STATE STREET.

Global Markets

Private Equity Insights

TWENTY-SIXTH EDITION | Q2 2022

CURRENT QUARTER PERFORMANCE SUMMARY

The State Street® Private Equity Index (SSPEI) posted an overall return of -4.71% in Q2 2022, a sharp decrease continued from the -0.64% in Q1 2022. Quarterly returns for Private Debt and Buyout also turned into negative territory in Q2 2022. But Private Debt continued to lead the group with -1.99% return, followed by -3.22% return from Buyout funds and -9.83% return from Venture Capital funds (see Exhibit 1).

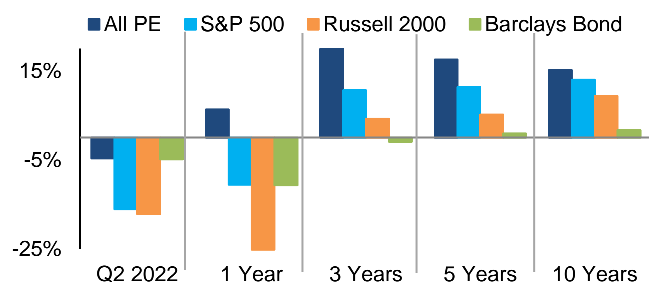
Exhibit 1. Private Equity Performance by Strategy

	All PE	Buyout	VC	Private Debt
2022 Q2	-4.71%	-3.22%	-9.83%	-1.99%
2022 Q1	-0.64%	0.53%	-4.40%	1.21%
YTD	-5.31%	-2.63%	-13.94%	-0.70%

Source: State Street®, as of Q2 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 US bond market, and outran the small-cap stocks and the US public equity market, which posted -17.2% and -16.1% returns respectively.

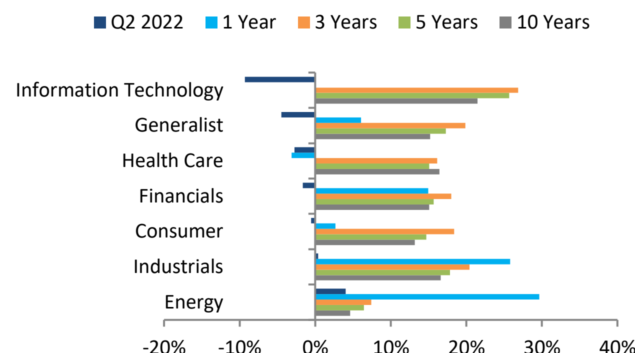
Exhibit 2. Investment Horizon Returns



Source: State Street®, DataStream, Bloomberg Barclays US Aggregate Bond Index (total returns as of Q2 2022).

Energy funds held their lead among the sectors for the second quarter in a row with a strong quarterly return of 4.02%, followed by Industrials funds with a quarterly return of 0.40% and Consumer funds with a quarterly return of -0.52%. Information Technology funds experienced worse returns and continued to lag behind other sectors with -9.28% in Q2 2022 (see Exhibit 3).

Exhibit 3. Returns of Sector Focused Private Equity Funds



Source: State Street®, as of Q2 2022.

Fund Raising and Dry Powder

The total capital raised in the first half of 2022 was $206 billion, signaling a downturn in fund raising activities. In the first half of 2022, Buyout and Venture Capital funds raised $136 billion and $45.29 billion respectively. Private Debt funds raised $24.47 billion, a faster slowdown from 2021 than those experienced by other strategies. Across regions, in the first half of 2022, the US and Rest of World funds raised $160.41 billion and $41.13 billion respectively. For Europe-focused funds, total fund size was only $4.11 billion in the first half of 2022 (see Exhibit 6(B)).

Continued on page 5.

THE ENGAGEMENT OF PRIVATE EQUITY WITH EMPLOYEES OF PORTFOLIO COMPANIES

Insights from Harvard University and the Private Capital Research Institute[1]

By Leslie Jeng, Josh Lerner

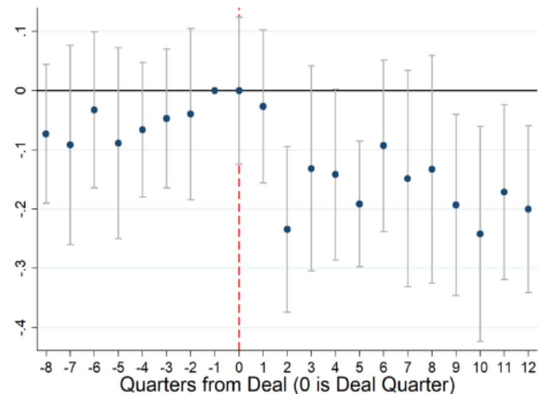
The Essential Challenge

Concerns about inequality in the American economy have grown ever more substantial over the years. Often, discussions of this issue are linked to those about the “financialization” of the economy—worries that financial transactions can enrich the few while detrimentally affecting many others.

In 2021, according to Federal Reserve data, the wealthiest 10% of Americans held $36 trillion in stocks and mutual funds, an increase of more than 21 times since 1989. In contrast, the bottom 50% held a mere $260 billion, an increase of only 12 times over the same period.[2] This wealth disparity has drawn much attention to the relationship between private equity (PE) investors and the employees of the companies they own. Many perceive private equity investors as enriching themselves and senior management of their portfolio companies at the expense of lower-level employees (“making millionaires” rather than creating jobs).

At least some data seem to confirm this. At a high level, a recent study[3] finds that after controlling for mergers and acquisitions, job losses are higher for PE-backed firms. In addition, the study also finds that even though there is about an annual one percentage point gain in productivity in buyouts (this is substantial as most buyouts are in mature industries), wages seem to fall after buyouts. Lastly, in Exhibit 4, a study by Sabrina Howell and her colleagues[4] shows that employee satisfaction with compensation declines in high-leveraged buyout transactions. Given these data, it is natural to wonder whether private equity is good or bad for society.

Exhibit 4. Effect of High leverage LBOs on Compensation Satisfaction



Closing the Gap

To further understand the nature of the relationship between private equity and employees, Howell and her co-authors study how the performance of private equity investments affects employee perceptions of job quality, which includes compensation and non-pecuniary amenities such as job satisfaction and work-life balance.[5] In Exhibit 5 below, the authors show that there are benefits to job satisfaction when an LBO is successful, which is consistent with rent sharing. The top graph shows a positive correlation between satisfaction with compensation that employees experience and the total value to paid-in multiple (TVM) of the transaction. In the bottom two graphs, the authors show that this satisfaction is primarily driven by a marked increase in variable pay rather than base pay. They also find that a 10% higher deal IRR maps to approximately a 7% increase in incentive pay. Thus, providing equity ownership opportunities to employees of LBOs could help align interests further and increase overall job satisfaction.

