STATE STREET.

# Private Equity Insights

TWENTY-SEVENTH EDITION | Q3 2022

## CURRENT QUARTER PERFORMANCE SUMMARY

The State Street® Private Equity Index (SSPEI) posted an overall return of -1.36% in Q3 2022, a slower decrease following the sharp -4.71% drop in Q2 2022. Private Debt rebounded from a negative return in the previous quarter and posted a positive return. Although Buyout and Venture Capital funds still yield negative quarterly returns, their magnitudes were much smaller than previous quarter (see Exhibit 1).

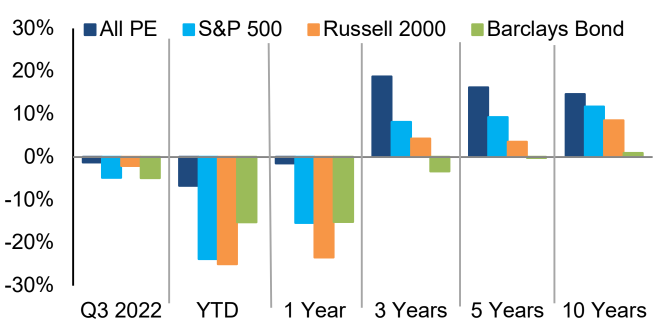
**Exhibit 1. Private Equity Performance by Strategy**

| | All PE | Buyout | VC | Private Debt |
|---|---|---|---|---|
| 2022 Q3 | -1.36% | -1.44% | -1.99% | 0.68% |
| 2022 Q2 | -4.71% | -3.22% | -9.83% | -1.99% |
| 2022 Q1 | -0.64% | 0.53% | -4.40% | 1.21% |
| YTD | -6.76% | -4.25% | -15.67% | -0.03% |

**Source: State Street®, as of Q3 2022.**

SSPEI outperformed the US bond market (proxied by Bloomberg Barclays US Aggregated Bond Index), small-cap stocks (proxied by Russell 2000), and the US public equity market (proxied by S&P 500) at all horizons (see Exhibit 2). PE market yielded a close quarterly return to that of the small-cap stocks, and outran the US bond market and the US public equity market, which returned -5.0% and -4.9% respectively.

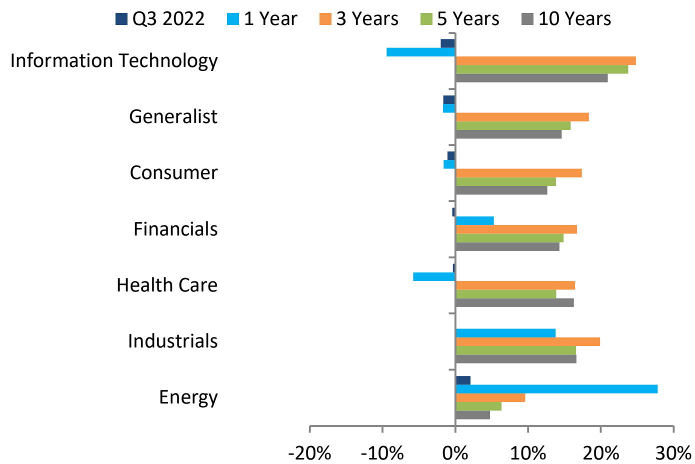
**Exhibit 2. Investment Horizon Returns**




**Source: State Street®, DataStream, Bloomberg Barclays US Aggregate Bond Index (total returns as of Q3 2022).**

Energy funds held their lead among the sectors for the third quarter in a row with a positive quarterly return of 2.09%, followed by Industrials funds with a quarterly return of -0.04% and Health Care funds with a quarterly return of -0.31%. Information Technology funds experienced the largest negative return among all sectors with -2.02% and continued to lag behind other sectors in Q3 2022 (see Exhibit 3).

**Exhibit 3. Returns of Sector Focused Private Equity Funds**




**Source: State Street®, as of Q3 2022.**

### Fund Raising and Dry Powder

The total capital raised in the first three quarters of 2022 was $333 billion, signaling a downturn in fund raising activities after the peak of 2021. In the first three quarters of 2022, Buyout and Venture Capital funds raised $211 billion and $78 billion respectively, while Private Debt funds raised $43 billion, indicating sharp slowdowns across all strategies (see Exhibit 7A). Across regions, in the first three quarters of 2022, the US and Rest of World funds raised $229 billion and $93 billion respectively, while Europe funds experienced a significant slowdown with a total fund size of $11 billion (see Exhibit 7B).

*Continued on page 5.*

## VOLATILE MARKETS AND THE LETHARGIC NAV RESPONSE

### Insights from Harvard University and the Private Capital Research Institute

*By Sam Holt, Leslie Jeng, Josh Lerner*

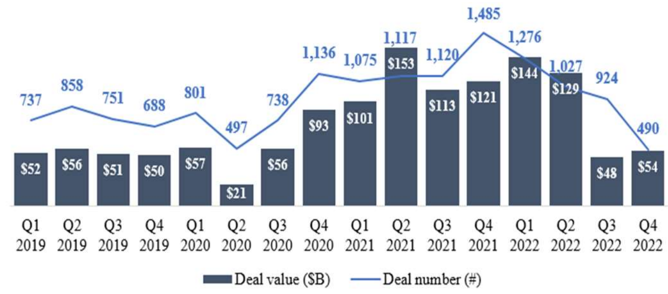
*Introduction: The Year of the Bear*

One needs only to read headlines like "Why a global recession is inevitable in 2023"[1] and "Why a recession by end-2023 should be the base case"[2] to gauge the grim state of investor sentiment for 2023. Industry press documenting economists' expectations for 2023 do not provide much indication of bullishness either: a *Bloomberg* poll of economists found that 70% of those surveyed believe there is a chance of a US recession by year-end, and a *Wall Street Journal* survey showed 63% of economists polled believe there will be a recession by October.[3]

