



RETIREMENT BOARD MEETING CALENDAR SHEET
May 8, 2024

To: Retirement Board

From: Anna Langs, Managing Director

Date: May 8, 2024

Agenda Item: 2024 Annual Liquidity Management Update

Recommendation:

This is a discussion only item.

Executive Summary:

- SFERS Trust has sufficient liquidity to meet its obligations.
- SFERS worked with Cambridge Associates to evaluate current and future liquidity needs using multiple models and stress scenarios.
- Staff is carefully managing liquidity in this more challenged market environment
 - Use 10%-percentile assumptions or below the "No Growth" stress scenario as liquidity plan for the next fiscal year
 - Reduced commitment pacing to accommodate for additional liquidity needs
- 2024 annual commitment pacing is reduced by \$350mm (13%) to \$2.35 billion from \$2.7 billion in 2023
 - Private Equity pacing reduced to \$1 billion in 2024 from \$1.2 billion in 2023
 - Real Assets to \$600 million in 2024 from \$650 million in 2023
 - Private Credit to \$750 million in 2024 from \$850 billion in 2023
- Reduced commitment pacing is in line with the glide path to reach total target allocation to private assets of 40% from current allocation of 51% over the next 7-10 years
- The attached report is the complete Annual Liquidity Management Update for 2024 as required by the IPS.

Background:

SFERS Investment Staff monitors and reviews liquidity and cash flows on an ongoing basis and presents an annual update to the Retirement Board.

SFERS is a large investor in private markets with an aggregate strategic target allocation to Private Equity, Real Assets, and Private Credit of 40%. Relative to this target, SFERS' current allocation to private market strategies is 51% of total plan assets or \$18.2 billion. Additionally, SFERS has approximately \$7.7 billion in contractual commitments of uncalled capital to private markets managers.

SFERS does not control the timing of when the committed capital is called and when distributions are received. Commitment pacing models are designed to reach and maintain the desired allocation to the asset class. Private investments are primarily 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 allocations particularly difficult.

SFERS worked closely with Cambridge Associates to evolve its cash flow and commitment pacing forecasts including multiple stress scenarios and stochastic modeling. Liquidity conditions have been stressed over the past 2 years and are expected to be challenging this year. Cambridge Associates estimated that SFERS' "No Growth" liquidity stress scenario as a 20%-probability event. The "GFC Stress" liquidity scenario is estimated to be a 2%-probability event according to Cambridge Associates' stochastic modeling of SFERS projected cash flows. To put the current market liquidity in prospective, SFERS' actual net cash outflow to private investments in 2023 was a 10%-probability event or below the "No Growth" stress scenario. In 2023, SFERS staff was managing liquidity using below "No Growth" stress scenario cash flows assumptions which allowed staff to carefully design and execute liquidity contingency plans by selling \$1.4 billion from Public Equity and Absolute Return portfolios.

This presentation updates the Retirement Board on the current management of SFERS' liquidity. It also highlights that as the Plan matures, liquidity is an increasingly important consideration in establishing strategic asset allocation and its implementation glide path, and in managing through stressed market conditions.

As the result of current challenging market liquidity conditions and projected higher net cash payout, SFERS reduced its actual commitments by 30% in 2023 vs 2022. Proposed commitment pacing for 2024 is reduced by 13% from \$2.7 billion in 2023 to \$2.35 billion in 2024 to accommodate current liquidity conditions while keeping appropriate vintage diversification. The \$350mm reduction in annual commitment pacing comes across all asset classes by decreasing Private Equity annual commitment pacing from \$1.2 billion to \$1 billion, Real Assets from \$650 million to \$600 million, and Private Credit from \$850 billion to \$750 million.

Attachments:

- 2024 Annual Liquidity Management Update, Staff's presentation
- SFERS Commitment Pacing Discussion, Cambridge Associates

2024 Annual Liquidity Management Update

Anna Langs, CFA, FRM

Managing Director - Asset Allocation, Risk Management, Innovative Solutions

Kevin Cao, CFA

Investment Officer - Asset Allocation, Risk Management, Innovative Solutions

May 8, 2024



SFERS

San Francisco Employees' Retirement System

Effective Liquidity Management of the Retirement Fund Is Critical

- SFERS has an extensive process for evaluating liquidity, which includes forecasting cash flows and pacing under different market conditions, reviewing asset allocation and forecasting pension obligations.
- With this process in place, SFERS has successfully managed liquidity risk over the last several years in what has been a challenging environment.

SFERS Liquidity Needs are Increasing

- Net cash outflows from SFERS Trust* are expected to increase.
 - In FY2025, estimated net cash outflows for benefit payments are \$1.07 billion or 3% of SFERS Trust Assets, a 4-times increase from 2015's level of \$256 million.
 - The annual pension payout rate is projected to increase in 10 years from 3% to 4.5%. **
- The payout increase is partly a result of an expected decline in future employer contributions.
- With decreased cash inflows, an increasingly larger portion of pension obligations is paid by the Trust rather than employer contributions.

Managing Future Liquidity

- To manage liquidity, SFERS has a variety of direct investment tools at its disposal.
 - Manage liquidity profile within asset classes and/or through allocation across asset classes
 - Selectively adjust pacing while maintaining vintage diversification
 - Evaluate asset allocation between illiquid and liquid assets, taking into account liquidity, diversification and return expectations
 - Manage short-term liquidity needs: Credit Facility, Leverage
 - Opportunistically explore secondary sales, adjust allocations to evergreen vehicles or other mechanisms of liquidity
- While net cash flows from Private Investments (PI) are expected to be net positive in >85% of modelled scenarios over the next 10 years, current conditions require managing liquidity under a stress scenario with net inflows to PI of ~\$200 million.
- Given the long tenure of private assets, liquidity available in 5 or 10 years is a function of decisions and allocations made today. SFERS actual commitment pacing to Private Investments in 2023 was reduced by 30% vs 2022.
- Tradeoffs between liquidity, pacing and returns are incorporated into the Asset Liability Study.
- In particular, the higher payout rate, resulting from decreased contributions, led to reduced allocation to Private Equity and increased allocations to Cash and Public Credit.

Why Liquidity Management is Critical

1. Meet benefit payments
2. Meet contractually obligated capital calls
3. Retain ability to take action when markets are dislocated
4. Rebalance to maintain strategic asset allocation and thereby achieve long term return objectives

Key Inputs into Managing Liquidity

Fund liquidity is a function of many factors, including:

- Plan design and level of benefit payments
- Actuarial assumptions
- Asset allocation
- Market conditions under different scenarios

Managing fund liquidity is complex and takes into account:

- Anticipated future benefit payments
- Pacing of Private Investments (Private Equity, Real Assets, and Private Credit):
 - Commitment Size to Private Markets
 - Size and Frequency of Capital Calls and Distributions from Private Investments
- Consideration of a range of market conditions under base case and downside cases
- Asset allocation targets and ranges under different modeling
- Evaluation of asset level liquidity, i.e. how quickly assets can be sold
- Measurement of liquid assets relative to anticipated benefit payments and outflows over a 3-year period using Liquidity Coverage Ratio (LCR)
- Implementation of structures to enhance liquidity

SFERS Liquidity Management Framework

Annual Process

Forecast Cash Flows for Private Investments



Review Asset Allocation and Asset Level Liquidity



Forecast Pension Obligations

Pacing Schedules and Estimated Cash Flows for Private Equity, Real Assets, and Private Credit

- Base Case
- Stress Scenarios
- **Stochastic Estimates**

Estimate Capital Needs for Rebalancing including Leverage

Asset Liquidity Analysis

- Base Case
- Stress Scenarios
- **Stochastic Estimates**

Review Credit Facilities

*Continuously estimate and monitor LCR and MLCR**

Yearly Actuarial Review

Estimated Pension Obligations

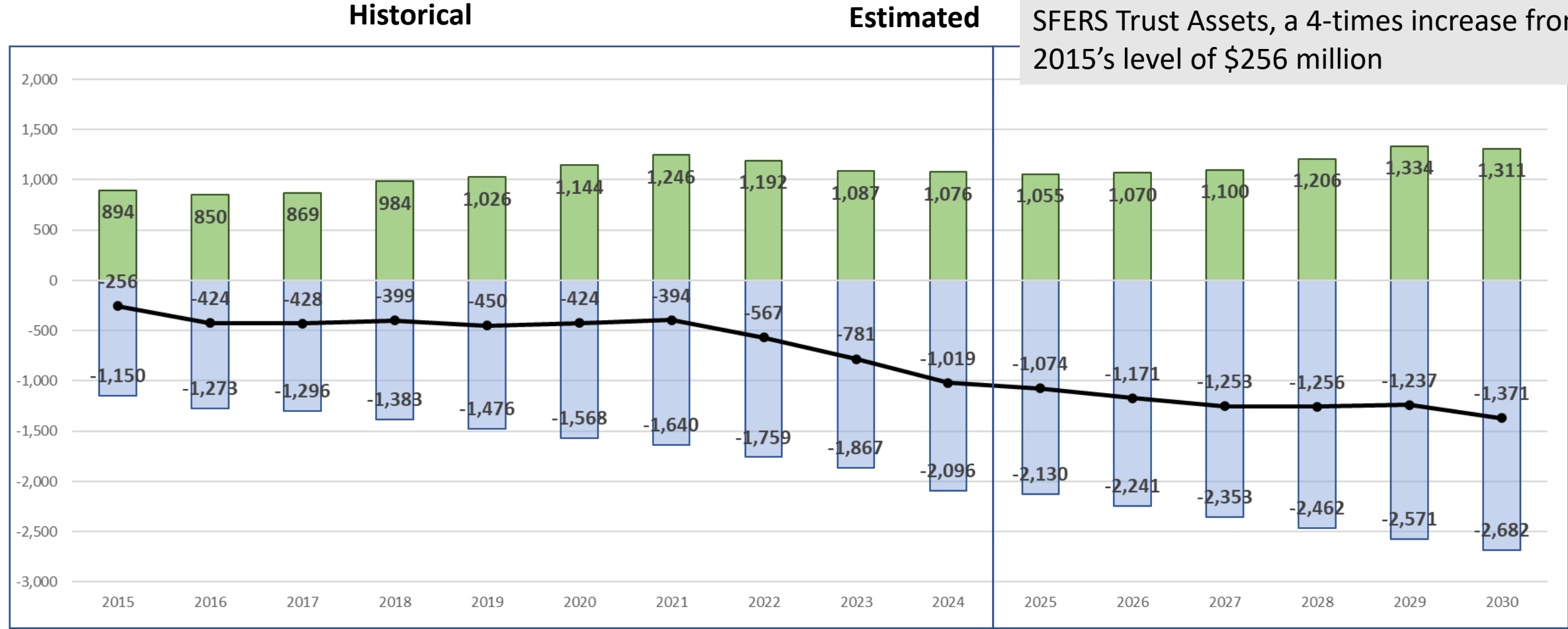
- Base Case
- Stress Scenarios
- **Stochastic Estimates**

* LCR and MLCR refer to the Liquidity Coverage Ratio and the Modified Liquidity Coverage Ratio that measure whether the plan has enough liquid assets and low-risk liquid assets, respectively, to cover planned cash outflows over the next three years.

Forecasting Pension Benefit Payments

Forecast Pension Needs: Historic and Projected Cash Flows to/from SFERS (in millions)

In FY2025, estimated net cash outflows for benefit payments are \$1.07 billion or 3% of SFERS Trust Assets, a 4-times increase from 2015's level of \$256 million



Forecasting Cash Flows for Private Investments

Commitment Pacing

SFERS Liquidity Management | 2023 Summary

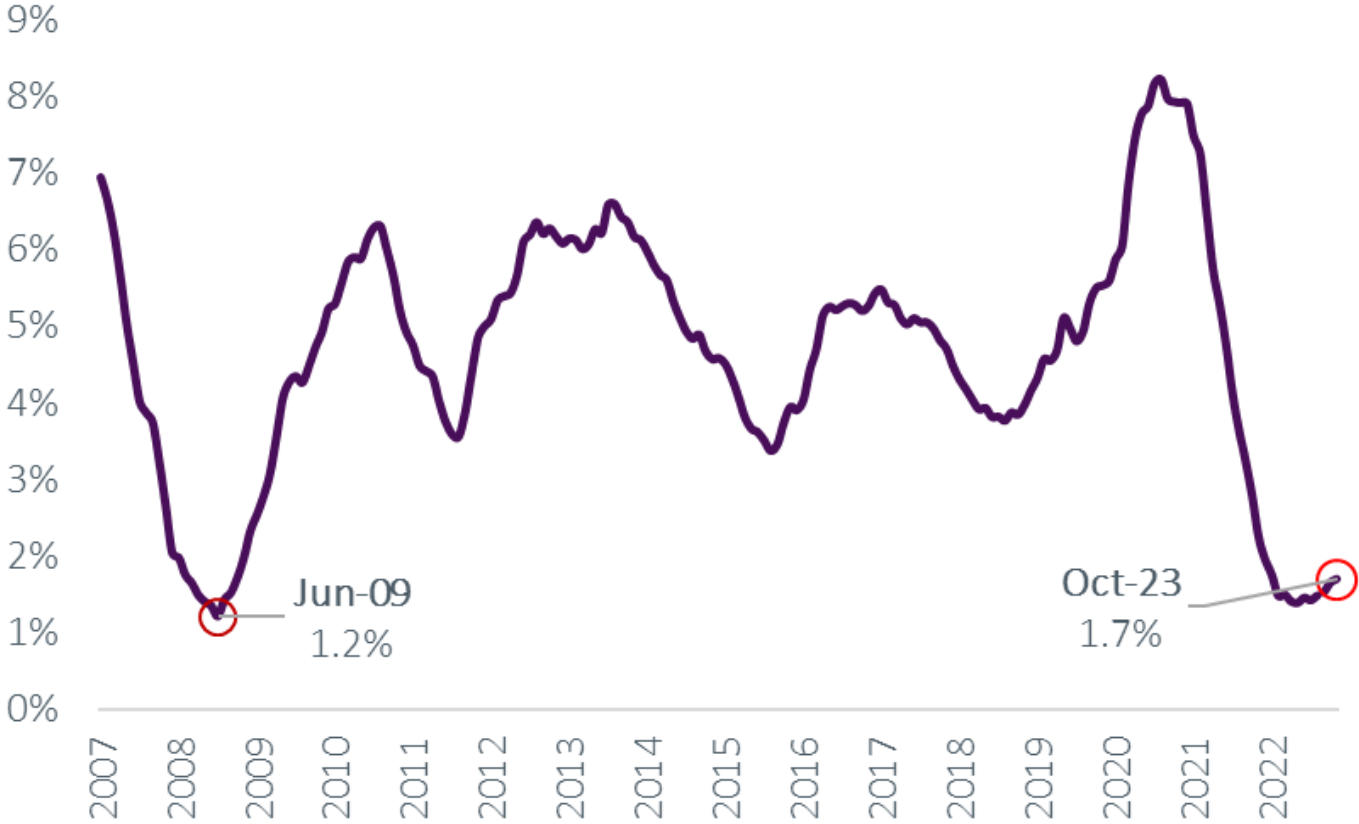
- Extremely challenging conditions with record low distributions from Private Investments in 2023
- SFERS significant allocation to private markets is expected to generate returns in excess of liquid markets but is also contributing to incremental net outflows from liquid to illiquid assets in addition to \$1.02B net pension payments
- SFERS Liquidity Management Framework includes tiered contingency planning using “No Growth” and “GFC-like” scenarios to fund commitments to private markets
- In 2023, SFERS managed liquidity using “No Growth” rather than “Base Case” scenario which allowed Staff to proactively plan redemptions from Absolute Return and less liquid Public Market investments
- In 2023, estimated “No Growth” plan forecasted net cash outflows from public to private allocations of \$369mm*. Actual net outflow was \$349mm, allowing Staff to effectively execute contingency plans for liquidity management
- Total \$1.4 billion net cash raised from Public Equity and Absolute Return in 2023
- Decreased commitment pacing while maintaining vintage year diversification: SFERS committed 30% less in 2023 vs 2022

SFERS Liquidity Management | 2024-25 Plan

- Continued stressed capital markets conditions with reduced distributions
- Continue to manage liquidity under “No Growth” stress case scenario
 - Use 10%-percentile assumptions or below the “No Growth” stress scenario as liquidity plan for the next fiscal year
- Reduced 2024 annual commitment pacing by \$350mm (13%) to \$2.35 billion from \$2.7 billion in 2023
 - Private Equity pacing reduced to \$1 billion in 2024 from \$1.2 billion in 2023
 - Real Assets to \$600 million in 2024 from \$650 million in 2023
 - Private Credit to \$750 million in 2024 from \$850 billion in 2023
- In FY2025, estimated net cash outflows to fund capital calls from Private Investments are ~\$200 million*
 - Private Equity and Real Assets programs are maturing with expected neutral cashflows*
 - Private Credit portfolio is younger with expected net outflows of approximately \$266 million*
- In FY2025, under a GFC stress scenario estimated net cash outflows to fund capital calls from Private Investments could reach \$1.2 billion
- Stress liquidity needs up to \$3.3 billion would be met by reducing Public Equities, Public Fixed Income, and Absolute Return
- These scenario analyses demonstrate that market stress could significantly impact SFERS’ liquidity and the ability to rebalance

Capital Market Liquidity | Current Market Liquidity at 2008 Great Financial Crisis Level

Capital Markets Liquidity, Trailing Twelve Months, as a % of GDP



Capital market liquidity remains at **GFC-like level** since 2022

Forecasting Cash Flows | Commitment Pacing Models

- 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.