---

[1] In this session, held on September 14, 2022, the Private Capital Research Institute explored these issues. The panelists included: Sabrina Howell, Associate Professor of Finance, NYU Stern School of Business; Andrew Stern, International President and President Emeritus, Service Employee International Union (SEIU), and Senior Fellow, Economic Security Project; Greg Jania, Global Co-head of Private Equity, APG Asset Management; and Peter Stavros, Co-Head of US Private Equity, KKR and Founder and Chairman, Ownership Works. Josh Lerner from the Harvard Business School and Private Capital Research Institute was the moderator.

[2] Miriam Gottfried, “Private Equity Giants Back New Nonprofit Promoting Employee Ownership,” *Wall Street Journal,* April 5, 2022, https://www.wsj.com/articles/private-equity-giants-back-new-nonprofit-promoting-employee-ownership-11649151000.

[3] Steven J. Davis, John Haltiwanger, Kyle Handley, Ben Lipsius, Josh Lerner, and Javier Miranda, “The (Heterogenous) Economic Effects of Private Equity Buyouts,” Working Paper, 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3465723.

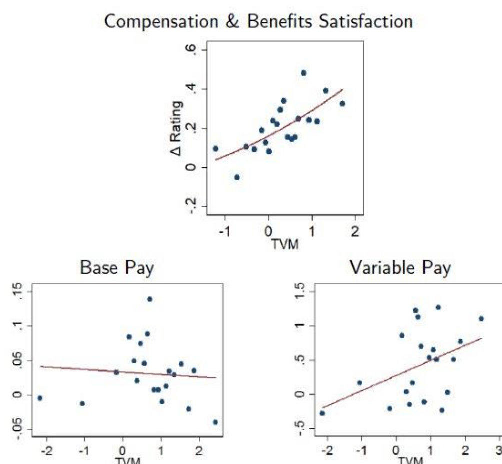
[4] Will Gornall, Oleg Gredil, Sabrina Howell, Xing Liu, and Jason Sockin, “Do Employees Cheer for Private Equity? The Heterogenous Effects of Buyouts on Job Quality,” Working Paper, February 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3912230. Satisfaction was measured using Glassdoor job reviews (over 3 million reviews from 271K companies during 2008-19).

[5] Gornall, op. cit.

However, these benefits are most likely for the top 35% of employees, who are already better off.

Worker dissatisfaction is an epidemic that impacts companies irrespective of whether they are PE-owned. According to the Gallup polls in 2022,[6] only 32% of all workers are engaged on the job and 17% are actively disengaged, down two percent and up one percent from the previous year, respectively. This lack of engagement is hugely problematic as employees significantly impact the firms they work for: e.g., interfacing with customers, determining productivity, and facilitating on-time delivery. The high cost of recruitment, training, and loss of company-specific knowledge when an employee quits is also problematic. Thus, investors are seeking new ways of value creation by focusing on employees' welfare.

Exhibit 5. Change in Job Quality & Returns to investors (Total Value Multiple)



Equity Ownership Programs

A number of GPs are experimenting with providing ownership opportunities to employees to create higher retention and job satisfaction. Ownership programs are promising because they presumably help align employee interests with the interests of the firm. However, despite their potential, very few equity ownership programs have been implemented thus far.

Part of the challenge with these programs is that junior employees find equity sharing difficult to understand, as such schemes have typically not been offered beneath senior management levels. Also, trust is a large part of the problem: many line workers simply do not trust management. Starting an equity ownership program takes years of education, as well as sharing of future plans for the business.

Standards for Labor

Whether or not workers are owners, another question is whether government regulation can play a role in creating more stability for workers. Unlike the U.S., many countries impose strict standards for labor. For example, many European countries have strict rules around dismissing employees, where severance pay is guaranteed. In Germany, employees have a voice on their companies' boards. In the U.S., there are few standards around pay equity, employee rights in case of job loss, employee input into corporate decision-making, healthcare programs, or retirement plans.

However, policy solutions have their own challenges. In today's highly polarized environment, the panelists agreed, it would be a long wait for an effective policy response to emerge. Moreover, some panelists raised concerns about the unintended consequences of the wholesale adoption of European labor standards to the U.S. In particular, a number of academic patterns have suggested that these rules in some cases can introduce rigidities that limit entrepreneurial dynamism and new hiring.[7]

Limited Partners' Influence

Although the PE industry as a whole is unlikely to self-impose labor standards, the limited partner community has a considerable influence over where money goes. In theory, it could play a role in influencing the relative weight that PE investors put on employment considerations.

Indeed, as private equity has become larger and its economic role more controversial, some LPs have added the welfare of workers to their list of priorities. More LPs are pushing for an environmental-social-governance (ESG) agenda, evolving away from return-seeking alone. Several LPs now require their GPs to track job growth, job satisfaction, higher pay, better-quality jobs, and diversity. But these efforts have inherent tensions, as promoting ESG may not always align with the maximization of financial returns. In the end, LPs, especially

[6] Jim Harter, "U.S. Employee Engagement Slump Continues," Gallup Workplace, April 25, 2022. https://www.gallup.com/workplace/391922/employee-engagement-slump-continues.aspx.

[7] For instance, see Luis Garicano, Claire LeLarge, and John Van Reenen, "Firm Size Distortions and the Productivity Distribution: Evidence from France," American Economic Review, 106 (2016), 3439-79, and Alberto Alesina, Michele Battisti, and Joseph Zeira, "Technology and Labor Regulations: Theory and Evidence," Journal of Economic Growth, 23 (2018), 41-78.

underfunded pensions, must generate returns, so there may need to be some compromise. Moreover, ESG efforts can themselves become politicized, as the recent steps by Governor DeSantis to eliminate ESG considerations from the state pension investments illustrate.[8]

Moreover, it is challenging to ensure that these employment issues have the same priority as other ESG considerations. Pension funds, which have historically championed worker issues, are now investing less as a percentage in PE than in earlier decades. Another challenge is the lack of transparent data, which makes it difficult to assess how responsible a given GP is on worker issues.[9]

Summary

In an ideal world, employee engagement in PE transactions can be a "win-win," leading to greater worker satisfaction and higher returns. Equity ownership programs can have an impact on retention but are hard to implement and take a long time to yield fruit. Meanwhile, there is a substantial need for systematic data that will allow LPs to assess different PE investors on these measures. While these tasks seem daunting, there is a tremendous opportunity for GPs to differentiate themselves to create both firm value and happier employees.

Josh Lerner is Director of the Private Capital Research Institute and Jacob H. Schiff Professor of Investment Banking and Head of the Entrepreneurial Management Unit at Harvard Business School.

Leslie Jeng is Director of Research of the Private Capital Research Institute

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.