This negative outlook appears to gradually manifesting itself in private markets as well. After a record-breaking period of activity between Q4 2020 to Q2 2022, private equity (PE) investment has abated. PE deal value and volume plummeted during the second half of 2022 relative to the corresponding period in 2021. Exhibit 4 displays the rapid drop in activity, reminiscent of decline recorded at the onset of the COVID-19 pandemic.[4]

Interestingly, despite significant declines in PE activity, negative market sentiment, and turbulent public markets, PE returns have yet to experience a similarly sharp performance correction. The State Street PE Index, for example, registered an annual return of -1.6% in the twelve months ending September 2022,[5] significantly outpacing the S&P 500's -16.1% decline over the same period.[6] Given the apparent widespread impact of the broader macroeconomic and financial market environment, it is natural to ask why PE has yet to witness a performance contraction as severe as that occurring in public markets.

**Exhibit 4. PE Deal Value and Number Q1 2019 – Q2 2022**




**Source: See footnote 4.**

*The Issue: Stale NAVs*

While there are a number of explanations, one answer to this question pertains to the underlying nature of PE asset valuations. At their core, PE net asset valuations (NAV) are often "stale," with the current price of the asset not fully reflecting the most recent information available. This stale pricing results in a lag in the change of the asset's price relative to current market conditions.[7]

The main explanation for this lag in PE is that the process of revaluing NAVs of private firms is time-consuming. Often general partners (GPs) only undertake fully audited and updated revaluations for each of their portfolio companies annually. Investors in PE funds, referred to as limited partners (LPs), then receive the updated NAVs as part of fund financial reports provided by the GPs a number of weeks, if not months, after the end of the period in which the assets are being valued. The result is, unlike public markets in which new data and investor sentiment are incorporated into asset prices in near real-time, the NAVs provided by GPs to LPs do not incorporate the prevailing market information at the time the NAVs are reported.

The disconnect between private asset NAVs and public markets is especially pronounced in high volatility environments similar to the current market. In fact, past academic work highlights that NAV markdowns in private capital, whether by venture capital or buyout funds, frequently take up to a year to occur following large public market

[1] Beddoes, Zanny Minton. "Why a global recession is inevitable in 2023." *The Economist*. November 18th, 2022.
[2] Hooper, Peter, Matthew Luzzeti, and Matthew Barnard. "Why a recession by end-2023 should be the base case." *Deutsche Bank*. May 2022.
[3] Golle, Vince and Kyungjin Yoo. "Economists place 70% chance for US recession in 2023." *Bloomberg*. December 20, 2022; Torry, Harriet and Anthony DeBarros. "Economists now expect a recession, job losses by next year." *Wall Street Journal*. October 16, 2022.
[4] "Private equity: US deals 2023 outlook." *PWC*. December 2022.
[5] State Street Private Equity Index Portal, accessed January 2023.
[6] Refinitiv data, accessed December 2022.
[7] "NASDAQ glossary." *NASDAQ:* https://www.nasdaq.com/glossary/s/stale-price

downturns.[8] The research noted that during the global financial crisis (GFC), specifically the third quarter of 2007 to the third quarter of 2008, the S&P 500 posted a -27.3% return. Across the same time period, however, PE funds only reported a -6.37% correction. Additionally, PE NAV downward revisions continued into the following quarters, even as public markets recovered.

*The Result: The Denominator Effect*

While the stale pricing matter may seem relatively benign, it can raise significant issues for private market investors through the "denominator effect." LPs that invest with GPs often have a specified target allocation to private assets. These allocation limits are typically defined as the ratio of the total value of private assets relative to the total value of assets (inclusive of public equities, bonds, etc.) in the LP's portfolio. When the overall value of a portfolio (i.e., the denominator) declines due to a drop in the publicly traded securities value and the value of private assets remains relatively constant due to stale pricing, the portfolio's private market allocation may surpass defined targets.

Exhibit 5 demonstrates this effect on a hypothetical $100M portfolio with a 20% PE target allocation and 80% public equity allocation. Assume a 20% decline in public equity values in tandem with stable PE asset values. The result is a contraction of the portfolio to $84 million, all attributable to the decline in public equities to $64M. The private asset holding remains valued at $20M. Despite not making any new commitments to PE, the portfolio's private allocation rises to 23.8%, surpassing the portfolio's 20% PE target allocation. Many institutional investors are bound to their stated target allocations, and the denominator effect can force them into a number of different actions to resolve the unintended overallocation situation.

**Exhibit 5. Stylized Example of Denominator Effect on Hypothetical Portfolio**

| | Before 20% public market decline | | After 20% public market decline | |
|---|---|---|---|---|
| Asset type | Value ($M) | % of total | Value | % of total |
| Public equities | $80 | 80% | $64 | 76% |
| PE assets | $20 | 20% | $20 | 24% |
| Portfolio | $100 | 100% | $84 | 100% |

*The Response: The Market Participant Dilemma*

Unfortunately, it appears the denominator effect has surfaced given a sustained bearish public market outlook and a lack of large-scale markdowns in PE NAVs. In 2022, only venture capital funds saw some large-scale markdowns in NAVs, while Buyout and Private Debt funds only had mild decreases in their NAVs (see Exhibit 11A 11D). Taken together, these factors can impact investors' investment decisions and commitments to PE, which have a number of implications for the PE industry as a whole.

