STATE STREET.

Private Equity Insights

TWENTY-FIRST EDITION | Q1 2021

CURRENT QUARTER PERFORMANCE SUMMARY

The State Street® Private Equity Index (SSPEI) posted a quarterly return of 9.76% in the first quarter of 2021, continuing the strong recovery since the COVID crisis (2020 Q1 quarterly return -9.99%). Venture Capital funds rallied 14.93 percent, followed by 8.45 percent return from Buyout funds and 5.95 percent return from Private Debt funds (see Exhibit 1).

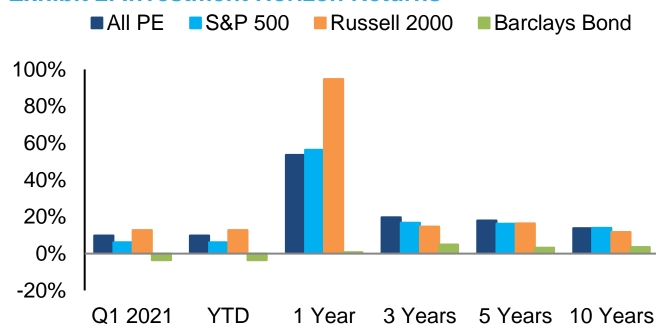
Exhibit 1. Private Equity Performance by Strategy

	All PE	Buyout	VC	Private Debt
2021 Q1	9.76%	8.45%	14.93%	5.95%
2020 Q4	15.19%	12.35%	27.73%	7.41%
2020	26.47%	21.08%	55.30%	7.52%

Source: State Street®, as of Q1 2021.

As shown in Exhibit 2, SSPEI outperformed the US debt market (proxied by Barclays US Aggregate Bond Index) at all times, while SSPEI exceeded the US public equity market (proxied by S&P 500) over quarterly, 3 years, and 5 years, but underperformed over 1 year and 10 years. Compared to small-cap stocks (proxied by Russell 2000), SSPEI lagged over short terms (quarterly and 1-year) but outperformed over mid to longer horizons.

Exhibit 2. Investment Horizon Returns



Source: State Street®, DataStream, Bloomberg Barclays US Aggregate Bond Index (total returns as of Q1 2021).

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PRIVATE EQUITY AND HEALTHCARE

Insights from Harvard University and the Private Capital Research Institute

By Josh Lerner, Leslie Jeng, and Jake Ledbetter

Healthcare in the United States is a massive and rapidly growing industry. In 1960, for example, healthcare expenditures – which include spending on everything from paying for doctor visits and prescriptions to delivering public health services – represented 5% of annual GDP. By 2019, this had increased more than three-fold to 17.7%.[1]

This growth has not gone unnoticed by private equity (PE) investors, who have shown increased interest in healthcare in recent years. For instance, data show PE investment in healthcare has increased substantially over the decade following the Global Financial Crisis (GFC).[2]

Unlike many other industries that attract PE investment; however, healthcare offers a critical service, not a manufactured product. As such, it is the center of much public interest and scrutiny. Given the extent of PE involvement here, questions have arisen regarding the effect that PE has on this crucial industry.

To this end, recent research has investigated the effect of PE ownership on healthcare firms. One popular research setting had been nursing homes, where numerous deals have occurred and patient outcomes that can be compared across different facilities. Two recent, well-done, but also somewhat contradictory studies shed light on this important topic.

[1] Data sourced from the Centers for Medicare & Medicaid Services, National Health Expenditure Accounts. Accessed on August 4, 2021

[2] "Perspectives 2021." Survey. Private Equity International, January 2021. https://www.privateequityinternational.com/lp-perspectives-2021/.

Continued on page 2.

The first of these studies consider the impact of PE ownership on the strategy of nursing homes. The authors find that PE-owned nursing homes demonstrate more "competitive sensitivity.[3] This means that when competition is high, these groups tend to compete more aggressively. However, when competition is weak, the groups tend to be less competitive and instead exploit market power, in a way that may be harmful to consumers. In related work, the same authors find that PE-backed nursing homes are less likely than other nursing homes to have a COVID-19 outbreak or shortages of protective equipment.[4]

