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ON THE PERFORMANCE OF PRIVATE EQUITY FUNDS

Manuel Schildknecht

Work project carried out under the supervision of:

Felix Wilke

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Abstract:

I explored the historic performance of Private Equity, utilizing absolute measures Net IRR and Net Multiple, alongside the relative performance measure Public Market Equivalents. Analyzing data obtained from Preqin, we examine factors influencing performance, including fund size, General Partner experience, macroeconomic indicators and prior performance. Our key findings are 1) Private Equity funds consistently outperform public benchmarks on average; 2) Private Equity fund performance is positively impacted by the performance of previous funds managed by the same General Partner.

Keywords:

Private Equity, Private Assets, Performance Measurement, PME, IRR, Multiple on Money

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1. Introduction

When institutional investors want to allocate their capital, a variety of different investment opportunities arise. In recent years new opportunities, especially around private markets arose, but limited information about the performance and its drivers is known, hindering effective asset allocation.

In this paper, we investigate the historic performance of Private Assets, especially Private Equity ("PE") and Private Debt ("PD"). We assess both, absolute performance measures in the form of Net Internal Rate of Return ("Net IRR") and Net Multiple on Money ("MoM", "Net Multiple") as well as relative performance measures in the form of Public Market Equivalents ("PME") introduced by Kaplan and Schoar (2005). In detail, we investigate the impact of factors like Fund size, the General Partner's ("GP") experience and central bank rates on the absolute and relative performance of the funds. We utilize data obtained from Preqin for information about Fund performance in both absolute and relative terms, as well as Fund and asset manager specific characteristics. The data covers funds with investment focus in North America, Europe, South America, Asia, Africa, Israel and Middle East and Australasia.

While a solid, yet ambiguous academic foundation on the performance of PE exists, we contribute to the existing literature by analyzing up to date Fund information and therefore including information about the most recent shifts in macroeconomic trends. In academic literature, performance of PD funds has not seen a lot of attention (Böni and Manigart 2022, p. 123). Our goal is to deepen the understanding of PD performance and to contribute to existing literature with the most recent Fund data. While existing literature for PE suggests ambivalent results whether PE funds overperform publicly traded indices (Harris / Jenkinson / Kaplan, 2014 p. 1851), existing literature for PD suggests constant and coherent overperformance against publicly traded debt and equity indices as seen in Böni and Manigart (2022) and Cumming et al. (2018).

In a first step we outline absolute performance of PE and PD funds and prove that PE and PD achieve constant overperformance against public markets through a cross-sectional analysis. We observe that Fund selection made by Limited Partners ("LPs") is important, since dispersion between top and bottom performing funds is significant. On average top quartile PE funds achieve a Net Multiple 2.07x higher than bottom quartile funds (0.98x for PD funds).

In a second step, we analyze which factors influence absolute and relative Fund performance by performing Ordinary Least Squares ("OLS") regressions with Net IRR, Net Multiple and PME in relation to the S&P 500 being the left-hand sided performance measures. On average, PD fund's performance measured by Net Multiple and the Fund Size have a convex relationship, indicating that larger funds benefit from a growing Fund size while smaller funds perform worse when they grow in size which might be due to economies of scale or unique investment opportunities only available for large funds. Our findings also show that Lagged Performance ("$Performance_{(t-1)}$") is a significant factor explaining current absolute and relative performance for both PE and PD funds. A one standard deviation ("SD") increases in $Performance_{(t-1)}$ increases the Net IRR of PE and PD funds by 0.15 SD of Net IRR, indicating that past performance impacts PE and PD funds with comparable magnitude. We find robustness of our results against different central bank rate measures and different PME benchmarks.

Lastly, we put our results in a practical environment. By creating investment portfolios based on lagged performance, we observe that a PE LP can on average achieve 0.24x higher Net Multiple and 4.09% higher Net IRR when investing in the top quartile ranked by lagged performance compared to the average PE Fund. PD LPs can expect 0.17x higher Net Multiple and 2.02% higher Net IRR. Hower, the strategy comes with its limitations such as limited information about Lagged Performance and investment constraints due to limited Fund size.

To conclude, we compare our results and how our investigated factors impact PE and PD performance differently. Based on our results, we give an outlook on how future research can build on our results and which limitations might impact the validity of our outcomes.

2. Literature Review

According to Kaplan and Strömberg (2009, p.124), the typical PE investment model involves the acquisition of a large stake of equity in an unlisted company that is subsequently held for a limited period and then either sold to another PE, a strategic investor or exited via an IPO. This Asset Class began gaining momentum in the 1980s and has since expanded substantially, with Assets under Management ("AuM") globally exceeding $4.5 trillion as of March 2024 (Preqin Pro).

PE funds are typically structured as closed-end partnerships with lifespans of 10–12 years. General Partners ("GPs") manage the fund, sourcing, executing, and overseeing investments, while Limited Partners—usually institutional investors like pension funds or high-net-worth individuals—provide the bulk of the capital. GPs earn fees for their management and a performance incentive, generally taking 1.5%–2% in management fees and performance fees around 20% of returns (also known as "carried interest") that exceed a "preferred return" threshold, commonly 8%. LPs, though passive, hold rights to preferred returns (Kaplan and Schoar 2005, p.1793).

Private Equity encompasses a broad range of different sub-strategies (Døskeland and Strömberg 2018, p.12). 1) The main segment of Private Equity that emerged in the early 1980's is the *Leveraged Buyout ("LBO").* An LBO is the acquisition of a company using a significant amount of borrowed money to meet the cost of acquisition. Buyouts typically involve mature companies with stable cash flows. 2) *Growth* invests in established businesses with proven business models and high growth potential, typically providing capital to scale operations or enter new markets. 3) *Distressed/Turnaround* concentrates on investing in underperforming or

financially distressed companies, aiming to restructure and revitalize them for value creation. 4) *Secondaries* involves purchasing existing PE stakes from other investors, offering liquidity and enabling portfolio diversification or exit opportunities. 5) *Venture Capital ("VC")*, a specialized category of Private Equity, involves equity investments in early-stage startups. It is typically regarded as a distinct Asset Class, separate from Private Equity. Consistent with this perception, we exclude VC Funds from our analysis. In addition to direct investments, investors can also get Private Equity exposure through *Fund of Funds*, which exclusively invest in other Private Equity funds. However, our analysis focuses solely on direct investments.

Despite extensive literature on PE Funds, consensus on their historical performance remains elusive (Harris, Jenkinson and Kaplan 2014, p. 1851; Metrick and Yasuda 2011, p.647). This uncertainty stems from several characteristics of Private Equity data: 1) limited data availability and quality, as funds are not required to report performance and typically do not disclose Fund cash flows; 2) delayed cash flows, with Fund lifecycles around ten years and effective investment durations closer to five (Coupe 2016, p. 41); 3) reliance on smoothed valuations and quarterly reporting rather than mark-to-market valuations; and 4) unique fee structures specific to Private Equity (Coupe 2016, p. 41). Prior research has reached differing conclusions on PE performance. Kaplan and Schoar (2005) analyzed Buyout and VC Fund performance using cash flow data from Venture Economics. They found that public markets slightly outperformed PE funds net of fees, while VC funds slightly outperformed on a capital-weighted basis. Phalippou and Gottschalg (2009) updated this dataset, obtaining broadly similar but somewhat more negative results, with returns around -3% net of fees without risk adjustment. Their conservative approach to Fund valuation assumed that unrealized investments after 10 years held no value, in contrast to the Net Asset Values ("NAV") used by Kaplan and Schoar. Stucke (2011) identified serious biases in the Thomson Venture Economics database, noting that many funds in the dataset had not been updated after 2001, with NAVs

simply rolled forward, suggesting that prior results may understate Fund returns, particularly for buyout funds. Subsequently, Driessen, Lin, and Phalippou (2012) used a modified approach with the Venture Economics dataset, reporting a 1.6% annual outperformance of PE. Ang et al. (2018) used data from Preqin and found a negative alpha of -2%. Harris, Jenkinson, and Kaplan (2014), examining nearly 1,400 buyout and VC funds from the Burgiss dataset, reported excess returns of around 3% over the S&P 500, without risk adjustment.

While extensive research exists on PE performance, there is comparatively less focus on the factors driving that performance. Some evidence links higher PE performance with increased aggregate capital commitments, as identified by Kaplan and Schoar (2005), Kaplan and Strömberg (2009), and Robinson and Sensoy (2016). At the Fund level, Kaplan and Schoar (2005) observed a concave relationship between performance and Fund size, but only significant for VC funds—not PE funds—whereas Robinson and Sensoy (2016) noted a mildly concave relationship for both Fund types. Ang et al. (2018) attempted to decompose PE returns, isolating a PE-specific premium they largely attribute to the illiquidity of these assets. Korteweg and Nagel (2016) applied a to some extent similar approach on VC assets, also reporting abnormal performance not fully explained by publicly traded factors. However, they state, that linear factor modeling techniques that are common in the mutual funds and hedge funds literature are not easily applicable to the private assets universe due to their specific features in terms of infrequent payoffs over varying time horizons and infrequent valuation (Korteweg and Nagel 2016, p.1468).

3. Performance Measurement of Private Assets

In our empirical analysis we measure Private Asset Performance with the most used absolute performance metrics: Internal Rate of Return and the Multiple on Money, as well as the relative performance measure Public Market Equivalent. A detailed understanding of these performance metrics is essential for the analysis of Private Asset performance.

The IRR represents the discount rate at which the net present value ("NPV") of an investment's cash inflows equals the outflows, offering a time-adjusted measure of performance. A primary advantage of IRR is its ability to account for the time value of money, making it sensitive to cash flow timing, which is crucial in private asset classes with irregular cash distributions and capital calls (Ang 2014, p. 601). IRR is also widely used because it provides a single, easily interpretable percentage that enables comparisons across investments. In our empirical analysis we define the IRR as being net of performance fee and net of carried interest focusing only on the cash in- and outflow occurring to the LP.

$$0 = NPV = \sum_{n=0}^{N} \frac{CF_n}{(1 + IRR)^n}$$

Equation 1: IRR Formula (Ang 2014,p.598)

However, IRR has notable limitations: it assumes interim cash flows are reinvested at the same IRR, which is often unrealistic and may lead to overstated returns (Sorensen and Jagannathan 2015, p. 43, Phalippou 2008, p.6). Additionally, IRR can produce multiple rates with alternating positive and negative cash flows, complicating interpretation. It also emphasizes early distributions, potentially distorting long-term performance (Phalippou 2009, p. 17), and investors sometimes suspect that PE funds may manipulate IRRs by strategically timing investments (Sorensen and Jagannathan 2015, p. 43). Furthermore, IRR does not fully account for investment tenure, potentially favoring short-term investments with higher IRRs over longer-term ones that may create more absolute value (Ang 2014, p. 596). Despite these limitations, IRR remains a widely accepted performance indicator, though it is recommended to complement it with other measures like the PME for a more comprehensive view of private asset performance (Massimiliano Saccone 2021).

The Multiple on Money (or Net Multiple) measures the ratio of the total value generated by an investment to the initial capital invested. It is calculated by dividing the total value of distributions and residual value by the invested capital, offering a straightforward, time-

agnostic measure of how much money has been returned relative to the investment. A key advantage of MoM is its simplicity, as it directly reflects the absolute value created without considering cash flow timing, making it easier to understand than time-weighted measures like IRR (Phalippou 2008, p.2). Additionally, it is not affected by early distributions or cash flow fluctuations, providing a clearer indication of an investment's overall financial success (Ang 2014, p. 601). In our empirical analysis we define the MoM as being net of performance fee and net of carried interest focusing only on the cash in- and outflow occurring to the investor.

$$Multiple\ on\ Money(T) = \frac{NAV(T) + \sum_t dist(t)}{\sum_t call(t)}$$

Equation 2: MoM Formula (Preqin Pro)

However, MoM has limitations. Most notably, it does not account for the time value of money, meaning two investments with the same MoM can yield very different outcomes depending on the length of capital commitment. For example, a MoM of 2.0 over ten years is less impressive than the same MoM over five years (Phalippou 2008, p. 8). MoM also does not reflect risk taken or cash flow volatility, so it should not be used in isolation when comparing investments with different durations or risk profiles (Ang 2014, p. 601). Despite these limitations, MoM remains a critical metric in private equity because it offers a direct measure of wealth creation and is frequently used alongside other metrics like IRR to gain a fuller understanding of an investment's performance (Kaplan and Schoar 2005, p. 1805).