For one, the amount of new allocations to PE could very well decrease. The denominator effect can lead to investors that are beneath their target allocations to PE suddenly reaching their goals without contributing any additional capital to PE. In fact, recent surveys indicate that LPs' appetites for PE may be quelled, at least temporarily. For the first time in years, fewer LPs intend to increase their allocation to PE relative to the previous year. A recent 2022 year-end survey reported that 31% of investors intend to increase their allocation to PE in 2023, 12% less than the 43% that intended to increase allocations the year prior.[9] Such surveys suggest that the overall PE fundraising environment may experience a sustained slowdown as LPs pause to navigate the current market turbulence.

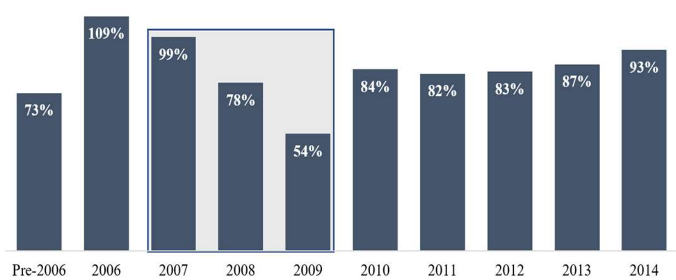
Moreover, LPs must deal with overallocation to PE as a result of the denominator effect. Another recent survey demonstrated that 24% of respondents are currently overallocated to PE, double the percentage of respondents in 2019.[10] Given this reality, investors must consider how to navigate potential PE investment opportunities given they are near or have already surpassed PE allocation targets. These managers likely will either redefine their allocation targets (if

[8] Barber, Brad and Ayako Yasuda, "Interim Fund Performance and Fundraising in Private Equity," *Journal of Financial Economics*, 124 (1), 2017: 172-194.
[9] Joyce, Cameron and Angela Lai. "Preqin global reports 2023: Private Equity." *Preqin*. December 14, 2022.
[10] Payton, Ben. "Seven key takeaways from the LP Perspectives 2023 study." *Private Equity International*. December 1, 2023.

possible) or sell portions of their PE positions. For instance, the Wisconsin Investment Board increased its PE and private debt target allocation to 15% from 12%, real estate to 8% from 7%, and decreased their public equities target from 52% to 48% as a means to counter to the denominator effect.[11]

If investors must sell a portion of their PE holdings, then LP-led secondaries could see a boom as investors reduce their exposure to PE. However, these stakes might ultimately be sold at a price heavily discounted to the assets' NAV. Such discounts reflect two factors. First, distressed sellers may have little market power, and be forced to accept lower prices. Second, this discount-to-NAV may be exacerbated by the stale price element discussed earlier: even if they sell at the "correct" price (i.e., with no penalty for being distressed), the realized values are likely to be below the current NAVs. Work from Nadauld et al. (2019), presented in Exhibit 6, shows how severe the price-to-NAV discounts were for secondaries during the GFC.[12]

**Exhibit 6. Secondary Market Transaction Prices as a Percent of NAV**




**Source: See footnote 12.**

An additional option is for investors to hold steady with their PE and public asset allocations, despite the denominator effect. Such a strategy rests with the understanding that the industry is cyclical and maintaining the long-term perspective that led to their initial entrance into private assets is the prudent choice moving forward.

Some LPs are taking it upon themselves to mark down their PE positions given the lack of valuation adjustments thus far.[13] Such actions can help an investor avoid a premature secondary sale of PE assets and maintain the long-term perspective needed to be successful in private markets. These actions suggest the need for better analytic tools, which can allow LPs a more timely sense of the true value of their holdings.

*Conclusion: PE is a long-term game*

The global economy and public markets are experiencing sustained volatility, and the outlook for 2023 does not suggest any calming in the short-term. The private markets are not immune to this phenomenon, and recent private market investment activity suggests that a correction of its own may be imminent. However, private asset valuations do not provide a real-time snapshot of their true value like public market securities; thus, the underperformance witnessed in public markets has yet to surface in the private markets. The slowness in which private investments are re-valued introduces complexity for all market participants. This lag in private asset NAV markdowns can produce a denominator effect in investor portfolios that leads to a myriad of portfolio management complexities.

This effect, combined with uncertainty surrounding the duration of economic and public market volatility, may result in LPs pausing further PE investments as they navigate the current environment. Some LPs may even seek exits through the secondary market at discounts to their holdings' NAVs. Notwithstanding the complications born from stale pricing and lagging NAV adjustments, market participants must keep in mind that PE is a long-term game. NAVs will eventually correct to reflect changes in the overall market, and investors should overlook the short-term volatility. The turbulence may bring pressure to revise long-term strategies but given the evidence that market timing strategies are not effective in private markets, the biggest winners in PE will likely be those that resist this temptation.[14]

[11] Kozlowski, Rob. "Wisconsin Investment Board raises targets for private equity/debt, real estate." *Pension & Investments*. December 16, 2022.
[12] Nadauld, Taylor, Berk Sensoy, Keith Vorknik, and Michael Weisbach, "The Liquidity Cost of Private Equity Investments: Evidence from Secondary Market Transactions", *Journal of Financial Economics*, 132 (3), 2019: 158-181.
[13] Gethard, Gregg. "MassPRIM reports nearly 6% private equity markdown." *Buyout Insider*. November 15, 2022; Gethard, Gregg. "Harvard expects private equity markdowns with year-end audits." *Buyout Insider*. October 14, 2022.
[14] Gregory Brown, Robert Harris, Wendy Hu, Tim Jenkinson, Steven Kaplan, and David Robinson. "Can Investors Time Their Exposure to Private Equity?" Journal of Financial Economics 139, no. 2 (February 2021): 561–77.

