



# Report to the Investment Committee

Sept. 19, 2024

- **Matters requiring investment committee action:**
  - None
- **Educational or scheduled updates and reviews requiring no action today:**
  - Summary of investment activity report, August 2024
  - Asset-liability study
  - Annual review of the Securities Lending Program
  - Meketa comments
  - Review of August 2024 investment transactions
- **Summary of requests**

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- **The preliminary total fund net return for August was +1.5%**
- **Domestic and international equities +2.1%, fixed income +1.4%**
  - All asset classes had positive returns
- **The preliminary total fund net return for fiscal year to date is +2.8%**
- **Rebalancing activity**
  - \$300 million was allocated to fixed income
  - \$244 million was removed from domestic equity
- **Preliminary total investment assets ended August at \$97.2 billion**
  - Higher by \$2 billion in fiscal 2025

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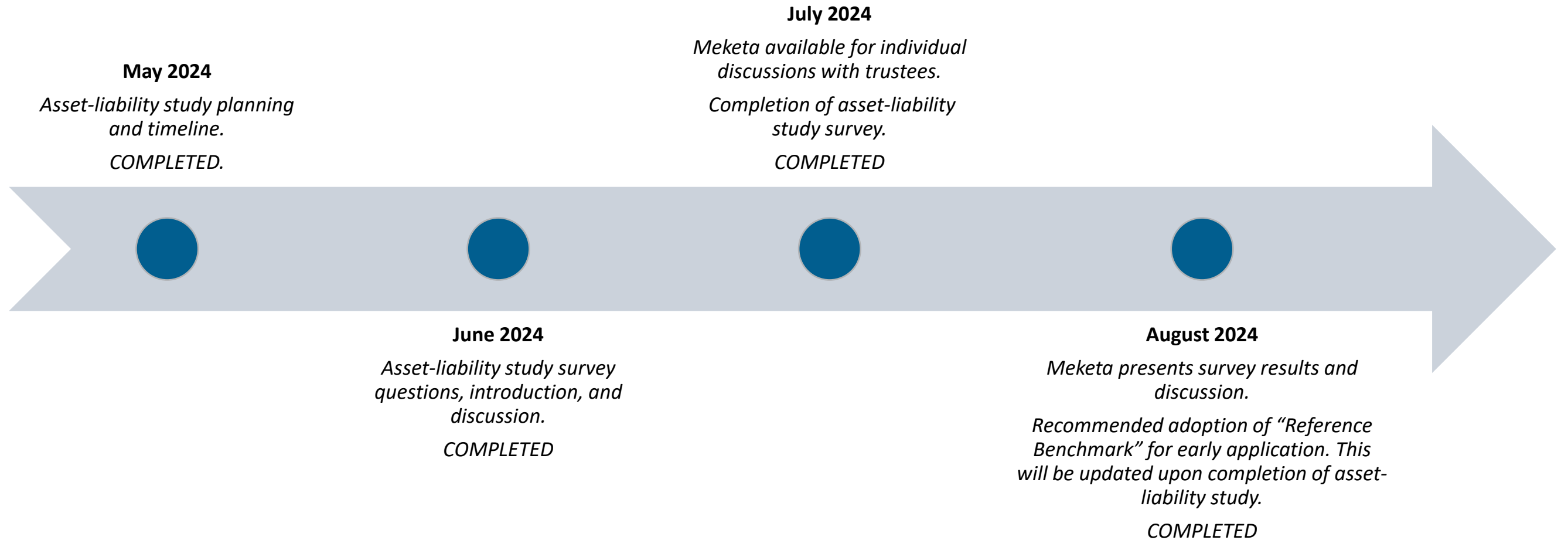
INVESTMENT GROUP

