctness of valuations made by the fund. The best practice would be for the independent valuation firm to make quarterly valuations, but an annual independent review is usually accepted because of costs and difficulties. When investing in Business Development Companies, which are the primary vehicle retail investors use to invest in the private debt asset class, the price-to-NAV ratio is crucial to have a proxy of the current level of BDC market price compared to its intrinsic value. The price-to-NAV ratio is equal to the market capitalization of the BDC divided by the NAV. If the ratio is high, the BDC may be overvalued and eliminated or underweighted from the portfolio. In contrast, if the ratio is low, it could be a sign that the BDC is undervalued, making it an attractive investment opportunity (Bergsagel, 2019).

b) Leverage: Leverage is used by private debt funds to enhance returns for GPs and LPs by reducing the amount of equity used as a source of funds (Guggenheim, 2024). Unlike private equity funds, private debt funds use leverage in lower terms, ranging from no leverage to 2.0x net asset value. Higher leverage levels, up to 2.0x, are utilized for senior secured loans to boost returns, whereas riskier and more sophisticated strategies are not well-suited to high leverage levels. To finance their investments, private debt funds rely on different financing strategies (Nesbitt, 2023). First, it is possible to use a subscription line, in which banks and insurance companies lend to BDCs or private partnerships against their undrawn committed capital; through this way of financing, funds can easily obtain capital on reasonable terms based on their size and creditworthiness; in addition, direct lenders can enter into a revolving credit facility (“RCF”) agreement, which is usually provided by a

syndicate of banks and insurance and guaranteed using a loan portfolio as collateral. Contrary to a subscription line, the RCF is usually a long-term agreement with 4-5 years of maturity; thirdly, private credit funds can use a special purpose vehicle (SPV), which is a lending vehicle secured by loans placed as collateral in the SPV; lastly, large BDC's asset managers can issue public fixed rate debt as administration costs and fees to originate these transactions are high and only a sufficiently big issuer can sustain them.

c) Track Record: Track record refers to the historical capability of a private equity fund to create returns from investments. Having the ability to generate strong returns consistently is crucial for fund managers to attract new investors and retain LPs who have already invested in previous vintages of the fund. According to research by BAI (2021), a strong track record of investment is positively correlated with the performance of funds raised in the future. Apart from the magnitude of returns, another crucial point is the consistency of these returns. Funds with several vintages of the funds showcase a higher future performance. This empirical evidence highlights that experience in sourcing and executing investments creates crucial expertise and know-how to extract maximum value from investments. In the case of public BDCs, data about track records must be disclosed by direct lenders operating with this legal structure. On the contrary, private funds do not make detailed performance breakdowns available—consequently, only private debt funds organized as BDCs disclose information about their track records.

Having investigated in depth not only the main trends of private debt and its characteristics but also the key terms, valuation methodologies, and other factors to consider when investing in private debt, our analysis is equipped with the toolkit needed to understand how to make profitable investments in private debt as investors. In this regard, the next chapter will focus on evaluating and back-testing the performance of direct lending strategies under different conditions in a multi-asset portfolio, benchmarking their returns with those of similar asset classes. Our point of view is the one of institutional and retail investors who do not have access to large GPs but want to invest in this asset class. As this chapter briefly anticipated, we will use BDCs, the easiest way to access private debt. The objective of the empirical analysis will be to understand if private debt as an asset class generated strong performances, as depicted by

its supporters, or if “standard” fixed-income instruments are still more convenient in a diversified portfolio.

# 4. Dataset Development and Empirical Analysis

Previous chapters have explored the evolution of private debt and the factors driving its growth as an asset class, particularly the rise of direct lending. This chapter shifts focus towards empirical analysis, aiming to assess the performance of direct lending as an investment strategy. Given the relatively recent expansion of private debt and the limited availability of publicly accessible data, the development of a comprehensive dataset is critical to understanding how private debt strategies, particularly direct lending, perform within diversified portfolios and relative to other asset classes.

This chapter will begin with an exploration of the methodologies used to measure the returns of private debt investments in the current literature, followed by the construction of a BDC or Direct Lending Index using data from publicly traded Business Development Companies (BDCs) in US. The performance of direct lending as an asset class will be assessed through both risk and return metrics, providing valuable insights into its role in institutional and retail portfolios. This chapter aims to offer a deeper understanding of direct lending's place within the broader landscape of investment strategies.

## 4.1. How to Measure Returns of Private Debt Investments

The empirical analysis in this chapter aims to understand the performance of direct lending investment strategy in a diversified portfolio under different scenarios.

Given the recent expansion of private debt investments and the low availability of public data from private debt funds, measuring private debt returns is complex and time-consuming. Research on returns of this asset class is restricted to a few examples as interest in this subject has only recently emerged.

Nonetheless, some scholars have started developing methodologies for analyzing the returns of private debt performance, relying on different methods and data providers.

According to Nesbitt (2023), private debt returns can be divided into three main components:

a) Income return is composed of interest payments derived from contractual obligations of the borrower and from price discounts that lenders might receive when they originate the loan. Apart from interest income, private debt lenders who originate in-house the

transaction between themselves and the borrower obtain transaction fees in the form of a discount on the origination of the loan.

b) Unrealized gains (or losses) represent changes in loan valuations certified by independent valuation firms. They are considered to reflect changes in the valuation of the loan portfolios because of changes in yield spreads or changes in credit risk premium entailed in loans in the portfolio. Even if income returns account for a significant portion of returns of private debt lenders, especially in long-term, short-term returns may be heavily impacted by unrealized gains or losses.
c) Realized losses (or gains) usually include losses originated by specific loan defaults or write-downs. In particular, this component reflects losses/gains from completed transactions. In the case of a portfolio of loans, losses are due to write-downs of the principal of loans resulting from borrower defaults.

Realized and unrealized gains (or losses) are bounded together in the exact mechanism of recognition that is divided into the following phases:

a) Every quarter, an independent valuation firm makes a fair value assessment of the value of the loan, considering the probability and size of potential loan losses.
b) Price changes in the broader traded markets give expectations and market sentiment about trends in loan valuation, future yields, and impairments.
c) Quarterly changes in valuation create unrealized losses (gains), causing a discrepancy between fair (or market) value and book (or cost) value. Usually, the fair value will be below book value to reflect worsening in loan conditions (e.g., higher risk of default)
d) Unrealized losses usually materialize before actual loan impairments as the certainty of losses increases as default approaches.
e) The default creates a realized loss that is a permanent reduction in the cost value of the loan.
f) Realized loss replaces existing unrealized loss through an offsetting unrealized gain. The new unrealized gain should equal the prior unrealized loss if the default were perfectly anticipated.
g) Over time, investors observe an accumulation of net realized losses, and the number of defaults increases. Realized losses can be compared to lose rates reported by rating agencies and banks for high-yield bonds and bank loans.
h) Unrealized losses tend to build in early stages of credit reduction and reverse in later stages as realized losses from defaults increase.

The three measures detailed above and the relationship between unrealized and realized losses are crucial to valuing effectively loan performance. However, obtaining these data is complex for investors and researchers, given the confidentiality and lack of disclosure of private investors' transactions, data availability is low.

To cope with the difficulty in finding exhaustive information, scholars investigating private debt funds' performances rely on different methodologies to obtain an accurate estimate of private debt loans' performances.

In particular, to obtain data about private debt funds, researchers have two prominent data sources: proprietary data and public data from Business Development Companies (BDCs). Both options present unique advantages and disadvantages that make them suitable for different aspects of academic research.

Proprietary data is sourced directly by financial data providers specialized in private markets (e.g., Preqin, Burgiss) from institutional investors, fund managers, or general partners. This data is often confidential, with detailed information provided under strict agreements.

Using proprietary data sources grant specific advantages:

a) Data Completeness: Proprietary datasets include comprehensive information such as cash flows, IRRs, and multiples for individual transactions.
b) Granularity: These datasets offer detailed insights into loan terms, borrower characteristics, and risk mitigation measures, allowing for focused analyses.
c) Anonymization: Data is typically anonymized, protecting the identities of investors and funds while maintaining high-quality insights.
d) Scope: Proprietary data can cover specific strategies such as sponsor-less deals, mezzanine debt, or distressed debt, making it highly relevant for focused research questions.
e) Quality Assurance: Proprietary datasets are often audited to ensure accuracy and consistency. This feature makes them particularly valuable for studies requiring reliable performance metrics.
f) Net-of-Fees Returns: Such data reflects net-of-fees returns, providing a realistic measure of investor experiences and returns.

Among the main limitations and disadvantages it is possible to note:

a) Limited Accessibility: Accessing proprietary data can be challenging and often requires non-disclosure agreements or expensive subscriptions.
b) Bias Potential: Institutional investors' reliance on voluntary reporting can introduce selection bias, as poorly performing funds may choose not to disclose their data.
c) Cost: Acquiring proprietary datasets typically involves significant financial investment, limiting accessibility for smaller research projects.

Munday et al. (2018) utilized Burgiss data to evaluate direct lending fund performance. Burgiss is a data provider with broad and comprehensive coverage of institutional investors' private debt investment portfolios relying on information disclosed by limited partners and accounting disclosures. Their sample encompassed North American and global direct lending funds, emphasizing realized investments during the study period. To ensure the robustness and correctness of the data sample, the sample included only funds with vintages ranging from 2004 to 2016, excluding funds without a complete performance track record up to the analysis date. The study incorporated only fully realized cash flows to eliminate biases from unrealized valuations and to focus on observable outcomes.

For his research, Nesbitt (2019, 2023) relied on the proprietary corporate loans index constructed by Cliffwater Direct Lending Index (CDLI), representing over $224 Billion in direct loans covering 8000+ loans from 111 individual public and private BDCs managed by large US asset managers. Loans captured in this methodology are a comprehensive subset of the direct lending universe, representing approximately 25% of the total direct lending AuM.

