

The Rise of Private Debt Real Estate Funds: A Performance and Risk Analysis

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Abstract:

We provide a first look at a rapidly growing asset class: private debt real estate (PDRE) funds. PDRE funds produce raw returns comparable to or better than private equity real estate (PERE) funds, despite generally holding more senior positions in the capital stack. After benchmarking against public fixed income assets, we find PDRE funds outperform by generating positive direct alphas and public market equivalents exceeding one. In contrast, PERE funds underperform their public benchmarks. Using the risk-adjusted profit methodology of Erel et al. (2025) to account for equity-like risk exposures embedded in many PDRE fund portfolios, we find that outperformance persists after incorporating real estate equity benchmarks. These findings suggest PDRE funds present a competitive risk-return profile for investors.

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The Rise of Private Debt Real Estate Funds: A Performance and Risk Analysis

The global private credit market is currently valued at \$1.9 trillion and is forecasted to reach \$3 trillion by 2028. Real estate private lending constitutes about 12-14% of these totals.¹ Demand for private lending sources increased sharply following the Great Financial Crisis when banks and other traditional lenders de-risked their loan portfolios.² Specific to private real estate lending, evidence continues to mount that banks have engaged in “extend and pretend” strategies to delay recognition of CRE loan losses (Crosignani and Prazad, 2024).³ These maturity extensions have created a “maturity wall” of CRE debt, which require large amounts of capital to refinance. S&P Global estimates that more than \$4 trillion of commercial mortgages mature between 2025 and 2028.⁴ With commercial banks increasingly on the sidelines, private sources of CRE debt are expected to provide an increasing percentage of the debt capital deployed in CRE markets.⁵

Industry estimates claim PDRE funds rose to a record 14% of all commercial real estate lending in the first half of 2025 and are expected to continue to rise.⁶ Despite this significant growth in private real estate debt, and the central role private debt is, and will, play in financing maturing loans, the academic literature has yet to formally investigate private debt real estate (PDRE) funds, one of the main vehicles used to attract capital to finance PDRE lending. This study addresses this gap in the literature by providing a first look at the market size and performance of closed-end PDRE funds.

¹ https://cdn.pfcdn.com/cms1/pgim-real-estate/sites/default/files/PREA_Fall_2024_Quarterly_Debt.pdf

² According to a report from IQEQ, private debt fundraising has increased by five times since the financial crisis. <https://iqeq.com/insights/unlocking-opportunities-the-rise-of-private-debt-funds-in-institutional-investor-portfolios/>

³ Banks face incentives to extend loans, carried at book values, rather than recognize losses on distressed CRE mortgages on their books. This has led to increased loan modifications on debt. The Goldman Sachs report “Corporate Credit Concerns” discusses this in more detail.

⁴ <https://www.spglobal.com/market-intelligence/en/news-insights/research/commercial-real-estate-maturity-wall-950b-in-2024-peaks-in-2027>

⁵ [The shift in real estate lending: private credit steps in as banks step out | Vistra](#)

⁶ <https://www.principalam.com/us/insights/real-estate/private-real-estate-debt-banner-2025-more-room-run>

We use Preqin data to size the market and find that 2,170 PDRE funds raised by 768 fund families across all vintages (1969 to 2023) have raised \$481 billion. Committed capital across 2009-2013 vintages totaled \$64.1 billion. That figure rose to \$158.2 billion in 2014-2018 and \$213.8 billion in 2019-2023, representing more than a three-fold increase over the period. While PDRE funds have experienced recent growth, they are still dominated by private equity real estate (PERE) funds, a market approximately six times the size of PDRE funds. Across both PDRE and PERE funds, the average (median) fund size is about \$300 (\$100) million.

To evaluate performance, we use data from MSCI Private Capital Universe (MSCI) to calculate internal rates of return (IRRs), multiples on invested capital (MOICs), direct alphas, public market equivalents (PMEs), and risk-adjusted profit (RAP) measures. We use MSCI rather than Preqin for performance analysis because MSCI provides cash-flow-level data sourced directly from institutional limited partners. By contrast, Preqin data are primarily obtained through FOIA requests to public pension funds supplemented with voluntary general partner reporting (Munday et al., 2019; Erel et al., 2025). To properly estimate performance, we require enough time after a fund is raised and deployed so that we have sufficient cash flow data for each fund. Therefore, we use 2019 as the latest vintage in our performance sample. The pooled IRR of our full PDRE sample is 8.34%, compared to 7.27% for PERE funds. Median IRRs for PDRE and PERE funds are almost identical at 8.37% and 8.49%, respectively. These raw returns are surprisingly similar given PDRE funds hold senior positions in the capital stack and generate returns primarily through contractual interest payments, while PERE funds bear direct exposure to property value fluctuations and residual equity risk. *Ex-ante*, one would expect PDRE funds to earn considerably lower returns than PERE funds.

Investigating further, we evaluate PDRE and PERE fund returns against appropriate public market benchmarks: public debt indices for PDRE and equity REIT indices for PERE. Direct alphas (Gredil et al., 2023) and PMEs (Kaplan and Schoar, 2005) measure whether each fund type has outperformed an investable alternative. PDRE funds exhibit positive direct alphas across all three public

debt benchmarks. Pooled direct alphas are 2.92% relative to investment grade CMBS, 2.00% relative to leveraged loans, and 1.72% relative to mortgage REITs. Pooled PMEs range from 1.07 to 1.11, and between 66% and 75% of PDRE funds produce a PME greater than one, depending on the benchmark. PERE funds, by contrast, have underperformed their natural public market comparator. The pooled direct alpha relative to equity REITs is -2.07%, with only 46% of PERE funds producing positives alphas. The pooled PME is 0.92; 47% of funds generated a PME greater than one. These results indicate that PDRE funds have delivered returns above what was available in public debt markets, while PERE funds have not kept pace with public equity REITs.⁷

However, we note that the "debt" label attached to PDRE funds obscures considerable heterogeneity in underlying risk exposure. Of the 1,303 funds in our Preqin sample that report the debt types in which they invest, 36% invest in first mortgages and 21% invest in senior debt. However, 38% of sample funds invest in mezzanine loans, 20% in bridge loans, 18% in preferred equity, and 12% in distressed debt. Investments in the moderate- and high-risk categories often expose investors to loss profiles and return distributions that more closely resemble equity rather than senior debt. If PDRE funds carry meaningful equity-like risk, that may explain the higher IRRs, and positive direct alphas may reflect compensation for risk rather than genuine outperformance. Whether PDRE funds deliver positive returns after accounting for their exposure to both debt and equity risk factors is an open question. We employ the risk-adjusted profit (RAP) methodology of Erel et al. (2025), which constructs a replicating portfolio from multiple public market benchmarks, including both debt and equity indices. This approach captures the full spectrum of systematic risk exposures embedded in PDRE fund cash flows.

⁷ The underperformance of PERE relative to equity REITs is well documented and our results are consistent. See, for example, Chacon et al. (2026), Pagliari et al. (2005), Riddiough et al. (2005), Ling and Naranjo, 2015; Carlo et al. (2021); Arnold et al. (2021); Li and Riddiough (2023; 2024; and 2025).

The RAP measure uses cashflow level data to estimate whether PDRE fund returns can be replicated by a set of publicly traded assets. Our RAP analysis generates fund level alphas, along with the statistical significance of estimated alphas across all funds in our sample. In contrast to direct alphas and PMEs, RAPs dynamically choose benchmarks, and a PDRE fund with equity-like cashflow characteristics will be appropriately benchmarked against appropriate instruments (e.g. equity REITs would be included in the benchmarking). Using the RAP methodology, we find that PDRE funds generate statistically significant positive alphas of approximately 3.3% to 3.9% when benchmarked against real estate debt and broader debt market indices. Notably, this outperformance persists even after accounting for equity REIT exposure, with alphas remaining significant at approximately 2.4% to 2.9%. Only when general equities are added as a replicating instrument does the alpha of sample PDRE funds lose statistical and economic significance.⁸ These results are consistent with the results of our direct alpha and PME analyses and suggest PDRE funds have outperformed on a risk/benchmark-adjusted basis.

Overall, we find that closed-end real estate debt funds have performed well on both a raw (IRR) return basis, when controlling for the returns on investable benchmarks, and on a fully risk-adjusted basis. However, to allow enough time for funds to be deployed and cash flows to be realized, our MSCI performance sample ends with the 2019 vintage. Given the interest rate hikes of 2022 and recent media reports highlighting troubles in private credit markets,⁹ an extension of our study with data including the more recent period may produce results less favorable for PDRE funds.

The remainder of our study consists of three sections: we first provide an institutional background of the private debt space, paying particular attention to PDRE funds' role in the debt space, and review the extant literature. Secondly, we conduct an empirical market sizing exercise for PDRE funds.

⁸ A zero net-of-fee alpha does not imply poor performance; it indicates that PDRE fund gross returns are sufficient to compensate investors for all systematic risks in the replicating portfolio and to cover fees.

⁹ See, for example, [Apollo Is Latest Private Credit Firm to Limit Redemptions - Business Insider](#)

Following that, we conduct performance measurement analyses on both real estate debt and equity funds and finally, we conclude.

Institutional Background: Private Debt

Private debt or private credit (used interchangeably) refers to debt or debt-like non—bank debt financing that is not issued or traded in public markets, and negotiated directly between borrowers and investors. Private credit instruments are characterized by limited secondary liquidity, infrequent valuations, and higher spreads relative to public debt with otherwise comparable credit characteristics. The asset class encompasses direct lending, distressed debt, mezzanine financing, specialty finance, and real estate debt, with capital typically committed by limited partners, often in the form of a closed-end fund, to finance investments managed by general partners who source, underwrite, and service loans on behalf of investors.¹⁰

Private credit has grown rapidly over the past decade. Industry estimates place global assets under management at approximately 1.9 trillion. U.S. defined benefit pension fund allocations to private credit among the 200 largest retirement plans grew from \$16.1 billion in 2018 to \$126.2 billion by the third quarter of 2023.¹¹ Correspondingly, private debt fund managers raised \$74.1 billion in the first quarter of 2025 alone.¹² Growth in this sector has been driven, in part, by post-crisis bank regulation under Basel III, which increased capital requirements and encouraged banks to reduce commercial lending exposure, creating a funding

¹⁰ Alternatives to closed-end fund structures, such as limited liability companies (LLCs), open-end funds, and evergreen structures are also used to raise equity capital to invest in various forms of debt.

