Risk-Adjusting the Returns to Private Debt Funds

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Abstract

Private debt funds are the fastest growing segment of the private capital market. We evaluate their risk-adjusted returns, applying cash-flow-based methods to form a replicating portfolio that mimics their risk profiles. Accounting for both equity and debt factors, a typical private debt fund produces an insignificant abnormal return to its investors. However, gross-of-fee abnormal returns are positive, and using only debt benchmarks also leads to positive abnormal returns as funds contain equity risks. The rates at which private debt funds lend appear to be high enough to offset the funds' fees and risks, but not high enough to exceed both their fees and investors' risk-adjusted required rates of return.

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JEL Classification: G12, G21, G23

1 Introduction

Private debt is the fastest-growing asset class in the private capital markets, with about $1.5 trillion in assets under management as of 2023 (Preqin, 2024). While various financial institutions less regulated than commercial banks (henceforth *nonbanks*) –e.g., finance companies, investment banks, insurance companies, and hedge funds– provide direct loans to firms, the most important participant of this lending market is private debt funds. These funds raise money from investors –i.e., limited partners (LPs)– and provide mostly direct loans to firms that typically cannot get bank loans based on their creditworthiness (Block et al. (2024)). However, surprisingly little is known about this market, especially the risks and risk-adjusted returns of private debt funds.

Market participants tout the high returns of private credit relative to their risks, claiming they offer better returns than traditional types of lending. For instance, Steve Schwarzman, the co-founder of Blackstone, commented on private credit: "If you can earn 12 percent, maybe 13 percent on a really good day in senior secured bank debt, . . . with almost no prospect of loss, that's about the best thing you can do" (Financial Times, 2023). However, most debt funds make loans that are substantially riskier than Schwarzman's characterization of them. It is not at all clear if, in practice, private debt funds' returns are sufficiently large to offset their risk.

Given the dramatic increase in capital that has been allocated to private debt in recent years, investors clearly believe that private returns justify its risk. This growing role of nonbanks in providing credit to firms calls into question the role of the 'specialness' of traditional bank intermediation. Is private credit special, too, and capable of earning "alpha"? Academic research, however, has been silent on the question of whether, in practice, returns are high enough to earn alpha for their investors. This issue is critical for the many investors in the private debt sector, as well as for academics studying the private capital market.

In this paper, we use state-of-the-art methods to evaluate the risk-adjusted returns of private debt funds originated between 1992 and 2015.[1] Our database from Burgiss-MSCI provides in-

[1] In robustness tests, we show that our main results also hold on more recent vintages of private credit funds

depth information on the net-of-fee cash flows paid to the LPs; it includes not only net asset values (NAVs) but also distributions and contributions throughout the life of the funds. A major advantage of the Burgiss-MSCI dataset is that there is no survivorship bias because the data are directly sourced from LPs, and their cash flows must be reported regardless of performance. The risk-adjustment methods we use are based on Flanagan (2024), which adapts the approach of Gupta and Van Nieuwerburgh (2021) for debt.

The idea underlying Gupta and Van Nieuwerburgh (2021) is that the cash flows of private assets, for which one would like to know the price, can be spanned by publicly traded benchmarks that do have observable market prices. The market price of a replicating portfolio constructed from these benchmarks can then be used to price the assets of interest. Flanagan (2024) specifically develops market benchmarks that are well-suited for spanning and pricing debt-like cash flows such as loans, relying only on the law of one price without requiring estimation of an asset pricing model to get prices.

We apply and extend the Flanagan (2024) methods to price the cash flows of private debt funds, adjusting for differences between loan-level cash flows and fund cash flows, such as allowing for delayed cash-flow contributions. An important difference between bank loans and private debt funds is that private debt funds are much more subject to "equity-like" risks, both because their loans are substantially riskier than most other debt, and also because roughly 20 percent of their portfolios is made up of equity or equity-linked instruments.[2] An advantage of the Gupta and Van Nieuwerburgh (2021) and Flanagan (2024) approach is that it is capable of including factors that capture equity-related risks. Therefore, to adjust for the risks inherent in private debt funds, our analysis includes loadings on both debt and equity factors when building replicating portfolios.

Borrowers generally approach private debt funds when they are unable to obtain bank financing (see e.g., Chernenko et al. (2022) and Block et al. (2024)). Consequently, firms that borrow privately are generally riskier than firms that receive bank loans, so their cost

up to those started in 2018.

[2] In more recent vintages, the equity share ranges from 19% to 27%.

of borrowing is higher. In addition, private debt funds have substantial fees, so the cost of borrowing includes these fees. The providers of the capital, the fund's LPs, must receive a return sufficient to offset the risk they face on the net-of fee cash flows earned by the fund. Promised returns must be large enough to offset the probability of default, the systematic risk of these defaults, and also the fees that the funds' general partners earn. Consequently, promised returns on loans from debt funds are substantially higher than the promised returns on bank loans or even risky bonds.

Our estimates suggest that the risk-adjusted abnormal return on $1 of capital invested in private credit funds is indistinguishable from zero. We get similar results using both the risk-adjusted profit (RAP) approach (Gupta and Van Nieuwerburgh (2021), Flanagan (2024)), which estimates an insignificant abnormal return of $0.032 per $1 invested, and the Korteweg and Nagel (2016)'s generalized public market equivalent (GPME) method, which estimates an insignificant abnormal return of $0.031 per $1 invested. These findings imply that private debt funds lend at rates high enough to offset the funds' fees and risks. However, competition limits the extent to which funds can raise their rates. In equilibrium, fund investors earn only a rate of return appropriate for the risks they face, but no more.

An important caveat to this zero abnormal return result is that it depends crucially on a discounting approach that adjusts for risks correlated with both debt and equity returns. When we use only debt as a risk factor, the estimated risk-adjusted profit becomes a positive, statistically significant $0.14 per $1 of capital invested. This estimate translates to a 2.3% alpha on private credit funds if only adjusting for corporate debt risk factors. Private debt is sufficiently equity-like that equity-specific risk factors must be accounted for to adjust for risk appropriately. When compared to other debt instruments alone, private debt returns look more attractive than they actually are, because the discounting approach does not adjust for the funds' equity-linked risks.

To provide better intuition of the risk factors implied by the RAP replicating portfolio, we also document the simplified representation of beta loadings on the time series of returns implied by the fully specified RAP replicating portfolio. When we estimate the betas on a time series implied by our replicating portfolio, we find a beta of 0.42 on the CRSP value-weighted index, a beta of 0.44 on a 10-year Treasury bond, and a beta of 0.39 on an high-yield bond benchmarks. These loadings imply that credit risk, interest rate risk/prepayment risk, and equity risk are all relevant in explaining the cash flows of private credit.

Our data set differentiates between fund types (“generalists”, “mezzanine” or “distressed”), as well as fund size (“small” or “large” relative to the median fund size). We also classify a subsample of our funds as "direct" lenders –i.e., funds that directly originate at least 70 percent of their assets as defined and identified by Munday et al. (2018). When only risk-adjusting using corporate-bond risk factors, some subsample of funds – e.g., distressed or direct funds– have positive and significant alphas. However, we still find no evidence of abnormal returns when we include equity factors across all fund types, except for direct lenders that produce marginally significant return of $0.095 per $1 invested over the life of the fund. A significant fraction of direct lenders’ returns also appears to be driven by equity-like investments.

We also perform our analysis on the gross returns, which are the returns from the cash flows received from portfolio firms, so do include the fees that general partners charge their investors. Our estimates indicate that gross alphas are around 4.0 percent, which is approximately equal to what general partners would earn with management fees of 1.5 percent and carried interest of 15 or 20 percent. While the rates charged to borrowers are set sufficiently high – the typical loan rate is about 700 basis points over LIBOR (see Jang (2023)) – the rents from these high rates appear to be captured by the funds’ general partners. Their fees provide compensation for the services they provide, including identifying borrowers, negotiating loans, and monitoring them after providing the capital.

As a comparison, the 4.0 percent required by private credit funds is over twice that of the 1.7 percent gross alpha on syndicated bank loan cash flows when also computed using a similar cash-flow based method (Flanagan (2024)). Despite the higher costs, these nonbank lenders are still the best option for some firms that are unable to obtain bank financing (Chernenko et al. (2022)). These findings are consistent with a model in which banks can provide intermediation services at a lower cost than other financial intermediaries (for instance, see Diamond (1997)), but some riskier borrowers are segmented from borrowing from banks due to increased bank regulation post 2008 Financial Crisis. Moreover, some borrowers prefer the speed and flexibility that these alternative lenders provide.

Overall, the results in our paper are consistent with the view that private debt funds enjoy high yields from lending to firms that typically cannot receive financing from banks or public markets. The rates they charge reflect both the risk that their limited partners must bear and the costs of lending to these small and mid-sized, riskier firms. The return that borrowers pay in excess of the risk-adjusted interest rate approximately equals the fees that the private debt funds charge. Rents earned by the funds from making private direct loans accrue to the general partners, not to the limited partners. They appear to reflect compensation for identifying, negotiating, and monitoring private loans to firms that could not otherwise raise financing.

The remainder of this paper is organized as follows. Section 2 discusses institutional details and existing literature. Section 3 presents our main empirical strategy. Section 4 describes the data. We discuss descriptive statistics on fund characteristics in section 5 and present our main results in section 6. Section 7 concludes.

2 Institutional Details and Related Literature

Private debt funds are rapidly growing institutions that provide credit intermediation. They are limited partnerships of private capital that are raised by a General Partner (the "GP") from investors, the limited partners (the "LPs"). These funds typically charge an annual management fee of about 1.5 percent and a "carried interest" of about 15 percent. Because of these relatively high fees, they are a relatively expensive form of financing, so cater to borrowers who are unable to receive financing from more conventional sources. Such borrowers include low rated or unrated firms, and also leveraged buyouts, which require substantial quantities of debt that can be arranged relatively quickly. Commercial banks used to be the primary lenders in this market but the risks that banks can take is limited by regulation. This regulation does not affect nonbanks, so it has helped create the enormous nonbank lending market.

Private debt portfolios typically include some equity components: often it is preferred stock but sometimes common equity; and warrants are regularly included as "equity kickers". In total, equity amounts to about 20 percent of their investments. Although these debt funds utilize some leverage, most of their funding is from typical private equity (PE) investors or Business Development Companies (BDCs).[3]

Block et al. (2024) summarizes a recent survey of general partners (GPs) of some U.S. and European private debt funds, focusing on the way in which their lending compares to banks' direct and syndicated loans by commercial banks. This survey suggests that private-debt funds lend to riskier companies than a typical bank borrower. However, they include both financial and negative covenants in their contracts to monitor these loans.[4] Nonbanks have gained a substantial market share in both corporate loan and bond markets, especially since the Great Recession. Jang (2023) explores whether private debt funds lend more like banks or arm's-length investors. Using detailed data on loan contracts extended by private debt funds in private equity buyouts, the author shows that direct lenders actively monitor and engage in loan restructurings similar to a bank. Davydiuk et al. (2024a) focus on the prevalence of dual holdings of equity and debt of the same portfolio firms by the same private debt fund and how this dual-holding structure relates to loan terms.

Our paper also contributes to the literature on the growth of FinTech and other nonbanks in credit intermediation. In the corporate loan market, nonbank participation is the largest in the syndicated deals, with nonbank lending in riskier leveraged term loans reaching to about 80% in 2021 (Erel and Inozemtsev (2024)). Although initially, finance companies were the primary

[3]BDCs are special types of closed-end funds that were established by the Small Business Investment Incentive Act of 1980 to provide funding directly to small and mid-sized companies. See Davydiuk et al. (2024b).