Boni and Manigart (2022) utilized data from 448 PD funds from Preqin raised between 1996 and 2018, managed by 94 GPs. Böni and De Roon (2023) refined the previous research of Boni (2022), constructing a more comprehensive sample of private debt funds across various strategies, including direct lending, mezzanine, and distressed debt, using Preqin's database. The dataset used comprised PD fund-level cash flows, which were utilized to compute quarterly returns, obtaining a total of 10,912 quarter fund returns over 62 quarters (i.e., ~16 years)—the analysis comprised the performance of private debt funds both in absolute terms and relative to public market factors.

Buchner (2023) focused its studies on the performance and risk of sponsored versus sponsor-less private debt investments, collecting data on individual private debt deals invested between 1982 and 2015 in companies operating in the US, Canada, and Europe. Data were obtained by the private market consulting firm CEPRES, which owns a database of over 40,000

investments worldwide, including private equity, private debt, venture capital, and growth capital deals.

Jang (2024) used a database for loans held by direct lenders provided by an anonymous valuation advisory specialized in direct lending valuations. Proprietary data includes information about financial statements, loan agreements, covenant compliance, and the restructuring history of primarily PE-backed middle-market borrowers. The database covered over 3,000 PE-backed firms between 2013 and 2021, including nearly half of all BDC-reliant PE-backed firms.

On the other hand, some researchers have relied on public data from BDC to study private debt performance. As already discussed in previous chapters, BDCs are publicly traded entities required to disclose detailed financial and operational data under SEC regulations. These disclosures provide an alternative, accessible data source for private debt research.

The main advantages of using BDCs to evaluate performances of direct lending investments are:

a) Transparency: BDCs are mandated to file detailed quarterly and annual reports (e.g., Forms 10-Q and 10-K), which include information on loan schedules, fair values, and borrower profiles.
b) Accessibility: Data from BDCs is publicly available, often through the SEC EDGAR database or company websites, making it highly accessible and cost-free.
c) Real-Time Market Insights: BDC filings offer up-to-date information on market dynamics, such as default rates and portfolio performance.
d) Focus on Middle Market: BDCs specialize in middle-market lending, providing valuable insights into this critical private debt segment.
e) Regulatory Scrutiny: Public disclosures are subject to regulatory oversight, ensuring a baseline level of accuracy and reliability.

By using BDCs public data researchers and scholar may incur in the following issues:

a) Moderate Granularity: While detailed, BDC data often lacks the depth of proprietary datasets, particularly regarding specific loan terms or borrower characteristics.
b) Limited Scope: The data focuses primarily on middle-market lending, potentially excluding other important strategies like mezzanine or distressed debt.

c) No Net-of-Fee Adjustments: Unlike proprietary data, BDC filings may not reflect net-of-fee returns, requiring additional calculations to assess investor outcomes accurately.
d) Aggregation: BDCs' financial disclosures may aggregate loan data, limiting the ability to perform deal-level analyses.

Research by Davydiuk (2024) utilized publicly available data on investments from Business Development Companies to study the development of direct lending in the US middle market. The sample comprises a total of 69 BDCs, about 10,000 portfolio firms, and over 20,000 individual debt investments using quarterly data from 2001 to 2007.

Suhonen (2023) utilized BDCs over the period spanning from 2009 to 2022 using 47 listed BDCs, creating a time series of total returns using market prices, including dividends based on both market values and reported net asset values.

| **Aspect** | **Proprietary Data** | **BDC Public Data** |
|---|---|---|
| **Data** | Includes cash flows, IRRs, and multiples | Loan schedules, fair values, borrower profiles |
| **Granularity** | High (detailed loan terms, risk mitigation) | Moderate (aggregated borrower and loan details) |
| **Anonymization** | Anonymized, protecting identities | Publicly disclosed, full transparency |
| **Scope** | Covers specific strategies like sponsor-less deals | Focused on middle-market lending |
| **Quality Assurance** | Audited and verified | Subject to regulatory oversight |
| **Accessibility** | Restricted, often expensive | Freely accessible through public filings |
| **Net-of-Fees Returns** | Reflects net-of-fees performance | Gross returns; requires adjustments |
| **Cost** | High (subscriptions, agreements) | Low to no cost |

*Figure 24 - Summary of advantages and disadvantages of using proprietary data vs BDC data*

Both data collection methodologies provide interesting features that fit different needs for scholars and researchers focused on analyzing private debt markets. Proprietary data is ideal for wide-in-scope analyses focused on private debt performance and offers a granular view

resembling that of private debt GPs. However, in our case, given the focus of the research on middle-market U.S. firms and our perspective as an investor willing to allocate funds to direct lending as an asset class, the public data from BDCs represents an effective alternative. The transparency and accessibility of BDC disclosures allow us to create an index based on BDC returns, enabling the construction of a portfolio that accurately represents the performance of direct lending to middle market in the US. This approach aligns with our goal of analyzing direct lending as a distinct and investable asset class while leveraging the real-time market insights and accessibility of public data from BDCs.

## 4.2. Direct Lending Index Construction Using Public Business Development Companies

This study investigates the performance of direct lending as an asset class through the creation of a Business Development Company or Direct Lending Index ("BDC Index"). The analysis leverages financial data spanning 60 months from 26 distinct BDCs publicly quoted on the US stock market to construct an equal-weighted index, which serves as a proxy for direct lending performance. The methodology is structured as follows:

A time series of monthly prices was downloaded from Yahoo Finance, a reliable and widely used public source for historical financial data. The choice of Yahoo Finance ensures data consistency and availability across all 26 BDCs over the analysis period. The data were obtained by using month-end closing adjusted closing prices between 31st July 2019 and 31st July 2024.

The chosen sample follows some rules to:

a) The 26 BDCs were chosen to create a good match between specialized BDC companies and large alternative asset managers.
b) 60 months were taken as it is considered to be a time sufficient to capture a business cycle and to reduce the potential impact of firm-specific events.
c) The primary input used for computing returns and structuring the analysis is the adjusted closing price, which reflects the most accurate measure of a security's value by incorporating adjustments for corporate actions such as stock splits, dividends, and other distributions. Using adjusted closing prices ensures that returns account for the full effect of these actions, providing a precise proxy for the actual returns realized by investors. The adjusted closing price is an essential proxy for returns because it accounts for all corporate actions that affect the actual returns experienced by investors. Unlike raw closing prices, adjusted prices incorporate:
    a. Dividends and Distributions: Ensuring the impact of income generated by the BDCs is included.
    b. Stock Splits and Consolidations: Reflecting the impact on the share value and keeping prices comparable over time.

In the following table it is possible to find the cumulative returns and annualized monthly returns of the BDCs included in the sample in the timeframe considered.

| # | BDC name | Ticker | Cumulative Returns | Annualized Monthly Return |
|---|---|---|---|---|
| 1 | OFS Capital Corporation | OFS | 42.2% | 7.3% |
| 2 | Fidus Investment Corporation | FDUS | 115.0% | 16.5% |
| 3 | Barings BDC, Inc. | BBDC | 59.1% | 9.7% |
| 4 | Ares Capital Corporation | ARCC | 82,2% | 12.7% |
| 5 | Carlyle Secured Lending, inc. | CGBD | 124.0% | 17.5% |
| 6 | Prospect Capital Corporation | PSEC | 44.0% | 7.6% |
| 7 | Sixth Street Specialty Lending, Inc. | TSLX | 91.6% | 13.9% |
| 8 | Golub Capital Inc. | GBDC | 36.0% | 6.3% |
| 9 | FS KKR Capital Corp | FSK | 78.4% | 12.3% |
| 10 | Monroe Capital Corporation | MRCC | 23.8% | 4.4% |
| 11 | Goldman Sachs BDC, Inc, | GSBD | 29.5% | 5.3% |
| 12 | Bain Capital Specialty Finance, Inc. | BCSF | 60.5% | 9.9% |
| 13 | BlackRock TCP Capital Corp. | TCPC | 29.6% | 5.3% |
| 14 | Capital Southwest Corporation | CSWC | 125.3% | 17.6% |
| 15 | SLR Investment Corp. | SLRC | 24.0% | 4.4% |
| 16 | New Mountain Finance Corporation | NMFC | 48.7% | 8.3% |
| 17 | MidCap Financial Investment Corporation | MFIC | 59.0% | 9.7% |
| 18 | PennantPark Floating Rate Capital Ltd. | PFLT | 62.0% | 10.1% |
| 19 | Main Street Capital Corporation | MAIN | 75.0% | 11.8% |
| 20 | Hercules Capital, Inc. | HTGC | 188.0% | 23.6% |
| 21 | Gladstone Capital Corporation | GLAD | 96.0% | 14.4% |
| 22 | Gladstone Investment Corporation | GAIN | 105.0% | 14.9% |
| 23 | Pennant Park Investment Corporation | PNNT | 95.0% | 14.3% |
| 24 | WhiteHorse Finance, Inc. | WHF | 55.0% | 9.2% |
| 25 | Horizon Technology Finance Corporation | HRZN | 57.2% | 9.5% |
| 26 | Saratoga Investment Corp. | SAR | 42.0% | 7.3% |

*Figure 25 - BDC returns and volatility*

*In the graph below, it is possible to find the histogram with the distribution of returns for all the BDCs analyzed and plotted using Python. The median value of monthly returns in the panel analyzed was equal to 1.0%, whereas the average monthly return of BDCs was equal to 1.3%. The distribution of returns is lightly left-skewed with fat tails compared to a normal distribution, with both extreme losses and gains appearing more frequently. High kurtosis indicates that BDC returns may be heavily impacted by extreme events (e.g., the COVID-19 outbreak).*