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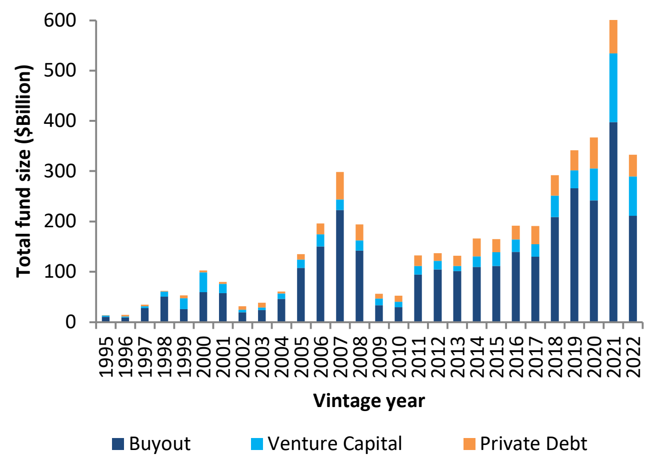
*The Private Capital Research Institute is a not-for-profit 501(c)(3) corporation formed to further the understanding of private capital and its global economic impact through a commitment to the ongoing development of a comprehensive database of private capital fund and transaction-level activity supplied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

CONTINUED FROM PAGE 1

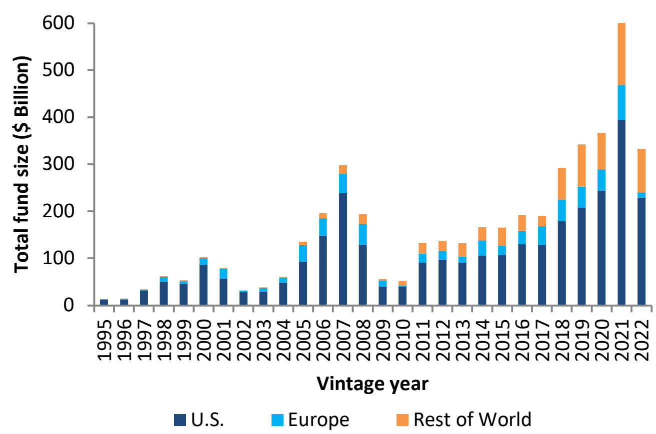
The average fund size continued to rise for Buyout funds, remained stable for Venture Capital funds and decreased for Private Debt funds in 2022. As of Q3 2022, Buyout funds posted their highest record of $3.65 billion, which is 13% higher than that in 2021. The average fund size of Venture Capital funds remained constant at $0.96 billion while the average funds size of Private Debt funds decreased by 16% from its 2021 average of $2.06 billion to $1.67 billion (see Exhibit 8).

**Exhibit 7. Total Fund Size (USD Billion)**

**(A) By Strategy**

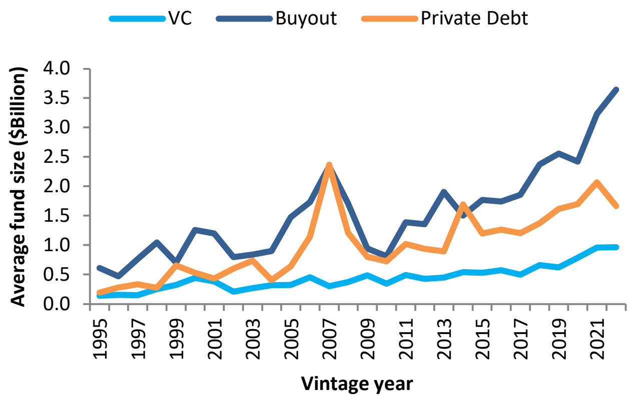



**(B) by Region**




**Source: State Street®, as of Q3 2022.**

### Exhibit 8. Average Fund Size (USD Billion)

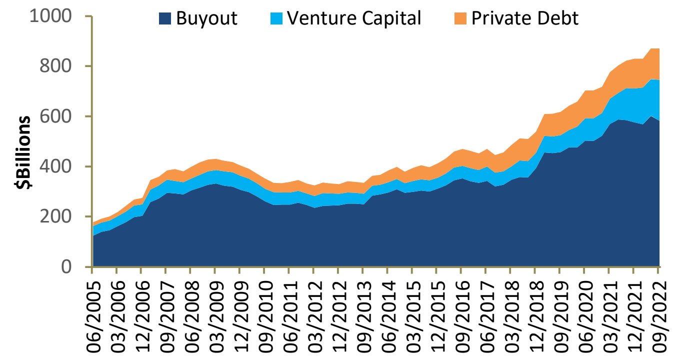



Source: State Street®, as of Q3 2022.

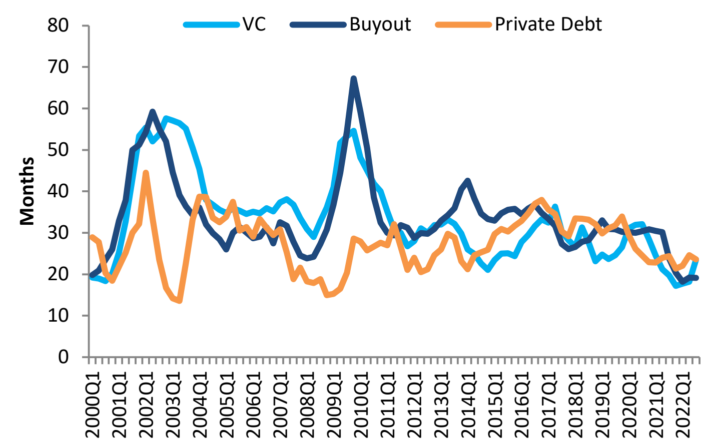
Dry powder is the part of the fund's committed capital that has not yet been called by the fund manager. It represents the amount of capital that can be used for future investment opportunities. By the end of Q3 2022, SSPEI posted a monthly dry powder of $870 billion which is slightly lower than that in the previous quarter. Exhibit 9A shows that the monthly dry powder has been following an increasing trend until mid-2022, at which it reached its historical high. In Q3 2022, however, the increasing trend has ended and the monthly dry powder has decreased marginally. Although the dollar amount of dry powder slightly decreased in Q3 2022, 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, drastically increased for Venture Capital funds and remained constant for Buyout funds in Q3 2022. On the other hand, the dry powder inventory of the Private Debt strategy fell down by a month (see Exhibit 9B). An increase in dry powder inventory is expected if the downward trend in capital calls persists (see Exhibit 10A).

