



RETIREMENT BOARD CALENDAR SHEET
Retirement Board Meeting of April 22, 2020

To: The Retirement Board

Through: Jay Huish 
Executive Director

From: William Coaker, Jr. – CFA
Chief Investment Officer

Anna Langs, CFA, FRM
Managing Director, Asset Allocation, Risk
Management and Innovative Solutions

Date: April 22, 2020

Agenda Item:

SFERS Liquidity Management Update

Background:

The San Francisco Employees Retirement is a \$25.6 billion Trust as of April 9, 2020. SFERS is a large investor in private markets with an aggregate strategic allocation to Private Equity, Real Assets, and Private Credit totaling 45% or just over \$11 billion of NAV. SFERS also has a total of approximately \$7 billion in contractual commitments of uncalled capital to private markets managers. SFERS does not control the timing of when capital is called and when distributions are received.

For a pension plan with net outflows to pay plan benefits, these features of private markets place an extra importance on management of liquidity and cash flow. This presentation updates the Retirement Board on the management of SFERS liquidity and cash flow.

Recommendation:

This is a discussion item.

Attachments:


- Staff Memorandum
- SFERS Liquidity Management Update, Staff presentation
- SFERS Commitment Pacing Discussion, Cambridge Associates



**San Francisco City and County
Employees' Retirement System
Chief Investment Officer**

William J. Coaker Jr., CFA, MBA

**RETIREMENT BOARD CALENDAR SHEET
Retirement Board Meeting of April 22, 2020**

DATE: April 22, 2020
TO: Members of the Retirement Board
THROUGH: Jay Huish 
Executive Director
FROM: William J. Coaker Jr. – CFA, CFP, MBA
Chief Investment Officer
SUBJECT: Liquidity Analysis

1 - Introduction

Attached please find two documents titled "SFERS Commitment Pacing Schedule Discussion" and another titled "Liquidity Management Update." This memo highlights key features of each document.

2 – Liquidity Management Update

Pension Payments:

Pension payments from the SFERS Trust are found on page 4 of the Liquidity Management Update and summarized in Table A below. The payments are net of the City-County of San Francisco's contribution.

From 2020 to 2025 our annual payments will increase from \$549 million to \$914 million annually, an increase of 66%, or 10.7% per year. In 2030 our pension payments are projected to be \$1,314 million, an increase of 139%, or 9.1% per year from 2020 to 2030. From 2020 to 2025 our pension payments will total \$4.11 billion and from 2020 to 2030 they will total \$9.685 billion.

Table A						
Net Pension Payments	2020	2021	2022	2023	2024	2025
Annual (\$mm)	\$ (549)	\$ (488)	\$ (565)	\$ (690)	\$ (843)	\$ (914)
Cumulative (\$mm)	\$ (549)	\$ (1,098)	\$ (1,663)	\$ (2,353)	\$ (3,196)	\$ (4,110)
Net Pension Payments	2026	2027	2028	2029	2030	
Annual (\$mm)	\$ (975)	\$ (1,038)	\$ (1,098)	\$ (1,150)	\$ (1,314)	
Cumulative (\$mm)	\$ (5,085)	\$ (6,123)	\$ (7,221)	\$ (8,371)	\$ (9,685)	

Asset Allocation, Pacing and Cash Flow:

Over the past 6 years SFERS has increased its strategic allocation to Private Equity from 16% to 18%, increased Private Real Assets from 12% to 17%, and introduced a 10% allocation to Private Credit and 15% allocation to Absolute Return. The revised strategic asset allocation dramatically changed SFERS liquidity profile which now requires very close monitoring. In 2015 Public Equity and Public Fixed Income constituted 72% of our strategic allocation while at the end of 2019 they accounted for 40% (31% to Public Equity, 6% to U.S. Treasuries and 3% to Liquid Credit). Page 16 has the details of SFERS actual asset allocation over time.

Building our exposure to Private Investments resulted in recent years in a robust commitment pacing to the three illiquid asset classes: Private Equity, Private Real -Assets, and Private Credit. Page 5 of the Liquidity Management Update shows SFERS commitments to private markets as follows: to Private Equity a 5-year average of \$1.116 billion vs. recommended pacing of \$900 million, or about \$1 billion over planned pacing; and to Real Assets a 5-year average of \$823 million vs. recommended pacing of \$800 million, or about \$100 million over planned pacing. Since the inception of Private Credit two years ago, we have allocated \$250 million more than planned for in our pacing schedule. In the aggregate, our underwriting has been over our planned pacing by about \$1.3 billion the past five years.

As shown on Page 5, our 5-year average net cash outflow to Private Equity, Real Assets, and Private Credit has been \$597 million, or nearly \$3 billion. The \$3 billion dollar funding to Private Markets and an additional \$3.7 billion funding to Absolute Return were funded by reducing highly liquid investments in Public Equity and Public Fixed Income from 72% of plan assets to 40%.

Page 6 of the Liquidity Management Update summarizes SFERS planned pacing for 2020. In recognition of SFERS current liquidity needs, robust recent commitments, and the potential for distributions to slow due to the market disruption caused by COVID-19, we plan to reduce pacing schedule for this year from a planned \$2.4 billion in 2019 to \$1.6 billion in 2020. The upside of SFERS overcommitments in recent years is that the underwriting for any market dislocation caused by the COVID-19 crisis is already done. We have \$3.29 billion of uncalled capital in Private Equity, \$2.39 billion of uncalled capital in Real Assets, and \$1.27 billion in Private Credit.

Liquidity:

Page 6 summarizes SFERS liquidity needs to fund its capital call obligations under three scenarios: Base Case, No Growth for 3 Years, and a Stress Case which is a replay of the Global Financial Crisis. Pages 8-10 show the availability of our liquid assets to fund net capital calls under normal conditions and fully correlated market shocks of 1 and 2 standard deviations to each asset class. Liquid assets to fund net capital calls to Private Markets include Treasuries, Core Bonds, Emerging Market and High Yield Bonds, Public Equity, and Absolute Return.

Pages 11 through 13 highlight our Liquidity Ratios. Ratios over 1 indicate we have sufficient liquid assets to pay for capital calls, plan expenses, and pension benefits.

The Liquid Coverage Ratio (LCR) is the sum of Treasuries, Core Bonds, Emerging Market and High Yield Bonds, Public Equity and Absolute Return, employer and employee pension contributions, and projected distributions divided by the sum of Capital Calls, Plan Expenses, and Pension Plan Payments for the next 3 years. The LCR is far above 1 in all three scenarios. Hence, we have sufficient liquid assets to pay plan benefits, meet capital calls, and pay plan expenses under all three scenarios.

The Modified Liquidity Coverage Ratio (MLCR) is the sum of liquid, very low risk assets – meaning, Treasuries and Core Bonds, but not including Emerging Market and High Yield Bonds, Public Equity, and Absolute Return – plus employee and employer pension contributions and projected distributions, divided by the sum of Capital Calls, Plan Expenses, and Pension Plan Payments for the next 3 years. A ratio above 1 means we would be able to fund capital calls and pay plan expenses and pension benefits by selling only very low risk assets, and not selling assets such as Public Equity, Emerging Market or High Yield Bonds, or Absolute Return assets.

For the MLCR, in the Base Case the ratio is barely above 1, meaning we have sufficient low risk assets to fund our pension and capital calls obligations, but we would draw their allocations close to zero. In the 3-Year No Growth and Stress Scenarios the MLCR is well below 1, meaning we would need to sell Public Equity, Emerging Market or High Yield bonds, or Absolute Return. The amount of redemptions could be in the \$1-2 billion range annually depending on the amount of capital called and how much distributions dry up.

3 - SFERS Commitment Pacing Schedule Discussion

The “SFERS Commitment Pacing Schedule Discussion” consists of four parts:

1 – Total Private Investments (PI) Portfolio	Page 1
2 – Private Equity/Venture Capital Portfolio	Page 5
3 – Real Assets Portfolio	Page 14
4 – Private Credit Portfolio	Page 23

Each of the three Private Markets portfolios and the Total Private Investments Portfolio include three scenarios as described next. The beginning Net Asset Value is \$25.5 billion which closely approximates the \$25.6 billion in plan assets as of April 9, 2022.

1 – Base Case Scenario – 4% Growth

The Base Case plans for 4% annualized growth of plan assets. The 4% growth is net of cash outflows for pension benefits. The implied investment return for the period 2020 to 2028 is slightly less than 7% annualized.

2 – 3-Year No Growth Scenario – 0% Plan Growth from 2020 to 2022 followed by 4% Plan Growth thereafter

This scenario plans for 0% annualized growth of plan assets from 2020 to 2022 followed by 4% annualized growth thereafter. The implied investment return for the period 2020 to 2028 is slightly less than 5.5% annualized.

3 – Stress Scenario – Replays the Experience from the Global Financial Crisis

The Stress Scenario replays the Global Financial Crisis based on SFERS current asset allocation. It includes a return of -27.6% in 2020 followed by returns of 10.3% and 10.7% in 2021 and 2022, respectively. It then plans for a long-term projected normalized growth of plan assets of 4% annualized. The implied investment return for the period 2020 to 2028 is slightly less than 3.5% annualized.

Private Equity/Venture Capital Portfolio

The modeling assumptions on page 6 of the "SFERS Commitment Pacing Schedule Discussion" reflect a strategic weight to Private Equity of 20%. SFERS current strategic weight is 18% while our actual weight as of March 31, 2020 is 22.6%. In this analysis we projected a weight of 20% because in all three scenarios we will be well above 18%. The projected returns for buyouts and venture capital are 13% and 14%, respectively. The projected mix of the two segments is 50/50.

Pacing: In 2019 SFERS committed \$1,070 million. To reduce our current weight of 22.6% toward 20% we plan to reduce our commitment pacing to \$700 million for the next few years.

Cash Flow: In the Base Case, Private Equity is projected to provide net cash inflows every year, scaling up from \$53 million in 2020, to \$231 million in 2021, to an average of just over \$600 million in 2022-23, then averaging over \$800 million in net cash inflows from 2024 to 2028.

In the No Growth from 2020 to 2022 Scenario, Private Equity net cash flows are projected to be slightly negative for each of the next three years, then provide cash inflows of nearly \$500 million in 2023 and more than \$700 million by 2027.

In the Stress Scenario, Private Equity net cash flows are negative totaling about \$1.2 billion from 2020 to 2022. Cash flows thereafter are very strong at more than \$800 million annually from 2023 to 2028.

Importantly, the variability of net cash flow from Private Equity even over multi-year time frames can be substantial, depending on the scenario that occurs.

Page 13 highlights that from 2015 to 2019 we planned for commitments totaling \$4.35 billion while our actual commitments totaled \$5.83 billion. The current market downturn, strong returns generated by the private equity portfolio, and robust commitments explain why our actual weight at March 31, 2020 to Private Equity is 22.6% versus our target weight of 18%. It also explains why in all three scenarios we are projected to have an allocation to Private Equity of more than 20% for quite some time.

Page 13 also highlights that from 2015 to 2019 Private Equity was projected to experience a net cash outflow totaling about \$550 million. Actual net cash outflows totaled approximately \$1.25 billion due to co-investments and commitments above planned pacing.

A positive aspect of SFERS robust underwriting to Private Equity over the past five years is that we have \$3.29 billion in uncalled capital. The underwriting for the current dislocation caused by the COVID-19 crisis has already been done.

Real Assets Portfolio

The modeling assumptions on page 15 of Cambridge's document reflect a strategic weight to Real Assets of 15%. SFERS current strategic weight is 17% while our actual weight as of March 31, 2020 is 16.6%. We decreased the strategic weight to Real Assets to 15% because we increased Private Equity to 20%, offsetting the change between two illiquid assets. The projected returns for real estate and natural resources are 9% and 11%, respectively. The projected mix of the two segments is 70/30.

Pacing: We committed \$902 million to Real Assets in 2019. In the Base Case, pacing is reduced to \$700 million in 2020 and the next few years so as to achieve a long-term lower allocation of 15%. The 3-Year No Growth scenario would reduce pacing the next three years to \$625 million. The Stress Scenario would reduce commitments to \$400 million for each of the next three years.

Cash Flow: In the Base Case, Real Assets are expecting close to a net zero cash flow over the next three years, then contribute nearly \$300 million in positive cash flow in 2023 and over \$400 million annually beginning in 2025.

In the No Growth from 2020 to 2022 Scenario, Real Assets net cash flows in the aggregate from 2020 to 2023 are negative by approximately \$900 million, then contribute positive cash flow of nearly \$300 million in 2024 and more than \$500 million each year beginning in 2025.

In the Stress Scenario, Real Assets net cash flows are negative totaling just over \$600 million from 2020 to 2023. Cash flows thereafter are positive, ranging from \$180 million in 2024 to \$300 million in 2028.

Just as with Private Equity, the variability of cash flow from the Real Assets portfolio even over a multi-year time frame can be substantial, depending on the scenario that takes place. The variability of cash flow is a major focus of Staff's focus and planning.

Page 22 highlights that from 2016 to 2019 we planned for commitments totaling \$2.95 billion while our actual commitments totaled \$3.75 billion. Further back, over the past six years our commitments are closer to our planned pacing.

If the current dislocation caused by COVID-19 persists, we have \$2.39 billion in uncalled capital in our Real Assets portfolio. Hence, our external managers will be able to make investments at lower prices.

Private Credit Portfolio

The modeling assumptions on page 24 of Cambridge's document reflect a strategic weight to Private Credit of 10%. SFERS current strategic weight is 10% while our actual weight as of March 31, 2020 was much lower at 4.7%. The underweight versus target is because the asset class was adopted just 2 ½ years ago (October 2017) and external managers have been cautious about putting capital to work.

Since approval of the asset class our commitment schedule has slightly exceeded our planned pacing, with actual commitments in 2018-19 of \$1.7 billion compared to planned underwriting of \$1.45 billion, building an amount of uncalled capital of \$1.3 billion. In the current COVID-19 crisis, we expect capital will be called and we will move closer to our target. The projected return for Private Credit is 10%.

Pacing: As noted, in 2018-19 our actual commitments totaled \$1.7 billion while planned pacing was \$1.45 billion. In the Base Case and the 3-Year No Growth Scenarios we plan to reduce pacing to \$550 million in 2020 then revert to a normalized pacing of \$750 million from 2021 to 2023. In the Stress Scenario, commitments are reduced to \$500 million annually from 2020 to 2022, then rise more slowly going forward.

Cash Flow: In the Base Case Scenario, Private Credit is expected to experience aggregate net cash flows of approximately -\$900 million over the next two years, another negative \$200 million from 2022-23, then contribute a positive \$150-\$200 million or more annually from 2025 to 2028.

In the No Growth from 2020 to 2022 Scenario, Private Credit is expected to experience aggregate net cash flows of negative \$960 million from 2020 to 2021, another negative \$260 million in 2022, be roughly flat in 2023 to 2024, then contribute positive cash flow of about \$150 million to \$200 million or more annually from 2025 to 2028.

In the Stress Scenario, Private Credit is expected to experience aggregate net cash flows of over negative \$1,000 million from 2020 to 2021, be slightly negative in 2022, then turn positive from 2023 and beyond.

Analysis

Allocation to Private Markets:

Table B shows that in our Base Case from 2022 to 2024 SFERS will have 50% in Private Markets. In the other two scenarios our allocation is 52% and 55%, respectively. We should be prepared to have about 5% overweight to illiquid investments for the next four or five years. The overweight could be as much as 8% in the 3-Year No Growth Case and 10% in the Stress Scenario.

Asset Allocation	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	44%	48%	50%	50%	50%	49%	47%	46%	44%
3 Year No-Growth	42%	46%	49%	52%	53%	52%	50%	49%	47%
Stress	47%	51%	55%	55%	54%	52%	50%	48%	46%

Annual Pacing:

Table B shows that we will be overweight illiquid assets for some time. That impacts our cash flow and liquidity, as we don't control when capital is called nor when capital is returned to us. Managing these factors is always important; it will become more important going forward due to the variability of when capital will be called, when distributions will be received, and the size of our Private Markets portfolio in the aggregate.

As shown in Table C, to bring our long-term asset allocation, annualized pacing, liquidity, cash flow, and plan risk back to where we planned, the modeling reduces our commitment pacing for 2020 to \$1.95 billion assuming a Base Case or as low as \$1.60 billion for a Stress Scenario.

Pacing (\$mm)	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	\$ 1,950	\$ 2,150	\$ 2,150	\$ 2,450	\$ 2,600	\$ 3,000	\$ 3,150	\$ 3,250	\$ 3,400
3 Year No-Growth	\$ 1,875	\$ 2,075	\$ 2,175	\$ 2,275	\$ 2,425	\$ 2,600	\$ 2,750	\$ 2,900	\$ 3,050
Stress	\$ 1,600	\$ 1,600	\$ 1,600	\$ 1,900	\$ 1,900	\$ 2,300	\$ 2,400	\$ 2,600	\$ 2,600

Projected Net Cash Flow of Private Investments:

Table D shows the net cash flows from Private Markets for each of the three scenarios. In the long-term, all three scenarios are projected to provide more than \$1 billion in net cash flow for each year from 2025 to 2028.

However, we need to keep in mind two considerations. First, there is significant variability of the net cash flows in any single year, cumulatively over several years and by scenario. For example, in 2020 the Base Case net cash flows are just -\$127 million but in the stress scenario they are -\$932 million. Further, from 2020 to 2022, the Base Case cumulative net cash flows are just -\$61 million but in the stress case they are -\$2,834 million. The variability of net

cash flows impact our asset allocation, liquidity, and total plan risk. Second, the three scenarios here do not include a Stress scenario in the out years, when our pension benefit payments will be more than twice as high as today.

Net Cash Flow (\$mm)	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	\$ (127)	\$ (455)	\$ 521	\$ 904	\$ 1,220	\$ 1,372	\$ 1,467	\$ 1,510	\$ 1,543
3 Year No-Growth	\$ (506)	\$ (911)	\$ (602)	\$ 79	\$ 917	\$ 1,302	\$ 1,497	\$ 1,555	\$ 1,597
Stress	\$ (932)	\$ (1,225)	\$ (677)	\$ 790	\$ 1,249	\$ 1,361	\$ 1,426	\$ 1,281	\$ 1,333

Table E shows the cumulative net cash flows from Private Markets over time. At the end of 2022, in the Base Case net cash flows are essentially even at -\$61 million, but in the Stress Scenario the cumulative three-year net cash flow is a negative -\$2.834 billion.

Cumulative Cash-Flow	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	\$ (127)	\$ (582)	\$ (61)	\$ 843	\$ 2,063	\$ 3,435	\$ 4,902	\$ 6,412	\$ 7,955
3 Year No-Growth	\$ (506)	\$ (1,417)	\$ (2,019)	\$ (1,940)	\$ (1,023)	\$ 279	\$ 1,776	\$ 3,331	\$ 4,928
Stress	\$ (932)	\$ (2,157)	\$ (2,834)	\$ (2,044)	\$ (795)	\$ 566	\$ 1,992	\$ 3,273	\$ 4,606

Projected Net Cash Flow of Private Investments and Benefit Payments:

Table F summarizes the net cash flow of Private Investments plus Benefit Payments for all three scenarios for each year from 2020 to 2028. In the Base Case, in 2021 we project net cash outflows of \$943 million, but in the Stress Case the outflows total \$1.713 billion.

Table G sums the cumulative net cash flow of Private Investments plus Benefit Payments for all three scenarios from 2020 to 2028. From 2020 to 2023, in the Base Case the net cash outflows to fund Private Markets and pay Benefit Payments total a negative \$1.449 billion, but in a Stress Case they total \$4.336 billion.

Net Cash Flow Private Markets + Pension Payments	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	\$ (676)	\$ (943)	\$ (44)	\$ 214	\$ 377	\$ 458	\$ 492	\$ 472	\$ 445
3 Year No-Growth	\$ (1,055)	\$ (1,399)	\$ (1,167)	\$ (611)	\$ 74	\$ 388	\$ 522	\$ 517	\$ 499
Stress	\$ (1,481)	\$ (1,713)	\$ (1,242)	\$ 100	\$ 406	\$ 447	\$ 451	\$ 243	\$ 235

Cumulative Cash Flow Private Markets + Pension Payments	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base	\$ (676)	\$ (1,619)	\$ (1,663)	\$ (1,449)	\$ (1,072)	\$ (614)	\$ (122)	\$ 350	\$ 795
3 Year No-Growth	\$ (1,055)	\$ (2,454)	\$ (3,621)	\$ (4,232)	\$ (4,158)	\$ (3,770)	\$ (3,248)	\$ (2,731)	\$ (2,232)
Stress	\$ (1,481)	\$ (3,194)	\$ (4,436)	\$ (4,336)	\$ (3,930)	\$ (3,483)	\$ (3,032)	\$ (2,789)	\$ (2,554)

4 - Discussion

Liquidity and Cash Flows

As the previous Tables show, particularly Table G which sums the cumulative net cash flows for Private Investments plus Benefit Payments over time, the variability of our liquidity position and cash flows could be substantial. From 2020 to 2023, our net cash flows could range from -\$1.449 billion in our Base Case to -\$4.336 billion our Stress Case.

We modeled three scenarios for the Board's review, but we evaluated many others. Our actual liquidity and cash flow experience could be better or worse than we have summarized here.

The main factor that could make the results better than what we have shown here would be returns that prove to be higher than projected. Other factors that would boost these results are distributions being received earlier than projected, capital calls being lower than forecasted, and secondary sales.

The primary factors that could make the results shown here worse would be lower than forecasted returns, a deeper stress than the Global Financial Crisis, or two or more stress events in the referenced time frame. Other factors that could cause our liquidity and cash flow to be worse than we have shown would be capital calls being made earlier than expected and distributions being received later than forecasted.

Asset Allocation and Plan Risk

As shown in Table B earlier, in our Base Case SFERS will be overweight Private Markets from 2022 to 2025 by about 4-5%, with an actual weight of 49-50%. In our Stress Case, the overweight to Privates is projected to be 10% - at 55% - in 2022 and 2023.

In all three scenarios, overweights to Private Markets will need to be funded by reducing Public Equity, Treasuries, Bonds, or Absolute Return. Since SFERS does not control when private markets call capital or return cash, the results will impact our asset allocation, liquidity, total plan risk, and flexibility to respond to market conditions and opportunities.

Summary

The key takeaways of our Liquidity Analysis are as follows:

1 – Benefits and Considerations of Private Markets Investing

In Private Markets investing we do not control when capital is called nor when capital is returned to us. We accept that lack of control because we expect to earn higher returns than if we invested in liquid assets only. At the same time, that lack of control impacts our asset allocation, liquidity, cash flow, and flexibility to respond to market conditions and opportunities. It also places extra importance on what we can control: namely, commitment pacing, scenario testing, and contingency planning. Staff has conducted an extensive amount of analysis of all three.

2- Significant Variability of Cash Flows

The significant variability of the cash flows in both the timing and amount of distributions and capital calls are possible developments that the SFERS investment team has planned for. As a result of the current COVID-19 crisis, we have devoted extensive analysis to updating and refreshing those plans.

3-Sufficient Liquidity to Pay Benefits in All Scenarios

Our analysis shows that under the three scenarios noted herein and others more severe we will always have liquidity to pay plan benefits and meet existing capital calls. The worst cumulative negative net cash flow as shown in Table G is a negative \$4.436 billion, while our current investments in Public Equity, Core Bonds, Emerging Market and High Yield

Bonds, and Absolute Return total \$13.7 billion. Even in our stress case which involves a large market loss, our Tier 1 through Tier 3 assets – meaning, assets available in less than one year – total more than \$9 billion.