- SFERS Staff worked with Cambridge Associates to incorporate multiple commitment pacing models:
 - Base-case scenario using industry-standard Yale Model
 - No-Growth Stress Test
 - GFC-like Stress Test
 - Stochastic Model using Monte-Carlo Simulations

Forecasted and Historic Cash Flows for Private Investments | Pacing and Market Scenarios

2024 and Previous 5-Year Average Forecasted and Actual Commitment Pacing and Cashflows

- Private Equity and Real Assets are out of the J-Curve and projected to be cash flow positive this year in the base case
- Private Credit portfolio is younger with expected net outflows for the next 2 years
- SFERS net cash outflows to Private Investments averaged ~\$361 million over previous 5 years (2018-2022) and projected to have net outflows of \$200 million in 2024 under the No-Growth scenario
- SFERS underwrote \$1.75 billion to Private Investments in 2023 vs. average of \$2.66 billion in previous 5-years (2018-2022) and projected \$2.35 billion commitment pacing for 2024

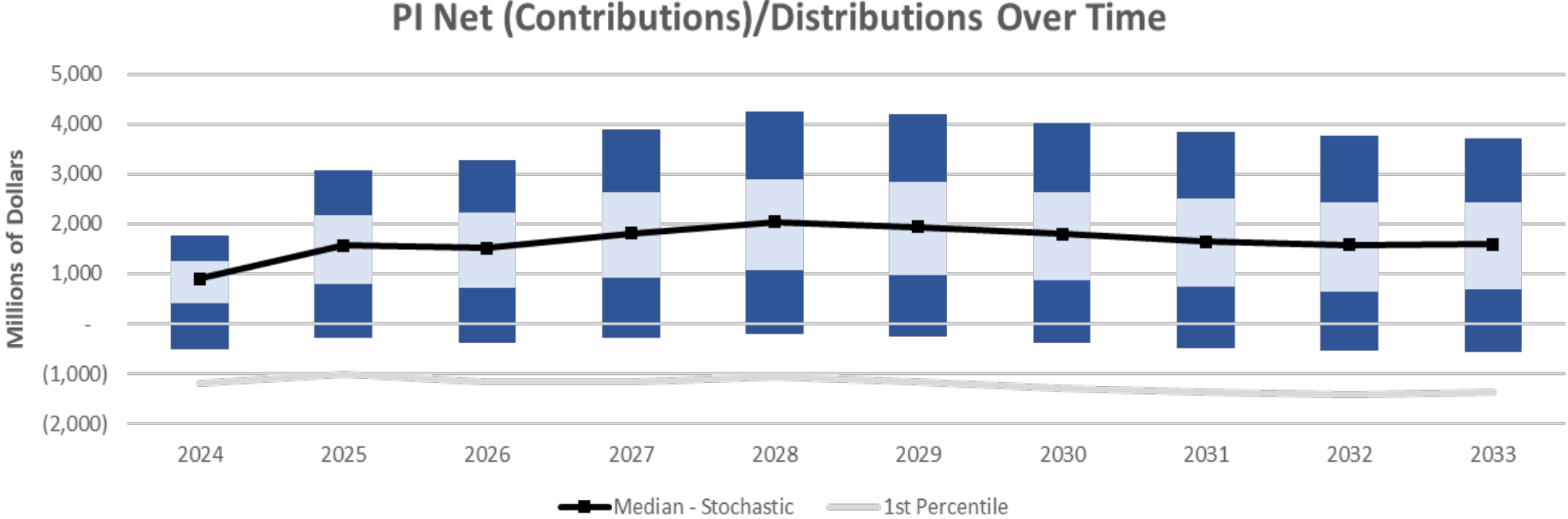
	Cambridge Associates Forecast (\$mm)				2023 Actual & 5-Year Average Statistics (\$mm)			
	2024 Commitment Pacing	2024 "Base" Net Cash Flow	2024 "No Growth" Net Cash Flow	2023 "No Growth" Net Cash Flow	2023 Actual Commitment	Prev. 5-Year* Average Commitment	2023 Actual Cash Flow	Previous 5-Year Average Cash Flow
Private Equity	1,000	853	107	97	764	1,240	3	-102
Real Assets	600	226	-41	-34	383	637	-124	21
Private Credit	750	-151	-266	-432	605	786	-227	-279
TOTAL Private Investments	2,350	928	-200	-369	1,752	2,663	-348	-361



Note: 2023 actual commitment from Cambridge Associates and 2023 Cash Flow data from Burgiss. No Growth and GFC Stress cashflow forecasts from Cambridge Associates incorporate adjustments to commitment pacing.

*5-Year average ranges from 2018 to 2022.

Private Investments (PI) Cash Flow Forecast | Stochastic Distribution Model



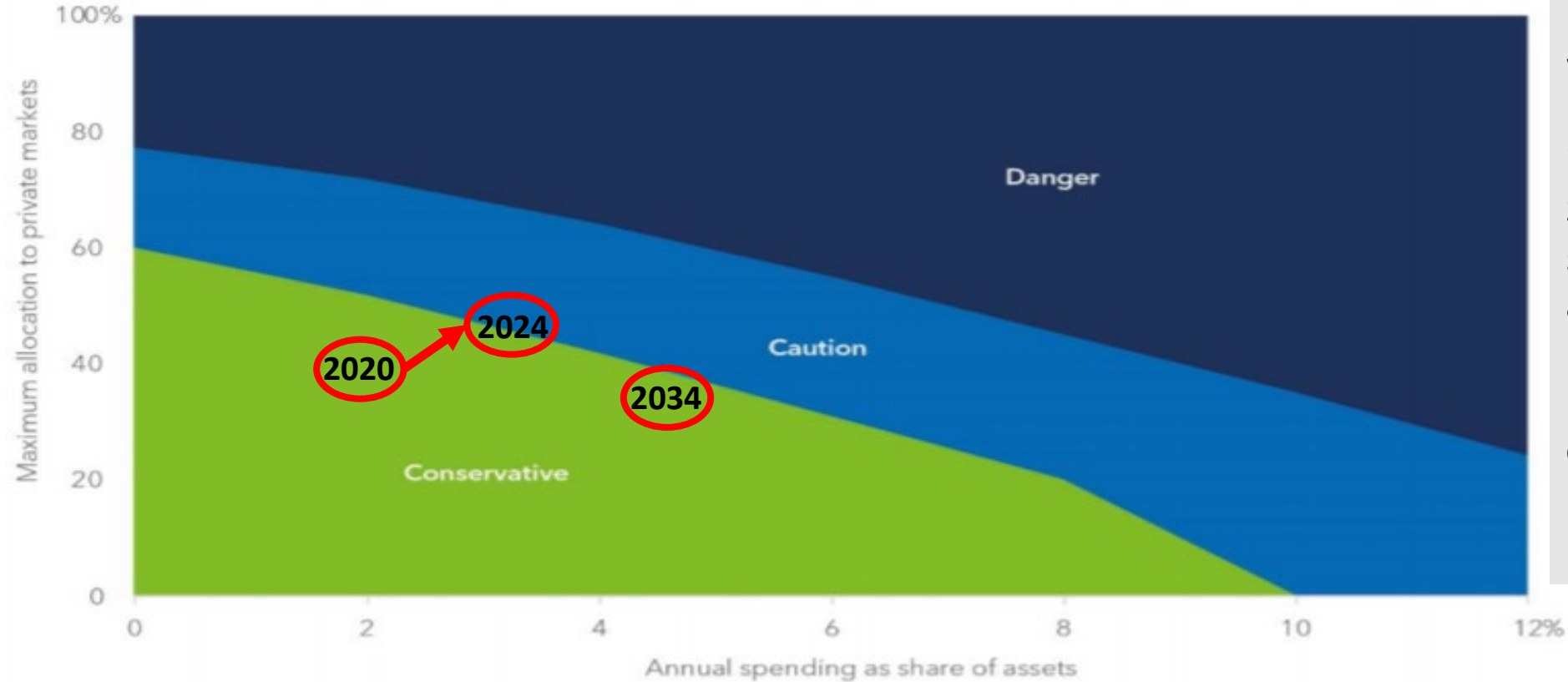
- Net cash inflow of the PI program is expected to increase over time and remain **net positive in >85% of modelled scenarios over the next 10 years**
- PI cash flows are expected to be positive under the median scenario of the stochastic model
- The primary driver of a decrease in net cash from the plan is from a stressed environment as the Private Investments are assumed to delay distributions

Asset Allocation and Liquidity Risk

Allocation to Privates and Liquidity Risks vs Annual Pension Payout Rates

Assessing liquidity risks

Hypothetical maximum allocations to private markets depending on annual spending needs, March 2019



In order to manage liquidity risk in line with the projected **higher payout rate in the future**, SFERS in the ALS study reduced its **allocations to private assets and reduced commitment pacing over the last three years**

This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even an estimate - of future performance. Source: BlackRock Investment Institute, March 2019. Notes: The chart shows different ranges for maximum allocations to private market assets depending on a hypothetical portfolio's annual spending needs, expressed as a share of the overall portfolio. The "conservative" zone shows the range of maximum allocations can start at 60% with no spending needs and falls to zero when spending needs reach 10% per year. The "caution" zone shows where maximum allocations would start hitting a 5% risk threshold described above. "Danger" is the zone where the maximum allocations result in a greater than 5% probability. We assume quarterly liquidity needs on the public assets. Annual liquidity needs would reduce the allocation to private markets. See the appendix for full methodology.



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Source: BlackRock Investment Institute.

Note: The analysis assumes quarterly liquidity for public assets.

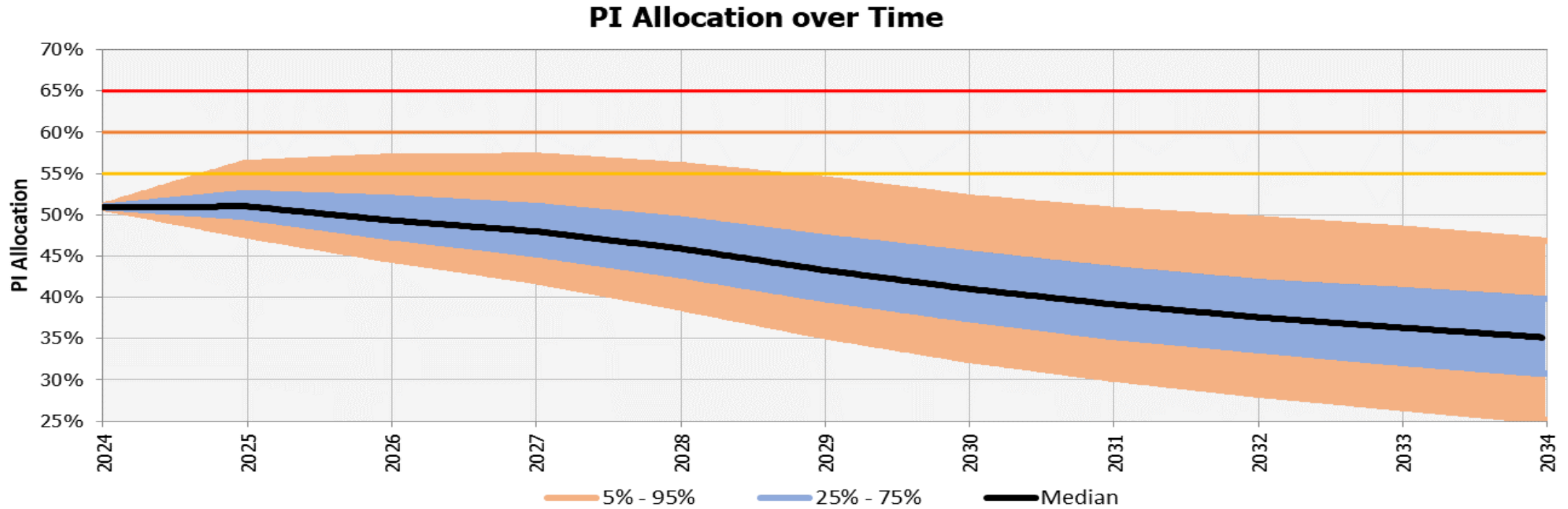
Allocation to Private Investments (PI) | Probability of Reaching Threshold Allocations

	YELLOW (RISK PI >55%)		ORANGE (RISK PI >60%)		RED (RISK PI >65%)	
YEAR	2024	2023	2024	2023	2024	2023
2025	9.1%	15.9%	0.7%	3.0%	0.1%	0.4%
2026	9.9%	17.2%	2.2%	4.6%	0.3%	0.9%
2027	10.4%	15.8%	2.4%	5.2%	0.5%	1.3%
2028	8.1%	12.0%	2.2%	3.8%	0.5%	1.1%
2029	5.2%	9.5%	1.4%	3.0%	0.3%	0.9%
2030	3.6%	8.1%	0.9%	2.7%	0.2%	0.8%
2031	2.4%	7.1%	0.7%	2.8%	0.2%	0.9%
2032	1.9%	6.6%	0.5%	2.9%	0.2%	0.9%
2033	1.6%	6.4%	0.4%	2.8%	0.1%	0.9%
2034	1.3%	n/a	0.4%	N/a	0.1%	n/A

- To maintain rebalancing flexibility and manage liquidity, SFERS established “Yellow” – 55%, “Orange” – 60%, and “Red” - 65% threshold allocations to Private Investments (PI)
- **Probabilities of breaching allocation thresholds are substantially lower this year vs last year due to both market conditions, i.e. higher Public Equity valuations, and Staff’s actions to add to Cash and Treasuries and reduce commitment pacing**



Allocation Ranges to Private Investments (PI) Over Time



- The median of PI allocation is projected to steadily decrease from current 51% to 36% in 2034
- PI allocation is increasing at the 95th percentile over the next three years before steadily decreasing
- Under a 95th percentile scenario, the plan can reach 57% PI allocation in 2027 before steadily decreasing



Asset Level Liquidity

SFERS Asset level Liquidity | Summary

- The 2023 market recovery in public markets increased SFERS' liquidity position from 39% to 41% in Liquid Assets.
- SFERS liquidity available with 12 months (Tier 1-3) is \$14.2 billion (41%) vs. \$12.7 billion (39%) a year ago
- A one-standard deviation market downturn can reduce annual liquidity from \$14.2 billion to \$12.4 billion
- Under more severe market stress markets, SFERS annual liquidity can be reduce to \$10 billion. While challenging, it is still sufficient to meet SFERS obligations for the next 3 years
- SFERS can deploy Credit Facility and/or Leverage to manage short-term liquidity needs and rebalancing