---

[8] "Governor Ron DeSantis Eliminates ESG Considerations from State Pension Investments," State of Florida, August 23, 2022, https://www.flgov.com/2022/08/23/governor-ron-desantis-eliminates-esg-considerations-from-state-pension-investments/.

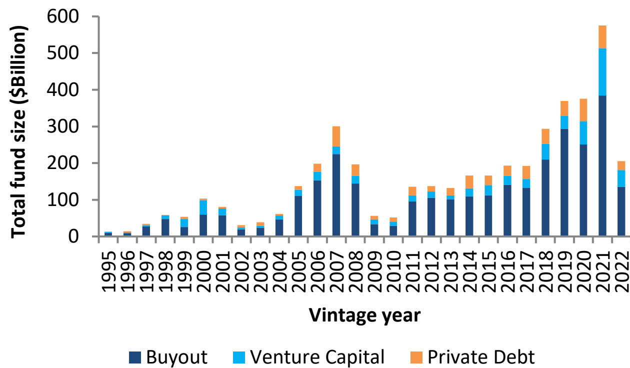
[9] Given these challenges, a response by a number of LPs has been tilted away from distressed buyouts and more toward growth and venture capital, which they hope may be less problematic in this regard. Such a move may also have unintended consequences.

CONTINUED FROM PAGE 1

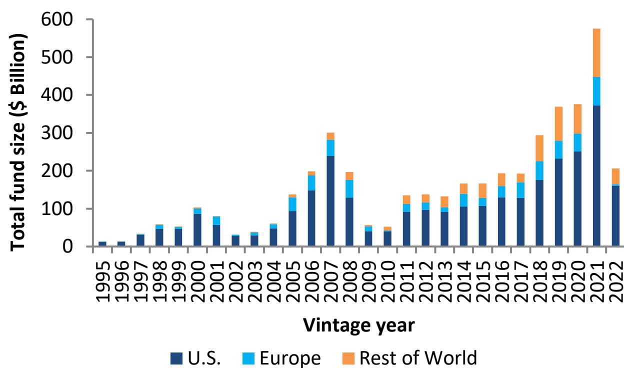
Although the average fund sizes have been on an upward trend in the last 5 years, the appetite for larger Buyout funds increased drastically in 2022. As of Q2 2022, 2022 Buyout funds posted their highest records of $4.86 billion, which is 52% higher than that in 2021. The average fund size of Venture Capital funds remained relatively stable at $0.91 billion, only slightly lower than $0.92 billion for 2021 funds. Private Debt funds size had an average of $1.62 billion, 16% lower than the average 2021 Private Debt funds of $1.94 billion (see Exhibit 7).

Exhibit 6. Total Fund Size (USD Billion)

(A) By Strategy

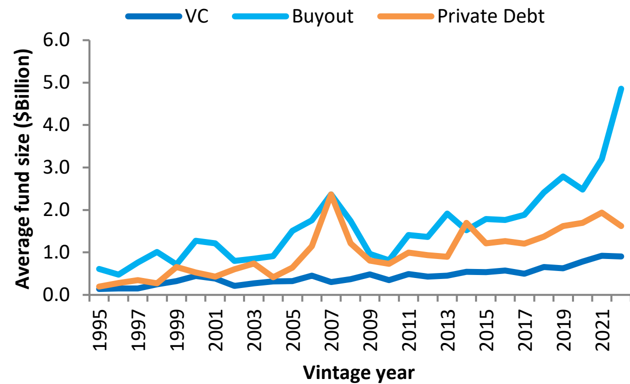


(B) by Region



Source: State Street®, as of Q2 2022.

Exhibit 7. Average Fund Size (USD Billion)

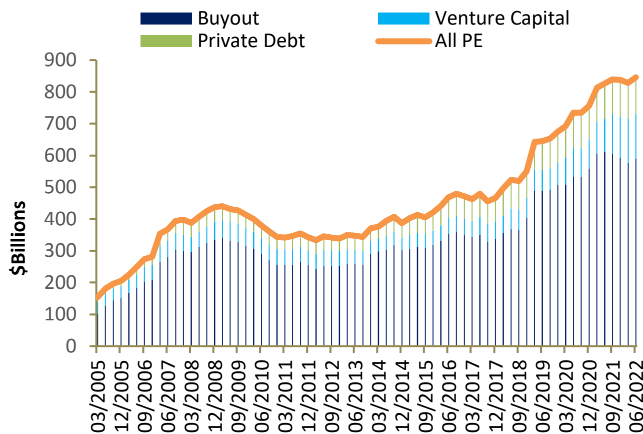


Source: State Street®, as of Q2 2022.

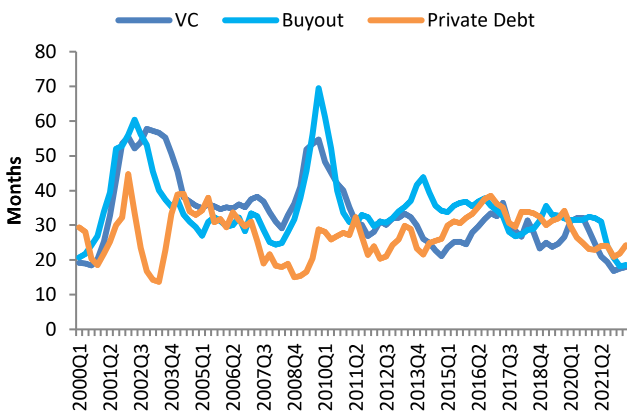
Dry powder is the part of the fund's committed capital that has not yet been called by the fund manager. It represents the amount of capital that can be used for future investment opportunities. As of 2022 Q2, SSPEI posted a monthly dry powder of $846 billion, increased from $828 billion in Q1 of 2022. Exhibit 8(A) shows that monthly dry powder follows an increasing trend and it's at a historical high in Q2 2022. Dry powder inventory measured by quarterly dry powder normalized by the monthly average contribution of the past 12 months, shows signs of increase across strategies compare to Q1 2022, but they are still near historical low for Buyout and Venture Capital funds. At the recent average capital call rate without new fund raising activities, current dry powder inventory can last Buyout and Venture Capital funds 18 months, which is much lower than the historical average, and Private Debt funds 24 months (see Exhibit 8(B)). An increase in dry powder inventory is likely with dampened deal activity and decrease in capital calls (see Exhibit 6 and 9).

Exhibit 8. Dry Powder

(A) Monthly Dry Powder



(B) Quarterly Dry Powder Normalized by Average Contribution



Source: State Street ®, as of Q2 2022.