¹¹ <https://www.pionline.com/alternatives/investors-upping-big-bets-private-credit-counting-income-return-and-diversification/>

¹²<https://media.privatedebtinvestor.com/uploads/2025/04/q1-2025-fundraising-report-pdi.pdf>

gap to be exploited by nonbank lenders.¹³ Rising interest rates in 2022 further boosted the demand for floating-rate private credit instruments among yield-seeking institutional investors.

Private Real Estate Debt: Anatomy and Distinguishing Features

Private real estate debt, a subset of the broader private credit universe, consists of nonpublic, negotiated loans secured by real estate collateral. These instruments are typically originated and held within closed-end fund vehicles structured as limited partnerships. The asset class is distinct from public CRE debt markets, which include agency lending and publicly traded commercial mortgage-backed securities (CMBS). PREA 2024 Commercial Real Estate Outlook estimates that the global private credit market in CRE reached \$238 billion in 2023 and is expected to grow to \$400 billion by the end of the decade.¹⁴ Growth has been catalyzed by approximately \$4 trillion in CRE loan maturities expected between 2025 and 2028, creating refinancing demand and by the expanding role of investor-driven lenders, including debt funds and mortgage REITs, in CRE origination.

Several features distinguish private real estate debt from other private credit strategies. First, underwriting is collateral driven. Unlike corporate direct lending, which is underwritten primarily against enterprise value and cash flow coverage, real estate debt underwriting centers on property-level collateral value, in-place net operating income, and refinance feasibility. Loan-to-value ratios, debt service coverage, and debt yield serve as the primary constraints faced by borrowers seeking to maximize leverage.¹⁵ This collateral orientation makes the loan lifecycle

¹³https://www.dws.com/globalassets/institutional/research/pdfs/Understanding_US_Real_Estate_Debt.pdf

¹⁴ This \$238B figure, which also comes from Preqin, represents the total assets under management as of 2023. Our \$481B figure noted earlier refers to total capital raised from the beginning of the sample to 2023.

¹⁵ The debt coverage ratio is equal to the collateral property's net operating income (NOI) divided by debt service. The debt yield ratio is equal to NOI divided by the loan amount.

highly sensitive to local real estate market conditions, particularly property valuations, capitalization rates, and interest rate levels, in ways that differ fundamentally from the credit risk drivers of corporate lending.

This collateral backing also contributes to comparatively favorable loss-given-default outcomes. The Giliberto-Levy Commercial Mortgage Performance Index, which tracks the credit performance of senior commercial real estate loans, has recorded modest average annual credit losses since 2009. By comparison, unsecured corporate bonds have historically exhibited lower recovery rates upon default, suggesting that the tangible collateral and structured protective features (loan covenants) of real estate lending tend to limit downside exposure relative to comparable-yielding corporate credit instruments.

A second distinguishing feature is that private real estate debt can span multiple layers of the capital stack, introducing considerable heterogeneity. Senior first-lien mortgages (both stabilized and transitional) represent the lowest-risk layer, protected by property collateral and priority of claim. Mezzanine debt is typically secured by a pledge of the borrower's equity interest as collateral, other than a property lien, governed by intercreditor agreements. Although technically an equity position in the capital stack, preferred equity is frequently structured with debt-like economics: current-pay coupons, accrual features, and control rights that activate upon covenant triggers. This heterogeneity in the type of real estate debt means that funds broadly labeled as real estate debt funds may pursue investment strategies with markedly different risk profiles, complicating comparisons both within the asset class and with corporate credit strategies that tend to operate within a narrower risk band.

Private real estate debt generates returns primarily through contractual income: coupon payments, origination fees, and extension fees. Capital appreciation of the underlying property plays a limited role, relative to private equity real estate strategies, except in the event of default and foreclosure. This income-driven return profile is more comparable to fixed-income securities than to private equity real estate (PERE) strategies, complicating the choice of appropriate public market return benchmarks.

Finally, distress in the current (post 2021) cycle has been driven more by maturity and refinancing frictions than operating distress and loan defaults. Owners of properties generating enough operating cash flow to service current mortgage payments may be unable to refinance existing mortgage balances at loan maturity because of increased mortgage rates and, in some cases, declining property values. This has often led to loan extensions and modifications, rather than foreclosure, as lenders, especially commercial banks, continue to avoid the write downs and loss of regulatory capital that foreclosure would often produce. This creates performance measurement challenges because reported net asset values may not fully reflect impairment until resolution.

Related literature and contribution

The academic literature on private credit fund performance is nascent. Munday et al. (2019) provide the first comprehensive study, analyzing 476 private credit funds from the MSCI database and documenting positive risk-adjusted returns relative to public credit benchmarks. Joenvaara and Suhonen (2026) benchmark private credit performance across three databases (MSCI, Pitchbook, and Preqin), highlighting the sensitivity of conclusions to data source selection. Brown, Lundblad, and Volckmann (2025) review risk-adjusted performance across 7,816 private funds spanning equity, credit, and real asset strategies, finding that debt funds

generate positive excess returns, though results are sensitive to benchmark selection. These studies establish that private credit broadly appears to compensate investors for illiquidity, but none isolates real estate debt for analysis.

A separate literature examines private equity real estate (PERE). Riddiough (2022) documents annual underperformance of three to four percentage points relative to public equity REITs from 1974 to 2019 and raises concerns about pension fund concentration. Li and Riddiough (2024) investigate the persistence of this underperformance, examining structural factors specific to PERE fund management. Arnold et al. (2021) also find that closed-end PERE funds have underperformed listed REITs. Jackson, Ling, and Naranjo (2026) provide evidence that private equity managers engage in return manipulation through distribution timing and NAV adjustments, a concern relevant to any fund performance evaluation. To the extent that PERE equity funds have underperformed, the relative performance of the debt side of the real estate capital stack is of particular interest.

Methodologically, our study draws on several advances in private fund performance measurement. Kaplan and Schoar (2005) develop the public market equivalent (PME) measure. Gredil et al., (2023) propose the Direct Alpha method, constructing an implied benchmark portfolio from actual fund cash flows. Korteweg and Nagel (2016, 2025) develop the Generalized Public Market Equivalent (GPME) framework. Erel, Flanagan, and Weisbach (2025) introduce the Risk-Adjusted Profit (RAP) methodology for private debt funds, employing rollover and gain benchmarks to estimate factor loadings and alpha from cash flow data, building on the strip valuation framework of Gupta and Van Nieuwerburgh (2021). Phalippou (2008) documents the hazards of relying on IRR as the primary performance metric, motivating the use of multiple complementary measures.

Despite these advances and the growing economic significance of private real estate debt, no prior study examines PDRE fund performance using transaction-level cash flow data and modern risk-adjustment methods. Munday et al. (2019) study private credit broadly but do not isolate real estate debt. Erel, Flanagan, and Weisbach (2025) develop the methodology we use to examine the risk-adjusted performance of real estate private debt. However, like Munday et al. (2019), their empirical analysis does not isolate real estate debt from the broader private credit market. We fill this gap using MSCI limited-partner-sourced cash flows for 171 North American private real estate debt funds, applying Direct Alpha, Public Market Equivalents, and the RAP methodology to provide the first comprehensive performance evaluation of this asset class.

Sizing the Private Real Estate Debt Fund Market

The starting point of our analysis is a discussion of the growth and activity of the private debt real estate fund (PDRE) market. The global data used in this analysis was obtained from Preqin. To facilitate comparisons, data for both real estate equity funds and real estate debt funds were downloaded. Fund characteristics include fund ID, name, fund manager, vintage year, strategy (debt versus equity), fund size, geographic focus, fund structure, property types, and debt types. The Preqin data include funds with vintage years from 1969 through 2023. Separately Managed Accounts were removed from the Preqin sample, as these represent bespoke mandates rather than commingled fund vehicles available to the broader LP market. This produces a final sample of 16,200 funds, of which 2,170 are real estate debt funds (earliest vintage 1976) and

14,030 are equity funds (earliest vintage 1969). The equity sample includes funds with core, core-plus, value-add, opportunistic, and other non-debt real estate strategies.¹⁶

Table 1 contains additional fund characteristics. The 2,170 debt funds are managed by 768 unique fund families. The mean fund size is \$340 million; the median is \$100 million. Collectively, these debt funds raised \$481 billion in committed capital from LPs. The 14,030 equity funds have been brought to market by 3,717 fund families and have raised a total of \$2.8 trillion in committed capital. The mean and median size of equity funds are quite similar to the debt funds.

Figure 1 displays the number of debt funds brought to market (left axis) and their total committed capital in millions of U.S. dollars (right axis) by vintage years from 1976 through 2023. The debt fund market began to emerge beginning in 1994 when the Resolution Trust Company (RTC) began selling the assets of the failed savings and loans associations it had acquired. Starting in the early 2000s, the number of debt funds brought to market began to rise steadily, slowed temporarily in 2009 and 2010 by the great financial crisis. In 2013, the number of new debt funds reached 100 and, in more recent years, approached 200 new offerings. Since 2017, the annual committed capital of new debt funds averaged approximately \$42 billion.

Despite this rapid growth, the number of real estate debt funds is small relative to real estate private equity funds. Figure 2 plots the total number of new real estate funds by vintage year, decomposed into debt funds (upper shaded region) and equity funds (lower shaded region).

¹⁶ We do not condition on closed-end fund structure because the objective of this section is to size the entire investable private real estate debt universe, which includes open-end and other fund structures alongside closed-end vehicles.

Figure 3 displays total committed capital (in millions of U.S. dollars) by vintage year. The small upper shaded region captures the AUM of debt funds; the remainder of the shaded region captures the AUM of equity funds brought to market.¹⁷ Although the number of PDRE funds, and private credit in general, has increased in size and importance in recent years, PERE funds still dominate.

Panel B of Table 1 reports the geographic distribution of investments by the Preqin sample based on each fund's stated geographic focus. United States is a subset of North America and includes funds targeting specific U.S. regions. Other geographic strategies identified by Preqin include Middle Eastern, African, and global or multi-regional mandates, as well as funds with no reported geographic focus.

Sixty-one percent of debt funds in our Preqin sample focus their investments in North America; 52% in the U.S. Twenty-four percent concentrate on Asia-Pacific markets, while 14% invest primarily in Europe. Relative to debt funds, a smaller percentage (55%) of PERE funds are invested primarily in North America. In contrast, the percentage of equity funds invested primarily in Europe (25%) is almost twice that of debt funds with a European focus. Fewer equity funds, however, have an Asia-Pacific focus (16%) compared to debt funds (24%).