That said, it is possible that the stress case shown here is not stressed enough, which could cause distributions to slow and our returns to be lower than included in our stress case.

4-Reducing our Commitment Pacing

Due to a sharp rise in our pension payments over the next 5 and 10 years, the potential for a large variability of cash flows from private markets, that our stress scenario could prove to be not stressed enough, and a need to further model stress scenarios five years out and further, we will reduce our pacing schedule. We will reduce our pacing from \$2.4 billion last year to \$1.6 billion this year and maintain a lower pacing schedule until our liquidity has improved. Our target allocations are \$700 million to Private Equity/Venture Capital, \$400 million to Real Assets, and \$500 million to Private Credit.

5-Additional Modeling of Stress Scenarios

As noted earlier, these forecasts do not include a stress case greater than the Global Financial Crisis and they do not include a stress case after 2022. We will incorporate such environments in an updated presentation to the Board. We will provide that presentation during or prior to our Asset Allocation recommendation in September.

6-Summary

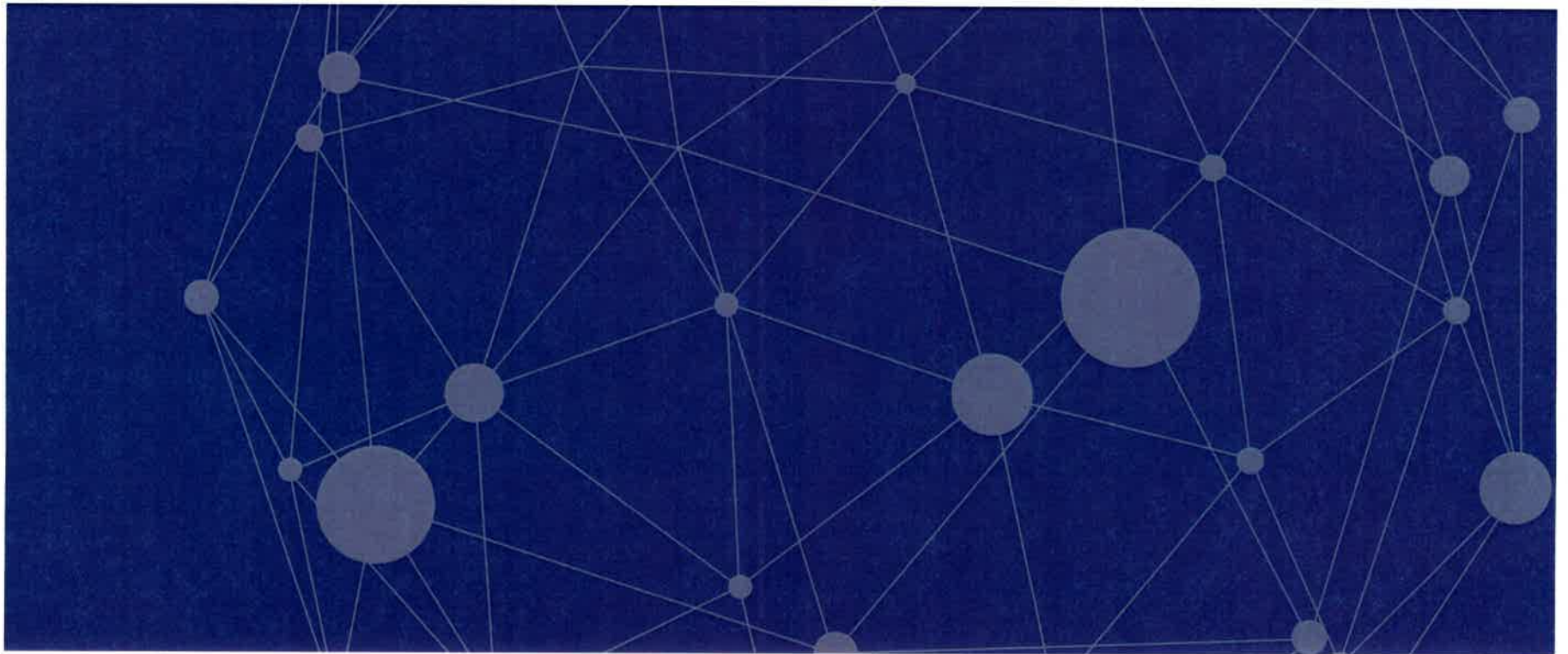
SFERS has also earned high excess returns from our private market investments while also reducing total plan volatility. Staff remains committed to private markets investing.

Also, our exposure to privates furnishes SFERS with an opportunity to benefit from the market dislocation caused by COVID-19. That's because as of March 31, 2020, we have over \$7 billion in capital for managers to call. The underwriting to put capital to work caused by the COVID-19 crisis has already been done.

At the same time, in view of the variability of cash flows from private markets and our increasing pension obligations, SFERS needs to become more liquid. We have a three-pronged strategy to do so. First, starting this year we will reduce our pacing schedule until our liquidity is improved. Second, at next month's Board meeting we will recommend tools to use futures to gain synthetic exposures rather than using physicals, providing SFERS with more flexibility and liquidity. Third, later this year we are likely to recommend to the Retirement Board changes to our strategic asset allocation that improve our liquidity while also generating high long-term returns and high risk-adjusted returns.

SFERS COMMITMENT PACING DISCUSSION

FOR ILLUSTRATIVE PURPOSES





Copyright © 2020 by Cambridge Associates LLC. All rights reserved.

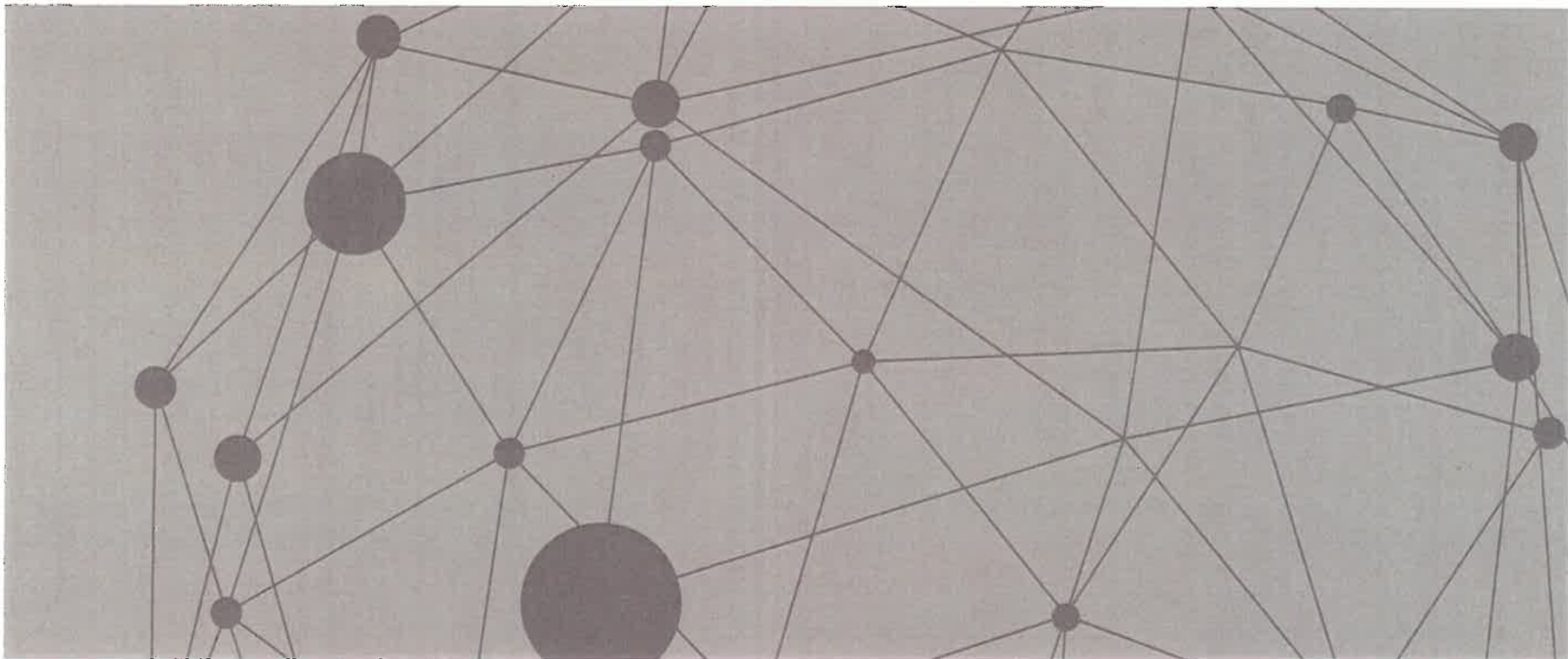
The information and material published in this report is nontransferable. Therefore, recipients may not disclose any information or material derived from this report to third parties or use information or material from this report without prior written authorization unless such use is in accordance with an agreement with Cambridge Associates ("CA"). Nothing contained in this document should be construed as the provision of tax, accounting, or legal advice. Past performance is not indicative of future performance. Broad-based securities indexes are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index. Any information provided in this document is as of the date of the document, and CA is under no obligation to update the information or communicate that any updates have been made.

The information contained herein represents CA's estimates of investment performance, portfolio positioning and manager information including but not limited to fees, liquidity, attribution and strategy and are prepared using information available at the time of production. Though CA makes reasonable efforts to discover inaccuracies in the data used in this report, CA cannot guarantee the accuracy and is ultimately not liable for inaccurate information provided by external sources. CA is under no obligation to update the information or communicate that any updates have been made. Clients should compare the investment values with the statements sent directly from their custodians, administrators or investment managers, and similarly, are ultimately responsible for ensuring that manager information and details are correct. Historical results can and likely will adjust over time as updated information is received. Estimated, preliminary, and/or proxy information may be displayed and can change with finalized information over time, and CA disclaims any obligation to update a previously provided report when such changes occur. Some of the data contained herein or on which the research is based is current public information that CA considers reliable, but CA does not represent it as accurate or complete, and it should not be relied on as such. This report is not intended as a Book of Record nor is it intended for valuation, reconciliation, accounting, auditing, or staff compensation purposes, and CA assumes no responsibility if the report is used in any of these ways.

The primary data source for information is the investment manager and/or fund administrator, therefore data may not match custodial or other client records due to differences in data sourcing, methodology, valuation practices, etc. Estimated values may include prior quarter end data adjusted by a proxy benchmark or by subsequent cash flows. In some instances, data may be sourced directly from a client and/or prior advisors or service providers. CA makes no representations that data reported by unaffiliated parties is accurate, and the information contained herein is not reconciled with manager, custodian, and/or client records. There are multiple methodologies available for use in the calculation of portfolio performance, and each may yield different results. Differences in both data inputs and calculation methodologies can lead to different calculation results. Expected return, efficient frontier analysis and methodology may include equilibrium asset class assumptions derived from CA's Capital Markets Group, and such assumptions are available upon request.

The terms "CA" or "Cambridge Associates" may refer to any one or more CA entity including: Cambridge Associates, LLC (a registered investment adviser with the US Securities and Exchange Commission, a Commodity Trading Adviser registered with the US Commodity Futures Trading Commission and National Futures Association, and a Massachusetts limited liability company with offices in Arlington, VA; Boston, MA; Dallas, TX; Menlo Park, CA, New York, NY; and San Francisco, CA), Cambridge Associates Limited (a registered limited company in England and Wales, No. 06135829, that is authorized and regulated by the UK Financial Conduct Authority in the conduct of Investment Business, reference number: 474331); Cambridge Associates Limited, LLC (a registered investment adviser with the US Securities and Exchange Commission, an Exempt Market Dealer and Portfolio Manager in the Canadian provinces of Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Nova Scotia, Ontario, Québec, and Saskatchewan, and a Massachusetts limited liability company with a branch office in Sydney, Australia, ARBN 109 366 654), Cambridge Associates Investment Consultancy (Beijing) Ltd (a wholly owned subsidiary of Cambridge Associates, LLC which is registered with the Beijing Administration for Industry and Commerce, registration No. 110000450174972), and Cambridge Associates Asia Pte Ltd (a Singapore corporation, registration No. 200101063G, which holds a Capital Market Services License to conduct Fund Management for Accredited and/or Institutional Investors only by the Monetary Authority of Singapore).

TOTAL PI PORTFOLIO



Modeling Assumptions Overview

Across All Modeled Scenarios

- **Across Portfolios**
 - Total pool value of \$25.5 billion
 - NAV as of September 30, 2019

- **PE/VC**
 - Target PE/VC allocation of 20%
 - Allocation mix: 50% buyouts / 50% venture capital
 - Return assumptions: 13% net IRR for buyouts, 14% net IRR for venture capital
 - Distributions as a percentage of beginning of year NAV capped at 30%

- **Real Assets**
 - Target Real Assets allocation of 15%
 - Allocation mix: 70% Real Estate / 30% Resource Mix
 - Return assumptions: 9% net IRR for real estate; 11% net IRR for resources

- **Private Credit**
 - Target Private Credit allocation of 10%
 - Return assumptions: 10% net IRR



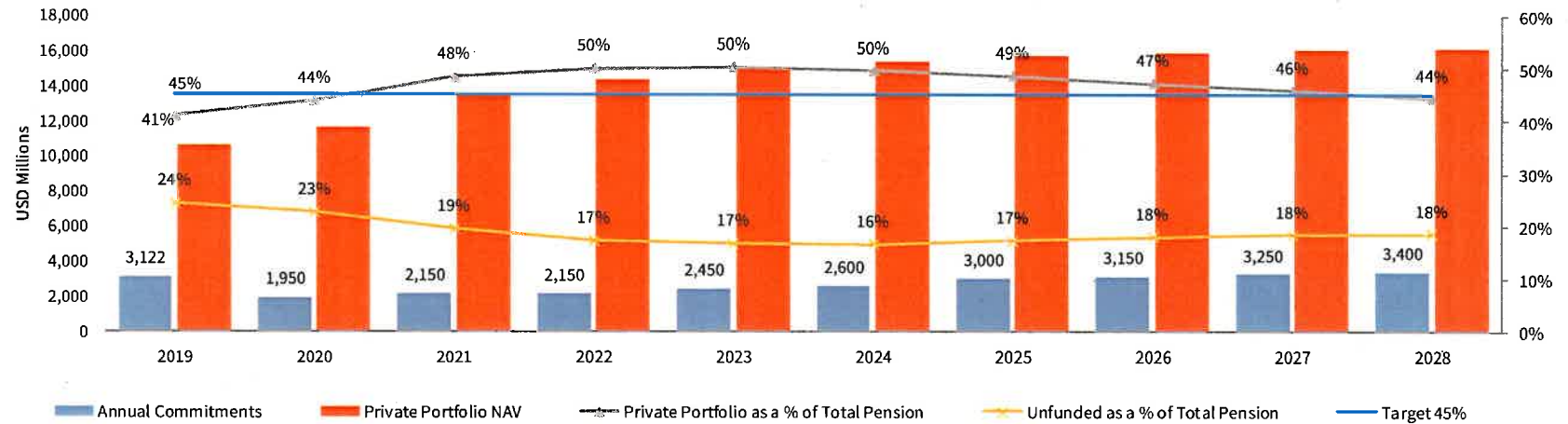
Note: Please refer to the individual asset class analysis for specific assumptions for each modeled scenario.

Base Case (4% Pool Growth)

For Illustrative Purposes

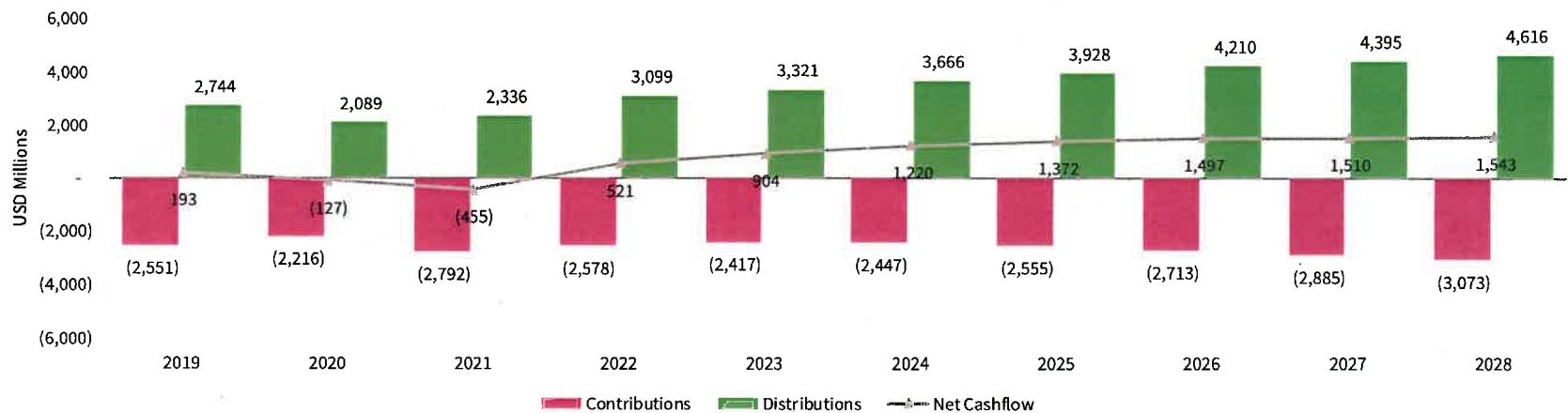
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



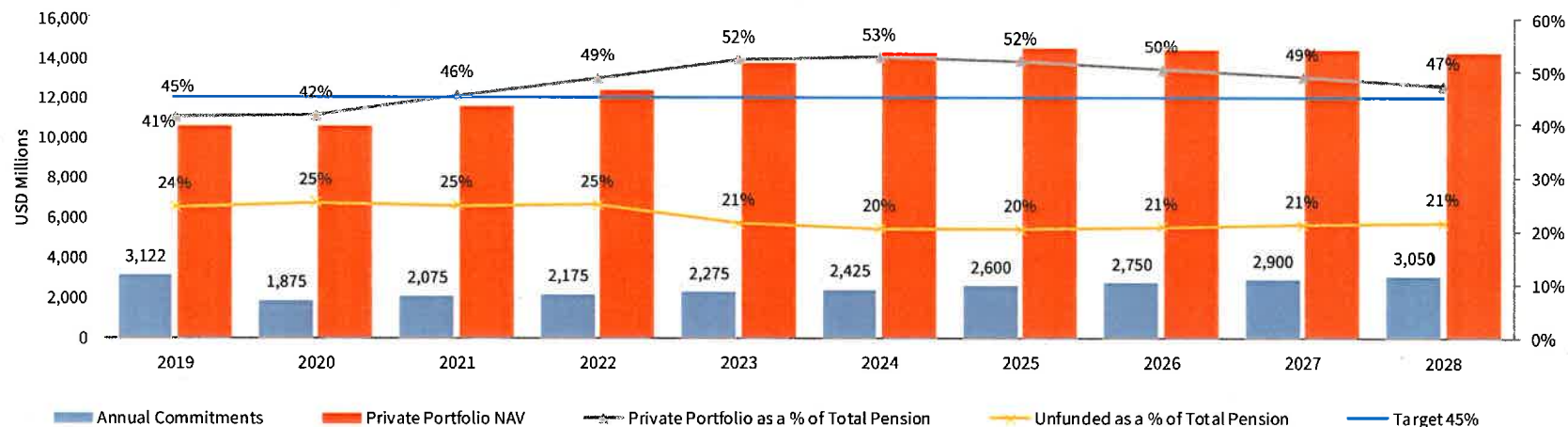
Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

No Growth (0% Pool Growth, 2020-2022)

For Illustrative Purposes

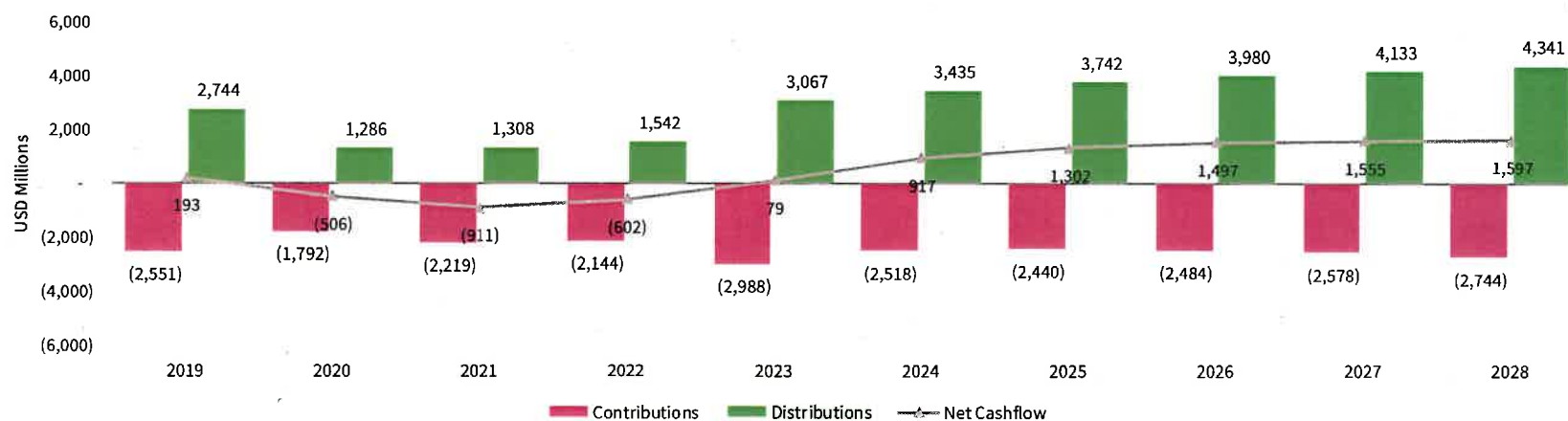
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



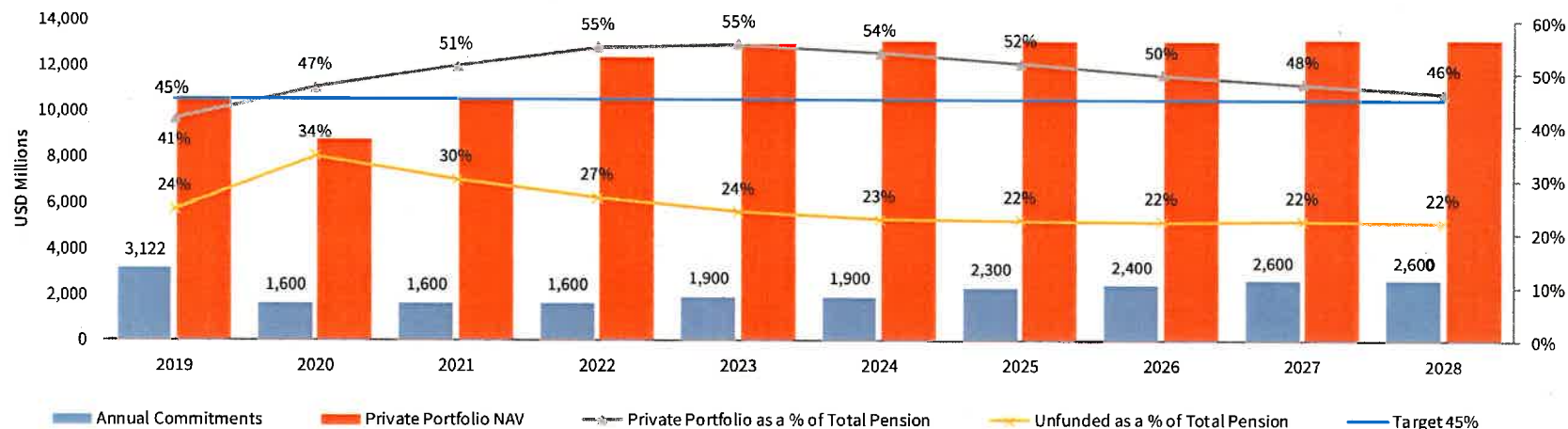
Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on C/A modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