Exhibit 3. National Health Expenditures as a Percent of Gross Domestic Product

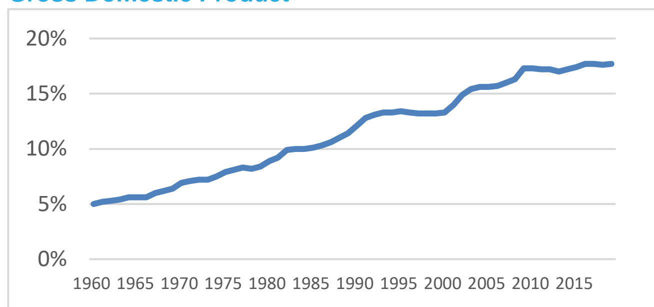
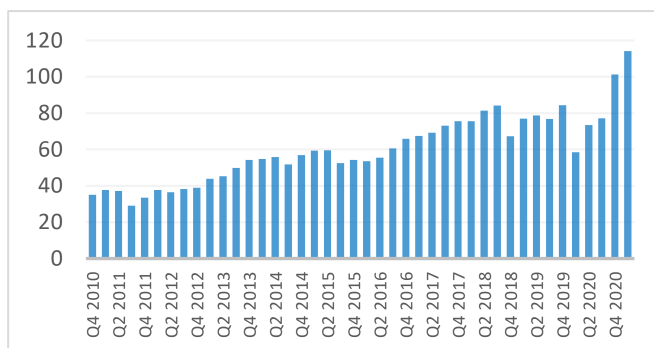


Exhibit 4. Global Healthcare Buyout Deal Value ($bn)



The second study paints a darker picture. It documented a 10% increase in short-term mortality of Medicare patients at nursing homes that received PE investment.[5] The researchers noted that a key cause of this could be observed operational changes, such as declines in nursing staff levels and lower compliance with standards of care. While such changes could be beneficial to PE firms from a profit standpoint, they come at the cost of patients.

One complication with research in this area—which may explain the differing conclusions--is that the decisions among PE firms regarding which healthcare facilities to purchase are not random. For example, some data have shown that hospitals acquired by PE groups have stronger baseline market power and charge-to-cost ratios.[6] This makes evaluations difficult and sensitive to the specifications and data used.

While data and research help describe what is happening in the industry, reports from practitioners are critical to understanding exactly why PE has such a large impact. To this end, the Private Capital Research Institute (PCRI) hosted a panel discussion in June 2021 to understand the nature of PE investments in the healthcare industry. Panelists shared a few important points that shed light on this topic.

First, PE firms are by definition long-term investors, generally holding companies for several years at a time. This enables PE investors to make longer-term strategic decisions to grow companies over an extended period, in contrast to public companies which are often motivated by quarterly performance targets. Further, PE firms are generally quite skilled at implementing strategic changes by reorganizing management structures and providing advice or access to expertise. This can be particularly helpful in the healthcare industry, as PE firms can help companies to navigate the complex healthcare regulatory environment while also making organizational changes to realize efficiencies and ultimately improve patient outcomes.

Panelists were quick to point out that buyouts are not the only form of private investment in healthcare: venture capital (VC) plays a critical role in healthcare innovation, especially drug

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[3] Gandhi, Ashvin, YoungJun Song, and Prabhava Upadrashta. "Private Equity, Consumers, and Competition." (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3626558.

[4] Gandhi, Ashvin, YoungJun Song, and Prabhava Upadrashta, "Have Private Equity Owned Nursing Homes Fared Worse Under COVID-19?" (2020), https://ssrn.com/abstract=3682892.

[5] Gupta, Atul, Sabrina T. Howell, Constantine Yannelis, and Abhinav Gupta. "Does Private Equity Investment in Healthcare Benefit Patients? Evidence from Nursing Homes." NBER Working Paper Series no. 28474 (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3537612.

[6] Offodile, Anaeze C., Marcelo Cerullo, Mohini Bindal, Jose Alejandro Rauh-Hain, and Vivian Ho. "Private Equity Investments In Health Care: An Overview Of Hospital And Health System Leveraged Buyouts, 2003–17." Health Affairs 40, no. 5 (2021): 719–26.

discovery. Panelists noted that a substantial portion of healthcare innovation is done through the research and development efforts of venture-backed biotechnology and pharmaceutical companies in particular. This sentiment is echoed by research that documents VC's importance in funding research and development efforts that complement government-backed funding schemes. [7]

Despite these potential positive impacts of PE on the industry, panelists noted several challenges of healthcare investments by PE and VC groups. First, because VC investment is highly concentrated in just a few cities, VCs could be missing out on entrepreneurs and talented workers who are located elsewhere and unwilling to relocate to these areas. Further, complex industry regulations can misalign incentives between patient care and healthcare facility profitability. For example, nursing homes are paid more the longer the patient stays, disincentivizing the nursing home from discharging patients. Finally, panelists noted that the government, as the largest payer of health services, can use its pricing power to capture the value gained from new innovations, decreasing the incentives for entrepreneurs.