While IRR and MoM are the most widely used absolute performance metrics among practitioners, one key question in Private Assets is its performance relative to public markets, requiring a measure that incorporates timed cash flows (Harris, Jenkinson, and Kaplan 2014, p. 1862). The PME, introduced by Kaplan and Schoar (2005), is a performance metric designed to compare private asset returns with public market returns. PME calculates the hypothetical value of a private asset investment if the same cash flows were invested in a public market index, typically using broad market indices. This is done by discounting private asset cash flows

with the returns of the chosen public market index and comparing the resulting value with the private asset fund's actual performance. The key advantage of PME is that it allows investors to benchmark illiquid, private investments against liquid, publicly traded securities, providing a relative measure of value creation that accounts for overall market trends (Kaplan and Schoar 2005, p. 1816). PME can be seen as a market-adjusted multiple of invested capital (Harris, Jenkinson, and Kaplan, 2014, p. 1862). The PME is calculated net of management fee and net of carried interest.

$$PME = \frac{\sum_t \frac{dist(t)}{1 + rM(t)}}{\sum_t \frac{call(t)}{1 + rM(t)}}$$

Equation 3: PME Formula (Kaplan and Schoar, 2005)

Table 1 shows a simplified example for the calculation of the PME. The resulting PME of 1.12x implies that at the end of the fund's life, investors end up with 12% more than they would have if they had invested in the public market benchmark.

Period	Called Capital	Distributed Capital	Benchmark Index	Discount. Called Capital	Discount. Distribution	KS-PME
0	80		100	80	0	
1	20		105	19	0	
2		50	115	0	43	
3		30	117	0	26	
4		50	120	0	42	
Sum				99	111	**1.12**

Table 1: Exemplary Calculation PME

Unlike IRR, PME is not distorted by reinvestment rate assumptions or the timing of cash flows, making it a more robust tool for performance comparison, particularly during periods of high market volatility (Phalippou 2008, p. 4).

However, PME also has limitations. It assumes that public and private markets are directly comparable, which may not always be the case given the unique risk and return profiles of private equity investments. Kaplan and Schoar (2005, p.1797) argue that PMEs serve as valid performance measures only when the analyzed funds have a beta of 1 with the benchmark,

aligning their risk profile with market benchmarks. However, Harris, Jenkinson, and Kaplan (2014, p.1870) demonstrate that PME performance remains robust regardless of systematic risk assumptions, while Sorensen and Jagannathan (2013) support discounting at the realized market return (e.g., S&P 500) without requiring specific systematic risk assumptions.

The choice of public market benchmark, however, can significantly affect PME outcomes, introducing potential bias if the benchmark does not appropriately reflect the risk-adjusted return expectations of the Private Asset (Brown, Gredil, and Kaplan 2019, p. 289). Despite these issues, PME remains a valuable complement to metrics like IRR and MoM and is recommended as a performance measure with less room for marketing-driven distortions in Private Asset Funds (Mulcahy, Weeks, and Bradley 2012, p.8).

For not fully liquidated funds all performance measures rely on the valuation of not distributed NAVs of the funds. We treat the NAVs as reliable and handle them without cautionary discount, in line with the approaches proposed by Kaplan and Schoar (2005), Harris, Jenkinson, and Kaplan (2014), Böni and Manigart (2022) and consistent with the calculation procedure followed by Preqin Pro.

4. Data

High-quality data on Private Assets is typically scarce, highly confidential and difficult to obtain for research purposes (Coupe 2016, p. 41). Even if data is available, as funds for Private Assets don't have the obligation to value the assets mark-to-market, the returns are typically reported only quarterly (Munday et al. 2018, p. 8). Prior researchers typically relied on datasets from Burgiss (Harris, Jenkinson, and Kaplan 2014), Cambridge Associates (Woodward and Hall 2004), Thompson Venture Economics (Driessen, Lin, and Phalippou 2011; Phalippou and Gottschalg 2009; Kaplan and Schoar 2005) or Preqin (Ang et al., 2013; Böni and Manigart 2022). The Venture Economics dataset is considered least robust as it includes data from funds who stopped reporting and which NAVs were rolled forward every quarter, resulting in

downwards biased results by research relying on this dataset (Stucke 2011, p.22). The dataset from Cambridge Associates does not provide fund-level data and the Burgiss dataset was not available for us. Therefore, we decided to use the vast dataset of Preqin.

While Preqin provides useful data for individual funds and its quality is considered to be very high, the data is collected through voluntarily disclosure and Freedom of Information Act ("FOIA") requests towards LPs, which makes it difficult to verify the data. The dataset was obtained from Preqin on 17/09/2024 and consists of reported data of 14.720 individual funds across the asset classes *Infrastructure, Multi, Natural Resources, Private Debt, Private Equity, Real Estate* and *Venture Capital*. To make use of the dataset for the following regression analysis we dropped all funds for which a dependent or independent variable was not available resulting in a final data subset for absolute return measures of 3,834 PE and PD funds. The dataset contains Fund data for funds with vintage years between 1980 and 2024. Table 2 shows the distribution of Fund inceptions.

Year	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**
Private Equity	2	1	2	2	1	6	6	4	7	6	2	10
Private Debt	0	0	0	0	0	0	0	1	0	2	1	2
Year	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Private Equity	15	20	28	23	43	58	53	66	47	36	43	56
Private Debt	3	2	2	7	6	4	10	10	14	11	10	9
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Private Equity	110	116	118	116	59	86	89	116	123	129	138	163
Private Debt	16	24	19	31	11	33	26	25	44	42	56	47
Year	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**				**Total**
Private Equity	148	189	195	171	182	112	69	5				2,971
Private Debt	68	71	74	71	57	35	18	1				863

Table 2: Distribution of Vintage Years

Since we are only looking at funds which perform direct investments, we dropped all PE and PD funds which specialize in "Fund of Fund" strategies. All the funds we are looking at are either categorized as "Closed" or "Liquidated", therefore none of the funds is currently in its fundraising stage nor are we including open-end funds which do not fit our definition of a PE or PD Fund. Our analyses cover $4,337bn of AuM for PE funds and $1,020bn of AuM for PD funds, which equals 63.9% and 61.1% of the total by Preqin observed AuM for each Asset Class, respectively. For further analysis, we also retrieved data about the FED Funds Rates, accessed on 03/10/2024 from the website of the Federal Reserve Bank of St. Louis.

	unit	count	mean	std	min	25%	50%	75%	max
		2971	1.74	0.86	0.00	1.25	1.58	2.04	16.39
Net Multiple	**x**	2778	-	-	-	-	-	-	-
		109	-	-	-	-	-	-	-
		2971	-	-	-	-	-	-	-
Net IRR	**%**	2778	16.60	17.47	-100.00	8.17	14.90	22.20	213.05
		109	-	-	-	-	-	-	-
		2971	-	-	-	-	-	-	-
S&P 500 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.22	0.41	0.26	0.95	1.17	1.40	2.60
		2971	-	-	-	-	-	-	-
Russell 2000 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.39	0.48	0.33	1.04	1.33	1.63	2.78
		2971	-	-	-	-	-	-	-
Russell 3000 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.24	0.42	0.27	0.95	1.19	1.44	2.62
		2971	-	-	-	-	-	-	-
MSCI World PME	**x**	2778	-	-	-	-	-	-	-
		109	1.27	0.44	0.32	0.99	1.18	1.44	2.80
		2971	1460	2758	1	217	512	1400	26000
Fund Size	**$m**	2778	1371	2541	1	211	500	1300	25072
		109	1190	1642	35	284	590	1350	9350
		2971	8.27	11.10	1.00	3.00	5.00	8.00	196.00
Fund Number Overall	**#**	2778	7.81	9.98	1.00	3.00	5.00	8.00	106.00
		109	11.99	12.40	2.00	5.00	7.00	14.00	60.00
		2971	3.70	2.34	1.00	2.00	3.00	5.00	15.00
Fund Number Series	**#**	2778	3.66	2.27	1.00	2.00	3.00	5.00	15.00
		109	3.80	2.41	1.00	2.00	4.00	5.00	11.00
		2971	2.18	1.65	0.11	1.03	1.96	3.14	11.34
5Y FED Funds Rate	**%**	2778	1.99	1.52	0.11	0.95	1.71	2.89	11.34
		109	2.71	1.67	0.12	1.14	2.37	4.13	5.31
		2971	2.22	1.52	0.13	0.85	2.23	3.11	10.04
7Y FED Funds Rate	**%**	2778	2.02	1.38	0.13	0.85	2.10	2.75	10.04
		109	2.87	1.55	0.18	1.83	2.37	4.13	5.31
		2971	0.14	0.35	0.00	0.00	0.00	0.00	1.00
First Fund	**1/0**	2778	0.14	0.35	0.00	0.00	0.00	0.00	1.00
		109	0.17	0.38	0.00	0.00	0.00	0.00	1.00
		2971	0.55	0.50	0.00	0.00	1.00	1.00	1.00
NA-Focus	**1/0**	2778	0.55	0.50	0.00	0.00	1.00	1.00	1.00
		109	0.45	0.50	0.00	0.00	0.00	1.00	1.00
		2971	2.00	1.24	0.05	1.40	1.77	2.28	26.81
Performance$_{(t-1)}$ Net Multiple	**x**	2778	-	-	-	-	-	-	-
		109	-	-	-	-	-	-	-
		2971	-	-	-	-	-	-	-
Performance$_{(t-1)}$ Net IRR	**x**	2778	18.45	17.79	-99.98	9.21	15.90	23.97	282.99
		109	-	-	-	-	-	-	-
		2971	-	-	-	-	-	-	-
Performance$_{(t-1)}$ S&P 500 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.33	0.65	0.36	0.96	1.21	1.45	5.27
		2971	-	-	-	-	-	-	-
Performance$_{(t-1)}$ Russell 2000 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.52	0.72	0.44	1.09	1.40	1.70	5.43
		2971	-	-	-	-	-	-	-
Performance$_{(t-1)}$ Russell 3000 PME	**x**	2778	-	-	-	-	-	-	-
		109	1.35	0.65	0.37	0.98	1.24	1.48	5.24
		2971	-	-	-	-	-	-	-
Performance$_{(t-1)}$ MSCI World PMI	**x**	2778	-	-	-	-	-	-	-
		109	1.44	0.78	0.41	1.02	1.28	1.53	6.42

Table 3: Descriptive Statistics PE Funds

For the analysis of PE Fund Performance, we relied on a subset of data for the funds categorized as “Private Equity” by Preqin. Table 3 depicts the whole descriptive statistics for the PE subset. The subsample for the absolute performance analyses includes data about 2,971 funds for the Net Multiple analysis and data about 2,778 funds for the Net IRR analysis. These funds are managed by 889 distinct GPs with vintage years spanning from 1980 to 2024. The sample for the analyses of relative performance contains 109 funds, managed by 65 distinct GPs with vintage years spanning from 2006 to 2023. Looking at the PMEs for the four different benchmarks we can conclude that the PE funds included in the dataset outperformed the benchmark both by mean (between 1.22-1.39) and by median (1.17-1.33). A detailed cross-sectional analysis on performance is discussed in section 6.1. The Net Multiple spans a range from 0.00-16.39 and the mean lies at 1.74 while the Net IRR is on average at 16.60% with its median being slightly lower at 14.90%. The Fund Size is $1,460m on average and $512m by median for the largest dataset, indicating a positive skewness towards smaller Fund sizes. On average, every GP manages around 8 funds, while the median is 5 for the largest dataset, indicating that a few GPs manage a significant number of all distinct funds we are looking at. Around 14% of the funds in the largest dataset are the first Fund of the respective Fund generation. Appendix 1 shows the descriptive statistics for log and squared variables used in our analysis on PE. Appendix 3 shows a correlation matrix of the variables used in the regression analyses.