Stress Scenario (2008 Scenario)

For Illustrative Purposes

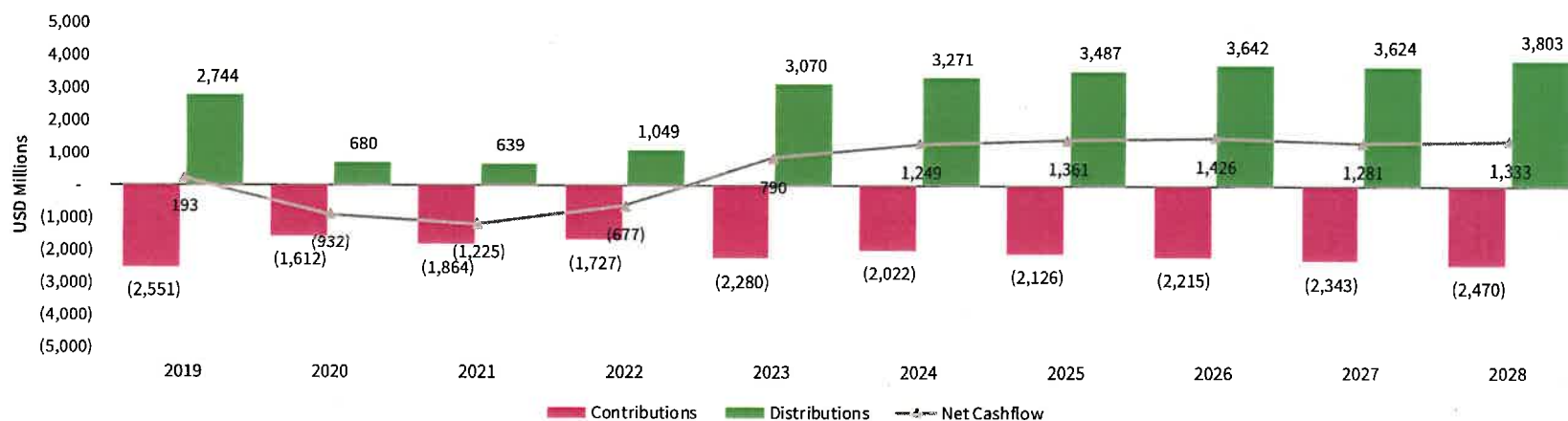
COMMITMENT PACE

September 30, 2019



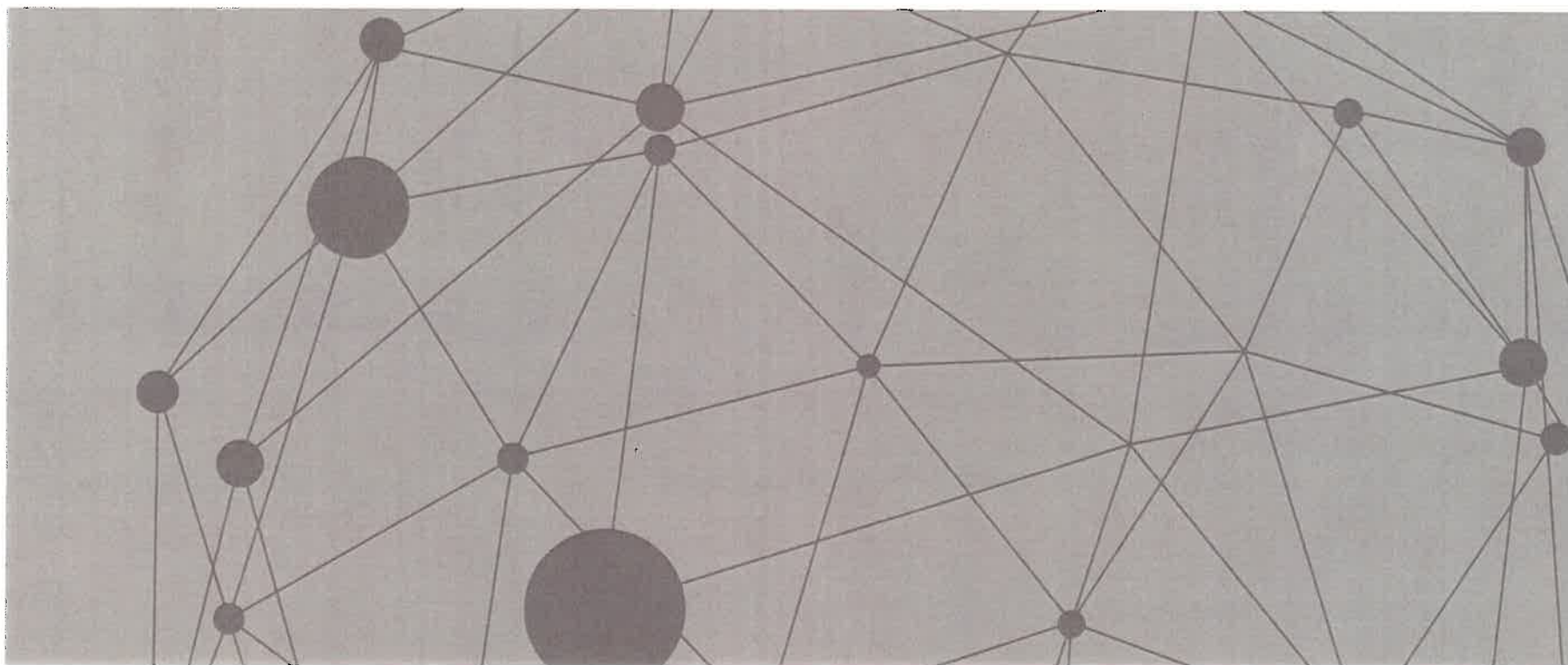
ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

PE/VC COMMITMENT PACING



Modeling Assumptions Overview

Across All Modeled Scenarios

- Total pool value of \$25.5 billion
- PE/VC NAV as of September 30, 2019
- Target Private Equity/Venture Capital allocation of 20%
- Allocation mix: 50% buyouts / 50% venture capital
- Return assumptions: 13% net IRR for buyouts, 14% net IRR for venture capital
- Distributions as a percentage of beginning of year NAV capped at 30%

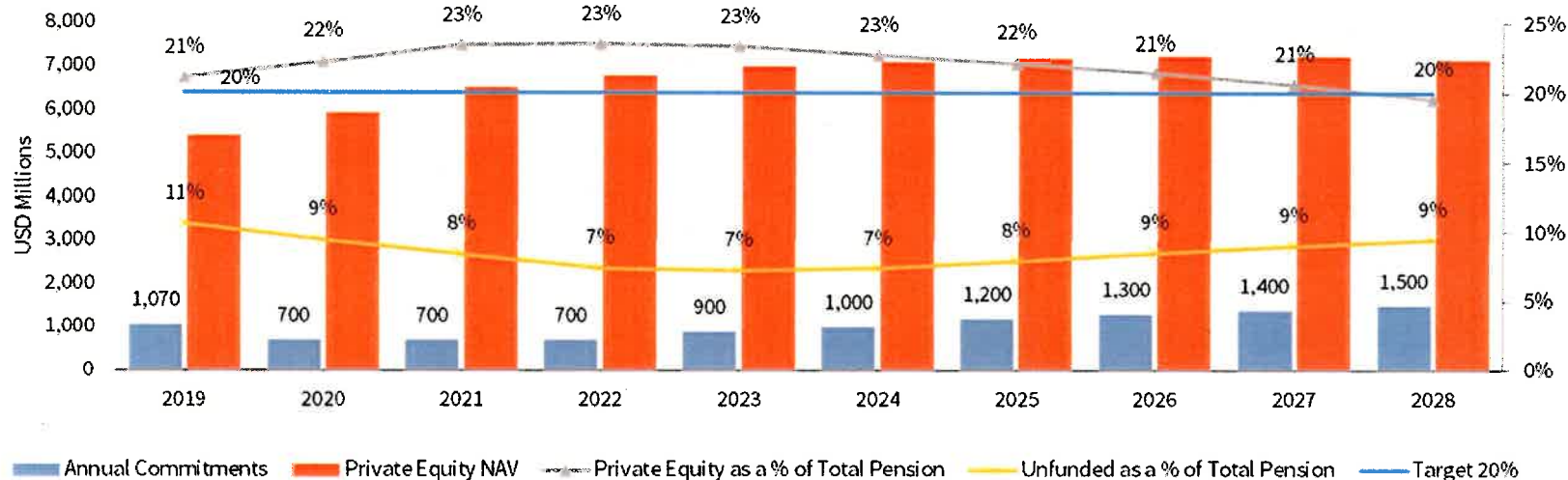
Base Case Assumptions

- Assumes constant annual (nominal) pool growth of 4.0%
- Assumes “normal” market environment assumptions, i.e. normal rates of contributions, distributions, and NAV growth

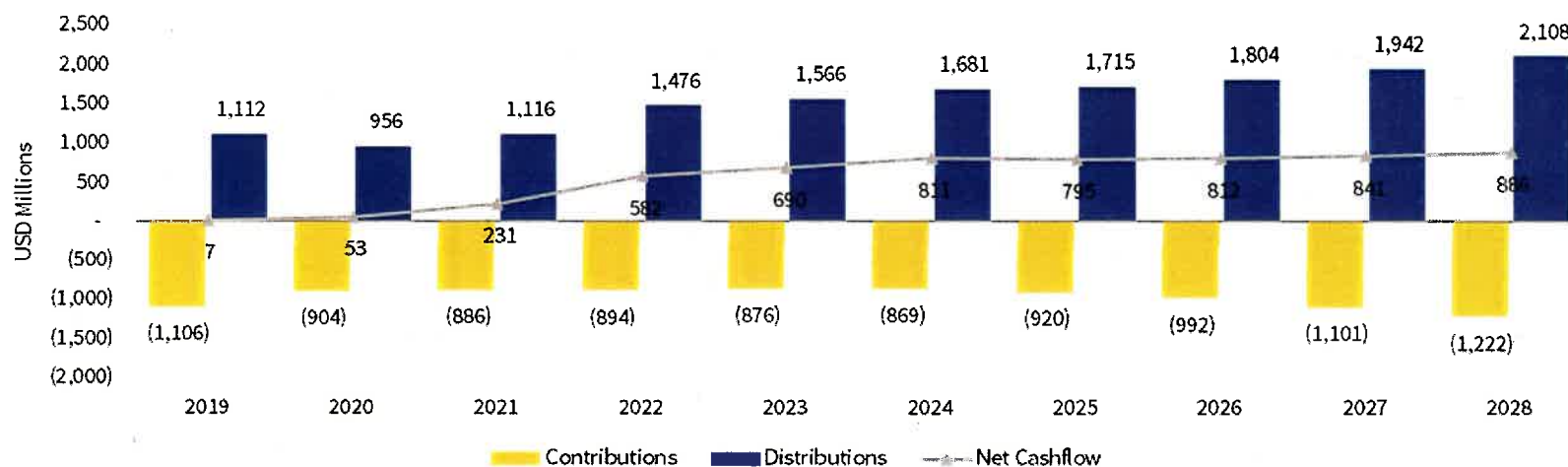
Base Case (4% Pool Growth)

For Illustrative Purposes

COMMITMENT PACE



ESTIMATED ANNUAL CASH FLOWS



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on C/A modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.



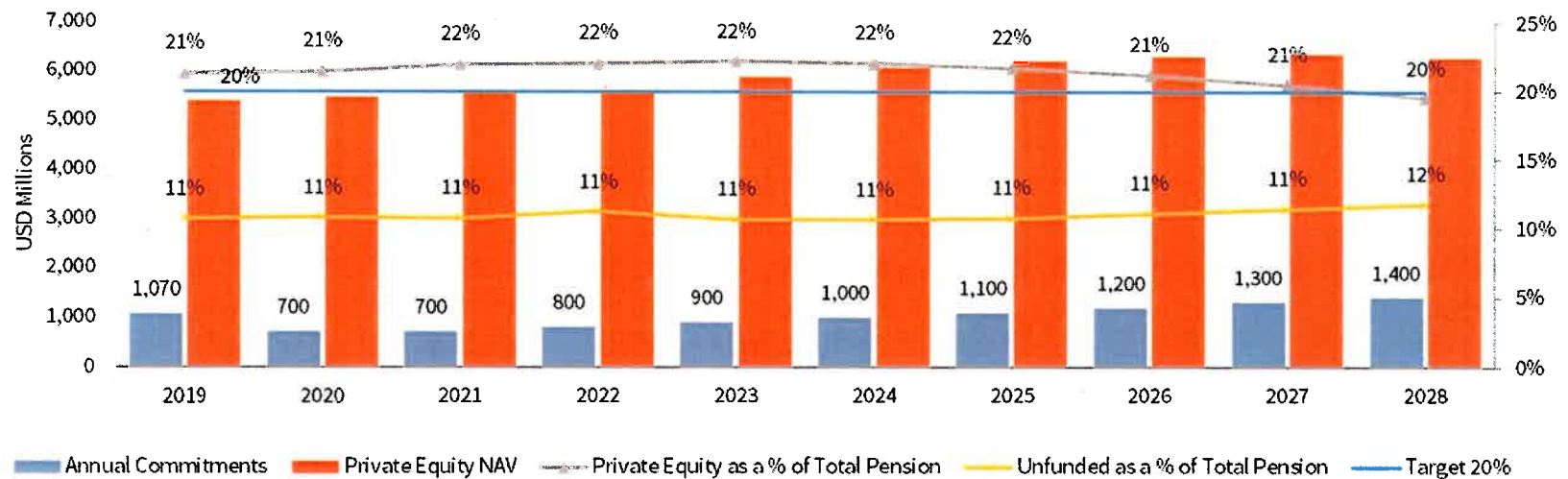
No Growth Assumptions

- Assumes (nominal) pool growth of 0% from 2020-2022, and 4% thereafter
- PE/VC NAV experiences no growth, distributions and contributions are reduced for three years
 - NAV experiences no growth from 2020-2022 and then returns to normal growth in 2023+
 - Distributions are cut by 50% in 2020-2022, before returning to normal in 2023+
 - Contributions are cut by 25% in 2020-2022, before returning to normal in 2023+

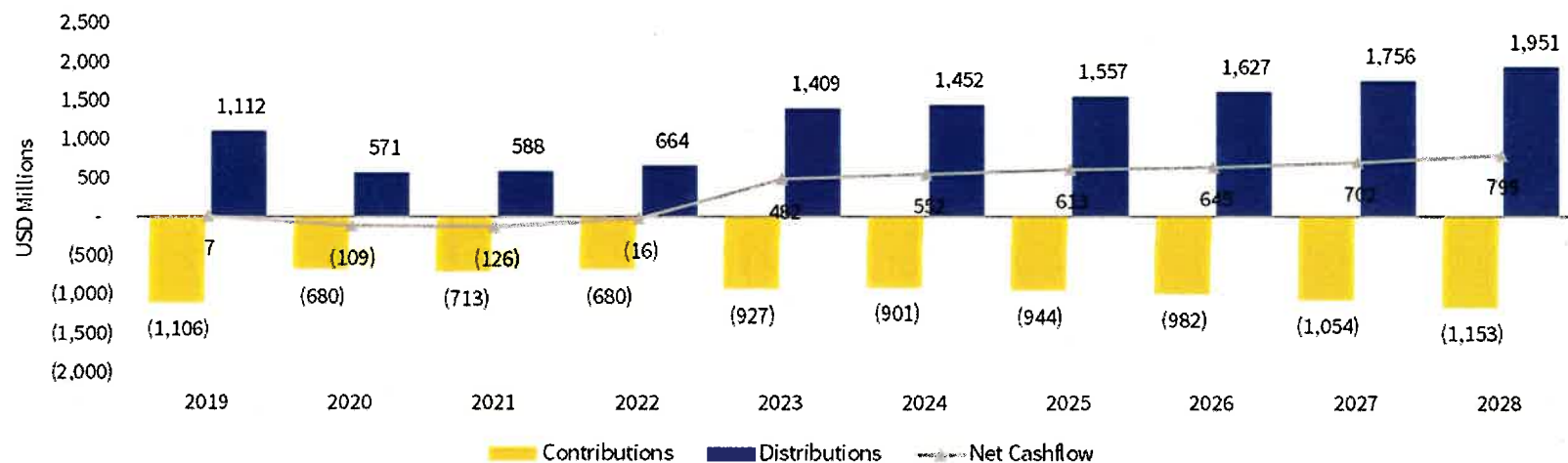
No Growth (0% Pool Growth, 2020-2022)

For Illustrative Purposes

COMMITMENT PACE



ESTIMATED ANNUAL CASH FLOWS



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the "2019E" projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.



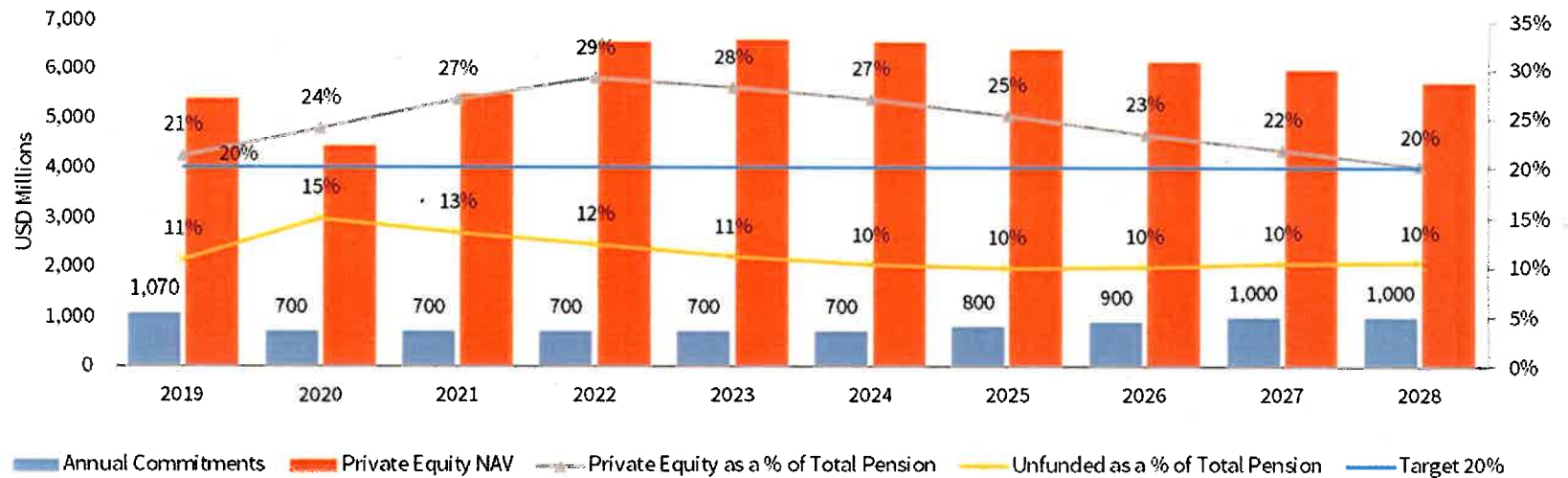
Stress Scenario Assumptions

- Applies GFC-like changes to pool value for 2020-22 (~28% drop in 2020, followed by two years of ~10% gains)
- PE/VC NAV takes a sizable one-time hit, distributions and contributions are reduced for three years
 - NAV takes a 25.7% hit in 2020, before returning to normal growth in 2021+
 - Distributions are cut by 75% in 2020-2022, before returning to normal in 2023+
 - Contributions are cut by 25% in 2020-2022, before returning to normal in 2023+

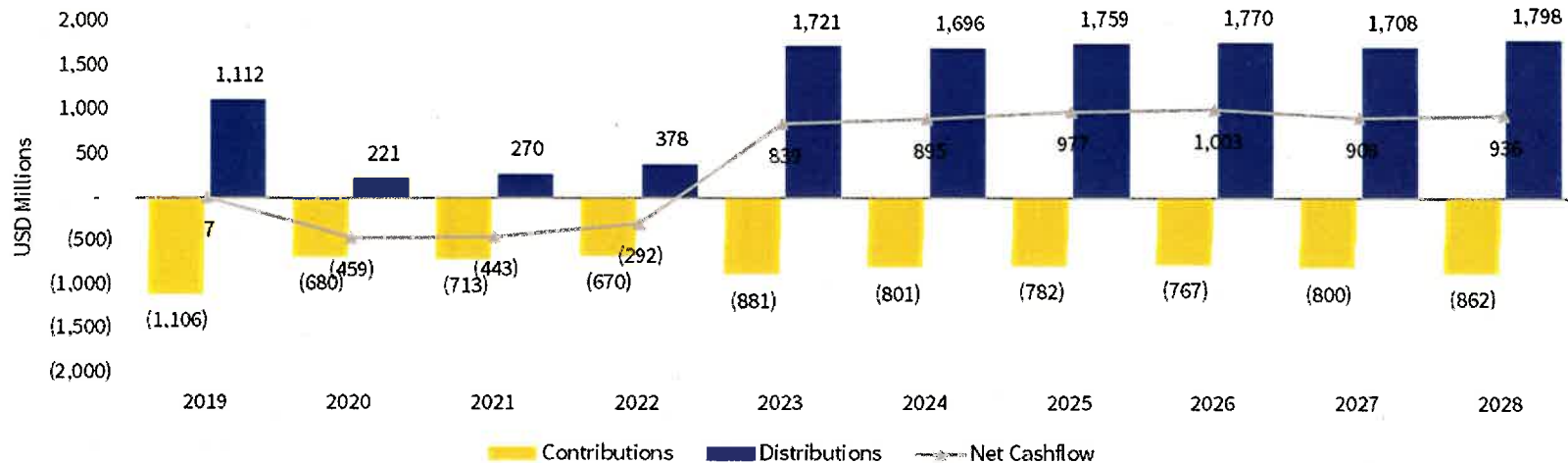
Stress Scenario (2008 Scenario)