Despite these challenges, the data suggest – and industry experts agree – that PE investment in healthcare is likely to continue to grow and play an important role in the industry. There is a substantial need for researchers to continue unpacking the exact effect of PE investment in healthcare.

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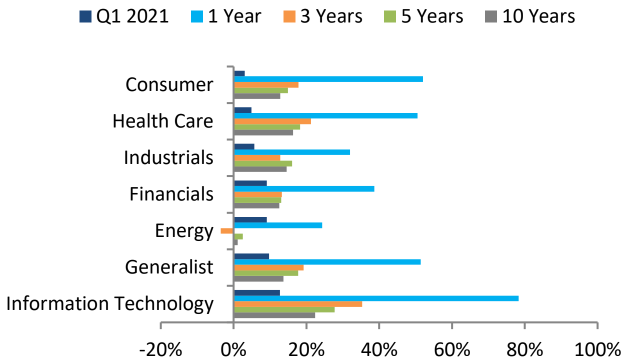
The Private Capital Research Institute is a not-for-profit 501(c)(3) corporation formed to further the understanding of private capital and its global economic impact through a commitment to the ongoing development of a comprehensive database of private capital fund and transaction-level activity supplied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

[7] Chandra, Amitabh, Cirrus Foroughi, and Lauren Mostrom. "Venture Capital Led Entrepreneurship in Health Care." (2021), forthcoming in Aaron Chatterji, Josh Lerner, Scott Stern, and Michael J. Andrews, The Role of Innovation and Entrepreneurship in Economic Growth, University of Chicago Press for National Bureau of Economic Research.

CURRENT QUARTER PERFORMANCE SUMMARY – CONTINUED FROM PAGE 1

Among sectors, Information technology, Consumer and Healthcare are the top sectors post COVID crisis in 2020 Q1 (see Exhibit 5, 1-year bars). And in 2021 Q1, Consumer and Healthcare reverted to a more normal pace of growth while information technology funds still maintain a 12.71% quarterly return (see Exhibit 5, Q1 2021 bars).

Exhibit 5. Returns of Sector Focused Private Equity Funds



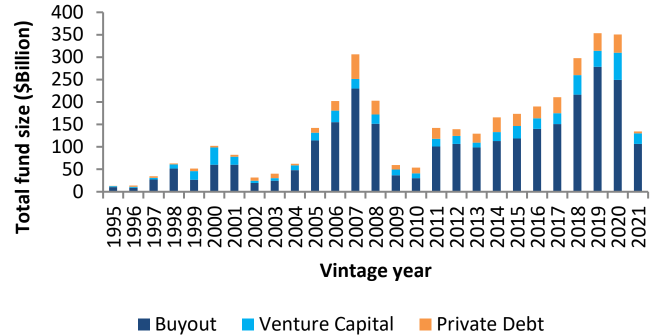
Source: State Street®, as of Q1 2021.

Fund Raising

Fund-raising activities in 2021 Q1 were mixed among the three private equity strategies. Buyout and Venture Capital funds, with a total fund size of 106.74 billion and 23.66 billion, raised almost 42.81% and 39.09% of the total capital raised in the full year of 2020 respectively. However, Private Debt fundraising slowed with approximately $3.78 billion in the first quarter to only 9.29% of their previous year's total capital raised (see Exhibit 6(A)). Despite the total fundraising of Private Debt funds, the average fund size increased for each strategy. Buyout funds posted a record high of $5.62 billion, which is more than doubled the 2020 average fund size of $2.33 billion. Venture Capital funds also reached the historically highest average fund size of 0.82 billion in 2021 Q1. Private Debt average fund size increased to 1.89 billion, marginally higher than $1.27 billion in 2020 (see Exhibit 7).

Among regions, fundraising in the Rest of World stands out with $36.75 billion, almost 48% of total funds raised in 2020. US and Europe funds collected $81 billion and $16 billion respectively, counting for 36% and 35% of the totals from last year (see Exhibit 6(B)).