Asset Allocation And Asset Level Liquidity | Asset Liquidity Analysis

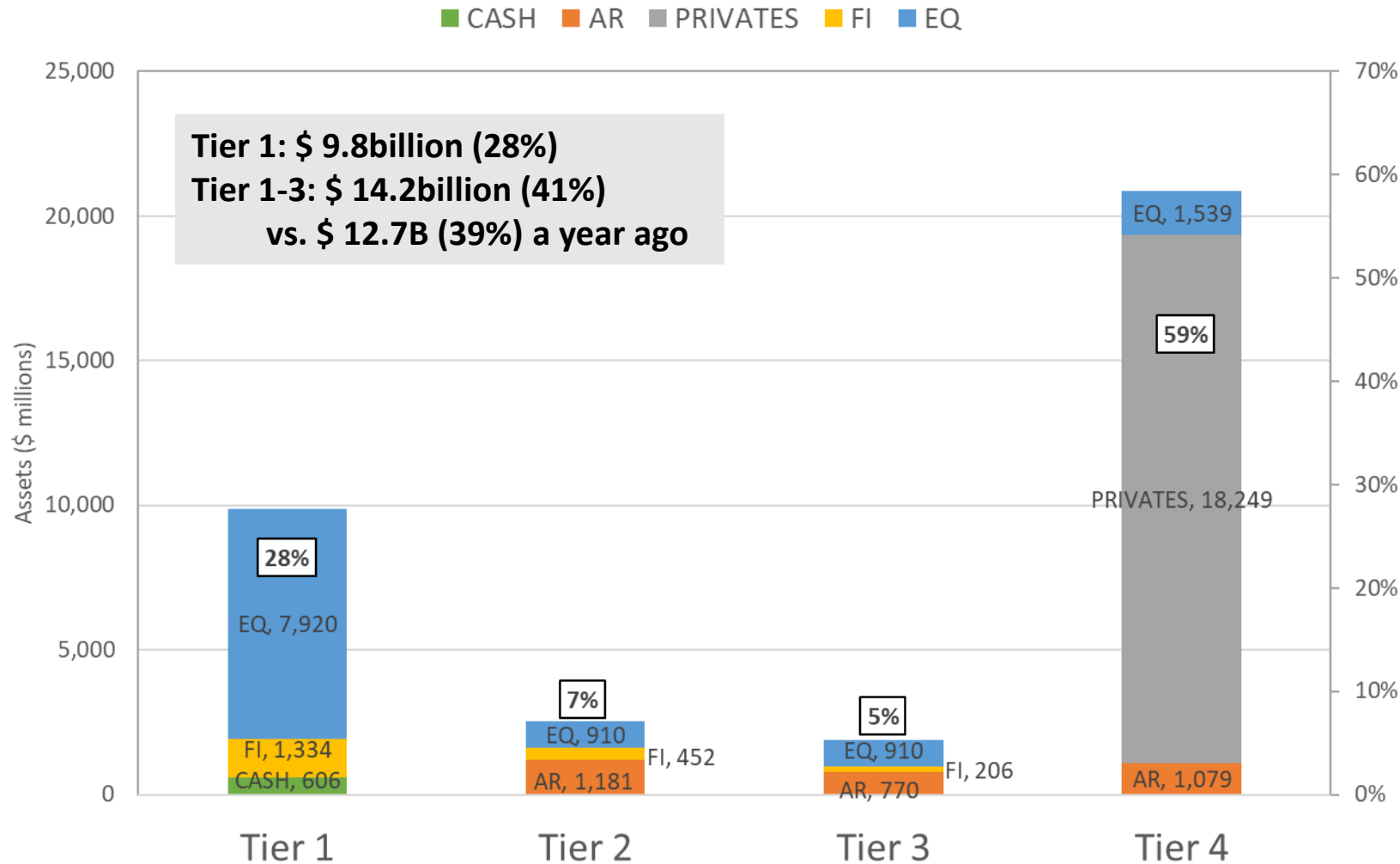
To determine Asset Liquidity, we define **four Liquidity Tiers** based on contractual agreements (including lock-ups and redemption schedules) and instrument liquidity

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:

- All Private Investments (Private Equity, Private Credit, and Real Assets) are Tier 4
- Absolute Return liquidity schedule provided by Blackstone Alternative Asset Management
- 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

Asset Allocation And Asset Level Liquidity | Normal Conditions – Base Case

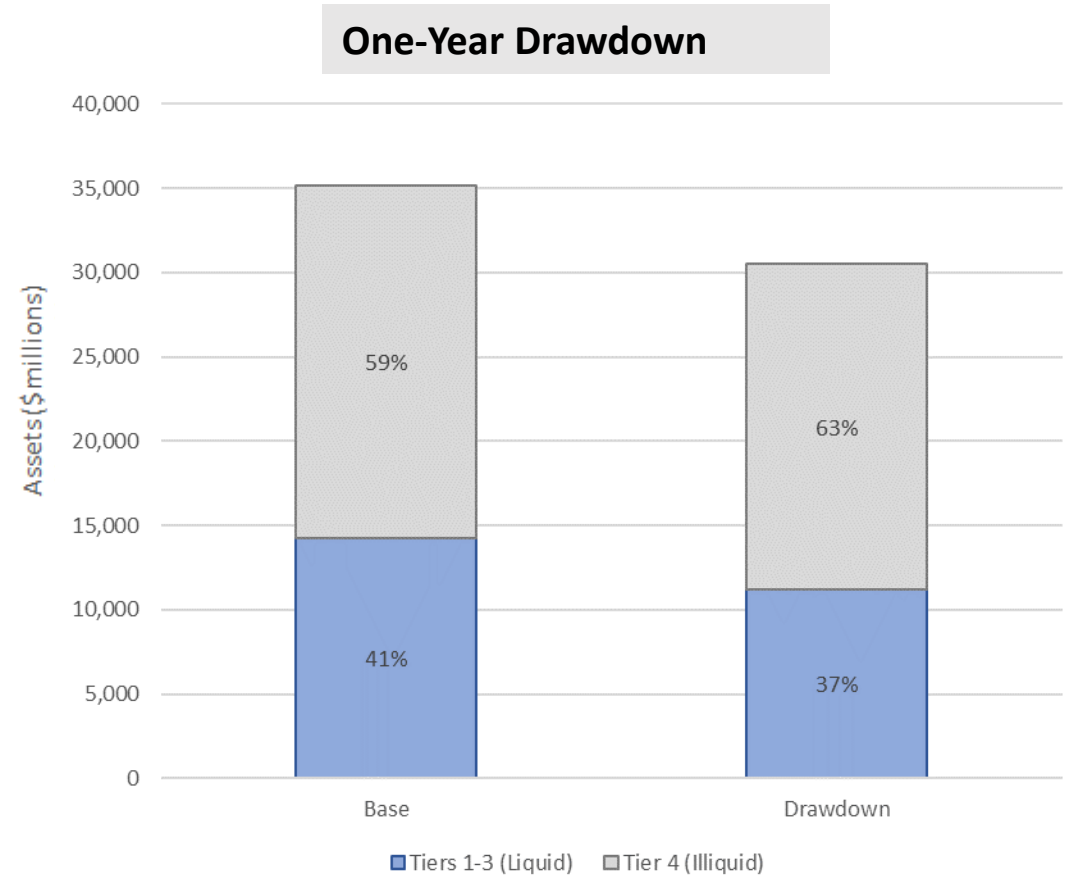
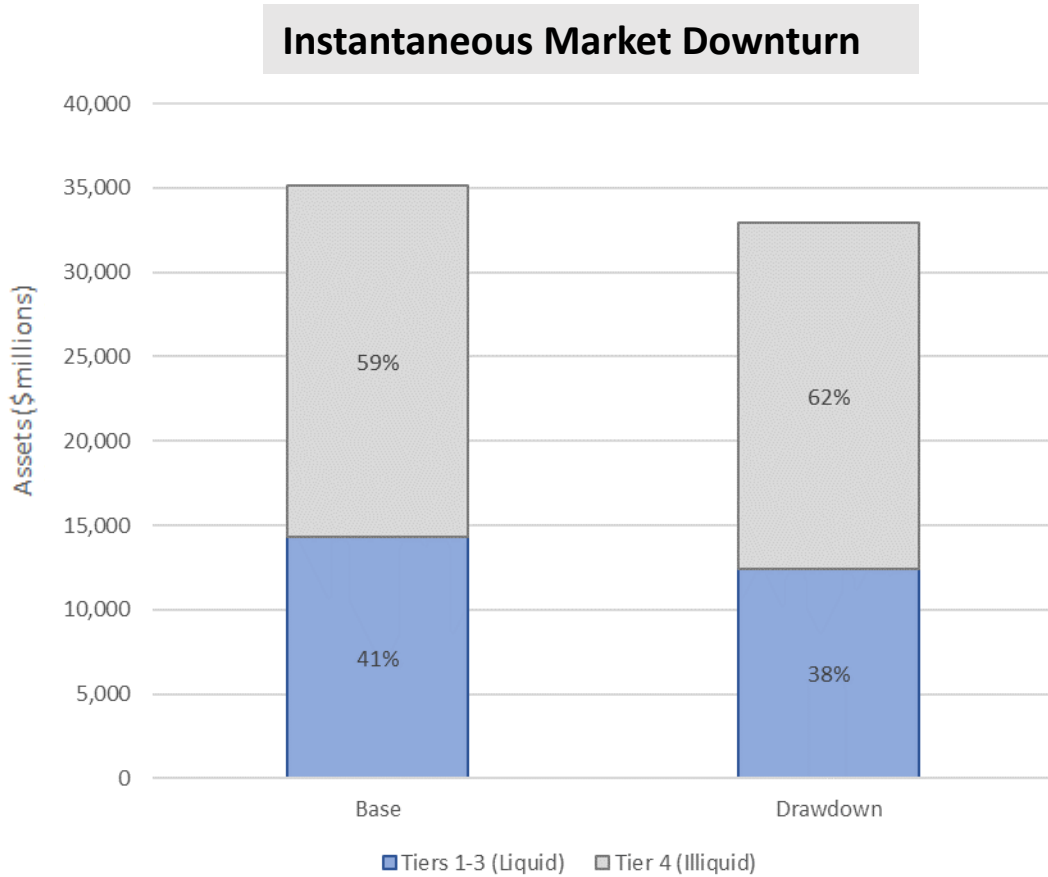


Tier 1-3 Liquid Assets
Increased from 39% to 41%
of NAV over FY2023 due to:

Market Recovery in Public Markets: SFERS Public Equities up ~ 15% and Fixed Income up ~ 5% in FY2024

Lagging valuation updates of Privates Assets: Private Equity up ~ +1%, Real Assets down ~ -2%, and Private Credit up ~ +6%

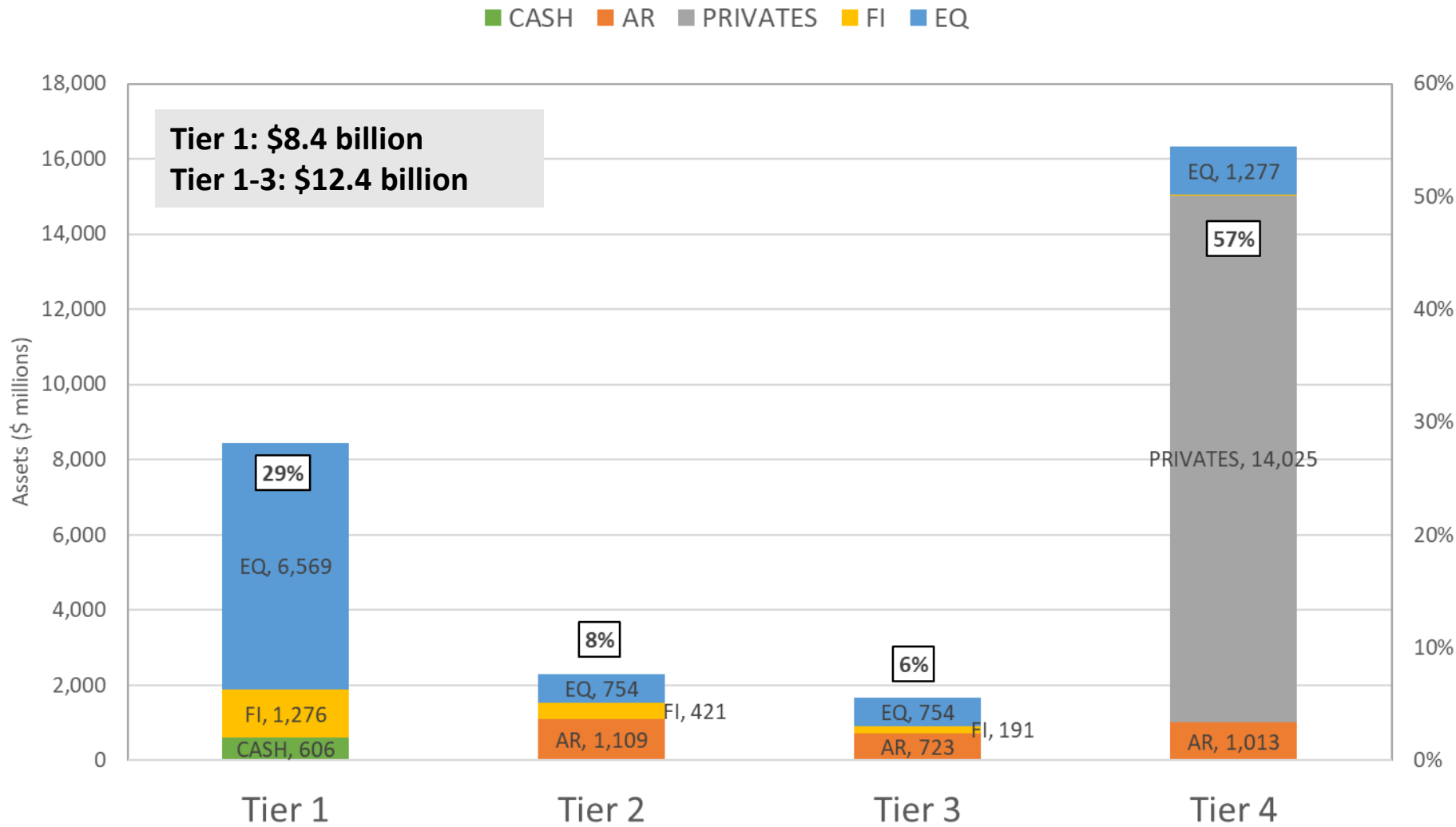
Asset Allocation And Asset Level Liquidity | Impact on Asset Allocation



Drawdown scenarios include one standard deviation drawdown in publicly traded assets with no drawdown in private assets

Drawdown scenarios include one standard deviation drawdown in publicly traded assets, one-half standard in private assets, and assumed pension contribution payments and capital calls in a no-growth pacing scenario