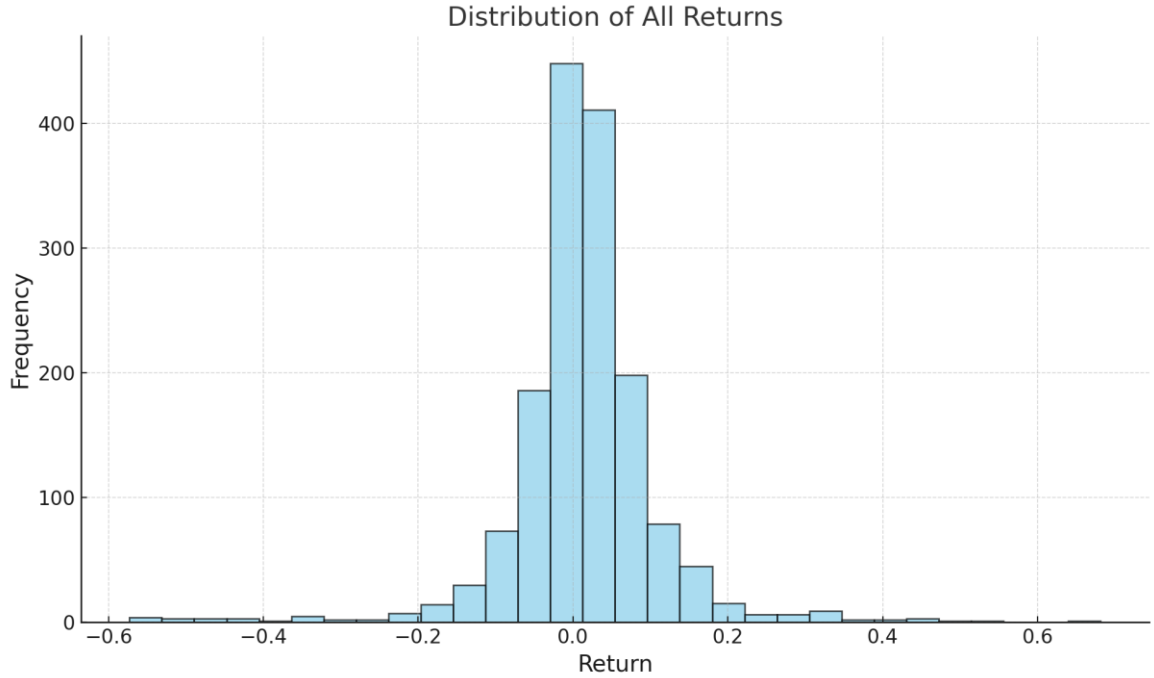


*Figure 26 - BDC distribution of returns*

The graph below plots the cumulative monthly returns of BDCs in % starting from t=0 equivalent to 31 July 2019 until the final observation happened on 31 July 2024. Approximately at t=7 most BDCs explained a steep drop in their value due to the breakout of Covid-19 and the subsequent lockdowns that shutdown a huge portion of economic activities. Considering that BDCs are mainly composed of loans to middle-market corporations, the reduction was severe as small and mid-cap corporates are usually more exposed to default and insolvency risks compared to large corporates.

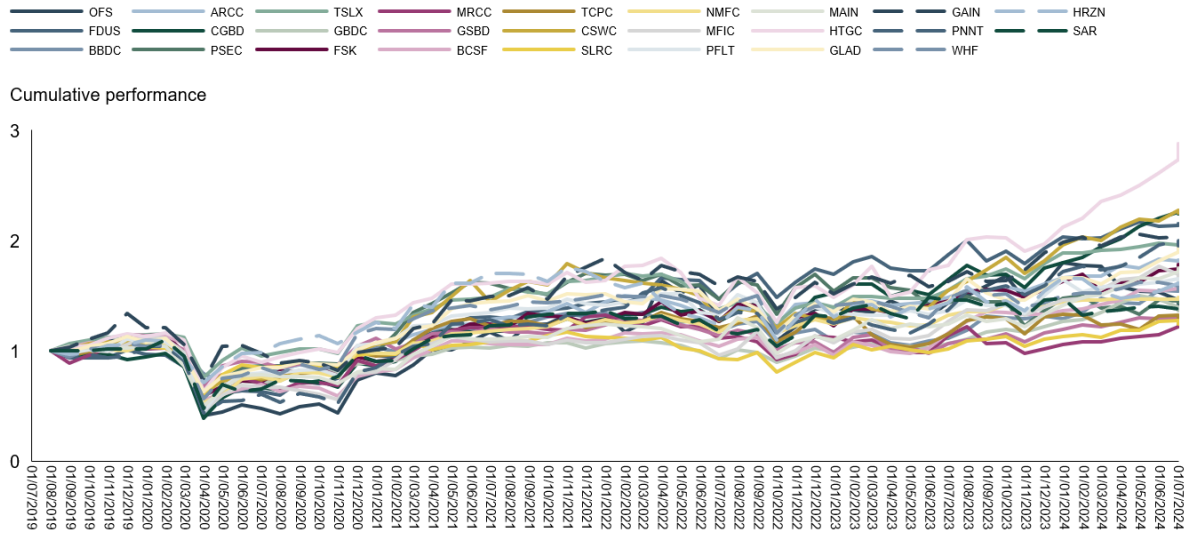


*Figure 27 - Cumulative performance of BDCs*

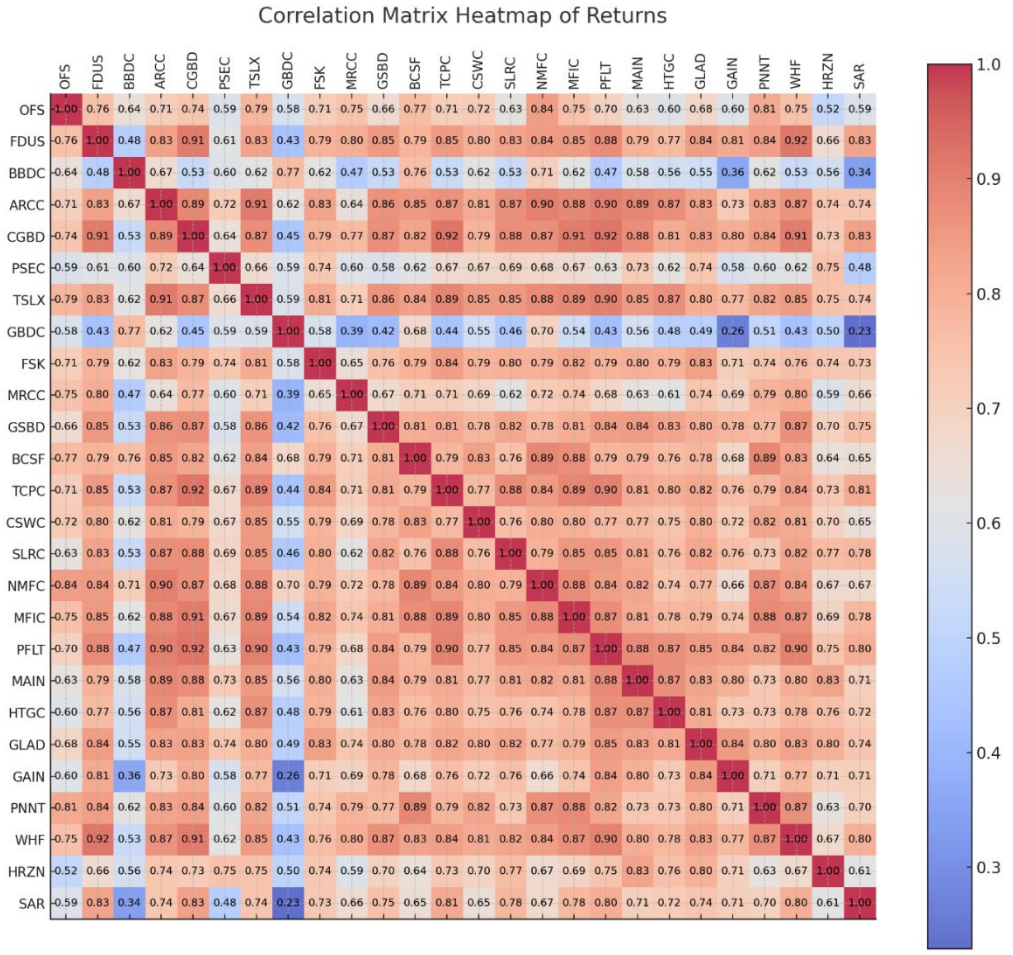


*Figure 28 - Correlation matrix between BDCs*

The heatmap above allows the visualization of the correlation matrix between all 26 BDcs considered in the sample highlighting in red boxes the more correlated BDCs, where 1.0 represents the maximum value of correlation, whereas blue areas depict fund where correlation was lower. The range of correlation coefficient was between 1.0 and 0.23 indicating that all BDCs demonstrate positive correlation among each other considering the composition of their portfolios which include mainly private loans issued to middle market companies.

After having analyzed the sample, in order to finalize the analysis, it is needed to highlight thoroughly the objectives and methodology used to create the BDC index and analyze its behavior.

The primary rationale used was to create a buy-and-hold equal-weighted portfolio, where each BDC contributes equally to the portfolio performance, irrespective of its size or market capitalization. The steps involved in constructing the index are as follows:

a) Monthly returns for each BDC were computed using the adjusted closing prices with the formula:

*Equation 5 - Monthly returns*

$$Monthly\ Return_t = \frac{Price_t - Price_{t-1}}{Price_{t-1}}$$

b) Equal-Weighted Return Aggregation:

The equal-weighted return for the index in each month was calculated as the mean of all individual returns:

*Equation 6 - Index Return*

$$Index\ Return_t = \frac{\sum_{i=1}^{N} Return_{i,t}}{N}\ \ where\ N = 26\ (number\ of\ BDCs)$$

c) Cumulative Index Construction:

The index's value was initialized at 100 and updated iteratively as:

*Equation 7 - Cumulative Index Value*

$$Index\ value_t = Index\ value_{t-1} * (1 + Index\ return_t)$$

In constructing the BDC index, a buy-and-hold equal-weighted approach was chosen to reduce some of the inherent biases and limitations associated with traditional market capitalization-weighted indexes and to avoid the theoretical high transaction costs associated with continuous portfolio rebalancing. This methodological decision provides a more balanced representation of the performance and risk characteristics of the included BDCs, aligning better with the objectives of academic research to represent a method for retail and institutional investors to access the direct lending asset class though public markets.