	unit	count	mean	std	min	25%	50%	75%	max
Net Multiple	**x**	863	1.40	0.45	0.47	1.16	1.30	1.49	6.05
		37	-	-	-	-	-	-	-
Net IRR	**%**	863	10.81	9.96	-91.84	7.20	9.90	13.27	156.40
		37	-	-	-	-	-	-	-
S&P 500 PME	**x**	863	-	-	-	-	-	-	-
		37	1.06	0.18	0.50	0.98	1.10	1.16	1.46
Russell 2000 PME	**x**	863	-	-	-	-	-	-	-
		37	1.18	0.23	0.52	1.04	1.23	1.33	1.76
Russell 3000 PME	**x**	863	-	-	-	-	-	-	-
		37	1.08	0.18	0.51	0.98	1.11	1.19	1.51
MSCI World PME	**x**	863	-	-	-	-	-	-	-
		37	1.07	0.16	0.50	1.02	1.09	1.15	1.44
Fund Size	**$m**	863	1,182	1,828	6	213	600	1,337	16,812
		37	1,550	2,369	19	290	973	1,911	13,800
Fund Number Overall	**#**	863	6.51	7.06	1.00	3.00	4.00	7.00	61.00
		37	8.16	4.96	2.00	5.00	6.00	11.00	22.00
Fund Number Series	**#**	863	3.15	2.25	1.00	2.00	3.00	4.00	17.00
		37	2.54	1.43	1.00	1.00	2.00	3.00	6.00
5Y FED Funds Rate	**%**	863	2.11	1.55	0.12	1.05	1.82	3.07	6.64
		37	3.18	1.60	0.76	1.82	3.00	4.77	5.31
7Y FED Funds Rate	**%**	863	2.22	1.46	0.13	0.85	2.29	3.00	5.88
		37	3.27	1.53	0.85	2.30	3.00	4.77	5.31
First Fund	**1/0**	863	0.21	0.40	0.00	0.00	0.00	0.00	1.00
		37	0.27	0.45	0.00	0.00	0.00	1.00	1.00
NA-Focus	**1/0**	863	0.70	0.46	0.00	0.00	1.00	1.00	1.00
		37	0.54	0.51	0.00	0.00	1.00	1.00	1.00
Performance$_{(t-1)}$ Net Multiple PME	**x**	863	1.46	0.45	0.41	1.21	1.36	1.58	5.57
		37	-	-	-	-	-	-	-
Performance$_{(t-1)}$ Net IRR PME	**x**	863	11.17	10.88	-95.99	7.37	10.00	13.20	156.40
		37	-	-	-	-	-	-	-
Performance$_{(t-1)}$ S&P 500 PME	**x**	863	-	-	-	-	-	-	-
		37	1.03	0.18	0.69	0.92	1.01	1.15	1.46
Performance$_{(t-1)}$ Russell 2000 PME	**x**	863	-	-	-	-	-	-	-
		37	1.16	0.19	0.78	1.00	1.19	1.30	1.58
Performance$_{(t-1)}$ Russell 3000 PME	**x**	863	-	-	-	-	-	-	-
		37	1.05	0.18	0.71	0.93	1.03	1.18	1.41
Performance$_{(t-1)}$ MSCI World PME	**x**	863	-	-	-	-	-	-	-
		37	1.07	0.15	0.78	0.95	1.07	1.15	1.40

Table 4: Descriptive Statistics PD Funds

The dataset used for the analysis of absolute PD performance contains data about 863 individual funds and the dataset for the analysis of relative performance contains data about 37 individual funds. Table 4 depicts the descriptive statistics for the two datasets used in this analysis. The 863 (37) individual funds are managed by 269 (20) different GPs and the inception years span from 1988 until 2024 (2007 until 2023). On average, the funds have a size of $1,160m with a median of $567m in the absolute performance sample and an average size of $1,550m and median of $973m for the relative performance sample, indicating that the distribution of Fund size features positive skewness. The average GP advises 6.51 funds while median is 4 funds. 23% of the 863 funds in the larger sample we analyze are the first ones of their respective Fund generation. On average, PD funds outperformed every reference public equity index we look at in our sample, measured by PME. While PD achieves the highest relative performance against the Russell 2000 with a PME of 1.18 on average, the lowest

relative performance is achieved against the S&P 500 with an average PME of 1.06. Median values are also consistently above 1 and larger than the respective average, implying a negative skewness towards relatively badly performing funds. A detailed cross-sectional analysis on PD performance is discussed in section 7.1. The average Net Multiple is 1.40 with a maximum of 6.05. Net IRR reaches 10.81% on average, spanning from -91.84% up to 156.40%. Appendix 2 shows the descriptive statistics for log and squared variables used in our analysis on PD. Appendix 4 shows a correlation matrix of the variables used in the regression analyses.

5. ***Empirical Methodology***

We explain the performance of Private Equity and Private Debt funds with a regression analysis. In separate regressions we analyze both the absolute performance measures Net IRR and Net Multiple and the relative performance measure PME for the benchmark S&P 500 as proposed by Kaplan and Schoar (2005) and Harris, Jenkinson, and Kaplan (2013). By performing an OLS Regression, we evaluate the impact of *Fund Size, Fund Number Overall, Fund Number Series, FED Funds Rate*, *First Fund*, *Geographic Focus* and *Performance*$_{(t-1)}$ (equal to the performance of the previous Fund managed by the same GP) on the performance of Private Equity and Private Debt. The regression model used for both PE and PD is as follows:

$$
\begin{aligned}
&Performance\ Measure_{i,k} \\
&\quad = \beta_0 + \beta_1 Log(Fund\ Size)_i + \beta_2 Log(Fund\ Size)^2{}_i \\
&\quad + \beta_3 Log(Fund\ Number\ Overall)_i + \beta_4 Log(Fund\ Number\ Overall)^2{}_i \\
&\quad + \beta_5 Log(Fund\ Number\ Series)_i + \beta_6 Log(Fund\ Number\ Series)^2{}_i \\
&\quad + \beta_7 FED\ 5Y\ Rate_t + \beta_8 First\ Fund_i + \beta_9 NA\ Focus_i \\
&\quad + \beta_9\ Performance\ Measure_{(t-1)i,k} \\
&\quad + Fund\ Characteristics\ Fixed\ Effects + Time\ Fixed\ Effects + \varepsilon_i
\end{aligned}
$$

Equation 4: Regression Formula

with the performance measure k of Fund i. In our regressions, k represents either *Net IRR, Net Multiple* or *PME. Log (Fund Size)* controls for closing size of the Fund. We use the logarithm of the Fund Size in line with prior literature (Kaplan and Schoar 2005, Böni and Manigart 2022). The *FED 5Y Rate* variable has been matched to each funds vintage year as previously done by Munday et al. (2018). We take the forward-looking average FED Funds rate starting from the vintage year to account for the average effective duration of private equity or debt funds of around 5 years (Coupe 2016, p. 41). If the Fund does not exist for the full 5 years, we calculate the average over the maximum available time period. We also include the variables *Log (Fund Number Overall)*, *Log (Fund Number Series)*, and the dummy variable *First Fund*, as proposed by Böni and Manigart (2022), to examine the influence of experience of the GP in managing Private Capital Funds on performance measures. The variable *NA Focus* is a dummy variable including geographic implications on performance. In case the variable is 0, it indicates that the Fund has a geographic investment focus in any other geographic region that is not North America. Lastly, we control for the persistence of performance of a certain Fund manager by including $Performance_{(t-1)}$ in our analysis as proposed by Böni and Manigart (2022), representing the performance of the previous Fund managed by the same Fund manager. For each of the three performance measures we include a lagged performance variable according to the respective measure.

To control for specific Fund characteristics, we include fixed effects for the Fund Strategy, the Fund Status (Closed or Liquidated), the Fund Domicile, the Fund Legal Structure and the Core Investment Industries. We group these fixed effects under the umbrella term *Fund Characteristics Fixed Effects ("FCFE").* Furthermore, we control for *Time Fixed Effects ("TFE")* by including dummy variables for the vintage year in which a Fund had its first investment. We list all variables and detail their definitions in Appendix Table 5.

6. ***Analysis of Private Equity Performance***

6.1. Cross-Sectional Analysis PE Performance

						Percentiles							
	count	**mean**	**median**	**std**	**min**	**1st**	**5th**	**25th**	**50th**	**75th**	**95th**	**99th**	**max**
Net Multiple Overall	**5922**	**1.74**	**1.53**	**1.14**	**0.00**	**0.25**	**0.74**	**1.16**	**1.53**	**2.03**	**3.28**	**5.47**	**26.81**
Fourth Quartile	1484	0.89	0.96	0.25	0.00	0.01	0.32	0.80	0.96	1.06	1.14	1.16	1.16
Third Quartile	1477	1.35	1.35	0.11	1.16	1.16	1.18	1.25	1.35	1.44	1.51	1.53	1.53
Second Quartile	1480	1.75	1.74	0.14	1.53	1.54	1.55	1.63	1.74	1.86	1.99	2.02	2.03
Top Quartile	1481	2.96	2.51	1.65	2.03	2.03	2.06	2.23	2.51	3.07	5.15	9.47	26.81
High-Low (Quartiles)		2.07	1.55	1.40	2.03	2.02	1.73	1.42	1.55	2.01	4.01	8.31	25.65
Net IRR Overall	**5309**	**17.39**	**15.00**	**25.22**	**-100.00**	**-23.29**	**-5.26**	**8.00**	**15.00**	**23.46**	**46.52**	**88.57**	**1013.37**
Fourth Quartile	1360	-1.20	2.40	13.33	-100.00	-61.42	-20.16	-3.00	2.40	5.84	7.90	8.00	8.00
Third Quartile	1320	11.60	11.70	2.06	8.01	8.10	8.40	9.80	11.70	13.40	14.80	15.00	15.00
Second Quartile	1302	18.87	18.80	2.33	15.03	15.10	15.43	16.90	18.80	20.88	22.80	23.26	23.46
Top Quartile	1327	40.76	32.50	37.66	23.47	23.53	24.00	26.93	32.50	42.60	80.79	155.24	1013.37
High-Low (Quartiles)		41.96	30.10	24.33	123.47	84.95	44.16	29.93	30.10	36.76	72.89	147.24	1005.37
S&P 500 PME Overall	**516**	**1.18**	**1.13**	**0.48**	**0.01**	**0.25**	**0.56**	**0.94**	**1.13**	**1.33**	**1.89**	**2.94**	**5.27**
Fourth Quartile	129	0.71	0.77	0.21	0.01	0.08	0.26	0.64	0.77	0.86	0.93	0.93	0.93
Third Quartile	132	1.03	1.03	0.06	0.94	0.94	0.94	0.98	1.03	1.07	1.13	1.13	1.13
Second Quartile	128	1.24	1.24	0.06	1.14	1.14	1.14	1.19	1.24	1.29	1.33	1.33	1.33
Top Quartile	127	1.74	1.53	0.57	1.34	1.34	1.36	1.42	1.53	1.80	2.60	3.94	5.27
High-Low (Quartiles)		1.03	0.76	0.37	1.33	1.26	1.10	0.78	0.76	0.94	1.67	3.01	4.34
Russell 2000 PME Overall	**516**	**1.31**	**1.24**	**0.56**	**0.01**	**0.25**	**0.64**	**1.00**	**1.24**	**1.52**	**2.14**	**3.12**	**5.43**
Fourth Quartile	133	0.77	0.85	0.22	0.01	0.08	0.30	0.69	0.85	0.93	0.99	1.00	1.00
Third Quartile	128	1.13	1.13	0.07	1.01	1.01	1.02	1.07	1.13	1.19	1.23	1.24	1.24
Second Quartile	128	1.39	1.38	0.08	1.25	1.25	1.26	1.31	1.38	1.46	1.52	1.52	1.52
Top Quartile	127	1.98	1.75	0.64	1.53	1.53	1.54	1.63	1.75	2.08	2.99	4.59	5.43
High-Low (Quartiles)		1.21	0.90	0.42	1.52	1.45	1.24	0.94	0.90	1.15	2.00	3.59	4.43
Russell 3000 PME Overall	**516**	**1.19**	**1.15**	**0.49**	**0.01**	**0.25**	**0.57**	**0.94**	**1.15**	**1.35**	**1.92**	**2.98**	**5.24**
Fourth Quartile	130	0.72	0.77	0.21	0.01	0.08	0.27	0.64	0.77	0.87	0.94	0.94	0.94
Third Quartile	128	1.04	1.04	0.06	0.95	0.95	0.95	0.99	1.04	1.08	1.13	1.14	1.14
Second Quartile	132	1.25	1.26	0.06	1.15	1.15	1.15	1.20	1.26	1.30	1.34	1.35	1.35
Top Quartile	126	1.77	1.56	0.58	1.36	1.36	1.37	1.45	1.56	1.83	2.62	4.00	5.24
High-Low (Quartiles)		1.06	0.79	0.37	1.35	1.28	1.10	0.81	0.79	0.96	1.68	3.06	4.30
MSCI World PME Overall	**516**	**1.23**	**1.17**	**0.54**	**0.01**	**0.28**	**0.62**	**0.96**	**1.17**	**1.41**	**2.06**	**3.26**	**6.42**
Fourth Quartile	133	0.75	0.79	0.20	0.01	0.10	0.30	0.69	0.79	0.90	0.95	0.96	0.96
Third Quartile	125	1.07	1.07	0.06	0.97	0.97	0.98	1.01	1.07	1.12	1.16	1.16	1.16
Second Quartile	137	1.28	1.29	0.07	1.17	1.17	1.17	1.22	1.29	1.34	1.41	1.41	1.41
Top Quartile	121	1.88	1.62	0.69	1.42	1.42	1.44	1.49	1.62	1.99	2.83	4.61	6.42
High-Low (Quartiles)		1.12	0.83	0.49	1.41	1.32	1.14	0.80	0.83	1.09	1.88	3.65	5.46

