State Street.

Private Equity Insights

CURRENT QUARTER PERFORMANCE SUMMARY

The private market continued its recovery, but at a lower growth rate in Q2 2023. The State Street Private Equity Index (SSPEI) reported an overall 1.80% return in Q2 2023, lower than 2.1% in Q1 2023. Returns for Venture Capital (VC) once again turned negative reporting a -0.16% return. Though still in positive territory, the return of Buyout funds experienced a slowdown, reporting 2.29% in Q2 2023. Benefiting from the rising high interest rates, Private Debt is the only strategy showing positive return growth, reporting a 2.61% return in Q2 2023, which is the highest among all strategies (see Exhibit 1).

Exhibit 1. Private Equity Performance by Strategy

|	All PE	Buyout	VC	Private Debt
2023 Q2	1.80%	2.29%	-0.16%	2.61%
2023 Q1	2.10%	2.73%	0.00%	2.28%
YTD	4.27%	5.55%	-0.25%	5.25%

Source: State Street®, as of Q2 2023.

In the quarterly and 1-year horizon, returns in SSPEI have been sluggish, comparing to short-term returns in the US public equity market (proxied by S&P 500 and Russell 2000), which had a strong comeback in the first half of 2023. On the other hand, SSPEI still outperformed the US bond market (proxied by Bloomberg Barclays US Aggregated Bond Index) as a consequence of the continuously rising interest rate. Over the long-time horizon, SSPEI continued to outperform the public equity and debt markets (See Exhibit 2).

Across sectors, at the one-year horizon, Energy and Industrials sector funds maintain their status as the best performers. However, the Energy sector has the worst quarterly performance across all sectors with 0.65% return, while the Industrials sector remained robust at 2.49%. With a 2.03% return, Financials sector surpassed Information Technology (IT), Health Care, and Consumers sectors and became the second best performer this quarter. Despite a

rebound from last quarter, IT focused funds lagged behind with a 1.51% quarterly return. Gloomed by inflation, consumer sector is the second worst performer across all sectors (see Exhibit 3).

Exhibit 2. Investment Horizon Returns
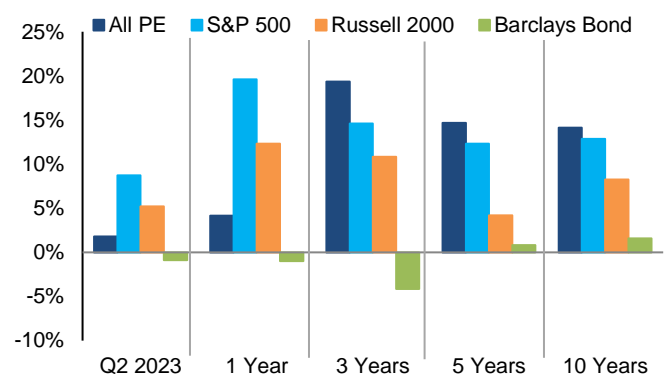
Source: State Street®, DataStream, Bloomberg Barclays US Aggregate Bond Index (total returns as of Q2 2023).

Exhibit 3. Performance of Sector Focused Funds
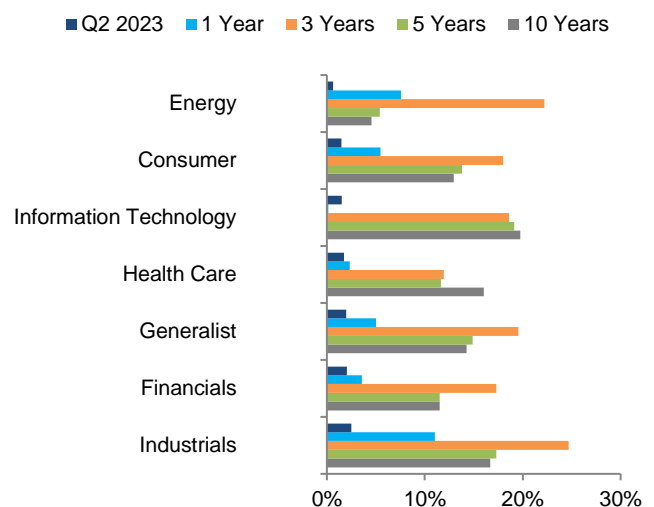
Source: State Street®, as of Q2 2023.

THE ADVENT OF AI IN PE: THE BEGINNING OF A NEW ERA?

Insights from Harvard University and the Private Capital Research Institute

By Sam Holt, Leslie Jeng, and Josh Lerner

Introduction

Artificial intelligence (AI) has dominated the news recently, and the bleeding-edge tech's touch can be felt in almost every aspect of our daily lives. The financial industry, unsurprisingly, has been at the center of this AI revolution due to its willingness to serve as an AI "sandbox." Gaining an informational and analytical edge is a surefire way to succeed in the increasingly competitive industry, and participants are more than ready—and willing—to test which technologies can generate these much-needed advantages.

It is natural then that private equity (PE) general (GP) and limited partners (LP) are exploring the potential advantages these technologies may offer in the increasingly competitive PE market. A prime example of this is India-based PE firm True North's 2017 "Analytics, Algorithms, and Artificial Intelligence" (3A) Project. The initiative was a firm-wide effort to overhaul operations and increase efficiency through data-driven and AI-supported programs. A key focus of the 3A Project was "The Investment Module" that was designed to free-up valuable time for the investment team through AI-driven reviews of potential investments. The aim was to have 90% of all deals in the pipeline filtered by AI, and the remaining 10% manually reviewed by the investment team.[1]

A more recent example is Ensemble, a venture capital (VC) firm dedicated to implementing AI tools throughout its investment process. The firm recently closed its debut $100 million fund.[2] Its main investment thesis is that startup success is driven by the quality of the team. To exploit this belief, it unleashes its proprietary algorithms to analyze potential portfolio companies' team histories, hoping to efficiently identify startups with the greatest human capital advantages.