In particular, an equal-weighted index assigns the same importance to each constituent, regardless of its size or market capitalization. This approach offers several distinct advantages, particularly for investments in BDCs:

a) Focus on Diversification:

Equal weighting reduces concentration risk, where a few large companies disproportionately influence the index (Bellucci & Gunzberg, 2018). By giving equal importance to all BDCs, the index captures the performance of the entire asset class more comprehensively.

b) Representation of Smaller BDCs:

Equal weighting enhances the representation of smaller or mid-cap BDCs, which might otherwise have minimal impact in a market-cap-weighted index. This is particularly relevant for BDCs, as smaller entities may capture unique growth opportunities or niche investment strategies, offering a more valuable investment strategy to capture the performance of direct lending as an asset class.

c) Long-term perspective:

Contrary to equal weighted rebalancing, the buy-and-hold approach fosters a disciplined, long-term investment perspective. By avoiding frequent rebalancing, this strategy reduces the influence of emotional biases, such as overreacting to short-term market volatility.

d) Tax and Cost Efficiency:

By minimizing portfolio adjustments, the strategy limits the realization of taxable events and transaction costs. This tax efficiency is particularly beneficial in jurisdictions with capital gains taxes such as the United States. Additionally, avoiding rebalancing eliminates costs associated with transaction fees and bid-ask spreads, preserving long-term wealth. This benefit is

particularly useful for retail investors who may not have the possibility to incur in high transactions involved in rebalancing strategy.

After constructing the index, in coherence with the aim of the methodological approach implemented, it is necessary to analyze risk-adjusted performances of the indexes standalone to better study the behavior and characteristics of direct lending as an asset class. To achieve this objective the following indicators for the BDC index were computed to analyze risk-adjusted performances:

### *1) Annualized returns*

In portfolio management, annualized returns are used to measure the performance of a portfolio over a given period of time an average annual growth rate. To compute annualized returns starting from monthly returns collected the following formula was used:

*Equation 8 - Annualized Return*

$$Annualized\ return = \left(\prod_{t=1}^{T}(1 + R_t)\right)^{\frac{12}{T}} - 1$$

Where:

$$R_t = monthly\ return\ at\ time\ t\ of\ the\ portfolio$$

$$T = end\ of\ the\ holding\ period$$

The cumulative annualized return was equal to approximately 11.3% with a cumulative return of the index equal to 71.1%. Below it is possible to find a table with the annualized return for each year analyzed:

| Year | Annualized Return |
|---|---|
| 2019[7] | 7.0% |
| 2020 | -7.2% |
| 2021 | 40.0% |
| 2022 | -8.2% |
| 2023 | 23.5% |
| 2024[8] | 15.1% |
| Cumulative compounded return | 71.1% |

*Figure 29 - Annualized returns BDC Index*

[7] Considering monthly returns from August 2019 to December 2019
[8] Considering monthly returns from January 2024 to June 2024

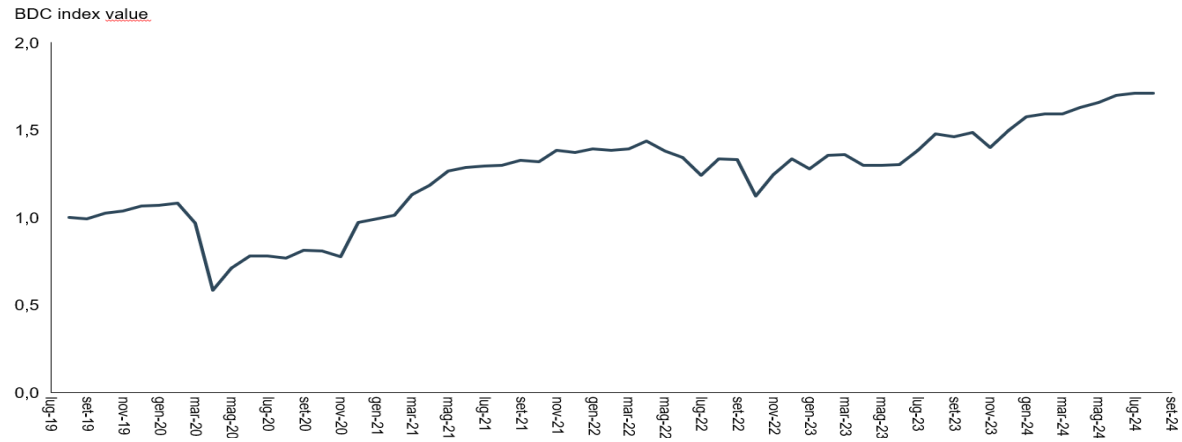


*Figure 30 - BDC index cumulative performance*

### *2) Annualized volatility (or standard deviation)*

According to the well-known theory of Markovitz (1952), volatility (or standard deviation) can be used as a proxy of portfolio risk. In the case of our portfolio, volatility was computed in annualized terms using monthly returns according to the following procedure.

Firstly, the monthly volatility was computed using the following formula:

*Equation 9 - Annualized volatility*

$$\sigma_{monthly} = \frac{\sqrt{\sum_{t=1}^{T}(R_t - \bar{R})^2}}{T-1}$$

Where:

$$R_t = return\ at\ time\ t\ of\ the\ portfolio$$

$$\bar{R} = annualised\ average\ return\ in\ the\ time\ period\ analysed$$

Then the monthly volatility was annualized according to the formula of annualization of volatility:

$$\sigma_{annualised} = \sigma_{monthly} * \sqrt{12}$$

The average annualized volatility was equal to 28.4%. In the following table it is possible to find the annualized volatility for each year analyzed:

| Year | Annualized Volatility |
|---|---|
| 2019[9] | 5.8% |

[9] Considering monthly returns from August 2019 to December 2019

| | |
|---|---|
| 2020 | 56.3% |
| 2021 | 12.5% |
| 2022 | 25.5% |
| 2023 | 15.0% |
| 2024[10] | 10.9% |

*Figure 31 - BDC index Annualized volatility*

### *3) Skewness*

Skewness is a statistical measure that describes the degree of asymmetry of a distribution around its mean. In a perfectly symmetric distribution (like a normal distribution), the skewness is zero. When a distribution is not symmetric, skewness can be either positive or negative. When skewness is positive (right-skewed), the right tail of the distribution is longer or fatter than the left tail. This means there are more extreme high values than extreme low values. When the distribution is negatively skewed, the left tail (lower values) of the distribution is longer or fatter than the right tail. This indicates more extreme low values than extreme high values. Skewness is computed using the following formula:

*Equation 10 - Skeweness*

$$S = \frac{T * \sum_{t=1}^{T}(R_t - \bar{R})^3}{(T-1) * (T-2) * \sigma^3}$$

Where:

$$R_t = return\ at\ time\ t\ of\ the\ portfolio$$

$$\bar{R} = annualised\ average\ return\ in\ the\ time\ period\ analysed$$

$$\bar{\sigma} = standard\ deviation\ of\ monthly\ returns$$

$$T = number\ of\ periods\ analysed$$

The skewness of the monthly returns for the BDC index is approximately -1.6, indicating a distribution that is moderately skewed to the left. This implies that the index returns have a longer tail on the negative side, suggesting a higher likelihood of extreme negative returns compared to positive ones.

[10] Considering monthly returns from January 2024 to June 2024

### *4) Kurtosis*

Kurtosis measures the "tailedness" of a distribution, indicating the likelihood and frequency of extreme returns.

*Equation 11 - Kurtosis*

$$K = \frac{T * \sum_{t=1}^{T}(R_t - \bar{R})^4}{(\sum_{t=1}^{T}(r_t - \bar{r})^2)^2}$$

where:

$$R_t = return\ at\ time\ t\ of\ the\ portfolio$$

$$\bar{R} = annualised\ average\ return\ in\ the\ time\ period\ analysed$$

$$\bar{\sigma} = standard\ deviation\ of\ monthly\ returns$$

$$T = number\ of\ periods\ analysed$$

Distributions of returns may be divided into 3 main cluster based on the level of their kurtosis:

If the value of kurtosis is <3, the distribution is defined as platykurtic (flat-topped distribution) indicating that it is difficult to find extreme values or outliers in return; a distribution having value around 3 is defined mesokurtic, which is the typical value of kurtosis for a normal distribution. Finally, a distribution characterized by kurtosis greater than 3 is leptokurtic having heavy tails and risk of frequent extreme events. In the case of our BDC Index kurtosis value was equal to 11.0 indicating that BDC portfolio has fat tails with significant tail risk to bear by investing in the asset class. This feature of BDCs is consistent with the extreme losses experienced during Covid-19 and the composition of asset held by BDC, which are mainly direct loans to middle market companies. Compared to large-cap and blue-chip companies, smaller companies tend to be less resilient during period of large financial crisis being more prone to experience default and liquidity risk. Jointly with high standard deviation and negative skewness, this demonstrates that the BDC portfolio may be risky in case of negative events.

### *5) Sharpe Ratio*

The Sharpe ratio is a widely used metric in finance that measures the risk-adjusted return of an investment portfolio or asset. It helps investors understand how much additional return they are earning for each unit of risk taken compared to a risk-free benchmark A positive value of

the ratio indicates that the portfolio generates returns greater than the risk-free rate, adjusted for its level of risk. Higher values are better, as they imply the portfolio creates higher returns per unit of risk. A negative value of the Sharpe ratio suggests that the portfolio's returns are worse than the risk-free rate, even after accounting for the risk. This often signals poor performance relative to the benchmark. A Sharpe ratio of 1 or higher generally indicates a good investment strategy. Ratios above 2 are often regarded as excellent investment strategy.

The formula is expressed as:

*Equation 12 - Sharpe Ratio*

$$S = \frac{\overline{R_p} - R_f}{\sigma_p}$$

Where:

$$\overline{R_p} = annualised\ return\ of\ the\ portfolio$$

$$\overline{R_f} = average\ risk - free\ rate\ of\ return$$

$$\sigma_p = annualised\ standard\ deviation\ of\ portfolio\ returns$$

To compute Sharpe Ratio, it was necessary to obtain time-series of monthly returns for the risk-free rate. To achieve this objective, monthly returns of the S&P U.S. Treasury Bill Index were used. This index can be used as a proxy to measure the performance of U.S. Treasury bills (T-bills) with maturities of equal to or less than one year. T-bills are short-term government securities issued by the U.S. Department of the Treasury and are considered one of the safest investments because they are backed by the full faith and credit of the U.S. government. Considering the volatile interest rate environment that characterized the time span analyzed, using an index with low duration and short maturity was fundamental to capture risk-free rate returns and to avoid biases introduced by changing interest rates.