Table 5: Cross Sectional Analysis PE Performance

We examine the absolute performance and relative performance through a cross-sectional analysis. Table 5 presents *Net Multiple, Net IRR* and *PME* performance overall and by quartile, across various benchmarks and percentiles. In total we analyzed 5,922 funds for *Net Multiple* (5,309 for *Net IRR* & 516 funds for *PME*).

The median Fund achieves a *Net Multiple* of 1.53x, the average Fund achieves 1.74x. The median *Net IRR* is 15,00%, while the average *Net IRR* amounts to 17.39%. The difference between the median values for the top quartile and bottom quartile amount to 1.55x and 30,10%, highlighting the wide difference in performance between different PE funds.

For all four benchmarks, the mean and median *PME* values exceed 1, indicating an overall excess return over public benchmarks. The highest excess return is observed against the Russell 2000, with an average *PME* of 1.31 and a median of 1.24. In contrast, the lowest excess

return is recorded for the S&P 500, with an average *PME* of 1.18 and a median of 1.13. While the median and average PE funds deliver positive excess returns compared to public markets, there is substantial variation between top-quartile and bottom-quartile funds, with a spread exceeding 1x on average for each benchmark. Bottom-quartile funds generally yield *PMEs* below or equal to 1 for all benchmarks.

These results emphasize the critical importance of Fund selection or proper diversification for investors within the private equity Asset Class. A practical approach to effective Fund choice is depicted in section 8.

6.2. Regression on PE Performance

6.2.1. Absolute Performance Drivers

	NET MULTIPLE (X)			NET IRR (%)		
Log (Size)	**0.01**	**0.02**	**0.01**	**2.64****	**1.18**	**1.60**
Std. Err.	0.06	0.07	0.06	1.34	1.38	1.35
Log (Size)^2	**-0.01**	**-0.01**	**0.00**	**-0.26****	**-0.17**	**-0.17**
Std. Err.	0.01	0.01	0.00	0.11	0.11	0.11
Log (Fund No. Overall)	**-0.13**	**-0.11**	**-0.06**	**-0.88**	**1.83**	**0.47**
Std. Err.	0.09	0.09	0.08	1.92	1.87	1.83
Log (Fund No. Overall)^2	**0.01**	**0.02**	**0.02**	**0.16**	**-0.43**	**-0.25**
Std. Err.	0.02	0.02	0.02	0.44	0.43	0.42
Log (Fund No. Series)	**0.00**	**0.02**	**-0.06**	**3.09**	**0.61**	**0.78**
Std. Err.	0.19	0.19	0.18	4.16	4.03	3.95
Log (Fund No. Series)^2	**0.01**	**0.01**	**0.04**	**-0.37**	**0.18**	**-0.04**
Std. Err.	0.07	0.07	0.06	1.47	1.42	1.39
5Y FED Funds Rate	**-0.07*****	**-0.10*****	**-0.04**	**0.50****	**0.56****	**0.62**
Std. Err.	0.01	0.01	0.03	0.22	0.24	0.67
First Fund	**0.08***	**0.13***	**0.08**	**6.97****	**4.99***	**4.77***
Std. Err.	0.13	0.14	0.13	2.90	2.82	2.77
NA-Focus	**0.16*****	**0.21*****	**0.10****	**2.61*****	**1.41**	**0.85**
Std. Err.	0.03	0.05	0.05	0.68	1.03	1.03
Performance$_{(t-1)}$	**0.14*****	**0.13*****	**0.10*****	**0.15*****	**0.12*****	**0.13*****
Std. Err.	0.01	0.01	0.01	0.02	0.02	0.02
FCFE	N	Y	Y	N	Y	Y
TFE	N	N	Y	N	N	Y
Adj. R^2	0.08	0.11	0.22	0.04	0.15	0.20
No. of Observations	2971	2971	2971	2778	2778	2778

Significance at 10% level is reported using (*), 5% level is (**), 1% level is (***)

Table 6: Regression Absolute Performance Measures PE

Table 6 presents the results for the regressions with the absolute return measures *Net Multiple* and *Net IRR* as left hand-sided variables. The regression model shows a significant positive

relationship for *Log (Size)* with *Net IRR*. The coefficient for *Log (Size)* is 2.64, indicating that one SD increase in *Log (Size)* is associated with a 3.83-percentage-point increase in *Net IRR*. This corresponds to approximately 0.22 SD of *Net IRR*, suggesting a moderate positive relationship between Fund size and performance. The *Log (Size)*^{2} term has a negative coefficient of -0.15, reflecting diminishing returns to scale: while larger funds may initially achieve higher performance, the effect of size on performance decreases as the Fund grows. The turning point when funds achieve lower *Net IRRs* with increasing Fund size lies around $160m. However, both coefficients lose significance when *Fund Characteristic Fixed Effects* are included, implying that the observed relationship between size and performance is driven by underlying, time-invariant characteristics of the funds rather than size itself. This suggests that the relationship between Fund size and performance is not causal but rather a reflection of unobserved factors correlated with both size and performance.

In the *Net Multiple* regression, the *5Y Fed Funds rate* has a highly significant negative relationship (coefficient of -0.07), indicating an increase of one SD in the Fed Funds rate leads to a 0.12x decrease in *Net Multiple*, which equals a decrease of 0.13 SD. This is possibly due to limited access to cheap leverage and the negative impact on the valuation of riskier assets. In contrast, in the *Net IRR* regression, the *5Y Fed Funds rate* shows a highly significant positive relationship (coefficient of 0.50), with a one SD (1.52%) increase in the rate is associated with a 0.76% increase in *Net IRR,* which corresponds to 0.04 SD of *Net IRR*. This indicates that higher interest rates might reflect short-term economic strength, benefiting certain investments in the short run. Even though highly significant, the impact on both performance measures is rather weak in units of SD with a slightly bigger impact on *Net Multiple.* The significance of both relationships disappears when *TFE* are included, highlighting that the effects of the *5Y Fed Funds* rate on performance are likely confounded by broader economic conditions that vary over time.

The *First Fund* dummy variable is positively associated with both performance measures, indicating that first-time funds outperform subsequent funds on average. For *Net Multiple*, the coefficient of 0.08 corresponds to a modest increase of 0.09 SD of the *Net Multiple*, but this relationship loses significance when TFE are added, likely indicating broader economic trends during certain Fund launch periods, rather than an inherent advantage of being a *First Fund* in a series. In contrast, for *Net IRR*, the coefficient of 6.97 represents a substantial and economically meaningful effect of 0.40 SD, and this relationship remains highly significant even after including *TFE*, indicating it is robust across different time periods. The disparity in magnitudes suggests that *First Funds* deliver notably higher annualized returns potentially reflecting strong early performance, but their cumulative performance *Net Multiple* is relatively less affected. The strong early performance could suggest that only managers with a well-developed investment pipeline, enabling earlier returns, succeed in raising a first-time Fund.

The *North America Investment Focus Dummy* is positively associated with both performance measures, but the robustness of these relationships differs. For *Net Multiple*, the effect of 0.16x, which equals 0.19 SD of *Net Multiple* is robust and persists in similar magnitude even after including *FCFE* and *TFE*, suggesting that North American investment focus genuinely enhances cumulative Fund performance. In contrast, the 2.61-percentage-point increase, which equals 0.15 units of SD in *Net IRR* loses significance when *FCFE* are included, indicating that the relationship with annualized performance is explained by time-invariant fund-specific attributes rather than the regional investment focus itself.

The *Lagged Performance Measures* have a highly significant positive relationship with both *Net Multiple* and *Net IRR*, with coefficients of 0.14 and 0.15, respectively. In economic terms, a one SD increase in the $Net\ Multiple_{(t-1)}$ corresponds to a 0.17x increase in the current *Net Multiple,* equivalent to approximately 0.20 units of SD. Similarly, a one SD increase in the $Net\ IRR_{(t-1)}$ leads to a 2.67 percentage point increase in the current *Net IRR*, which represents

approximately 0.15 units of SD of the dependent variable. The difference in magnitude shows an almost similar impact on both performance measures. These relationships persist when including *FCFE* and *TFE*, highlighting the robust association between past and current Fund performance. The persistence against *TFE* indicates that the relationship is not driven by broader market conditions or macroeconomic trends but rather reflects a certain continuity in fund-individual advantages that could be attributed to managerial skill or reputational gains.

In conclusion, the adjusted R^2 values for the regression models reveal the explanatory power of the regression models in predicting *Net Multiple* and *Net IRR*. For the *Net Multiple* models, the adjusted R^2 increases from 0.08 in the base model to 0.11 with the inclusion of *FCFE* and further rises to 0.22 when *TFE* are added. This suggests that while fund-specific characteristics play a modest role, time-varying factors, such as market conditions or economic cycles, have a significant influence on cumulative Fund performance. For the *Net IRR* model, the adjusted R^2 starts at 0.04 in the base model, increases to 0.15 with *FCFE*, and reaches 0.20 with the addition of *TFE*. These results indicate that *FCFE* contribute to a higher extent than for the *Net Multiple*, with less influence by broader, time-specific factors. Overall, we can explain the observed variance in *Net Multiples* slightly better than the *Net IRR*. Our results for the performance persistence on absolute performance for individual funds match those found by Kaplan and Schoar (2005).

6.2.2. Robustness Against Different FED Funds Rates

In our regression analysis, we included the *5Y FED Funds Rate* following the inception of each Fund. This reflects the average effective duration of a private capital Fund as determined by Coupe (2016). However, this is not a static figure and may vary over time. For instance, Phalippou and Gottschalg (2009, p. 1773) calculated an average effective duration of 6.25 years. To test the robustness of our results against variations in the effective Fund duration, we repeated our analysis using the *7Y FED Funds Rate*. Detailed results are presented in Table 7.