When implementing AI, however, a firm must carefully consider how the AI-generated insights will be incorporated into the firm's decision-making processes. In fact, recent academic research demonstrates that developing such systems is not as straight forward has one might think. Agarwal et al. (2023) examines the outcomes of AI initiatives designed to support radiologists in their readings of test output. Surprisingly, the authors find that both human-only and AI-only decisions on their own result in better outcomes than do decisions combining both human-elements and AI-driven suggestions.[3] Recent AI efforts by Google Ventures provide a similar example of this in the financial sphere. The firm used its due diligence and investment decision-making algorithm, "The Machine," to aid the investment team throughout the investment process. Google Ventures, however, ultimately gravitated away from its use as the human-generated information alone proved more valuable.[4]

In the end, a real understanding of the benefits (or drawbacks) AI can offer the PE world shouldn't rely solely on anecdotal evidence gleaned from the experiences of firms like True North, Ensemble, and Google Ventures. In fact, past technological revolutions may provide insight into how the use of AI may evolve in the coming years. For instance, productivity gains associated with the introduction of electricity to factories took substantial time to manifest. This wasn't because the technology around electricity required gradual improvement prior to implementation. Rather, it was the result of the need to reengineer the production systems that were initially developed based on less efficient power sources like steam. The new production systems leveraged the increased efficiency of electricity, and redesigned the factory by placing equipment where it was most productive and not simply based on proximity to energy sources. This led to the advent of the Fordist assembly line.[5] The lesson is: it takes time to grasp how a new and powerful technology can be applied to truly harness its advantages.

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[1] Karim Lakhani, Kairavi Dey, and Hannah Mayer, "True North: Analytics, Algorithms and Artificial Intelligence," HBS Case 9-621-042 (September 19, 2020).

[2] Rebecca Szkutak, "Ensemble Raises $100M Debut Fund to Bet on Startup Teams — but Not in the Way You Think," TechCrunch (blog), April 4, 2023, https://techcrunch.com/2023/04/04/ensemble-raises-100m-debut-fund-to-bet-on-startup-teams-but-not-in-the-way-you-think/.

[3] Nikhil Agarwal, Alex Moehring, Pranav Rajpurkar, and Tobias Salz, "Combining Human Expertise with Artificial Intelligence: Experimental Evidence from Radiology," Working Paper no 31422, National Bureau of Economic Research, 2023.

[4] Dan Primack, "Google Ventures Shelves Its Algorithm," Axios, September 28, 2022, https://www.axios.com/2022/09/28/google-ventures-shelves-its-algorithm

[5] Timothy F. Bresnahan and Manuel Trajtenberg, "General purpose technologies: 'Engines of growth?'" Journal of Econometrics, 65, 1995, 83-108.

With this in mind, recent academic research has placed AI's potential use cases across the PE investment process under its discerning eye with the hopes of identifying areas where AI can truly change the industry. The remainder of this essay explores these recent papers, discussing their findings on the potential benefits and drawbacks that AI-driven investment management and decision-making can offer GPs and LPs.

Finding more needles in the haystack: Can AI revolutionize the due diligence and deal origination process?

A seemingly natural stage for AI to be implemented in the investment process is during deal due diligence and origination. Here, AI techniques could be used on detailed data of prospective portfolio companies, with AI helping to determine which companies have a higher chance of success based on identified "rewarded" characteristics. Bonelli (2023) examines this, specifically looking at how AI can alter VCs' choices in screening startups. Using data on VC deals from 2000 to 2019, the author finds AI can help VCs avoid failures when investing in business models similar to those of past startups. The rub, Bonelli (2023)[6] finds, is that applying AI to historical data does not aid the VC in finding the company with the next market-shifting idea. In fact, the author finds AI can even reduce the chances of the VC finding its next moonshot— a function of AI models' reliance on historical data.

The deal is done: Using AI to enhance post-investment value creation

The next line of research investigates how AI can be leveraged for value-creation after the investment decision is made. Erel at al. (2021)[7] discusses this potential use-case by exploring if AI can aid VCs in electing board directors for recent investments. Using data on public company boards and associated shareholder sentiment, the authors claim that the directors the AI programs predicted to do poorly (well) based on a range of characteristics like sex, age, and experience, actually performed poorly (well). The implication is that VCs may be able to leverage predictive AI capabilities to make better decisions with regard to the post-investment governance structures the VC applies to portfolio companies.

AI isn't just for the GP: Can LPs leverage AI in their manager selection practices?

The first two papers explore the potential advantages AI can create for GPs, but what are the potential possibilities it creates for LPs? Tamayo et al. (2023)[8] approaches the question of AI in PE from the LP perspective and examines if qualitative information available in private placement memoranda (PPMs) can help LPs make better allocation decisions. The authors create a dataset of 365 PPMs and use natural language processing (NLP) and machine learning techniques to quantify the value of the qualitative data available in the PPMs. The authors' findings indicate that the classic characteristics of reputation and performance are connected to fundraising success, but that these characteristics are not associated with future outperformance. Interestingly, the NLP and machine learning results indicate that qualitative information in the PPM around how the GP defines its investment strategy does have predictive capabilities for future fund performance. The authors do caution that research in this area is novel and not without limitations, and that hopefully future work will build on their results.