For Illustrative Purposes

COMMITMENT PACE



ESTIMATED ANNUAL CASH FLOWS



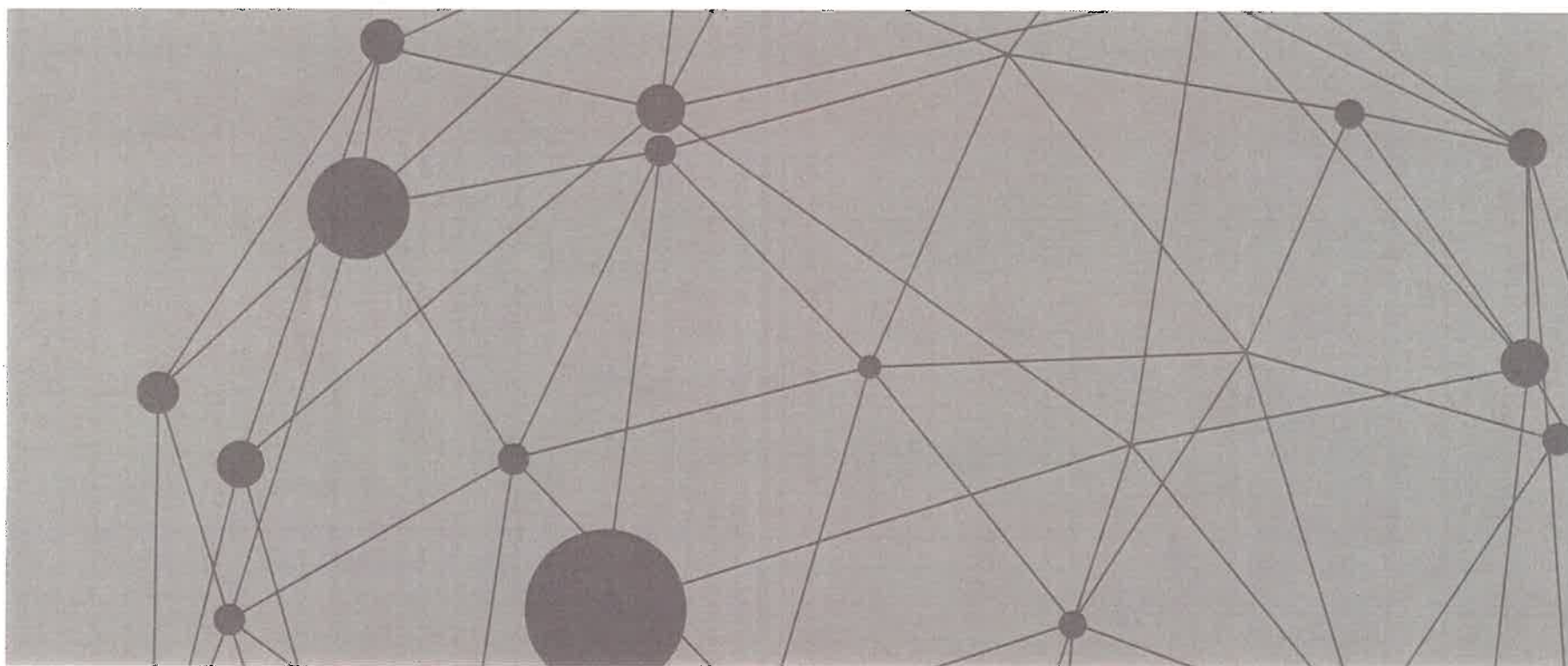
Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

SFERS' PEVC Projected and Actual Cash Flows

	Projected				Actual			
	Commitments	Capital Calls	Distributions	Net Cash Flows	Commitments	Capital Calls	Distributions	Net Cash Flows
2015	\$850	-\$594	\$695	\$102	\$1,200	-\$570	\$465	-\$106
2016	\$850	-\$805	\$806	\$1	\$1,192	-\$691	\$489	-\$202
2017	\$850	-\$888	\$509	-\$379	\$994	-\$932	\$603	-\$329
2018	\$900	-\$984	\$763	-\$221	\$1,370	-\$1,139	\$782	-\$357
2019	\$900	-\$1,045	\$989	-\$55	\$1,070	-\$1,102	\$930	-\$171

Notes: Actual commitments based on year closed. Actual cash flows based on CA data for 2015 – 2018 and Burgiss for 2019. Projected cash flows from July 2019, June 2018 and March 2017 Board Meeting materials, February 2016 and December 2014 strategy materials respectively. Projected cash flows include 17 funds that were transferred to private credit portfolio in 2019. Actual cash flows exclude 17 funds transferred to private credit portfolio. The 17 funds transferred to private credit accounted for \$99.6 million of capital calls and \$179.8 million of distributions from 2015 to 2018. In 2015 they accounted for \$16.1 million in capital calls and \$30.1 million in distributions. In 2016 they accounted for \$63.3 million in capital calls and \$41.6 million in distributions. In 2017 they accounted for \$9.4 million in capital calls and \$67.8 million in distributions. In 2018 they accounted for \$10.9 million in capital calls and \$40.2 million in distributions.

REAL ASSETS COMMITMENT PACING



Modeling Assumptions Overview

Across All Modeled Scenarios

- Total pool value of \$25.5 billion
- Real Assets NAV as of September 30, 2019
- Target Real Assets allocation of 15%
- Allocation mix: 70% Real Estate / 30% Resource Mix
- Return assumptions: 9% net IRR for real estate; 11% net IRR for resources

Base Case Assumptions

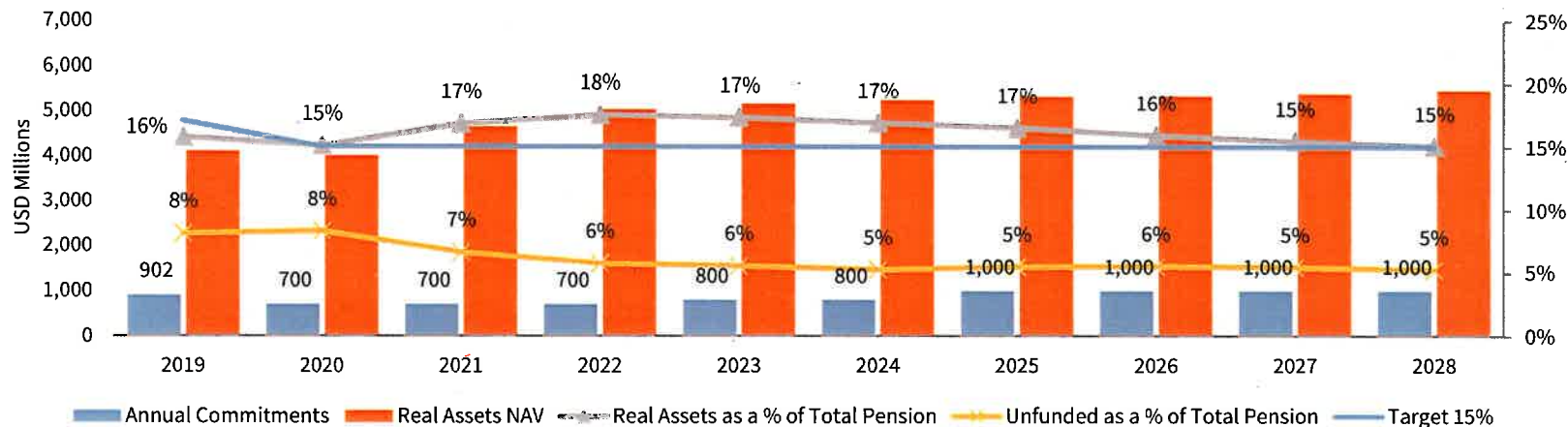
- Assumes constant annual (nominal) pool growth of 4.0%
- Assumes “normal” market environment assumptions, i.e. normal rates of contributions, distributions, and NAV growth

Base Case (4% Pool Growth)

For Illustrative Purposes

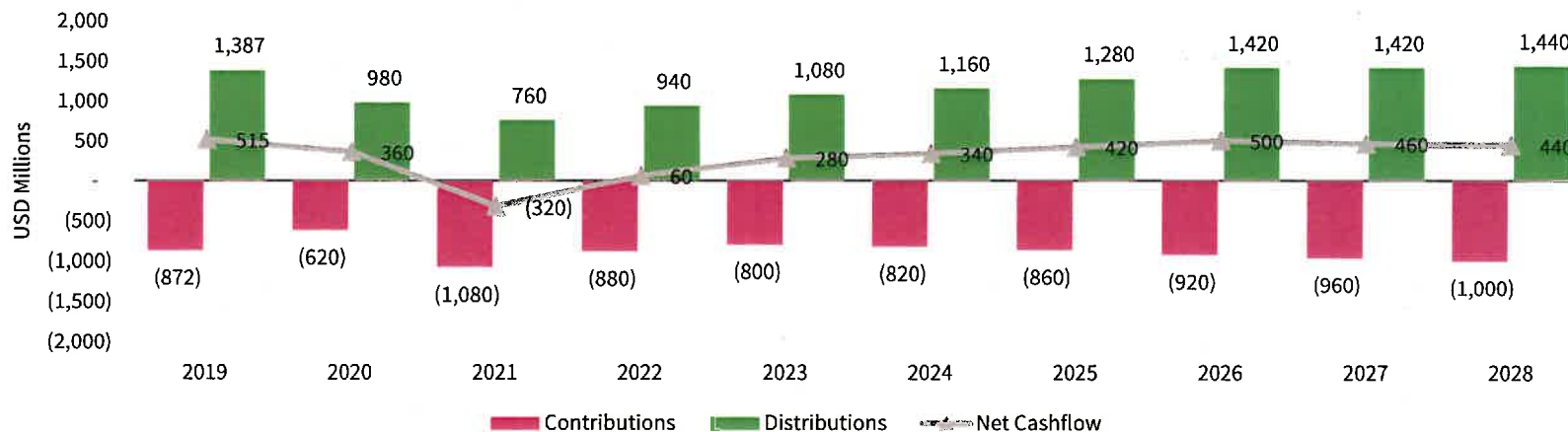
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

No Growth Assumptions

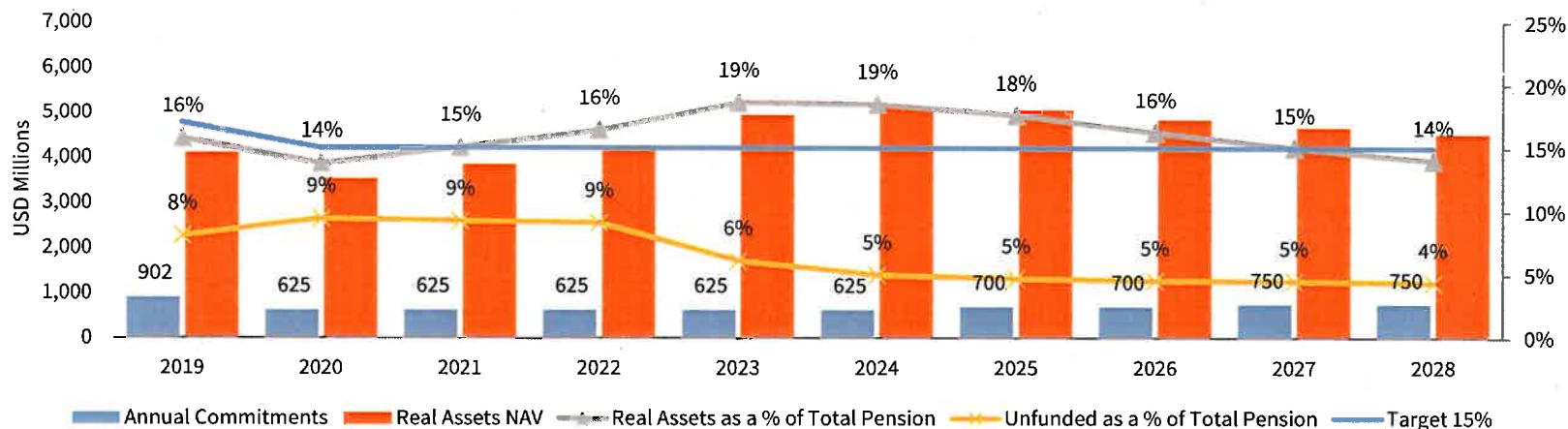
- Assumes (nominal) pool growth of 0% from 2020-2022, and 4% thereafter
- Real Assets NAV experiences no growth, distributions and contributions are reduced for three years
 - NAV experiences no growth from 2020-2022 and then returns to normal growth in 2023+
 - Distributions are cut by 50% in 2020-2022, before returning to normal in 2023+
 - Contributions are cut by 25% in 2020-2022, before returning to normal in 2023+

No Growth (0% Pool Growth, 2020-2022)

For Illustrative Purposes

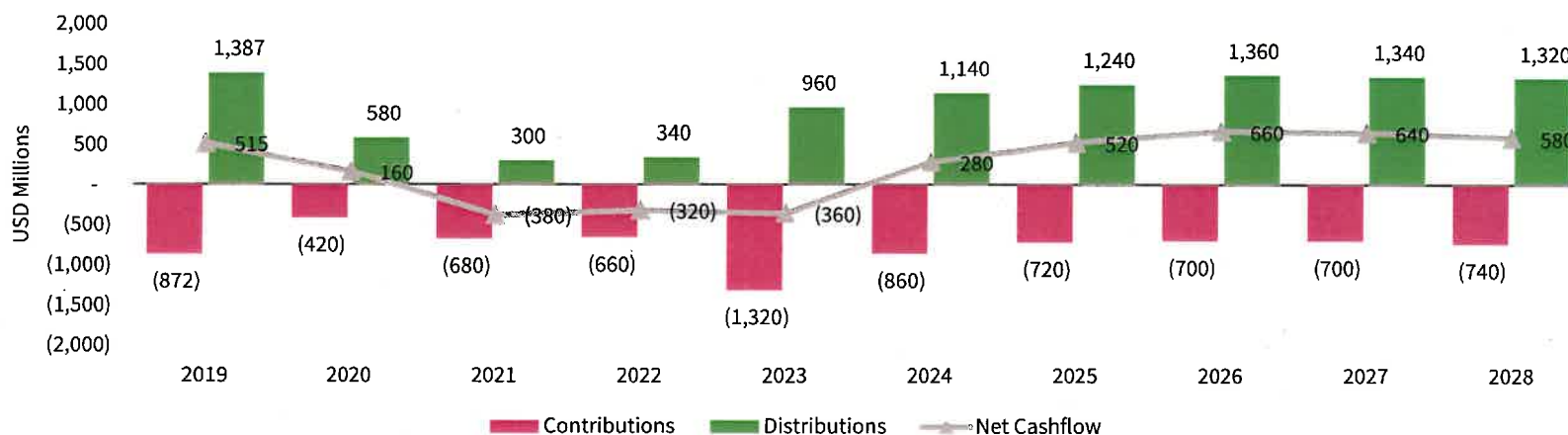
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

Stress Scenario Assumptions

■ Total Pension Growth:

- Rest of Year 2020: -27.6%
- 2021: +10.3%
- 2022: +10.7%
- 4% thereafter

■ Cash Flow Assumptions:

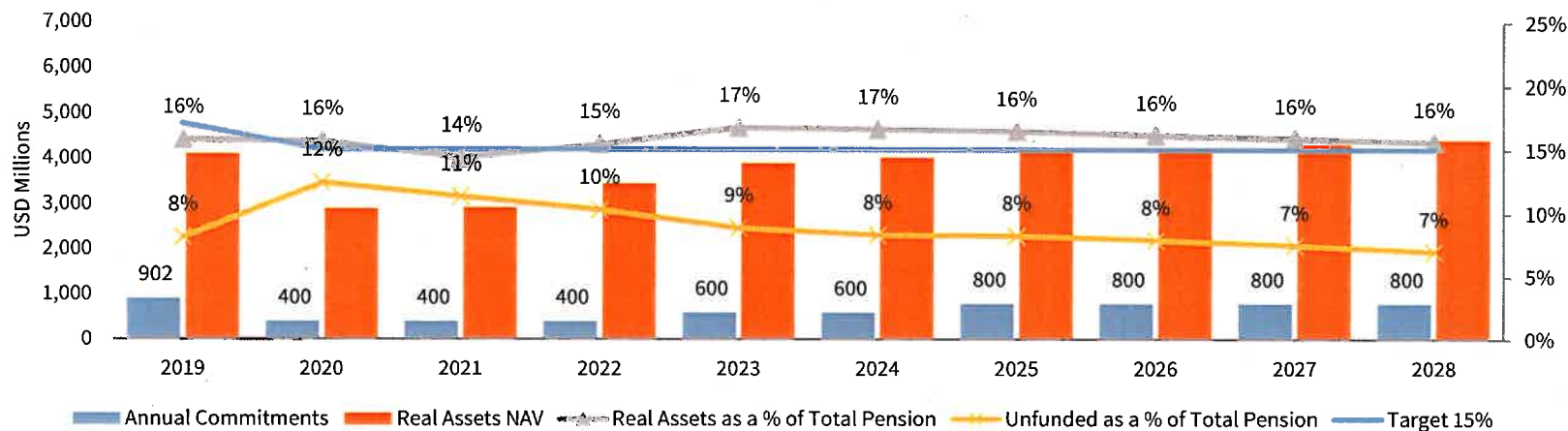
- NAV growth: -27% in 2020; -9% in 2021
- Distributions are cut by 75% in 2020-2022, before returning to normal in 2023+
- Contributions are cut by 25% in 2020-2022, before returning to normal in 2023+

Stress Scenario (2008 Scenario)

For Illustrative Purposes

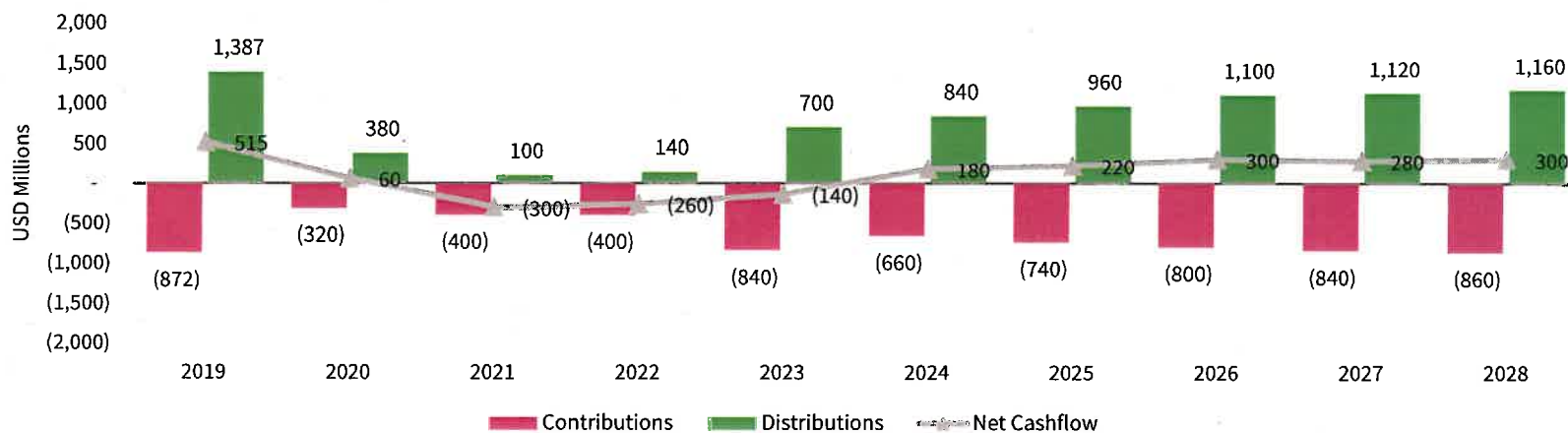
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments closed during 4Q 2019 are included in the 2019 projection. Projected cash flows and allocations are based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

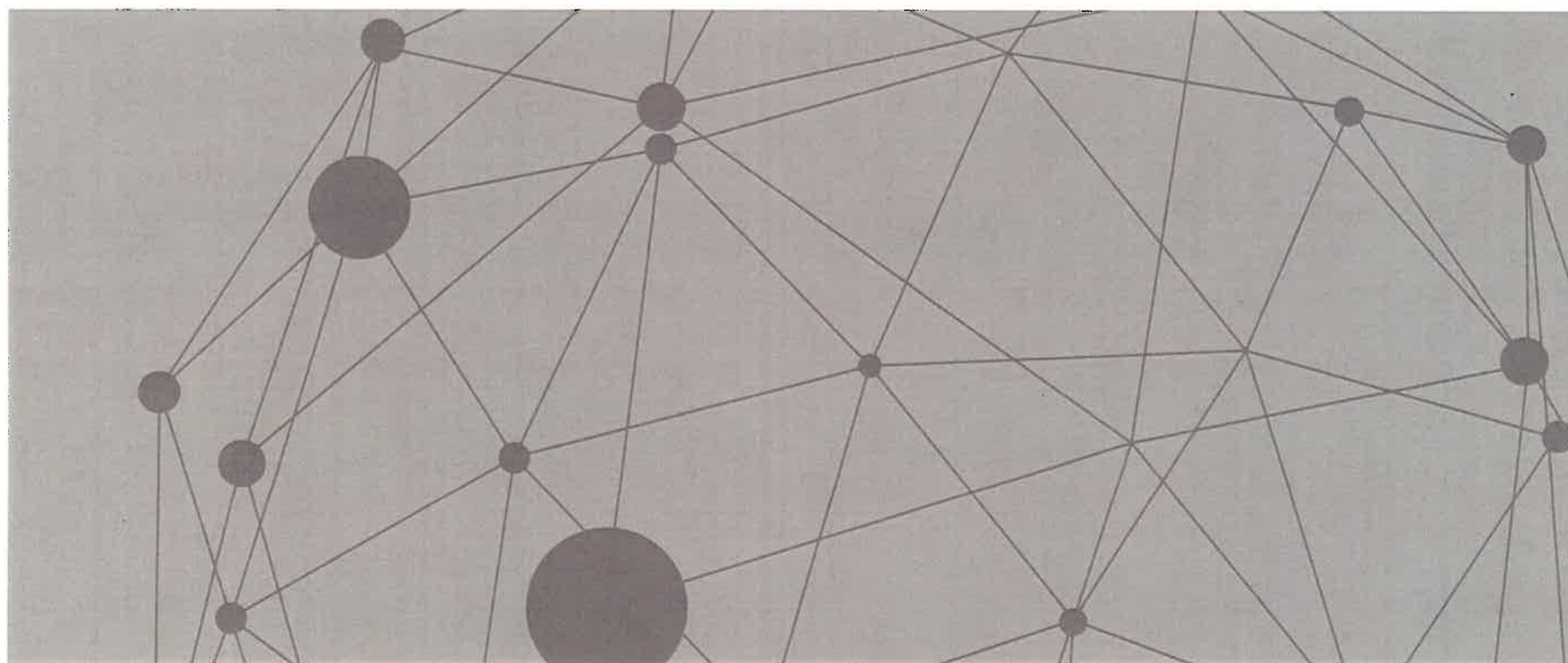
SFERS' Real Assets Projected and Actual Cash Flows

	Projected				Actual			
	Commitments	Capital Calls	Distributions	Net Cash Flows	Commitments	Capital Calls	Distributions	Net Cash Flows
2016	\$700	-\$799	\$341	-\$459	\$943	-\$1,063	\$784	-\$278
2017	\$700	-\$990	\$578	-\$412	\$871	-\$1,151	\$940	-\$211
2018	\$750	-\$1,267	\$307	-\$960	\$934	-\$912	\$624	-\$288
2019	\$800	-\$855	\$985	\$129	\$902	-\$977	\$1,111	\$134



Notes: Actual commitments based on year closed. Actual cash flows based on CA data for 2016 – 2018 and Burgiss data for 2019. Projected cash flows from July 2019, June 2018, March 2017 and March 2016 Board Meeting materials, respectively.