	NET MULTIPLE (X)			NET IRR (%)		
Log (Size)	**0.01**	**0.02**	**0.01**	**2.57***	**1.12**	**1.57**
Std. Err.	0.06	0.07	0.06	1.34	1.38	1.35
Log (Size)^2	**-0.01**	**-0.01**	**0.00**	**-0.25****	**-0.17**	**-0.17**
Std. Err.	0.01	0.01	0.00	0.11	0.11	0.11
Log (Fund No. Overall)	**-0.12**	**-0.10**	**-0.06**	**-0.81**	**1.88**	**0.55**
Std. Err.	0.09	0.09	0.08	1.92	1.87	1.83
Log (Fund No. Overall)^2	**0.01**	**0.02**	**0.01**	**0.12**	**-0.47**	**-0.27**
Std. Err.	0.02	0.02	0.02	0.44	0.43	0.42
Log (Fund No. Series)	**0.01**	**0.03**	**-0.07**	**3.20**	**0.41**	**0.64**
Std. Err.	0.19	0.19	0.18	4.15	4.02	3.94
Log (Fund No. Series)^2	**0.01**	**0.01**	**0.04**	**-0.43**	**0.23**	**0.01**
Std. Err.	0.07	0.07	0.06	1.47	1.42	1.39
7Y FED Funds Rate	**-0.07*****	**-0.10*****	**-0.02**	**1.08****	**1.19****	**1.35***
Std. Err.	0.01	0.01	0.03	0.24	0.26	0.74
First Fund	**0.09***	**0.13***	**0.07**	**6.84****	**4.69***	**4.67***
Std. Err.	0.13	0.14	0.13	2.89	2.81	2.77
NA-Focus	**0.16*****	**0.21*****	**0.10****	**2.42*****	**0.99**	**0.87**
Std. Err.	0.03	0.05	0.05	0.68	1.03	1.02
Performance$_{(t-1)}$	**0.14*****	**0.13*****	**0.10*****	**0.14*****	**0.12*****	**0.13*****
Std. Err.	0.01	0.01	0.01	0.02	0.02	0.02
FCFE	N	Y	Y	N	Y	Y
TFE	N	N	Y	N	N	Y
Adj. R^2	0.08	0.11	0.22	0.04	0.15	0.20
No. of Observations	2971	2971	2971	2778	2778	2778

Significance at 10% level is reported using (*), 5% level is (**), 1% level is (***)

Table 7: Robustness against Changes in FED Funds Rate PE

In the *Net Multiple* regression, the coefficient for the *7Y Fed Funds Rate* is -0.07, indicating a negative relationship between the *7Y Fed Funds Rate* and the *Net Multiple*. Specifically, a one SD increase in the *7Y Fed Funds Rate* corresponds to a -0.11x unit decrease in *Net Multiple*, which is approximately -0.13 SD of the dependent variable. In the *Net IRR* regression, the coefficient for the *7Y Average Fed Funds Rate* is 1.08, indicating a positive relationship between the *7Y Fed Funds Rate* and the *Net IRR*. A one SD increase in the *7Y Fed Funds rate* corresponds to a 1.49-percentage point increase in *Net IRR*, which represents approximately 0.09 SD.

Comparing the results to the *5Y Fed Funds Rate*, the impact on *Net Multiple* is similar in magnitude. The *Net IRR* impact for the *7Y Fed Funds Rate* is considerably larger than for the *5Y Fed Funds Rate*, however still on a low level with a modest influence of 0.09 SD vs. 0.04 SD on the *Net IRR*. Both the *5Y and 7Y Fed Funds Rate* coefficients' significance disappear once *TFE* are included, reinforcing the idea that these effects are largely driven by broader

macroeconomic conditions that vary over time, such as changes in monetary policy, inflation expectations, or economic cycles.

The similarity in results between the 5Y and 7Y models suggests that the robustness of the model is maintained across different time horizons for the Fed Funds rate, although the specific effect on *Net IRR* appears more pronounced when using the 7Y average. Across both regressions, the goodness of fit, as indicated by the adjusted R^2, remains unchanged with 0.22 after adding *FCFE* and *TFE*.

6.2.3. Relative Performance Drivers

Having analyzed the absolute performance measures, we now turn our focus to the *PME*. As proposed by Kaplan and Schoar (2005) and Harris, Jenkinson, and Kaplan (2013), we use the S&P 500 index as our primary benchmark. For the average institutional investor, this choice appears appropriate (Harris, Jenkinson, and Kaplan 2014, p.1863) and allows for direct comparison with previous research.

	S&P 500 KS-PME		
Log (Size)	**0.11**	**-0.23**	**0.01**
Std. Err.	0.29	0.41	0.45
Log (Size)^2	**-0.01**	**0.02**	**0.00**
Std. Err.	0.02	0.03	0.04
Log (Fund No. Overall)	**0.28**	**0.17**	**0.56***
Std. Err.	0.23	0.27	0.31
Log (Fund No. Overall)^2	**-0.05**	**-0.02**	**-0.09**
Std. Err.	0.05	0.06	0.07
Log (Fund No. Series)	**-0.17**	**-0.53**	**-0.28**
Std. Err.	0.49	0.65	0.76
Log (Fund No. Series)^2	**0.07**	**0.23**	**0.16**
Std. Err.	0.17	0.23	0.26
5Y FED Funds Rate	**-0.02**	**-0.04**	**-0.01**
Std. Err.	0.03	0.04	0.12
First Fund	**0.11**	**-0.09**	**-0.07**
Std. Err.	0.34	0.45	0.55
NA-Focus	**0.02**	**0.01**	**0.13**
Std. Err.	0.09	0.17	0.20
Performance$_{(t-1)}$	**0.17*****	**0.14***	**0.02**
Std. Err.	0.06	0.07	0.09
FCFE	N	Y	Y
TFE	N	N	Y
Adj. R^2	0.05	0.03	0.13
No. of Observations	109	109	109

Significance at 10% level is reported using (*), 5% level is (**), 1% level is (***)

Table 8: Regression Relative Performance Measure PE

Table 7 shows the regression results for the relative performance measure *S&P 500 PME*. The regression results reveal a positive and statistically significant relationship between the *lagged PME* and *current PME*, with a coefficient of 0.17. Specifically, a one SD increase in the $PME_{(t-1)}$ corresponds to a 0.11 unit increase in the current *PME*, which is equivalent to approximately 0.27 SD of the dependent variable. This suggests that past performance has a notable, positive impact on future performance relative to the S&P 500.

When *TFE* are included, the significance of the $PME_{(t-1)}$ vanishes, highlighting that the observed relationship is largely driven by time-varying factors such as market conditions or economic cycles that are correlated with the lagged-performance.

The adjusted R^2 decreases from 0.05 to 0.03 when *FCFE* are added, implying that the inclusion of fund-specific characteristics does not significantly improve the model's fit but rather worsens it. Conversely, the adjusted R^2 increases with the inclusion of *TFE*, suggesting that broader macroeconomic factors present in certain time periods are key in explaining *PME* performance relative to the S&P 500.

Overall, the results suggest that while past performance is positively correlated with future *PME* outcomes, this relationship is sensitive to macroeconomic factors and time-specific trends.

6.2.4. Robustness Against Different Benchmarks

We check for robustness of the observed results for the regression on the relative performance measure *PME* against different benchmark choices. We include the *PMEs* for the Russell 2000, Russell 3000, and MSCI World in our analysis alongside the S&P 500. The results for the three additional benchmark *PMEs* are presented in Table 9.

	RUSSELL 2000 KS-PME			RUSSELL 3000 KS-PME			MSCI WORLD KS-PME		
Log (Size)	**0.07**	**-0.20**	**0.10**	**0.11**	**-0.23**	**0.02**	**0.08**	**-0.26**	**0.01**
Std. Err.	0.34	0.47	0.50	0.30	0.42	0.45	0.31	0.44	0.48
Log (Size)^2	**-0.01**	**0.01**	**-0.01**	**-0.01**	**0.02**	**0.00**	**-0.01**	**0.02**	**0.00**
Std. Err.	0.03	0.04	0.04	0.02	0.03	0.04	0.02	0.04	0.04
Log (Fund No. Overall)	**0.29**	**0.20**	**0.63***	**0.28**	**0.17**	**0.56***	**0.25**	**0.14**	**0.59***
Std. Err.	0.26	0.31	0.35	0.23	0.27	0.32	0.24	0.29	0.33
Log (Fund No. Overall)^2	**-0.05**	**-0.03**	**-0.10**	**-0.05**	**-0.02**	**-0.09**	**-0.04**	**-0.02**	**-0.09**
Std. Err.	0.06	0.07	0.08	0.05	0.06	0.07	0.05	0.07	0.07
Log (Fund No. Series)	**-0.23**	**-0.57**	**-0.50**	**-0.17**	**-0.53**	**-0.31**	**-0.36**	**-0.68**	**-0.26**
Std. Err.	0.57	0.75	0.85	0.50	0.66	0.77	0.51	0.71	0.80
Log (Fund No. Series)^2	**0.11**	**0.26**	**0.25**	**0.07**	**0.23**	**0.17**	**0.14**	**0.27**	**0.16**
Std. Err.	0.20	0.26	0.29	0.18	0.23	0.26	0.18	0.25	0.27
5Y FED Funds Rate	**-0.05***	**-0.07***	**-0.01**	**-0.02**	**-0.04**	**-0.01**	**-0.04**	**-0.07***	**-0.02**
Std. Err.	0.03	0.04	0.14	0.03	0.04	0.12	0.03	0.04	0.13
First Fund	**0.10**	**-0.12**	**-0.27**	**0.12**	**-0.09**	**-0.10**	**-0.01**	**-0.18**	**-0.04**
Std. Err.	0.39	0.52	0.61	0.34	0.46	0.55	0.35	0.49	0.58
NA-Focus	**0.01**	**0.06**	**0.20**	**0.02**	**0.02**	**0.14**	**0.02**	**0.01**	**0.12**
Std. Err.	0.10	0.19	0.22	0.09	0.17	0.20	0.09	0.18	0.21
Performance$_{(t-1)}$	**0.19*****	**0.16****	**0.04**	**0.17*****	**0.14***	**0.02**	**0.17*****	**0.16****	**0.04**
Std. Err.	0.06	0.08	0.09	0.06	0.07	0.09	0.05	0.07	0.08
FCFE	N	Y	Y	N	Y	Y	N	Y	Y
TFE	N	N	Y	N	N	Y	N	N	Y
Adj. R^2	0.08	0.07	0.22	0.05	0.04	0.14	0.09	0.02	0.16
No. of Observations	109	109	109	109	109	109	109	109	109

Significance at 10% level is reported using (*), 5% level is (**), 1% level is (***)

Table 9: Robustness against different Benchmark Choices PE

For all benchmarks we observe a significant relationship of the *lagged PME* and the *PME* of similar magnitude than for the *S&P 500 PME.* When *TFE* are included, the significance of the *Lagged Performance* vanishes as with the *S&P 500 PME*.

Overall, we conclude that the results for the relative performance measure *PME* are robust across different benchmark choices.

6.2.5. Relationship of Absolute and Relative Performance Measures

	S&P 500		RUSSELL 2000		RUSSELL 3000		MSCI WORLD	
Net IRR	**0.01*** **	**0.01*** **	**0.01*** **	**0.01*** **	**0.01*** **	**0.01*** **	**0.01*** **	**0.01*** **
Std. Err.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Multiple	**0.36*** **	**0.42*** **	**0.42*** **	**0.49*** **	**0.36*** **	**0.43*** **	**0.48*** **	**0.53*** **
Std. Err.	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
TFE	N	Y	N	Y	N	Y	N	Y
Adj. R^2	0.83	0.91	0.81	0.90	0.82	0.91	0.90	0.94
No. of Observations	349	349	349	349	349	349	349	349

Significance at 10% level is reported using (*), 5% level is (**), 1% level is (***)

Table 10: Regression Performance Measures PE

We examine the relationship between absolute and relative performance measures to determine whether relative performance against public markets can be predicted using absolute performance measures. This is particularly valuable because, while *Net IRR* and *Net Multiple* are commonly reported, Fund cash flow data—and thus access to *PMEs*—is rarely available.