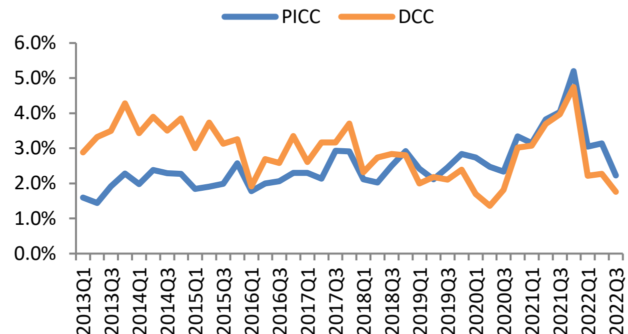
Cash Flow Activity

After a sharp decline in Q1 2022, quarterly Paid-in Capital over Committed Capital (PICC) was stable in Q2 2022, but dipped to 2.23% in Q3 2022. The quarterly Distribution over Committed Capital (DCC) marginally rebounded after its sharp fall of 2.5 percentage points in Q1 2022, but fell again in Q3 2022 to 1.76%. Despite similar trends, the net cash flow rebounded in Q3 due to a sharper drop in PICC. At the end of Q3, the net cash flow was at -0.47% , a slight increase from the -0.86% in Q2 (see Exhibit 9(A)).

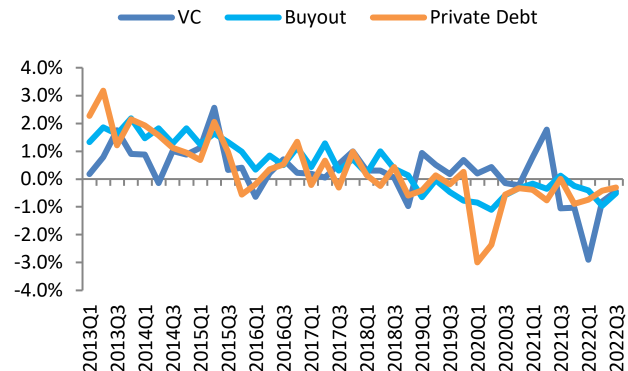
Exhibit 9(B) provides a closer look of the net cash flow among strategies. Net cash flow of all strategies remained negative, but we see signs of an increase across all strategies. Net cash flows of Venture Capital and Private Debt funds started to rebound in Q2, In particular, in Q3, the net cash flow of Venture Capital funds was -0.44%, increased from the -2.9% reported in Q1 2022. The net cash flow for Buyout funds increased to -0.51% in Q3 after hitting -0.96% in Q2 2022 (see Exhibit 9(B)).

Exhibit 9. 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 Q2 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.

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

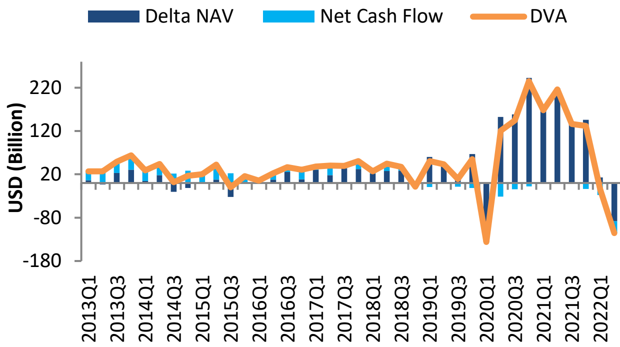
The quarterly DVA of overall PE continued to drop from -$15 billion in the previous quarter to -$115 billion in Q2 2022. We see that the DVA across all strategies swung back to the negative territory after the recovery from the COVID shock in Q1 2020.

Furthermore, the negative DVAs are mostly contributed by the negative change in remaining values (Delta NAV) over the

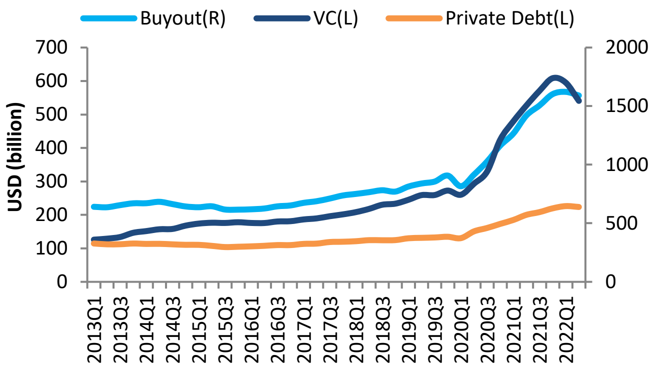
quarter. The Delta NAV for overall PE turned negative for the first time since Q1 2020 (see Exhibit 10(A)). In particular, as shown in Exhibit 10(B), the NAV decline was most salient for Venture Capital funds in Q2 2022.

Exhibit 10. Dollar Value Added

(A) All PE



(B) NAV by Venture Capital, Buyout, and Private Debt



Source: State Street ®, as of Q2 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 for Q2 2022 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.

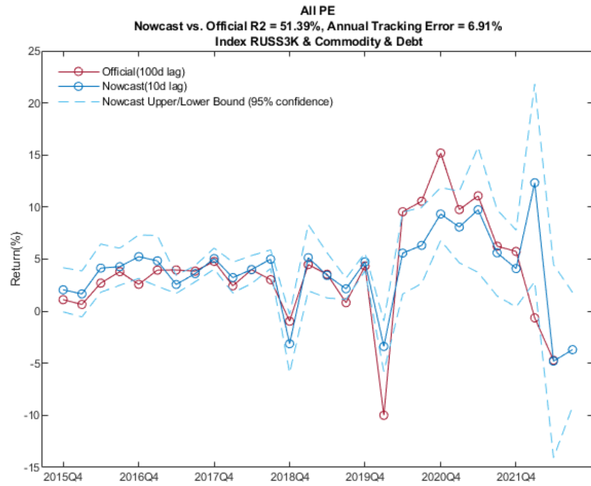
For Q2 2022, the realized PE returns converged to the nowcasting model predicted returns. As shown in Exhibit 11, the actual Q2 2022 returns of All PE, Buyout, Venture Capital and Private Debt were -4.71%, -3.22%, -9.83% and -1.99% respectively. Correspondingly, the nowcasting model predicted returns were -4.79%, -5.64%, -13.56% and -0.24%. The nowcasting was able to accurately predict the Q2 overall PE performance with only 8 bps difference; Given the public markets decrease in Q2, the nowcasting model's predictions for Buyout and Venture Capital strategies were more conservative than the actual returns, and the Private Debt strategy exceeded the prediction, but they all fell within the predicted 95% confidence intervals.