What does this ultimately mean for PE?

Clearly, there is immense potential for AI to help the eager GP or LP find a much-needed advantage in an increasingly competitive market. In fact, the academic research around the potential use cases of AI suggests these benefits are there for the taking. These findings, however, are accompanied by fair warnings of much needed prudence when applying AI to the investment process. The incredible build up in expectations of OpenAI and ChatGPT followed by the subsequent increase in skepticism and concern serves an initial example of this. The technology is still nascent. It still remains to be seen how it can most efficiently—and accurately—intertwine with classic human-only decision-making processes. Most importantly, as the advent of electricity in the factory shows us, the most advantageous applications of AI in PE may still be untapped.

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[6] Maxime Bonelli, "Data-driven Investors," Working paper (September 2023).
[7] Isil Erel, Lea Stern, Chenhao Tan, and Michael Weisbach, "Selecting Directors Using Machine Learning," ECGI working finance paper no. 605/2019 (January 2021).

[8] Borja Fernandez Tamayo, Reiner Braun, Florencia Lopez-de-Silanes, Ludovic Phallippou, and Natalia Sigrist, "Limited Partners versus Unlimited Machines: Artificial Intelligence and the Performance of Private Equity Funds," Working paper (September 2023).

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The Private Capital Research Institute is a not-for-profit 501(c)(3) corporation formed to further the understanding of private capital and its global economic impact through a commitment to the ongoing development of a comprehensive database of private capital fund and transaction-level activity supplied by industry participants. The PCRI, which grew out of a multi-year research initiative with the World Economic Forum, also sponsors policy forums.

Fund Raising and Dry Powder

Fundraising activity maintained the pace it had in the first quarter, with the SSPEI constituent funds raising $62 billion in Q2 2023. Fundraising activities still pales in comparison to previous years. A linear projection of the capital raised for the full year of 2023, which only includes the funds that already started making capital calls in the first half of 2023, is $245 billion. It corresponds to 56.3% of total fundraising in 2022 and 39% of that in 2021. During Q2 2023, Buyout, VC and Private Debt funds raised $37.16 billion, $21.05 billion, and $4.65 billion respectively (see Exhibit 4A). Across regions, US funds raised $46.19 billion in Q2, a slowdown from Q1 2023. Europe funds raised $11.16 billion, and Rest of World funds raised $5.5 billion, a drastic decrease comparing to previous years (see Exhibit 4B).

Exhibit 4. Total Fund Size (USD Billion)

(A) By Strategy
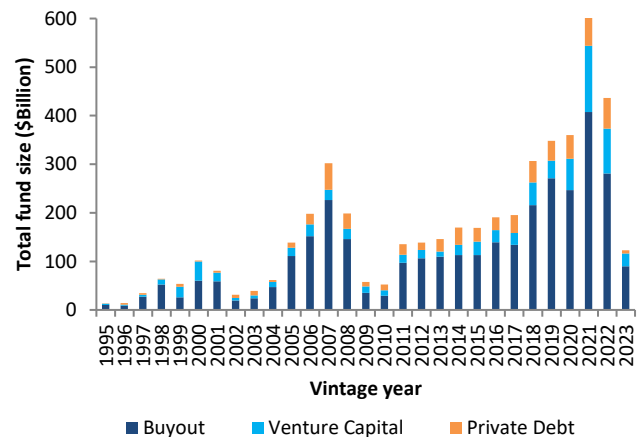
(B) by Region
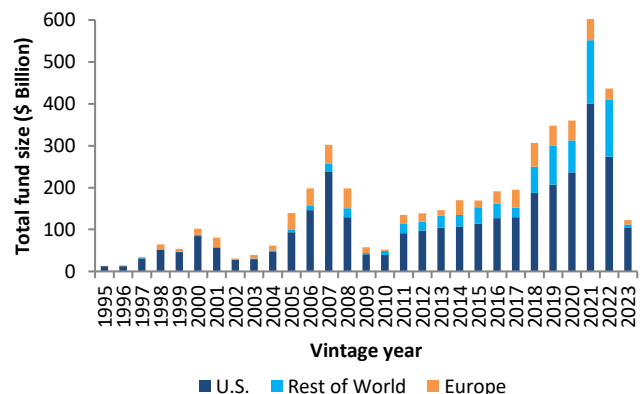
Source: State Street®, as of Q2 2023.

Fund size changes have been more pronounced in Q2 2023, the average fund size of 2023 vintage funds as of Q2 2023 is $1.7 billion, which is smaller than the average fund sizes in 2021 and 2022 vintage years but still larger than the previous five vintage year average between 2016-2020. VC average fund size broke through $1 billion for the first time, which is a 15% increase over VC funds in 2022. On the contrary, despite a record high in Q1 2023, new Buyout funds raised in Q2 2023 tend to be smaller, dragging its average funds size down by 15% comparing to 2022. Average fund size for Private Debt also decreased drastically in the first half of 2023, down to $0.7 billion, a 60% decrease from the $1.9 billion we saw in 2022 (see Exhibit 5).

Exhibit 5. Average Fund Size (USD Billion)
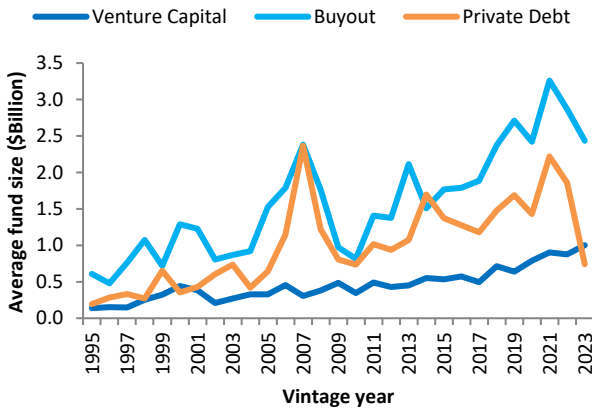
Source: State Street®, as of Q2 2023.