To obtain a picture of the property types in which PDRE and PERE funds tend to focus their investments, we again rely on the broader sample of real estate funds available in Preqin. Table 2 reveals that two-thirds of real estate debt funds diversify their investments across property types. The corresponding percentage of diversified equity funds is 48%. Almost 25% of debt funds report a focus on debt instruments tied to residential properties. A similar

¹⁷ Funds with unreported size are excluded from the committed capital calculation but are included in fund counts.

percentage (22%) of equity funds also focus on residential properties. However, few debt funds report that they invest primarily in other property types, such as office, hospitality, industrial, and retail properties. In contrast, a meaningful percentage of equity funds report a focus on office, industrial, and retail properties.

We conclude our overview of PDRE funds with an analysis of the types of debt securities in which they invest. Of the 2,170 debt funds in our Prequin sample, 1,303 (60.0%) report the type(s) of debt in which they invest. We identify 14 unique debt types across these 1,303 funds.¹⁸

Table 3 reports the number and percentage of debt funds that allocate at least a portion of their portfolio to each of the 14 debt types. These percentages sum to more than one because most debt funds invest in more than one type of debt. Of the 1,303 funds that report debt type, 38% maintain investments in mezzanine loans, 36% in first mortgages, 21% in senior debt, 20% in bridge loans, and 18% in preferred equity. Distressed debt and CMBS are the next most frequently reported investments. Clearly, many PDRE funds invest in a variety of debt instruments. This substantial heterogeneity of underlying investments means PDRE is not a unified asset class.¹⁹ Moreover, mezzanine loans, preferred equity and distressed debt expose investors to loss profiles and return distributions that, at times, more closely resemble equity than traditional senior debt, especially during market downturns or when the collateralized property

¹⁸ Prequin reports debt strategies in the field RE: DEBT TYPES. This is a free-text field that may contain one or more debt type labels separated by semicolons, commas, slashes, pipes, or the word "and." For example, a single fund might report "First Mortgages; Bridge Loans & CMBS." Each fund's RE: DEBT TYPES string is split into individual types. Each resulting type string is then looked up in an alias map that standardizes variant spellings to a single canonical name. For example, "first mortgage," "first mortgages," and "first-lien," all map to "First Mortgages." After canonicalization, duplicate types within a single fund are removed.

¹⁹ We see similar variation in risk strategies in our MSCI closed-end fund sample where 37% of debt funds are classified by MSCI as "generalist" funds.

experiences idiosyncratic distress. The prevalence of equity-like risk within funds nominally classified as "debt" complicates the choice of appropriate performance benchmarks and underscores the need for risk-adjustment methodologies that account for the heterogeneous risk exposures embedded in PDRE fund portfolios.

Taken together, the Preqin data document a debt sector that has expanded rapidly over the past two decades, with annual capital commitments averaging approximately \$42 billion since 2017. PDRE funds tend to be concentrated geographically in North America, invest predominantly across diversified property types, and employ debt strategies spanning the full capital structure, from senior-secured positions to subordinated and distressed instruments.

These patterns indicate that PDRE funds represent a large and heterogeneous segment of the private real estate market, one in which the "debt" label may obscure meaningful variation in underlying risk exposure. To examine the risk and return characteristics of PDRE funds, we turn to cash flow data provided by MSCI, which records the timing and magnitude of LP contributions, distributions, and net asset valuations for individual funds. Unlike the Preqin data, MSCI allows the computation of accurate dollar-weighted IRRs, MOICs, Direct Alphas, PMEs, and RAPs for the portfolio of funds in a given sample.

Performance Analysis

MSCI Sample Selection and Summary Statistics

Our analysis of fund performance is focused on a subset of debt funds for which cash flow data is provided by MSCI (formerly Burgiss). Cash flow data, including LP contributions, distributions, and valuations (NAVs), are obtained directly from limited partners. These cash

flows are measured net of management fees and the GP's carried interest, reflecting the actual investment experience of LPs. Because the data are sourced from LPs rather than from general partners or public records requests, the MSCI dataset avoids the survivorship and selection biases that can arise when fund managers voluntarily report performance (Munday et al., 2019; Erel et al., 2025).

The MSCI dataset records the exact size and timing of each LP cash inflow or outflow, enabling the researcher to compute time-weighted return metrics (IRRs) that are preferred to GP-reported net asset values (NAVs) and to-date LP IRRs. (Munday et al., 2019). As noted by Brown et al. (2025), the availability of the underlying LP cash flows make the MSCI dataset particularly well suited for risk-adjusted profit evaluation of closed-end funds. To ensure funds in our final sample have had adequate time to mature, we remove funds with vintage years after 2019. The last cash flow observation in our sample is December 2023, therefore, the youngest funds in our sample (vintage 2019) have about 5 years of data.

An important feature of our approach is that performance measurement relies on actual LP cash flows (contributions and distributions) rather than on reported net asset values. The well-documented smoothing of private asset valuations, in which GP-reported NAVs tend to understate volatility and lag true market values, is therefore not a concern for the bulk of our analysis. For fully realized (liquidated) funds, estimates of net asset values (NAVs) are not required because a complete history of LP cash flow contributions and distributions is observable. For funds that remain active as of December 2023, the final NAV reported by the GP is converted into a synthetic final LP distribution. This is the only point in the analysis at which NAV smoothing is a potential concern. Ninety percent of this reported NAV is used as the final LP cash distribution to account for potential overvaluation of the fund's remaining assets by

the GP. This cash flow “haircut” follows the approach used by Erel et al. (2025), who adopt the Korteweg and Nagel (2016) terminal liquidation assumption and apply a 10% discount to account for potentially inflated NAVs (Phalippou and Gottschalg, 2009; Boyer et al., 2023; Jackson et al., 2026). Erel et al. (2025) provide additional support for the 90% figure using secondary market transaction data from Andonov et al. (2024), which indicates that private credit fund LP stakes trade at approximately 90% of their reported NAV.

Our analysis focuses on the subset of funds within North America, consistent with Brown et al. (2025), who separate North America and the Rest of the World due to differences in appropriate public benchmarks. Erel et al. (2025) similarly restrict their analysis to USD-denominated funds. North American vehicles represent roughly 80 percent of the total MSCI sample. Following Brown et al. (2025), we screen funds for anomalous cash flow entries. Funds are removed if any cash flow reverses its expected sign by more than 25% of total fund commitments, such as a large distribution clawback or an abnormal reversal of a capital call, which is indicative of data errors or highly unusual fund events.

To address long-lived funds that report cash flows more than sixteen years after a fund's inception, all cash flows beyond year sixteen are discounted back to year 16 using the risk-free rate. This truncation, which follows the approach of Erel et al. (2025), limits the influence of long-tail observations on performance. This cash flow truncation is also required to estimate the Risk-Adjusted Profit (RAP) of each fund. The underlying MSCI data include the exact date of each cash flow. For performance measurement, we aggregate cash flows to a quarterly frequency, consistent with Erel et al. (2025).

Table 4 reports summary statistics for private real estate debt funds and private equity real estate funds in our MSCI sample. The funds in both are closed-end fund structures in which LPs commit capital at inception, invest committed capital when called, and receive cash flow distributions from the periodic income generated by the underlying portfolio investments. As the fund matures, PERE cash flow distributions to LPs are typically generated largely by sales of portfolio properties; in contrast, PDRE cash flow distributions to LPs are increasingly generated by principle repayments. Fund size is total LP committed capital in millions of U.S. dollars.²⁰

The mean (median) fund size (committed capital) among our sample of 171 PDRE funds is \$733.5 (\$457.3) million.²¹ On average, actual capital called equals 95% or more of committed LP capital. The mean age of our sample PDRE funds is 8.9 years, which is slightly greater than the median age of 8.3 years. These fund ages indicate that our performance metrics (IRRs and equity multiples) are based largely on well-seasoned funds.

The mean, to-date, of total fund distributions to LPs is \$898.5 million, which produces a pooled mean multiple on invested equity (MOIC) of 1.26. The "pooled" mean MOIC is not the arithmetic mean of the MOICs reported by the 171 funds; rather, it is calculated using the total cash flow distributions to LPs of all sample funds divided by total LP contributions of all funds. As such, it is a size-weighted MOIC mean. The pooled mean IRR of our PDRE fund sample is

²⁰ Fund size is reported by MSCI at the fund level but reported fund size may exceed the total capital called from LPs over time. An alternative measure of fund size, "calculated fund size," is therefore calculated by discounting all LP contributions (capital calls) at the risk-free rate. In practice, the differences between the reported and calculated fund sizes are small, so the analysis proceeds using reported values.

²¹ The corresponding mean (median) size of debt funds in the broader Preqin sample (see Table 1) is \$340 (\$100). Thus, the debt funds in our MSCI sample tend to be the larger funds.

8.34%. This pooled mean is also calculated by summing LP contributions and distributions in each period across all funds in the sample.

How does the size, age, and return performance of our PDRE fund sample compare to PERE funds? The mean committed capital among our MSCI sample of 863 PERE funds, reported in Panel B of Table 4, is \$613.9 million, roughly \$120 million less than the corresponding mean size among PDRE funds. This difference is partly attributable to the longer history of PERE funds in the MSCI sample; PERE funds have a greater representation of earlier vintages, when average fund sizes were smaller. Similar to PDRE funds, actual equity contributions (capital raised) total 95% or more of committed capital. The mean age of our PERE funds is 10.6 years, which is notably older than the mean age of 8.9 years among PDRE funds, consistent with PERE funds having longer fund cycles than PDRE funds.

The mean cash distributions to investors in PERE funds is \$825.1 million. These LP distributions have produced a pooled mean MOIC of 1.31, which is slightly greater than the 1.26 MOIC among PDRE funds. However, the pooled IRR of our PERE fund sample is 7.27%, more than 100 basis points less than the pooled PDRE IRR of 8.34%. To provide additional context for the cash flow dynamics underlying these return differences, Figures 4 and 5 examine the lifecycle and calendar-time patterns of fund contributions and distributions.

Figure 4 displays mean scaled contributions and distributions by fund age for PDRE funds (Panel A) and PERE funds (Panel B), where cash flows are expressed as a proportion of total capital committed. PDRE fund capital calls are heavily concentrated in the first two years of fund life, with approximately 37% of committed capital called in year one and an additional 30% in year two. Distributions begin in year one and peak in year five at approximately 24% of

committed capital, after which they decline gradually. The crossover point, at which annual distributions begin to exceed annual contributions, occurs by year four. This pattern is consistent with the shorter duration of debt investments relative to equity: origination and deployment occur quickly, and repayment of principal and interest commences soon after.