[4]See also Fristch et al. (2021) for a review of the European private debt funds and Erel and Inozemtsev (2024) for an extensive review of the participation of not only private debt funds but also other nonbank financial institutions in the loan and bond markets.

lenders to riskier borrowers (Carey et al. (1998)), CLOs, hedge funds, private equity firms, and loan mutual funds increased their presence significantly over time (Irani et al. (2021)). Considering direct loans to mid-sized firms, Chernenko et al. (2022) show that about one-third of these firms borrow directly from nonbanks, especially finance companies, private equity firms, and hedge funds. These lenders charge higher interest rates than banks, even after controlling for the risk of their borrowers.[5] In the market for small corporate business loans, Gopal and Schnabl (2022) document that finance companies and FinTech lenders dominate small business loans secured by non-real estate collateral post Financial Crisis.[6]

The growth in nonbank participation in the direct loan market increased substantially because of the lending gap created by large banks during the Financial Crisis and also increased bank regulation afterwards (see, e.g., Chen et al. (2017), Cordell et al. (2023), Cortés et al. (2020), and Chernenko et al. (2022)).[7] Private debt funds are relatively younger, but the fastest growing, players in this market (Block et al. (2024). In addition to providing loans to riskier customers that banks do not typically lend to, these nonbank lenders also provide speed and convenience in the loan approval process as well as more flexible, innovative loan terms.

There is some work that examines the performance of these funds in comparison to leveraged loan or bond markets and shows that their returns are higher (e.g., Munday et al. (2018), Boni and Manigart (2023), and Suhonen (2024)). These papers use the funds' net asset values (NAVs) as an approximation to market values in order to measure returns and estimate alphas. For example, Böni and de Roon (2023) compute private credit funds using reported NAV and use these returns in a factor model and find evidence of risk-adjusted returns. In contrast with using NAVs to construct returns, our analysis relies entirely on a cash flow-based valuation approach. Our results can be reconciled with their if reported NAVs are inflated, not fully

[5]See also Davydiuk et al. (2024a) emphasizing the fast growing role of BDCs as lenders in the middle market and how their lending helps spur employment growth and innovation of these firms.

[6]Nonbank participation has been growing in the personal loans as well. See, for example, Buchak et al. (2018) and Fuster et al. (2021) for evidence from the U.S. mortgage market. There is also a growing literature on peer-to-peer unsecured personal loans that use FinTech. See Morse (2015) for a review.

[7]See also Acharya et al. (2024) and Chernenko et al. (2024) focusing on bank capital –i.e., regulatory capital arbitrage– and Haque et al. (2024) private equity fueling growth in nonbank lending.

incorporating the credit risk of the investments, because they are not marked to market. Consistent with this explanation, we show that when include fund vintages with more outstanding un-liquidated NAVs, we find higher risk-adjusted returns. [8]

Gupta and Van Nieuwerburgh (2021) also apply their methodology to private credit funds in their paper and find a negative risk-adjusted profit. Our paper's methodology and findings differ in several key ways. First, we adapt their methodology in a reduced-form fashion that does not require estimating an asset pricing model to obtain prices. Second, this reduced-form approach allows us to explicitly incorporate corporate debt and loan risk factors that may matter for the pricing of private credit funds. Third, we develop benchmark funds specifically designed to better capture fixed-income risk exposures and their cash flows. Finally, our paper documents the role of equity investments in private debt funds and analyzes heterogeneity, persistence in risk-adjusted performance, betas, and gross alpha of private debt funds.

Finally, our paper is also related to work studying risk-adjusted returns in financial intermediation more broadly, including Begenau and Stafford (2019) which examines whether bank activities generate excess returns for bank shareholders, Flanagan (2024), which studies the valuation of bank loan cash flows, and Cordell et al. (2023) which examines the risk-adjusted returns of CLO tranches.

3 Discounting Methods

3.1 Risk-Adjusted Profit (RAP)

The primary risk-adjustment approach in this paper applies the Gupta and Van Nieuwerburgh (2021) methodology to private credit funds. This approach involves regressing fund cash flows on the payoffs of publicly traded securities and using the prices of these securities to discount the cash flows. Formally, let R^k_{t+h} denote the return on a public security k bought at time t

[8] Boyer et al. (2023) discuss potential issues with using alphas derived from NAVs when private equity NAVs differ substantially from market values.

and held for h periods, and let X^i_{t+h} be a cash flow to a private debt fund i at h periods after origination at time t, normalized to a \$1 capital investment. Gupta and Van Nieuwerburgh (2021) estimate the following regression of cash-flows on security payoffs with horizon varying risk exposures at each cash-flow horizon h:

$$X^i_{t+h} = a_h + b_h R^k_{t+h} + e^i_{t+h}. \tag{1}$$

Estimating this equation is equivalent to discounting the fund cash flows using the known prices of these benchmarks. The model's key identification assumption is that the replicating portfolio, composed of publicly traded benchmarks $b_h R^k_{t+h}$, spans the priced risk in the cash flows, X^i_{t+h}, and the market prices of R^k_{t+h} are known. In Gupta and Van Nieuwerburgh (2021), R^k_{t+h} represents the cash flows of dividend and gains strips, whose prices are estimated with an affine term structure model.

As an alternative approach, Flanagan (2024) uses a reduced form version of this approach using public securities returns to form benchmarks, R^k_{t+h}, and the law of price to price them. For instance, when R^k_{t+h} is the *total return* on a publicly traded security until horizon h, the market price of any return is 1 by the law of one price:

$$E_t[M_{t,t+h} R_{t+h}] = 1. \tag{2}$$

This reduced-form approach offers flexibility in terms of including any risk factors for which return data is available without needing to estimate an asset pricing model. Because the primary underlying asset of private debt funds is loans, this reduced-form approach easily allows for incorporating interest rate risk/prepayment risk, corporate debt risk, liquidity risk factors, loan risk factors, as well as equity risk factors. This flexibility helps achieve the key empirical task of selecting right-hand side benchmarks that span the relevant priced risk for private debt funds.

In addition to selecting the risk factors that matter for private credit, we also carefully account for the horizon-varying exposure of private credit funds to these risk exposures. Because the funds' underlying assets are loans and fixed-income instruments such as preferred equity, the two major sources of the private credit fund cash flows are interest/dividends and principal repayment. Both sources of cash flows crucially depend on how the amount of a fund's outstanding invested capital changes across time following fund inception. We construct two types of benchmark funds to explain the variation in each source of cash flows to account for these time-varying exposures.

To explain variation in the interest payment cash flows of credit funds, we construct "rollover" benchmark funds that, at each point in time, invest an amount of capital that is proportional to a corresponding fund's outstanding NAV in a given security. At the end of the period, this benchmark fund then pays out any realized returns and at the beginning of the next period it rebalances its capital to match that of the matched fund's NAV. This construction captures that the total interest paid out from the fund portfolio will be proportional to the total capital or principal balance outstanding at that point in time. Including returns generated from this benchmark, therefore, helps explain this interest payment variation in cash flows.

The 'rollover" investment strategy, $F_{t+h}^{i,k}$, starts with an initial $\$X$ investment in a risky security, k, where $\$X$ represents the amount of capital initially invested by a matched private credit fund, i. At the start of each period, the benchmark matches any additional capital contributions made by its matched private credit fund.[9] At each period's end, any accumulated returns on this capital are paid out. In the next period, the rollover loan benchmark again contributes to or distributes its capital to match the NAV outstanding of its matched debt fund (i.e., if the debt fund distributes capital, then the benchmark fund does as well) and reinvests the remaining balance in the same risky security, repeating this process until the capital invested equals zero. The benchmark's price equals the initial capital allocation of its matched fund plus the discounted value of capital needed to fund the reserve account. See Section B of the Internet Appendix for the derivations of the rollover benchmark price.

[9]To derive prices of the benchmark, we assume that investors know the capital call schedule in advance.

The second main source of variation in private credit cash flows is principal repayment. In particular, benchmark funds should be able to explain the cash flow risk of making a loan and having it default at h horizons later – aggregating across all investment holdings to the fund level. To explain the default risk of capital invested up to horizon h, we compute returns to a "gain" benchmark fund. This benchmark fund starts with a normalized $1 at fund inception, reinvests and compounds returns on that invested capital, and pays out capital distributions as the underlying fund capital balance declines. This benchmark fund construction captures risk exposures that are proportional to the outstanding capital balance of a matched fund, and that uncertainty is resolved as the principal is returned as investors. Consequently, these gain benchmark funds account for the fund's time-varying default risk exposures as well as allow for horizon-specific loadings.

We formally define this "gain" benchmark as follows. A gain benchmark fund, $G^{i,k}_{t+h}$, takes long positions in a risky security, k, and short positions in a risk-free bond until a pre-specified maturity, h. At inception, it invests $1 of capital in security k and goes short an equivalent amount in the risk-free bond. Each period, the benchmark earns returns on its invested capital. Unlike the rollover benchmarks, however, it does not pay out returns every period but reinvests those returns into capital invested in the next period. Gain benchmarks distribute a fraction of their total accumulated capital at the same time as their matched fund i. When the fund distributes capital, the gain benchmark fund also 'distributes' capital by moving a fraction of its total capital out of the risky security, k, and into a risk-free bond. This fraction is proportional to the change in the fraction of the NAV of its matched fund i. See Section B of the Internet Appendix for the derivations of the gain benchmark price.

To summarize, the primary difference between gain and rollover benchmarks is that "gain benchmarks" reinvest any returns into the next period's capital balance, allowing for compounded returns across horizons. In contrast, "rollover benchmarks" immediately distribute any earned returns. The gain benchmarks also have pre-specified maturities, allowing for horizon-specific loadings denoted by the h subscript in c_h. For each security k, we include both rollover $F^{i,k}_{t+h}$, and gain benchmarks $G^{i,k}_{t+h}$ in the following baseline specification:

$$X^i_{t+h} = a_h + \sum_{k=1}[b^k F^{i,k}_{t+h} + c^k_h G^{i,k}_{t+h}] + e^i_{t+h} \tag{3}$$

By the law of one price, the risk-adjusted profit of the credit fund cash flows can be computed by taking the present discounted value of both sides of Equation (3). As in Gupta and Van Nieuwerburgh (2021), we apply the market prices to the replicating portfolio benchmarks and compare it to the normalized \$1 of invested capital in the private credit funds. Private credit funds, therefore, have a risk-adjusted return if the market price of replicating the cash flows exceeds the \$1 of capital needed to fund the investment:

$$RAP^i = \sum_{h=1} P^{\$}_{t,h} a_h + \sum_{k=1} q^{\$,i} b^k + \sum_{h=1} P^{\$}_{t,h} e^i_{t+h} - 1. \tag{4}$$

The market price of the replicating portfolio consists of (a) the price of purchasing the zero-coupon bonds that correspond with the horizon fixed effects a_h, (b) the price of purchasing the rollover benchmarks, $q^{\$,i}$, and (c) the residual cash flows discounted at the risk-free rate. The prices of the gain benchmarks are zero because they are implemented as long-short portfolios. We subtract \$1, which corresponds to the normalized one-dollar investment in the private credit fund cash flows.

The risk-adjusted profit measure corresponds to the net present value of a \$1 invested in private credit funds. In practice, we can also compute an "alpha" by annualizing the risk-adjusted profit with the fund's ex-post cash-flow duration:

$$Alpha = (1 + RAP)^{(1/Duration)} - 1. \tag{5}$$

3.1.1 RAP Implementation

We use cash-flows and returns at the quarterly frequency and specify horizon dummies h at the yearly frequency. We compute fund size by discounting all the funds' contributions using the risk-free rate and normalizing the cash-flow distributions to a $1 capital investment using this fund size. We follow Gupta and Van Nieuwerburgh (2021) and only risk-adjust the cash flow distributions and discount cash flow contributions at the risk-free rate. We estimate Equation (3) using OLS and compute each fund's risk-adjusted profit using Equation (4). Where applicable, we also report the annualized risk-adjusted profit, alpha, using Equation (5). We compute the standard errors of the risk-adjusted profit measure by bootstrapping –i.e., re-sampling individual private credit funds without replacement using 50 replications.

Additionally, we report results in which we estimate the extended specification using elastic net. Elastic net is a regularization technique that combines lasso and ridge regression penalties to handle high-dimensional or highly correlated predictors by selecting and shrinking coefficients. This approach reduces overfitting risk but makes standard error estimation infeasible.