Dry powder is the part of the fund's committed capital that has not yet been called by the fund manager. It represents the amount of capital that can be used for future investment opportunities. As of Q2 2023, SSPEI posted a dry powder of $845 billion, a decrease from the $871 billion posted in Q1 2023, continuing the downward trend since Q3 2022 (see Exhibit 6A). The quarterly dry powder normalized by the monthly average contribution of the past 12 months, which measures how long the current dry powder inventory can last at the recent average capital call rate without new fund raising activities, continued to increase for VC and Private Debt funds by 1 month each, but remained stable for Buyout funds (see Exhibit 6B). The increase in dry powder inventory is expected to persist as capital calls continue to decline (see Exhibit 7A).

Exhibit 6. Dry Powder

(A) Monthly Dry Powder
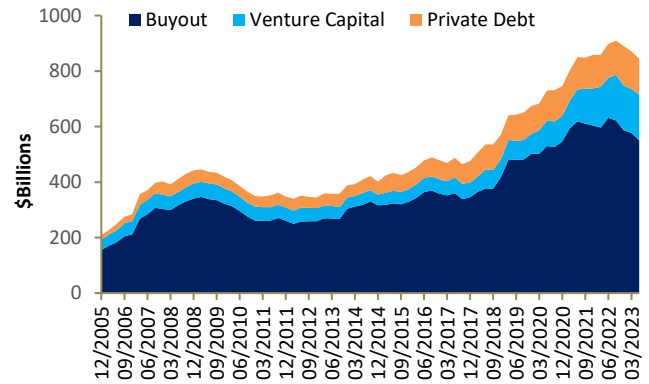
(B) Quarterly Dry Powder Normalized by Average Contribution
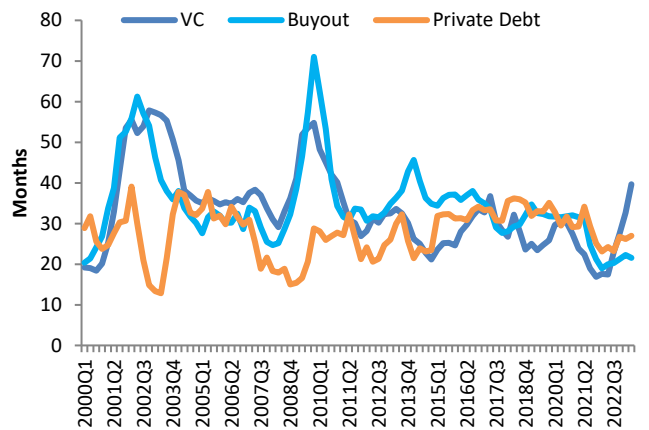
Source: State Street ®, as of Q2 2023.

Cash Flow Activity

As of the most recent quarter, quarterly Paid-in Capital over Committed Capital (PICC) in Q3 2023 continued its previous decline. Quarterly Distribution over Committed Capital (DCC) however shows encouraging signs of relief with a reported increase. The gap between quarterly PICC and DCC closed for the first time since early 2019. Net cash flow over committed capital reported a positive 0.06%. (see Exhibit 7A and 7B).

Exhibit 7B provides a closer look at the net cash flows among different PE strategies. Net cash flows increased across all strategies in Q3 2023. In particular, while the net cash flow of Buyout and VC funds remained negative, their DCCs increased in Q3 2023. Accompanied by decreasing PICCs, we see 1.15 and 0.89 percentage point increases in net cash flow

to commitment for Buyout and VC funds respectively in Q3. Private Debt funds, on the other hand, experienced slowdowns in both PICC and DCC in Q3 2023. Private Debt DCC decreased for the first time since Q2 2021, although quarterly net cash flow remained positive (see Exhibit 7B).

For Venture Capital and Private Debt funds, despite positive net cash flows, both strategies saw positive valuation changes, exemplified by the increases in NAV Delta (see Exhibit 8C and 8D). Notably, Venture Capital valuation has likely bottomed out in H1 2023 after its significant losses since Q1 2022.

Exhibit 7. Quarterly Cash Flow Ratios Normalized by Commitment

(A) Contribution and Distribution for All PE
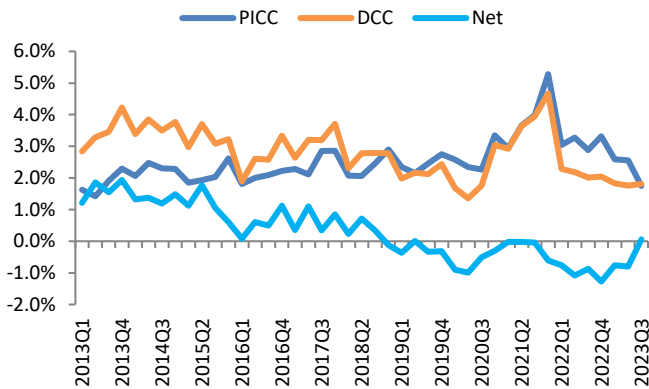
(B) Net Cash Flow to Committed Capital By Strategy
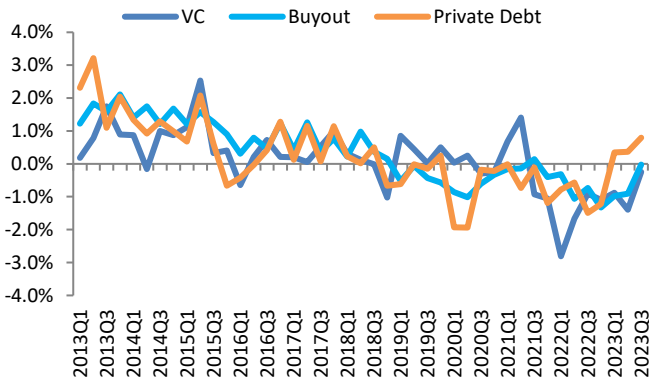
Source: State Street ®, as of Q3 2023.