PERE funds, by comparison, exhibit a somewhat more extended capital deployment phase, with contributions peaking at approximately 30% of committed capital at inception and distributions reaching their maximum in year five at approximately 22%. The crossover from net capital consumption to net distribution occurs roughly one year later than for PDRE funds. This difference in cash flow timing explains the divergence between MOIC and IRR observed in Table 4: PDRE funds produce a higher pooled IRR (8.34%) than PERE funds (7.27%) despite a similar pooled MOIC (1.26 versus 1.31). Because PDRE funds return capital more quickly, the same dollar of invested capital generates a higher annualized return even though the equity multiple is lower.

Figure 5 overlays average scaled distributions for PDRE and PERE funds in calendar time from 2005 through 2022, with shaded regions indicating the Global Financial Crisis (2008 to 2009) and the COVID-19 pandemic (2020). Scaled distributions are defined as quarterly distributions divided by total fund commitments, averaged across all active funds in each calendar year. Scaling by commitments normalizes for differences in fund size, allowing meaningful comparison of distribution intensity across funds of varying scale and across the two fund types. The series begins in 2005, the earliest year in which enough funds are active to satisfy

data disclosure requirements.²² Because distributions represent the return of capital to LPs, this figure provides a measure of fund liquidity over time and across market conditions.

Several patterns are noteworthy. First, PDRE funds exhibit modestly higher distribution rates than PERE funds across most of the sample period, consistent with the contractual nature of debt cash flows (interest and principal repayment) relative to equity positions, where distributions depend on a combination of property income, asset sales, and refinancing events. The difference, however, is not large, suggesting that the liquidity advantage of PDRE fund structures over PERE is incremental.

Second, the GFC produced a severe contraction in distributions for both fund types, though the decline was sharper and more prolonged for PERE funds. PDRE distributions fell substantially in 2008 but began to recover by 2009, whereas PERE distributions continued to deteriorate through 2009 before gradually recovering over the following several years. The relatively more resilient cash flow stream of PDRE funds during this period is consistent with the senior position of debt claims in the capital structure, while the deeper contraction among PERE funds reflects the greater sensitivity of equity positions to asset value impairment.

Third, the COVID-19 period produced a more moderate disruption for both fund types, with a notable decline in distributions in 2020 followed by a sharp recovery in 2021. The rapid rebound in distributions is consistent with the extraordinary liquidity interventions by the Federal Reserve, which stabilized credit markets and supported asset valuations across both debt and equity real estate. Overall, the calendar-time evidence indicates that PDRE funds provide slightly

²² Per our data use agreement with MSCI, we suppress all statistics computed from fewer than five funds.

greater liquidity to LPs than PERE funds, although the cash flow distributions of both fund types remain highly sensitive to macroeconomic shocks.

Performance by Vintage Year and Fund Size

Panel A of Table 5 reports performance metrics for PDRE and PERE funds across three vintage periods. The performance of pre-2000 PDRE funds is the strongest; however, this subsample contains only eight funds. The difference between the performance of PDRE funds brought to market in the 2000s and those with vintage years after 2009 is striking. The pooled mean IRR of PDRE funds with vintage years between 2000 and 2009 is just 3.72% with a corresponding MOIC of 1.16. The performance of these funds was negatively affected by the Great Financial Crisis. Although not separately tabulated, the worst-performing vintages during this decade were 2004 to 2006; that is, funds that raised capital just prior to the onset of the GFC. In contrast, PDRE funds with vintage years between 2010 and 2019 have produced a pooled IRR of 11.98% and a pooled MOIC of 1.28.

The corresponding performance of PERE funds by vintage year is displayed in the bottom half of Panel A. The 130 PERE funds with vintage years prior to 2000 produced a pooled IRR of 8.60% and a pooled MOIC of 1.56. Similar to PDRE funds, LP investors in PERE funds brought to market in the 2000s earned disappointing returns: the pooled IRR of PERE funds in this decade is 4.00% with a corresponding MOIC of just 1.19. The pooled IRR of PERE funds with vintage years of 2010 to 2019 is 10.56%, which is below the 11.98% pooled IRR among PDRE funds over this period. This suggests that, unconditionally, PDRE funds slightly outperformed PERE funds during the post-crisis period. However, the pooled MOIC of 1.28 for PDRE funds is lower than the 1.34 MOIC among PERE funds, again reflecting the shorter duration of PDRE fund cash flows.

Panel B of Table 5 reports performance metrics for PDRE and PERE funds by fund size. Mean IRRs for PDRE funds vary considerably across fund size. Interestingly, funds raising \$50 to \$200 million in capital produced a pooled IRR of 12.30%. This is double the magnitude among funds that raised \$200 to \$500 million in capital. PDRE funds that raised more than \$500 million performed somewhat better, producing a pooled IRR of 8.69%. Small funds (less than \$50 million) performed the worst, generating a pooled IRR of 1.93%; however, this sample contains only nine funds. Although pooled IRRs among PDRE funds vary considerably by fund size, pooled MOICs, excluding the smallest funds, exhibit much less variability, ranging from 1.22 (\$200 to \$500 million) to 1.31 (\$50 to \$200 million). Among PERE funds, pooled IRRs vary considerably less across fund size, ranging from 6.82% (less than \$50 million) to 7.80% (\$50 to \$200 million).

Pooled PERE MOICs vary somewhat more than IRRs, ranging from 1.30 (greater than \$500 million) to 1.55 (less than \$50 million). Notably, both PDRE and PERE funds exhibit the highest pooled and median IRRs in the \$50 to \$200 million range, suggesting a performance "sweet spot" at moderate fund sizes. This pattern is consistent with mid-sized funds being large enough to access institutional-quality deal flow while remaining small enough to deploy capital selectively without compromising on investment quality.

Direct Alphas and Public Market Equivalents

The key challenge in evaluating private fund performance is that the timing of cash flows is not under the investor's control. Unconditional metrics such as IRR and MOIC do not account for the opportunity cost of capital at the time each cash flow occurs. Direct Alphas and Public Market Equivalents address this limitation by matching each fund cash flow to the contemporaneous return on a public benchmark, thereby controlling for the timing of capital

deployment and distributions. In essence, these metrics answer the question: would an LP have earned more by investing in the fund or by investing identical amounts in the chosen benchmark over the same time period and with the same cash flow timing?

Direct Alpha (DA), proposed by Gredil et al. (2023), computes the annualized excess return of a fund relative to a public benchmark. Each fund's cash flow is compounded forward to the fund's terminal date using the cumulative return on the benchmark over the identical period. The Direct Alpha is the IRR computed on these future-valued, benchmark-adjusted cash flows. Intuitively, a DA can be viewed as an annualized Kaplan and Schoar (2005) Public Market Equivalent (PME) that does not require an explicit estimate of fund duration. A positive DA indicates that the fund earned an annualized return above the benchmark; a negative DA indicates underperformance.

The Kaplan-Schoar PME addresses a related but distinct question (Kaplan and Schoar, 2005; Long and Nickels, 1996). The PME computes the ratio of LP distributions to LP contributions, where each fund cash flow is first compounded forward to the fund's terminal date using the benchmark return. If the fund outperformed the benchmark, future-valued distributions will exceed future-valued contributions, producing a PME greater than one; a PME below one indicates the investor would have accumulated more wealth by investing in the public benchmark. DA expresses outperformance relative to the benchmark as an annualized excess return, the PME expresses it as a wealth ratio.

It is important to note that neither DA nor PME constitutes a risk-adjusted performance measure. Both metrics implicitly assume that the fund has a beta of one with respect to the single benchmark against which it is measured. If the fund's true risk exposure is, for example, greater

than the benchmark, both DA and PME will overstate relative performance. We return to this limitation of DAs and PMEs in our discussion of Risk-Adjusted Profit (RAP), which explicitly accounts for multi-factor risk exposures.

We compute Gredil et al. (2023) Direct Alphas and Kaplan-Schoar (2005) PMEs for our sample of PDRE funds using three benchmark debt indices: the Bloomberg CMBS Investment Grade index, the Morningstar LSTA leveraged loan index, and the NAREIT mortgage REIT total return index. The CMBS index tracks returns on investment-grade commercial mortgage-backed securities.²³ The leveraged loan index captures the performance of senior secured loans to below-investment-grade borrowers.²⁴ The mortgage REIT index tracks total returns on listed public REITs that invest in mortgages, mortgage-backed securities, or other forms of real estate debt.²⁵ Because DA and PME require benchmark return data spanning the fund's full life, the number of funds varies slightly across benchmarks. The NAREIT mREIT index begins in January 1972 and covers all 171 PDRE funds. The leveraged loan index begins in Q1 1997 and the Bloomberg CMBS Investment Grade index begins in Q3 1997; funds with inception dates prior to the start of these series are excluded (165 and 163 funds, respectively). An additional fund's DA fails to converge in the polynomial root solver used for DA computation. Our Direct Alpha and PME results are reported in Panel A of Table 6.²⁶

²³ Available [here](#)

²⁴ Available [here](#)

²⁵ Available [here](#)

²⁶ Funds with non-converging IRRs are dropped out of the calculation of a sample median. This is consistent with what is reported by Gredil et al. (2023). Pooled IRRs allow the cash flows from non-converging funds to remain in the calculation of mean IRRs and MOICs.

The pooled Direct Alpha using CMBS returns as the benchmark is 2.92%. The corresponding Direct Alphas using leveraged loans and mortgage REITs as benchmarks are 2.00% and 1.72%, respectively. The median Direct Alpha with debt returns benchmarked against CMBS returns is 5.39%. The corresponding medians using leveraged loans and mortgage REITs as benchmarks are 2.73% and 2.89%, respectively. Approximately 75% of PDRE funds produced a positive Direct Alpha when benchmarked against CMBS returns, 66% produced positive Direct Alpha when benchmarked against leveraged loans, and 62% of PDRE funds outperformed when benchmarked against mortgage REITs.

The PME results are consistent with the Direct Alpha results. The pooled mean and median PMEs exceed one regardless of the debt benchmark that is used. Approximately two-thirds to three-quarters of funds produced a PME greater than one. Overall, these Direct Alpha and PME results provide evidence that PDRE funds, as a sector, have outperformed widely used public debt benchmarks.