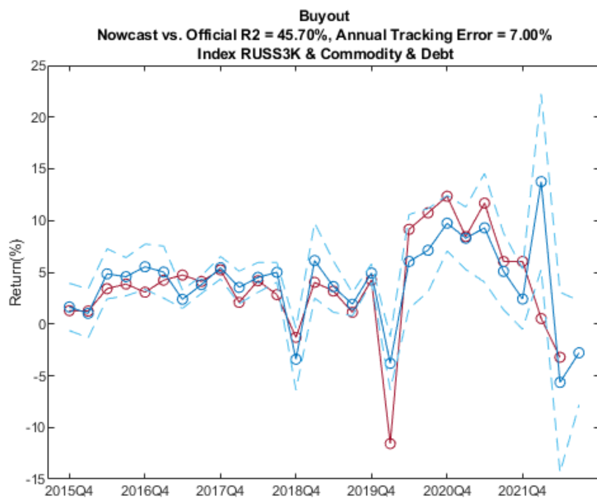
Looking forward, our nowcasting model expects the Q3 2022 returns of all strategies to increase, with All PE, Buyout and Venture Capital remaining in the negative territory with returns of -3.69%, -2.79% and -6.03% respectively; The Private Debt is predicted to turn positive from nowcasted -0.24% in Q2 to 2.27% in Q3. The predicted improvement in quarterly IRRs is mainly contributed by the slowdown in the downward trend from public markets. Among the strategies, Venture Capital remains to have the lowest predicted return. NASDAQ composite is the only input for Venture Capital, which decreased by only 3.91% in Q3 compared to the significant drop of 22.28% in Q2. Similarly, Russell 3000, which is a common input for both all PE and Buyout nowcasting models, is still weak with a -4.5% decrease in Q3, but the magnitude is smaller compared to the -16.7% decrease in Q2. The decrease

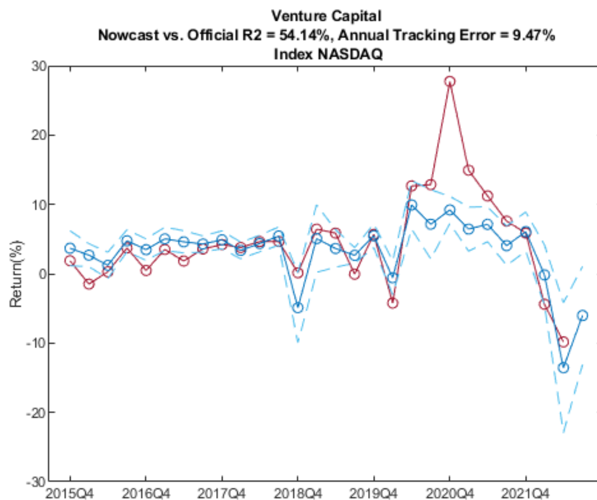
[10] State Street Private Equity Insights Q3 2021 https://globalmarkets.statestreet.com/portal/peindex/pe-insights/

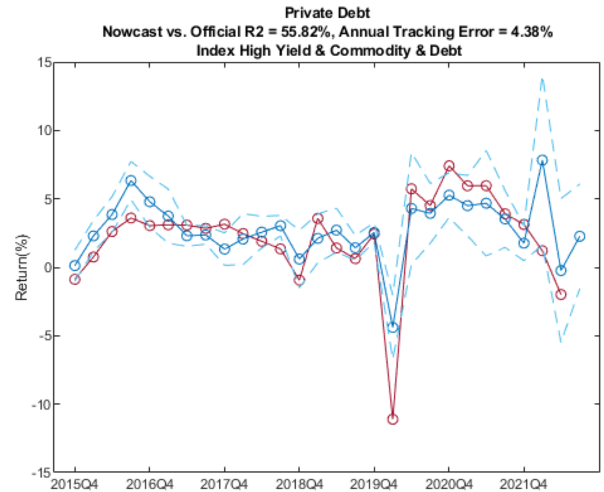
in the Bloomberg U.S. Corporate High Yield slows down from -10.3% in Q2 to -0.68% in Q3.

Exhibit 11. Actual vs. Out-of-sample Nowcast IRRs







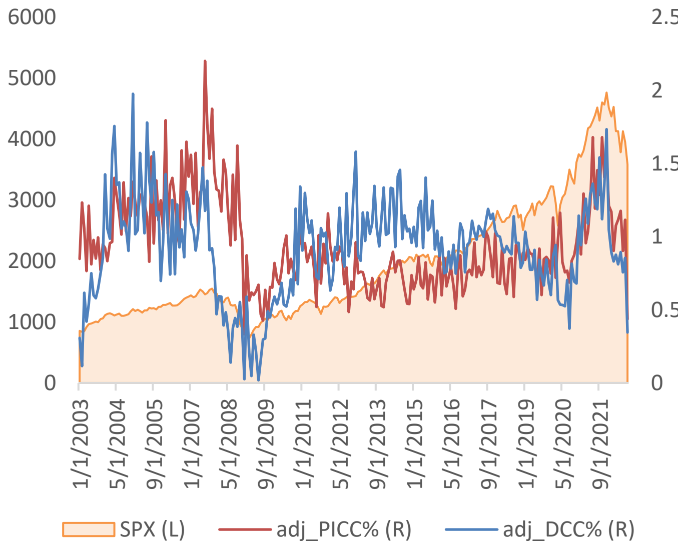


Source: State Street ®, as of Q2 2022.

DISCUSSION – COMOVEMENT OF PE CASH FLOW AND PUBLIC MARKET

Robinson and Sensoy(2011)[11] documented the co-cyclicality between private equity cash flows and public market business cycles using a dataset of 837 private equity funds formed between 1984 and 2009. They found that quarterly capital calls and distributions rise with public equity valuations of the prior quarter (proxied by Price/Dividend ratio) and distributions are more sensitive than calls, and venture capital cash flows were more procyclical than buyout. Can similar co-cyclicality be observed in the larger SSPEI universe? Does co-cyclicality still exist in the recent decade after Robinson and Sensoy's study? What can we find if we look at a higher frequency such as monthly cash flows?

Exhibit 12. Monthly Private Equity cash flows (seasonality adjusted) vs S&P500 Index



Source: State Street ®, as of Sep 30 2022. PICC and DCC are in percentages of total active commitment. PICC and DCC are seasonality adjusted. (see PE Insights 2022 Q1 for more details)

Exhibit 12 shows the monthly seasonality adjusted Paid-in Capital to Commitment (PICC) and Distribution to Committed Capital (DCC) between 2003-2022 from the SSPEI universe of more than 3700 primary funds. At a glance, we can see significant co-movements between the SPX and PE cash flows in recent two decades: the falls of PE cash flows coincided with 2008 GFC, 2020 Covid crisis, and 2022 Fed rate hikes, as well as the rises of PE cash flows in robust growth periods in 2003-2006, 2010-2013 and 2nd half of 2020 – 2021.