PRIVATE CREDIT COMMITMENT PACING



Modeling Assumptions Overview

Across All Modeled Scenarios

- Total pool value of \$25.5 billion
- Private Credit NAV as of September 30, 2019
- Target Private Credit allocation of 10%
- Return assumptions: 10% net IRR

Base Case Assumptions

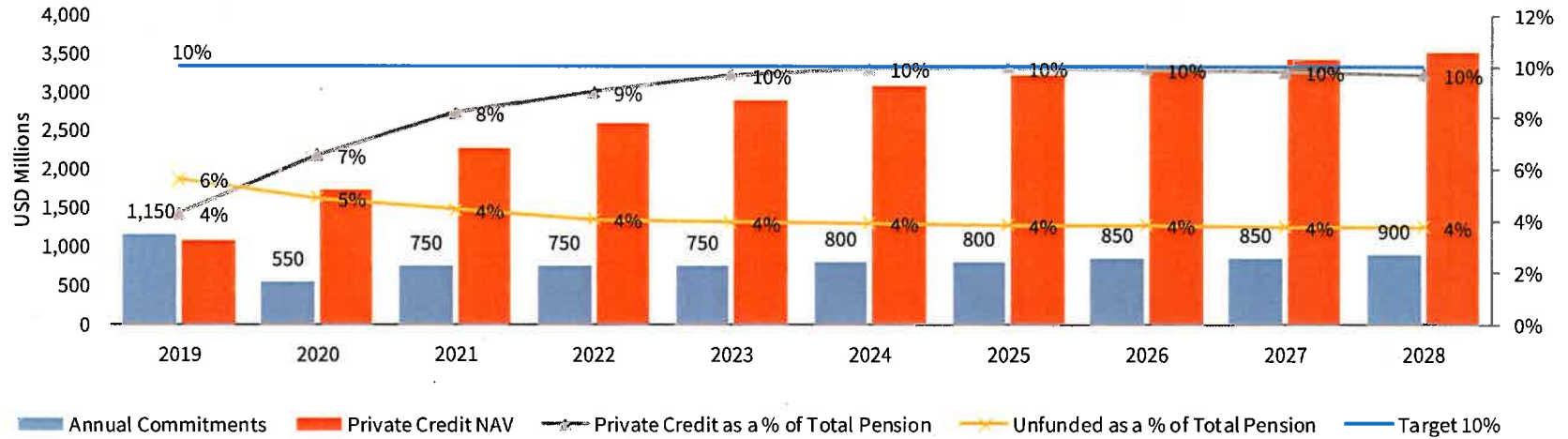
- Assumes constant annual (nominal) pool growth of 4.0%
- Assumes “normal” market environment assumptions for contributions and NAV growth
- Given current market environment, and for purposes of more conservative cash flow forecasting assumes 50% less distributions in 2020 (with a lagged uptick of 25% in distributions in 2022)

Base Case (4% Pool Growth)

For Illustrative Purposes

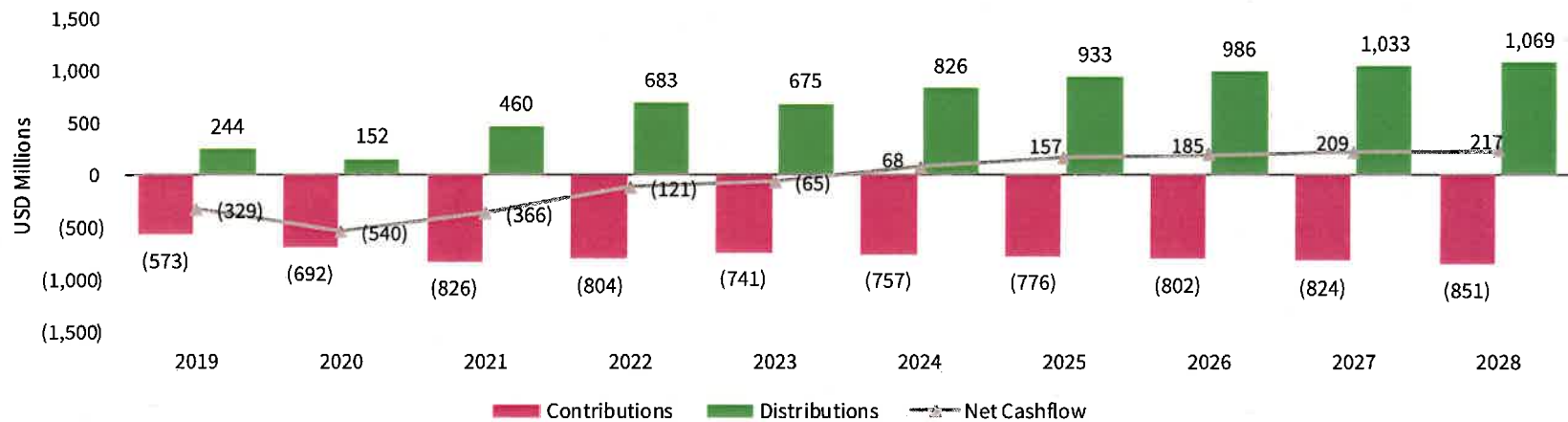
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments approved/closed during 4Q 2019 are included in the 2019 projection. Private Credit portfolio includes 17 funds transferred from Private Equity portfolio. Projected cash flows and allocations based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

No Growth Assumptions

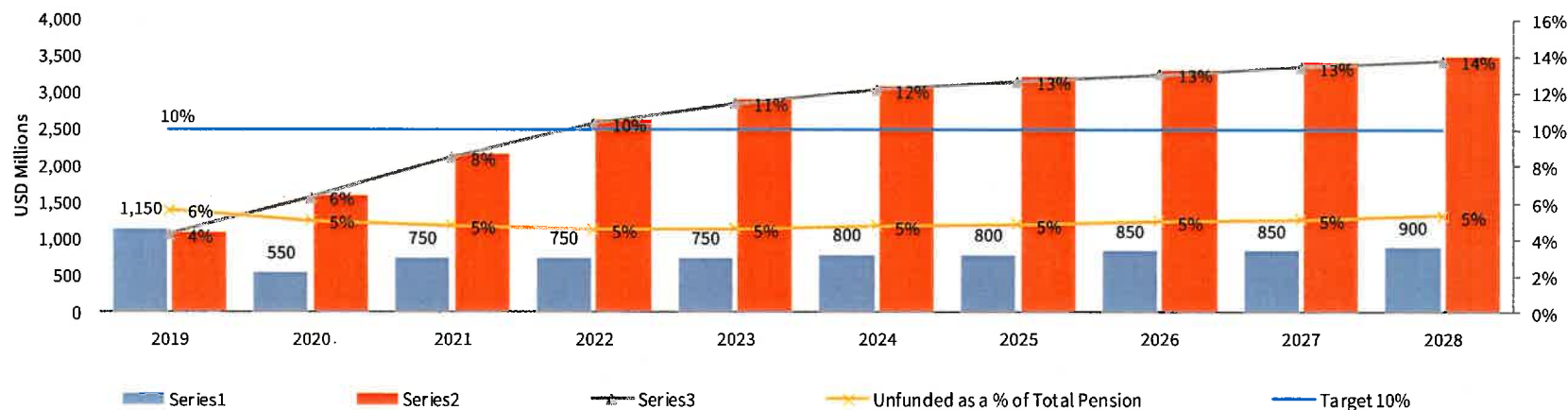
- Assumes flat (0.0%) pool growth
- In 2020, PC NAV is marked down by 10% and distributions are cut in half, while contributions rate is kept normal; then normal assumptions applied in 2021 and forward

No Growth (0% Pool Growth)

For Illustrative Purposes

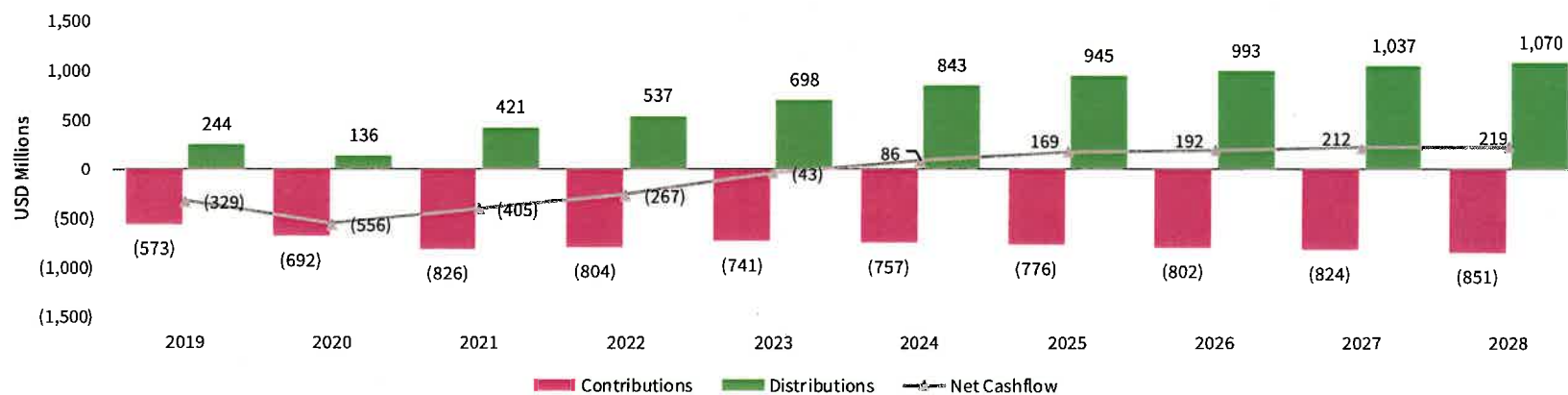
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments approved/closed during 4Q 2019 are included in the 2019 projection. Private Credit portfolio includes 17 funds transferred from Private Equity portfolio. Projected cash flows and allocations based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

Stress Scenario Assumptions

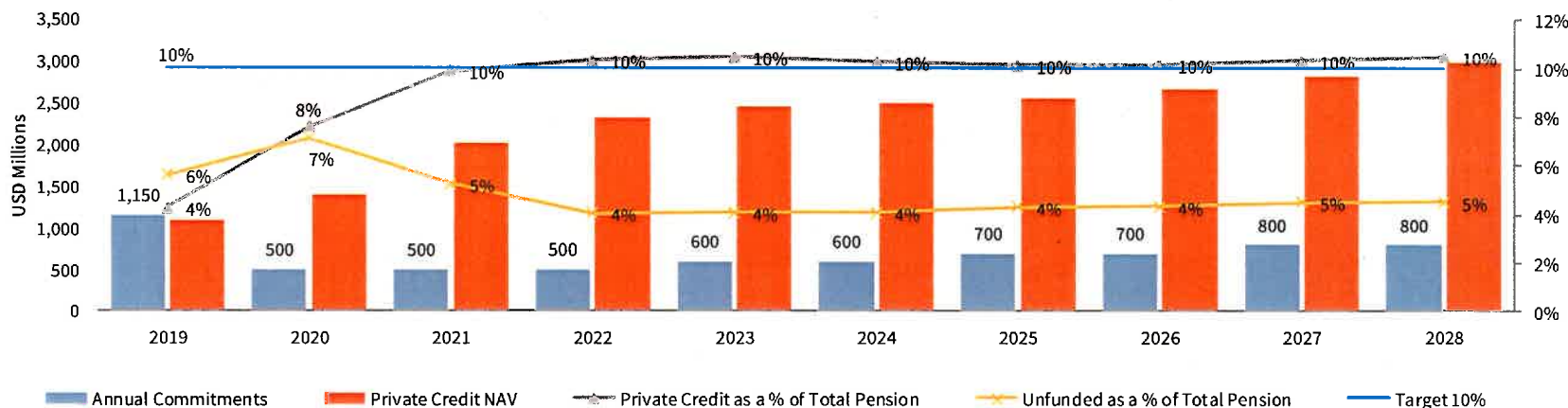
- Applies GFC-like changes to pool value for 2020-22 (~28% drop in 2020, followed by two years of ~10% gains)
- PC NAV takes a sizable one-time hit, distributions are slashed for two years, while contributions are kept normal
 - NAV takes a 20% hit in 2020 and experiences no growth, then retuning to normal growth in 2021+
 - Distributions are cut by two-thirds in 2020 and one-third in 2021, before returning to normal in 2022+
 - Assumes slight (10%) decline in contributions in 2020, but otherwise normal in 2021+

Stress Scenario (2008 Scenario)

For Illustrative Purposes

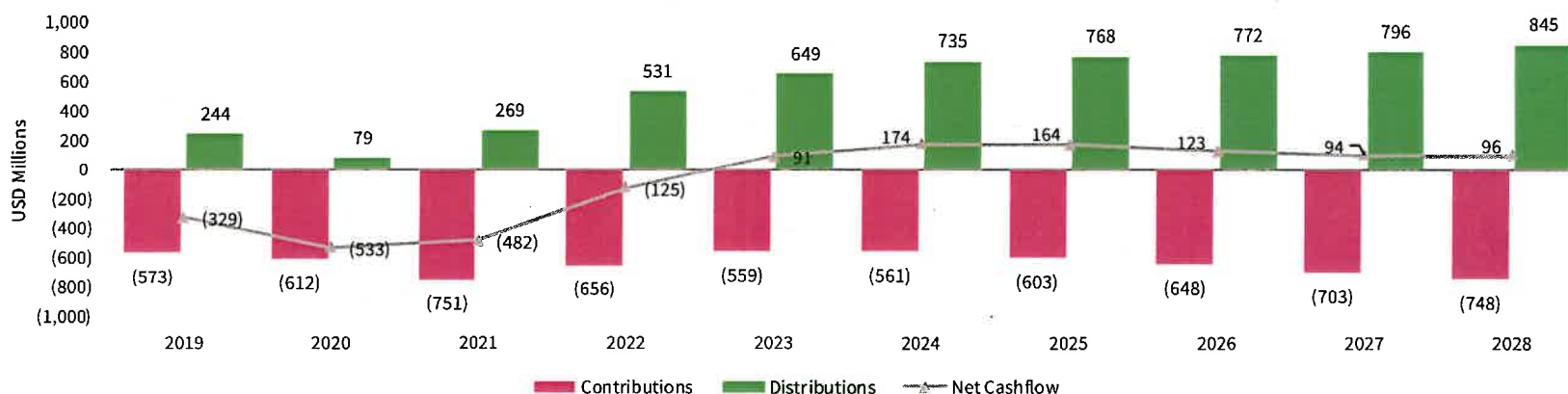
COMMITMENT PACE

September 30, 2019



ESTIMATED ANNUAL CASH FLOWS

September 30, 2019



Note: Model populated with historical portfolio data as of September 30, 2019. Commitments approved/closed during 4Q 2019 are included in the 2019 projection. Private Credit portfolio includes 17 funds transferred from Private Equity portfolio. Projected cash flows and allocations based on CJA modeling and proprietary assumptions. Modeling is intended to be used as a guideline; actual capital calls, distributions, and exposure may differ materially from projections, depending on macroeconomic and fund-specific variables.

SFERS' Private Credit Projected and Actual Cash Flows

	Projected				Actual			
	Commitments	Capital Calls	Distributions	Net Cash Flows	Commitments	Capital Calls	Distributions	Net Cash Flows
2018	\$700	-\$356	\$121	-\$235	\$550	-\$295	\$195	-\$100
2019	\$750	-\$684	\$284	-\$401	\$1,150	-\$521	\$199	-\$323



Notes: Actual commitments based on year closed. Actual cash flows based on CA data for 2018 and Burgiss data for 2019. Projected cash flows from June 2018 and July 2019 Board Meeting materials. Projected cash flows exclude 17 funds transferred to private credit portfolio in 2019. Actual cash flows include 17 funds transferred to private credit portfolio. The 17 funds transferred to private credit accounted for \$99.6 million of capital calls and \$179.8 million of distributions from 2015 to 2018. In 2018 they accounted for \$10.9 million in capital calls and \$40.2 million in distributions.

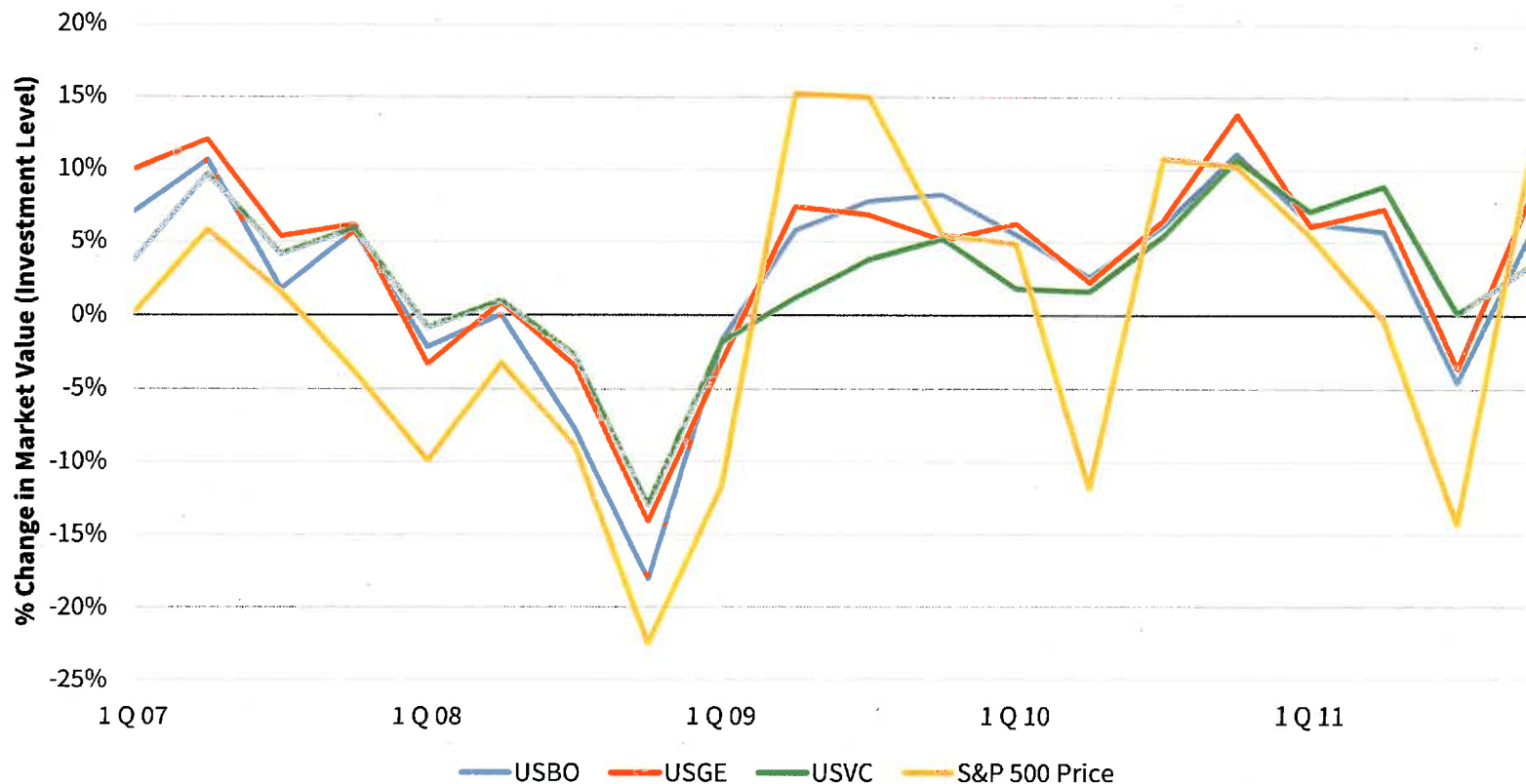
SUPPLEMENTAL ANALYSIS



During the GFC, Private Investment Valuation Fluctuations Were Less Volatile Than Those of the S&P 500

U.S. BUYOUTS, GROWTH EQUITY, AND VENTURE CAPITAL QUARTERLY MARKET VALUE FLUCTUATIONS VERSUS S&P 500 PRICE RETURN

January 1, 2007 - December 31, 2011



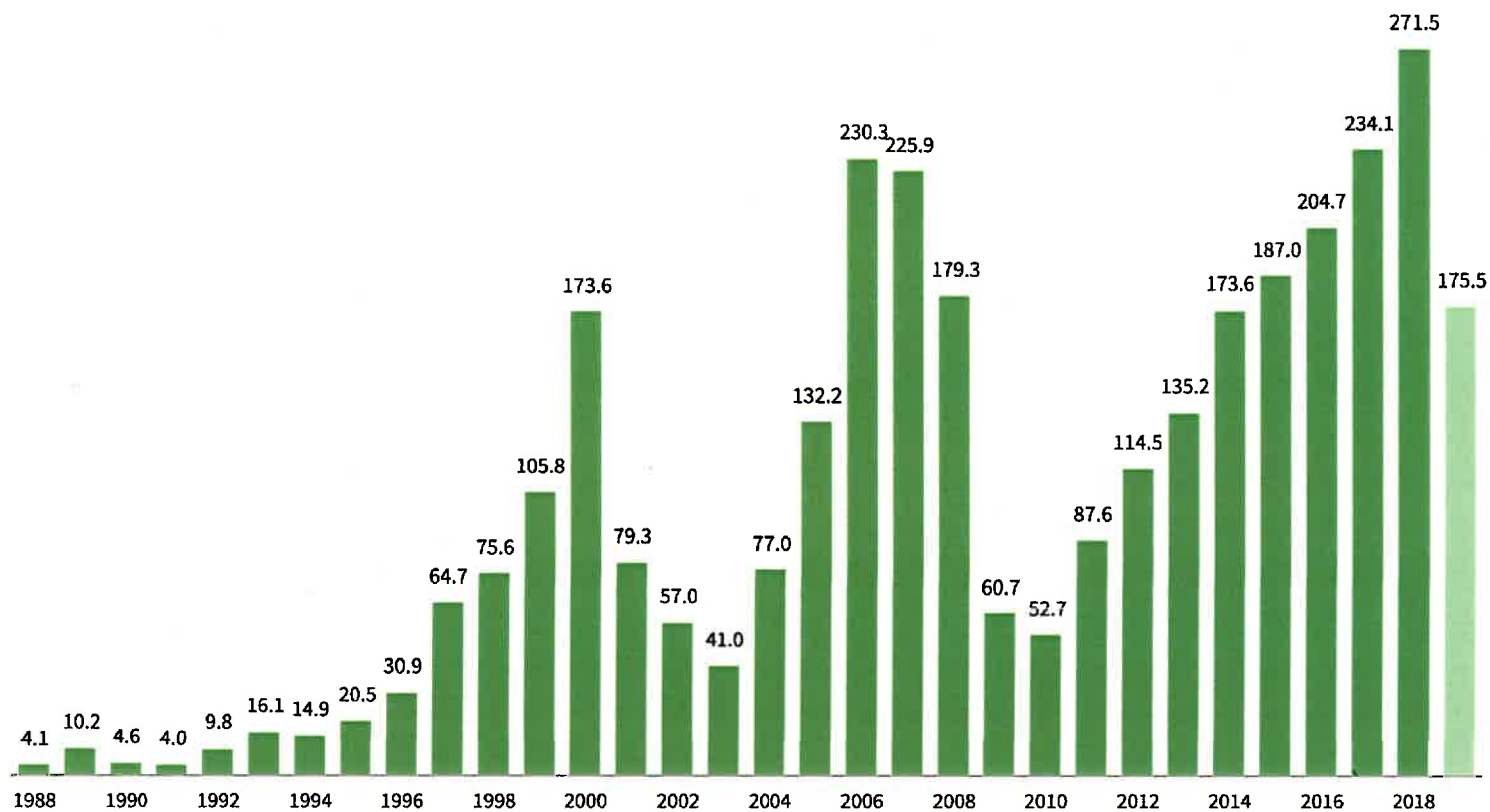
	1Q 07	2Q 07	3Q 07	4Q 07	1Q 08	2Q 08	3Q 08	4Q 08	1Q 09	2Q 09	3Q 09	4Q 09	1Q 10	2Q 10	3Q 10	4Q 10	1Q 11	2Q 11	3Q 11	4Q 11
USBO	7%	11%	2%	6%	-2%	0%	-8%	-18%	-2%	6%	8%	8%	6%	3%	6%	11%	6%	6%	-5%	6%
USGE	10%	12%	5%	6%	-3%	1%	-3%	-14%	-3%	7%	7%	5%	6%	2%	6%	14%	6%	7%	-4%	8%
USVC	4%	10%	4%	6%	-1%	1%	-3%	-13%	-2%	1%	4%	5%	2%	2%	5%	11%	7%	9%	0%	3%
S&P 500 PRICE	0%	6%	2%	-4%	-10%	-3%	-9%	-23%	-12%	15%	15%	5%	5%	-12%	11%	10%	5%	0%	-14%	11%

Sources: Cambridge Associates LLC Private Investments Database and Standard & Poor's.