3.1.2 Benchmark Specifications

In estimating Equation (2), we use the following factors specifications, which consist of different right-hand side market benchmarks:

Bonds Only: This specification only uses Treasury bonds and corporate bonds. Specifically, it includes benchmarks constructed from the returns of ten-year (10Y) Treasury bonds, high-yield (HY) corporate bonds, and BBB-rated corporate bonds.[10]

CAPM: Analogous to the CAPM, this specification only uses returns to 10Y Treasury bonds and the CRSP value-weighted (VW) market portfolio.

Both: This specification uses Treasury bonds, corporate bonds, and stocks. Specifically, it includes benchmarks constructed from the returns of 10Y Treasury bonds and BBB-rated corporate bonds.

Extended: This specification uses Treasury bonds, both corporate bond factors and stocks,

[10] Additionally, all the specifications described here include the zero coupon bond fixed effects and a rollover benchmark investing in three-month (3M) Treasury bonds. This 3M Treasury bond benchmark corresponds to payoffs of a floating rate bond. Because it is not ex-ante known what fraction of loans in the funds are floating or fixed rate instruments, we also include benchmark funds constructed using 10Y Treasury bonds and let the data speak for whether the cash flows can be better explained by the returns of these floating rate or fixed rate instruments.

as well as a loan factor and liquidity factor. Specifically, it includes benchmarks constructed from the returns of 10Y Treasury bonds, high-yield corporate bonds, BBB-rated corporate bonds, the U.S. LSTA leveraged loan index[11], and the Pastor and Stambaugh (2003) liquidity factor.[12]

3.2 Generalized Public Market Equivalent (GPME)

We also apply the generalized public market equivalent (GPME) approach of Korteweg and Nagel (2016) to value the cash flows of the private debt funds. The idea behind GPME is to estimate a stochastic discount factor (SDF) that correctly prices capital market benchmarks that have outstanding investments of similar magnitude to the assets one would like to know the price of. This SDF can then be used to discount the cash flows and price the asset of interest. To this end, Korteweg and Nagel (2016) construct benchmark funds with capital market investments to private equity funds, with similar timing of capital investments and distributions. To apply GPME to private *credit*, we exploit the fact that in the previous section, we have already constructed capital market benchmarks that have similar investment timing and magnitude to credit funds and for which we know the price. In particular, we estimate corporate bond and equity versions of GPME that use the corporate bond and equity returns to form SDFs that price their respective rollover capital market benchmarks as well as a rollover benchmark investing in 10Y Treasury bonds. These benchmarks effectively invest in these capital market assets in a way that is proportional to the outstanding NAV of the private credit funds, similar to the implementation of GPME in Gredil et al. (2019).

We use the estimated SDF to discount the private credit fund cash-flow distributions normalized to a $1 capital investment as we did in the risk-adjusted profit case. We follow Korteweg and Nagel (2016) in obtaining standard errors for these estimates.

[11] The U.S. LSTA leveraged loan index is a "market-value weighted index designed to measure the performance of the US leveraged loan market." Its return series begins in 1997. Available at https://indexes.morningstar.com/indexes/details/morningstar-lsta-us-leveraged-loan-FS0000HS4A?currency=USD&variant=TR&tab=overview

[12] Specifically we use the 10th decile of liquidity sorted portfolios from Pastor and Stambaugh (2003).

4 Data

We employ three key data sources in this paper, which are described below.

Burgiss-MSCI: The central database used in this paper on private debt funds is sourced from Burgiss-MSCI, which is described in detail in (Munday et al., 2018). Our data provide in-depth information on the net-of-fee cash flows paid to Limited Partners investing in private debt funds. In particular, it includes distributions, contributions, and NAVs of a comprehensive sample of private credit funds. Because Burgiss-MSCI obtains information on the total cash flows contributed and distributed by all LPs in a given fund, our return evaluation represents that of an average LP. Notably, it offers greater coverage of private credit fund cash flows than other databases since it sources the data from Limited Partners rather than relying on FOIA requests (Munday et al., 2018). In addition, Burgiss-MSCI also provides data on the gross cash flows paid from portfolio firms to the debt funds prior to any fees or compensation paid to General Partners (GPs), although a disadvantage of this data is that it is available for a much smaller number of funds than our sample of funds with information on net cash flows. A drawback of the Burgiss-MSCI data is that the funds are anonymous.

We apply several filters to our sample. First, we consider only private debt funds denominated in US dollars. Second, we narrow the sample to funds that were initiated between 1992 and 2015. The start date of 1992 is chosen because of the absence of corporate bond returns before this time. The end date of 2015 is selected to allow for a sufficient number of years to observe distributions and estimate risk loadings.[13] Finally, we exclude funds with less than 5 years of cash flow data post-inception. These filters result in a sample of 532 private credit funds.

Following the standard approach in the private equity literature (Gupta and Van Nieuwerburgh, 2021; Korteweg and Nagel, 2016), we compute the fund size as the contribution cash flows discounted at the risk-free rate. We scale the cash flow distributions by this computed fund size, which represents a cash flow relative to a \$1 investment. Following Gupta and

[13] In the Internet Appendix, Table A3 reports results for choosing different end dates of sample Vintages

Van Nieuwerburgh (2021), if a fund has not distributed all of its capital after 16 years since inception, we sum up any remaining cash flow distributions, discount them back to year 16 using Treasury bond rates, and assume they are paid out at year 16. In Table A2 and Table A3 in the Appendix, we show that the results are not robust to this assumption as nearly all cash flows have been distributed by year 16.

If a fund has unliquidated NAVs at the end of our sample period, we follow Korteweg and Nagel (2016) and assume the remaining Net Asset Value (NAV) is liquidated. We discount this final NAV cash flow at 90% to account for potentially inflated NAVs, as reported by the funds and not market to market (e.g., see Phalippou and Gottschalg (2009) and Boyer et al. (2023)). Supporting this assumption, we follow Andonov et al. (2024) and estimate the average discount to NAVs when credit fund LP stakes are sold in the secondary market. Specifically, we compare the change in NAV of an LP that sells their stake to the change in NAVs of LPs that remain in the fund. Using this procedure, we find the average market value of private credit fund stakes is approximately 90% of their reported NAVs, as shown in Figure A1 of the Internet Appendix. Further, in Table A3 of the Internet Appendix, we show that our main results are robust to a sample of old vintages (e.g., limit the sample to funds originated on or before 2010) when nearly all the NAV has been paid out by the end of the sample. We also report results in Table A5 where we instead assume the fund recovers 100% of NAV upon liquidation and still find a risk-adjusted return that is not different from zero.

For a subset of funds, Burgiss-MSCI provides holding-level cash flows of individual fund investments (i.e., individual loan cash flows). For these funds, we can calculate the gross returns, which are the returns received by the funds prior to the payment of fees. For these data, we apply the same filters as described above for the broader net of fee fund sample.

Pitchbook: Because the Burgiss-MSCI dataset does not provide information on the characteristics of the underlying investments of private credit funds, we turn to Pitchbook data to offer basic summary statistics on the holdings of private credit funds. Particularly relevant are data from Pitchbook on funds' underlying investments such as the fraction of underlying investments in private debt funds that have equity-like features.

Dealscan: We utilize the sample of syndicated term loan cash flows from Flanagan (2024) to estimate the risk-adjusted returns on these loans, involving at least one non-bank as a lead agent in the syndicate.

5 Descriptive Statistics: Private Debt Fund Characteristics

Despite their high costs, private debt funds have grown substantially in recent years. Figure 1 plots the total AUM of the entire sample of credit funds in the Burgiss-MSCI sample by year. This figure documents the large increase in capital raised by private debt funds, with very little capital raised around 2000 and nearly $400 billion by 2022. This quantity represents approximately half of the deployed capital in the private credit universe (Preqin, 2024).

5.1 Fund Investments

We provide information on two actual private debt funds in Table 1, *Main Street Capital II* and *CapitalSouth Partners Fund III*. *Main Street Capital II* raised $159m in 2006, and earned a 7% IRR, while *CapitalSouth Partners Fund III* raised $ 280m in 2009 and earned a 12% IRR (Source: Pitchbook). Each fund's portfolio contained mostly debt but also had some equity. The returns of the funds are lower than the rates on the loans it provides for several reasons. First, some of the loans default. Second, the funds charge substantial fees, which can lower the funds' (net-of-fee) returns by two or three percentage points. Third, the funds contain some equity, the returns of which could be higher or lower than that of the debt.

This table highlights an important feature of all private capital funds: unlike other managers of similar types of portfolios, such as mutual funds or insurance companies, they are essentially unconstrained in the types of securities in which they can invest. Consequently, general partners do whatever possible (legally) to boost returns. Two ways to do so in debt funds is to add leverage to the fund by delaying draw-downs through lines of credit backed by the fund's capital commitments, and by adding equity and equity-linked securities such as warrants to their portfolios.

Table 2 provides statistics on private debt funds' holdings. These data are taken from the *Pitchbook* holdings database that reports the type of investment holdings the credit funds make and which have any type of equity attached to them.[14] These holdings could be direct preferred equity investments (common in Mezzanine funds), preferred equity paired with loans, warrants attached to a buyout, or even common stock investments in startups. This table indicates that 15% of the private credit investments have some equity-like feature attached to them. When value-weighted the fraction of equity-linked investments increases to 20%. Most of these equity investments in private debt funds come from preferred equity investments, which comprise 10.6% of the holdings. Overall, about 60% of private credit funds have at least one equity-linked investment.

Equity-linked investments of the funds are very different from one another – preferred equity can be only slightly riskier than debt, while warrants are substantially more risky than common equity. We do not have sufficient information on the funds' investments to attempt to assess the portfolios' risks directly. While not the majority of the investments - these are credit funds after all - equity-linked investments are nonetheless an important part of the funds' portfolios. Consequently, we rely on methods that account for both equity and debt-related risks when computing the funds' risk adjusted returns. The risk-adjustment methodology, which is designed to price fixed-income cash flows, is also well suited for valuing cash flows such as preferred equity, although they are riskier than debt and can easily incorporate equity risk factors.

Another important takeaway from Table 2 is that the most common investment type of private debt funds is loans to fund leveraged buyouts, comprising 62% of fund investments.

An important question is the extent to which our findings, which are measured on historical data, are relevant to funds being raised more recently. A particular concern is the possibility

[14] We require that funds report at least 5 of their investment holdings to be included in this sample and apply sample filters in the same way that we apply to our Burgiss-MSCI sample.

that the composition of private debt fund holdings have changed substantially in recent times. Providing more recent data, the subpanel of 2 reports the fraction of portfolio holdings from Burgiss-MSCI that are equity, warrants, convertible debt, and or preferred equity over from 2020 to 2022. The subpanel shows that the percentage of equity investments is 22.2% in 2020 to 26.8% in 2022. Overall these facts show that equity risk in the portfolio of current private debt fund is still highly relevant and, if anything, appears to be increasing.

5.2 Fund Cash Flows

Credit funds, like other private capital funds, receive capital commitments at the initial (and sometimes subsequent) closing, and draw down this capital over the next few years. This drawdown process is illustrated in Panel A of Figure 2. About 25% of a fund's capital is drawn down in each of the first two years, and the vast majority is drawn down by year 6.

This capital is eventually returned (with interest) to the fund's investors. Panel B of Figure 2 illustrates the timing of these distributions. The largest distributions are in years 4 and 5, with about 20 % of initial capital returned in each year. Following Gupta and Van Nieuwerburgh (2021) we truncate the capital distributions at year 16, and discount any remaining cash flows back to year 16 using the term structure of Treasury bonds. Because the overwhelming majority of the capital distributions happen before year 16, this cutoff does not greatly impact the results. In Table A2 in the internet appendix, we show our results are robust to relaxing this assumption and using different cutoffs.