### Exhibit 9. Dry Powder

#### (A) Monthly Dry Powder




#### (B) Quarterly Dry Powder Normalized by Average Contribution




Source: State Street ®, as of Q3 2022.

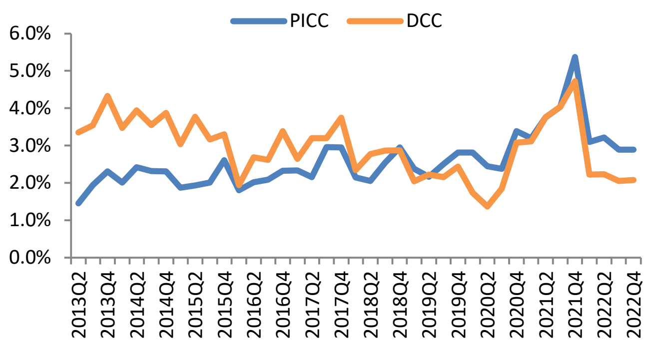
### Cash Flow Activity

After a sharp decline in Q1 2022 and a marginal drop in Q3 2022, the quarterly Paid-in Capital over Committed Capital (PICC) remained constant in Q4 2022. Similarly, after following a similar pattern in the first three quarters of 2022, the quarterly Distribution over Committed Capital (DCC) also remained stable, increasing by only 2 basis points of active commitments in Q4 2022. Throughout the year, PICC stayed much higher than DCC, resulting significant negative net cash flows for all three main PE strategies (see Exhibit 10A, 10B).

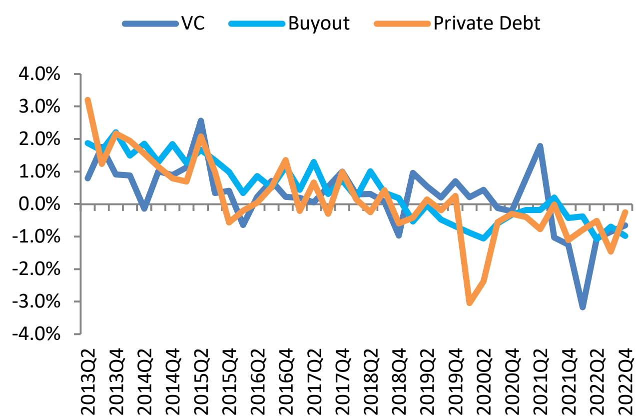
Exhibit 10B shows two quarters with sharply negative net cash flows recently: one for Venture Capital in 2022Q1 and the other for Private Debt in 2020Q1. Although they look similar on the chart, they were driven by very different factors. The negative cash flow of Private Debt in 2020Q1 was driven by increases in contributions in response to the outsized demand of private debt in the COVID19 crisis, while the negative cash flow of Venture Capital in 2022 overall was driven by the sharp decreases of distributions, as a result of diminishing valuations and exit activities.

### Exhibit 10. Quarterly Cash Flow Ratios Normalized by Commitment

#### (A) Contribution and Distribution for All PE




#### (B) Net Cash Flow By Strategy




**Source: State Street ®, as of Q3 2022.**

### Valuations

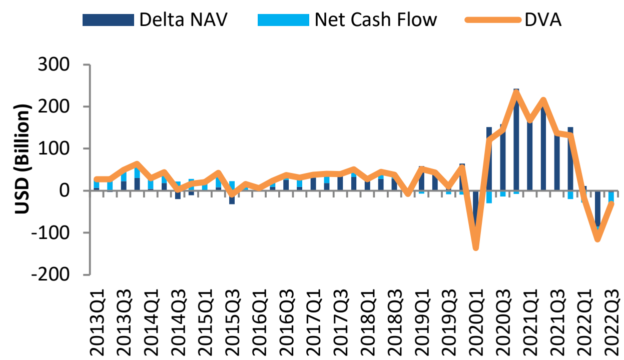
The Dollar Value Added (DVA) is the sum of NAV changes and net cash flows. It measures the realized and unrealized gain and loss in dollar amounts.

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

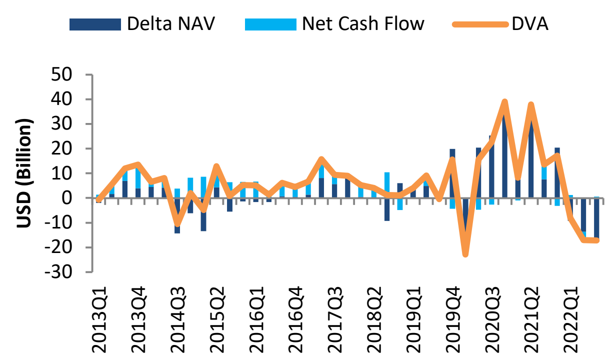
The quarterly DVA of overall PE rebounded, while staying below zero, from -$116 billion in Q2 2022 to -$32 billion in Q3 2022. The negative DVA in Q3 2022 is almost completely attributable to net cash flows (see Exhibit 11A). As shown in Exhibit 11D, the stability of the change in NAV is consistent among different trading strategies. Exhibits 11B shows that Europe funds experienced a significant decline in DVA in USD throughout 2022. However, this decline in DVA was driven by the relative appreciation of the US dollar against the Euro in 2022. Exhibits 11C shows that Europe funds had positive DVA driven by positive changes in NAV in Euro over the past two quarters.