To explore this relationship, we regress the *PMEs* for each benchmark on the absolute performance measures. The results are presented in Table 10. The analysis reveals a highly significant positive relationship between both *Net IRR* and *Net Multiple* and the *PMEs.* The coefficient of 0.01 for the *Net IRR*, implies that one additional SD of *Net IRR* equals to additional 0.20x units of *S&P 500 PME* on average, which is equal to 0.42 SD of the *PME*. The coefficient of 0.36 for the *Net Multiple* implies additional 0.41x performance against the S&P 500 per additional SD of *Net Multiple*. This is equal to an effect of 0.84 SD, which shows that the *Net Multiple* has a stronger impact on the *PME*. The coefficients are similar in direction and magnitude for the different *PMEs*. The regression models demonstrate strong goodness-of-fit values, with adjusted R^2 values over 80% for each of the benchmarks.

Following the approach proposed by Harris, Jenkinson, and Kaplan (2014), we added *TFE* to the regression. This doesn't change the coefficient and impact of the *Net IRR* but increases further the impact of *Net Multiple* on the *PME*. One additional SD of *Net Multiple* leads to additional 0.99 SD for the *S&P 500 PME*. The predictive quality of all four regression models increases to over 90% across all benchmarks.

Overall, the results show that funds that perform well in an absolute sense, do also perform well relative to the market. Furthermore, we show a higher impact of the *Net Multiple* on the *PME*-values than the *Net IRR*. As in practice most funds only report *Net IRR* and *Net Multiple* this could help investors interested in the relative performance of Private Equity funds to put more emphasis on the *Net Multiple*. However, *Net IRR* and *Net Multiple* are only known in hindsight and therefore not usable as predictor for the *PME*.

7. Practical Applications

Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Top Quartile Net Multiple	2.13x	2.81x	1.82x	1.92x	1.79x	2.06x	2.27x	1.93x	2.27x	2.23x	1.95x	1.98x
Average Net Multiple	2.07x	1.81x	1.57x	1.51x	1.71x	1.95x	2.24x	1.82x	2.24x	1.84x	1.76x	1.59x
Bottom Quartile Net Multiple	1.63x	1.26x	1.22x	1.10x	1.35x	1.70x	2.21x	1.56x	3.14x	1.52x	1.71x	1.43x
Difference Top Quartile - Average	*0.06x*	*1.00x*	*0.24x*	*0.41x*	*0.08x*	*0.11x*	*0.04x*	*0.11x*	*0.03x*	*0.40x*	*0.19x*	*0.38x*
Difference Top Quartile - Bottom	*0.50x*	*1.55x*	*0.60x*	*0.82x*	*0.45x*	*0.37x*	*0.07x*	*0.38x*	*-0.87x*	*0.71x*	*0.24x*	*0.55x*
Top Quartile Net IRR	26.03%	35.94%	12.66%	13.55%	16.12%	16.96%	35.27%	29.67%	26.25%	19.22%	12.21%	11.46%
Average Net IRR	24.89%	17.58%	12.69%	5.35%	11.33%	16.63%	26.09%	18.33%	23.05%	17.58%	13.41%	7.75%
Bottom Quartile Net IRR	24.40%	-0.39%	7.46%	-6.01%	2.11%	14.19%	21.49%	9.24%	26.44%	13.80%	10.83%	4.55%
Difference Top Quartile - Average	*1.14%*	*18.35%*	*-0.03%*	*8.21%*	*4.79%*	*0.33%*	*9.18%*	*11.35%*	*3.20%*	*1.65%*	*-1.20%*	*3.72%*
Difference Top Quartile - Bottom	*1.63%*	*36.33%*	*5.20%*	*19.56%*	*14.00%*	*2.76%*	*13.78%*	*20.43%*	*-0.19%*	*5.43%*	*1.39%*	*6.91%*
Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Top Quartile Net Multiple	2.21x	1.92x	1.94x	2.88x	2.23x	2.28x	2.30x	2.44x	2.12x	2.25x	2.17x	1.85x
Average Net Multiple	1.72x	1.74x	1.85x	2.16x	1.84x	1.88x	1.91x	2.02x	1.97x	2.00x	1.81x	1.67x
Bottom Quartile Net Multiple	1.35x	1.62x	1.42x	1.70x	1.58x	1.54x	1.60x	1.57x	1.61x	1.72x	1.47x	1.49x
Difference Top Quartile - Average	*0.49x*	*0.18x*	*0.09x*	*0.71x*	*0.40x*	*0.40x*	*0.39x*	*0.42x*	*0.15x*	*0.25x*	*0.36x*	*0.18x*
Difference Top Quartile - Bottom	*0.86x*	*0.29x*	*0.52x*	*1.17x*	*0.66x*	*0.74x*	*0.70x*	*0.87x*	*0.51x*	*0.53x*	*0.70x*	*0.36x*
Top Quartile Net IRR	7.86%	17.00%	16.58%	21.09%	14.63%	19.18%	21.11%	18.34%	17.89%	24.48%	29.01%	25.32%
Average Net IRR	8.85%	12.87%	13.53%	17.42%	13.10%	14.04%	15.58%	16.83%	17.06%	18.98%	20.04%	20.69%
Bottom Quartile Net IRR	6.57%	9.73%	9.18%	11.62%	10.74%	4.16%	12.19%	15.26%	15.53%	13.98%	14.33%	15.97%
Difference Top Quartile - Average	*-0.99%*	*4.13%*	*3.05%*	*3.67%*	*1.54%*	*5.15%*	*5.53%*	*1.51%*	*0.83%*	*5.50%*	*8.96%*	*4.63%*
Difference Top Quartile - Bottom	*1.30%*	*7.27%*	*7.40%*	*9.47%*	*3.90%*	*15.02%*	*8.92%*	*3.08%*	*2.36%*	*10.50%*	*14.67%*	*9.35%*
Year	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**			**% of Years Difference >0**		**Median**	**Average**
Top Quartile Net Multiple	1.55x	1.34x	1.26x	1.13x	1.12x	0.81x					2.02x	1.97x
Average Net Multiple	1.51x	1.36x	1.25x	1.06x	1.05x	0.86x					1.81x	1.73x
Bottom Quartile Net Multiple	1.50x	1.37x	1.23x	0.99x	0.97x	0.71x					1.51x	1.51x
Difference Top Quartile - Average	*0.04x*	*-0.01x*	*0.01x*	*0.07x*	*0.07x*	*-0.05x*			93.33%		0.21x	0.24x
Difference Top Quartile - Bottom	*0.05x*	*-0.02x*	*0.03x*	*0.13x*	*0.16x*	*0.10x*			*93.33%*		*0.51x*	*0.46x*
Top Quartile Net IRR	19.41%	19.39%	21.72%	n/a	n/a	n/a					19.22%	20.31%
Average Net IRR	20.13%	17.88%	16.40%	n/a	n/a	n/a					16.83%	16.22%
Bottom Quartile Net IRR	15.60%	13.47%	10.27%	n/a	n/a	n/a					11.62%	11.36%
Difference Top Quartile - Average	*-0.72%*	*1.51%*	*5.32%*	*n/a*	*n/a*	*n/a*			*85.19%*		*2.39%*	*4.09%*
Difference Top Quartile - Bottom	*3.81%*	*5.92%*	*11.45%*	*n/a*	*n/a*	*n/a*			*96.30%*		*7.61%*	*8.95%*

Table 11: Practical Applications PE

We test the practical applicability of our findings concerning Fund performance persistence for PE LP's. For each vintage year between 1995 and 2023 we rank each Fund based on their

lagged performance into top- and bottom quartiles. Then we look at the performance difference between 1) Top Quartile Lagged Performance Funds and average performance of the respective vintage and 2) Top Quartile Lagged Performance Funds and Bottom Quartile Lagged Performance Funds. The results are presented in table 16. On average (median) the top performing quartile achieve 0.24x (0.21x) higher Net Multiples and 4.09% (2.39%) higher Net IRR compared to the average PE Fund in the respective vintage year. In 93% of the years, the top performing quartile achieve a higher Net Multiple than the average PE Fund. In 85% of the years, the top performing quartile achieve a higher Net IRR than the average PD Fund. The dispersion between performance is higher when the top quartile is benchmarked against the bottom quartile. On average (median) Net Multiple is 0.46x (0.51x) higher for top quartile funds. Bottom quartile funds provide worse Net Multiple in 93% of the observed years. Net IRR is on average (median) 8.95% (7.61%) higher in 96% of the years. These findings support our initial findings concerning the positive relationship between lagged performance and current performance and show that this relationship can be exploited for better Fund choices in most of the vintage years.

Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Top Quartile Net Multiple	1.70x	1.03x	3.25x	1.39x	1.82x	1.82x	2.01x	2.07x	1.94x	1.63x	1.34x	1.90x
Average Net Multiple	1.75x	1.43x	2.00x	1.41x	1.56x	1.58x	1.70x	1.72x	1.59x	1.61x	1.38x	1.52x
Bottom Quartile Net Multiple	1.80x	1.26x	1.11x	1.62x	0.95x	1.57x	1.70x	1.53x	1.41x	1.86x	1.37x	1.30x
Difference Top Quartile - Average	*-0.05x*	*-0.40x*	*1.25x*	*-0.02x*	*0.26x*	*0.24x*	*0.31x*	*0.34x*	*0.36x*	*0.02x*	*-0.05x*	*0.39x*
Difference Top Quartile - Bottom	*-0.10x*	*-0.23x*	*2.14x*	*-0.23x*	*0.87x*	*0.25x*	*0.31x*	*0.54x*	*0.53x*	*-0.23x*	*-0.03x*	*0.61x*
Top Quartile Net IRR	22.50%	-1.60%	42.95%	9.80%	15.00%	13.69%	19.72%	34.56%	13.27%	9.88%	2.17%	8.08%
Average Net IRR	17.50%	6.36%	18.58%	9.52%	10.94%	13.94%	16.75%	18.22%	13.12%	11.35%	5.90%	6.88%
Bottom Quartile Net IRR	12.50%	6.06%	2.03%	10.31%	-0.05%	16.32%	21.72%	10.57%	11.01%	17.14%	5.73%	7.78%
Difference Top Quartile - Average	*5.00%*	*-7.96%*	*24.37%*	*0.28%*	*4.05%*	*-0.25%*	*2.97%*	*16.35%*	*0.15%*	*-1.47%*	*-3.73%*	*1.20%*
Difference Top Quartile - Bottom	*10.00%*	*-7.66%*	*40.93%*	*-0.51%*	*15.05%*	*-2.63%*	*-1.99%*	*24.00%*	*2.27%*	*-7.26%*	*-3.57%*	*0.29%*
Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Top Quartile Net Multiple	1.63x	1.55x	2.11x	1.53x	2.24x	1.25x	1.59x	1.70x	1.68x	1.42x	1.47x	1.55x
Average Net Multiple	1.59x	1.64x	1.64x	1.53x	1.67x	1.32x	1.38x	1.38x	1.43x	1.40x	1.40x	1.34x
Bottom Quartile Net Multiple	1.42x	1.65x	1.41x	1.50x	1.39x	1.37x	1.20x	1.13x	1.24x	1.42x	1.27x	1.20x
Difference Top Quartile - Average	*0.04x*	*-0.08x*	*0.47x*	*0.00x*	*0.57x*	*-0.07x*	*0.21x*	*0.31x*	*0.25x*	*0.03x*	*0.08x*	*0.21x*
Difference Top Quartile - Bottom	*0.21x*	*-0.09x*	*0.70x*	*0.03x*	*0.85x*	*-0.12x*	*0.39x*	*0.57x*	*0.44x*	*0.00x*	*0.20x*	*0.35x*
Top Quartile Net IRR	9.82%	11.65%	21.10%	9.02%	19.37%	4.21%	10.34%	9.90%	10.96%	10.77%	10.10%	16.13%
Average Net IRR	10.94%	12.33%	17.62%	10.34%	12.39%	11.82%	8.13%	7.36%	9.48%	8.20%	9.85%	12.54%
Bottom Quartile Net IRR	8.55%	12.08%	12.91%	11.36%	9.08%	5.80%	6.87%	3.06%	8.50%	5.71%	7.01%	7.94%
Difference Top Quartile - Average	*-1.12%*	*-0.68%*	*3.48%*	*-1.32%*	*6.98%*	*-7.61%*	*2.21%*	*2.54%*	*1.48%*	*2.57%*	*0.25%*	*3.59%*
Difference Top Quartile - Bottom	*1.27%*	*-0.43%*	*8.19%*	*-2.34%*	*10.29%*	*-1.59%*	*3.47%*	*6.85%*	*2.46%*	*5.06%*	*3.09%*	*8.19%*
Year	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**			**% of Years Difference >0**		**Median**	**Average**
Top Quartile Net Multiple	1.37x	1.60x	1.17x	1.14x	1.08x	n/a					1.60x	1.66x
Average Net Multiple	1.27x	1.32x	1.16x	1.13x	1.10x	n/a					1.43x	1.48x
Bottom Quartile Net Multiple	1.23x	1.18x	1.06x	1.13x	1.08x	n/a					1.37x	1.36x
Difference Top Quartile - Average	*0.10x*	*0.28x*	*0.02x*	*0.01x*	*-0.03x*	*n/a*			*72.41%*		0.10x	0.17x
Difference Top Quartile - Bottom	*0.14x*	*0.42x*	*0.11x*	*0.01x*	*0.00x*	*n/a*			*68.97%*		0.21x	*0.30x*
Top Quartile Net IRR	14.23%	14.48%	10.07%	13.66%	9.28%	n/a					10.96%	13.62%
Average Net IRR	11.58%	12.02%	9.11%	12.20%	11.49%	n/a					11.49%	11.60%
Bottom Quartile Net IRR	11.77%	10.59%	1.86%	13.93%	11.48%	n/a					9.08%	9.30%
Difference Top Quartile - Average	*2.65%*	*2.46%*	*0.96%*	*1.45%*	*-2.21%*	*n/a*			*68.97%*		1.45%	2.02%
Difference Top Quartile - Bottom	*2.46%*	*3.89%*	*8.21%*	*-0.27%*	*-2.19%*	*n/a*			*62.07%*		*2.46%*	*4.33%*