Asset Liquidity Analysis | Correlated Market Downturn Stress Test

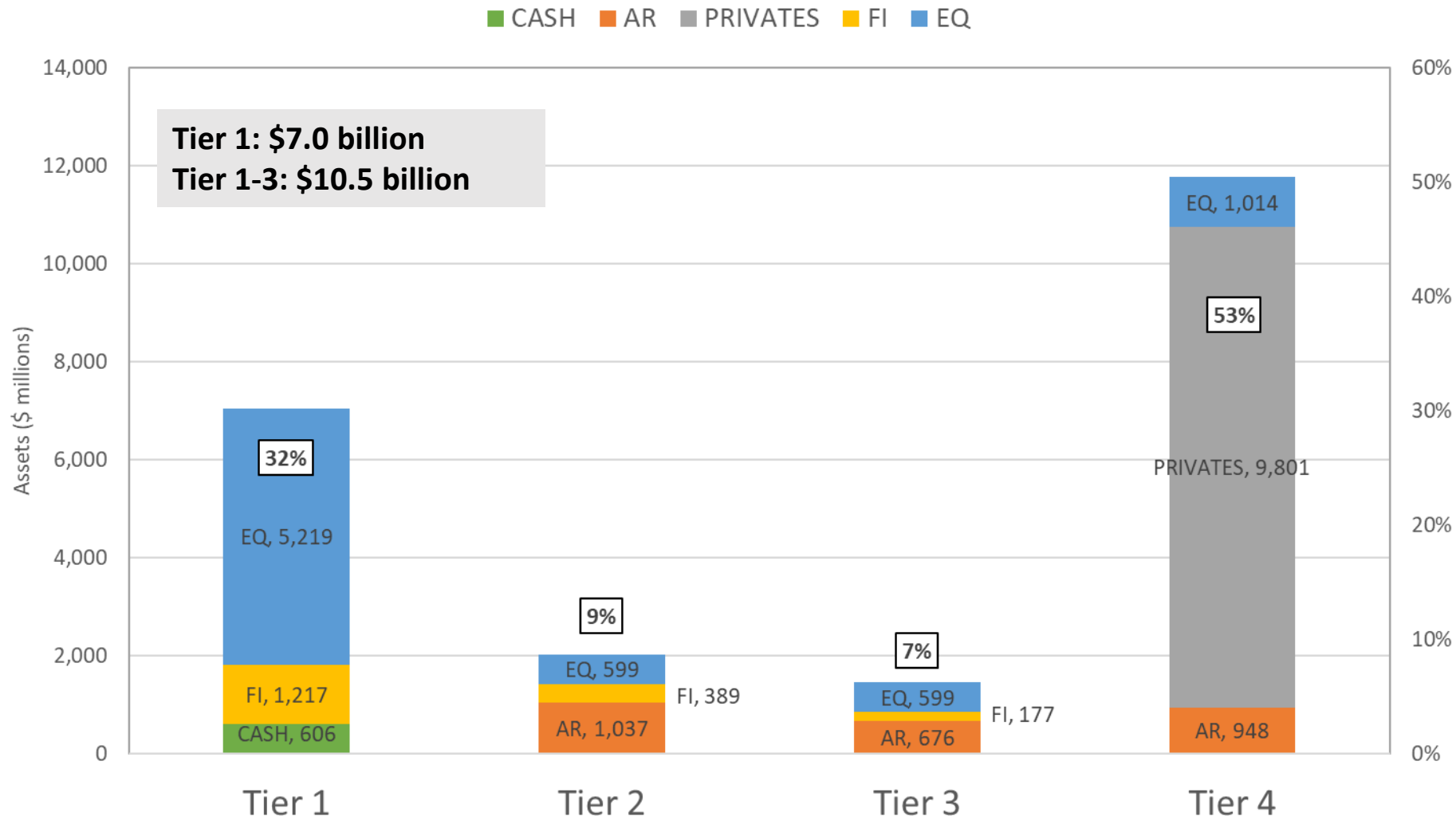


Stress Test Assumptions:

Each Asset Class is marked down in market value using **one standard deviation** (annualized volatility estimate provided by Wilshire)

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

Asset Liquidity Analysis | Correlated Strong Market Downturn Stress Test



Stress Test Assumptions:

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

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

Asset Allocation And Asset Level Liquidity | Short Term Sources of Liquidity

SFERS Trust holds a large and growing allocation to funds in its PE, RA and PC portfolios, which can opportunistically call large amounts of cash at the same time and with short notice.

To fund unexpected, material capital calls, SFERS Trust can:

- Hold cash in excess of policy target
- Sell other assets to fund capital calls
- Utilize a credit facility
- Increase plan leverage by adjusting synthetic exposure for Public Equity and U.S. Treasuries

Liquidity Option	Benefits	Issues to Consider
Hold Excess Cash	Guarantees liquidity	Potential drag on performance
Sell Liquid Assets	Straightforward, quick execution	Potential to lock in losses in periods of stress or selling underweight asset class
Utilize Credit Facility	Quick access to needed capital	Requires attention to structure and execution
Utilize Leverage	Capital efficient	Potentially increases exposure to risk assets, managing margin risk

Asset Allocation And Asset Level Liquidity | Short Term Sources of Liquidity

SFERS has utilized some of these mechanisms over the last year

Liquidity Option	Implementation	Rationale
Hold Excess Cash	Held approx. 1.5% cash	Given yield curve, holding cash rather than treasuries provided liquidity with attractive relative returns
Sell Liquid Assets	\$1.4 billion sold across Public Equity and Absolute Return	
Utilize Credit Facility	To manage large cashflows and redemption schedules	
Utilize Leverage	Removed leverage	Removed given cost of leverage and liquidity needs met elsewhere

Asset Allocation and Liquidity Coverage Ratio

Asset Liquidity Analysis | 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

Asset Allocation And Asset Level Liquidity | 3-year Liquidity Coverage Ratio (LCR)

3-Year Liquidity Coverage Ratio (LCR) Under Different Pacing and Asset Liquidity Scenarios

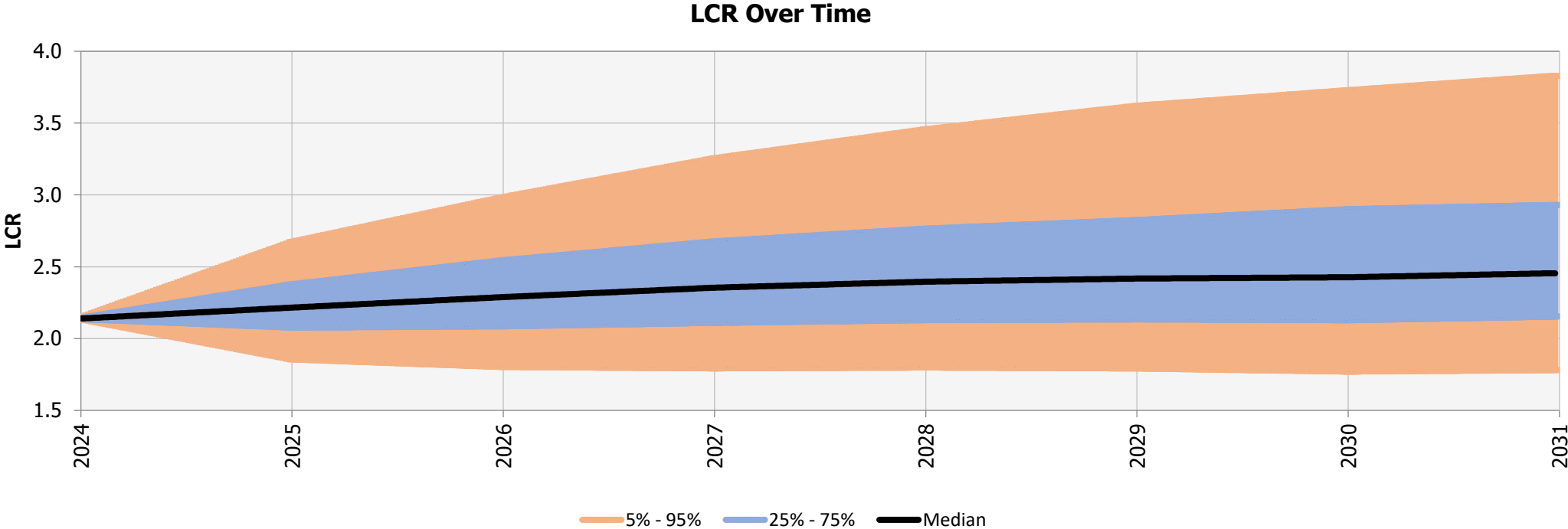
Pacing Scenarios	Asset Liquidity Scenarios***			
		Base	1 stdev down	2 stdev down
Base		2.15	1.99	1.83
No Growth		1.85	1.69	1.54
GFC Stress		1.42	1.30	1.18

- SFERS holds enough liquid assets to meet planned obligations in 3 year under normal conditions
 - LCR = 2.15, 2.15x coverage in liquidity available relative to spending needs in the next 3 years.
 - LCR is estimated to be 2.37 under current SAA and 2.50 under new SAA
- **SFERS' liquidity is compromised in moderate and extreme stress cases.**
- These scenario analyses demonstrate that further market stress could significantly impact SFERS' liquidity and the ability to rebalance.

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

** Assumed Return is applied to Liquid Financial Assets; *** Asset Liquidity 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 Wilshire), without correlation benefits. **** Liquid Financial Assets as of June 30, 2024 is approximated by deducting \$580M from Feb 29, 2024 value.

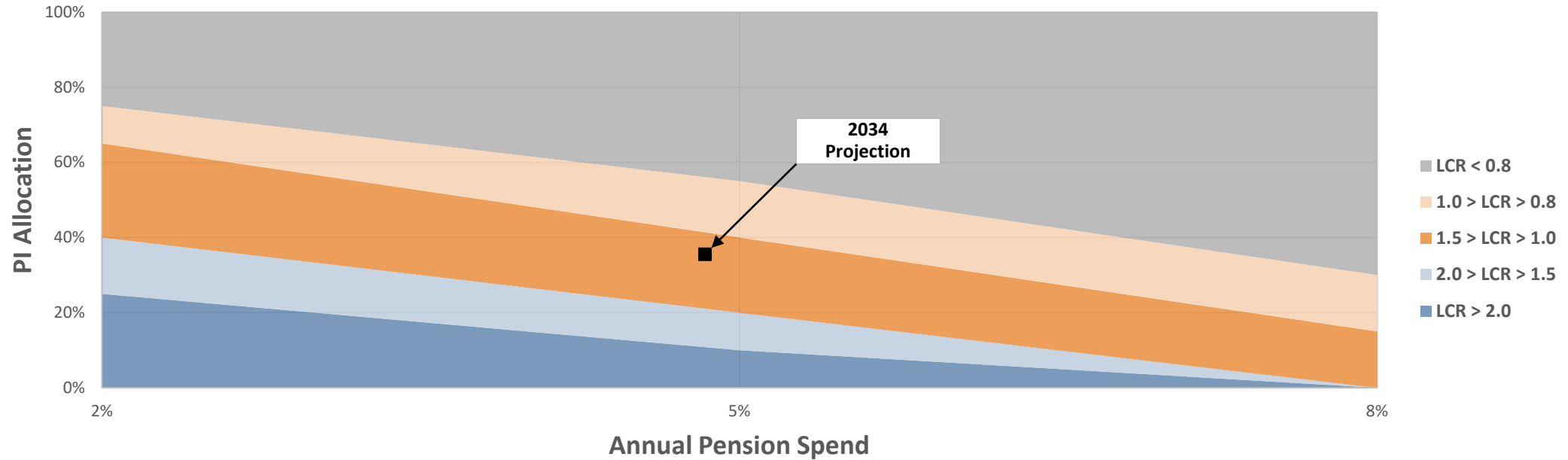
Liquidity Coverage Ratio (LCR) Stochastic Modeling Results



- LCR is very unlikely to fall below 1.5
- Over time the LCR is projected to increase steadily above the current ratio of 2.15x



Asset Allocation and Liquidity Coverage Ratio (LCR): Stochastic Modeling Results



- As the annual spend increases, the Liquidity Coverage Ratio (LCR) decreases
- Based on SFERS’s current and target private allocations, the risk of an LCR of <1.0 is small
- SFERS is well within the >1.0 LCR range as the current spend rate is ~3%
- SFERS is expected to increase in size to ~\$50bn by 2034, at which point the annual spend will be ~4.5% and median PI allocation is 36%
- SFERS stays within the 1.0 – 1.5 LCR range

SFERS Liquidity Management | Conclusion

- To meet pension obligations and capital call requirements, SFERS continues to focus on managing liquidity needs using multiple models and stress scenarios
- Reduced commitment pacing is in line with the glide path to reach total target allocation to private assets of 40% from current allocation of 51% over the next 7-10 years
- SFERS has already implemented measures to meet short-term liquidity needs in a capital efficient manner.
 - Increased allocation to Fixed Income including Treasuries and Cash
 - Secured a Credit Facility
 - Judiciously utilized leverage
- SFERS has sufficient liquidity to meet short-term needs, particularly over the next three years
- However, in cases of severe market dislocation, the liquidity becomes more challenged
- Longer term, payouts are expected to increase. SFERS Asset and Liability Study addressed the increased liquidity need by reducing allocation to Private Equity and adding allocation to Cash and Public Credit

Appendix

Asset Allocation And Asset Level Liquidity | 3-year Modified Liquidity Coverage Ratio (MLCR)

Base Case*

Liquidity Available	Treasuries + Core Fixed Income Assets	2,183,030,686
	Distributions from Illiquids	10,648,000,000
	Employer + Employee Contributions	3,225,448,475
Liquidity Needs	Benefit Payments & Plan Expenses	6,724,128,023
	Capital Calls	6,930,000,000
MLCR		1.18

- MLCR = 1.18, 1.18x 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
- **SFERS' liquidity is compromised in moderate and extreme stress cases**

Drawdown Scenarios and Change in Future Return

Asset Liquidity Scenarios***				
		Base	1 stdev down	2 stdev down
Assumed Return	0%	1.16	1.15	1.15
	1%	1.16	1.16	1.15
	2%	1.17	1.16	1.16
	3%	1.17	1.17	1.16
	4%	1.18	1.17	1.17
	5%	1.18	1.18	1.17
	6%	1.19	1.18	1.18
	7%	1.19	1.18	1.18

Sensitivity to Contribution & Distribution Changes

Asset Liquidity Scenarios***				
		Base	1 stdev down	2 stdev down
Pacing Scenarios	Base	1.18	1.17	1.17
	No Growth	0.87	0.87	0.86
	GFC	0.71	0.70	0.70
	Stress	0.71	0.70	0.70

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

** Assumed Return is applied to Liquid Financial Assets; *** Asset Liquidity 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 Wilshire), without correlation benefits. **** Liquid Financial Assets as of June 30, 2024 is approximated by deducting \$580M from Feb 29, 2024 value.

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	2,183,030,686	2,116,835,445	2,050,640,204
	Liquid Financial Assets	15,420,226,016	13,300,911,606	11,181,597,196
	Distributions from Illiquids	10,648,000,000	10,648,000,000	10,648,000,000
	Employer + Employee Contributions	3,225,448,475	3,225,448,475	3,225,448,475
Liquidity Needs	Benefit Payments & Plan Expenses	6,724,128,023	6,724,128,023	6,724,128,023
	Capital Calls	6,930,000,000	6,930,000,000	6,930,000,000
LCR		2.15	1.99	1.83
MLCR		1.18	1.17	1.17

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

** Assumed Return is applied to Liquid Financial Assets; *** Asset Liquidity 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 Wilshire), without correlation benefits. **** Liquid Financial Assets as of June 30, 2024 is approximated by deducting \$580M from Feb 29, 2024 value.

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	1,940,706,330	1,881,859,002	1,823,011,675
	Liquid Financial Assets	13,708,524,778	11,824,461,985	9,940,399,191
	Distributions from Illiquids	5,327,000,000	5,327,000,000	5,327,000,000
	Employer + Employee Contributions	3,225,448,475	3,225,448,475	3,225,448,475
Liquidity Needs	Benefit Payments & Plan Expenses	6,724,128,023	6,724,128,023	6,724,128,023
	Capital Calls	5,305,000,000	5,305,000,000	5,305,000,000
LCR		1.85	1.69	1.54
MLCR		0.87	0.87	0.86

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

** 0% 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 Wilshire), without correlation benefits. **** Liquid Financial Assets as of June 30, 2024 is approximated by deducting \$580M from Feb 29, 2024 value.