### Exhibit 11. Dollar Value Added

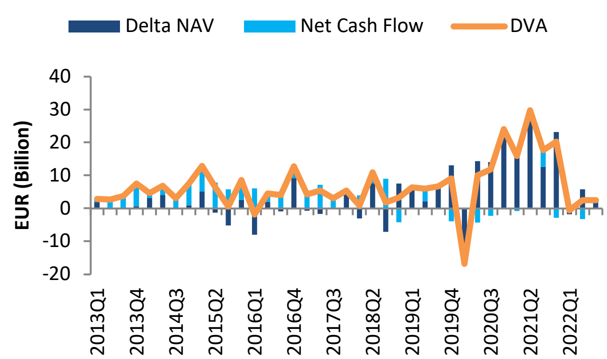
#### (A) All PE



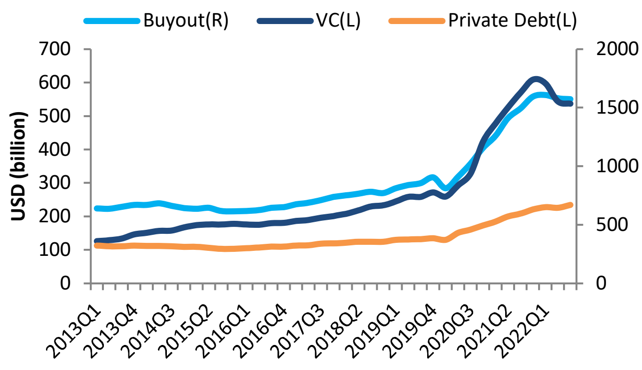

#### (B) Europe (USD)




#### (C) Europe (EUR)



### (D) NAV by Venture Capital, Buyout, and Private Debt




**Source: State Street ®, as of Q3 2022.**

## NEXT QUARTER PERFORMANCE FORECAST

### Nowcasting

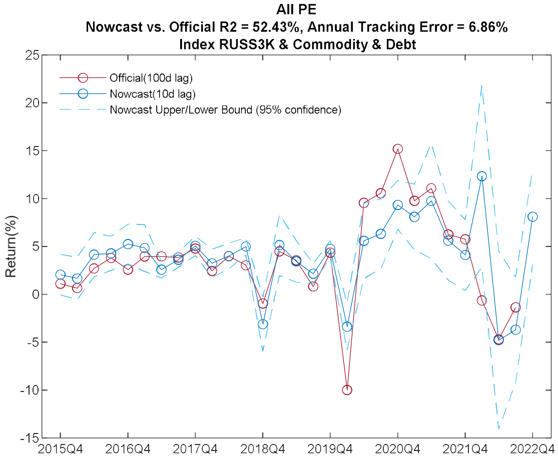
Inspired by the concept of nowcasting, SSPEI research team developed a model, aspiring to estimate the concurrent performance of private equity market, of which the reporting is otherwise delayed at least by one quarter. We hereby only share the model predictions without going into theoretical background. For model details, please refer to State Street Private Equity Insights Q3 2021 publication.[15] Nowcasting results are out-of-sample predictions based on regression coefficients from the past 5 year rolling window and the observed public market returns and private market cash flows.

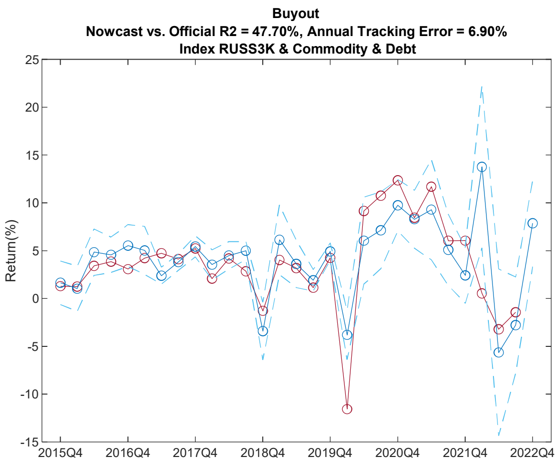
In Q3 2022, the realized PE returns were directionally consistent with the predicted returns of the nowcasting model. As shown in Exhibit 12, the actual Q3 2022 returns of all PE, Buyout, Venture Capital and Private Debt were -1.36%, -1.44%, -1.99% and 0.68% respectively. Correspondingly, the nowcasting model predicted returns were -3.69%, -2.79%, -6.03% and 2.27%. More importantly, the actual returns were within the 95% confidence intervals of the predicted returns. Given the bearish public market outlook, the predictions of the nowcasting model were more conservative than the realized returns of all strategies except for Private Debt.