Valuations

The Dollar Value Added (DVA) is the sum of NAV changes and net cash flows. It measures the realized and unrealized gain and loss in dollar amounts.

$$DVA = EndingNAV - BeginningNAV + Distribution - Contribution$$

The quarterly DVA of all PE funds declined from $61 billion in Q1 2023 to $48 billion in Q2 2023 (see Exhibit 8A). Overall net cash flows remained relatively stable. DVA decline was primarily driven by decline in NAV Delta for Buyout funds (see Exhibit 8B), which was 15 billion lower than that in Q1 2023.

Exhibit 8. Dollar Value Added

(A) All PE
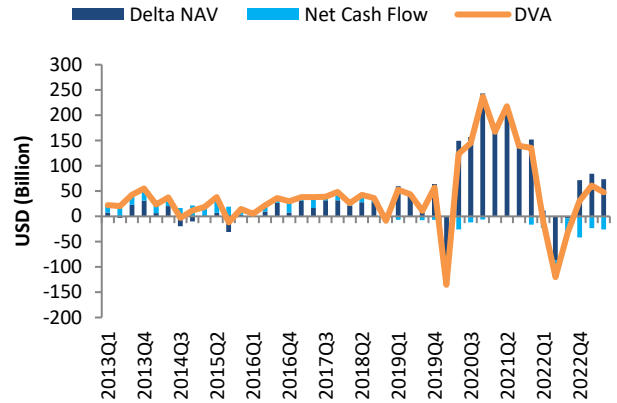
(B) Buyout
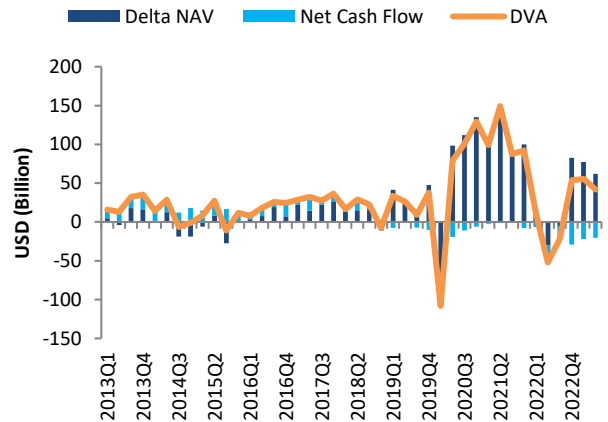
(C) Venture Capital
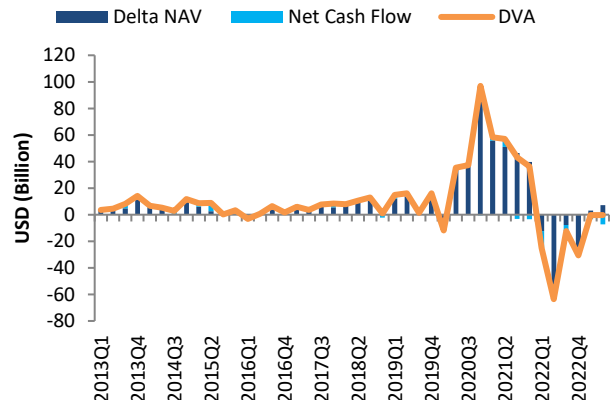
(D) Private Debt
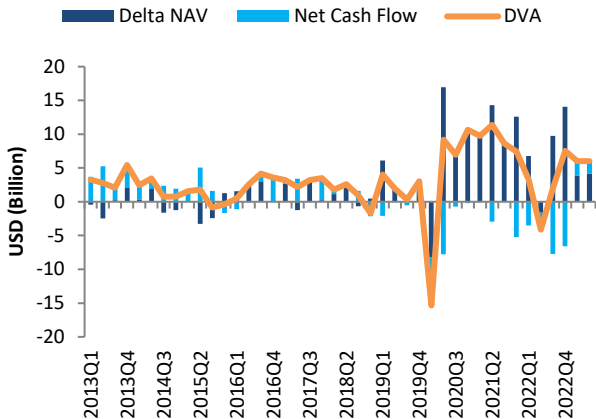
Holdings Exposure

The SSPEI categorizes PE investments at the fund level. While this classification offers insights into the overall allocation, classifications at the holdings level would provide finer granularity, allowing us to better identify preferences and exposures among different PE strategies.

Exhibit 9(A) displays the NAV weights of sectors based on holdings across different strategies as of Q2 2023[9]. Across all strategies, Information Technology, Health Care, Industrials, and Consumer Discretionary were four largest sectors in terms of NAV exposures as of Q2 2023. However, their ranking within each strategy varies slightly. In Buyout funds, Information Technology took the lead, followed by Industrials and Health Care. Health Care sector led in Private Debt funds, followed by Information Technology as the second-largest, and Industrials as the third. In Venture Capital funds, Information Technology held the top position, accounting for more than 50% of the NAV weights. Health Care ranked second and Consumer Discretionary secured the third spot.