We provide summary statistics on our sample in Table 3: The average fund size is $783M, and the average IRR of the net-of-fee cash flows received by LPs is 8.6%. If we compute the NPV of cash flows using risk-free rates, the average NPV is $0.34 per $1 of capital invested. The average duration of the distributions is 5.5 years.

6 Empirical Analysis: Main Results

6.1 Risk-Adjusting Net-of-Fee Distributions Received by LPs

The average private debt fund's net-of-fee cash flows to its limited partners has an NPV of $0.34 per $1 of capital invested when discounted at the risk-free rate. However, this NPV is an overstatement and it should be adjusted to reflect the risks the LPs actually face, since the risk-free rate is clearly too low. In this section, we focus on properly risk-adjusted returns to the LPs.

We present estimates of the risk adjusted returns received by LPs in Table 4, discounting using the approaches discussed in Section 3. For convenience, in Panel A, we repeat the calculation of the returns without adjusting for risk. The average IRR is 8.6% , and the average "risk-free NPV" is $0.34 on a $1 investment.

In Panel B, we report estimates of the risk adjusted return calculated using the Gupta and Van Nieuwerburgh (2021) risk-adjusted profit (RAP) approach. For this approach, one must specify the risk factors facing the cash flows. We present estimates using only bond factors, only stock factors, and both, which we think are most appropriate since private debt funds contain both debt and equity.

The estimates presented in Panel B indicate that when we discount the cash flows using just corporate bonds and Treasury bonds, we find a statistically significant risk-adjusted profit of $0.14 per $1 of capital invested. Annualizing this total return using the duration of the credit funds, we find a statistically significant alpha of 2.3% using the corporate and Treasury bond factors. When we replace corporate bond factors with a single stock factor, the CRSP VW index, the estimate decreases to a statistically insignificant $0.03 risk-adjusted profit per $1 invested.

When we include both corporate bond and stock factors (Treasury bonds, BBB-rated bonds, and CRSP VW index), we find that the risk-adjusted profit is still essentially zero. We convert this NPV to an alpha by annualizing the total return to $1 of capital using the duration of the fund. The resulting alpha is an insignificant 0.6%. The standard error of this estimate is 0.8%, meaning that a 95% confidence interval cannot rule out an alpha less than 2.2%.

We also include an 'extended' specification that includes a Pastor and Stambaugh (2003) liquidity factor, and the U.S LSTA leveraged loan return index as factors. Because the loan factor is only available beginning in 1997, the sample for this specification is somewhat smaller. The results again are similar in this specification, with a risk-adjusted profit indistinguishable from zero.

Finally, we address the potential concern that including this many factor loadings leads to spurious replicating portfolios by re-estimating the model using elastic net to estimate risk-adjusted profit loadings. Elastic net estimation involves selecting penalty parameters to shrink spurious coefficients, setting those with little out-of-sample predictive power to zero, reducing overfitting and improving model stability. When we estimate the specification with elastic net, we find a similar NPV point estimate of $0.032 per dollar invested. The downside of elastic net is that obtaining standard errors is not feasible.

The estimates using GPME in Panel C are similar to those using the Gupta and Van Nieuwerburgh (2021) approach. The estimated NPV equals $0.176 per $1 invested using the corporate bond returns in GPME to discount the cash-flows. This estimate is even larger than the bond-only RAP NPV point estimate; however, it is not statistically different from zero. If we discount using stocks, it decreases by about one-fourth in value to $0.042 and is also not statistically significantly different from zero. We also estimate a GPME specification including both a BBB corporate bond factor as well as the CRSP VW stock factor in Column (3). We again find a similar estimate that is not statistically different from zero.

Table 5 presents the risk loadings from our risk-adjusted profit estimation corresponding to Equation (2). For the exposition, we report the loadings for the model with a single stock and corporate bond factor which corresponds to Columns (3) and (8) in Panel B of the above table. Each factor has horizon-specific loadings that correspond to the 'gain' capital benchmarks and a single loading for the 'rollover' benchmarks.

The first column reports the horizon fixed effects that correspond to zero coupon bonds (ZCB) in Equation (2). These fixed effects pick up cash flows from the fund that always pays out regardless of the state of the world, meaning that they are discounted back at the risk-free rate. The second column reports the horizon-specific loadings from benchmarks created by investing in BBB-rated corporate bonds. The corporate bond benchmark funds have positive and statistically significant loadings, especially for the cash-flow distributions in years 2-7 since fund inception. In other words, the cash-flow distributions that come from private credit funds 2-7 years after fund inception mostly closely resemble the risk profile of corporate bonds. Likewise, we see positive and significant stock market loadings in years 1-4. The joint F test at the bottom of the table shows that these factors are significant in explaining the variation in fund distributions.

One way to interpret the risk loadings is that they form a capital market replicating portfolios that best replicate the cash flows coming from private credit funds. The significance of risky corporate bond and equity capital market benchmarks indicates that risky capital markets are needed to explain variation in private credit returns and that risk-free benchmarks are not sufficient. The *R-Squared* of the model is also reasonable, at 72%, indicating that our capital market benchmarks form a replicating portfolio that explains much of the variation of fund cash-flows. As confirmed by our evidence in Table 2, equity factors seem to matter for pricing the risks in private credit funds.

From an arbitrage pricing perspective, an *R-Squared* of 72% means that the 72% of the variation that we can explain with our benchmarks is priced exactly because we know the true prices of these benchmarks. The key assumption is that the residuals, the remaining unexplained 28% variation, are orthogonal to priced risk factors. In Table A4 of the Internet Appendix, we directly test this assumption by providing an alternative discounting procedure for the residuals. Specifically, when we discount the residuals using GPME, we cannot reject the identification assumption that their price is different from \$0.[15]

[15] Even though GPME is also estimated using the same factors, this two-step procedure is nontrivial because RAP requires that the cash flows are linear in the specified benchmarks, whereas GPME does not.

6.2 Fund Betas

Next, we provide a simplified summary of the beta loadings from our full factor loading specification. We estimate these loadings in two steps. First, we compute the average market returns to investing a dollar of capital into the replicating portfolio strategy implied by the full multi-horizon factor specification. By average, we mean that at any point in time t we compute the average return across overlapping vintages to compute a single time series of market returns without a horizon h dimension.[16] Second, we then regress this single time series market return onto our factors: the CRSP value-weighted (VW) index and 10Y T-Bond, BBB-rated Bond, high-yield (HY) Bond factors –i.e., the benchmarks constructed using the value-weighted returns on respective corporate bonds– as well as the U.S. LSTA Leveraged Loan Index and Pastor and Stambaugh (2003) liquidity factor.[17] We complete this exercise using all of our factors and loadings estimated from our elastic net specification.

We report the results in Table 6. For exposition, we first report betas on individual factors and then the joint betas when we use all factors at once to explain the replicating portfolio returns. The first column shows that the replicating portfolio return has a beta of 0.425 on the CRSP VW index, consistent with private debt being less risky than equity on average. We also find a loading of 1.20 on a BBB bond and a loading of 0.65 on a high-yield bond benchmarks, consistent with the idea that private credit is riskier than a BBB bond but somewhat safer than a typical junk-rated bond benchmark. We also see a beta of 0.72 on the U.S. LSTA leveraged loan index. However, the full factor specification shows that both equity and debt factors matter for explaining the variation in the replicating portfolio. In particular, in the fully saturated specification, we find that the main factors driving the replicating portfolio are the CRSP VW index, the 10Y Treasury bond, and the high-yield bond benchmarks, with betas of 0.42, 0.44, and 0.39, respectively. Together, these loadings are consistent with the holdings of private

[16] When estimating the betas, we initialize this time series at three years after the first fund vintage, after which at least 50 % of the capital would be called for the first vintage of funds.

[17] Specifically, we compute excess returns for both the replicating portfolio returns and factor returns by subtracting out the return of a 3M Treasury bond.

credit funds comprising risky debt and junior equity-like investments. We plot the replicating portfolio returns implied by these three factors and their loadings in Figure 3.

6.3 Fund Heterogeneity

Private debt funds are not uniform; they vary substantially by size, and also by the type of firms to which they lend. Some funds specialize in lending to firms in financial distress, while others are "mezzanine" funds that provide loans that are typically junior to the firm's all other debt. It is possible that there is cross-sectional variation in abnormal performance where some types of funds perform better than others.

Table 7 presents risk-adjusted returns sorted by fund type, including "generalists", "senior," "mezzanine", and "distressed" funds, as defined by Burgiss-MSCI.[18] In addition to these categories, we follow Munday et al. (2018) and identify "direct lenders" as those funds that "directly originate 70% or more of their assets." 'Direct lenders" comprise 35 percent of our sample in terms of the number of funds. We also identify "small" and "large" funds based on the median fund size within a given vintage-quarter. Fund size is determined by the discounted capital calls rather than the total AUM of the fund advisor. We also split the sample into funds originated before and after the Financial Crisis of 2008. We label funds that started on or before 2009Q1 'Pre-GFC' Funds and funds that started after 2009Q1 as 'Post-GFC' Funds. Finally, we report results when dropping outliers (top 1% and bottom 1% performers) from our fund sample.

Across these subsamples, we still see positive and significant returns when only risk-adjusting using corporate bond risk factors, but find no evidence of abnormal returns when we include equity factors across almost all fund types. There do not appear to be noticeable differences in risk-adjusted returns across fund types. The only evidence of abnormal returns is that direct lenders earn \$0.095 per \$1 invested, and it's significant at the 10% level. Direct lenders also seem to be significantly exposed to equity-like risks, with the estimate shrinking by about half after controlling for equity factors compared to the bonds-only specification.

[18] Munday et al. (2018) provides an in depth discussion of these categories.

6.4 Fund Persistence

Next, we test whether the risk-adjusted performance of a fund manager predicts future risk-adjusted performance. In the previous analysis, we reported the average risk-adjusted profit across all funds or subsets of funds. In this set of analyses, we use *fund-level* risk-adjusted profits using Equation (4) by making the assumption that all funds share the same risk loadings. With fund-level estimates, we use information on fund managers and take the average risk-adjusted of a fund manager in a given vintage quarter. We then estimate the effect of a fund manager's lagged risk-adjusted performance on the fund's risk-adjusted performance to evaluate whether there is persistence. In estimating this equation, we include time-fixed effects, log fund size, and the ex-post duration of the fund as controls.

Even if alpha is zero on average, there could still be heterogeneity in the skill of credit fund managers. Such skill would lead managers who outperform due to superior ability to continue to perform well in subsequent fund vintages. Alternatively, if there is no heterogeneity in fund manager ability, then prior manager performance should have no effect on subsequent performance.

Table 8 shows the results of this exercise. We find that fund managers' past risk-adjusted performance has no predictive power on future risk-adjusted returns across multiple lags. This finding holds for lagged returns from one to three previous quarters. Further, in Table A7 of the Internet Appendix, we show this result holds even using indicator variables for top quartile performance in a given quarter. It suggests that manager skill is not an important determinant of performance. Private debt managers appear to be more like mutual fund managers, for which skill is minimal, than like private equity managers, for whom it is extremely important (see Kaplan and Schoar (2005) and Korteweg and Sorensen (2010)). Overall, the results imply that not only do managers deliver zero alpha to their LPs on average, but also there is no evidence of cross-sectional differences in managers' skill.

6.5 Gross-of-Fee Returns

6.5.1 Fee Structure

A major difference between private debt funds and other providers of private debt is the fee structure. Private debt funds' fees are typically lower than private equity funds but substantially higher than other lenders who issue private loans. While there is some variation across funds, a 1.5% management fee and a 15 % carried interest (a fraction of the profits) is common. Presumably the reason why funds can charge so much and still find borrowers is that they have skill at identifying quality borrowers, negotiating loans, and monitoring them after they are made. Because of the fees, a fund must charge higher rates than a lender providing a similar loan.

Fees on private debt funds (and private equity funds as well) are nonlinear, and they increase more when returns are higher. Therefore, it is impossible to convert the fees that a fund charges to a specific increase in the cost of finance without making a number of other assumptions. However, it is possible to do some illustrative calculations, which we present in Table 9.