Table 12: Practical Applications PD

In section 7.1 we conclude that Fund selection made by LPs is crucial given the high divergence between top and bottom performing funds. In line with the practical implications for PE performance, we investigate if our theoretical findings can find practical applications and how we can use them to perform effective Fund selection. For each vintage year between 1995 and 2023 we rank each Fund based on their lagged performance into top- and bottom quartiles, as seen in Table 17. Then we look at the performance difference between 1) Top Quartile Lagged Performance Funds and average performance of the respective vintage and 2) Top Quartile Lagged Performance Funds and Bottom Quartile Lagged Performance Funds. On average (median) the top quartile funds achieve 0.17x (0.10x) higher Net Multiples and 2.02% (1.45%) higher Net IRR compared to the average PD Fund in the respective vintage year. In 72% of the years, the top quartile funds achieve a higher Net Multiple than the average PD Fund. In 69% of the years, the top quartile funds achieve a higher Net IRR than the average PD Fund. The dispersion between performance is higher when the top quartile is benchmarked against the bottom quartile. On average (median) Net Multiple is 0.30x (0.21x) higher for top quartile funds. Bottom quartile funds provide worse Net Multiple in 69% of the observed years. Net IRR is on average (median) 4.33% (2.46%) higher in 62% of the years. The data on differences in Net IRR features positive skewness, indicating that some years have an outstanding high dispersion between top and bottom quartile funds, again underlining the importance of performing the right Fund selection. These findings support our initial findings that future and past performance are positively related and underline the importance of Fund selection made by LPs.

However, our practical application comes with limitations. 1) When new funds are raised, information about the performance of the predecessor Fund is not always available since they have not been liquidated yet. 2) Some LPs might be constrained by the selection of sub-strategies they want to invest in. In our analysis the Fund series are sub-strategy agnostic, ergo

a distressed debt Fund might follow a direct lending Fund (or a buyout Fund might follow a direct secondaries fund). 3) Private Asset funds have a fund-raising limit. Funds with good prior performance might be facing oversubscription of Fund commitments, limiting the possibility of allocating capital to the best performing Fund management firms.

8. Conclusion and Limitations

8.1. Conclusion

On average we observe excess returns for PE (PD) over public markets of 23% (7%) across all benchmarks. Our analysis highlights the importance of Fund choice for PE and PD as the lower quartile of funds yield less return than the public benchmarks.

The regression analyses of PE and PD funds show a highly significant positive and economically meaningful relationship of lagged Fund performance with all performance measures. While the significance for the relative performance vanishes after the addition of TFE, the significance for the absolute performance measures is robust against TFE. One SD variation of lagged performance impacts Net Multiple (Net IRR) with 0.20 SD (with 0.15 SD) for PE funds, and Net Multiple (Net IRR) with 0.30 SD (0.06 SD) of Net IRR for PD funds.

For the PD funds we observe an economically meaningful negative relationship between Log (Size) and Net Multiple that is persistent against the inclusion of TFE. A variation of one unit of SD in Log (Size) leads to a deviation of 0.59 units of SD for the Net Multiple. However, the relationship is convex and turns positive at a Fund size over $1.156m, potentially due to economies of scale or investment opportunities unavailable for smaller funds.

We test the applicability of our findings concerning the positive relationship of past performance on current performance for absolute return measures. If an investor had access to historical performance data, he could have leveraged the observed relationships to inform their investment decisions, potentially achieving higher returns. Following our investment rule, on

average a PE investor would have achieved a higher Net Multiple of 0.24x and a higher Net IRR of 4.09% compared to the average fund, while a PD investor would have achieved a higher Net Multiple of 0.17x and a higher Net IRR of 2.02%. However, this strategy comes with limitations that could hinder the practical applicability like limited access to data on lagged performance at the time of the inception of the new fund or investment constraints concerning the sub-strategy.

8.2. Limitations and Outlook

In the following we state the limitations which need to be considered when interpreting our results and connected to that, how future research could build on our results. Our data is sourced from Preqin and is primarily derived from surveys and voluntary disclosures. This might lead to an upward bias of performance data since badly performing Funds are less incentivized to report results. This effect is referred to as "Survivorship Bias" (Böni and Manigart 2022, p. 128). However, this bias is partly mitigated in the United State of America where Preqin collects data through FOIA requests to public pension plans alongside voluntary disclosures. Future research could therefore validate the results we observed by including data sourced from different data providers such as Burgiss.

PMEs, being cash flow-based metrics, are only reported for funds disclosing their cash flows, limiting their representation to a small subset of the dataset. We furthermore rely on the PMEs provided by Preqin, which only include equity focused indices. This might be adequate for analyses on PE Performance, but fixed-income focused indices would offer better risk-adjusted insights for PD Funds. Future research on PD Performance could focus on including relative performance analyses in comparison to fixed-income benchmarks. Additionally, the dataset used for relative performance regressions (PMEs) is significantly smaller than that used for absolute performance measures.

The data set used in our analyses includes a greater number of funds with recent vintage years, emphasizing newer funds over earlier vintages. This is crucial for PE funds, since the first years in the fund's lifetime only produce negative cash flows as opposed to PD funds which earn positive cash flows even in early years through cash interest (Böni and Manigart 2022, p. 133). A related limitation with recently established funds is that many have not yet been liquidated and still include unrealized investments. Unlike our followed approach that we described in 1.3, Phalippou and Gottschalg (2009) argue that NAVs of not fully realized funds are overstated and results for not fully liquidated funds are therefore upwards biased.

Competition among funds is not addressed in our analysis. Earlier vintages experienced less competition due to a lower number of active funds, which may have influenced returns. Nanda, Samila, and Sorenson (2020) highlighted declining return persistence in VC and PE, which could also apply to PD—a topic worth exploring further.

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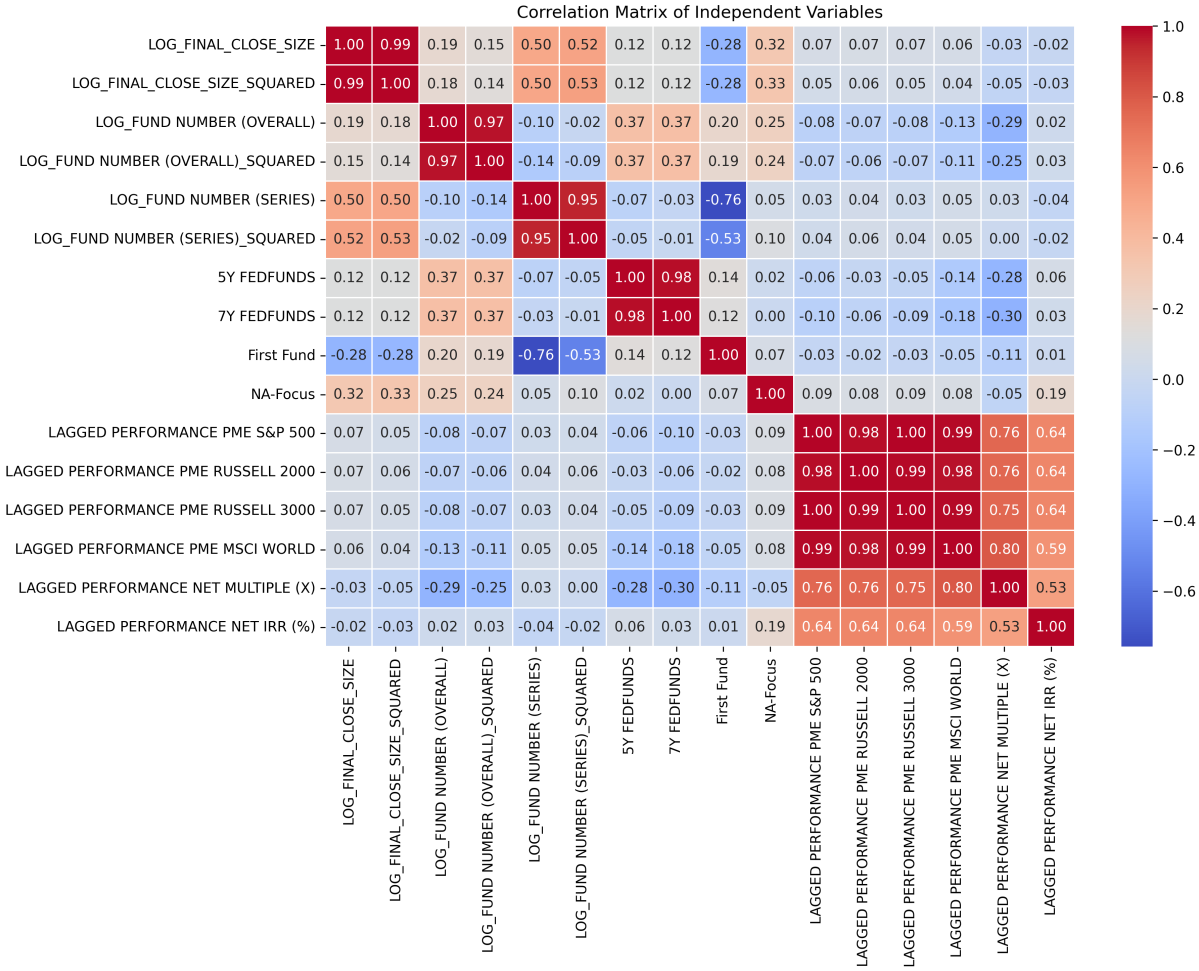
Appendix