To more precisely answer our questions, we devised a simple VAR(2) model with only three variables: SPX monthly returns, monthly PICC and monthly DCC.

$$PICC_t = a_{11} * PICC_{t-1} + a_{12} * DCC_{t-1} + a_{13} * SPX_{t-1} + a_{14} * PICC_{t-2} + a_{15} * DCC_{t-2} + a_{16} * SPX_{t-2} + u_{PICC,t}$$

$$DCC_t = a_{21} * PICC_{t-1} + a_{22} * DCC_{t-1} + a_{23} * SPX_{t-1} + a_{24} * PICC_{t-2} + a_{25} * DCC_{t-2} + a_{26} * SPX_{t-2} + u_{DCC,t}$$

$$SPX_t = a_{31} * PICC_{t-1} + a_{32} * DCC_{t-1} + a_{33} * SPX_{t-1} + a_{34} * PICC_{t-2} + a_{35} * DCC_{t-2} + a_{36} * SPX_{t-2} + u_{SPX,t}$$

We tested this model with buyout and venture cash flows between 2003-2022 and sub-periods of 2003-2009, 2010-2022.

Exhibit 13 shows the impulse responses of buyout cash flows to 1 percentage point SPX return shocks. The IR magnitude is economically meaningful and statistically significant in the first several months. For example, Buyout distributions can increase by 0.15% of the total active commitment if the SPX return in the prior month had a +10 percentage point shock (For comparison, the average monthly DCC is ~1% of the total active commitment. See Exhibit 12) and is significantly positive until 7 months later.

[11] Cyclicality, performance measurement, and cash flow liquidity in private equity, David T. Robinson and Berk A. Sensoy, Journal of Financial Economics, 2016

Exhibit 13. Impulse responses of monthly PE cash flows to 1% SPX return shock (2003-2022)

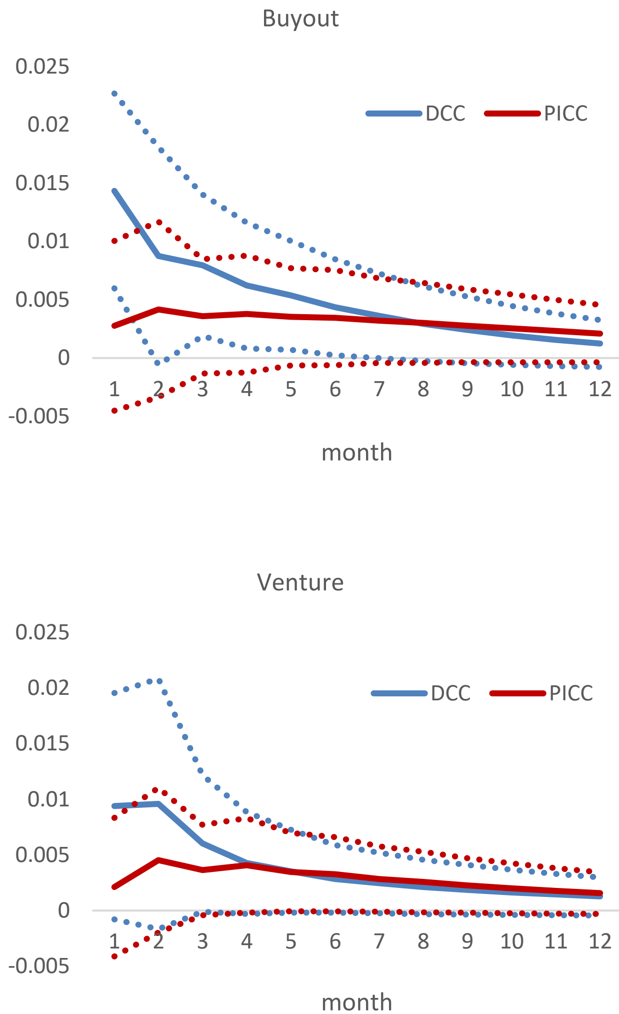
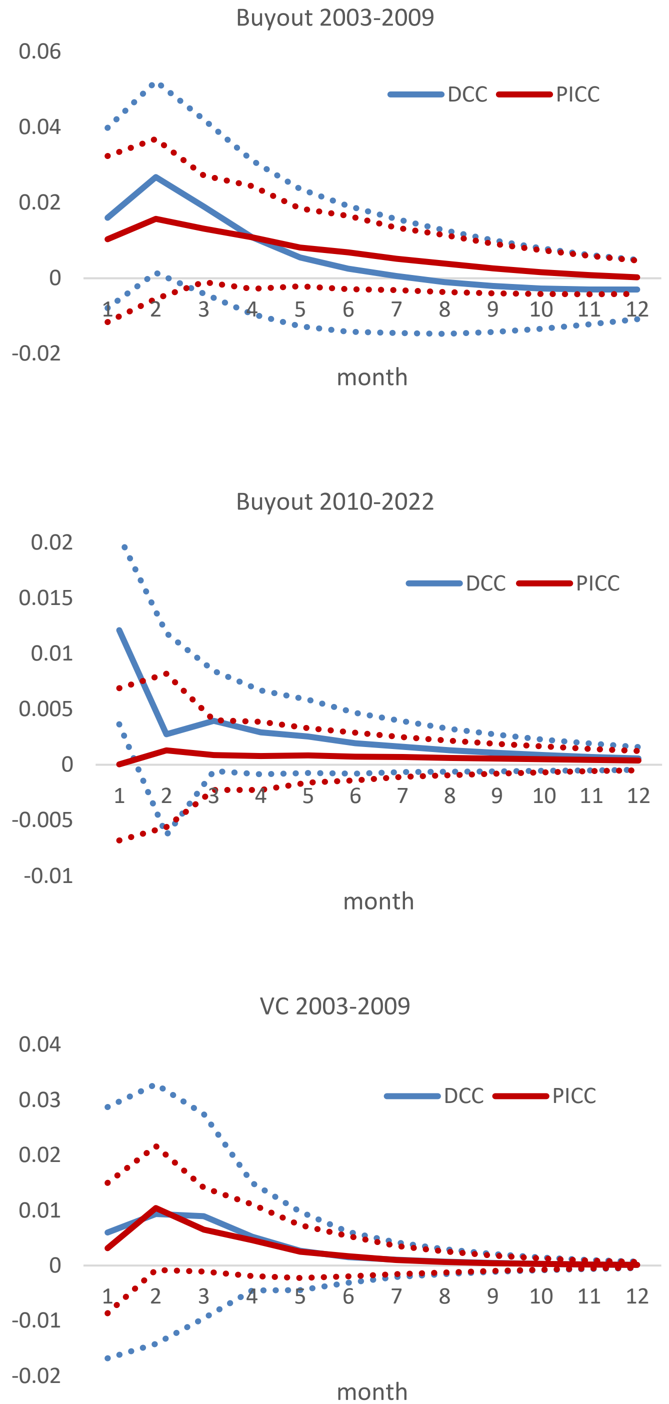


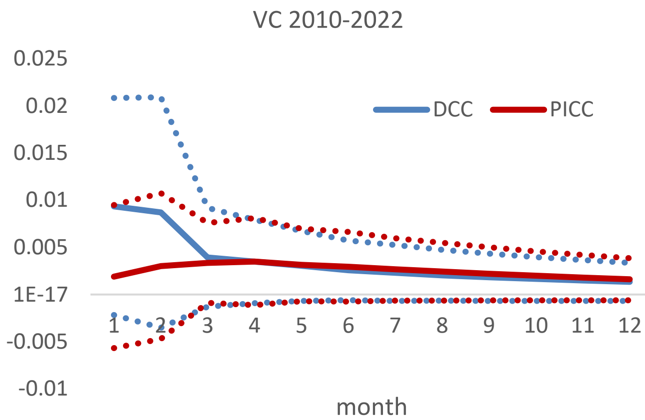
Exhibit 14. Impulse responses of monthly PE cash flows to 1% SPX return shock pre-GFC vs post-GFC



Source: State Street ®, as of Q2 2022. Dotted lines represent 95% confidence interval.