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

		GFC Stress	1 stdev down	2 stdev down
Liquidity Available	Treasuries + Core Fixed Income Assets	1,940,706,330	1,881,859,002	1,823,011,675
	Liquid Financial Assets	10,906,124,311	9,407,215,904	7,908,307,497
	Distributions from Illiquids	3,683,000,000	3,683,000,000	3,683,000,000
	Employer + Employee Contributions	3,225,448,475	3,225,448,475	3,225,448,475
Liquidity Needs	Benefit Payments & Plan Expenses	6,724,128,023	6,724,128,023	6,724,128,023
	Capital Calls	5,812,000,000	5,812,000,000	5,812,000,000
LCR		1.42	1.30	1.18
MLCR		0.71	0.70	0.70

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

** Liquid Financial Assets discounted by MSCI ACWI's performance from Oct 2007- Oct 2010, adjusted for monthly cash flows. *** 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 Wilshire), without correlation benefits. **** Liquid Financial Assets as of June 30, 2024 is approximated by deducting \$580M from Feb 29, 2024 value.

Wilshire's 2023 Asset Class Return and Volatility Assumptions

Asset Classes	Expected Return 10 Years	Expected Return 30 Years	Risk	Cash Yield	Factor Exposure Growth	Factor Exposure Inflation	Liquidity Market Level	Liquidity Stressed Metric
Global Equity	5.60	6.85	17.05	2.00	8.00	-1.35	90	0
Private Equity	9.20	10.20	30.90	0.00	14.00	-3.50	0	0
Public Credit	5.70	6.00	6.95	7.55	2.50	-1.50	90	35
Private Credit	8.45	8.35	11.90	5.95	4.80	-1.20	0	0
Int. Treasuries	4.10	4.05	3.05	4.20	-1.20	-2.40	100	85
Cash	3.80	3.55	0.75	3.80	0.00	0.00	100	100
Real Assets	6.95	8.00	14.55	2.55	4.40	2.50	0	0
Absolute Returns	6.50	6.80	6.10	0.00	1.20	1.20	30	15
Leverage	4.05	3.75	0.75	4.05	0.00	0.00	100	100

Assumptions for Cambridge Associates' Stochastic Model

- CA has utilized its capital market simulation tool to project future returns of the portfolio to better potential asset allocations and liquidity risks
- The simulation engine runs 5,000 trials and rank-sorts the size of the PI program over the next ten years – all analysis starts with the SFERS's plan profile
- CA projected out ten years' worth of investment returns for SFERS' asset classes
- Included in the projection is a dynamic cash flow stream, by year, for each private investment that changes based on the returns assumed in the model²
 - In the case of a shock scenario the commitments are assumed to temporarily drop by up to 15% and the disbursements as a percent of the NAV drops up to 40%
- After each year, the plan is re-balanced and cash is raised as necessary around the private allocation before moving to the next year's return streams
- At the end of the model, the allocation percentage to the private bucket is sorted to showcase the “cone of doubt” of the private portfolio over the next ten years
 - Additionally, CA modeled the 3-year liquidity coverage ratio annually

Cambridge Associates' Stochastic Model: Cone of Doubt Details

Allocation to Private Investments Over Time

YEAR	5 TH PERCENT TILE	25 TH PERCENT TILE	MEDIAN	75 TH PERCENT TILE	95 TH PERCENT TILE
2024	51%	51%	51%	51%	51%
2025	48%	50%	51%	53%	56%
2026	45%	48%	50%	53%	58%
2027	43%	46%	49%	52%	58%
2028	39%	44%	47%	51%	57%
2029	36%	41%	44%	48%	55%
2030	33%	38%	42%	46%	54%
2031	31%	36%	40%	45%	52%
2032	28%	34%	39%	43%	52%
2033	27%	33%	37%	42%	51%
2034	25%	32%	36%	41%	50%

Liquidity Coverage Ratio Over Time

YEAR	5 TH PERCENT TILE	25 TH PERCENT TILE	MEDIAN	75 TH PERCENT TILE	95 TH PERCENT TILE
2024	2.1	2.1	2.1	2.1	2.1
2025	1.9	2.1	2.2	2.4	2.7
2026	1.8	2.1	2.3	2.5	3.0
2027	1.8	2.1	2.4	2.7	3.3
2028	1.8	2.1	2.4	2.8	3.5
2029	1.8	2.1	2.4	2.8	3.6
2030	1.8	2.1	2.4	2.9	3.7
2031	1.8	2.2	2.5	2.9	3.8

SFERS PI COMMITMENT PACING DISCUSSION

FOR ILLUSTRATIVE PURPOSES



MODELING ASSUMPTIONS



- Across Portfolios
 - Total pool value of \$34.6 billion as of December 31, 2023

- PE/VC
 - Target PE/VC allocation of 18%
 - Allocation mix: 50% Buyouts / 30% Venture Capital / 20% Growth Equity
 - Return assumptions: 12% net IRR for Buyouts, 13% net IRR for Venture Capital, 13% net IRR for Growth Equity, 11% net IRR for VC Fund of Funds, 9% net IRR for Fund of Funds
 - Guardrails: >35% annual contribution rate and <25% annual distribution yield

- PC
 - Target PC allocation of 10%
 - Return assumptions: 9% net IRR for Private Credit, 8% net IRR for SMAs

- Real Assets
 - Target Real Assets allocation of 10%
 - Allocation mix: 70% Real Estate; 20% Infrastructure; 10% Natural Resources
 - Return assumptions: 10% net IRR for Real Estate, 10% net IRR for Infrastructure, 9% net IRR for Natural Resources

Modeling Assumptions Overview (con't)

- Base Case

- Assumes (nominal) pool growth of 4%
- Assumes “normal” market environment assumptions for contributions, distributions, and NAV growth

- No Growth Stress Case

- Assumes (nominal) pool growth of 0% from 2024-2026, and 4% thereafter
- NAV experiences no growth from 2024-2026 and then returns to normal growth in 2027+
- PE/VC, PC, and RA:
 - Distributions are cut by 50% in 2024-2026, before returning to normal in 2027+
 - Contributions are cut by 25% in 2024-2026, before returning to normal in 2027+

Modeling Assumptions Overview (con't)

■ GFC Stress Case

- Applies GFC-like changes to pool value for 2024-2026 (~28% drop in 2024, followed by two years of ~10% gains)
- PE/VC:
 - NAV declines 25.7% in 2024, before returning to normal growth in 2025+
 - Distributions are cut by 75% in 2024-2026, before returning to normal in 2027+
 - Contributions are cut by 25% in 2024-2026, before returning to normal in 2027+
- PC:
 - NAV declines 10% in 2024, before returning to normal growth in 2025+
 - Distributions are cut by two-thirds in 2024 and one third in 2025, before returning to normal in 2026+
 - Contributions are cut by 10% in 2024, before returning to normal in 2025+
- RA:
 - NAV declines 28% in 2024, before returning to normal growth in 2025+
 - Distributions are cut by 75% in 2024-2026, before returning to normal in 2027+
 - Contributions are cut by 25% in 2024-2026, before returning to normal in 2027+

TOTAL PI COMMITMENT PACING



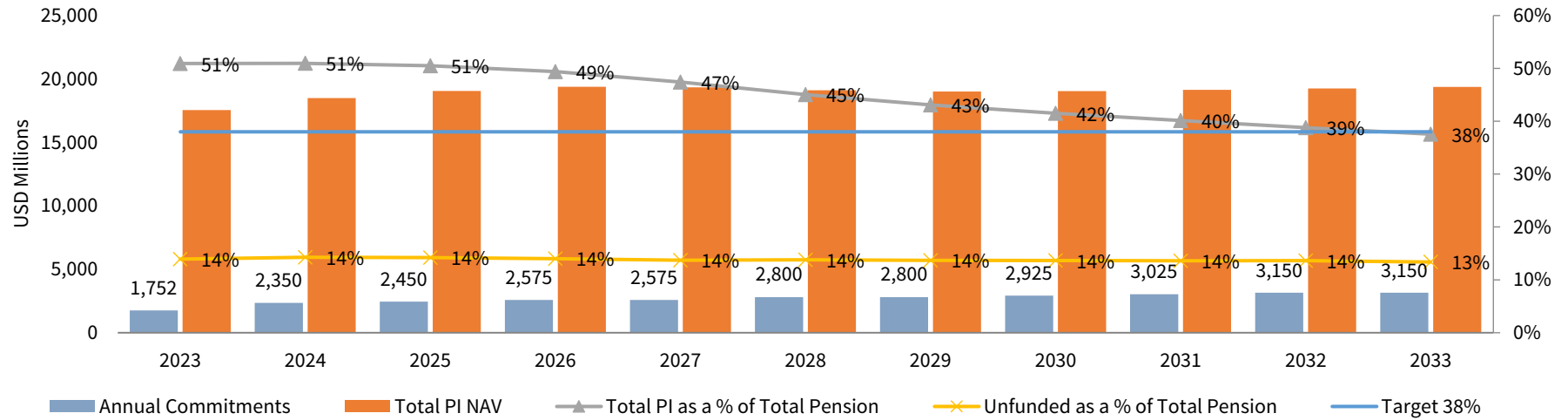
TOTAL PI PORTFOLIO

Base Case – 38% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

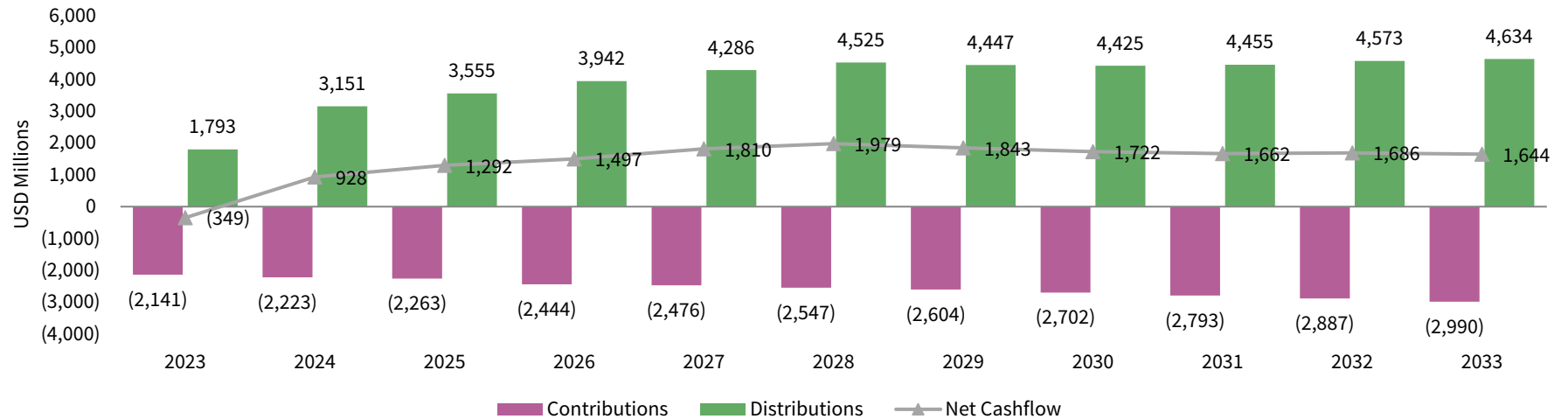
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



Note: Model populated with historical portfolio data as of September 30, 2023, unless otherwise noted. 2023 Annual Commitments and 2023 Annual Cash Flows are as of December 31, 2023. Projected cash flows and allocations based on CA 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.

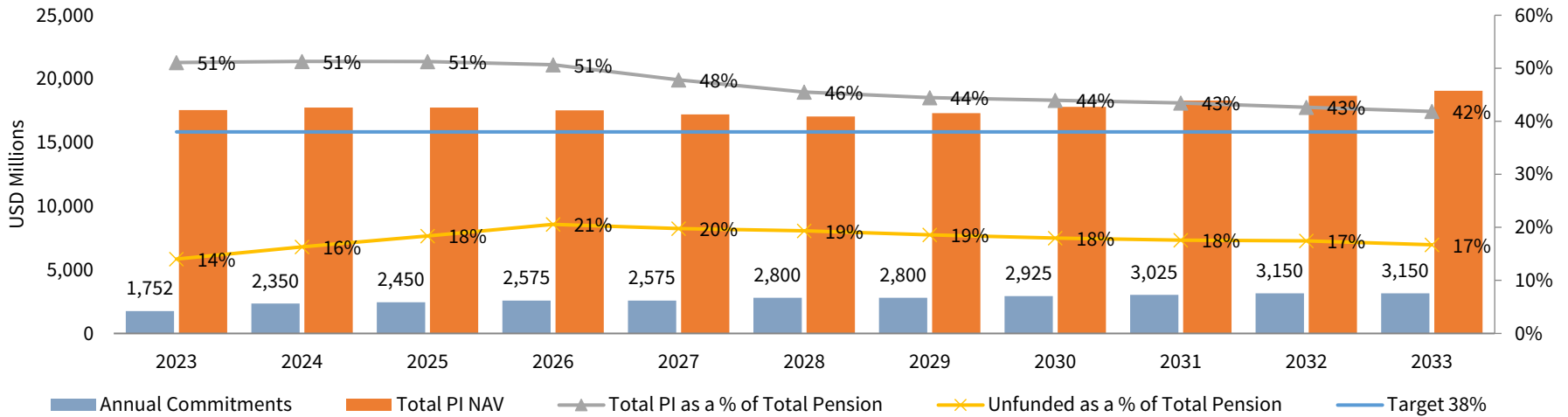
TOTAL PI PORTFOLIO

No Growth Case – 38% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

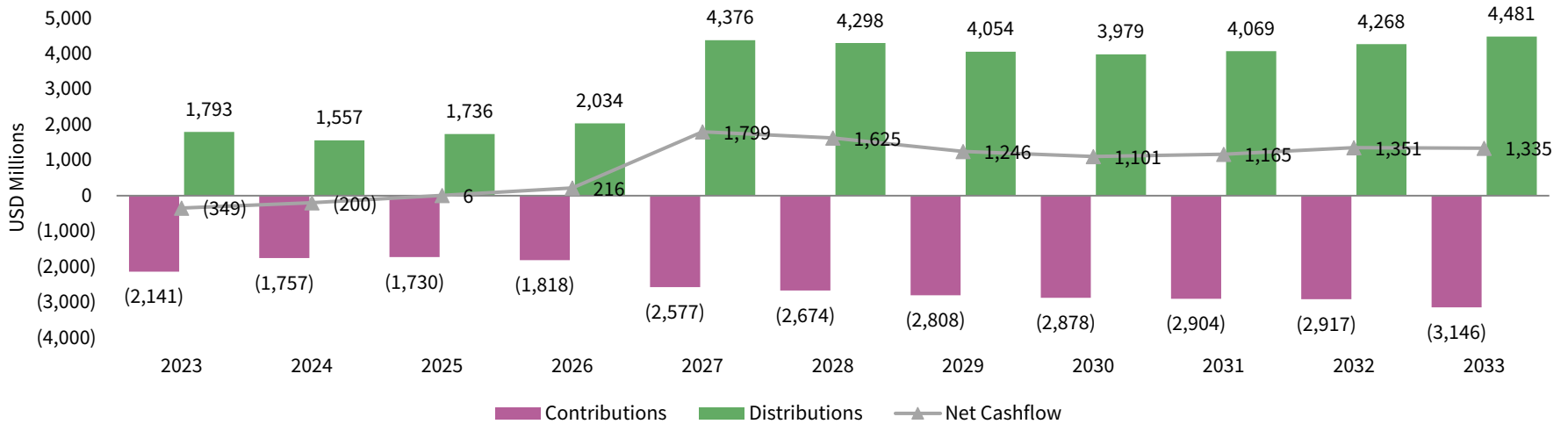
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