Notes: Data as of September 30, 2019. Returns shown for private investments are the quarter-over-quarter (end-to-end) percent change in total market value for investments made by U.S. buyout, growth equity, and venture capital funds in each time period and are gross of fees and expenses. S&P 500 return represents quarter-over-quarter price return for the S&P 500 Index and excludes returns from dividends and interest.

Fundraising Slowed Following Financial Crisis

CAPITAL COMMITMENTS TO US PRIVATE EQUITY & VENTURE CAPITAL FUNDS
1988–2019 • US Dollars (billions)

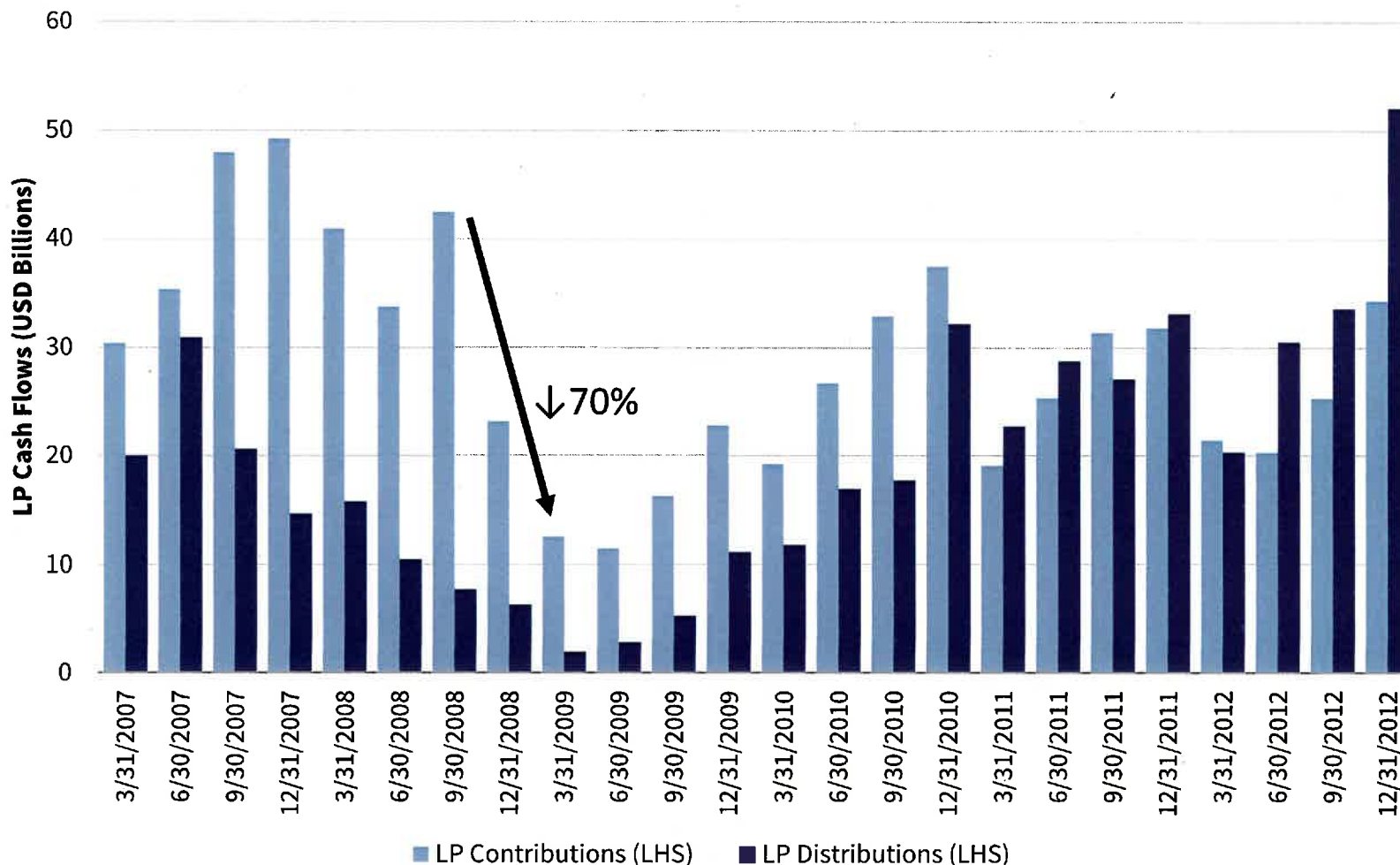


Sources: Dow Jones VentureSource, National Venture Capital Association, and PitchBook.
Notes: 2019 data are as of June 30.



If History Repeats Itself, Expect Fewer Capital Calls, But Subscription Lines Add Complexity

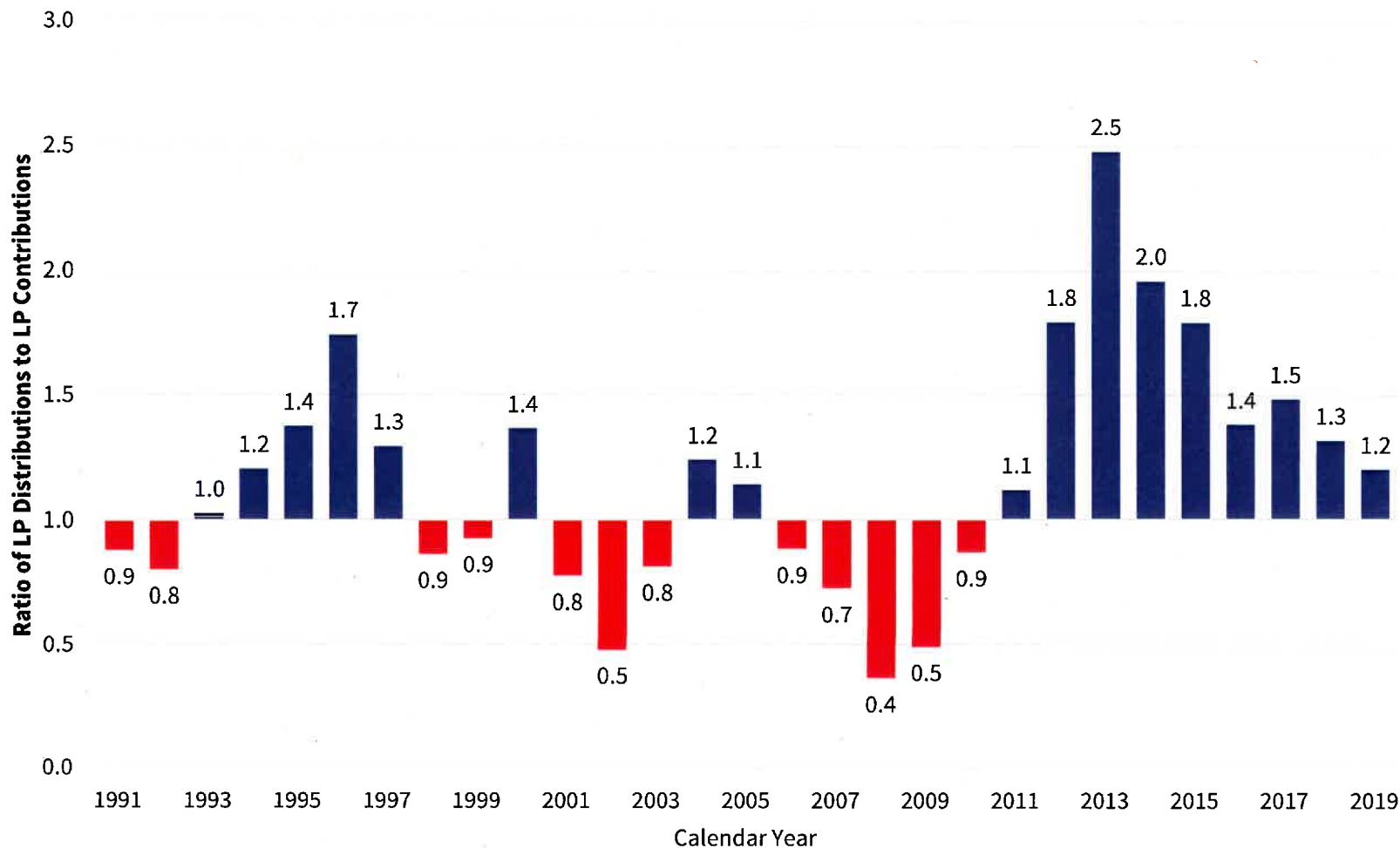
GLOBAL PRIVATE EQUITY: LP CASH FLOWS AND NAV – CALENDAR YEARS 2007-2012
As of September 30, 2019



Source: Cambridge Associates LLC.
Notes: Includes funds formed between 2000-2012 based on date of legal inception. Private equity includes buyout and growth equity funds. Cash flows are net of recallable returns of capital.

The Expected Stall on Exit Activity Will Result in More Capital Being Called Than Returned

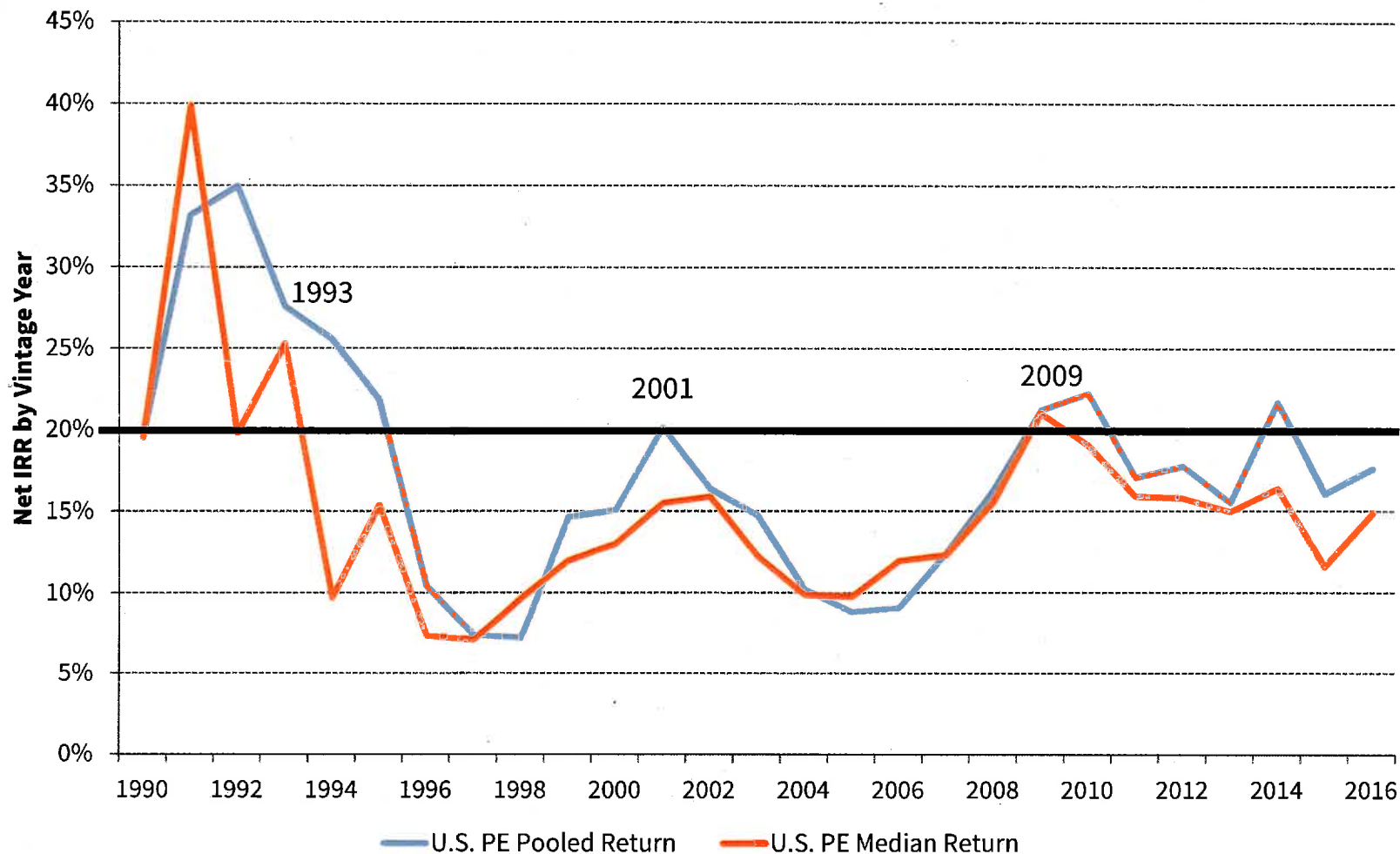
CASH FLOW CYCLE – U.S. PRIVATE EQUITY AND VENTURE CAPITAL 1991-2019
 As of September 30, 2019 • Ratio of annual LP distributions to LP contributions



Source: Cambridge Associates LLC Private Investments Database.
 Note: Cash flow ratio is LP distributions divided by LP contributions. Distributions are net of recallable returns of capital. Private equity includes buyout and growth equity funds. 2019 data reflect activity for the first nine months of the year and are through September 30, 2019.

Maintaining Private Investment Activity During Periods of Volatility Can Benefit a Program

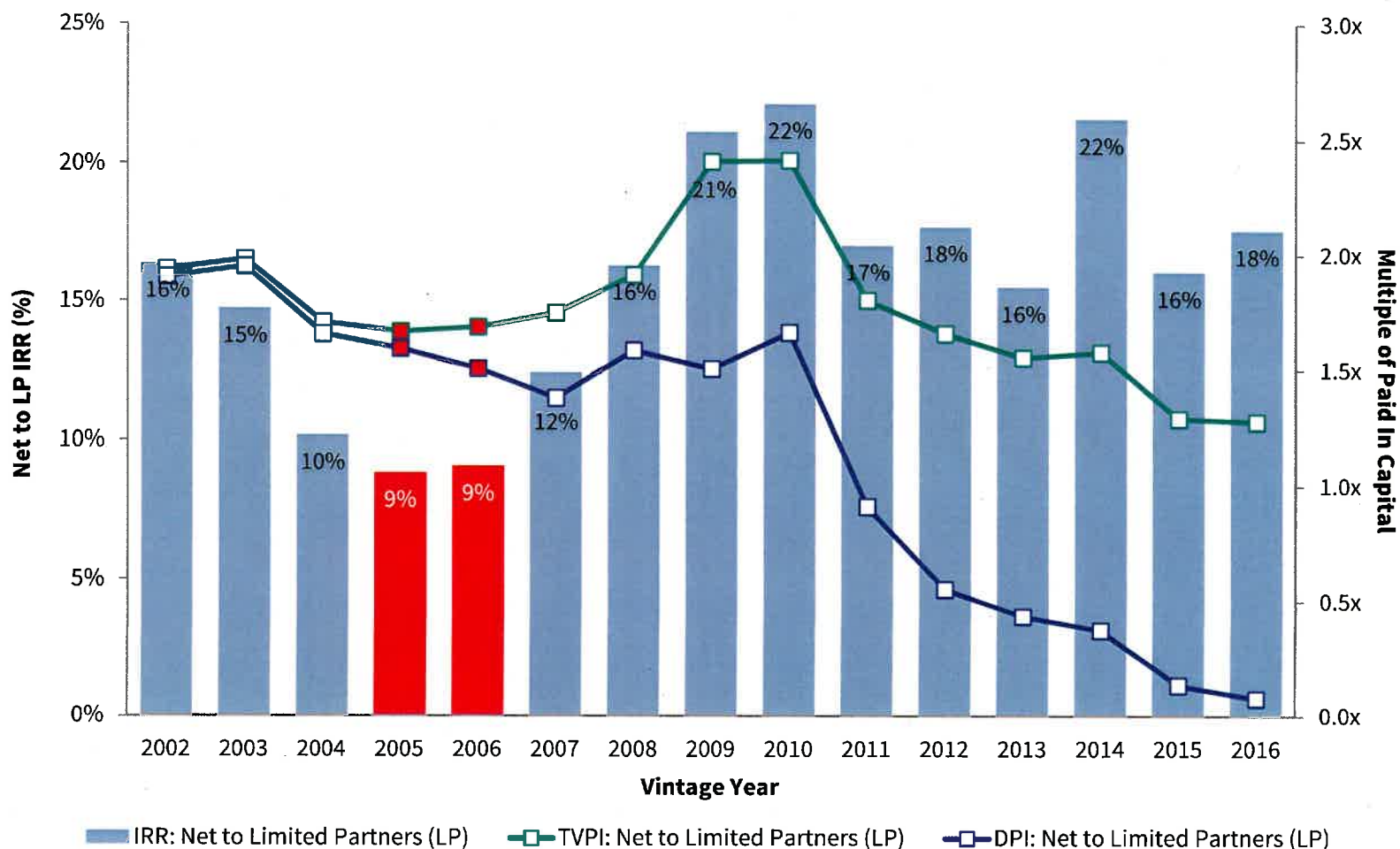
US PRIVATE EQUITY: NET POOLED IRRS AND MEDIAN FUND IRRS BY VINTAGE YEAR
As of September 30, 2019



Source: Cambridge Associates LLC Private Investments Database.
Notes: Pooled and median net internal rates of return of US private equity funds by vintage year. Private equity includes buyouts and growth equity. Vintage year funds after 2016 are considered too young to have produced meaningful results. Private equity includes growth equity and buyout.

Vintages Fully Invested Now are Most at Risk; PE Funds Raised During and Coming Out of the GFC Have Been Strong Performers

U.S. PRIVATE EQUITY: NET POOLED IRRS AND FUND MULTIPLES BY VINTAGE YEAR
As of September 30, 2019



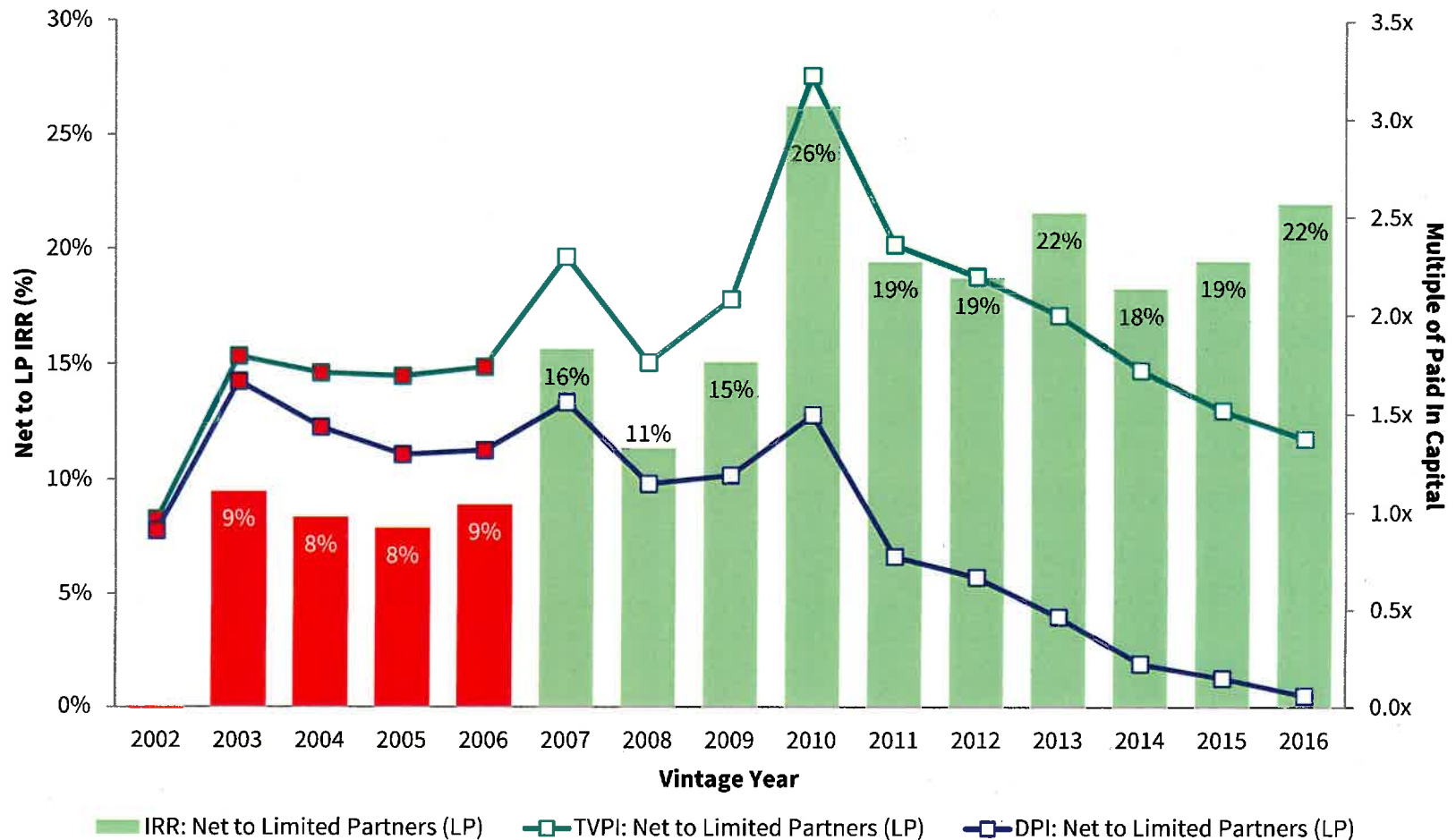
Source: Cambridge Associates LLC Private Investments Database.

Notes: Based on data compiled from 710 US buyout and growth equity funds, including fully liquidated partnerships, formed between 2002 and 2016. Internal rates of return are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful.