Panel B of Table 6 reports Direct Alpha and PME for our sample of PERE funds using the returns on listed public equity REITs, as measured by the FTSE-NAREIT Equity REIT total return index, as a benchmark. The pooled mean Direct Alpha is -2.07%; the median Direct Alpha is -1.23%. Only 46 percent of PERE funds outperformed the equity REIT index. The pooled PME is 0.92. These results provide additional evidence that PERE funds have underperformed equity REITs, consistent with the PERE literature.

Figure 6 displays the cross-sectional distribution of fund-level PME values. Panels A through C plot PME distributions for PDRE funds relative to CMBS, leveraged loans, and mortgage REITs, respectively. Panel D plots the PME distribution for PERE funds relative to

equity REITs. In each panel, the dashed vertical line denotes a PME equal to 1.0, the breakeven threshold.

The PDRE distributions in Panels A through C share a common shape: the mass of the distribution is concentrated at or just above 1.0, with most funds outperforming their respective benchmarks. Each panel also displays a pronounced left tail extending well below 1.0, indicating that a meaningful minority of PDRE funds substantially underperformed. This negative skew is consistent with the return profile of debt investments, where upside is contractually bounded by coupon and principal repayment but downside exposure to borrower default or asset impairment can produce large losses. The CMBS benchmark (Panel A) produces the most favorable distribution, with the highest concentration of funds above 1.0. The leveraged loan and mREIT benchmarks (Panels B and C) produce somewhat more dispersed distributions, which likely reflects the greater volatility and heterogeneity of these benchmarks relative to investment grade CMBS returns.

The PERE distribution in Panel D presents a notably different pattern. The left half of the distribution is considerably more populated than in any of the PDRE panels, with substantial mass extending well below 1.0. This wider dispersion and heavier left tail is consistent with the higher return volatility of equity real estate investments and the greater potential for large losses in equity positions. Unlike the three PDRE panels, there is no clear rightward shift of the distribution; roughly half of PERE funds fall below 1.0, confirming the pooled result that PERE funds have, on average, underperformed equity REITs, a finding consistent with the broader literature on private versus public real estate performance.

Taken together, the Direct Alpha, PME, and distributional evidence present a clear picture. Even without adjusting for risk, PDRE funds, as a group, have strongly outperformed selected public debt benchmarks, with positive pooled alphas ranging from 1.72% to 2.92% and a majority of individual funds exceeding the breakeven threshold. This stands in stark contrast to the PERE results, where the pooled alpha is negative, the pooled PME falls below one, and the fund-level distributions confirm broad-based underperformance relative to equity REITs.

Performance by Debt Sub-Type

A central finding of our analysis of both Preqin and MSCI data is the substantial variation across funds in the type of debt securities in which they invest. The use of a single benchmark against which performance is judged is therefore likely to be inadequate. The results presented in Table 7 therefore disaggregate Direct Alphas and PMEs by debt sub-type classification.²⁷

Panel A reports pooled IRRs and MOICs by sub-type. Generalist funds, which invest across multiple debt strategies, represent the largest sub-type (55 funds) and produce a pooled IRR of 9.56% and a MOIC of 1.32. Distressed debt funds (32 funds) perform comparably using this metric, with a pooled IRR of 9.41% and a MOIC of 1.31. Senior debt funds (18 funds) occupy an intermediate performance position, generating a pooled IRR of 7.57% and a MOIC of 1.16. The "Not Classified" category (19 funds) produces a pooled IRR of 6.56% and a MOIC of 1.22. Mezzanine funds (44 funds) perform the worst among the sub-types, with a pooled IRR of 4.98%

²⁷ The sample for this table comprises 168 of the 171 PDRE funds; three funds classified as "Unknown" sub-type are excluded because the group contains fewer than five funds, which falls below the minimum disclosure threshold required by our data use agreement with MSCI.

and a MOIC of 1.14. Overall, when ignoring the corresponding performance of a suitable benchmark, the variation in unadjusted performance across debt strategies is notable.

Excluding generalist funds, which are difficult to position on the risk spectrum, the ordering of sub-type performance is broadly consistent with a risk-return tradeoff. Distressed strategies, which involve the highest credit risk, produce the highest average returns. Senior debt funds, which occupy the safest position in the capital structure, generate more modest returns. The relatively weak performance of mezzanine funds is noteworthy, as mezzanine debt occupies a subordinated position in the capital stack and would therefore be expected to command a risk premium relative to senior debt. That said, the sample period represents a single realization of returns, and one path of outcomes is unlikely to perfectly align with long-run risk-reward relationships, particularly given the influence of the GFC and subsequent recovery on fund performance across all sub-types.²⁸

Panel B reports benchmark-adjusted performance by sub-type. Generalist funds produce positive pooled Direct Alphas across all three benchmarks, ranging from 2.84% (mREIT) to 4.67% (CMBS), with corresponding PMEs of 1.11 to 1.19. The pooled alpha for senior funds is positive relative to CMBS (4.03%) and leveraged loans (2.48%) but is close to zero relative to mREITs (0.51%), consistent with a close risk match between senior debt fund holdings and mortgage REIT portfolios. Distressed funds also generate positive alphas across all benchmarks, though of smaller magnitude (0.66% to 1.46%). Mezzanine funds are the only sub-type to produce pooled alphas near or below zero across all benchmarks, with a negative alpha of -0.97%

²⁸ We examine the potential effects of the GFC on our results in a subsequent robustness check.

relative to leveraged loans and alphas indistinguishable from zero relative to CMBS and mREITs. The PME evidence is consistent: mezzanine funds are the only sub-type with pooled PMEs at or below one.

Performance measurement based on IRRs suggest generalist and distressed investment strategies outperformed. However, the distressed alphas displayed in Panel B of Table 7 (1.46%, 1.30%, and 0.66%, respectively) are below the aggregate (pooled) alphas reported in Table 6 (2.92%, 2.00%, and 1.72%, respectively). The benchmark adjusted results in Panel B of Table 7 reveal that the overall outperformance of debt funds has been driven by generalist, senior, and unclassified investment strategies. Mezzanine funds, despite occupying a riskier position in the capital structure than senior debt have not delivered commensurate benchmark-adjusted returns. The heterogeneity of performance across debt sub-types reinforces the importance of accounting for the composition of debt strategies when evaluating the performance of a sub-sector.

Risk-Adjusted Profit

The three benchmarks used in our Direct Alpha and Public Market Equivalent analysis reflect returns on publicly traded debt instruments. However, the Preqin evidence displayed in Table 3 indicates that a substantial fraction of PDRE funds hold instruments with equity-like risk characteristics. If part of the measured outperformance observed in our DA and PME analysis reflects compensation for exposure to equity risk, rather than genuine alpha, benchmarking against debt indices alone will overstate fund performance. Whether the apparent outperformance of PDRE funds survives adjustment for these broader risk exposures is the question we address next.

In this section, we introduce a methodology that explicitly accounts for multi-factor risk exposures, followed by the results.

RAP Methodology

We employ the Risk-Adjusted Profit (RAP) methodology developed by Erel et al. (2025), which adapts the approach of Gupta and Van Nieuwerburgh (2021) and Flanagan (2025) to private credit funds. The core idea is to construct a replicating portfolio of publicly traded benchmarks that mimics the cash flows of the fund. By the law of one price, if such a portfolio can be constructed from tradable securities with observable market prices, the market price of the replicating portfolio provides a measure of the risk-adjusted value of the fund's cash flows. The Risk-Adjusted Profit is interpreted as the net present value (NPV) of the fund's cash flows: the difference between the market price of the replicating portfolio and the \$1 of capital invested. Said differently, a positive RAP indicates that the fund generated more value than could have been obtained by investing in the replicating portfolio of publicly traded securities.

A central challenge in risk-adjusting private fund returns is that a fund's exposure to market risks changes dramatically over its life. Early in a fund's life, when only a fraction of committed capital has been deployed, risk exposure is low. As capital is called and invested, exposure increases. Later, as principal is repaid and capital is returned to LPs, risk exposure declines again. A simple regression of fund cash flows on benchmark returns assumes constant risk exposure and therefore produces misleading estimates. The RAP methodology addresses this by constructing benchmark portfolios that mechanically track the fund's evolving capital deployment and repayment patterns.

For each risk factor, two types of benchmark funds are constructed. "Rollover" benchmarks replicate the income component (interest and related income) of fund cash flows. These benchmarks invest the same stream of capital contributions as the matched fund and pay out income proportional to outstanding LP capital in each period; the capital balance grows by the price return of the benchmark asset, ensuring that income-generating exposures are scaled by the amount of capital actually at risk.

"Gain" benchmarks replicate the principal repayment component. These benchmarks form a zero-cost position by being long \$1 in a risky asset and short \$1 in a risk-free zero-coupon bond. All returns are reinvested and compounded into the capital balance, and when the matched fund returns capital to the LPs (principal repayment), the gain benchmark reduces its risky exposure by the same fraction. This construction captures the risk of principal values rising or falling due to credit and equity risks, and how those exposures unwind as LP capital is returned. The decomposition into rollover and gain components is analogous to the dividend and capital gain strips in Gupta and Van Nieuwerburgh (2021), adapted here for the cash flow structure of debt funds.

The fund's outstanding capital balance, which determines the time-varying weights on rollover and gain benchmarks, is estimated directly from observed cash flows rather than from reported NAVs. Reported NAVs are inadequate for this purpose because they are manager-determined, often smoothed, and not marked to market. Instead, the methodology treats the fund like a fixed-income instrument whose principal balance grows at a solved-for rate of return, is

augmented by new contributions, and is reduced by distributions, with the constraint that the LP's capital balance reaches zero at the fund's terminal date.²⁹

For each fund, the RAP is computed as:

$$RAP = (\text{market price of replicating portfolio}) - \$1 \quad (1)$$

where the market price consists of the rollover benchmark loadings (priced at \$1 by construction), the gain benchmark loadings (priced at zero), and horizon fixed effects (priced using zero-coupon bond prices), net of the \$1 investment. A positive RAP indicates that the fund's cash flows are worth more than the cost of replicating them with publicly traded instruments. We also report an annualized alpha, computed as:

$$Alpha = (1 + RAP)^{(1/Duration)} - 1 \quad (2)$$

where Duration is the ex-post cash-flow-weighted duration of the fund. Bootstrap standard errors are computed from 1,000 replications, resampling individual funds.