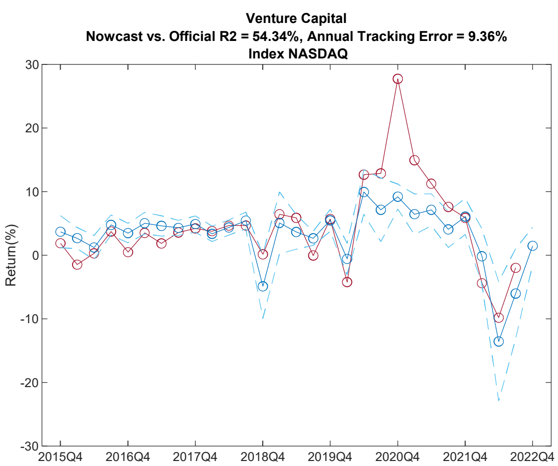
Looking forward, our nowcasting model expects the Q4 2022 returns of all strategies to increase significantly to positive levels. All PE predicted return is 8.11% in Q4 2022 while the predicted strategy returns are 7.86%, 1.47% and 3.96% for Buyout, Venture Capital and Private Debt respectively. The predicted rebounds in quarterly IRRs are mainly attributed to the slowdown in the downward trend of the public markets. Among the three strategies, similar to the previous quarter, Venture Capital remains to have the lowest predicted return. NASDAQ composite index is the only input for Venture Capital, which decreased by only 0.79% in Q4 compared to its previous drop of 3.91% in Q3. Hence the model expects Venture Capital returns to go up in the last quarter of 2022, however less than other strategies. Russell 3000, which is a common input for both all PE and Buyout nowcasting models, jumped drastically by 6.23% in Q4 2022 and is the main driver of the high predicted returns of all PE and Buyout in Q4 2022.

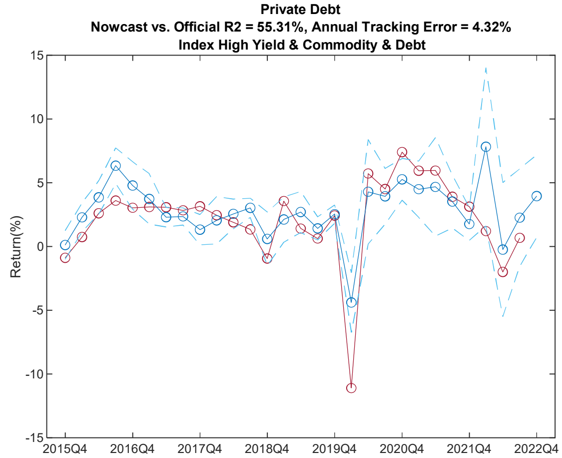
[15] State Street Private Equity Insights Q3 2021
https://globalmarkets.statestreet.com/portal/peindex/pe-insights/

## Exhibit 12. Actual vs. Out-of-sample Nowcast IRRs




**Source: State Street ®, as of Q3 2022.**

## DISCUSSION – MEASURING PRIVATE EQUITY MARKET'S PUBLIC EXPOSURE

The linkage between the private equity market and the public market can have direct effects on LPs' investment decisions in diversification, risk management, and liquidity provision. Indirectly, the mis-aligned timing in valuation adjustment between private and public markets can affect LPs' portfolio allocation as institutional investors seek to meet their target allocations. Amid heightened public market turbulence, the co-movement between the public market and private equity funds has become a more pressing question. In this quarter's discussion, we look at public exposure in State Street's Private Equity Index universe and further investigate how such exposure has developed over time and by sub-strategies for buyout and venture capital funds.

To understand public exposure in the private equity index universe without direct usage of portfolio level data, we look at private equity's market beta exposure to public market returns. We estimate market beta by regressing PEI's returns by sub-strategy on the concurrent and lagged returns of corresponding public market indices, which is the Russell 3000 Total Return Index for buyout funds and NASDAQ Composite Return Index for venture capital funds, as well as on a variable indicating recession regimes, in order to accurately reflect the characteristics of the respective strategies.[16] The regression model can be shown as follows:

$$PEReturn_t = \alpha + \beta_1 PublicReturn_t + \beta_2 PublicReturn_{t-1} + \gamma_2 R + \gamma_3 R * PublicReturn_t + \epsilon_t$$

*R* is an indicator variable for recession, which is 1 for recession periods and 0 otherwise[17]. $\beta_1$ is the main market beta during non-recession periods. $\gamma_3$ is the coefficient for the interaction term, which measures the additional co-movements between private and public market returns during a recession. Public market indices are lagged by one quarter to capture non-contemporaneous effects.

### Exhibit 13. Private Equity Exposure to Public Market

#### (A). Market Beta Estimation Result for Buyout Funds

| Buyout | Mega BO | Large BO | Midsize BO | Small BO |
|---|---|---|---|---|
| **Intercept** | 3.24*** | 2.08*** | 2.74*** | 3.31*** |
| | 0.47 | 0.34 | 0.41 | 0.43 |
| **Recession** | -3.50*** | -2.83** | -2.43** | -3.36** |
| | 1.17 | 1.35 | 1.06 | 1.32 |
| **Russell 3000** | **0.50*** ** | **0.33*** ** | **0.31*** ** | **0.25*** ** |
| | 0.05 | 0.05 | 0.05 | 0.04 |
| **Russell 3000 Lag** | 0.13*** | 0.13*** | 0.12*** | 0.11*** |
| | 0.03 | 0.04 | 0.03 | 0.03 |
| **Recession * Russell 3000** | 0.05 | 0.09 | 0.06 | 0.02 |
| | 0.09 | 0.10 | 0.06 | 0.08 |
| ***R-squared Adj.*** | *0.52* | *0.49* | *0.47* | *0.25* |