For funds classified as Generalist in SSPEI, their top sector exposure in holdings data showed a similar pattern to Buyout Funds. Information Technology constitutes 24% of the NAV, followed by Industrials and Health Care, accounting for 17% and 16.8% respectively. These three sectors collectively represented over 50% of the NAV weight within Generalist funds (see Exhibit 9(B)).

Exhibit 9. Holdings Sector Exposure Measured by NAV

(A) Sector Exposure by Strategies
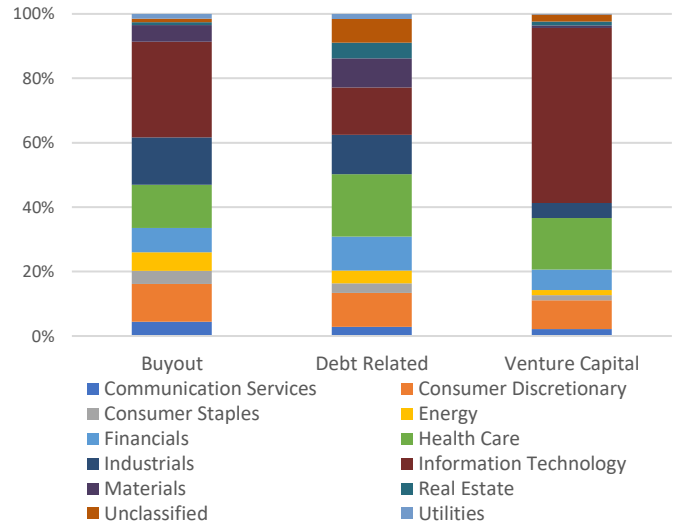
(B) Sector NAV weights for Generalist PE Funds

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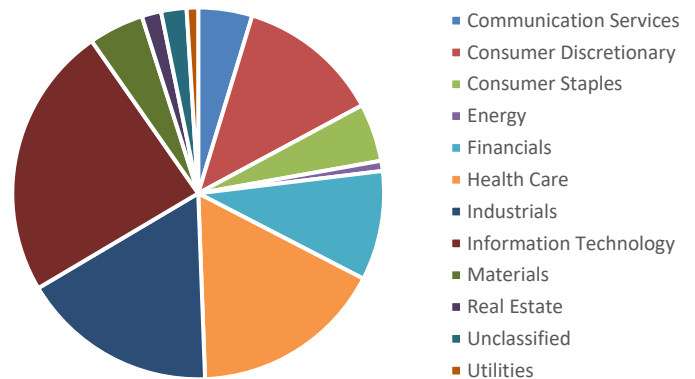
[9] As of Oct 2023, the coverage of Q2 holdings data was 46% of the overall NAV in SSPEI, primarily due to a longer reporting lag for holdings data.

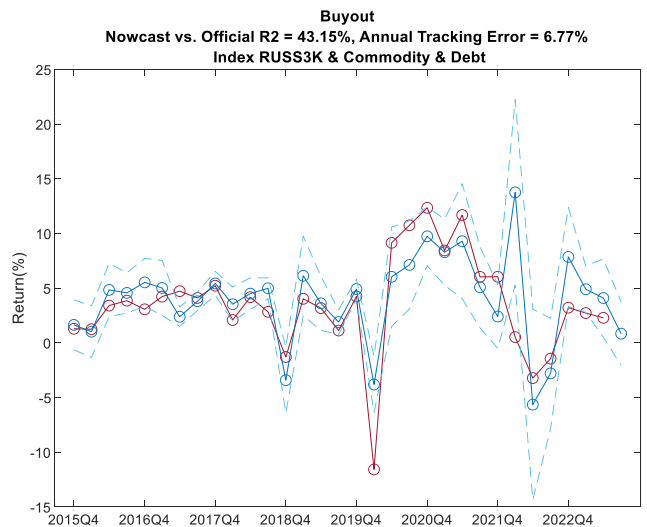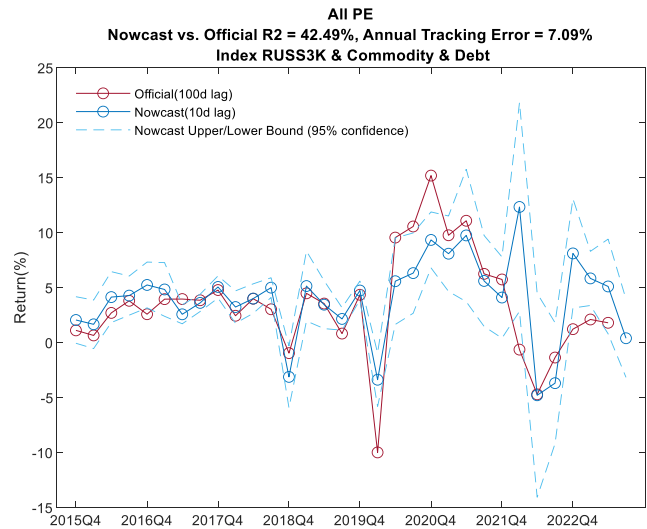## NEXT QUARTER PERFORMANCE FORECAST

Nowcasting

Inspired by the concept of nowcasting, SSPEI research team developed a model, aspiring to estimate the concurrent performance of private equity market, of which the reporting is otherwise delayed at least by one quarter. We hereby only share the model predictions for Q3 2023 without going into theoretical background. For model details, please refer to State Street Private Equity Insights Q3 2021 publication.[10] Nowcasting results are out-of-sample predictions based on the regression coefficients from the past 5 year rolling window and the observed public market returns and private market cash flows.