Exhibit 6. Total Fund Size (USD Billion)
(A) By Strategy



(B) by Region

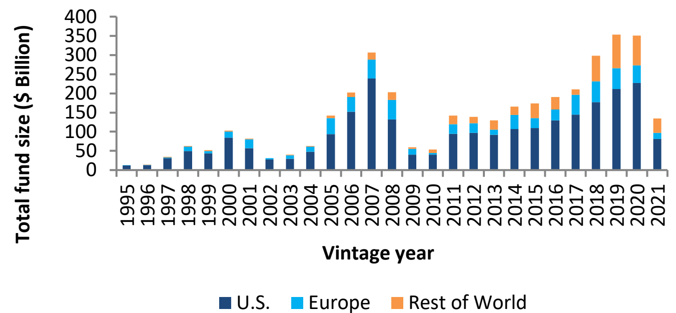
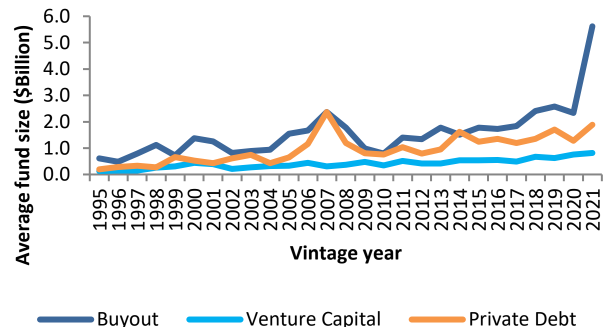


Exhibit 7. Average Fund Size (USD Billion)



Source: State Street®, as of Q1 2021.

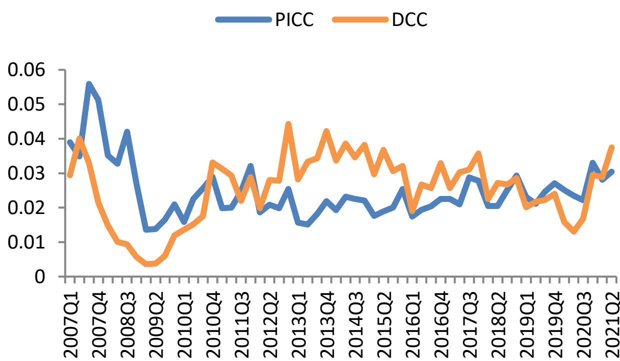
Cash Flow Activity

We observed continuous cash flow recovery in the second quarter since 2021 Q1 (see Exhibit 8(A)). Particularly, the distributions climbed back to 3.7% of total active committed capital, the highest level since 2014Q4.

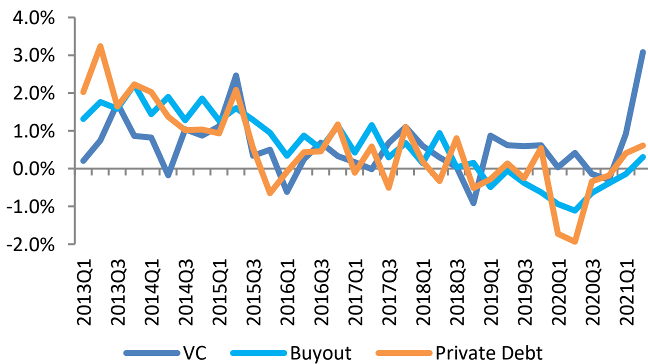
The net cash flows remain increasing across all strategies in 2021 Q2. Venture Capital funds led the incremental trend with the record highest net cash flow of 3.1%, and for the Buyout and Private Debt funds, the net cash flows are increased to 0.3% and 0.6% respectively (see Exhibit 8(B)).

Exhibit 8. Quarterly Cash Flow Ratios Normalized by Commitment

(A) Contribution and Distribution of All PE



(B) Net Cash Flow By Strategy (2013Q1 – 2021Q2)



Source: State Street ®, as of Q2 2021.

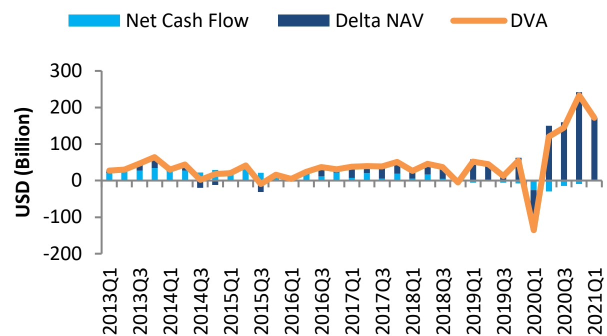
Valuations

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.