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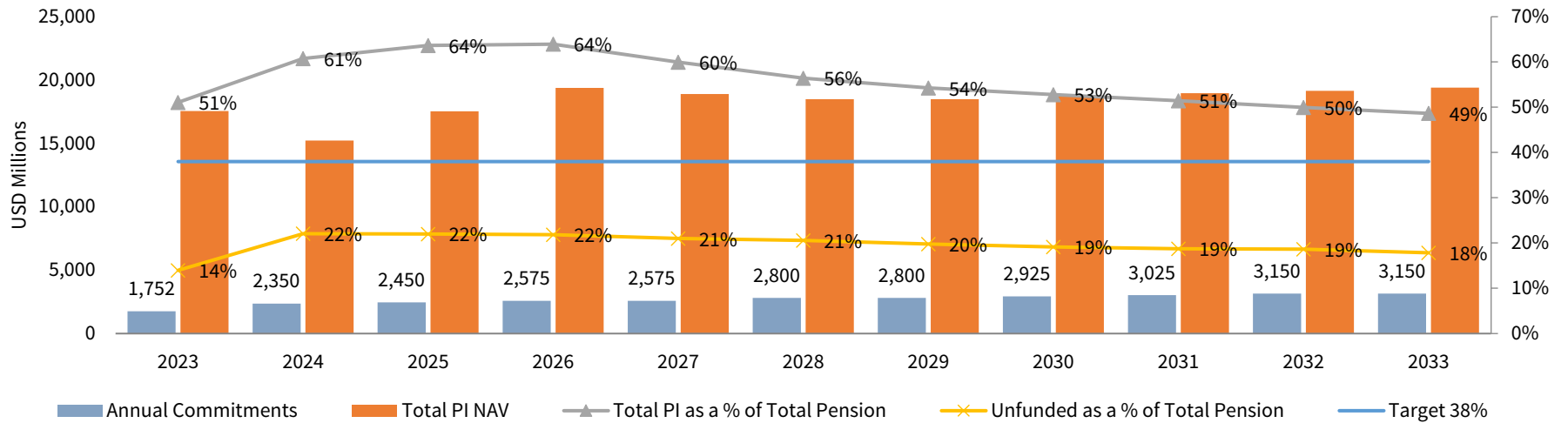
TOTAL PI PORTFOLIO

GFC Stress Case – 38% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

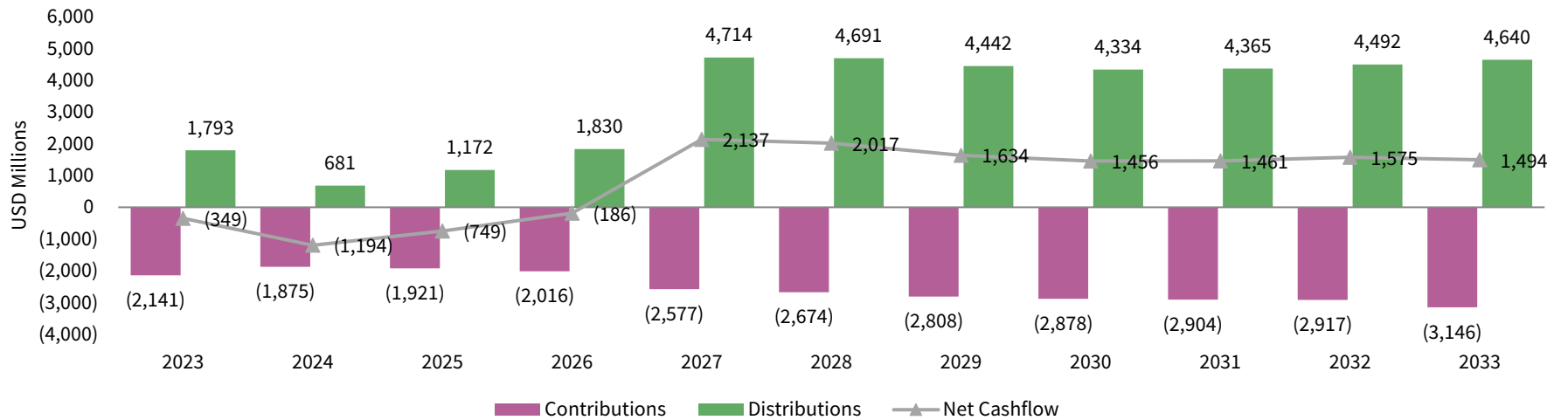
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



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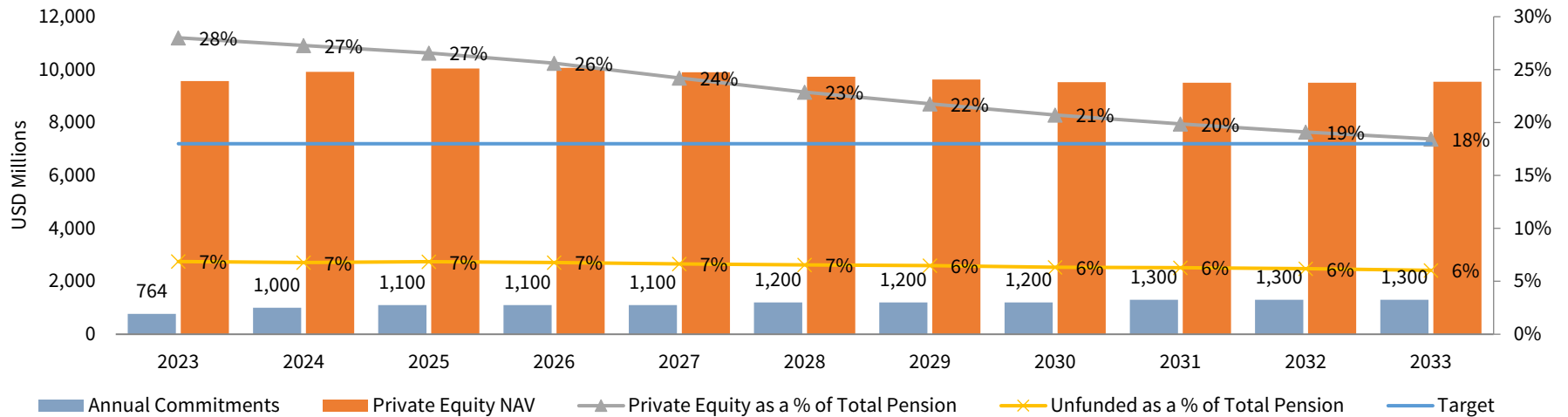
PE/VC COMMITMENT PACING



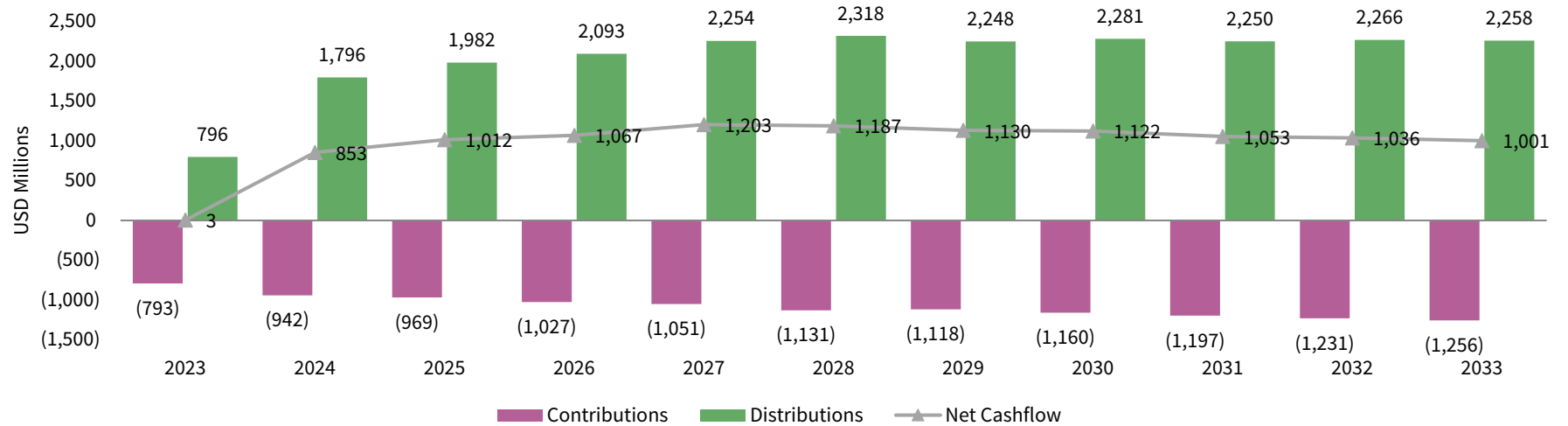
PE/VC Base Case – 18% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023

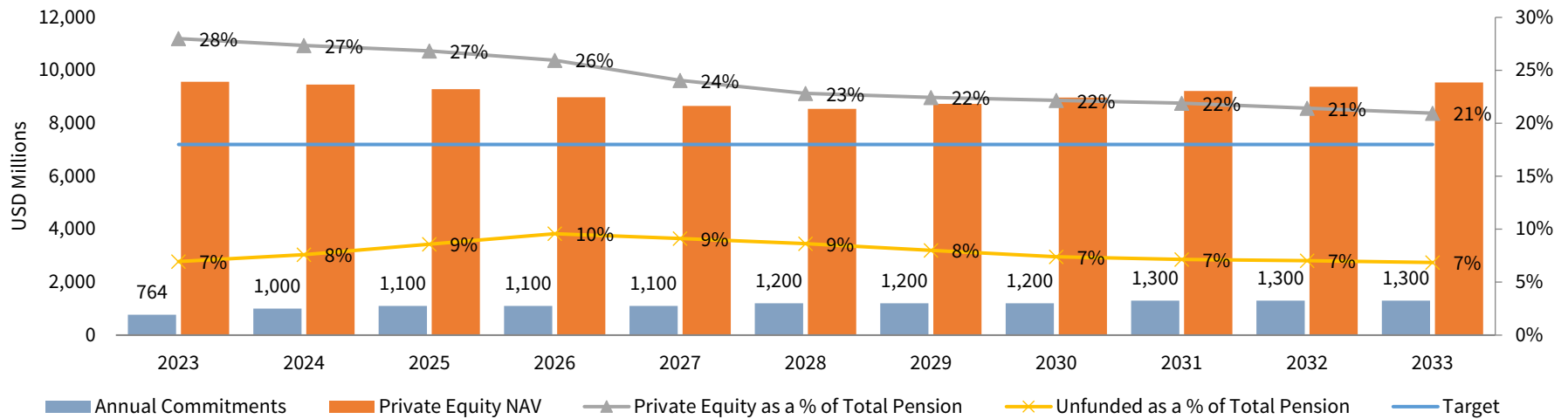


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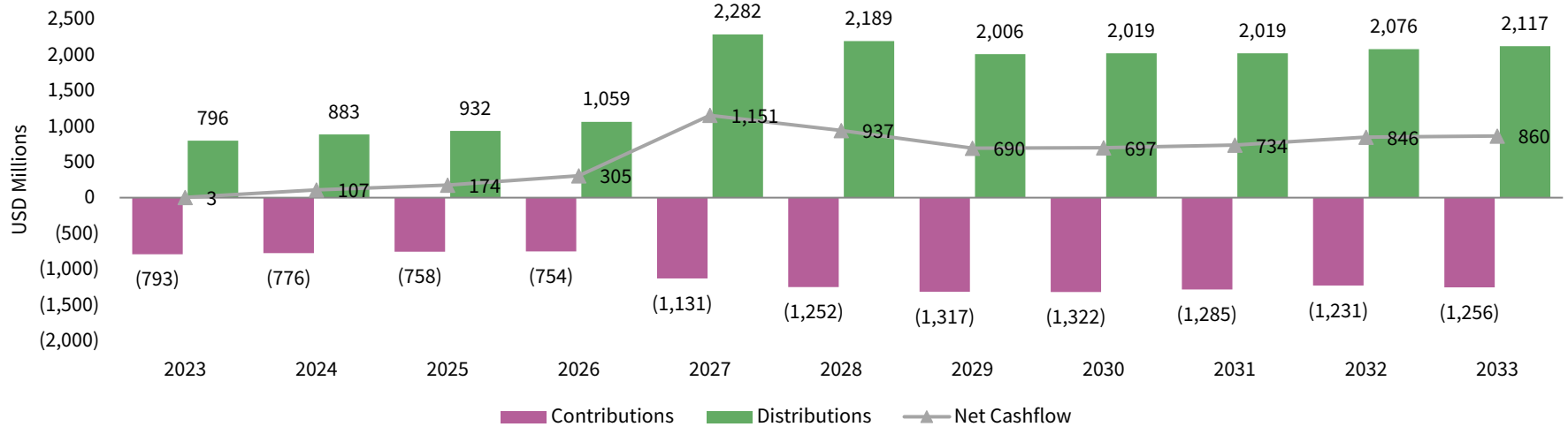
PE/VC No Growth Case – 18% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023

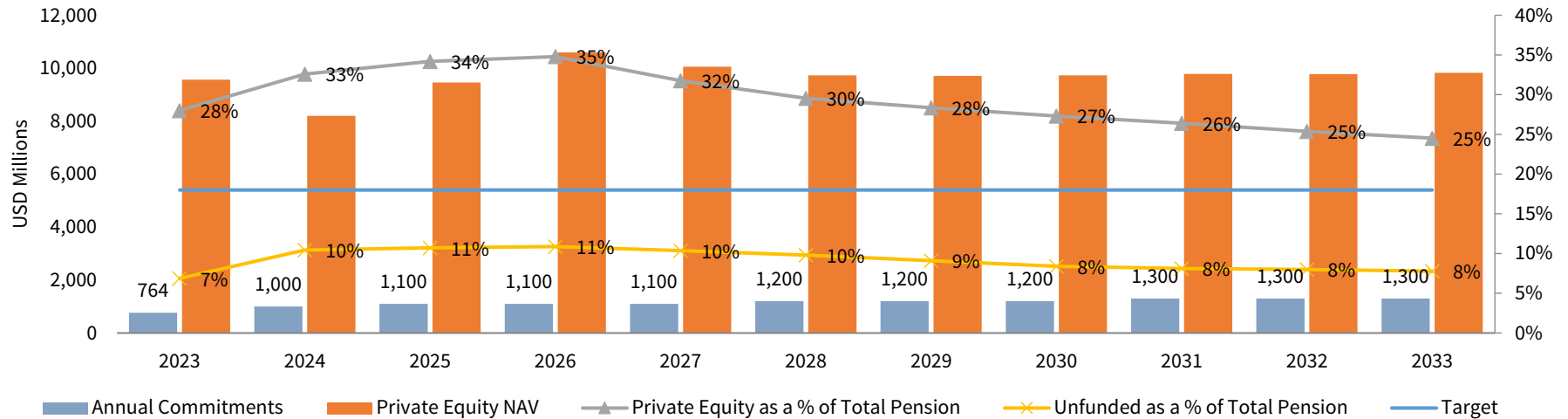


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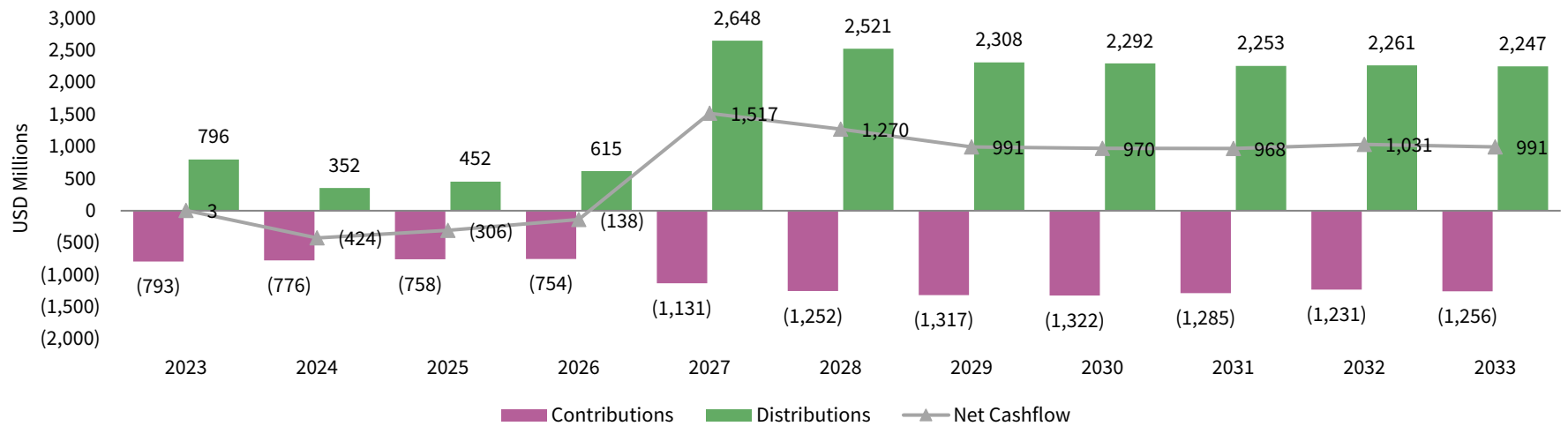
PE/VC GFC Stress Case – 18% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023