Panel A reports estimates of GP fees using the typical private credit fund contract is 1.5 management fee with a 15% carried interest, assuming a 6% hurdle (as is typical). It also presents calculations for 2% management fee with a 20% carry and an 8% hurdle rate. In this table, we use the IRRs of the fund to solve for these fees when assuming one of these contract structures: GP Fee = .015 + max(.15*((IRR+.015)/.85),0) if IRR > .06; and .015 if IRR < .06. Using this approach, we find that if all our funds had a 1.5/15% contract structure, GPs would earn 3.2% per year and if they had a 2/20% contract they would earn 4.2% per year.

6.5.2 Risk-Adjusted Gross of Fee Returns

Next, we consider the subsample of funds for which Burgiss-MSCI has access to the cash flows between funds and their portfolio firms. These cash flows occur prior to the payment of the fund's fees, so are higher than the net of fee cash flows that are paid to the LPs. In our sample, the IRR of the gross cash flows is 14.5%, which is substantially higher than the 8.6% IRR of the net cash flows going to LPs (which is from a much larger sample of funds).[19]. The size of the sample for which we have gross cash flows during our sample period is 55 funds.

We adjust these gross returns for risk using the Gupta and Van Nieuwerburgh (2021) approach and present the estimates in Panel B of Table 9. The estimates imply that the gross abnormal returns are positive and statistically significantly different from zero. When adjusted by corporate bonds and treasury bonds only, the implied alpha is 4.8%, and when discounted using both equity and debt factors, the alpha is 5.9%. Because we use k risk factors times 16 horizon-specific loadings, one concern with using this procedure on a smaller sample of funds is that it results in a noisy estimate. When we re-estimate the specification using elastic net, which sets spurious coefficients to zero, we find a smaller alpha of 4.6%. Similarly, when we estimate abnormal returns of gross returns using GPME with both bonds and stocks as risk factors, we find a positive and statistically significant alpha of 4.2%.

The abnormal return from the gross cash flows is approximately equal to the estimated fees paid by the fund. This pattern suggests that the loans are priced above their fundamental risks, but that any rents go to the GPs who manage the fund rather than the LPs who invest in it. Presumably, these GPs are adding value through their ability to source, negotiate, and manage deals.

6.5.3 Comparison to Syndicated Loans

Another way to illustrate the importance of fees in the pricing of loans from private debt funds is to consider a sample of loans from nonbank lenders who do not charge the same level of fees. We consider a sample of syndicated loans from the Dealscan database that have a nonbank as a lead lender in the syndicate. [20] For a stricter comparison of banks and nonbanks, we focus

[19]Table A6 in the online appendix shows that the risk-adjusted value of the net of fee cash flows for this subsample is not different than zero

[20]We rely on the definition of a nonbank used by Chernenko, Erel, and Prilmeier, 2022).

on loans that only have a single lead lender.

Table 10 reports the annualized risk-adjusted profit on the cash flows from these syndicated loans. This table suggests that nonbank abnormal returns are about 2.3%, which is substantially lower than the 4.1% abnormal returns of the gross of fee cash flows from the private debt funds in our sample. It is nonetheless slightly higher than the bank loan abnormal returns of 1.7% reported by Flanagan (2024). The difference between the gross returns of debt funds and nonbank syndicated loans likely reflects a number of factors: a) The firms that turn to private credit funds probably could not get (cheaper) funding from syndicated loans; b) private credit also includes equity-linked investments; and c) loans from private debt funds have to be priced so that the ultimate providers of capital, the funds' LPs, receive a sufficiently high return to justify investing given the loans high risk when fees are netted out.

7 Concluding Remarks

The fastest growing sector of the private capital market involves lending, and in particular, private debt funds, which currently surpass $1.5 trillion under management. Yet, the academic literature on private debt funds is remarkably sparse. While practitioners argue that these funds are excellent investments, our knowledge is limited about their returns and whether these returns are sufficient to justify their risk.

Private debt funds, like private equity funds, charge substantial fees, usually a 1.5% annual management fee and a 15% carried interest. Since other nonbank lenders have much lower fees, private debt funds must lend at much higher rates than other nonbank lenders, and consequently do business with lower quality borrowers who do not have other sources of capital. To boost returns, private debt funds supplement the loans in their portfolios with equity or equity linked instruments such as warrants. Consequently, to measure the risk adjusted returns investors receive, it is important to take the net-of-fee distributions and discount them using an approach that adjusts for both equity and debt related risks.

In this paper, we follow such a procedure that was developed by Flanagan (2024) for evaluating bank loans. Our estimates indicate that once we adjust for fees and risks, private debt funds provide their investors with returns just appropriate for the risks they face, but not more. When we examine the gross-of-fee cash flows received by the debt funds from their portfolio firms, they do have an alpha that approximately equals the fees that they charge.

We emphasize that even though our results suggest that investors in private debt funds do not earn *abnormal* returns, they do provide investors with the returns they should receive given the risks they face. Consequently, our results do not imply that investors should avoid investing in private credit. These funds provide their investors with an appropriate return given their risks, and, as implied by finance theory, should be a part of a diversified portfolio.

Overall, the results in our paper are consistent with the view that private debt funds charge rates to their borrowers that reflect their fees and also the risks involved in lending to these small and mid-sized, riskier firms. The return that borrowers pay in excess of the risk-adjusted interest rate approximately equals the fees that the private debt funds charge. Rents earned by the funds from making private direct loans accrue to the general partners, not to the limited partners. These rents appear to reflect compensation for identifying, negotiating, and monitoring private loans to firms that could not otherwise raise financing.

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Figure 1: Sample AUM over time

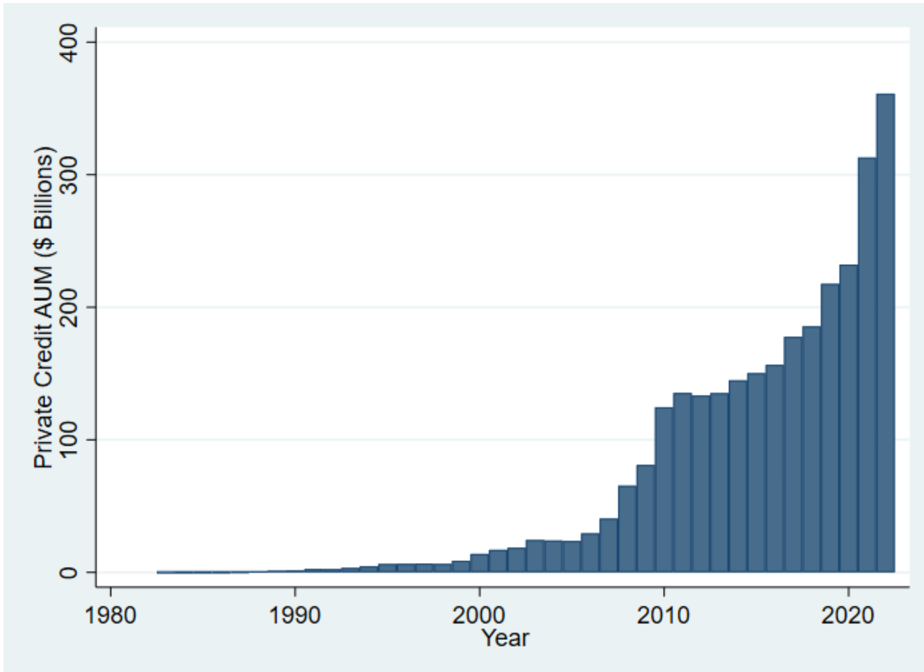
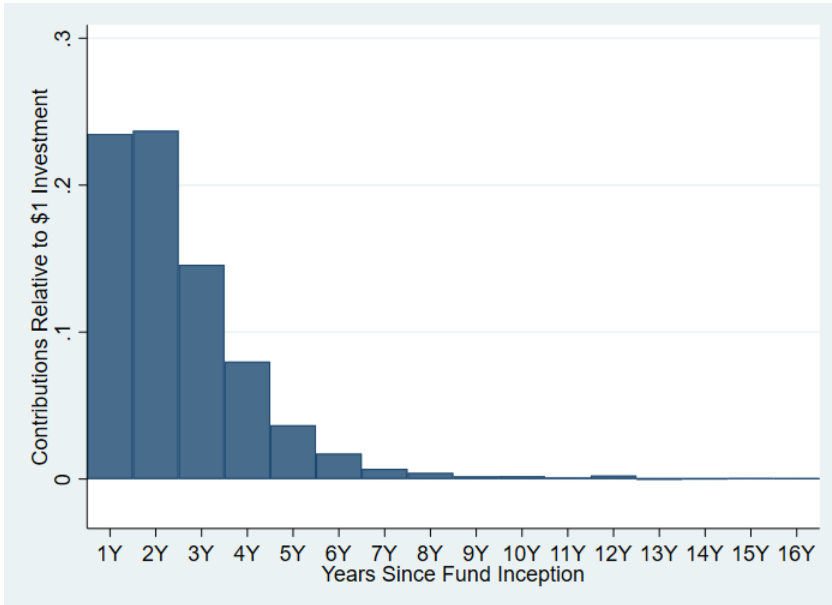
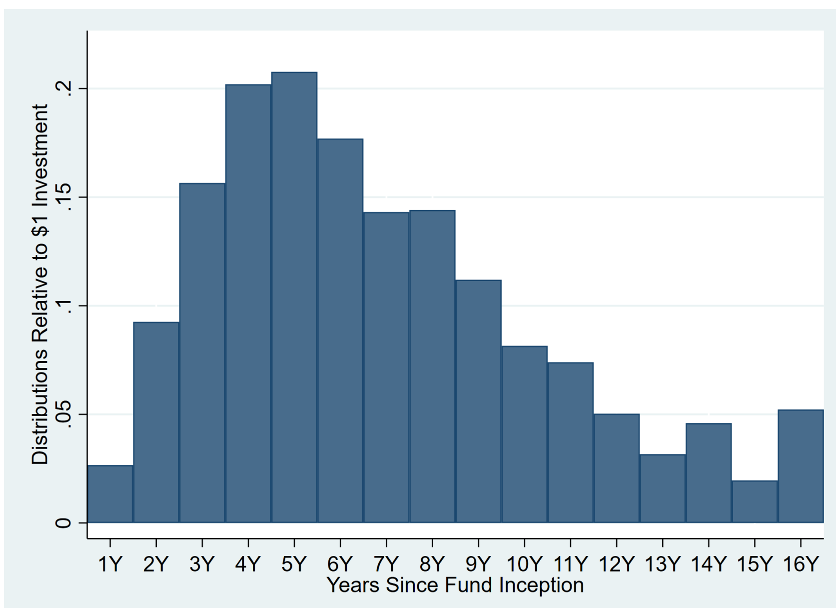


Figure 1 plots the assets under management (AUM) of the entire sample of credit funds in the Burgiss-MSCI sample by vintage year in which the fund was created. Source: Burgiss-MSCI

Figure 2: Private Credit Contributions and Distributions by Horizon



Panel A: Average contributions into Private Credit Funds by number of years since fund inception. Contributions are normalized to a $ 1 capital investment. Source: Burgiss-MSCI



Panel B: Average distributions into Private Credit Funds by number of years since fund inception. Distributions are normalized to a $ 1 capital investment. Source: Burgiss-MSCI

Figure 3: Simple Beta Market Replicating Portfolio Returns

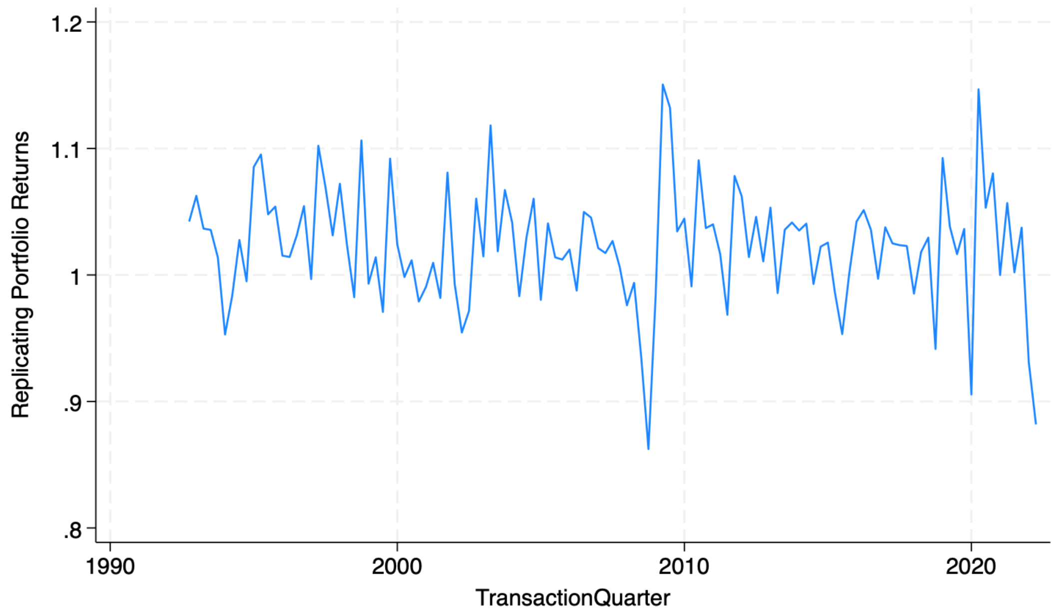


Figure 3 plots the market returns to the replicating return implied by the three significant risk factors estimated in Table 6.