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

In 2021 Q1, we continue to see strong positive DVA driven by increases in NAV. SSPEI posted $172 billion value gain in 2021 Q1, after hitting a record high of $233 billion in 2020 Q4 (see Exhibit 9).

Exhibit 9. Dollar Value Added (2013Q1 – 2021Q1)



Source: State Street ®, as of Q1 2021.

DISCUSSION – PRIVATE EQUITY CUSTOMIZED BENCHMARK

One of the many reasons why investors have struggled to find the best beta for their private equity investments is the performance reporting method in private investments. In general, internal rate of return (IRR) is used when measuring the performance of private equity investments or any other non-marketable securities.

On the other hand, time-weighted rate of return (TWR) is widely adopted as a performance measure for funds investing in liquid, publicly-traded assets. Because public fund managers typically have no control of interim cash flows, so TWR attempts to minimize or remove the effects of cash flows, such that the underlying "true" manager performance can be standardized and thus compared to benchmarks or other portfolios. For this reason, investors often look for a TWR for their private equity investments, but struggle to do so because: 1) real time-weighted return requires valuation at each cash flow, which is infeasible and calculation taxing; 2) the size and timing of the cash flows are altogether controlled by private equity fund managers, so how they exercise this control is also a component when evaluating manager's investment skills. Therefore, private investors usually resort to IRR for performance or an approximation of TWR such as linked IRR. In this discussion, we will analyze and compare different return methods.

TWR is the geometric mean return calculated by multiplying (linking) returns from all sub-periods together. By breaking up the horizon into smaller units, the effect of cash flows is minimized. Given this very nature, TWR does not reflect an individual investor's actual investment return, which largely depends on the investor's market timing strategy with cash contributions and withdrawals. With that said, a positive TWR doesn't necessarily guarantee an individual investor's profits nor positive IRR. We will illustrate this point with a numerical example (see Exhibit 10).

Consider a case that an investor put $100 in a portfolio at the beginning of the year. At the first quarter-end, the portfolio is worth $200. The investor's period/quarterly return is 100%. For the next quarter, given the good historical return, the investor decided to contribute $300 more to the same portfolio. However, in the second quarter, the portfolio lost 25%. At this time, the investor's net asset value decreased from $500 on April 1st to $375 on June 30th. The overall time-weighted return for this investment period – two quarters, is therefore (1+100%)(1-25%)-1 = 50%. However, compared to the total invested amount of $400, the investor still loses $25, which gives a basic rate of return (RoR) -6.25%; solved IRR for this period is also negative, -9.85%.

Exhibit 10. Example Investment Returns Comparison

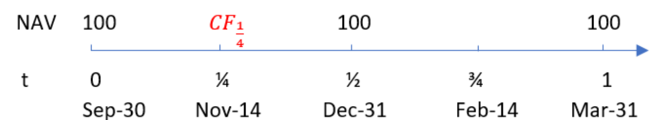
Dates	NAV	Cash Flow
1/1/2021		$ (100.00)
3/31/2021	$ 200.00	
4/1/2021		$ (300.00)
6/30/2021	$ 375.00	
	RoR	-6.25%
	TWR	50.00%
	IRR	-9.85%

Linked IRR is often used as an approximation of the true time-weighted return. It is calculated by linking the IRRs over shorter periods. For instance, to get a 1-year LIRR of a private asset, one can combine 4 quarterly IRRs by compounding them together. Since LIRR is still calculated from IRRs, albeit reduced, the impact by cash flow pattern remains. We show through a hypothetical example below how linked IRR is impacted by cash flow size and timing and how much deviation there is from horizon IRR.

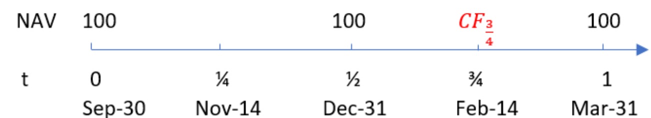
Consider a hypothetical PE fund that has below cash flows and valuations in a two-quarter investment period (Q4 2020 – Q1 2021).