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Multi-Year Performance by Asset Class

As of September 30, 2023

	NAV (millions)	IRR (%) ¹						
		Current Quarter	1 Year	3 Years	5 Years	10 Years	20 Years	Inception to Date ²
<u>Private Investments</u>								
Total Venture Capital	\$3,667	-1.2	-6.9	12.0	15.6	16.2	12.7	20.9
Total Growth Equity	\$2,442	-0.1	-1.0	11.1	13.2	15.1	---	12.4
Total Buyout	\$3,571	0.8	9.9	16.0	15.6	15.6	18.3	15.3
Total Co-Investments	\$307	2.1	10.0	16.5	27.8	---	---	25.9
Total Special Situations	\$0	-17.0	-33.4	-2.6	-13.1	-0.3	---	12.1
Total Other Opportunistic	\$3	-2.5	-9.2	6.8	7.5	9.6	---	18.1
Total Portfolio	\$9,989	-0.1	0.5	13.2	15.1	15.6	15.2	15.9
CA Global Private Equity & Venture Capital (All Vintage Years)		-0.6	3.7	15.5	15.5	15.1	14.1	14.7
CA Global Venture Capital (All Vintage Years)		-2.4	-8.9	14.9	17.2	17.2	12.5	NA
CA Global Growth Equity (All Vintage Years)		-0.6	0.8	12.3	14.8	14.3	13.8	NA
CA Global Buyouts (All Vintage Years)		0.1	10.2	16.8	15.0	14.6	14.6	NA
CA Global Private Equity (All Vintage Years)		-0.1	7.8	15.7	15.0	14.5	14.5	NA
CA Global Distressed Securities (All Vintage Years)		0.8	6.9	15.1	10.3	9.6	10.5	NA
CA Global Secondaries (All Vintage Years)		0.2	2.9	18.8	13.7	13.0	13.0	NA
75% Russell 3000/25% MSCI ACWI ex-US IMI + 300 bps AACR ³		-2.4	24.9	12.0	11.4	13.3	12.8	12.5
S&P 500 Index AACR		-3.3	21.6	10.2	9.9	11.9	9.7	10.6
S&P 500 mPME		-3.3	21.6	10.0	10.1	11.8	10.4	9.2

¹ IRR calculations are based on a stream of quarterly cash flows; including NAV, paid-in capital, and distributions. The multi-year return calculation assumes the starting period NAV is the first contribution in the stream of cash flows used to calculate the IRR. Liquidated investments are only included in the total returns for each asset class and the total portfolio.

² Inception to Date IRRs are not provided for the CA benchmarks, given differing inception dates for SFERS' asset class composites.

³ 25% MSCI ACWI ex-US consists of the MSCI ACWI ex-US Index (Net) from 6/30/1994 – 9/30/2023, the MSCI ACWI ex-US Index (Gross) from 1/1/1988 – 6/30/1994, and the MSCI ACWI World Index (Net) prior to 1/1/1988.

Annual Performance by Asset Class

As of September 30, 2023

	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>Q1 2023</u>	<u>Q2 2023</u>	<u>Q3 2023</u>
Venture Capital	21.0	23.3	-15.3	-0.9	12.0	13.3	4.7	24.3	34.0	17.7	1.5	7.8	22.3	21.1	41.1	48.8	-19.9	-1.2	-0.8	-1.3
Growth Equity	17.3	28.0	-20.2	14.9	17.5	7.7	11.5	19.3	10.9	10.4	13.9	21.9	22.8	16.7	34.9	32.6	-11.7	1.0	-0.6	0.0
Buyouts	33.0	26.0	-26.5	18.0	16.7	5.3	12.0	24.3	11.6	10.1	12.0	21.4	11.3	19.1	26.9	29.6	-1.9	3.1	2.8	0.8
Special Situations	22.1	26.7	-30.5	16.5	15.6	8.0	13.2	10.9	4.0	-1.0	9.6	19.4	15.7	20.3	21.6	84.7	-24.2	0.0	11.4	-17.0
Total Private Equity	27.7	25.5	-23.5	12.5	15.6	7.7	10.3	22.4	17.3	12.2	8.0	16.2	17.9	19.4	34.1	39.8	-12.2	0.9	0.6	-0.1
<i>CAGlobalPEVCIndex</i>	33.8	23.2	-28.1	15.0	20.0	7.8	13.1	21.6	12.7	9.8	8.9	20.4	11.4	17.6	33.6	39.3	-9.3	2.1	1.6	-0.6

All data is as of September 30, 2023 and reported by Aksia.



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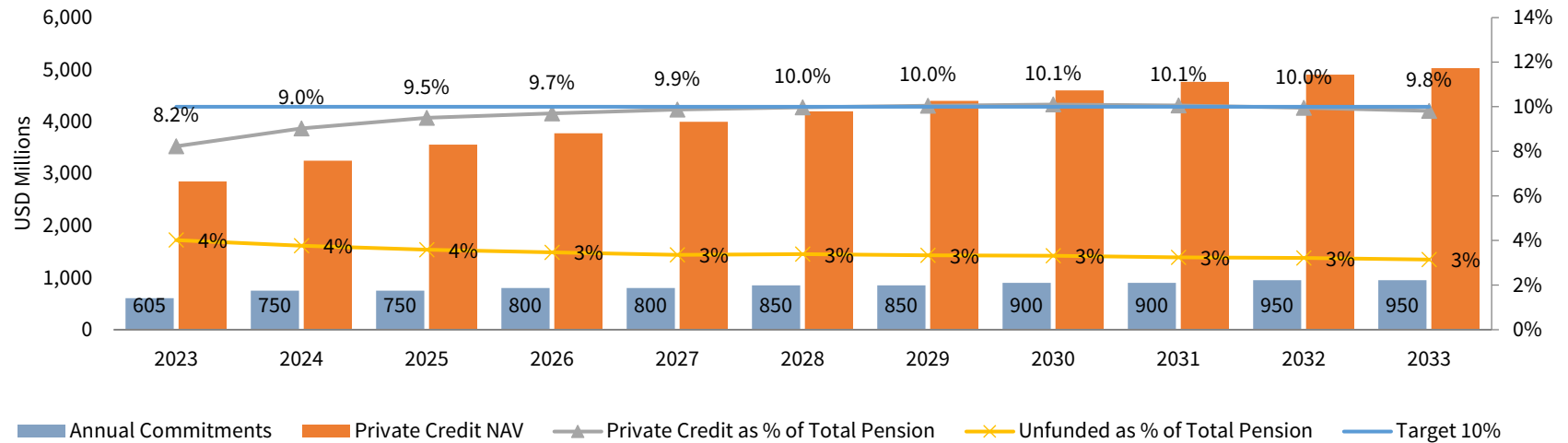
PRIVATE CREDIT COMMITMENT PACING



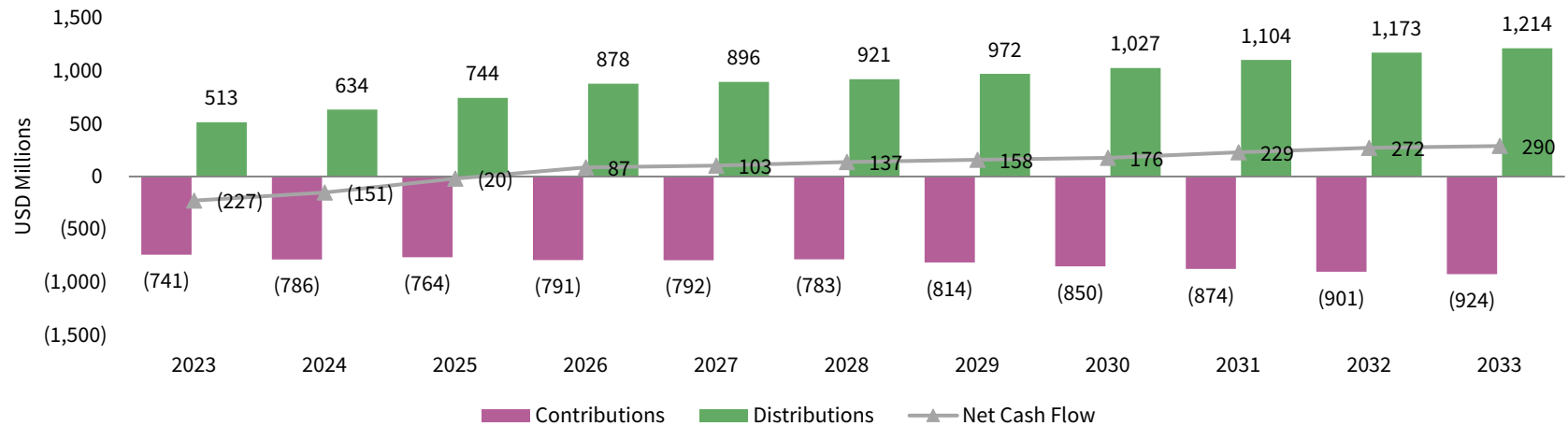
Private Credit Base Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023

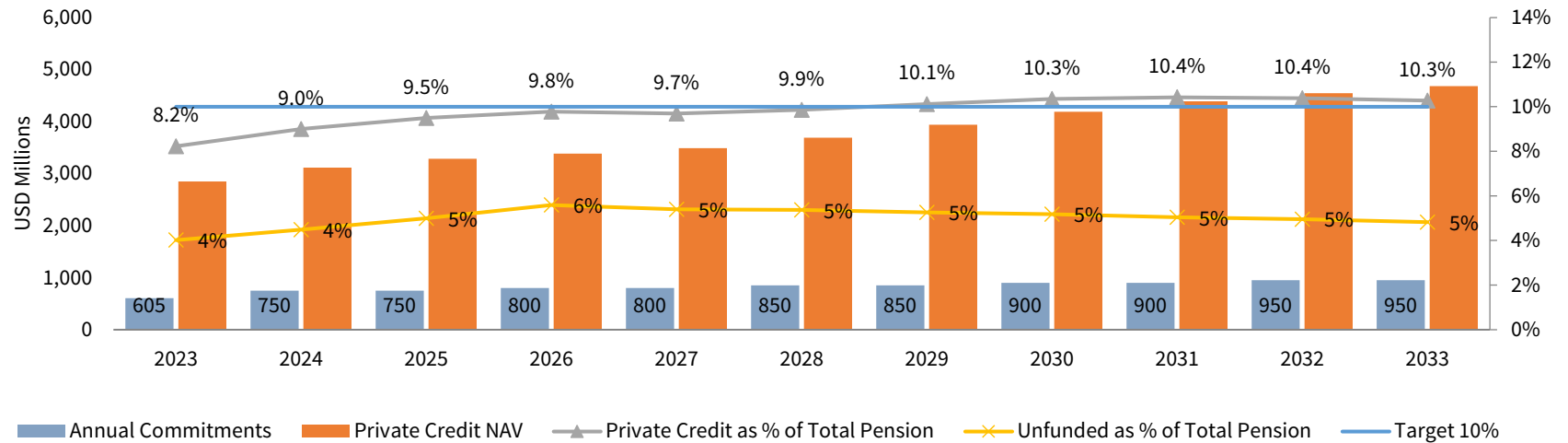


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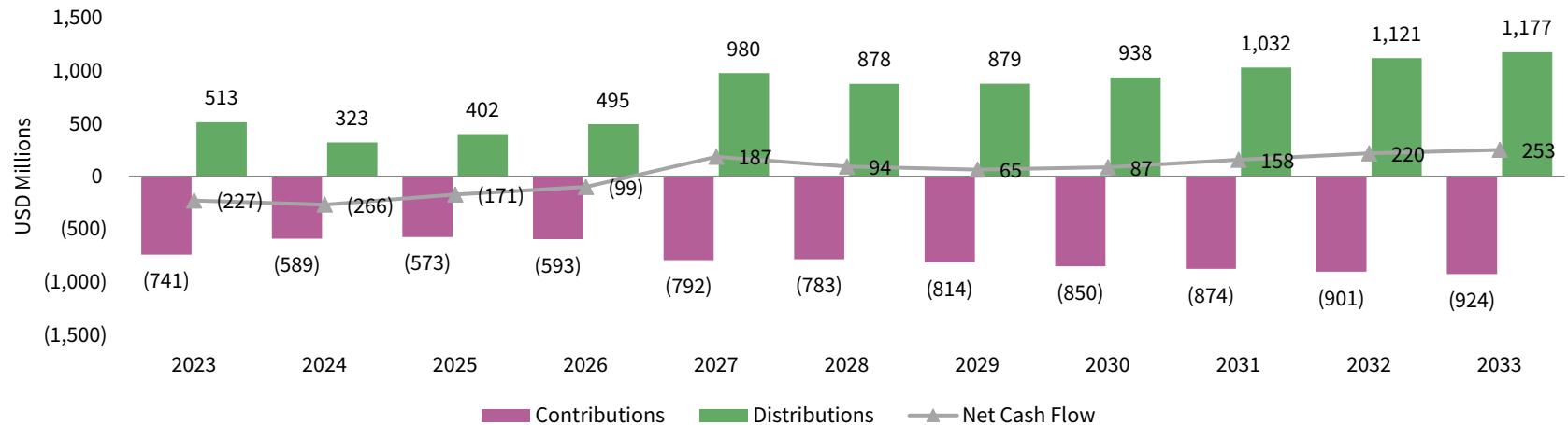
Private Credit No Growth Stress Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023