In Venture, Funds Raised During the GFC and its Aftermath Have Posted Double-Digit Returns

U.S. VENTURE CAPITAL: NET POOLED IRRS AND FUND MULTIPLES BY VINTAGE YEAR

As of September 30, 2019

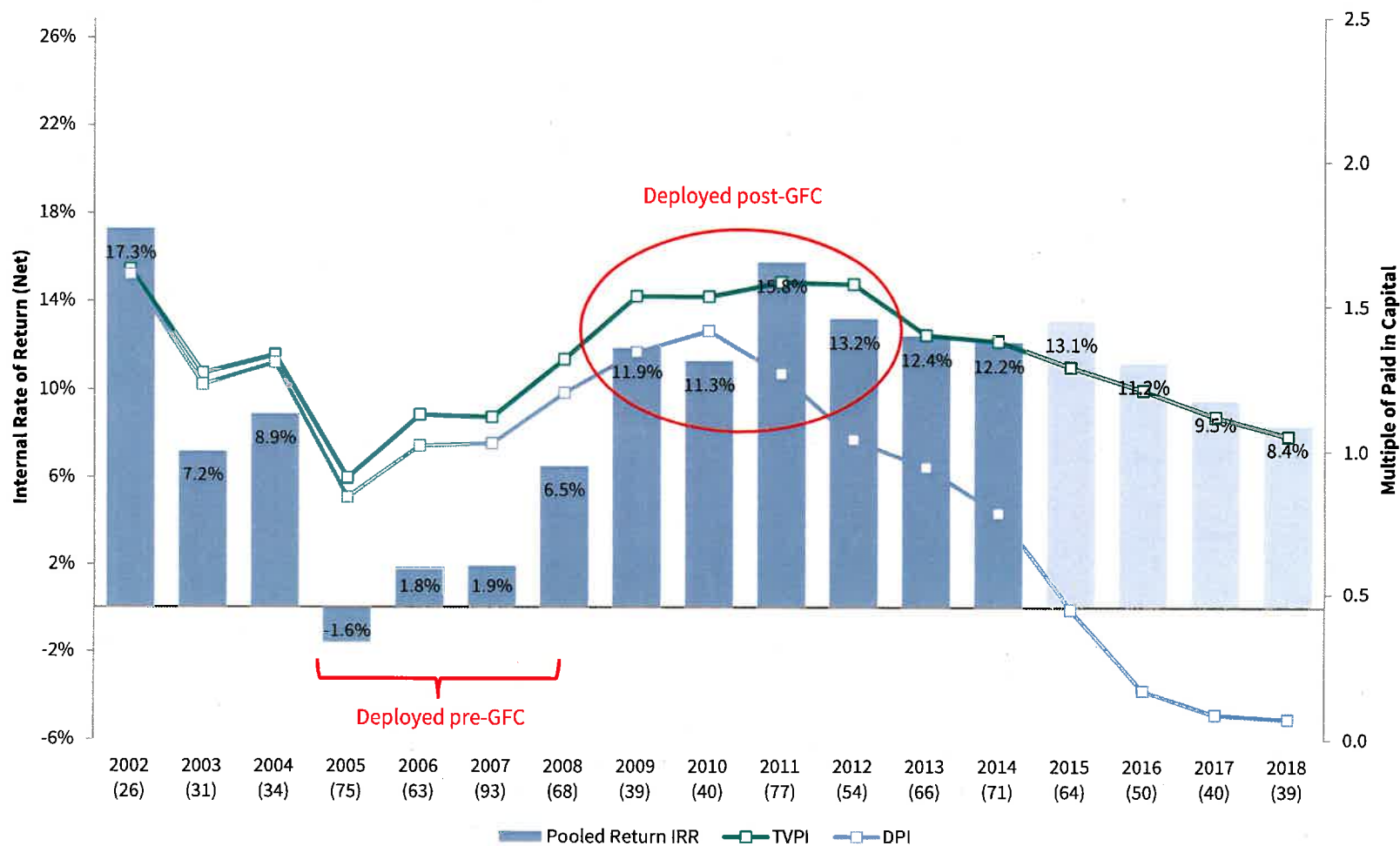


Source: Cambridge Associates LLC Private Investments Database.

Notes: Based on data compiled from 863 US venture capital funds, including fully liquidated partnerships, formed between 2002 and 2016. Internal rates of return are net of fees, expenses and carried interest. CA research shows that most funds take at least six years to settle into their final quartile ranking, and previous to this settling they typically rank in 2-3 other quartiles; therefore fund or benchmark performance metrics from more recent vintage years may be less meaningful. 2002 return is -0.6%. Axis minimum held at 0% for formatting purposes.

Consistent Commitment Pace Key to Generating Strong Returns Over Long Term

REAL ESTATE PERFORMANCE BY VINTAGE YEAR
As of September 30, 2019



Source: Cambridge Associates LLC Private Investments Database. Vintage year is based on First cash flow methodology. Fund counts included under each vintage year. Light blue shade indicates vintage years that are still immature. Values for vintage years 2015-2018 are NM.

Real Assets Indices Generally Have Performed Well During Tumultuous Periods

	9/11 Attacks & SARS Epidemic (September 2001 - July 2003)		Global Financial Crisis (October 2007 - March 2009)	
	During	Subsequent 12 Months	During	Subsequent 12 Months
Diversified Natural Resources				
MSCI World Natural Resources	-2.0	35.0	-33.2	47.0
Energy / Oil & Gas				
S&P 500 Energy	-4.7	39.7	-28.8	29.5
WTI Crude	6.2	43.4	-28.2	68.7
Metals & Mining				
Market Vectors Junior Gold Miners Index	---	---	-38.9	83.3
Gold Bullion	14.6	10.0	14.9	21.5
MLPs				
Alerian MLP Index	12.2	14.0	-19.3	71.7
Commodity Futures				
S&P GSCI	6.7	35.0	-34.2	25.9
Real Estate				
FTSE NAREIT North America Index	10.0	22.2	-49.8	112.1
FTSE NAREIT Developed Europe Real Estate Index	13.6	47.1	-50.9	69.9
FTSE NAREIT Developed Asia Real Estate Index	-2.1	45.2	-47.2	67.0
NCREIF ODCE Index	5.0	8.2	-14.3	20.1
Equities				
MSCI All Country World Index	-4.7	17.8	-36.4	55.5
S&P 500 Index	-5.3	13.2	-33.5	49.8
MSCI EAFE Index	-5.0	25.0	-38.8	54.4
MSCI Emerging Markets Index	11.7	23.1	-38.0	81.1
Fixed Income & Rates				
Bloomberg Barclays Aggregate Bond Index	6.1	4.8	5.6	7.7
10-Year Treasuries	5.8	5.3	14.8	-6.3
30-Year Treasuries	5.0	8.3	19.8	-14.5
3-Month LIBOR	1.7	1.2	3.1	0.4

Source: Thomson Reuters Datastream





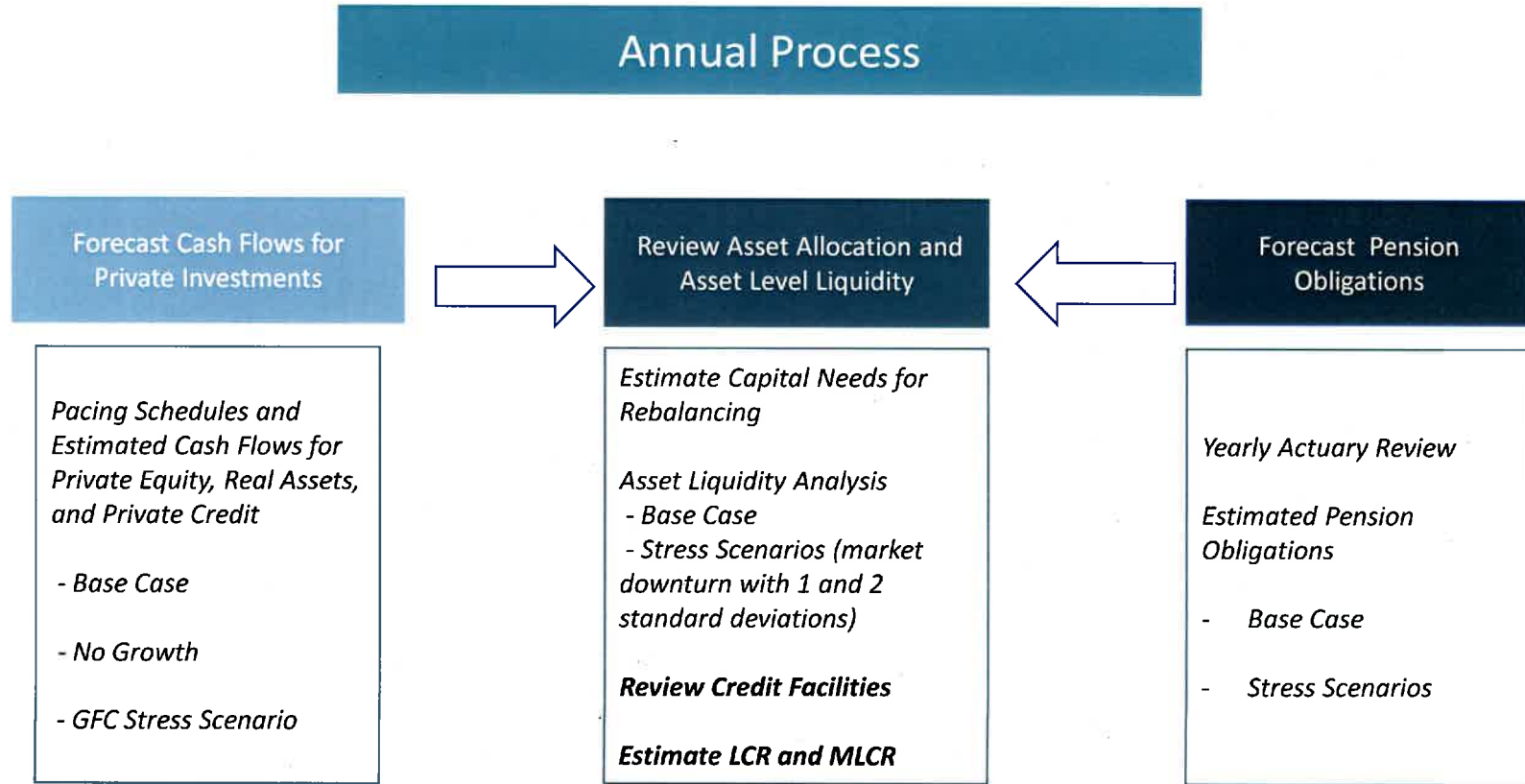
SFERS
San Francisco Employees' Retirement System

San Francisco Employee's Retirement System

Liquidity Management Update

Board Meeting April 22nd, 2020

SFERS Liquidity Management Framework | Overview

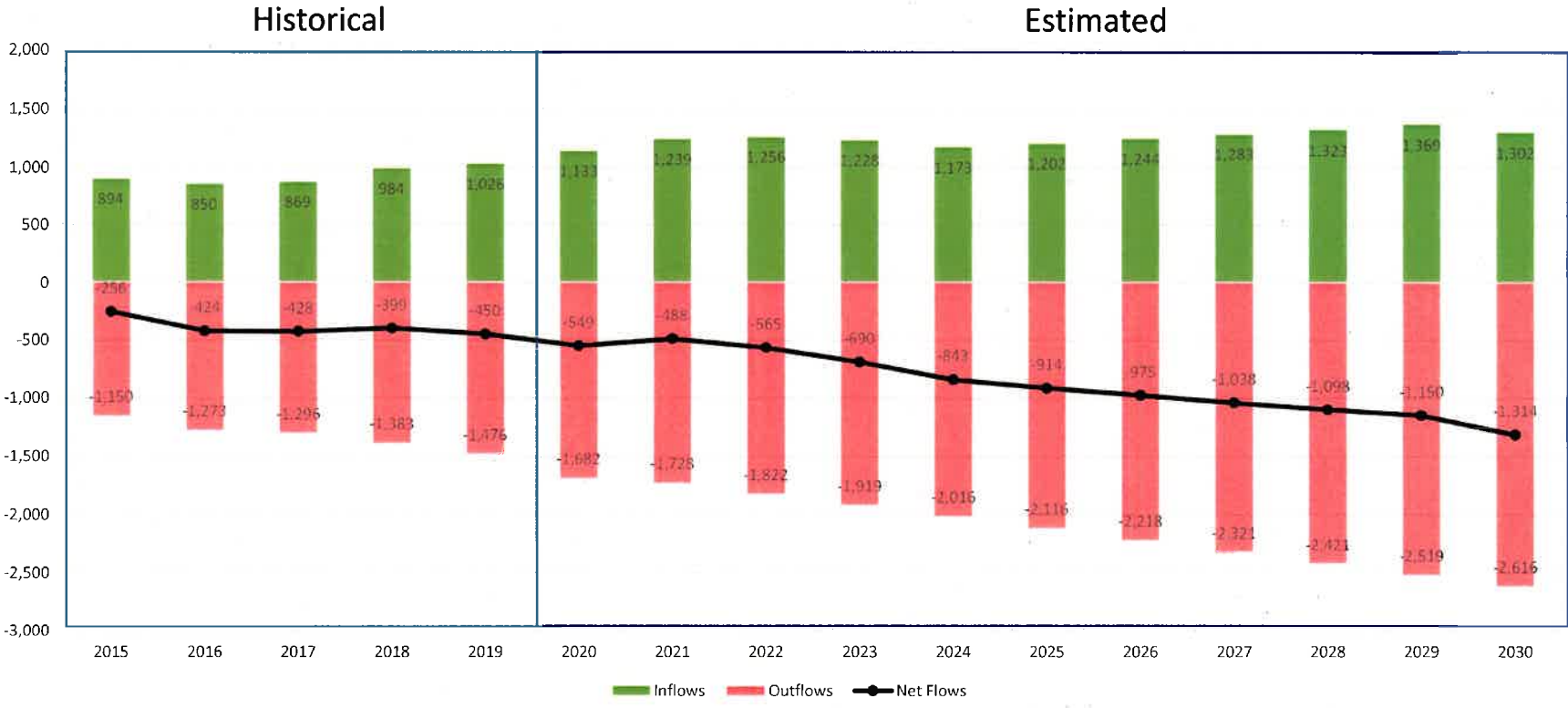


SFERS Liquidity Management | Summary

- Estimated net cash outflows for benefit payments is \$549 million in 2020 or 2% of SFERS Plan Assets.*
- Estimated net cash outflows to fund capital calls from Private Investments and Absolute Return portfolio are around \$755 million in 2020 with GFC stress scenario of net cash outflow of \$1.45 billion.**
- Liquidity needs to fund pension obligations and capital calls are \$1.3 billion with stress liquidity needs up to \$2 billion will be met by reducing Treasuries, Liquid Credit, Public Equities, Real Assets, and Absolute Return.
- Private Equity is over target allocation of 18% at 21% and projected to become net cash flow neutral in 2020.*
- Real Assets is close to target allocation of 17% at 16% and is planned to be further reduce in 2020. Forecasted net cash inflow for Real Assets portfolio in 2020 are around \$160 million.**
- Private Credit target allocation of 10% at 4%, with forecasted liquidity needs of \$556 million net outflows in 2020.**
- Absolute Return portfolio has \$240mm of unfunded commitments that are projected to be called in 2020.
- Liquidity analysis includes Base Case, No Growth, and GFC stress scenarios for cash flow forecasts. Due to recent market volatility, **we are operating under “No Growth” scenario and preparing for further stress cases.**



Pension Obligation Historical and Projected Cash Flows



Note: Data, assumptions, methods, and plan provisions based upon Cheiron's July 1, 2019 projections using 7.4% discount rate. Net cash flows are Benefit Payments + Supplemental COLAs + Administrative Expenses - Member and Employer Contributions. 4

2019 and Previous 5-Year Average Forecasted and Actual Commitment Pacing and Cash Flows

- SFERS increased its allocations to Private Equity and Real Assets and introduced allocation to Private Credit
- Private Investments are in mid to early J-Curve and projected to become cash flow positive in 3-5 years
- SFERS net cash outflows to Private Investments averaged apprx. \$500 million per year over last 6 years
- SFERS underwritten \$2.8 billion to Private Investments in 2019 and \$12 billion over previous 5 years (2014-2018)

	<i>Cambridge Associates Forecast</i>		<i>2019 Actual & 5-Year Average Statistics</i>			
	2019 Commitment Pacing (mm)	2019 Net Cash Flow (mm)	2019 Actual Commitment (mm)	5-Year* Average Commitment (mm)	2019 Actual Cash Flow (mm)	5-Year Average Cash Flow (mm)
<i>Private Equity</i>	900	(55)	1,070	1,116	(171)	(293)
<i>Real Assets</i>	800	129	902	823	134	(207)
<i>Private Credit</i>	750	(401)	856	451**	(323)	(97)**
TOTAL Private Investments	2,400	(327)	2,828	2,390	(360)	(597)

2020 Forecasted Commitment Pacing and Cash Flows

- Commitment pacing models are designed to reach the desired allocation to the asset class.
- Private investments are structured as self-liquidating funds that draw down and distribute capital opportunistically. The opportunistic nature of private asset classes makes the process of achieving and maintaining target allocation particularly difficult.
- The forecasts incorporate many assumptions and are for planning purpose only.

We currently operate under “No Growth” scenario and prepare for further stress cases.

	Cambridge Associates Forecast			
	2020 Commitment Pacing (mm)	Base Case 2020 Net Cash Flow (mm)	No Growth 2020 Net Cash Flow (mm)	GFC Stress 2020 Net Cash Flow (mm)
<i>Private Equity</i>	700	53	(109)	(460)
<i>Real Assets</i>	400	360	160	0*
<i>Private Credit</i>	500	(540)	(556)	(750)**
<i>Absolute Return</i>	-	(240)	(240)	(240)
<i>TOTAL Private Investments</i>	1,600	(367)	(755)	(1,450)

SFERS Liquidity Management | Asset Liquidity Analysis

We define **four Liquidity Tiers** based on contractual agreements (including lock-ups and redemption schedules) and instrument liquidity

Liquidity Tier Definition Based on Time to Full Liquidation

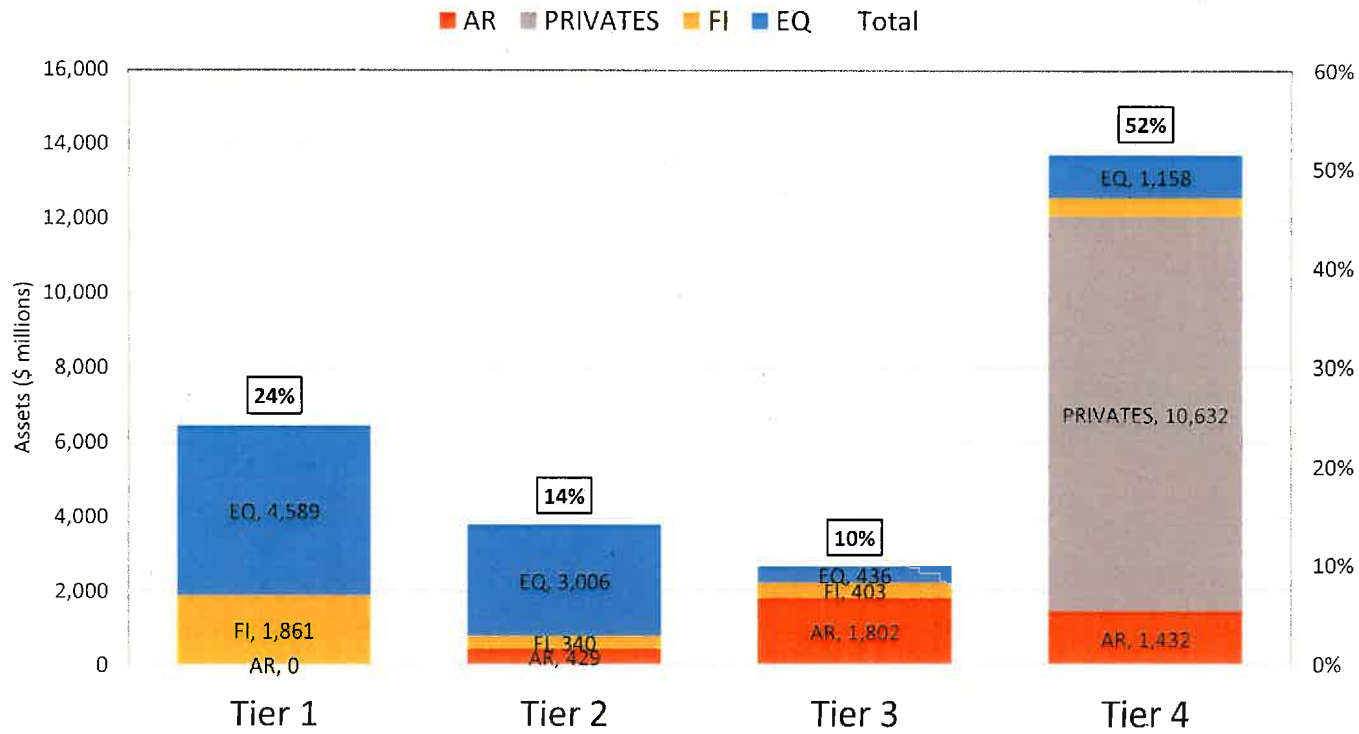
Tier 1	< 1 month
Tier 2	1-3 months
Tier 3	3-12 months
Tier 4	> 1 year

Assumptions:

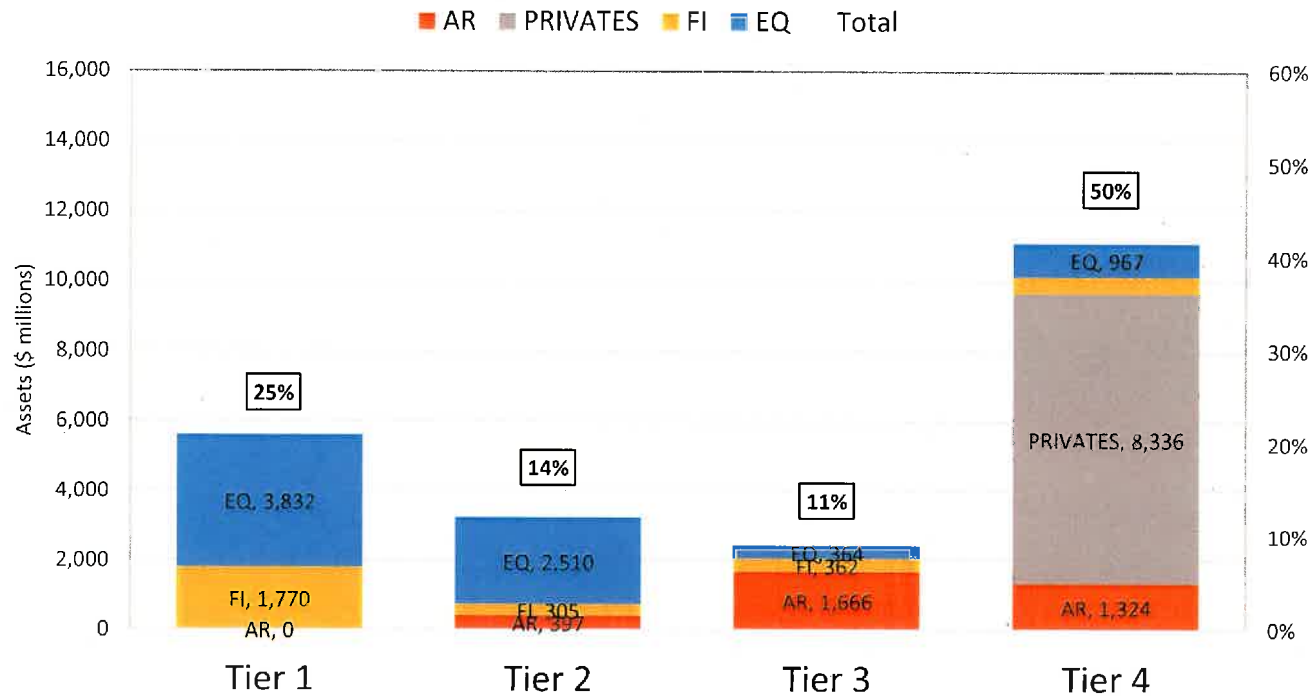
- International Small Cap and Emerging Market Equities are Tier 2
- High Yield and Emerging Market Fixed Income are Tier 2
- Bank Loans and CMBS are Tier 3
- All Private Investments (Private Equity, Private Credit, and Real Assets) are Tier 4
- Absolute Return liquidity schedule provided by Blackstone Alternative Asset Management