Similar to Robinson and Sensoy (2011), we see positive co-movements of PE cash flows and public market returns even at monthly frequency. The distribution is much more sensitive than contributions and the impact of public market shocks can last for at least 6 months. Unlike Robinson and Sensory (2011), we find Buyout distributions to be more responsive than those of Venture Capital.

As shown in Exhibit 14, we find the PE cash flow responses, especially the distributions, to public market return shocks became stronger after the GFC.



Source: State Street ®, as of Q2 2022. Dotted lines represent 95% confidence interval.

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 3,700 funds representing more than $4.4 trillion in capital commitments as of Q2 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.

AUTHORS

Derin Aksit, PhD daksit@statestreet.com

Maggie Miao, CFA qmiao@statestreet.com

Boyu Wang, bwang13@statestreet.com

Yuou Wu, ywu20@statestreet.com

Yaoyun Zhang, yzhang50@statestreet.com

Nan R. Zhang, CFA, PhD nzhang2@statestreet.com

Disclaimers and Important Risk Information

State Street Global Markets® is the business name and a registered trademark of State Street Corporation® and is used for its financial markets business and that of its affiliates. State Street Associates® is a registered trademark of State Street Corporation, and the analytics and research arm of State Street Global Markets.

The products and services outlined herein are only offered to professional clients or eligible counterparties through State Street Bank and Trust Company, authorized and regulated by the Federal Reserve Board. State Street Bank and Trust Company is registered with the Commodity Futures Trading Commission as a Swap Dealer and is a member of the National Futures Association. Please note that certain foreign exchange business, including spot and certain forward transactions, are not regulated.

This document is a communication intended for general marketing purposes, and the information contained herein has not been prepared in accordance with legal requirements designed to promote the independence of investment research. It is for clients to determine whether they are permitted to receive research of any nature. It is not intended to suggest or recommend any transaction, investment, or investment strategy, does not constitute investment research, nor does it purport to be comprehensive or intended to replace the exercise of an investor's own careful independent review and judgment regarding any investment decision.

This communication is not intended for retail clients, nor for distribution to, and may not be relied upon by, any person or entity in any jurisdiction or country where such distribution or use would be contrary to applicable law or regulation. This communication and the information herein does not constitute investment, legal, or tax advice and is not a solicitation to buy or sell securities or any financial instrument nor is it intended to constitute a binding contractual arrangement or commitment by State Street of any kind. The information provided does not take into account any particular investment objectives, strategies, investment horizon or tax status. This communication or any portion hereof may not be reprinted, sold or redistributed without the prior written consent of State Street Global Markets.

The views expressed herein are the views of State Street Global Markets as of the date specified and are subject to change, without notice, based on market and other conditions. The information provided herein has been obtained from sources believed to be reliable at the time of publication, nonetheless, we make no representations or assurances that the information is complete or accurate, and you should not place any reliance on said information. State Street Global Markets hereby disclaims any warranty and all liability, whether arising in contract, tort or otherwise, for any losses, liabilities, damages, expenses or costs, either direct, indirect, consequential, special, or punitive, arising from or in connection with any use of this document and/or the information herein.

State Street Global Markets may from time to time, as principal or agent, for its own account or for those of its clients, have positions in and/or actively trade in financial instruments or other products identical to or economically related to those discussed in this communication. State Street Global Markets may have a commercial relationship with issuers of financial instruments or other products discussed in this communication.

This document may contain statements deemed to be forward-looking statements. These statements are based on assumptions, analyses and expectations of State Street Global Markets in light of its experience and perception of historical trends, current conditions, expected future developments and other factors it believes appropriate under the circumstances. All information is subject to change without notice. Clients should be aware of the risks trading foreign exchange, equities, fixed income or derivative instruments or in investments in non-liquid or emerging markets. Derivatives generally involve leverage and are therefore more volatile than their underlying cash investments. Past performance is no guarantee of future results.

The products and services outlined in this document are generally offered in the **United States and Latin America** by State Street Bank and Trust Company. This communication is made available in **Japan** by State Street Bank and Trust Company, Tokyo Branch, which is regulated by the Financial Services Agency of Japan and is licensed under Article 47 of the Banking Act. **EMEA**: (i) State Street Bank and Trust Company, London Branch, authorised and regulated by Federal Reserve Board, authorised by the Prudential Regulation Authority, subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. Details about the extent of regulation by the Prudential Regulation Authority are available upon request; and/or (ii) State Street Bank International GmbH, authorised by Deutsche Bundesbank and the German Federal Financial Supervisory Authority and, in respect of State Street Bank International GmbH, London Branch, subject to limited regulation by the Financial Conduct Authority and Prudential Regulation Authority. Details about the extent of regulation by the Financial Conduct Authority and Prudential Regulation Authority are available upon request. **Brazil:** The products in this marketing material have not been and will not be registered with the Comissão de Valores Mobiliários - the Brazilian Securities and Exchange Commission ("CVM"), and any offer of such products is not directed to the general public within the Federative Republic of Brazil ("Brazil"). The information contained in this marketing material is not provided for the purpose of soliciting investments from investors residing in Brazil and no information in this marketing material should be construed as a public offering or unauthorized distribution of the products within Brazil, pursuant to applicable Brazilian law and regulations. The products and services outlined in this document are generally offered in **Canada** by State Street Bank and Trust Company. This communication is made available in **Hong Kong** by State Street Bank and Trust Company which accepts responsibility for its contents, and is intended for distribution to professional investors only (as defined in the Securities and Futures Ordinance). This communication is made available in **Australia** by State Street Bank and Trust Company ABN 70 062 819 630, AFSL 239679 and is intended only for wholesale clients, as defined in the Corporations Act 2001. This communication is made available in **Singapore** by State Street Bank and Trust Company, Singapore Branch ("SSBTS"), which holds a wholesale bank license by the Monetary Authority of Singapore. In Singapore, this communication is only distributed to accredited, institutional investors as defined in the Singapore Financial Advisers Act ("FAA"). Note that SSBTS is exempt from Sections 27 and 36 of the FAA. When this communication is distributed to overseas investors as defined in the FAA, note that SSBTS is exempt from Sections 26, 27, 29 and 36 of the FAA. This advertisement has not been reviewed by the Monetary Authority of Singapore. The products and services outlined in this document are made available in **South Africa** through State Street