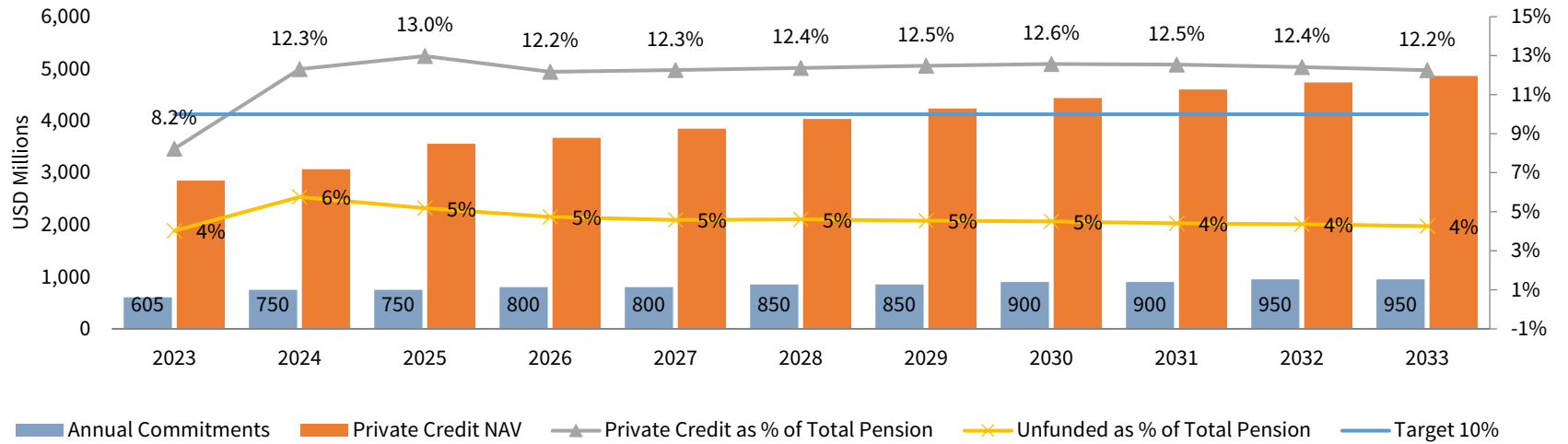


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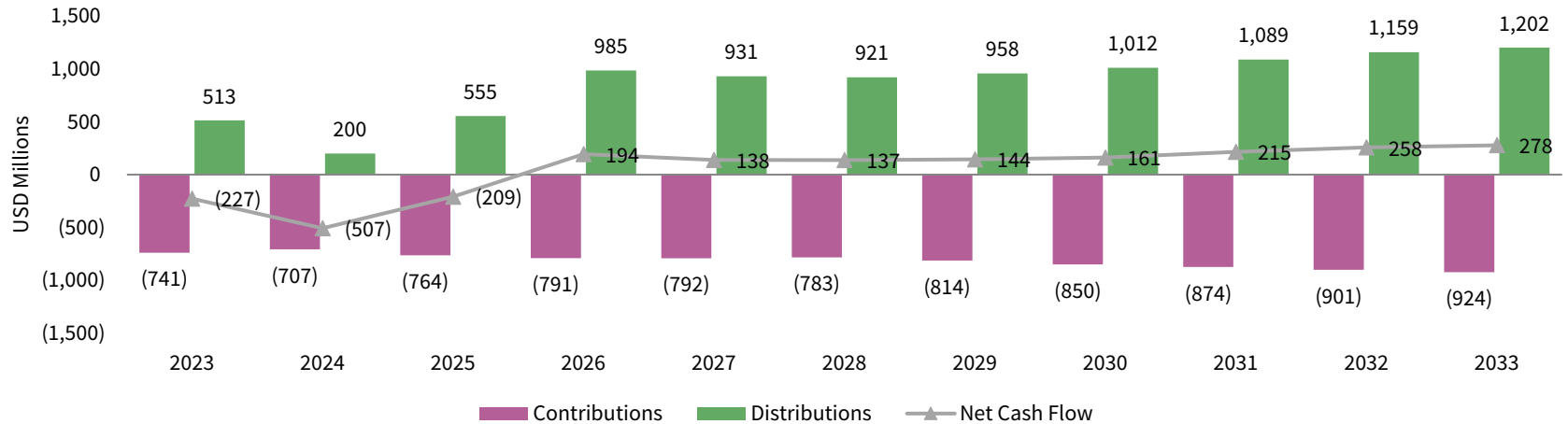
Private Credit GFC Stress Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

COMMITMENT PACE As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS As of September 30, 2023



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REAL ASSETS COMMITMENT PACING



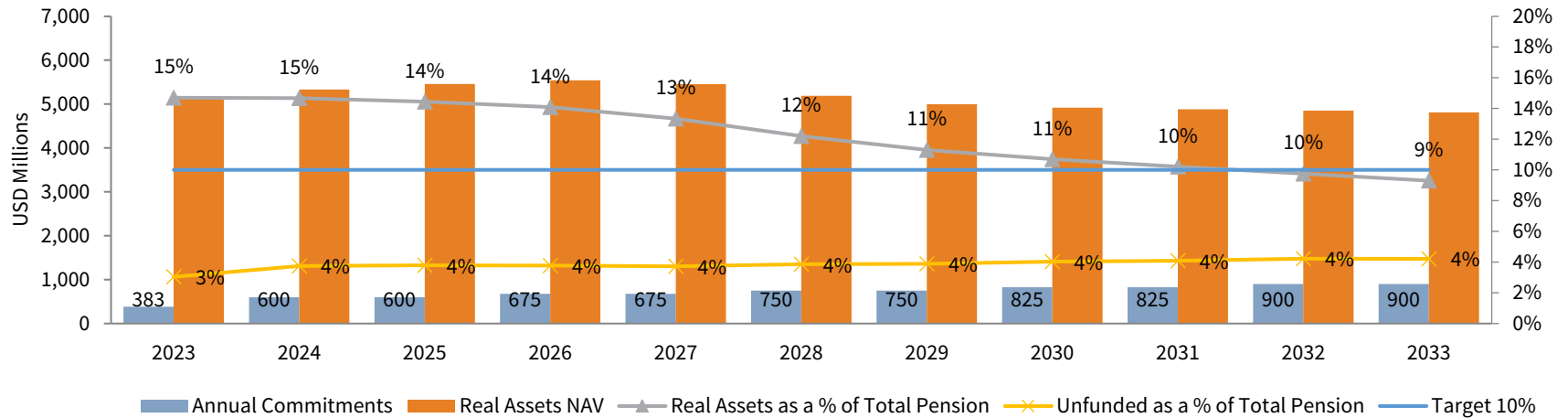
Real Assets

Base Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

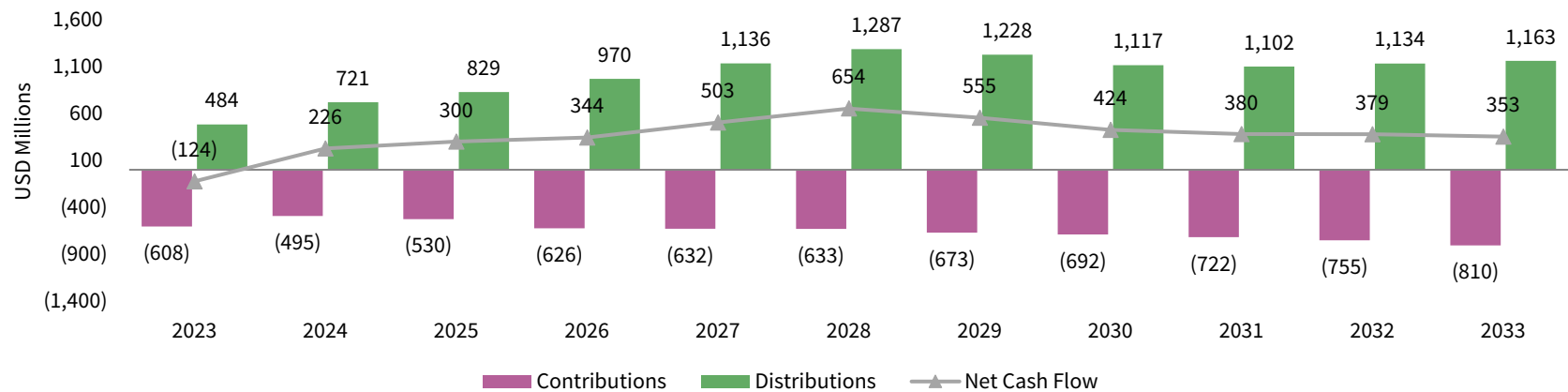
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



Note: Model populated with historical portfolio data as of September 30, 2023, unless otherwise noted. 2023 Annual Commitments and 2023 Annual Cash Flows are as of December 31, 2023. Projected cash flows and allocations based on CA 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.

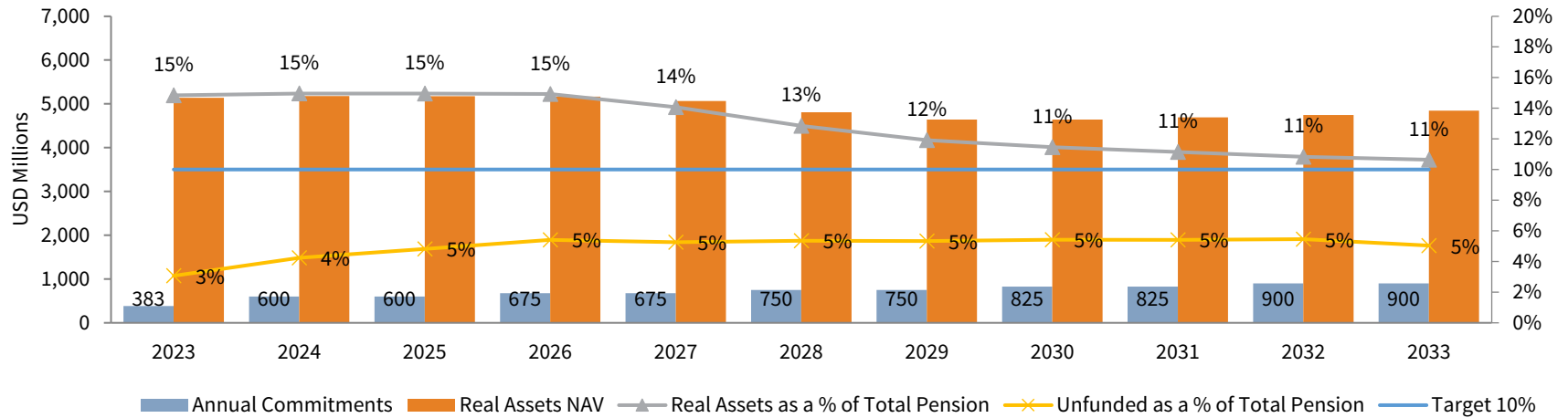
Real Assets

No Growth Stress Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

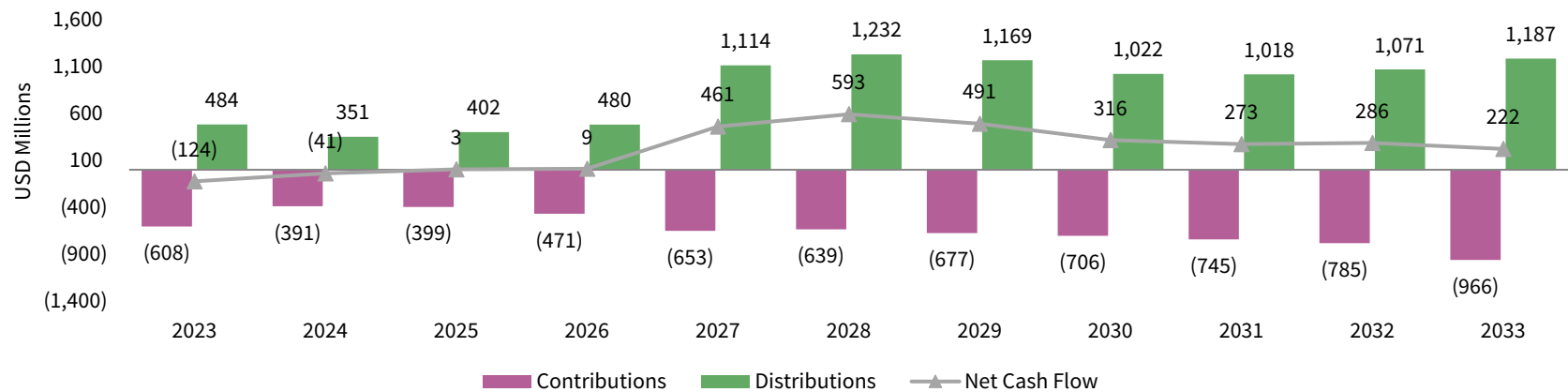
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



Note: Model populated with historical portfolio data as of September 30, 2023, unless otherwise noted. 2023 Annual Commitments and 2023 Annual Cash Flows are as of December 31, 2023. Projected cash flows and allocations based on CA 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.

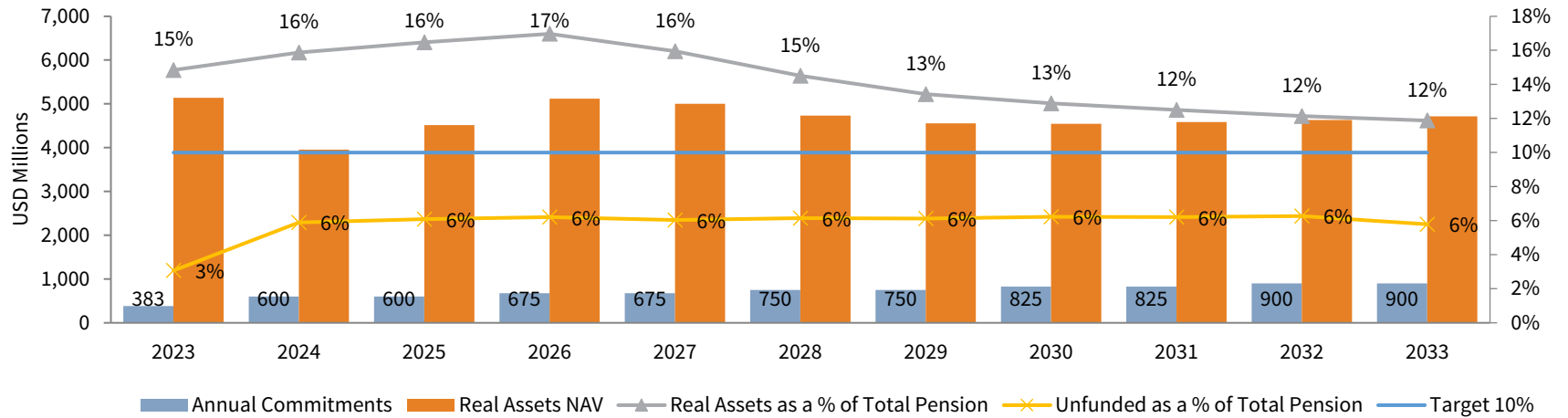
Real Assets

GFC Stress Case – 10% target

Starting Pool Value: \$34.6 billion (as of 12/31/2023)

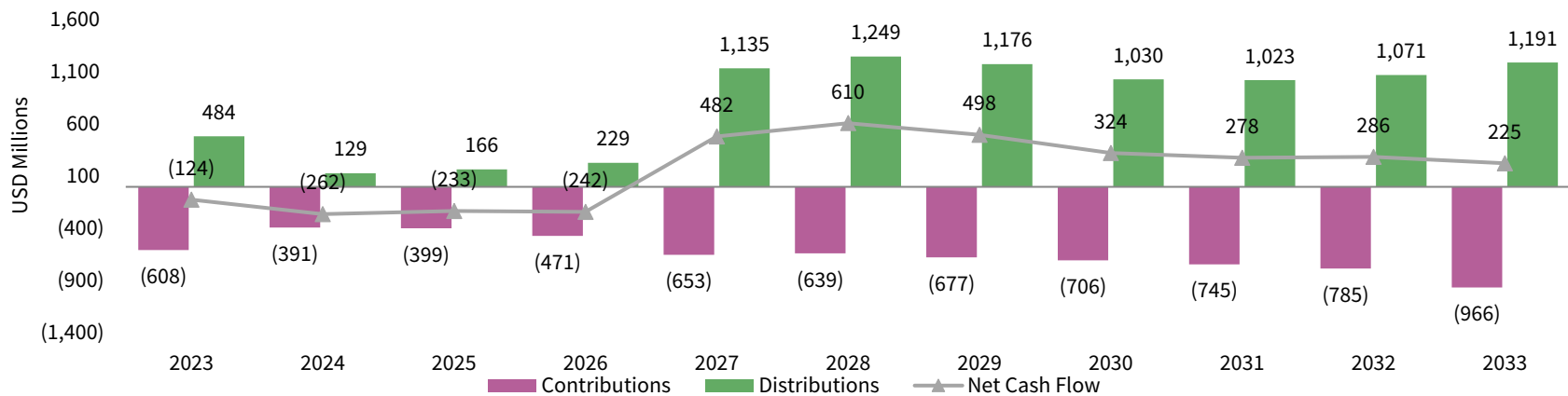
COMMITMENT PACE

As of September 30, 2023



ESTIMATED ANNUAL CASH FLOWS

As of September 30, 2023



Note: Model populated with historical portfolio data as of September 30, 2023, unless otherwise noted. 2023 Annual Commitments and 2023 Annual Cash Flows are as of December 31, 2023. Projected cash flows and allocations based on CA 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.



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