	unit	count	mean	std	min	25%	50%	75%	max
Log (Size)	**n/a**	2,971	6.29	1.46	0.36	5.38	6.24	7.24	10.17
		2,778	6.24	1.45	0.36	5.35	6.21	7.17	10.13
		109	6.41	1.17	3.55	5.65	6.38	7.21	9.14
Log (Size)^2	**n/a**	2,971	3.52	3.51	0.00	1.21	2.59	4.32	27.86
		2,778	3.37	3.37	0.00	1.21	2.59	4.32	21.75
		109	5.14	3.91	0.48	2.59	3.79	6.96	16.76
Log (Fund Number Overall)	**n/a**	2,971	41.64	18.31	0.13	28.94	38.92	52.48	103.34
		2,778	41.06	18.02	0.13	28.65	38.62	51.41	102.61
		109	42.40	15.29	12.57	31.91	40.71	51.95	83.60
Log (Fund Number Overall)^2	**n/a**	2,971	1.11	0.64	0.00	0.69	1.10	1.61	2.71
		2,778	1.11	0.63	0.00	0.69	1.10	1.61	2.71
		109	1.12	0.68	0.00	0.69	1.39	1.61	2.40
Log (Fund Number Series)	**n/a**	2,971	1.69	0.82	0.00	1.10	1.61	2.08	5.28
		2,778	1.65	0.80	0.00	1.10	1.61	2.08	4.66
		109	2.11	0.84	0.69	1.61	1.95	2.64	4.09
Log (Fund Number Series)^2	**n/a**	2,971	1.65	1.45	0.00	0.48	1.21	2.59	7.33
		2,778	1.62	1.42	0.00	0.48	1.21	2.59	7.33
		109	1.72	1.49	0.00	0.48	1.92	2.59	5.75

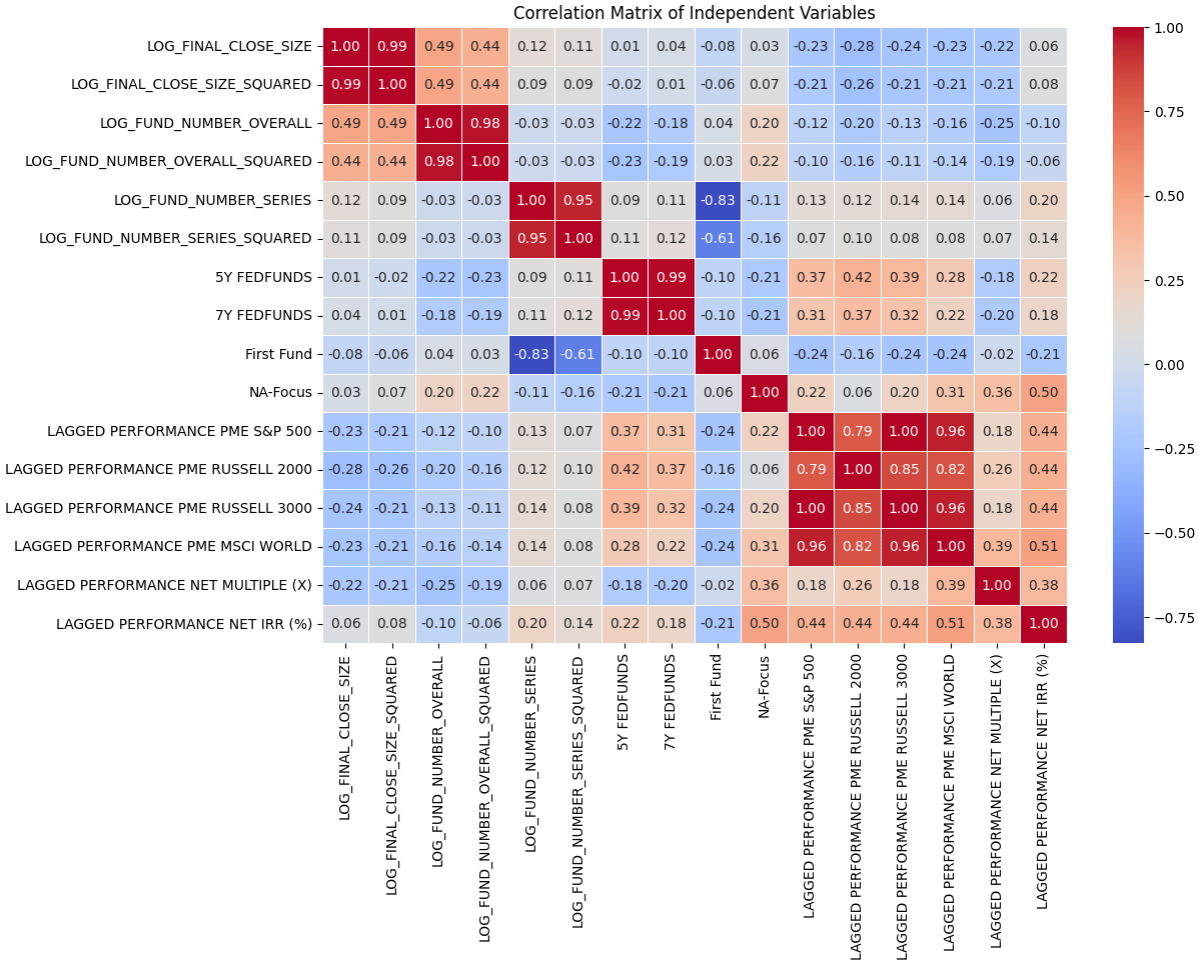
Appendix 1: Additional Descriptive Statistics PE

	unit	count	mean	std	min	25%	50%	75%	max
Log (Size)	**n/a**	863	6.27	1.38	1.77	5.36	6.40	7.20	9.73
		37	6.65	1.27	2.97	5.67	6.88	7.56	9.53
Log (Size)^2	**n/a**	863	41.17	16.73	3.15	28.76	40.92	51.81	94.67
		37	45.73	16.45	8.79	32.15	47.34	57.08	90.87
Log (Fund Number Overall)	**n/a**	863	1.54	0.75	0.00	1.10	1.39	1.95	4.11
		37	1.93	0.60	0.69	1.61	1.79	2.40	3.09
Log (Fund Number Overall)^2	**n/a**	863	2.95	2.80	0.00	1.21	1.92	3.79	16.90
		37	4.06	2.36	0.48	2.59	3.21	5.75	9.55
Log (Fund Number Series)	**n/a**	863	0.94	0.64	0.00	0.69	1.10	1.39	2.83
		37	0.78	0.58	0.00	0.00	0.69	1.10	1.79
Log (Fund Number Series)^2	**n/a**	863	1.29	1.36	0.00	0.48	1.21	1.92	8.03
		37	0.93	0.94	0.00	0.00	0.48	1.21	3.21

Appendix 2: Additional Descriptive Statistics PD



Appendix 3: Correlation Matrix PE



Appendix 4: Correlation Matrix PD

Variable	Description	Scale
Net Multiple	The ratio between the total value that the LP has derived from its interest in the partnership – i.e. distributed cash and securities plus the value of the LP's remaining interest in the partnership – and its total cash investment in the partnership, expressed as a multiple. The Multiple is net of fees. Retrieved from Preqin Pro.	(X)
Net IRR	The Net IRR earned by an LP to date, after fees and carry. The internal rate of return (IRR) is based upon the realized cash flows and the valuation of the remaining interest in the partnership. IRR is an estimated figure, given that it relies upon not only cash flows but also the valuation of unrealized assets. Retrieved from Preqin Pro	(X)
S&P 500 PME	Kaplan-Schoar Public Market Equivalent with the S&P 500 index as benchmark. Based on cashflows per quarter disclosed by the Fund or its LPs. Retrieved from Preqin Pro.	(X)
Russell 2000 PME	Kaplan-Schoar Public Market Equivalent with the Russell 2000 index as benchmark. Based on cashflows per quarter disclosed by the Fund or its LPs. Retrieved from Preqin Pro.	(X)
Russell 3000 PME	Kaplan-Schoar Public Market Equivalent with the Russell 3000 index as benchmark. Based on cashflows per quarter disclosed by the Fund or its LPs. Retrieved from Preqin Pro.	(X)
MSCI World PME	Kaplan-Schoar Public Market Equivalent with the MSCI World index as benchmark. Based on cashflows per quarter disclosed by the Fund or its LPs. Retrieved from Preqin Pro.	(X)
Log (Size)	Logarithm of the final closing size of the Fund. Calculated based on final closing sizes in million USD retrieved from Preqin Pro.	n/a
Log $(Size)^2$	Squared Logarithm of the final closing size of the Fund. Calculated based on final closing sizes in million USD retrieved from Preqin Pro.	n/a
Log (Fund No. Overall)	Logarithm of the sequential count of funds managed by the same Fund manager, indicating the fund's position in the overall series of funds launched by that manager. Retrieved from Preqin Pro.	n/a

Log (Fund No. Overall)²	Squared Logarithm of the sequential count of funds managed by the same Fund manager, indicating the fund's position in the overall series of funds launched by that manager.	n/a
Log (Fund No. Series)	Logarithm of sequential count of funds within the same Fund series, indicating the fund's position in the respective Fund series. Retrieved from Preqin Pro.	n/a
Log (Fund No. Series)²	Squared Logarithm of sequential count of funds within the same Fund series, indicating the fund's position in the respective Fund series. Retrieved from Preqin Pro.	n/a
5Y FED Funds Rate	Average annual FED Funds Rate for 5 years starting from the vintage year of the respective Fund. Calculated based on retrieved FED Funds data from the Federal Reserve Bank of St. Louis.	%
7Y FED Funds Rate	Average annual FED Funds Rate for 7 years starting from the vintage year of the respective Fund. Calculated based on retrieved FED Funds data from the Federal Reserve Bank of St. Louis.	%
First Fund	Dummy Variable indicating whether the Fund is the first Fund of the respective Fund series. Calculated based on Fund Number Series retrieved from Preqin Pro.	1/0
NA-Focus	Dummy Variable indicating whether the Fund has an investment focus on North America. Calculated based on primary regional focus per Fund retrieved from Preqin Pro.	1/0
$Performance_{t-1}$ Net Multiple	Net Multiple for the previous Fund managed by the same Fund manager. Calculated based on Net Multiple data and Fund Number Overall data retrieved from Preqin Pro.	(X)
$Performance_{t-1}$ Net IRR	Net IRR for the previous Fund managed by the same Fund manager. Calculated based on Net IRR data and Fund Number Overall data retrieved from Preqin Pro.	(X)
$Performance_{t-1}$ S&P 500 PME	Kaplan-Schoar Public Market Equivalent with the S&P 500 index as benchmark for the previous Fund managed by the same Fund manager. Calculated based on S&P 500 PME data and Fund Number Overall data retrieved from Preqin Pro.	(X)

$Performance_{t-1}$ Russell 2000	Kaplan-Schoar Public Market Equivalent with the Russell 2000 index as benchmark for the previous Fund managed by the same Fund manager. Calculated based on S&P 500 PME data and Fund Number Overall data retrieved from Preqin Pro.	(X)
$Performance_{t-1}$ Russell 3000	Kaplan-Schoar Public Market Equivalent with the Russell 3000 index as benchmark for the previous Fund managed by the same Fund manager. Calculated based on Russell 3000 PME data and Fund Number Overall data retrieved from Preqin Pro.	(X)
$Performance_{t-1}$ MSCI World	Kaplan-Schoar Public Market Equivalent with the MSCI World index as benchmark for the previous Fund managed by the same Fund manager. Calculated based on Russell 2000 PME data and Fund Number Overall data retrieved from Preqin Pro.	(X)

Appendix 5: Description of Variables