Table 1: Fund and Investment Examples

Loan Level Example A		
Firm Name	Investment Type	Amount
CHMB	12% Loan	$1.4M
Merrick Systems	13% Loan	$3M
CAI Software	12% Loan	$6.75M
Cody Pools	Preferred Equity + 10.5% Loan	$16M

Fund Level Example A		
Fund/Lender Name	IRR	Fund Size
Main Street Capital II	7%	$159M

Loan Level Example B		
Firm Name	Investment Type	Amount
Immersive Media	13% Loan	$1.3M
B&W Growers	14% Loan	$10M
SOAR Transportation	Preferred Equity + Warrants	$16M
Abutec	Preferred Equity	$5.4M

Fund Level Example B		
Fund/Lender Name	IRR	Fund Size
CapitalSouth Partners Fund III	12%	$280M

Notes: Table 1 provides some examples of typical private credit funds and their underlying investments
Source: Pitchbook

Table 2: Investment Holdings in Private Credit Funds

	Mean	SD	Min	P25	P50	P75	Max	N
% Equity Investments	0.150	0.233	0.000	0.000	0.059	0.182	1.000	424
% Preferred Equity Investments	0.106	0.214	0.000	0.000	0.000	0.105	1.000	424
% LBO Investments	0.623	0.300	0.000	0.400	0.712	0.857	1.000	424
Any Equity Investments	0.590	0.492	0.000	0.000	1.000	1.000	1.000	424
% Equity Investments (Dollar Amt)	0.198	0.308	0.000	0.000	0.011	0.282	1.000	407
% Preferred Equity Investments (Dollar Amt)	0.131	0.268	0.000	0.000	0.000	0.107	1.000	407
% LBO Investments (Dollar Amt)	0.557	0.396	0.000	0.120	0.641	0.978	1.000	407

Subpanel: Recent Equity Investments (2020-2022)

Year	2020	2021	2022
% Equity Investments	22.2%	19.2%	26.8%

Notes: Table 2 provides descriptive statistics on the credit funds' holdings, including the fraction of investments that are equity or have any equity-like attachments (% Equity Investments). % Preferred Equity Investments measures the fraction of fund investments that are preferred equity. %LBO Investments measures the fraction of fund investments that are loans as a part of leverage buyouts. We report a discretized version of the variable 'Any Equity Investments' which is equal to 1 if any of the funds' investments are equity or have equity attachments. 'Dollar Amt' indicates if the percentage is value-weighted. The subpanel reports the fraction of investments that are equity, warrants, convertible debt, or preferred equity over the period 2020-2022. Source: Main Panel – Pitchbook; Sub Panel – Burgiss-MSCI;

Table 3: Fund-Level Cash-Flow Summary Statistics

	Mean	SD	Min	P25	P50	P75	Max	N
Fund Size	783	1151	2	169	418	903	10744	532
Fund Duration	5.578	1.817	1.803	4.362	5.412	6.698	13.478	532
IRR	0.086	0.104	-0.344	0.048	0.085	0.125	0.811	532
Amt. Distributed	1074	1677	3	224	589	1255	17194	532
Amt. Contributed	796	1162	2	173	437	925	10825	532
Rf NPV	0.339	0.532	-0.783	0.146	0.288	0.464	7.238	532
Generalist	0.160	0.367	0.000	0.000	0.000	0.000	1.000	532
Mezzanine	0.160	0.367	0.000	0.000	0.000	0.000	1.000	532
Distressed	0.305	0.461	0.000	0.000	0.000	1.000	1.000	532
Direct	0.353	0.478	0.000	0.000	0.000	1.000	1.000	532
Large Fund	0.541	0.499	0.000	0.000	1.000	1.000	1.000	532
Post-GFC Fund	0.487	0.500	0.000	0.000	0.000	1.000	1.000	532

Notes: Table 3 presents summary statistics on the net of fee LP private credit cash-flow dataset. Fund size is the present value of fund contributions discounted at the risk-free rate in $ millions. Fund Duration is the Macaulay Duration of the fund's cash-flow distributions. IRR is the IRR of the fund's net cash flows. Amt. Distributed is the raw sum of total distributions of a fund in $ millions. Amt. Contributed is the raw sum of total contributions of a fund in $ millions. Rf NPV is the present value using the risk-free rate of the fund distributions relative to a $1 capital investment into the fund. 'Generalist,' 'Distressed,' 'Direct,' 'Large Fund,' and 'Post-GFC Fund' are indicator variables used in the subsample analysis. Source: Burgiss-MSCI

Table 4: Baseline Fund Risk-Adjusted Returns

Panel A: Risk Free Benchmarks

	LP Net of Fee Cash-Flows	
	(1) IRR	(2) NPV
Estimate	0.086*** (0.004)	0.339*** (0.023)
Observations	532	532

Panel B: Risk-Adjusted Profit

	NPV				
	(1) Bonds Only	(2) CAPM	(3) Both	(4) Extended	(5) Elastic Net
Estimate	0.136*** (0.039)	0.033 (0.045)	0.032 (0.045)	0.035 (0.042)	0.032
Observations	532	532	532	506	506
R2	0.72	0.72	0.72	0.76	0.73

	Alpha				
	(6) Bonds Only	(7) CAPM	(8) Both	(9) Extended	(10) Elastic Net
Estimate	0.023*** (0.006)	0.006 (0.008)	0.006 (0.008)	0.006 (0.007)	0.006
Observations	532	532	532	506	506
R2	0.72	0.72	0.72	0.76	0.73

Panel C: GPME

	NPV		
	(1) Bonds	(2) Stocks	(3) Both
Estimate	0.176 (0.121)	0.042 (0.090)	0.031 (0.103)
$b1$	0.05	0.025	0.004
$b2$	4.86		-1.54
$b3$		1.98	2.19
Observations	532	532	532

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table 4 presents estimates of the risk-adjusted returns received by LPs. Panel A starts by reporting returns without adjusting for risk, including the mean IRR and mean NPV discounted at the risk-free rate. Panel B reports risk-adjusted returns using the risk-adjusted profit measure using only corporate bond and treasury bond factors (Column 1), treasury bond and the stock market CRSP VW portfolio (Column 2), both a BBB-rated corporate bond, the CRSP VW portfolio, as well as treasury bond factors (Column 3), an 'extended' specification that also includes, a HY-rated corporate bond factor, the Pastor and Stambaugh (2003) factor, and the U.S. LSTA leveraged loan factor (Column 4) and an elastic net version of the estimate (Column 5). In columns (6)- (10), we report the annualized "alpha" version of this risk-adjusted profit. In Panel C, we report the risk-adjusted NPV measures estimated by using GPME, which uses a high-yield corporate bond factor (Column 1), a stock factor (Column 2), and both corporate bond and stock factors (Column 3).
Source: Burgiss-MSCI

Table 5: Risk-Loadings From RAP Model

	ZCB	BBB Bond	Tbills	Stock Mkt
	(1)	(2)	(3)	(4)
Horizon 1	-0.000	0.005	0.043**	0.018**
	(0.001)	(0.025)	(0.018)	(0.009)
Horizon 2	0.004*	0.031*	0.026	0.020***
	(0.002)	(0.018)	(0.021)	(0.006)
Horizon 3	0.009***	0.035**	-0.007	0.016***
	(0.002)	(0.017)	(0.021)	(0.004)
Horizon 4	0.009***	0.038*	0.006	0.012**
	(0.003)	(0.022)	(0.024)	(0.005)
Horizon 5	-0.002	0.026	0.052	0.016
	(0.007)	(0.040)	(0.059)	(0.015)
Horizon 6	-0.002	0.052***	0.001	0.003
	(0.003)	(0.020)	(0.025)	(0.005)
Horizon 7	-0.003	0.044**	-0.009	0.001
	(0.003)	(0.017)	(0.020)	(0.004)
Horizon 8	-0.003	-0.020	0.051*	0.005
	(0.003)	(0.021)	(0.029)	(0.004)
Horizon 9	0.003	0.009	-0.007	0.002
	(0.004)	(0.011)	(0.018)	(0.003)
Horizon 10	0.000	-0.017	0.016	0.005
	(0.003)	(0.015)	(0.018)	(0.003)
Horizon 11	-0.001	-0.012	0.023	0.004
	(0.003)	(0.009)	(0.016)	(0.003)
Horizon 12	-0.000	-0.013	0.012	0.004*
	(0.002)	(0.009)	(0.008)	(0.002)
Horizon 13	0.003	0.006	-0.019	-0.001
	(0.003)	(0.007)	(0.013)	(0.001)
Horizon 14	-0.002	0.016*	-0.009	0.000
	(0.001)	(0.008)	(0.008)	(0.002)
Horizon 15	0.002*	-0.022***	0.017**	0.001
	(0.001)	(0.008)	(0.007)	(0.001)
Horizon 16	-0.002	0.010	-0.010	0.008*
	(0.003)	(0.021)	(0.015)	(0.005)
Rollover Loading		-0.120	-0.137**	0.122***
		(0.084)	(0.058)	(0.046)
Observations	26440	26440	26440	26440
F-stat p-value	0.001	0.000	0.040	0.002
R^2	0.723	0.723	0.723	0.723

t statistics in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table 5 presents the risk loadings from our risk-adjusted profit estimation corresponding to Equation (2). For the exposition, we report the loadings for a simplified model with a single stock and corporate bond factor. Each factor has horizon-specific loadings that correspond to the 'gain' capital benchmarks and a single loading for the 'rollover' benchmarks. ZCB corresponds to the zero coupon bond that are estimated using the horizon fixed effects. The point estimates associated with these estimates correspond to columns (3) and (8) in Panel B of Table 4.
Source: Burgiss-MSCI

Table 6: Simple Beta Representation

	Market Replicating Portfolio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CRSP VW	0.425***						0.416***
	(0.047)						(0.060)
10Y Tbond		-0.256					0.440***
		(0.160)					(0.132)
BBB Bond			1.201***				-0.116
			(0.220)				(0.287)
HY Bond				0.649***			0.386***
				(0.065)			(0.120)
LSTA Loan					0.719***		0.016
					(.092)		(0.114)
P-S Liq						0.263***	-0.036
						(.038)	(0.061)
Constant	0.009***	0.018***	0.005	0.006**	0.010***	0.009***	0.001
	(0.003)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)
R-squared	0.664	0.043	0.370	0.600	0.480	0.516	0.838