Bank and Trust Company, which is authorized in South Africa under the Financial Advisory and Intermediary Services Act, 2002 as a Category I Financial Services Provider; FSP No. 42671. This communication is made available in **Israel** by State Street Bank and Trust Company, which is not licensed under Israel's Regulation of Investment Advice, Investment Marketing and Portfolio Management Law, 1995. This communication may only be distributed to or used by investors in Israel which are "eligible clients" as listed in the First Schedule to Israel's Regulation of Investment Advice, Investment Marketing and Portfolio Management Law 1995. This communication is made available in **Qatar** by State Street Bank and Trust Company and its affiliates. The information in this communication has not been reviewed or approved by the Qatar Central Bank, the Qatar Financial Markets Authority or the Qatar Financial Centre Regulatory Authority, or any other relevant Qatari regulatory body. This communication is made available in **Malaysia** by State Street Bank and Trust Company, which is authorized and regulated by the Federal Reserve Board. State Street Bank and Trust Company is not licensed within or doing business within Malaysia and the activities that are being discussed are carried out off-shore. The written materials do not constitute, and should not be construed as constituting: 1) an offer or invitation to subscribe for or purchase securities or futures in Malaysia or the making available of securities or futures for purchase or subscription in Malaysia; 2) the provision of investment advice concerning securities or futures; or 3) an undertaking by State Street Bank and Trust Company to manage the portfolio of securities or futures contracts on behalf of other persons. This communication is made available in **Turkey** by State Street Bank and Trust Company and its affiliates. The information included herein is not investment advice. Investment advisory services are provided by portfolio management companies, brokers and banks without deposit collection licenses within the scope of the investment advisory agreements to be executed with clients. Any opinions and statements included herein are based on the personal opinions of the commentators and authors. These opinions may not be suitable to your financial status and your risk and return preferences. Therefore, an investment decision based solely on the information herein may not be appropriate to your expectations. This communication is made available in **United Arab Emirates** by State Street Bank and Trust Company and its affiliates. This communication does not, and is not intended to, constitute an offer of securities anywhere in the United Arab Emirates and accordingly should not be construed as such. Nor does the addressing of this communication to you constitute, or is intended to constitute, the carrying on or engagement in banking, financial and/or investment consultation business in the United Arab Emirates under the rules and regulations made by the Central Bank of the United Arab Emirates, the Emirates Securities and Commodities Authority or the United Arab Emirates Ministry of Economy. Any public offer of securities in the United Arab Emirates, if made, will be made pursuant to one or more separate documents and only in accordance with the applicable laws and regulations. Nothing contained in this communication is intended to endorse or recommend a particular course of action or to constitute investment, legal, tax, accounting or other professional advice. Prospective investors should consult with an appropriate professional for specific advice rendered on the basis of their situation. Further, the information contained within this communication is not intended to lead to the conclusion of any contract of whatsoever nature within the territory of the United Arab Emirates. This communication has been forwarded to you solely for your information, and may not be reproduced or passed on, directly or indirectly, to any other person or published, in whole or in part, for any purpose. This communication is addressed only to persons who are professional, institutional or otherwise sophisticated investors. This communication is made available in **Saudi Arabia** by State Street Bank and Trust Company and its affiliates. The information contained in this communication is not intended to invite or induce any person to engage in securities activities nor does it constitute an offer to sell securities or the solicitation of an offer to buy, or recommendation for investment in, any securities within the Kingdom of Saudi Arabia or any other jurisdiction. The information in this communication is not intended as financial advice. Moreover, this communication is not intended as a prospectus within the meaning of the applicable laws and regulations of the Kingdom of Saudi Arabia or any other jurisdiction and this communication is not directed to any person in any country in which the distribution of such communication is unlawful. This communication provides general information only. The information and opinions in this communication are stated as at the date indicated. The information may therefore not be accurate or current. The information and opinions contained in this communication have been compiled or arrived at from sources believed to be reliable in good faith, but no representation or warranty, express or implied, is made by State Street Bank and Trust Company and its affiliates as to their accuracy, completeness or correctness. This communication is made available in **South Korea** by State Street Bank and Trust Company and its affiliates, which accept responsibility for its contents, and is intended for distribution to professional investors only. State Street Bank and Trust Company is not licensed to undertake securities business within South Korea, and any activities related to the content hereof will be carried out off-shore and only in relation to off-shore non-South Korea securities. This communication is made available in **Indonesia** by State Street Bank and Trust Company and its affiliates. Neither this communication nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable Indonesian capital market laws and regulations. This communication is not an offer of securities in Indonesia. Any securities referred to in this communication have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market law and regulations. This communication is made available in **Oman** by State Street Bank and Trust Company and its affiliates. The information contained in this communication is for information purposes and does not constitute an offer for the sale of foreign securities in Oman or an invitation to an offer for the sale of foreign securities. State Street Bank and Trust Company is neither a bank nor financial services provider registered to undertake business in Oman and is neither regulated by the Central Bank of Oman nor the Capital Market Authority. Nothing contained in this communication report is intended to constitute Omani investment, legal, tax, accounting, investment or other professional advice. This communication is made available in **Taiwan** by State Street Bank and Trust Company and its affiliates, which accept responsibility for its contents, and is intended for distribution to professional investors only. State Street Bank and Trust Company is not licensed to undertake securities business within Taiwan, and any activities related to the content hereof will be carried out off-shore and only in relation to off-shore non-Taiwan securities. **Peoples Republic of China ("PRC").** This communication is being distributed by State Street Bank and Trust Company. State Street Bank and Trust Company is not licensed or carrying on business in the PRC in respect of any activities described herein and any such activities it does carry out are conducted outside of the PRC. These written materials

do not constitute, and should not be construed as constituting: 1) an offer or invitation to subscribe for or purchase securities or futures in PRC or the making available of securities or futures for purchase or subscription in PRC; 2) the provision of investment advice concerning securities or futures; or 3) an undertaking by State Street Bank and Trust Company to manage the portfolio of securities or futures contracts on behalf of other persons.

Products and services may not be available in all jurisdictions. Please contact your State Street representative for further information. SSA MMD 2022-01

To learn how State Street looks after your personal data, visit: http://www.statestreet.com/utility/data-processing-and-privacy-notice.html

© 2022 State Street Corporation – All Rights Reserved