A key advantage of this approach over Direct Alpha and PME is flexibility in benchmark specification. Because the replicating portfolio can include any combination of publicly traded risk factors, the methodology can simultaneously account for credit risk (e.g., corporate bonds, Treasuries), real estate debt risk (e.g., mREIT returns), equity risk (e.g., CRSP value-weighted index, equity REIT returns), and interest rate risk. This allows us to test whether the outperformance of PDRE funds relative to debt benchmarks documented in Table 6 survives the inclusion of equity risk factors.

²⁹ See Erel et al. (2025) for a detailed description of the rollover, gain, and capital balance constructions.

The RAP analysis uses a sample of 150 PDRE funds. In addition to the filters applied in our main analysis (Debt, Real Estate, North America, vintage 2019 or earlier), the RAP estimation requires at least five years of post-inception cash flow data to ensure reliable construction of the replicating portfolio benchmarks. This requirement, combined with an outlier screen at the cash flow level, reduces the sample from 171 to 150 funds.

Results

Table 8 reports bootstrap significance tests for the mean RAP and fund-specific annualized alpha across six benchmark specifications. All specifications include the risk-free rate (one-month Treasury bill). The individual benchmarks are the 10-year Treasury bond, the BBB corporate bond index, high-yield corporate bonds (collectively, "Bonds"); the NAREIT mortgage REIT total return index (mREIT); the NAREIT equity REIT total return index (eREIT); and the CRSP value-weighted market index (Stocks). The six specifications combine these components as follows: (1) mREIT only; (2) Bonds only (no mREIT); (3) eREIT only; (4) Bonds plus mREIT; (5) mREIT plus eREIT; and (6) Bonds, mREIT, eREIT, and Stocks. This progression allows us to observe how the estimated alpha changes as the benchmark set expands from debt-only factors to include equity risk factors.

When PDRE fund cash flows are benchmarked against mortgage REIT or bond factors alone, the estimated alphas are positive and statistically significant. The mREIT-only specification produces a mean annualized alpha of 3.86% ($t = 5.43$); the bonds-only specification yields an alpha of 3.62% ($t = 3.23$). The combined bonds-plus-mREIT specification produces an alpha of 3.31% ($t = 3.18$; Panel B, column (4)). These results confirm the pattern documented in Table 6: when evaluated against debt benchmarks alone, PDRE funds exhibit strong outperformance.

However, as noted earlier, these specifications may not fully account for the equity-like risk exposures embedded in many PDRE fund portfolios. The most natural benchmark inclusion to address equity-like real estate exposure is equity REITs. Specifications incorporating equity REIT returns continue to produce positive and statistically significant alphas: 2.43% for eREIT only ($t = 2.17$; column 3) and 2.90% for the combined mREIT-plus-eREIT specification ($t = 2.14$; column (5)). That PDRE funds continue to generate significant positive alpha even after accounting for real estate equity risk exposure is noteworthy and suggests that the performance of PDRE funds is not simply a by-product of equity-like risk taking.

Only in the most comprehensive specification, which includes bonds, mortgage REITs, equity REITs, and the CRSP value-weighted equity index, does the mean alpha fall to -0.68% and become statistically indistinguishable from zero ($t = -0.49$). The corresponding RAP is also insignificant at -0.007 per \$1 invested. This suggests that replicating the risk profile of PDRE funds requires not only debt and real estate benchmarks but also broad equity market exposure.

The interpretation of these results is nuanced. If PDRE funds are benchmarked against only debt indices, the estimated outperformance is large, but this comparison understates the risk to which investors in these funds are exposed. Accounting for equity-like risk from real estate benchmarks narrows the gap but leaves a significant positive alpha. It is only after including the full set of publicly traded factors that the net-of-fee alpha declines to zero. Importantly, a zero net-of-fee alpha does not imply poor performance. Because these metrics are measured after management fees and carried interest, a zero alpha indicates that the gross returns earned by PDRE funds are sufficient to compensate LPs for all systematic risks in the replicating portfolio and to cover the fees charged by general partners.

From a portfolio allocation perspective, these findings suggest that PDRE funds offer investors a risk-return profile that is, at a minimum, competitive with a complex basket of publicly traded securities. Matching the cash flow characteristics of PDRE funds with public market instruments requires simultaneous exposure to corporate bonds, Treasuries, mortgage REITs, equity REITs, and the broad equity market. For investors who cannot or prefer not to construct and rebalance such a portfolio, PDRE funds may represent a practical vehicle for accessing a comparable return stream. Additionally, these results do not speak to the potential diversification benefits that may accrue to portfolios with PDRE funds. Taken together, our results suggest PDRE funds have been a welcome addition to many institutional portfolios.

Conclusion

This paper provides the first analysis of private debt real estate (PDRE) fund performance. PDRE and PERE funds produce strikingly similar raw returns despite fundamentally different risk profiles, with PDRE holding senior capital stack positions and generating contractual returns while PERE bears direct equity risk. Benchmarking each against its natural public market comparator resolves this puzzle: PDRE funds outperform public debt benchmarks across all specifications, while PERE funds underperform equity REITs.

Many PDRE funds hold instruments with equity-like risk characteristics, and single-benchmark comparisons may overstate performance. Using the RAP methodology of Erel et al. (2025), which accounts for multi-factor risk exposures across both debt and equity indices, we find that PDRE fund alphas remain positive and significant even after incorporating real estate equity benchmarks. Only when broad public equities are included does the estimated alpha converge to zero. PDRE funds are riskier than their public debt benchmarks suggest, but they

deliver strong performance after carefully accounting for that risk. These findings position PDRE as a competitive component of institutional portfolios.

Several questions remain for future research. Our performance sample ends with the 2019 vintage; extending the analysis as post-2019 funds mature will be important given the interest rate increases of 2022 and elevated CRE loan distress that followed. Our sub-type analysis reveals meaningful heterogeneity across debt strategies, with mezzanine funds performing markedly worse than generalist and distressed funds. Understanding the sources of this variation, and whether it persists across market cycles, would refine investor expectations for individual strategies within the PDRE universe. Finally, the growing integration of private real estate lending with public securitization markets through CRE CLOs and private-label CMBS also raises questions about how these linkages affect fund performance and the transmission of risk between public and private capital markets.

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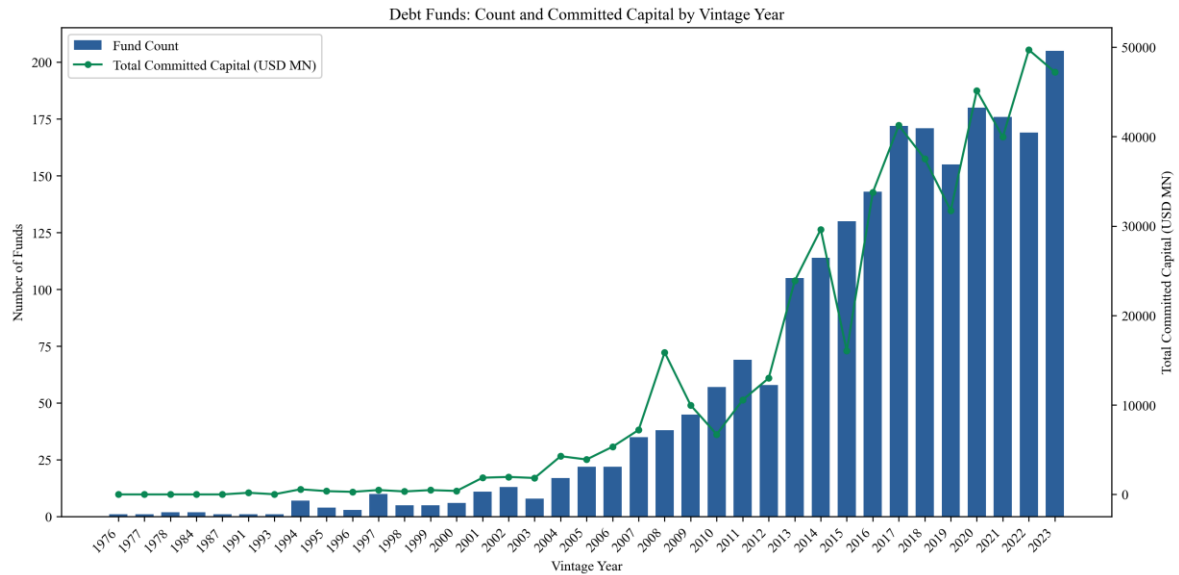
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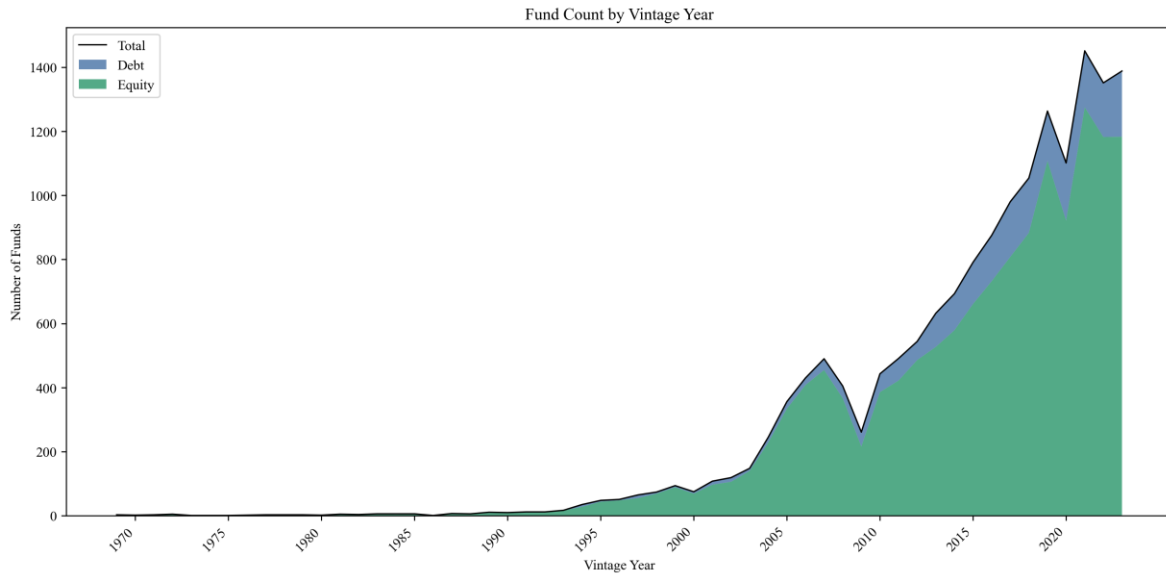
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Figure 1. Private Real Estate Debt Fund Activity by Vintage Year