Below it is possible to find a recap of the trend of the Sharpe ratios and its main components in the years considered:

| Year | Annualized return | Average Risk-free rate | Excess return | Standard deviation | Sharpe Ratio |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 2019 | 7.0% | 2.06% | 4.93% | 5.8% | 0.86 |
| 2020 | -7.2% | 0.72% | -7.87% | 56.3% | -0.14 |
| 2021 | 40.0% | 0.05% | 39.91% | 12.5% | 3.18 |
| 2022 | -8.2% | 1.35% | -9.55% | 25.5% | -0.37 |
| 2023 | 23.5% | 5.11% | 18.38% | 15.3% | 1.20 |
| 2024 | 15.1% | 5.35% | 11.43% | 10.9% | 0.89 |
| Annualized Cumulative | 11.3% | 2.22% | 9.75% | 28.4% | 0.32 |

*Figure 32 - Annual performances BDC index*

The annualized Sharpe ratio in the period analyzed was equal to 0.32. The value is below the threshold of 1, which is considered a value of an investment strategy having a good reward for a unit of excess risk taken. In 2021 and 2023, the portfolio highlights high Sharpe ratios (respectively 3.18 and 1.2), indicating the capability of direct lending to perform extremely well in good market conditions. On the other hand, high levels of standard deviations in volatile years (i.e., 2020 and 2022) had detrimental effects on the performance of the BDC index, negatively impacting the overall performance of the index.

Considering the standalone analysis carried out in this chapter, it is possible to conclude that the investments in business development companies and, as a consequence, in direct lending to US mid-market companies present the possibility of obtaining above-average returns but present some risks, particularly in periods of extreme volatility. To refine this hypothesis, in the next paragraph, the analysis will focus on comparing direct lending performances versus similar asset classes (i.e., high-yield bonds and leveraged loans). Finally, the analysis will move to understanding how direct lending as an asset class performs in a diversified portfolio also highlights limitations of the empirical analysis used.

## 4.3. Direct Lending Performances as an Asset Class in a Diversified Portfolio: Results and Limitations

This paragraph details the methodology employed to analyze the performance of direct lending, proxied by the BDC index, within diversified portfolios. The methodology follows a structured approach similarly to the previous paragraph, emphasizing data preparation, portfolio construction, performance measurement, interpretation of results and limitations of the analysis.

The analysis utilized financial time series data for six asset classes, including the BDC index as a proxy for US direct lending, High-Yield Bonds, Leveraged Loans, U.S. Treasury 10-Year Bonds, Cash, and the S&P 500. Data was sourced from provider of the index (e.g., S&P) and other financial data providers. The dataset consists of end of month adjusted closing prices spanning a consistent 60-month period enabled the creation different portfolio structures to execute the analysis. The 6 indexes that were used to compute portfolios and their performances are based on the following index:

1) BDC Index: Developed as explained in the previous paragraph.
2) The S&P U.S. High Yield Corporate Bond Index is a financial benchmark designed to measure the performance of the U.S. dollar-denominated, high-yield corporate bond market. High-yield bonds, often referred to as "junk bonds," are issued by corporations with below-investment-grade credit ratings. These bonds offer higher yields to compensate investors for the increased credit risk associated with the issuers. The index includes mainly fixed-rate corporate bonds that are rated below investment grade (BB+ or lower by S&P, or Ba1 or lower by Moody's). It was used as a proxy of performance of investing in US corporate high-yield bonds.
3) To benchmark US leveraged loans, the Morningstar Leveraged Loan Index was used. It is a financial benchmark that tracks the performance of the U.S. leveraged loan market. Leveraged loans are debt instruments typically issued by companies with higher levels of debt relative to their equity, making them non-investment-grade or "high-yield" instruments. These loans are generally syndicated and structured as floating-rate instruments, providing a hedge against rising interest rates.
4) S&P 500 Index is a benchmark designed to measure the performance of the 500 largest publicly traded companies in the United States by market capitalization. The index provides a representative overview of the U.S. equity market and is considered a key

indicator of overall market performance. Companies included in the S&P 500 span various sectors, including technology, healthcare, financials, and consumer goods, offering a broad view of the U.S. economy. Eligibility for inclusion requires companies to meet criteria such as market capitalization, liquidity, and fiscal domicile in the U.S., among others. The S&P 500 is often used as a benchmark for investors, mutual funds, and ETFs to compare and evaluate the performance of their portfolios. For the purpose of thesis, the index was used as a proxy of the performances of the US equity market.

5) The S&P U.S. Treasury 10-Year Index is designed to measure the performance and yield of 10-year U.S. Treasury securities. This index mirrors the market value of a portfolio of U.S. government-issued debt instruments with a constant maturity of 10 years, making it a key indicator of interest rate forecasts. The index serves as a benchmark for long-term interest rates and is commonly used by investors, policymakers, and analysts to track the cost of long-term borrowing, inflation expectations, and overall economic outlook. It is also a critical reference point for fixed-income investments, serving as a benchmark for pricing loans, mortgages, and other financial instruments.
6) The S&P U.S. Treasury Bill Index is a financial benchmark designed to mirror the performance of U.S. Treasury bills, which are short-term government debt securities with maturities of one year or less. Treasury bills (T-bills) are issued by the U.S. Department of the Treasury and are widely regarded as one of the safest investments. This index reflects the performance of T-bills across various maturities, such as 1-month, 3-month, 6-month, and 1-year instruments, providing insight into short-term interest rate trends and liquidity conditions in the financial markets. Yields of T-Bills serve as a proxy of the risk-free rate of return, which is fundamental component in asset pricing and corporate valuation. The S&P U.S. Treasury Bill Index is commonly used by investors and analysts as a benchmark for cash-equivalent investments and short-term fixed-income portfolios. In our research it was used as proxy of cash.

After downloading datasets, to ensure the complete readiness of the dataset actions of cleaning were implemented by removing missing values and standardizing date formats. Moreover, all inputs belonging to datasets were aligned to ensure consistent timeframes, avoiding discrepancies in temporal comparisons.

To properly understand the performances of the assets included in the portfolios, monthly returns for each index *i* were computed using adjusted closing prices with the formula:

*Equation 13 - Asset returns*

$$Return_{t,i} = \frac{Price_{t,i} - Price_{t-1,i}}{Price_{t-1,i}}$$

After time series of returns correlation among variables was computed to compare assets variability and interdependence to better study an optimal allocation of assets in the different portfolios using the following formula:

*Equation 14 - Correlation Coefficient*

$$r_{i,j} = \frac{covariance\ (i,j)}{\sigma_i * \sigma_j}$$

Where:

$$r_{i,j} = correlation\ coefficient\ between\ asset\ i\ and\ j$$

$$Covariance\ (I,j) =\ covariance\ between\ asset\ i\ and\ j$$

$$\sigma_i = \text{volatility for asset i}$$

$$\sigma_j = \text{volatility for asset j}$$

The correlation matrix for the 6 asset classes considered in the analysis was computed with the following results:

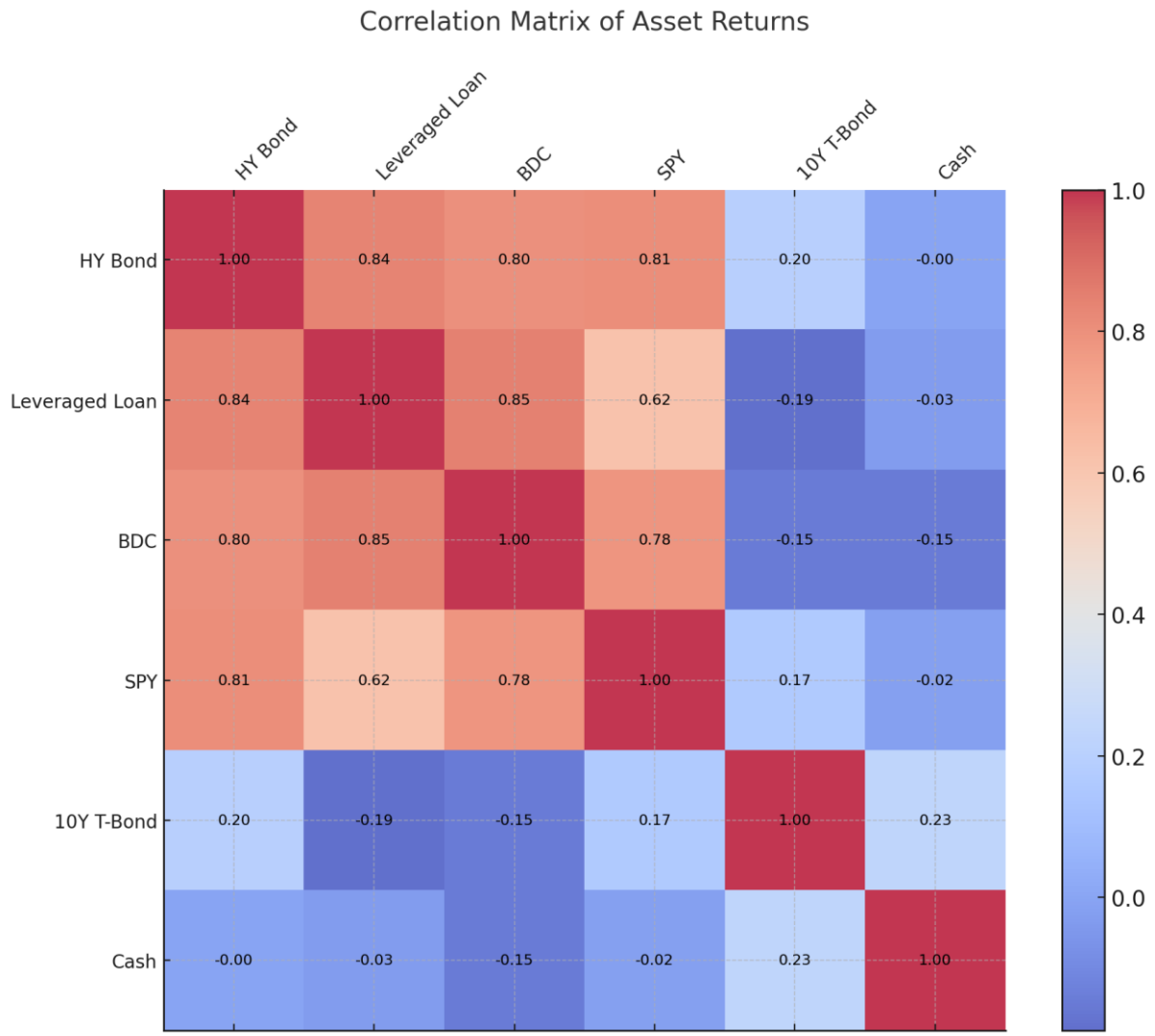


*Figure 33 - Correlation matrix between asset classes*

High-yield bonds, leveraged loans, and BDCs demonstrate strong positive correlations among each other, with values ranging between 0.80 and 0.85 indicating that these asset classes tend to move in the same direction. This feature reflects their shared sensitivity to credit market conditions and economic cycles. The correlation between BDCs and leveraged loans 0.85 is particularly significant, as both asset classes heavily invest in corporate loans and are predominantly composed of floating-rate instruments. This shared structural characteristic allows them to perform better than fixed-rate bonds in rising interest rate environment.

Furthermore, the BDC index exhibits a high correlation with the S&P 500, reflecting its dependence on economic performance and corporate earnings. As mid-market borrowers form the backbone of BDC portfolios, their success is interconnected with the overall economic health and growth, leading to a positive relationship with equity instruments.

Not surprisingly, the Cash index demonstrates correlations close to zero with other asset classes, underscoring its independence from broader economic cycles. This characteristic, coupled with its low volatility, makes cash an effective stabilizing component in a diversified portfolio.

The 10-year Treasury bond index has a negative correlation with BDCs and leveraged loans. This inverse relationship is explained by the sensitivity of Treasuries to rising interest rates, which negatively impact their valuations. In contrast, BDCs and leveraged loans, primarily composed of floating-rate loans, are more resilient to interest rate increases, as their interest payments for lenders adjusts upward in response to rising rates. This divergence highlights the contrasting behaviors of fixed-rate and floating-rate instruments in dynamic interest rate environments.

For each asset *i* an index with base 1 was constructed to better compare returns and volatility of the different asset class analyzed. The cumulative performance of each asset class was computed as follows:

*Equation 15 - Index Value*

$$Index\ value_{i,t} = Index\ value_{i,t-1} * (1 + Index\ return_{i,t})$$

In the graph below it is possible to see cumulative performances for each asset class:

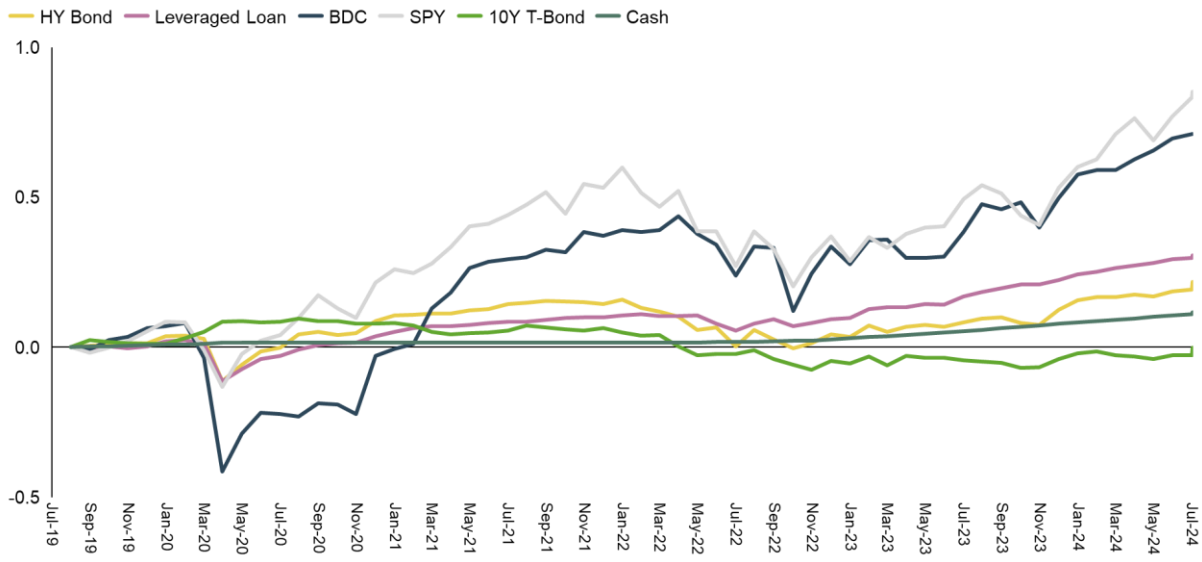


*Figure 34 - Cumulative Performances Asset Classes*

The cumulative performance of the assets highlights both the trends in their cumulative returns and their respective levels of volatility. BDCs and the S&P 500 exhibit similar patterns, characterized by high returns accompanied by significant volatility. However, the fluctuations in BDC performances are more pronounced, aligning with the evidence outlined in the previous chapter. For instance, during the COVID-19 pandemic crisis, the declines in BDC performance were significantly steeper than those of the S&P 500.

Leveraged loans and high-yield bonds had a similar trajectory with moderate levels of volatility, although leveraged loans outperformed due to their floating-rate structure, which provides protection in a rising interest rate environment (e.g., 2022). Conversely, 10-year Treasury bonds recorded the lowest cumulative returns, primarily due to the adverse impact of rising interest rates, given their high sensitivity to rate changes because of their time to maturity. Cash, as expected, exhibited minimal fluctuations, reflecting its low level of volatility and inherent stability with respect to market turmoil.

To conduct the analysis on the performance of direct lending as an asset class in a diversified portfolio, the six asset classes analysed above were used to create diversifies portfolios of different risk profiles and to analyze patterns in the returns throughout the timeframe and compute risk-adjusted returns.

Six distinct portfolios were created, categorized into low-risk and high-risk strategies. Each portfolio was constructed with specific asset weightings to reflect varying risk-return profiles:

a) Firstly, the performance of the BDC, High yield and Leveraged loans were tested in low-risk portfolios having 60% of their allocation in fixed income securities, and 30% in equity with the aim of testing the performance of asset class in a defensive portfolio with limited exposure to volatility:
    a. ***Low_Risk_LL*** composed by Cash US (10%), S&P 500 (30%), Leveraged Loan index (50%), and US Treasury (10%).
    b. ***Low_Risk_HY*** composed by Cash (10%), S&P 500 (30%), High-Yield index (50%), and US Treasury (10%).
    c. ***Low_Risk_BDC*** composed by Cash (10%), S&P 500 (30%), BDC index (50%), and US Treasury (10%).
b) Secondly, the performance of the BDC, High Yield and Leveraged loans were tested in high-risk portfolios having 60% of their allocation in equity, and 30% in fixed-income

with the aim of testing the performance of asset class in a riskier portfolios having potential higher returns:

a. ***High_Risk_LL*** composed by Cash US (10%), S&P 500 (60%), and Leveraged Loan index (30%).
b. ***High_Risk_HY*** composed by Cash US (10%), S&P 500 (60%), and High-Yield index (30%).
c. ***High_Risk_BDC*** composed by Cash US (10%), S&P 500 (60%), and BDC index (30%).

The formula used to compute the value of the index value was equal to:

*Equation 16 - Portfolio Value*

$$Portfolio\ value_t = \sum_{i,t} \omega_i * V_{i,t}$$

Where:

$$\omega_i = weight\ for\ asset\ class\ i$$

$$V_{i,t} = Value\ of\ the\ asset\ class\ i\ at\ time\ t$$

For each portfolio different indicators were used to compute performances and risks of each strategy. In coherence with the analysis already performed when composing the BDC index, Annualized returns, annualized standard deviation, annualized Sharpe ratio, skewness and kurtosis were utilized to have a comprehensive analysis of performances and risks under different scenarios.

To compute monthly returns at time t for each portfolio the following formula was used:

*Equation 17 - Portfolio Return*

$$Return_t = \frac{Portfolio\ value_t - Portfolio\ value_{t-1}}{Portfolio\ value_{t-1}}$$

The dataset spans multiple years and provides key metrics such as annualized returns, excess returns, risk-free rates, Sharpe ratios, skewness, and kurtosis. This comprehensive structure enables an in-depth evaluation of each portfolio's performance. The results of the simulation of the portfolio can be found in the figures below:

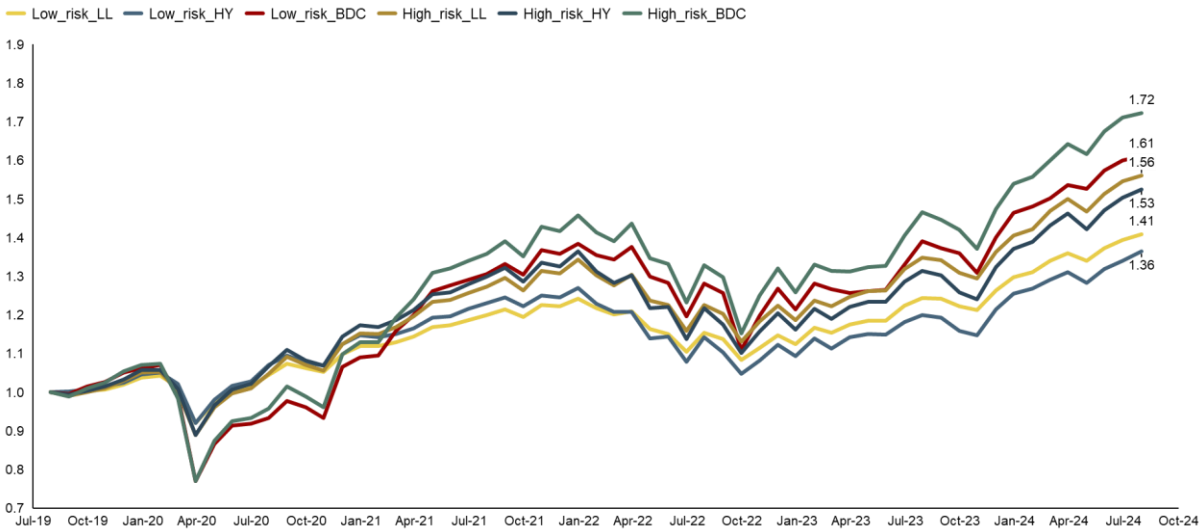


*Figure 35 - Cumulative performances portfolios*

| 2019 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 9.0% | 11.2% | 15.5% | 14.2% | 15.5% | 18.2% |
| Riskfree | 2.1% | 2.1% | 2.1% | 2.1% | 2.1% | 2.1% |
| Excess return | 7.0% | 9.1% | 13.5% | 12.2% | 13.5% | 16.2% |
| Standard deviation | 3.0% | 3.0% | 3.0% | 3.0% | 3.0% | 3.0% |
| Sharpe ratio | 2.36 | 3.07 | 4.55 | 4.11 | 4.55 | 5.45 |

*Figure 36 - Portfolio performances 2019*

| 2020 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 7.4% | 9.1% | 2.1% | 11.0% | 12.0% | 7.8% |
| Riskfree | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% | 0.6% |
| Excess return | 6.8% | 8.5% | 1.5% | 10.4% | 11.4% | 7.2% |
| Standard deviation | 18.9% | 21.5% | 32.0% | 27.1% | 28.7% | 33.6% |
| Sharpe ratio | 0.36 | 0.40 | 0.05 | 0.38 | 0.40 | 0.21 |

*Figure 37- Portfolio performances 2020*

| 2021 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 11.3% | 11.0% | 27.4% | 18.7% | 18.5% | 27.9% |
| Riskfree | 0% | 0% | 0% | 0% | 0% | 0% |
| Excess return | 11.3% | 11.0% | 27.4% | 18.7% | 18.4% | 27.9% |
| Standard deviation | 13.6% | 14.3% | 30.4% | 23.9% | 24.3% | 33.9% |
| Sharpe ratio | 0.83 | 0.77 | 0.90 | 0.78 | 0.76 | 0.82 |

*Figure 38 - Portfolio Performances 2021*

| 2022 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | -8.6% | -13.0% | -11.5% | -13.5% | -15.8% | -14.8% |
| Riskfree | 1% | 1% | 1% | 1% | 1% | 1% |
| Excess return | -10.0% | -14.4% | -12.9% | -14.9% | -17.2% | -16.2% |
| Standard deviation | 9.9% | 13.2% | 20.2% | 15.8% | 21.4% | 21.4% |
| Sharpe ratio | -1.01 | -1.09 | -0.64 | -0.94 | -0.80 | -0.76 |

*Figure 39 - Portfolio performances 2022*

| 2023 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 15.5% | 14.8% | 20.6% | 19.6% | 19.3% | 22.4% |
| Riskfree | 5.1% | 5.1% | 5.1% | 5.1% | 5.1% | 5.1% |
| Excess return | 10.4% | 9.7% | 15.5% | 14.5% | 14.2% | 17.3% |
| Standard deviation | 15.3% | 14.0% | 23.9% | 21.2% | 20.5% | 26.1% |
| Sharpe ratio | 0.68 | 0.70 | 0.65 | 0.68 | 0.69 | 0.66 |

*Figure 40 - Portfolio Performances 2023*

| 2024 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 8.6% | 8.8% | 10.1% | 12.1% | 12.2% | 12.7% |
| Riskfree | 5.3% | 5.3% | 5.3% | 5.3% | 5.3% | 5.3% |
| Excess return | 3.3% | 3.4% | 4.7% | 6.7% | 6.9% | 7.3% |
| Standard deviation | 4.3% | 5.4% | 5.2% | 7.2% | 7.2% | 7.2% |
| Sharpe ratio | 0.75 | 0.64 | 0.91 | 0.93 | 0.96 | 1.02 |

*Figure 41 - Portfolio performances 2024*

| Cumulative | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 7.3% | 6.6% | 10.2% | 10.1% | 9.7% | 11.7% |
| Riskfree | 2.2% | 2.2% | 2.2% | 2.2% | 2.2% | 2.2% |
| Excess return | 5.1% | 4.4% | 7.9% | 7.8% | 7.5% | 9.4% |
| Standard deviation | 8.6% | 10.4% | 18.4% | 12.9% | 18.2% | 18.2% |
| Sharpe ratio | 0.59 | 0.42 | 0.43 | 0.61 | 0.41 | 0.52 |
| Skewness | -1.21 | -0.87 | -1.33 | -0.67 | -0.88 | -0.86 |
| Kurtosis | 3.94 | 2.14 | 6.63 | 1.00 | 3.18 | 3.24 |

*Figure 42 - Cumulative portfolio performances*

In 2019, global economic conditions were characterized by stability, moderate growth, and accommodative monetary policies. These favorable conditions provided a supportive environment for riskier asset classes. Low_Risk_BDC portfolio achieved an annualized return of 15.5% and a Sharpe ratio of 4.55, reflecting the high-yielding nature of BDC investments during periods of stability which is benefited from both lower credit losses and higher earnings from investments. High_Risk_BDC outperformed all portfolios with an annualized return of 18.2% and a Sharpe ratio of 5.45, driven by consistent performance in equity markets and the strong credit conditions for mid-market borrowers. Leveraged loan portfolios (Low_Risk_LL and High_Risk_LL) delivered solid but relatively lower returns, with Sharpe ratios of 2.36 and 4.11, respectively. Overall, the stability in credit spreads and low interest rates favored BDC-

heavy portfolios, which benefited from their exposure to mid-market companies with strong cash flows and lower default risks. In contrast, leveraged loans and high-yield bonds, while steady, slightly underperformed compared to BDC-heavy portfolios due to their lower yield potential when the market performs extremely well considering the fixed income nature of their returns. It is important to note that performances of 2019 considered only 5 months of the year and are influenced by the timespan analyzed.

The outbreak of COVID-19 in early 2020 caused a significant economic contraction, leading to heightened market volatility, widening credit spreads, and increased default risks, particularly for smaller and mid-market companies. Low_Risk_BDC and High_Risk_BDC portfolios obtained annualized returns of 2.1% and 7.8%, respectively, with Sharpe ratios of 0.05 and 0.21, reflecting their vulnerability to disruptive economic shocks. All other portfolios delivered superior performances as they were less exposed to market turmoil considering their typical borrowers' profiles. Mid-market companies, which form the core assets of BDC investments, were disproportionately impacted by the pandemic due to their limited cash reserves and reduced operational flexibility. This situation led to heightened default risks and significant losses for BDC-heavy portfolios. By contrast, leveraged loans and high-yield bonds exhibited greater resilience, supported by their lower exposure to smaller, high-risk borrowers.

The best performing portfolios were the HY portfolios as the value of the high-yield bonds benefited from the expansionary monetary carried out by the FED to boost economic recovery and contrast recession. Both low risk and high-risk high yield portfolios had Sharpe Ratios equal to 0.40, which, considering the volatility of assets in that year, can be considered as a positive result.

The low risk-adjusted performances of BDC portfolios can be also noted through an analysis of the cumulative kurtosis levels of 6.63 for Low_Risk_BDC and 3.24 for High_Risk_BDC. This high level of kurtosis further underscores the extreme tail risks observed for this kind of asset, which is a significant risk factor to consider when investing in private debt. These results and behavior of BDC portfolios are coherent with the analysis carried out when creating the BDC index.

The economic rebound in 2021, supported by vaccine rollouts and expansive fiscal and monetary policies, marked a year of strong growth, narrowing credit spreads and lower defaults risks. Low_Risk_BDC achieved an exceptional annualized return of 27.4% with a Sharpe ratio of 0.90. High_Risk_BDC delivered the highest return of all portfolios, at 27.9%, with a Sharpe

ratio of 0.82. The recovery phase and the fiscal stimuli enhanced by US government benefited heavily small and medium enterprises, which saw improved credit profiles and reduced default risks. BDC-heavy portfolios thrived in this environment, delivering equity-like returns due to their exposure to high-yielding private debt.

Because of the war in Ukraine and supply chain bottleneck, 2022 was defined by aggressive monetary tightening by central banks in response to surging inflation. Rising interest rates negatively impacted fixed-income instruments, particularly those with fixed-rate structures. Low_Risk_BDC and High_Risk_BDC portfolios showed resilience, with Sharpe ratios of -0.64 and -0.76, compared to -1.01 for Low_Risk_LL and -1.09 for Low_Risk_HY. The floating-rate nature of BDC portfolios provided greater protection against rising rates, enabling them to outperform fixed-rate instruments such as high-yield bonds. Nonetheless, higher financing costs and economic slowdown impacted mid-market companies leading to negative returns throughout the year.