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: Table 6 provides a simplified summary of the beta loadings from our full factor loading specification. The outcome variable is the average time series market returns to the replicating portfolio strategy implied by the full multi-horizon factor specification. The right-hand side consists of excess returns (computed by subtracting out the return of a 3M Treasury bond) of factors: the CRSP VW index, 10Y T-Bond, HY Bond, U.S. LSTA Leveraged Loan Index, and Pastor and Stambaugh (2003) liquidity return. The market returns are computed from the fully saturated elastic net specification.
Source: Burgiss-MSCI

Table 7: Fund-Level Heterogeneity in Risk-Adjusted Returns

	IRR	NPV (Rf)	RAP - Bonds	RAP	Num Funds
	(1)	(2)	(3)	(4)	(5)
Full Sample	0.086***	0.339***	0.136***	0.035	532
	(0.00)	(0.02)	(0.04)	(0.04)	
Direct Lenders	0.091***	0.366***	0.214***	0.095*	188
	(0.01)	(0.03)	(0.04)	(0.05)	
Generalist	0.068***	0.233***	0.032	-0.012	85
	(0.01)	(0.04)	(0.07)	(0.83)	
Senior	0.075***	0.267***	0.060	0.054	50
	(0.01)	(0.03)	(0.08)	(0.41)	
Mezzanine	0.084***	0.331***	0.089	-0.011	188
	(0.01)	(0.03)	(0.08)	(0.08)	
Distressed	0.083***	0.354***	0.158*	0.132	162
	(0.01)	(0.05)	(0.09)	(0.12)	
Small	0.079***	0.378***	0.189***	0.071	244
	(0.01)	(0.04)	(0.07)	(0.07)	
Large	0.091***	0.305***	0.100***	0.018	288
	(0.01)	(0.02)	(0.04)	(0.05)	
No Outliers	0.085***	0.314***	0.109***	0.021	520
	(0.00)	(0.01)	(0.03)	(0.03)	
Pre GFC	0.089***	0.345***	0.040	-0.056	273
	(0.01)	(0.04)	(0.07)	(0.08)	
Post GFC	0.082***	0.332***	0.057	0.099	259
	(0.00)	(0.02)	(0.06)	(0.06)	

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table 7 reports the returns and risk-adjusted return measures on a subsample of private credit funds. We split the sample by fund type, including “direct lenders,” “generalists,” “mezzanine,” “distressed,” “small,” “large” funds (defined as above /below median fund size), “Pre GFC” funds, and “Post GFC” funds. We also report results when dropping outliers in our fund sample. We report estimates using the “extended” factor specification.
Source: Burgiss-MSCI

Table 8: Persistence

RAP Peristence

	RAP			
	(1)	(2)	(3)	(4)
L.RAP	0.070			
	(0.102)			
L2.RAP		-0.002		
		(0.040)		
L3.RAP			-0.071	
			(0.135)	
L4.RAP				-0.399
				(0.244)
logsize	-0.044	-0.008	-0.002	0.085
	(0.030)	(0.030)	(0.052)	(0.239)
duration	0.021	0.005	0.090	-0.036
	(0.026)	(0.037)	(0.054)	(0.177)
Observations	133	66	38	21
Time FE	Yes	Yes	Yes	Yes
R^2	0.386	0.459	0.701	0.908

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table 8 tests for persistence across fund family managers in private debt. Risk-adjusted returns at the fund level are estimated using the assumption that all funds share the same risk loadings. This table tests for persistence by regressing risk-adjusted returns on lagged risk-adjusted returns where 'L1.' indicates the risk-adjusted return on that fund family managers' last private debt funds. 'L2.' represents the fund family's risk-adjusted return from two funds ago and so on. Standard errors clustered by fund family are in parentheses.
Source: Burgiss-MSCI

Table 9: GP Fees and Gross Risk-Adjusted Returns

Panel A: GP Fee Estimates

	1.5 / 15 Contract	2.0 / 20 Contract
	(1)	(2)
Estimate	0.032*** (0.001)	0.042*** (0.001)
Observations	532	532

Panel B: Gross Risk-Adjusted Cfs

	IRR	NPV (Rf)	Alpha				
	(1)	(2)	(3) Bonds	(4) CAPM	(5) Both	(6) Elastic Net	(7) GPME
Estimate	0.145*** (0.016)	0.456*** (0.042)	0.048*** (0.010)	0.057*** (0.011)	0.059*** (0.012)	0.046	0.042*** (0.01)
Observations	55	55	55	55	55	55	55

standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Panel A reports estimates of GP fees using the typical private credit fund contract is 1.5 management fee with a 15% carried interest, assuming a 6% hurdle or 2.0 management fee with 20% carried interest, assuming a 8% hurdle. We back out estimates of these annual fees using the funds' IRRS. Panel B reports the risk adjusted returns of the gross cash-flows (i.e. before GP fees) a the subsample of funds for which Burgiss-MSCI has access to the payments between funds and their portfolio firms.
Source: Burgiss-MSCI

Table 10: Risk-Adjusted Returns on Nonbank Syndicated Loans

Panel A: Bank Estimates

	NPV		Alpha	
	(1)	(2)	(3)	(4)
	RAP - Bonds	RAP	Alpha - Bonds	Alpha
Estimate	3.400***	3.142***	1.807***	1.697***
	(19.07)	(15.58)	(18.44)	(14.07)

Panel B: Nonbank Estimates

	NPV		Alpha	
	(1)	(2)	(3)	(4)
	RAP - Bonds	RAP	Alpha - Bonds	Alpha
Estimate	4.359***	4.146***	2.430***	2.293***
	(7.97)	(7.07)	(8.62)	(7.53)

t statistics in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table 10 estimates the gross risk-adjusted returns on the realized cash-flows of syndicated loans in dealscan, for which at least one nonbank part of the lead syndicate. Panel A reports the risk adjusted returns only on the sample of loans for which there is only a single bank as the lead agent in the syndicate. Panel B reports the risk adjusted returns only on the sample of loans for which there is a single nonbank as the lead agent in the syndicate.
Source: Dealscan

Internet Appendix

A Additional Tables & Figures

Table A1: Time Clustered Standard Errors

	NPV			
	(1) Bonds Only	(2) CAPM	(3) Both	(4) Extended
Estimate	0.136*** (0.041)	0.033 (0.055)	0.032 (0.055)	0.035 (0.062)
Observations	532	532	532	506
R2	0.72	0.72	0.72	0.76

Notes: Table A1 repeats the estimates from Table 6 using time clustered bootstrapped standard errors.

Table A2: Sensitivity to number of H horizons

	18 year Horizon	14 year Horizon
RAP	0.032 (0.045)	0.027 (0.045)

Notes: Table A2 reports the baseline RAP model estimates (using both corporate bonds and equities) when we alternatively specify a maximum of 14 year horizons or 18 year horizons.

Table A3: Different Sample Periods

Sample	Outstanding NAV	Sample size	RAP
Vintage ≤ 2018	0.259***	707	0.049
	(0.014)		(0.030)
Vintage ≤ 2017	0.229***	657	0.046
	(0.014)		(0.034)
Vintage ≤ 2016	0.188***	597	0.030
	(0.014)		(0.040)
Vintage ≤ 2015	0.133***	532	0.035
	(0.012)		(0.042)
Vintage ≤ 2014	0.103***	472	-0.020
	(0.011)		(0.055)
Vintage ≤ 2013	0.089***	420	0.019
	(0.012)		(0.056)
Vintage ≤ 2012	0.074***	374	0.008
	(0.012)		(0.067)
Vintage ≤ 2011	0.064***	329	-0.035
	(0.013)		(0.067)
Vintage ≤ 2010	0.053***	293	-0.058
	(0.012)		(0.086)

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table A3 repeats the baseline RAP model estimation using different sample windows of fund vintages. In the table, we report how the sample size of funds, the outstanding NAV at the end of the sample (2022Q4), and the corresponding risk-adjusted profit estimate (using the extended model).

Table A4: Discounting Residuals

	NPV
GPME(e^i_{t+h})	-0.001
	(0.019)

Notes: Table A4 presents the results from discounting the residuals from RAP model using GPME to test the identification assumption that the unspanned risk is orthogonal to the priced risk. In step (1) we compute the residuals from the RAP model using both corporate bonds and equities and in step (2), we discount these residuals using GPME estimated from using both corporate bonds and equities

Figure A1: Private Debt Secondary Market Discount

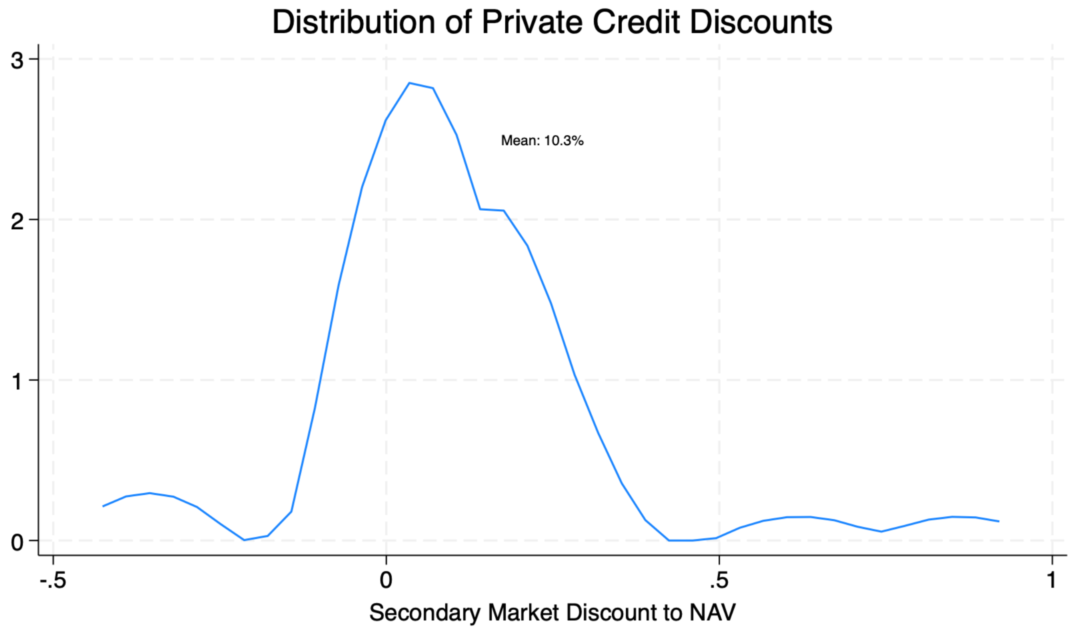


Figure A1 plots the distribution of estimated discount to NAV when LPs sell their private debt stakes. To estimate these discounts, we follow the methodology in Andonov et al. (2024) on a sample of private credit funds. The methodology compares the change in NAV of an LP who sells their stake in a private credit fund to the change in NAVs of the remaining LPs in the fund. Source: Pitchbook.

Table A5: Alternative Liquidity Assumption

	NPV
RAP (100% Liquidation)	0.067
	(0.051)

Notes: Table A5 presents the results from estimating the RAP model (using both corporate bonds and equity) under the alternative assumption that investors can recover 100% of NAV when selling their LP private credit stake before its maturity.

Table A6: Net Risk-Adjusted Returns on Gross Subsample

	NPV			
	(1) Bonds Only	(2) CAPM	(3) Both	(4) Extended
Estimate	0.014	-0.007	-0.007	0.021
	(0.016)	(0.030)	(0.032)	(0.037)

Notes: Table A6 presents the results (in alpha terms) from estimating the RAP model on the net of fee LP cash flows for the subsample of credit funds, for which we have gross cash flow data.