#### (B). Market Beta Estimation Result for VC Funds

| Venture Capital | Late VC | Balanced VC | Early VC |
|---|---|---|---|
| **Intercept** | 2.13*** | 1.90*** | 1.98*** |
| | 0.39 | 0.31 | 0.51 |
| **Recession** | -2.66** | -2.79*** | -2.43 |
| | 1.05 | 0.79 | 1.56 |
| **NASDAQ Comp.** | **0.43*** ** | **0.32*** ** | **0.41*** ** |
| | 0.08 | 0.05 | 0.08 |
| **NASDAQ Comp. Lag** | 0.14** | 0.09** | 0.17** |
| | 0.05 | 0.05 | 0.07 |
| **Recession * NASDAQ Comp.** | -0.25*** | -0.13** | -0.21* |
| | 0.09 | 0.05 | 0.11 |
| ***R-squared Adj.*** | *0.53* | *0.5* | *0.39* |

**Source: State Street ®, as of Q3 2022. Newey West standard errors are shown in the rows below the coefficients. * p<.1, ** p<.05, ***p<.01**

16 The sample period for Russell 3000 Total Return Index and for buyout regression is 1992-2022. The sample period for the VC regression is 2003-2022, since the NASDAQ Composite Return Index in our data starts in 2003.

17 We follow the NBER Recession Indicator: NBER based Recession Indicators for the United States from the Period following the Peak through the Trough (USREC) | FRED | St. Louis Fed (stlouisfed.org). Since it's a monthly indicator, we classify a recession quarter to be a quarter that has at least two recession months.

Exhibit 13 shows market beta for both buyout and Venture Capital funds are positive and smaller than 1[18]. Comparing across sub-strategies within buyout funds, we see that the magnitude of beta gets smaller as fund size decreases, suggesting high public exposure for larger funds. In particular, during non-recession period the market betas for mega, large, mid-size, and small-size buyout funds are 0.5, 0.33, 0.31, and 0.25 respectively. Betas for venture capital sub-strategies vary less, but late stage VC, a strategy that targets more mature companies in venture capital, has the largest exposure to public market with a beta of 0.43.

Funds targeting more mature companies as their strategy are more exposed to fluctuations in the public market can also be seen from the adjusted R-squared of the model. Adjusted R-squared decreases as the sub-strategy focuses on smaller/earlier stage portfolio companies within each strategy, in line with common expectation that more mature private companies are increasingly comparable to the public companies.

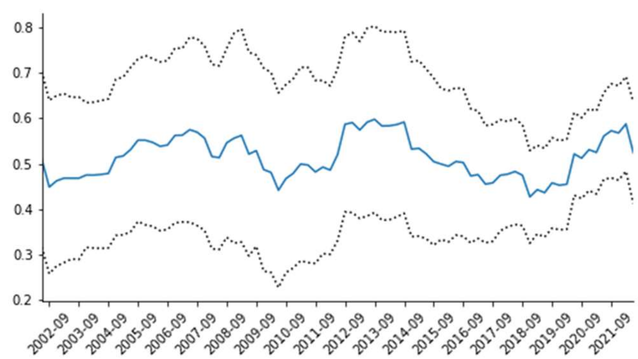
Because public markets typically become more volatile during market downturns, we further look at how market beta changes during a recession. The coefficient of the interaction terms tells us the additional changes to market beta during recessions compared to non-recession periods. For buyout funds, the coefficients are not significant, which means betas do not vary considerably despite recession periods. However, for VC funds, the negative and statistically significant coefficients for the interaction terms suggest less contemporaneous co-movements between VC returns and public market returns during a recession.

This difference between buyout and VC funds can be explained by their public exposures. Due to the difference in the nature of their investments styles, VC funds may adjust more slowly to market conditions than buyout funds. We further see the delay of private market adjustment from the market betas with respect to the lagged public returns, by which are smaller in magnitude than those for current public returns, but still positive and statistically significant.

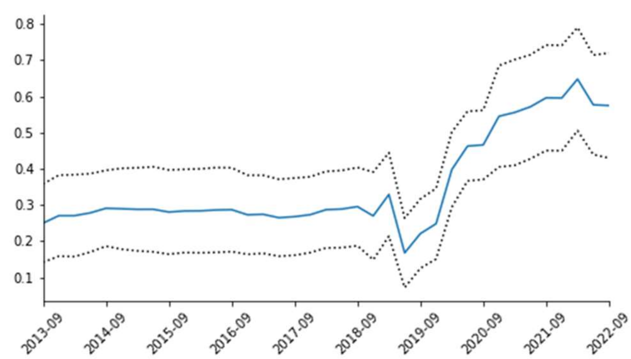
Lastly, we show how market betas have evolved over time. Results for rolling regressions with a 10-year rolling window are shown in Exhibit 14. Exhibit 14A shows that, for buyout funds, the market beta has remained relatively close to 0.5. After a brief period of increase in around 2009, the market beta showed a downward trend from 2014 to 2018 and started picking up from 2018 until mid-2022. For Venture Capital funds (see Exhibit 14B), the market beta is less correlated with market volatility. It consistently hovered around 0.3 from 2013 to 2018 and started to increase in late 2019, consistent with the main trends for buyout funds. It is worth noting that the lack of proper adjustments in private valuations during public market downturns such as 2000-2001, 2008-2009 and 2022 could result in a lower market beta for the sample periods that include them, or vice versa. This effect appears to be more pronounced in Venture Capital funds than in Buyout funds.

**Exhibit 14 Private Equity Exposure to Public Market over time**

**(A). Market Beta for Buyout funds over time**




**(B). Market Beta for Venture Capital funds over time**




**Source: State Street ®, as of Q3 2022. The gray lines are two standard deviation confidence intervals.**

[18] Private market returns used in our analysis are not desmoothed, The goals of desmoothing are to reduce private market performance lags and autocorrelations. As a result it make PE returns more like public market proxies and will yield higher betas in our analysis.

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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 3,800 funds representing more than $4.5 trillion in capital commitments as of Q3 2022
- 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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