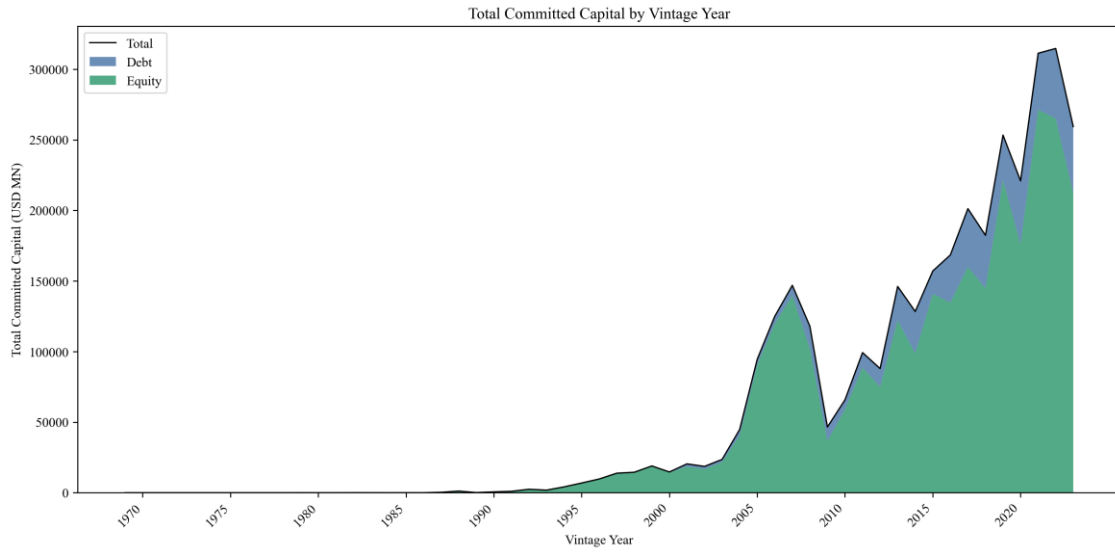
Note: This figure displays the number of private real estate debt fund launches (bars, left axis) and total committed capital in millions of U.S. dollars (line, right axis) by vintage year. The sample includes 2,170 debt funds with vintage years from 1976 through 2023.

Figure 2. Real Estate Fund Launches by Vintage Year: Debt and Equity



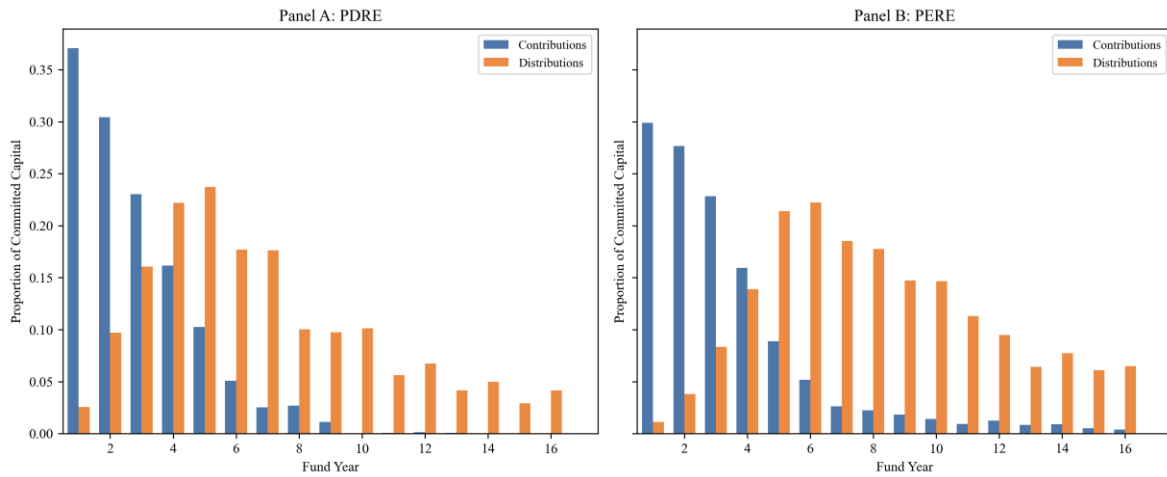
Note: This figure displays the number of real estate fund launches by vintage year, decomposed into debt funds and equity funds. The sample includes 16,200 funds (2,170 debt, 14,030 equity). The data for equity funds begins in 1969; our debt fund sample begins with vintage year 1976. The data for both samples runs through 2023.

Figure 3. Real Estate Fund Size by Vintage Year: Debt and Equity



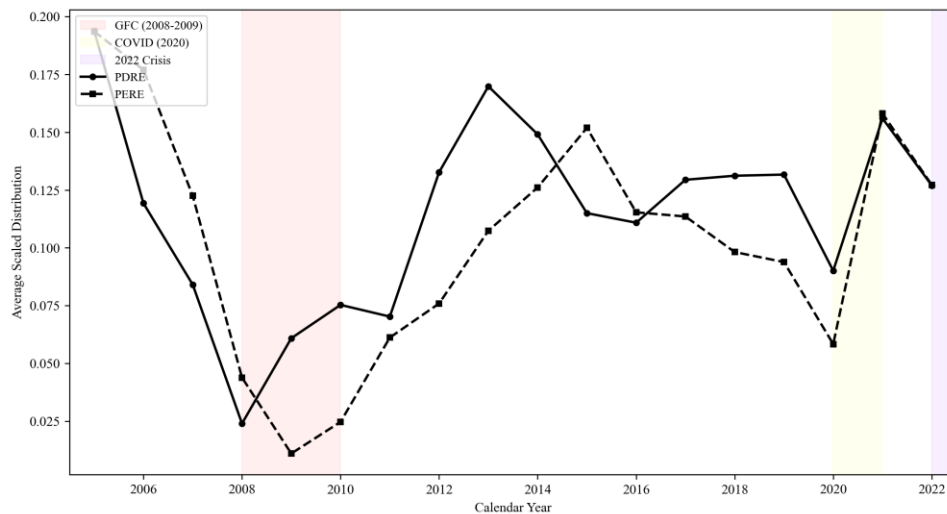
Note: This figure displays total committed capital (millions of U.S. dollars) by vintage year, decomposed into debt funds and equity funds. Fund size is total capital raised. Funds with unreported size are excluded from this figure but are included in fund count figures. The data for equity funds begins in 1969; our debt fund sample begins with vintage year 1976. The data for both samples runs through 2023.

Figure 4. Scaled Contributions and Distributions by Fund Age



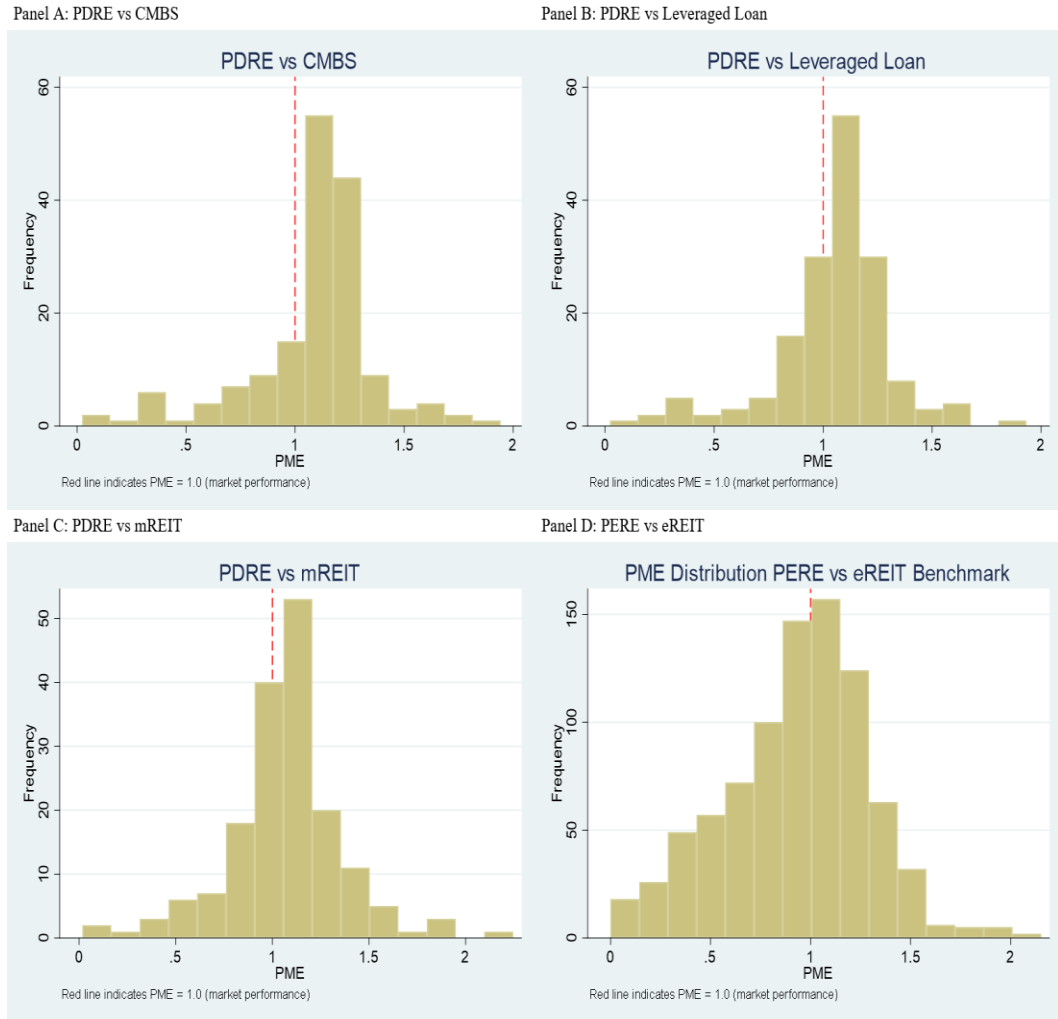
Note: This figure displays mean scaled contributions and distributions by fund age (years since inception). Panel A reports PDRE funds; Panel B reports PERE funds. Cash flows are scaled by total fund commitments.

Figure 5. Average Scaled Distributions Over Time with Crisis Periods



Note: This figure displays average scaled distributions over calendar time for PDRE funds (solid line) and PERE funds (dashed line). Scaled distributions are the ratio of quarterly distributions to total fund commitments, averaged across active funds in each year. Shaded regions indicate the Global Financial Crisis (2008 to 2009), COVID-19 (2020), and the 2022 interest rate shock. The series covers 2005 through 2022.