Looking at the current quarter, the nowcasting model underpredicted Q2 2023 return for Private Debt strategy, but over-predicted the returns of all other strategies. Shown in Exhibit 10, the actual Q2 2023 returns of All PE, Buyout, Venture Capital and Private Debt were 1.80%, 2.29%, -0.16% and 2.61% respectively. Correspondingly, the nowcasting model predicted returns were 5.10%, 4.10%, 13.45% and 1.12%. Nevertheless, except for Venture Capital, the actual returns across strategies all fell within the 95% confidence intervals of the predictions. Due to the strong performance in Q2 Nasdaq Composite index, the prediction for Q2 2023 Venture Capital performance was overly optimistic.

Looking forward, our nowcasting model expects the Q3 2023 returns of all strategies to stay at positive levels. For All PE, Buyout, and Venture Capital, we expect to see their returns decrease from their realized returns in Q3 2023 but we expect to see an increase in returns for Private Debt. The predicted returns for All PE, Buyout, Venture Capital and Private Debt are 0.39%, 0.84%, 3.06%, and 2.77% respectively. The model predictions for Buyout and Private Debt funds are adjusting to decrease in Barclays US Aggregate index, and increase in Bloomberg U.S. Corporate High Yield Index, which we observed in Q3 2023.

Exhibit 10. Actual vs. Out-of-sample Nowcast IRRs

All PE
Nowcast vs. Official R2 = 42.49%, Annual Tracking Error = 7.09%
Index RUSS3K & Commodity & Debt

Buyout
Nowcast vs. Official R2 = 43.15%, Annual Tracking Error = 6.77%
Index RUSS3K & Commodity & Debt

Venture Capital
Nowcast vs. Official R2 = 33.70%, Annual Tracking Error = 11.52%
Index NASDAQ

Private Debt
Nowcast vs. Official R2 = 54.49%, Annual Tracking Error = 4.18%
Index High Yield & Commodity & Debt

Source: State Street ®, as of Q2 2023.

DISCUSSION – Flock to safety in large funds

LPs' manager selection has increasingly leaned towards larger funds since 2022, aligning with the backdrop of rising interest rates and a cooling PE market. As depicted in Exhibit 11, the proportion of larger funds has notably surged in 2022 and 2023 compared to the preceding decade, despite a significant drop in total funds raised.

Exhibit 11. Fund size composition changes of SSPEI

(A). 2022-2023 (fund size bucket in $billions)

Vintage year 2022-2023
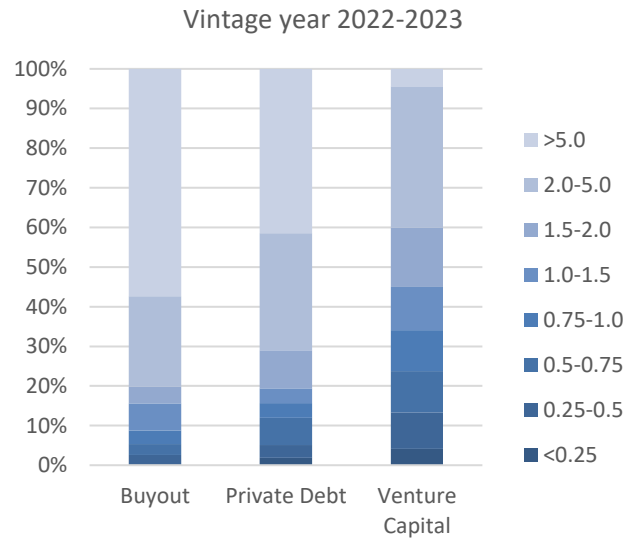
(B). 2012-2021 (fund size bucket in $billions)

Vintage year 2012-2021
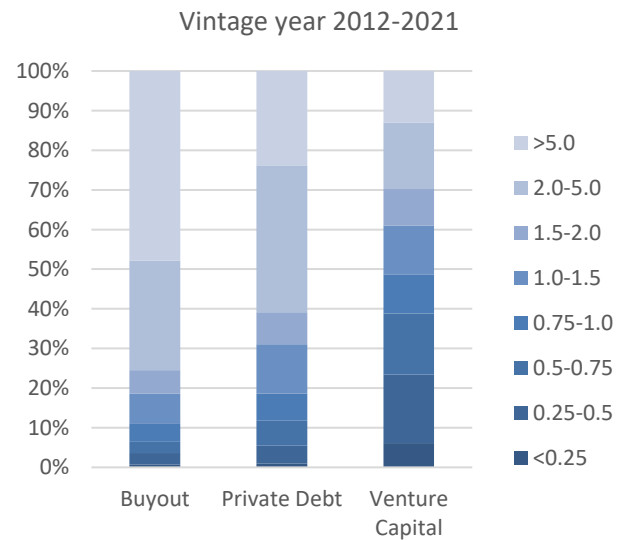
Source: State Street ®, as of Q2 2023.

Confronting uncertain market conditions and liquidity constraints, LPs appear to be gravitating towards safety by maintaining reduced commitments to prominent multi-asset incumbent GPs.[11] From a risk aversion stand point, this shift is reasonable, given the wider dispersion of returns observed in smaller funds, as indicated in Exhibit 12A and B.