Exhibit 11. Hypothetical Investment Schedule Illustration

Case 1: Cash flow is called in Q4 2020.



Case 2: Cash flow is called in Q1 2021.



To control for NAV changes, the beginning, ending and interim NAVs are all set to 100. We only introduce one cash flow, CF_t, over the whole investment horizon, with the percentage of cash flow amount relative to NAV size, CF_t/NAV, ranging from [-1000%, 100%), where negative cash flow means contribution and positive means distribution. Note that since the ending NAV is non-zero, the distribution amount may never be the same as NAV, therefore the range [-1000%, 100%), is open on the right end. To account for timing impact, we suppose that the cash flow CF_t only takes place approximately at 1/4 or 3/4

of the two-quarter investment period, that is on 11/14/2020 or on 02/14/2021. When calculating sub-period (quarterly) IRR for linking, the cash flow has the same time distance to the quarter begin date no matter if it's called in the first half of the second half (see Exhibit 10x). This way, the time factors in quarterly IRRs are the same in both cases and thus LIRRs are the same.

Through this simplified two-period investment, we see that as the percentage of cash flow to NAV increases, either contribution or distribution, the deviation of LIRR from half-year horizon IRR also increases. All IRRs' left tail converges to -100% as contribution size goes to 10 times NAV size; right tail explodes as distribution amount infinitely approaches NAV size (see Exhibit 13 (A)). The difference between horizon IRR and linked IRR is the smallest around 0%. In fact, at exactly 0% when there's no cash flow, the linked IRR is the same as horizon IRR.

Timing also plays a role in creating differences in IRRs. The differences between horizon IRR and linked IRR in case 1 - cash flow happens in the first half of the investment period – are always positive for all cash flow sizes; while in case 2, the differences are always negative (see Exhibit 13 (B)). This can also be seen in Exhibit 12 (A) that linked IRR line is always below the line of IRR with t=1/4 but above that of t=3/4. This is true because as the cash flow date moves from the start to the end of any period, the time factor for cash flow discounting becomes larger, reducing the discount rate - IRR.

Exhibit 12 (A). Impact of Single Cash Flow on Horizon and Linked IRR

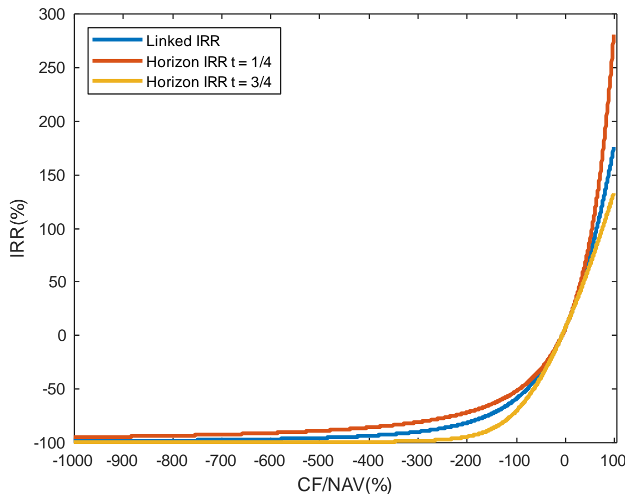
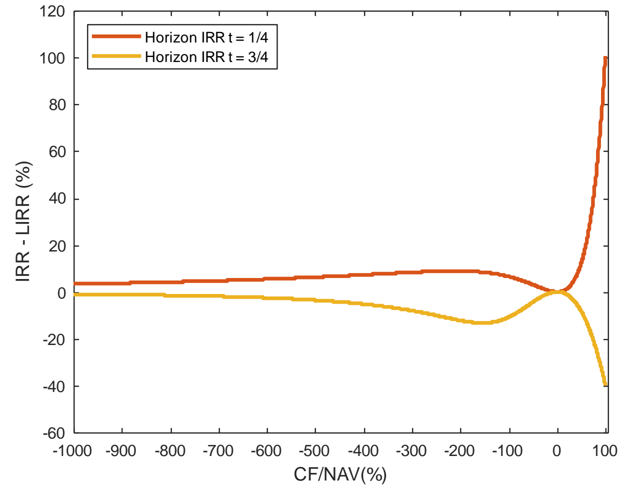
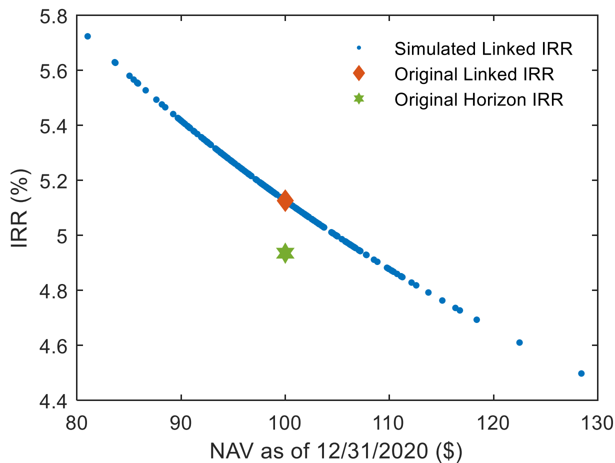