Asset Liquidity Analysis | Normal Conditions

Tier 1: \$6.4 billion and Tier 1-3: \$12.9 billion



Asset Liquidity Analysis | Correlated Market Downturn 1 StDev Stress Test



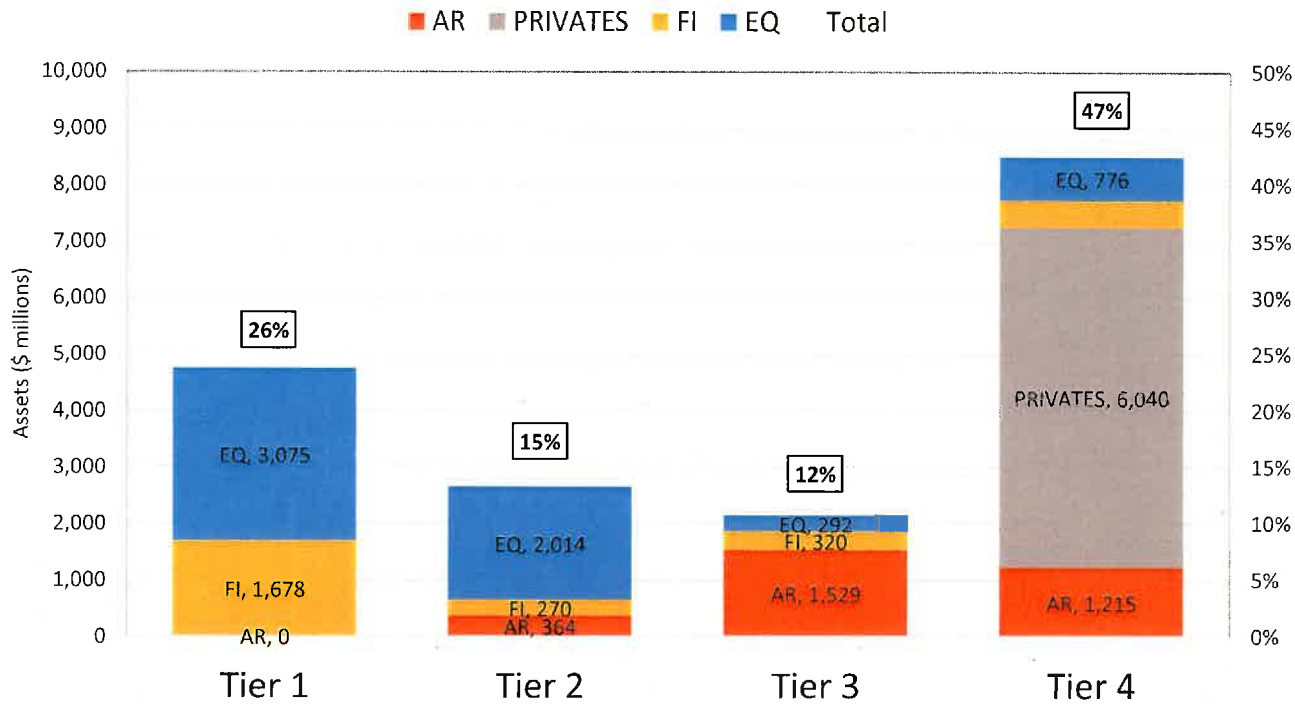
Tier 1: \$5.6 billion
Tier 1-3: \$11.2 billion

Stress Test Assumptions:

Each asset class is marked down in market value using **one standard deviation** (annualized volatility estimate provided by NEPC)

Correlation of **1** between **all** asset classes (conservative worst case estimate)

Asset Liquidity Analysis | Correlated Strong Market Downturn 2 StDev Stress Test



Tier 1: \$4.8 billion
Tier 1-3: \$9.5 billion

Stress Test Assumptions:

Each Asset Class is marked down in market value using **two standard deviations** (annualized volatility estimate provided by NEPC)

Correlation of **1** between all asset classes (conservative worst case estimate)

SFERS Liquidity Management | Funding Liquidity Risk

1. Liquidity Coverage Ratio (LCR)

Does the plan have enough **liquid assets** to cover cash outflows in the next **3 years**?

$$LCR = \frac{\text{Liquid Financial Assets} + \text{Distributions from Illiquid Assets} + \text{Employer \& Employee Contributions}}{\text{Benefit Payment} + \text{Plan Expenses} + \text{Capital Calls for Illiquid Assets}}$$

LCR Value	Implication
<1	The plan will need to sell illiquid assets to cover cash flows
1	The plan has sufficient liquidity to cover all cash flows
>1	The plan will not be required to sell illiquid assets to cover liquidity needs

2. Modified Liquidity Coverage Ratio (MLCR)

Does the plan need to sell **risky liquid assets** to cover cash outflows in the next **3 years**?

$$MLCR = \frac{\text{Treasury} + \text{Core Fixed Income} + \text{Distributions from Illiquid Assets} + \text{Employer \& Employee Contributions}}{\text{Benefit Payment \& Plan Expenses} + \text{Capital Calls for Illiquid Assets}}$$

MLCR Value	Implication
<1	The plan will need to sell liquid assets to cover cash flows
1	The plan has sufficient liquidity to cover all cash flows
>1	The plan has excess liquidity and may consider increasing illiquid allocation

SFERS Liquidity Management | 3-year Liquidity Coverage Ratio (LCR)

Base Case*

Liquidity Available	Liquid Financial Assets	14,474,772,663
	Distributions from Illiquids	7,523,000,000
	Employer + Employee Contributions	3,642,976,058
Liquidity Needs	Benefit Payments & Plan Expenses	5,142,420,202
	Capital Calls	7,586,000,000
LCR		2.01

- LCR = 2.01, 2.01x coverage in liquidity available relative to spending needs in the next 3 years.
- SFERS holds enough liquid assets to meet planned obligations in 3 years, even under 0% future return, stressed and strong drawdown scenarios.

Drawdown Scenarios and Change in Future Return

	Drawdown Scenario ***			
	Base	1 stdev down	2 stdev down	
Assumed Return **	0%	1.89	1.76	1.63
	1%	1.92	1.78	1.65
	2%	1.95	1.81	1.67
	3%	1.98	1.84	1.70
	4%	2.01	1.87	1.72
	5%	2.05	1.90	1.75
	6%	2.08	1.93	1.77
	7%	2.12	1.96	1.80

Sensitivity to Contribution & Distribution Changes

	Drawdown Scenario		
	Base	1 stdev down	2 stdev down
Distribution/Contribution Change			
Base *	2.01	1.87	1.72
No Growth	1.83	1.68	1.53
Stress	1.83	1.66	1.50



Notes: *Base Case, No Growth and Stress Scenarios distribution/contribution assumption calculated by Cambridge Associates.

** Assumed Return is applied to Liquid Financial Assets; *** Drawdown Scenarios: 1 and 2 stdev down scenarios represent market downturn with Liquid Financial Assets returns down -1 and -2 standard deviations (annualized volatility estimated by NEPC), without correlation benefits.

SFERS Liquidity Management | 3-year Modified Liquidity Coverage Ratio (MLCR)

Base Case*

Liquidity Available	Treasuries + Core Fixed Income Assets	2,093,779,272
	Distributions from Illiquids	7,523,000,000
	Employer + Employee Contributions	3,642,976,058
Liquidity Needs	Benefit Payments & Plan Expenses	5,142,420,202
	Capital Calls	7,586,000,000
MLCR		1.04

- MLCR = 1.04, 1.04x coverage in modified liquidity relative to spending needs in the next 3 years.
- SFERS does not need to sell risk assets to meet planned obligations in 3 years under normal conditions; but needs to sell risk assets under No Growth and Stressed Scenarios due to increased contribution rates and/or decreased distribution rates.

Drawdown Scenarios and Change in Future Return

Assumed Return**	Drawdown Scenario ***		
	Base	1 stdev down	2 stdev down
	0%	1.02	1.02
1%	1.03	1.02	1.01
2%	1.03	1.02	1.02
3%	1.04	1.03	1.02
4%	1.04	1.03	1.03
5%	1.05	1.04	1.03
6%	1.05	1.04	1.03
7%	1.06	1.05	1.04

Sensitivity to Contribution & Distribution Changes

Distribution/Contribution Change*	Drawdown Scenario ***		
	Base	1 stdev down	2 stdev down
	Base	1.04	1.03
No Growth	0.85	0.85	0.84
Stress	0.76	0.75	0.74

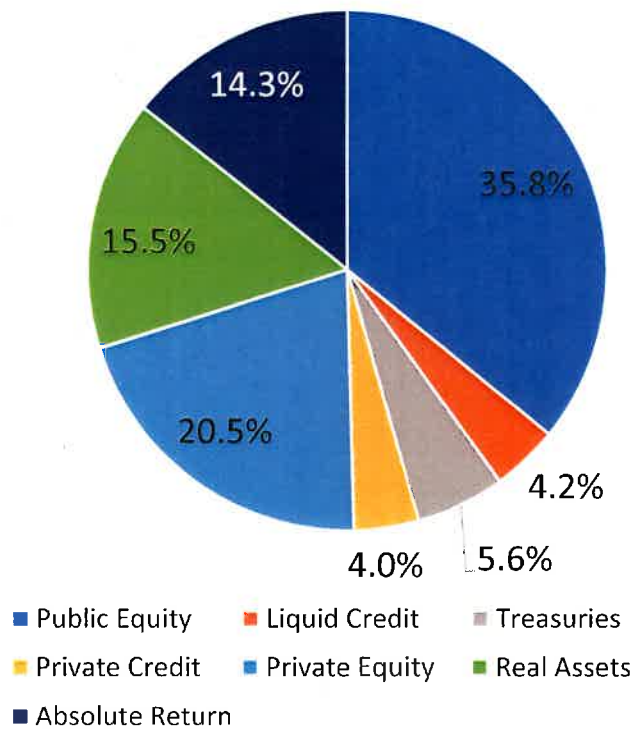


Notes: *Base Case, No Growth and Stress Scenarios distribution/contribution assumption calculated by Cambridge Associates.

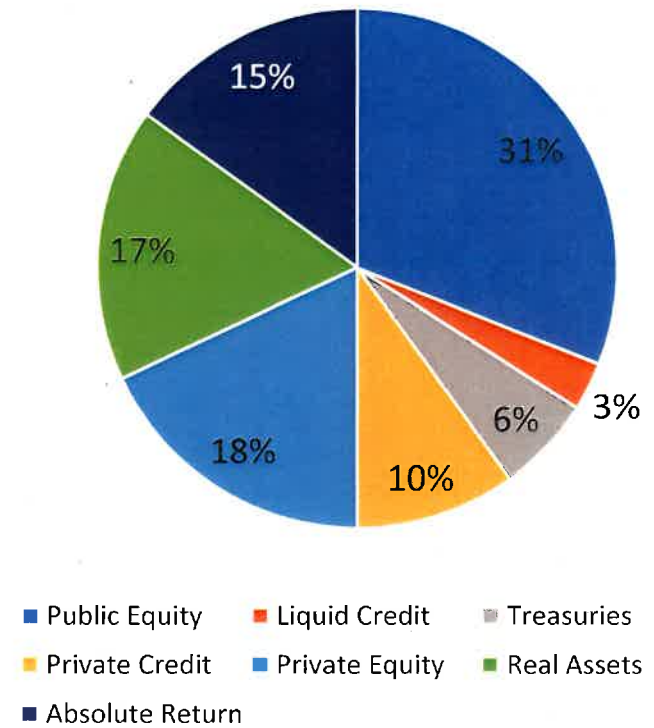
** Assumed Return is applied to Liquid Financial Assets; *** Drawdown Scenarios: 1 and 2 stdev down scenarios represent market downturn with Liquid Financial Assets returns down -1 and -2 standard deviations (annualized volatility estimated by NEPC), without correlation benefits.

SFERS Asset Allocation Actual as of February 29, 2020

Actual Asset Allocation



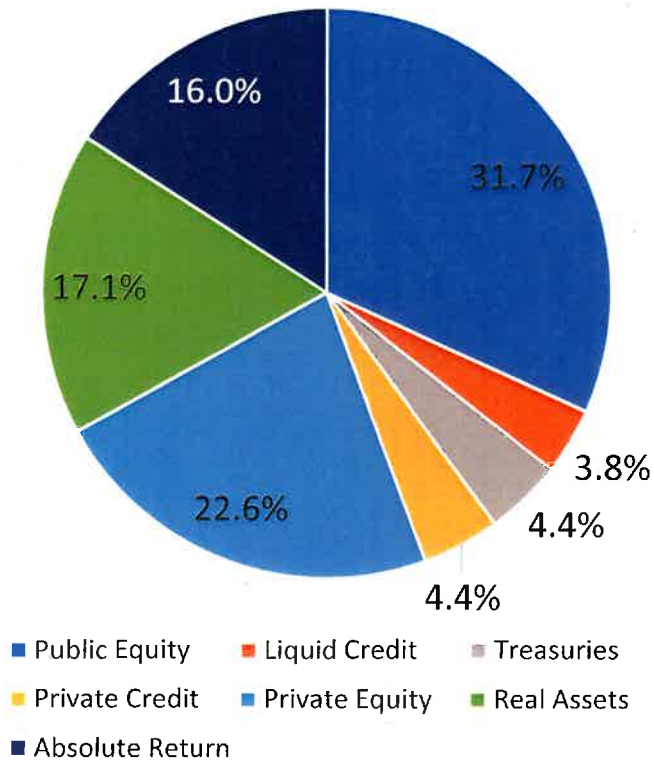
Target Asset Allocation



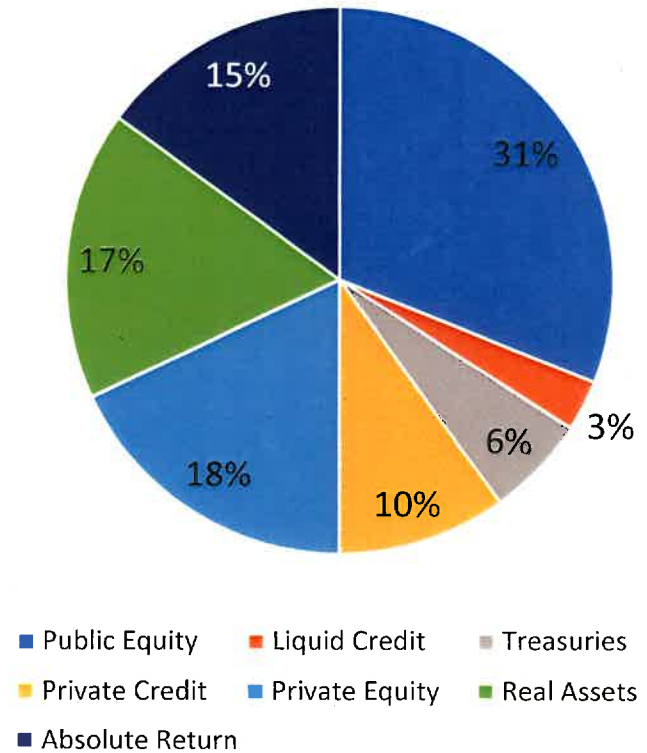
Note: Actual asset allocation are preliminary numbers as of Feb 29th, 2020. Public Equity and Treasuries include overlay notional amount.

SFERS Asset Allocation Actual as of March 24th, 2020

Actual Allocation

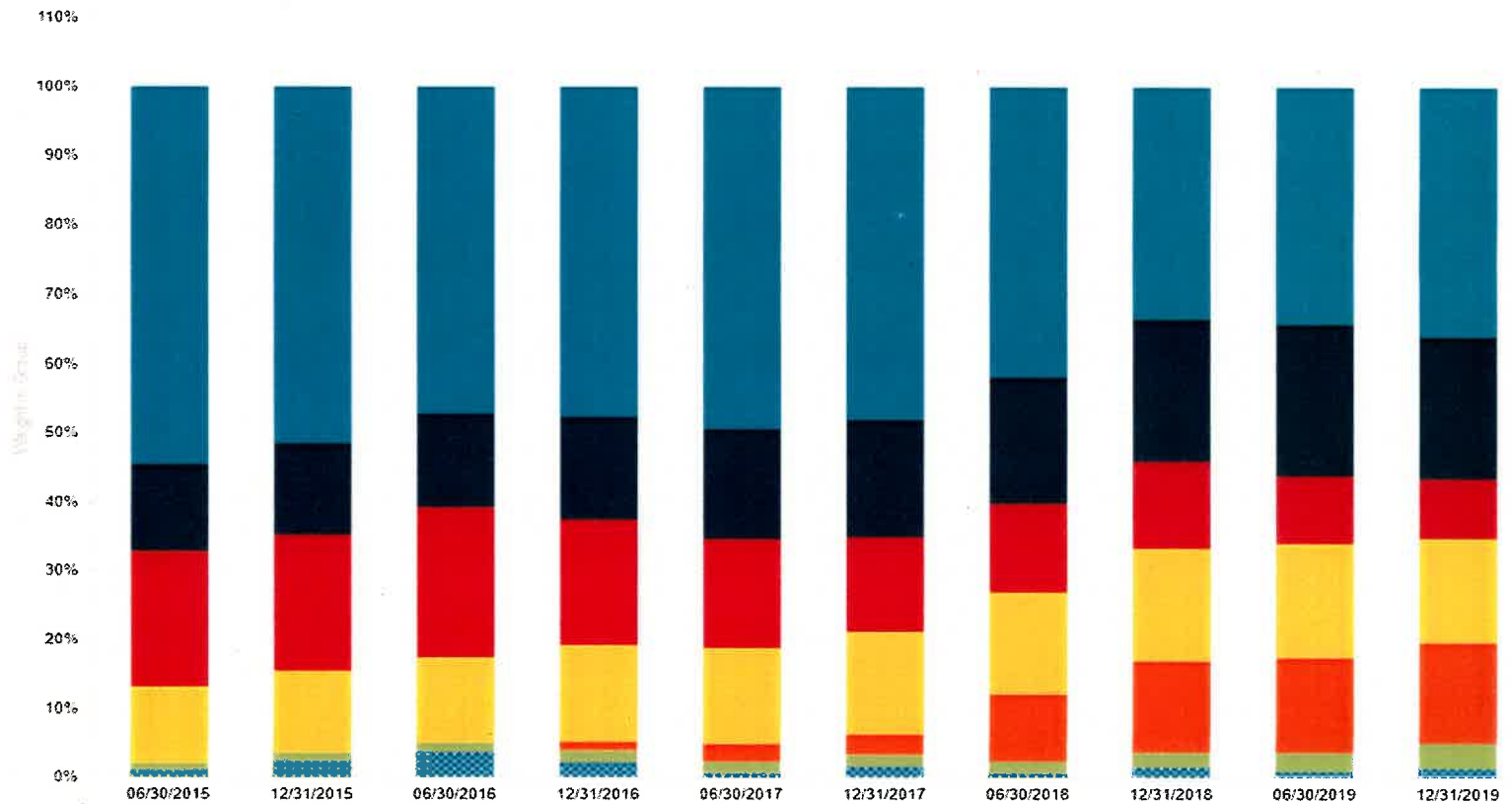


Target Asset Allocation



SFERS Liquidity Management | Historical Asset Allocation

- Public Equity
- Private Equity
- Public Fixed Income
- Real Assets
- Absolute Return
- Private Credit
- Cash



Appendix

Details for Calculating Liquidity Coverage Ratios

3-Year Liquidity Coverage Ratios | Base Case Scenario LCR & MLCR

		Base Case*	1 stdev down***	2 stdev down***
Liquidity Available	Treasuries + Core Fixed Income Assets	2,093,779,272	1,990,687,149	1,887,595,026
	Liquid Financial Assets	14,474,772,663**	12,604,597,068	10,734,421,474
	Distributions from Illiquids*	7,523,000,000	7,523,000,000	7,523,000,000
	Employer + Employee Contributions	3,642,976,058	3,642,976,058	3,642,976,058
Liquidity Needs	Benefit Payments & Plan Expenses	5,142,420,202	5,142,420,202	5,142,420,202
	Capital Calls*	7,586,000,000	7,586,000,000	7,586,000,000
LCR		2.01	1.87	1.72
MLCR		1.04	1.03	1.03



Notes: *Base Case Scenario distribution/contribution assumption calculated by Cambridge Associates.

** 4% return is applied to Liquid Financial Assets; *** Drawdown Scenarios: 1 and 2 stdev down scenarios represent market downturn with Liquid Financial Assets returns down -1 and -2 standard deviations (annualized volatility estimated by NEPC), without correlation benefits.

3-Year Liquidity Coverage Ratios | No Growth Scenario LCR & MLCR

		No Growth*	1 stdev down***	2 stdev down***
Liquidity Available	Treasuries + Core Fixed Income Assets	1,861,362,148	1,769,713,627	1,678,065,105
	Liquid Financial Assets**	12,868,020,190	11,205,440,896	9,542,861,603
	Distributions from Illiquids*	4,136,800,000	4,136,800,000	4,136,800,000
	Employer + Employee Contributions	3,642,976,058	3,642,976,058	3,642,976,058
Liquidity Needs	Benefit Payments & Plan Expenses	5,142,420,202	5,142,420,202	5,142,420,202
	Capital Calls*	6,155,000,000	6,155,000,000	6,155,000,000
LCR		1.83	1.68	1.53
MLCR		0.85	0.85	0.84



Notes: *No Growth Scenario distribution/contribution assumption calculated by Cambridge Associates.

** No return is applied to Liquid Financial Assets; *** Drawdown Scenarios: 1 and 2 stdev down scenarios represent market downturn with Liquid Financial Assets returns down -1 and -2 standard deviations (annualized volatility estimated by NEPC), without correlation benefits.

3-Year Liquidity Coverage Ratios | GFC Stress Scenario LCR & MLCR

		GFC Stress Case*	1 stdev down***	2 stdev down***
Liquidity Available	Treasuries + Core Fixed Income Assets	1,861,362,148	1,769,713,627	1,678,065,105
	Liquid Financial Assets**	12,868,020,190	11,205,440,896	9,542,861,603
	Distributions from Illiquids*	2,368,000,000	2,368,000,000	2,368,000,000
	Employer + Employee Contributions	3,642,976,058	3,642,976,058	3,642,976,058
Liquidity Needs	Benefit Payments & Plan Expenses	5,142,420,202	5,142,420,202	5,142,420,202
	Capital Calls*	5,202,000,000	5,202,000,000	5,202,000,000
LCR		1.83	1.66	1.50
MLCR		0.76	0.75	0.74



Notes: *GFC Stress Scenario distribution/contribution assumption calculated by Cambridge Associates.

** No return is applied to Liquid Financial Assets; *** Drawdown Scenarios: 1 and 2 stdev down scenarios represent market downturn with Liquid Financial Assets returns down -1 and -2 standard deviations (annualized volatility estimated by NEPC), without correlation benefits.