Figure 6. Public Market Equivalent Distributions



Note: This figure displays the cross-sectional distribution of public market equivalent (PME) values for individual funds. Panels A through C report PDRE fund PME relative to CMBS, leveraged loans, and mortgage REITs (mREITs), respectively. Panel D reports PERE fund PME relative to equity REITs (eREITs). PME is the ratio of future-value-weighted distributions to contributions using the benchmark index as the compounding rate; values above 1.0 indicate outperformance. The dashed vertical line marks PME equal to 1.0.

Table 1. Summary Statistics: Private Real Estate Funds by Strategy

Panel A: Fund Characteristics

	Debt Funds	Equity Funds
Number of Funds	2,170	14,030
Unique Fund Families	768	3,717
Total Size (\$M)	481,499	2,843,176
Mean Fund Size (\$M)	340	302
Median Fund Size (\$M)	100	105

Panel B: Geographic Distribution

Geography	Number of Debt Funds	% of Total Debt Funds	Number of Equity Funds	% of Total Equity Funds
North America	1,333	61.4	7,692	54.8
United States	1,130	52.1	6,574	46.9
Europe	297	13.7	3,473	24.8
Asia-Pacific	520	24.0	2,275	16.2
South America	11	0.5	212	1.5
Other	9	0.4	378	2.7
Total	2,170	100.0	14,030	100.0

Note: This table reports summary statistics for private real estate debt and equity funds with vintage years from 1969 through 2023. Fund size is total capital raised in millions of U.S. dollars; size statistics are computed over funds with reported data. Panel A reports fund characteristics. Panel B reports geographic distribution; United States is a subset of North America. Other includes all other geographies and cases where the geography is not reported.

Table 2. Main Property Type Distribution of Debt Funds by Strategy

Property Type	Number of Debt Funds	% of Total Debt Funds	Number of Equity Funds	% of Total Equity Funds
Diversified	1,401	66.0	6,581	48.4
Residential	529	24.9	2,988	22.0
Land	55	2.6	205	1.5
Office	36	1.7	962	7.1
Hotels	31	1.5	400	2.9
Industrial	24	1.1	1,040	7.7
Niche	23	1.1	633	4.7
Retail	22	1.0	729	5.4
Operating Co.	3	0.1	50	0.4
Not Reported	46		442	
Total	2,170	100	14,030	100

Note: This table reports the distribution of main property type for private real estate debt and equity funds with vintage years from 1969 through 2023. Percentages are computed over funds with reported property type data (debt: 2,124; equity: 13,588). Not Reported funds are excluded from the percentage denominator. Diversified indicates funds targeting multiple property types.

Table 3. Debt Fund Risk Classification by Debt Type

Debt Type	Funds	% of Reported
Mezzanine	488	37.5
First Mortgages	464	35.6
Senior Debt	271	20.8
Bridge Loans	263	20.2
Preferred Equity	240	18.4
Distressed Debt	153	11.7
CMBS	140	10.7
Whole Loans	115	8.8
Non-Performing Loan	105	8.1
B-Notes	100	7.7
High-Yield Debt	73	5.6
Sub-Performing Loan	45	3.5
RMBS	41	3.1
CRE CDOs	18	1.4
Total Reported	1,303	
Not Reported	867	

Note: This table reports the distribution of debt types for private real estate debt funds. Percentages are computed over the 1,303 funds with reported debt type data. Because funds may hold multiple debt types, percentages sum to more than 100. Of 2,170 total debt funds, 867 (40.0%) have no reported debt type.

Table 4. MSCI Sample Summary Statistics

	N	Mean/Pooled	25th Pctl	Median	75th Pctl
PDRE					
Fund Size (\$M)	171	\$733.5	\$175.0	\$457.3	\$974.0
Fund Age (Years)	171	8.9	6.2	8.2	11.2
Total Contributions (\$M)	171	\$707.6	\$156.7	\$434.5	\$948.1
Total Distributions (\$M)	171	\$898.5	\$187.5	\$512.6	\$1,212
IRR (%)	171	8.34	5.33	8.37	11.98
MOIC	171	1.26	1.14	1.25	1.39
PERE					
Fund Size (\$M)	863	\$613.9	\$188.9	\$363.5	\$671.6
Fund Age (Years)	863	10.6	7.5	10.8	14.0
Total Contributions (\$M)	863	\$616.6	\$179.4	\$342.5	\$648.4
Total Distributions (\$M)	863	\$825.1	\$210.0	\$443.0	\$858.1
IRR (%)	860	7.27	1.54	8.49	14.75
MOIC	863	1.31	1.07	1.37	1.64

Note: This table reports summary statistics for private real estate debt (PDRE) and private equity real estate (PERE) funds. The sample includes North American funds with vintage years through 2019. Fund size is total capital committed in millions of U.S. dollars. For IRR (internal rate of return) and MOIC (multiple on invested capital), the Mean column reports the pooled value; remaining columns report the cross-sectional distribution of fund-level estimates.

Table 5. Performance by Time Period and Fund Size

Panel A: By Time Period

	Pre-2000	2000-2009	2010-2019
PDRE			
Pooled IRR (%)	14.23	3.72	11.98
Median IRR (%)	16.56	6.52	8.49
Pooled MOIC	1.66	1.16	1.28
Median MOIC	1.49	1.24	1.25
Number of Funds	8	54	109
PERE			
Pooled IRR (%)	8.60	4.00	10.56
Median IRR (%)	9.76	5.26	9.64
Pooled MOIC	1.56	1.190	1.34
Median MOIC	1.55	1.30	1.35
Number of Funds	130	288	445

Panel B: By Fund Size

	≤\$50M	\$50-200M	\$200-500M	>\$500M
PDRE				
Pooled IRR (%)	1.93	12.30	6.20	8.69
Median IRR (%)	5.95	10.15	8.43	7.98
Pooled MOIC	1.06	1.31	1.22	1.26
Median MOIC	1.14	1.28	1.26	1.21
Number of Funds	9	37	45	80
PERE				
Pooled IRR (%)	6.82	7.80	7.41	7.16
Median IRR (%)	8.47	10.00	8.20	8.23
Pooled MOIC	1.55	1.45	1.32	1.30
Median MOIC	1.43	1.49	1.35	1.31
Number of Funds	38	193	321	311

Note: This table reports performance metrics for PDRE and PERE funds by vintage year (Panel A) and fund size (Panel B). Pooled IRR and pooled MOIC aggregate all fund cash flows within each group. Median values are cross-sectional medians of fund-level estimates. Fund size categories are based on total capital committed in millions of U.S. dollars.

Table 6. Direct Alpha and PME Analysis

Panel A: PDRE

	CMBS	Leveraged Loan	mREIT
Pooled Direct Alpha (%)	2.92	2.00	1.72
Median Direct Alpha (%)	5.39	2.73	2.89
% Funds with Positive Alpha	75	66	62
Pooled PME	1.11	1.07	1.07
Median PME	1.14	1.07	1.09
% Funds with PME > 1	75	68	66
Number of Funds	162	164	170

Panel B: PERE

	eREIT
Pooled Direct Alpha (%)	-2.07
Median Direct Alpha (%)	-1.23
% Funds with Positive Alpha	46
Pooled PME	0.92
Median PME	0.97
% Funds with PME > 1	47
Number of Funds	856

Note: This table reports direct alpha (%) and public market equivalent (PME) for PDRE funds (Panel A) and PERE funds (Panel B). Direct alpha is the annualized IRR spread over the benchmark, following Gredil, Griffiths, and Stucke (2023). Pooled values aggregate all fund cash flows before computing the metric. PME is the ratio of future-value-weighted distributions to contributions; values above 1.0 indicate outperformance. Fund counts vary across benchmarks due to start dates of the respective benchmarks.

Table 7. PDRE Performance by Debt Sub-Type

Panel A: Performance

Sub-Type	N = 168	IRR (%)	MOIC
Generalist	55	9.56	1.324
Mezzanine	44	4.98	1.137
Distressed	32	9.41	1.313
Senior	18	7.57	1.161
Not Classified	19	6.56	1.217

Panel B: Benchmark-Adjusted Performance

Sub-Type	Direct Alpha			PME		
	CMBS	Lev Loan	mREIT	CMBS	Lev Loan	mREIT
Generalist	4.67	3.58	2.84	1.19	1.14	1.11
Mezzanine	-0.18	-0.97	-0.34	1.00	0.98	1.00
Distressed	1.46	1.30	0.66	1.09	1.09	1.05
Senior	4.03	2.48	0.51	1.10	1.06	1.01
Not Classified	4.11	1.52	4.57	1.18	1.09	1.17

Note: This table reports pooled performance for PDRE funds by debt sub-type. Panel A reports pooled IRR (%) and MOIC. Panel B reports pooled direct alpha (%) and pooled PME relative to CMBS, leveraged loans, and mortgage REITs (mREITs). All pooled metrics aggregate fund cash flows within each sub-type.

Table 8. Risk-Adjusted Profit: Bootstrap Significance Tests

Benchmarks	(1) mREIT	(2) Bonds	(3) eREIT	(4) mREIT Bonds	(5) mREIT eREIT	(6) Bonds mREIT eREIT Stocks
Mean RAP (NPV)						
Coefficient	0.1738***	0.1650***	0.1149**	0.1532***	0.1323**	-0.0066
Std. Error	(0.0309)	(0.0448)	(0.0451)	(0.0430)	(0.0547)	(0.0507)
T-Stat	5.63	3.68	2.55	3.56	2.42	-0.13
P-value	0.000	0.000	0.011	0.000	0.016	0.896
Fund-Specific Alpha (%)						
Coefficient	3.86***	3.62***	2.43**	3.31***	2.90**	-0.68
Std. Error	(0.71)	(1.12)	(1.12)	(1.04)	(1.35)	(1.40)
T-Stat	5.43	3.23	2.17	3.18	2.14	-0.49
P-Value	0.000	0.001	0.030	0.001	0.032	0.624
N Funds	150	150	150	150	150	150

Note: This table reports bootstrap significance tests for mean risk-adjusted profit (RAP) and fund-specific alpha across alternative benchmark model specifications. RAP follows Erel et al. (2025). Bootstrap standard errors (in parentheses) are from 1,000 replications. All specifications include the risk-free rate (1-month T-bill). Bonds include the BBB corporate bond index, 10-year treasury rate, and high yield corporate bonds. Stocks use the CRSP VW market index. mREIT and eREIT are return indices from NAREIT. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.