Exhibit 12. Since inception return dispersion by fund sizes

(A) IRR spread between 25th and 75th percentile by fund size buckets ($billions)
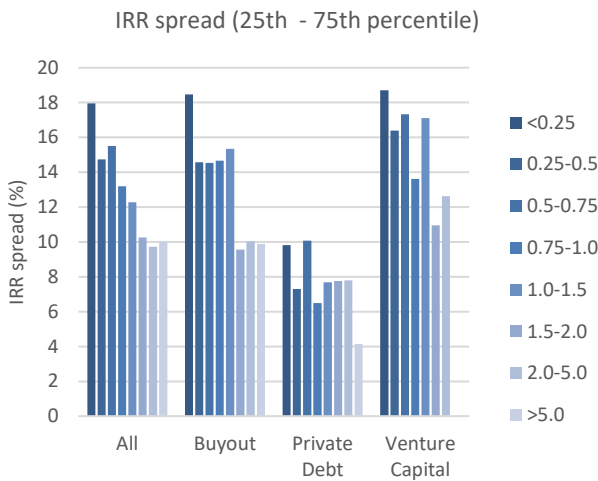
(B) TVPI spread between 25th and 75th percentile
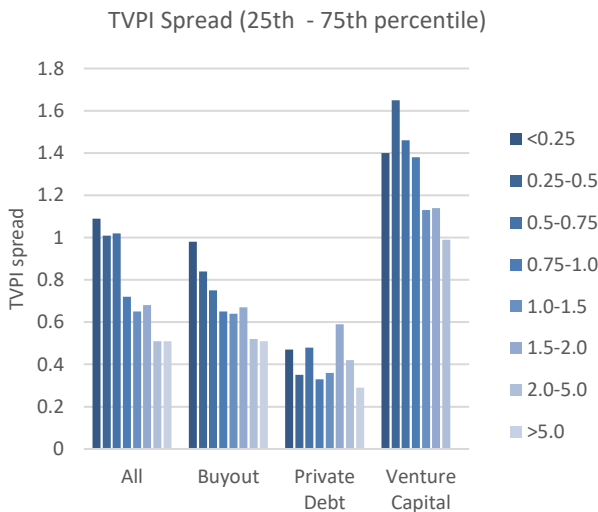
(C) Median IRR by fund size buckets
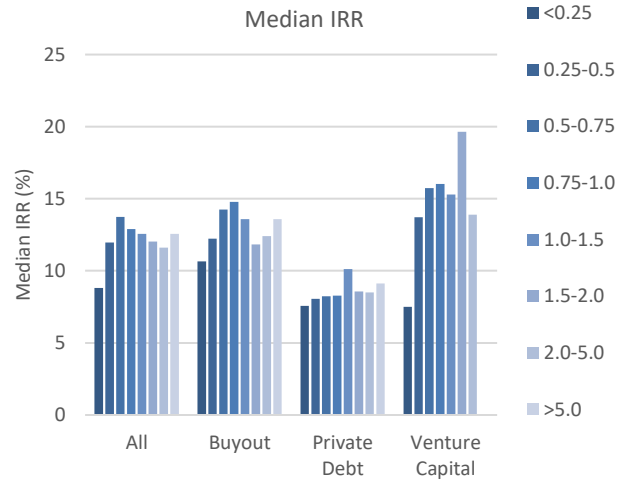
Source: State Street ®, as of Q2 2023. Vintage year 2002-2018

Despite a clear trend in return dispersion, Exhibit 12C displays a mixed pattern of median IRRs by fund size groups. To quantify the correlation between fund size and performance, Exhibit 13 employs a multiple regression analysis. Focusing on SSPEI constituent funds with vintage years spanning from 2002 to 2018, the analysis regresses their fund-level since-inception IRRs against characteristics such as fund size (log), vintage year, regional focus, and sector focus. The regression results reveal the size effect is more pronounced for Venture Capital Funds. Venture Capital fund performance (SI-IRR) increases by 5.05% for each 10X increase in fund size. Buyout and Private Debt funds exhibit positive but statistically in-significant fund size effect.

Exhibit 13. Regression analysis of fund size effect on performance

	VC	Buyout	Private Debt
Log10(Fund Size)	5.05*	0.57	2.14
t-Stat	3.99	0.73	1.82
p-Value	0.00	0.47	0.07
DF	680	1059	305
Adj R²	0.26	0.20	0.10

Source: State Street ®, as of Q2 2023. Vintage year 2002-2018. Since inception IRR is winsorized at [0.5% 99.5%]. Fixed effects of vintage year, sector focus, and region focus are included in the analysis but not reported above.

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[11] https://www.buyoutsinsider.com/private-equity-funds-are-getting-biggerand-bigger/

ABOUT THE STATE STREET PRIVATE EQUITY INDEX

Participants in private capital markets need a reliable source of information for performance and analytics. Given the non-public nature of the private equity industry, collecting comprehensive and unbiased data for investment analysis can be difficult. The State Street Private Equity Index ("SSPEI") helps address the critical need for accurate and representative insight into private equity performance.

Derived from actual cash flow data of our Limited Partner clients who make commitments to private equity funds, SSPEI is based on one of the most detailed and accurate private equity data sets in the industry today. These cash flows received as part of our custodial and administrative service offerings are aggregated to produce quarterly Index results. Because the SSPEI does not depend on voluntary reporting of information, it is less exposed to biases common among other industry indexes. The result is an index that reflects reliable and consistent client data, and a product that provides analytical insight into an otherwise opaque asset class.

- Currently comprises more than 3,900 funds representing more than $4.8 trillion in capital commitments as of Q2 2023
- Global daily cash-flow data back to 1980.
- The Index has generated quarterly results since Q3 2004.
- Published approximately 100 days after quarter-end.

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