Table A7: Persistence – Top Performers

RAP Peristence

	RAP			
	(1)	(2)	(3)	(4)
L.Top Perf.	0.061			
	(0.151)			
L2.Top Perf.		0.195		
		(0.175)		
L3.Top Perf.			-0.090	
			(0.211)	
L4.Top Perf.				-1.317
				(1.051)
logsize	-0.053	-0.017	0.072	0.011
	(0.053)	(0.089)	(0.167)	(0.371)
duration	0.066	0.069	0.165	0.638
	(0.044)	(0.096)	(0.141)	(0.395)
Observations	133	66	38	21
Time FE	Yes	Yes	Yes	Yes
R^2	0.308	0.338	0.601	0.932

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Notes: Table A7 repeats the test for persistence across fund family managers in private debt using indicators for whether a fund manager was in the top quartile of performers in a given quarter. Risk-adjusted returns at the fund level are estimated using the assumption that all funds share the same risk loadings. This table tests for persistence by regressing risk-adjusted returns on lagged risk-adjusted returns where 'L1.' indicates the risk-adjusted return on that fund family managers' last private debt funds. 'L2.' represents the fund family's risk-adjusted return from two funds ago and so on. Standard errors clustered by fund family are in parentheses.
Source: Burgiss-MSCI

B Benchmark Derivations

B.1 Rollover Investment Benchmark

Formally, a rollover strategy invests z^i_{t-1} in a security, k, with one-period return $r_{t,t+1}$ at the beginning of the period and pays out any return on this capital. Each period, if the matched investment balance, z^i_t, increases, then the benchmark fund requires an additional $z_t - z_{t-1}$ capital contribution. If the investment balance declines, the benchmark pays out the change in investment balance $z_t - z_{t-1}$ at the end of the period after the return is realized.
Define the payoff to this strategy:

$$\tilde{F}^{i,k}_{t+h} = z^i_{t+h-1} r^k_{t,t+h} - z^i_{t+h-1} + max(z^i_{t+h-1} - z^i_{t+h}, 0) \tag{A.1}$$

Because, the investment strategy involves investing an initial capital amount z^i_0 and funding the increase in capital amount $z^i_{t+h} - z^i_{t+h-1}$ in each period, we show the price to implement this strategy is:

$$E_t[\sum_{j=1}^{H} M_{t,t+j} \tilde{F}_{t+j}] = z^i_0 - \sum_{j=1}^{H} P^{\$}_{t,j} min(z^i_{t+j-1} - z^i_{t+j}, 0) \tag{A.2}$$

Proof: Let $z_t \in [0,1]$ for $t \leq H$. Assume the law of one price holds for every cash flow horizon and $E_{t+h-1}[m_{t,t+h} r_{t+h}] = 1$ where m and r are one period SDF and returns, respectively. Define the pricing function $P_t(F_{t+h}) = E_t[M_{t,t+h} F_{t+h}]$. $M_{t,t+h}$ is the cumulatively compounded one-period SDF. This implies $P_t(F_{t+h}) = P_t(P_{t+1}(F_{t+h}))$. Additionally, assume that an investor knows the capital call schedule in advance in their initial time information set.
Normalize t = 0. we will prove $P_0(\sum_{j=1}^{H} \tilde{F}^{i,k}_j) = z^i_0 - \sum_{j=1}^{H} P^{\$}_{t,j} min(z^i_{t+j-1} - z^i_{t+j}, 0) - P_0(z_h)$ by induction.
Set H = 1.
$P_0(\sum_{j=1}^{1} \tilde{F}^{i,k}_j) = P_0(\tilde{F}^{i,k}_1) = E_0[m_{0,1}(z^i_0 r^k_1 - z^i_0 + max(z^i_0 - z^i_1, 0))] =$
$z^i_0 - z^i_0 - P_0(z^i_0 - z^i_1) - P_0(min(z^i_0 - z^i_1, 0)) = z^i_0 - P_0(z^i_1) - P^{\$}_{0,1}(min(z^i_0 - z^i_1, 0))$. Next, assume that $P_0(\sum_{j=1}^{n+m} \tilde{F}^{i,k}_j) = z_0 - \sum_{j=1}^{n+m} P^{\$}_{0,j} min(z^i_{t+j-1} - z^i_{t+j}, 0) - P_0(z_{n+m})$.
It follows that

$$\begin{aligned} P_0(\sum_{j=1}^{n+m+1} \tilde{F}^{i,k}_j) - P_0(\sum_{j=1}^{n+m} \tilde{F}^{i,k}_j) = P_0(\tilde{F}^{i,k}_{n+m+1}) = \\ P_0(z^i_{n+m} r^k_{n+m+1} - z^i_{n+m} + max(z^i_{n+m} - z^i_{n+m+1}, 0)) = \\ P_0(P_{n+m}(z^i_{n+m} r^k_{n+m+1} - z^i_{n+m} + max(z^i_{n+m} - z^i_{n+m+1}, 0)) = \\ P_0(max(z^i_{n+m} - z^i_{n+m+1}, 0))) = \\ P_0(z^i_{n+m} - z^i_{n+m+1}) - P_0(min(z^i_{n+m} - z^i_{n+m+1}, 0))) \end{aligned}$$

Therefore $P_0(\sum_{j=1}^{n+m+1} \tilde{F}^{i,k}_j) = z_0 - \sum_{j=1}^{n+m} P^{\$}_{0,j} min(z^i_{t+j-1} - z^i_{t+j}, 0) - P_0(min(z^i_{n+m} - z^i_{n+m+1}, 0)) + P_0(z^i_{n+m} - z^i_{n+m+1}) - P_0(z^i_{n+m}) = z_0 - \sum_{j=1}^{n+m+1} P^{\$}_{0,j} min(z^i_{t+j-1} - z^i_{t+j}, 0) - P_0(z^i_{n+m+1})$. The last step follows by applying the assumption that the capital calls are in the time 0 information set, meaning that they can be discounted to time 0 using $P^{\$}_{0,n+m+1}$. Thus, the premise is proved by induction.

Assume that for the first date $z_0 < 1$ and $z_H = 0$ the final maturity date is known, after which the investment balance will be zero with certainty. (Note that H can be set arbitrarily large while z_t for t less than H can take on any values).
With this additional assumption, it immediately follows that

$$P_0(\sum_{j=1}^{H} \tilde{F}_j^{i,k}) = z_0^i - \sum_{j=1}^{H} P_{t,j}^{\$} min(z_{t+j-1}^i - z_{t+j}^i, 0).$$

□

B.2 Gain Investment Benchmark

Define a gain benchmark strategy as follows. The gain strategy starts by investing \$1 at time t in security, k, that earns one-period gross return $r_{t,t+1}^k$.

$$\tilde{X}_{t+1}^{i,k} = r_{t,t+1}^k \tag{A.3}$$

In subsequent periods ($h > 1$), a gain investment benchmark reinvests the accumulated return in security k but also moves some of its capital into a risk-free asset as the underlying loan balance is paid down. Let $\tilde{X}_{t+h}^{i,k}$ denote the capital balance in the risky asset and $\tilde{Y}_{t+h}^{i,k}$ denote the capital balance that has moved to the risk-free asset. Each period, the amount of capital transferred to the risk-free asset is proportional to the percentage change in its matched investment balance from the previous period, $\frac{z_{t+h}^i}{z_{t+h-1}^i}$. Because the investment balance may initially increase from capital contributions, we only consider decreases in the investment balances: $\frac{z_{t+h}^i}{z_{t+h-1}^i} \mathbb{1}[\frac{z_{t+h}^i}{z_{t+h-1}^i} < 1]$

$$\tilde{X}_{t+h}^{i,k} = r_{t+h-1,t+h}^k \tilde{X}_{t+h-1}^{i,k} (1 - \frac{z_{t+h}^i}{z_{t+h-1}^i} \mathbb{1}[\frac{z_{t+h}^i}{z_{t+h-1}^i} < 1]) \tag{A.4}$$

$$\tilde{Y}_{t+h}^{i,k} = r_{t+h-1,t+h}^f (\tilde{Y}_{t+h-1}^{i,k}) + r_{t+h-1,t+h}^k \tilde{X}_{t+h-1}^{i,k} \frac{z_{t+h}^i}{z_{t+h-1}^i} \mathbb{1}[\frac{z_{t+h}^i}{z_{t+h-1}^i} < 1] \tag{A.5}$$

The total accumulated return to a gain investment strategy across both balances held until horizon h can be written as

$$\tilde{L}_{t+h}^{i,k} = \tilde{X}_{t+h}^{i,k} + \tilde{Y}_{t+h}^{i,k} \tag{A.6}$$

We show the price of this investment strategy's cash flow held until investment horizon h is equal to the \$1 of invested capital:

$$E_t[M_{t,t+h} \tilde{L}_{t+h}^{i,k}] = 1 \tag{A.7}$$

The intuition of the proof is that the law of one price (LOP) will price the returns.

Proof: We will prove $E_t[M_{t,t+h} \tilde{L}_{t+h}^{i,k}] = 1$ by induction. Normalize t = 0.
Set h = 1. $E_t[M_{0,1} \tilde{L}_1^{i,k}] = E_t[M_{0,1} \tilde{X}_1^{i,k}] = E_t[M_{0,1} r_{0,1}^k] = 1$ by (A.3) and the LOP.

Next assume that $E_0[M_{0,n+m}\tilde{L}^{i,k}_{n+m}] = 1$.

For ease of notation, define the pricing function of any cash flow $C_{t,t+h}$ as $P_t(C_{t,t+h}) = E_t[M_{t,t+h}C_{t,t+h}]$.

Note that $P_{n+m}[\tilde{L}^{i,k}_{n+m+1}] = P_{n+m}[(\tilde{X}^{i,k}_{n+m+1})] + P_{n+m}[(\tilde{Y}^{i,k}_{n+m+1})] = P_{n+m}[r^k_{t+h-1,t+h}\tilde{X}^{i,k}_{t+h-1}(1 - \frac{z^i_{t+h}}{z^i_{t+h-1}}\mathbb{1}[\frac{z^i_{t+h}}{z^i_{t+h-1}} < 1])] + P_{n+m}[r^f_{t+h-1,t+h}(\tilde{Y}^{i,k}_{t+h-1}) + r^k_{t+h-1,t+h}\tilde{X}^{i,k}_{t+h-1}(\frac{z^i_{t+h}}{z^i_{t+h-1}}\mathbb{1}[\frac{z^i_{t+h}}{z^i_{t+h-1}} < 1]))] = \tilde{X}^{i,k}_{t+h-1}(1 - \frac{z^i_{t+h}}{z^i_{t+h-1}}\mathbb{1}[\frac{z^i_{t+h}}{z^i_{t+h-1}} < 1]) + \tilde{Y}^{i,k}_{t+h-1} + \tilde{X}^{i,k}_{t+h-1}(\frac{z^i_{t+h}}{z^i_{t+h-1}}\mathbb{1}[\frac{z^i_{t+h}}{z^i_{t+h-1}} < 1]) = \tilde{X}^{i,k}_{n+m} + \tilde{Y}^{i,k}_{n+m}$ by the LOP and the fact that the z^i_{n+m} investment balances known are in the $n+m$ information set.

It immediately follows that $E_0[M_{0,n+m+1}\tilde{L}^{i,k}_{n+m+1}] = P_0[\tilde{L}^{i,k}_{n+m+1}] = P_0[P_{n+m}[\tilde{L}^{i,k}_{n+m+1}]] = P_0[(\tilde{X}^{i,k}_{n+m} + \tilde{Y}^{i,k}_{n+m})] = P_0[(\tilde{L}^{i,k}_{n+m})] = E_0[M_{0,n+m}\tilde{L}^{i,k}_{n+m}] = 1$ by assumption. □

A corollary is that long-short gain benchmarks that go long security k and short security j have price \$0.

$$\tilde{G}^{i,k,j}_{t+h} = \tilde{L}^{i,k}_{t+h} - \tilde{L}^{i,j}_{t+h}. \tag{A.8}$$

The price of this long-short investment cash flow for any maturity horizon h is zero:

$$E_t[M_{t,t+h}\tilde{G}^{i,k,j}_{t+h}] = 0 \tag{A.9}$$