Exhibit 13 (B). Horizon and Linked IRR Value Difference



Another factor that would impact the difference between linked IRR and horizon IRR is valuation volatility in the sub-periods, which could make linked IRR deviate further from horizon IRR. In the above hypothetical fund, assuming there is a contribution of $5 on 11/14/2020 and a distribution of $10 on 2/14/2021 and NAVs stay the same, the linked IRR is 5.13% and horizon IRR is 4.94% (see the orange diamond and green hexagram in Exhibit 14). If NAV as of 12/31/2020 changed dramatically, quarterly returns of two sub-periods would change, resulting in higher volatility of linked IRR. However, the horizon IRR would remain the same. We simulated the 12/31/2020 NAV of the hypothetical fund using a log-normal distribution with a mean of $100 and variance of 50 and calculated the corresponding linked IRR (the blue dots in Exhibit 14). Under 200 times simulation, linked IRR could vary from 4.5% to 5.72% with December NAV ranging from $128 to $81, all else being equal.

Exhibit 14. Scatter Plot of IRRs and Simulated NAV



Some State Street clients choose to link historical point-in-time (PIT) quarterly IRRs to generate an approximated time-weighted return for longer horizons. This method has its advantage of convenience but is expected to be different from the horizon IRR based on the latest sample given the cash flow pattern and valuation volatility as discussed above. Moreover, the nature of SSPEI's construction by incorporating Cash-Adjusted Market Value (CAMV) and constituent changes across PIT samples contributes to the expected difference as well.

In each SSPEI quarterly publication, a small proportion of the latest quarter-end GP reported valuation could be missing by the publication cutoff date. Several circumstances prevent State Street from receiving timely valuations for some funds including: 1) Old funds that are in the liquidation phase; 2) Yong funds that just started operation without many transactions; 3) Funds that follow a less frequent valuation reporting (semi-annual or annual reporting); 4) GP delayed valuation reporting. In this situation, we apply CAMV as an estimation of the fund's most recent quarter-end NAV. By doing so, quarterly IRR for these funds would be zero assuming no FX rate movement impact.

The universe of SSPEI constituents is locked for each quarter's publication. However, constituents could be different among quarters due to several factors including: 1) Adding newly raised funds from existing State Street LP clients; 2) Adding funds from newly onboard State Street LP clients; 3) Losing funds due to secondary sale of LP client's portfolio or termination of service; 4)Adding/ Losing funds due to GP's choice of opt-in/opt-out from SSPEI universe.

With the impact of CAMV funds and constituent changes among quarterly snapshots, linked PIT IRR can be different from linked rolling IRR based on a most recent snapshot as illustrated in Exhibit XX. The linked 1-year IRR from PIT quarterly IRR is 53.13%, while the linked 1-year IRR from rolling quarterly IRR based on 2021Q1 snapshot is 53.59%. Given the 2021Q1 SSPEI snapshot has the most complete information of GP reported valuation and constituents for all historical quarters by far, the 46 bps difference between two linked 1-year IRRs is a result of a combined impact from GP reported valuation updates and constituents change.

Exhibit 15. Comparison between Linked IRR from PIT and Rolling IRRs

	PIT Quarterly IRR (%)	Rolling Quarterly IRR with 2021Q1 Snapshot (%)
2020Q2	9.55	9.76
2020Q3	10.56	10.61
2020Q4	15.19	15.26
2021Q1	9.76	9.76
Linked 1-yr IRR	**53.13**	**53.59**

Source: State Street ®, as of Q1 2021.

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 3,400 funds representing more than $3.5 trillion in capital commitments as of Q1 2021
- 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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