In 2023, High_Risk_BDC achieved an annualized return of 22.4% with a Sharpe ratio of 0.66. Low_Risk_BDC also performed well, delivering a return of 20.6% and a Sharpe ratio of 0.65. Fixed-income portfolios, such as Low_Risk_LL and Low_Risk_HY, provided steady but lower returns of 15.5% and 14.8%, respectively.

| 2021-2024 | Low_risk_LL | Low_risk_HY | Low_risk_BDC | High_risk_LL | High_risk_HY | High_risk_BDC |
|---|---|---|---|---|---|---|
| Annualised Return | 7.0% | 5.4% | 11.9% | 9.3% | 8.4% | 12.0% |
| Riskfree | 2.7% | 2.7% | 2.7% | 2.7% | 2.7% | 2.7% |
| Excess return | 4.4% | 2.7% | 9.2% | 6.7% | 5.8% | 9.4% |
| Standard deviation | 7.0% | 9.2% | 13.5% | 11.4% | 14.7% | 14.6% |
| Sharpe ratio | 0.62 | 0.30 | 0.68 | 0.59 | 0.39 | 0.64 |

*Figure 43 - Portfolio Performances (2021-2024)*

Another interesting trend to analyze is the performance of portfolios from January 2021 to July 2024. Coherently with previous considerations, BDC portfolios were the most performing assets, with low_risk_BDC having a cumulative annualized return of 11,9% and an annualized Sharpe ratio of 0,68, whereas High_risk_BDC had returns of 12,0% and Sharpe Ratio of 0,64. These results are consistent with the capability of middle-market private loans to perform extremely well in periods of expansion and to be resilient in rising interest rate environments.

Overall, it is possible to draw several key conclusions regarding the performance and strategic utilization of investing in direct lending assets through Business Development Companies

(BDCs). Given the composition of BDC portfolios, which are primarily comprised of middle-market loans, BDCs exhibit higher volatility and potential for higher returns compared to other fixed-income instruments such as high-yield bonds and leveraged loans. These characteristics stem from the composition of its private loans, which are given to small and medium enterprises having a typical high-risk, high-return investment profile.

The COVID-19 crisis provided a clear illustration of this dynamic, as mid-market companies were disproportionately exposed to risks associated with depleting cash reserves and running out of liquidity. This vulnerability led to a higher probability of insolvency, which in turn translated into significant risks for BDC investors. As concerns over rising default rates grew, the market valuation of BDCs reflected these fears, leading to heightened volatility and reduced valuation of direct lending investments.

Conversely, during periods of robust economic growth, BDCs demonstrate performance levels that rival or surpass those of equity indexes composed of large-cap, blue-chip companies. For instance, in 2021, the Low_risk_ BDC portfolio, having 50% allocation to BDCs, achieved a return of 28%. This highlights the ability of investment in direct lending to thrive in strong economic conditions, showcasing their potential as a high-performing asset class during economic expansion.

Another significant feature of BDC investments is their relative resilience during periods of rising interest rates and inflation. Unlike traditional fixed-income instruments, such as high-yield bonds and 10-year US Treasuries, which are typically structured with fixed rates and are sensitive to rate increases, typical direct lending loans benefit from floating interest rate structures. This intrinsic feature mitigates exposure to reductions in loan values, providing a degree of protection against monetary tightening and inflationary pressures.

In summary, direct lending represents a high-risk, high-return asset class that combines characteristics of both equity and debt. The primary drawback of this strategy lies in its tail risk, which is inherent to the composition of BDC loan portfolios—loans extended to below-investment-grade mid-market companies. To effectively incorporate this asset class into a portfolio, investors must exercise thorough risk management actions to mitigate potential excessive losses in case of high volatility. Through these actions, it is possible to leverage the unique attributes of BDCs, such as their superior returns in favorable economic conditions and their resilience in rising-rate environments while mitigating risks posed by economic downturns.

This analysis underscores the dynamic performance characteristics of BDC-heavy portfolios compared to traditional fixed-income strategies. While BDC portfolios deliver exceptional returns during periods of economic growth and mitigate losses with rising interest rates, they exhibit equity-like volatility and significant tail risks during extreme downturns. Fixed-income portfolios, such as leveraged loans and high-yield bonds, provide steadier but lower returns, making them valuable stabilizers in diversified portfolios.

While the empirical analysis conducted in this thesis provides valuable insights into the performance and characteristics of Business Development Companies (BDCs) as a proxy for US direct lending, several limitations should be acknowledged to provide a balanced evaluation of the work and possible future developments.

The analysis relies heavily on historical data spanning 60 months from 26 distinct BDCs. While this timeframe is sufficient to capture a complete business cycle, it may not fully account for unprecedented market shocks or structural changes in the economy.

The portfolios constructed in this study use fixed-weight allocations. While this approach simplifies the analysis and reduces the complexity of portfolio management, it may not reflect how investors dynamically adjust allocations in response to changing market conditions. Dynamic portfolio strategies, such as tactical asset allocation or momentum-based adjustments, could yield different performance outcomes and may better mitigate risks during volatile periods.

The analysis focuses on six asset classes: BDCs, high-yield bonds, leveraged loans, the S&P 500, 10-year Treasury bonds, and cash. While this selection is appropriate for capturing key components of a diversified portfolio, it excludes other potentially relevant alternative investments asset classes, such as distressed debt, mezzanine financing, or private equity. Including a broader range of instruments could provide a more comprehensive view of how BDCs perform relative to other private market strategies.

The empirical work assumes a frictionless market, excluding transaction costs, tax implications, and management fees. These real-world factors can significantly affect net returns, particularly for strategies involving frequent rebalancing or smaller investors who may face higher costs relative to institutional investors. Future analyses could incorporate these considerations to better approximate the practical viability of BDC-heavy portfolios.

In summary, while the empirical work offers significant contributions to understanding BDC performance, addressing these limitations through future research could enhance its robustness and applicability. Incorporating dynamic strategies, broader asset classes, and real-world constraints would provide a more comprehensive and practical framework for evaluating BDCs within diversified portfolios.

# 5. Conclusions

This thesis has explored the role of private debt, particularly direct lending, as an asset class for institutional and retail investors. The research has examined the historical evolution of private debt, the key strategies employed by private debt funds, and the characteristics of private debt investments. Through the empirical analysis carried out, this study has aimed to answer whether private debt, and specifically direct lending, can be utilized effectively as an asset class in a diversified portfolio, offering investors both significant returns and risk mitigation in a low-interest-rate environment.

It is possible to conclude that private debt, especially in the form of direct lending, offers a valuable addition to a diversified investment portfolio. The appeal of private debt stems from its ability to deliver higher returns compared to traditional fixed-income investments, such as leveraged loans and high-yield bonds. This feature is particularly valuable in environments marked by low-interest rates, where conventional fixed-income assets may struggle to offer adequate yields.

For institutional investors and asset managers, direct lending represents an effective means to increase portfolio yield while managing downside risk of fixed-income securities through its floating-rate structure and bespoke loan terms. The customization available in private debt transactions—such as seniority in the capital structure, tailored covenants, and higher interest rates in return for greater risk—offers considerable flexibility. By integrating direct lending into a multi-asset portfolio, investors can benefit from steady returns also in rising interest rate environments. These factors make private debt an attractive component in portfolios seeking to balance obtain significant returns.

To effectively utilize private debt in a portfolio, investors should carefully consider the following factors:

a) Risk Profile: Given its higher yields, private debt typically carries a higher level of risk compared to traditional debt instruments. Therefore, a thorough understanding of the feature of loans inside the portfolios and market conditions is essential for managing risk. In addition, risk management measures to contrast direct lending's tail risk should be put in place to effectively include private debt in a multi-asset portfolio.
b) Diversification: As with any asset class, diversification within private debt itself is critical. Exposure should be spread across different types of private debt strategies, including direct

lending, distressed debt, mezzanine financing, and asset-backed lending. This mitigates "strategy-specific" risks and ensures that performance is not overly dependent on the success of a single strategy or borrower.

c) Manager Selection: The performance of private debt investments can vary significantly depending on the expertise and track record of the fund manager. Given the customized nature of private debt transactions, it is important to choose managers with a proven ability to source high-quality loans, structure deals efficiently, and manage credit risk effectively.

While this thesis has provided a comprehensive analysis of private debt, few limitations should be recognized:

a) Data Availability: A key challenge in the thesis has been the limited availability of consistent and transparent data, particularly regarding non-public private debt investments. The reliance on publicly available data from Business Development Companies (BDCs) as a proxy for direct lending may not fully capture the broader spectrum of direct lending, especially those that are not publicly listed or have more complex structures.
b) The focus of the study on the US market, particularly in the context of BDCs, limits the generalizability of the findings to other regions and to all strategies. The performance of private debt can vary significantly across geographies due to different economic conditions, regulatory environments, and credit markets. Therefore, future research should explore the performance of private debt across different geographies and strategies.
c) The study uses different assumptions to facilitate the structuring of the empirical research. A more granular analysis of loans and borrowers at portfolio level could grant more accuracy in the evaluation of results of the thesis enlarging the constraints imposed by the assumptions used in the research.

As private debt continues to grow as an asset class, future research should aim to overcome the limitations identified above. In particular, the following areas should be investigated:

a) Portfolio Level Analysis: Future studies may incorporate more granular, proprietary data from private debt funds to gain deeper insights into loan performance and risk factors at a portfolio level. This would provide a more accurate reflection of private debt's risk-return profile and allow for more granular performance benchmarks.
b) Cross-Border Comparisons: Expanding the scope of research to include private debt markets outside the US would offer valuable insights into how the asset class performs in different economic and regulatory environments. Research comparing US direct lending

with European or Asian private debt markets could help investors understand regional variations and identify new opportunities.

c) Scenario testing: Given the increasing frequency of global economic disruptions, future research could analyze the resilience of private debt investments under different stress scenarios. This would help in understanding better the behavior of private debt in volatile market environments and to create risk management policies to account for this behavior.
d) Inclusion of other private debt strategies: As private debt funds continue to innovate, new strategies such as credit secondaries, NAV lending, and infrastructure debt are becoming mainstream. Research into these emerging trends would be valuable in understanding the full spectrum of private debt opportunities, and how these strategies within diversified portfolios.

In conclusion, private debt, particularly direct lending, has become an increasingly attractive asset class for investors seeking higher yields and portfolio diversification. While it carries higher risks, its potential for stable income and resilience in rising interest rate environments make it a valuable addition to diversified portfolios. By carefully managing the risks associated with private debt, particularly in the context of extremely volatile market environments, investors can successfully integrate this asset class into their portfolios.

This thesis has made significant effort in analyzing the role of private debt, but it also highlights the need for further research to address the risks and uncertainties surrounding this rapidly growing market. With the ongoing evolution of private debt and its increasing importance for global economic development, the potential for future research in this field is still extremely high.

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