# State Teachers Retirement System of Ohio

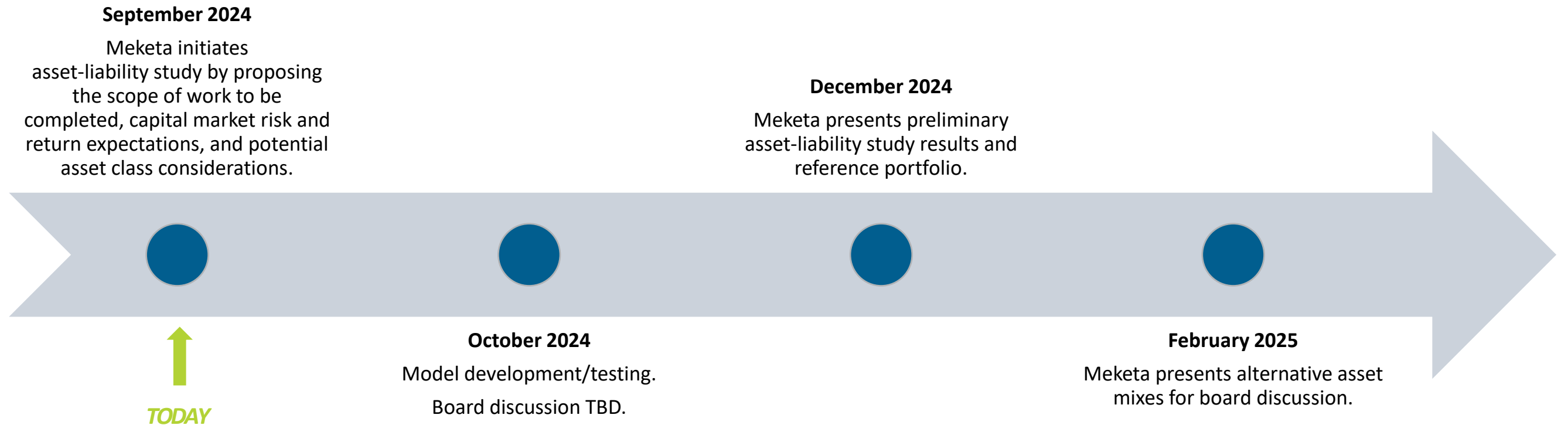
September 19, 2024

Asset-Liability Study:  
Strategic Structure &  
Proposed Scope

**Asset-Liability Study Timeline | May - August 2024**

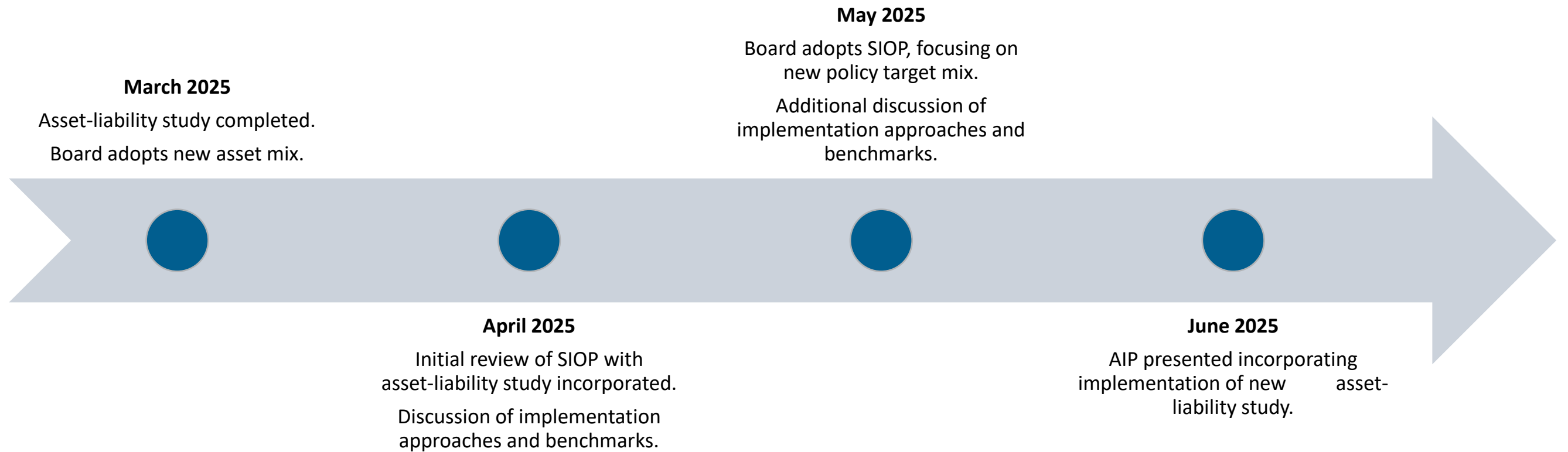


**Asset-Liability Study Timeline | September 2024 – February 2025**





**Asset-Liability Study Timeline | March – June 2025**



## **Asset-Liability Study – Purpose and Process**

## Asset-Liability Study | Purpose

- Selecting a strategic asset allocation is the most important investment-related activity of a public pension board. **The outcome of an asset-liability will be an STRS Board-selected asset allocation.**
- Best practices is to conduct asset-liability studies every 3-5 years, or when market and/or benefit structures materially change (e.g., liability assumptions).
- For STRS, the previous asset-liability study was completed in 2022, which aligns with the 3-5 year timeframe.
  - Additionally, the capital markets (i.e., interest rates) have significantly changed since 2022.

**Noteworthy STRS Considerations**

- Material negative net cash flow (-4% to -5% | exceeded -5% in years 2012-2020)
- Fixed contribution policy (provides another headwind for cash-flow/liquidity)
- *Fiscal Integrity* provisions and related SBP-tests

# 3 key high-level steps to the A/L process:

**1.**

Develop an understanding of **how the financial condition of STRS Ohio might vary** based on outcomes of the investment portfolio.

**2.**

Set a consensus definition and view of the risk(s) STRS Ohio should bear.

**3.**

Once a view/tolerance for risk has been established, **select an appropriate long-term investment strategy** (i.e., a policy portfolio / strategic allocation).

STRS Ohio – Decoupling Retirement and Health Care Plans

- Historically, retirement plan (DB) and health care (HC) plan assets have been invested via the same strategic allocation (i.e., policy portfolio).
- With the 2024/2025 Asset-Liability Study, these plans (as well as DC plan assets) will be separated for modeling purposes.
- DB and HC plans have different cash-flow and liability projections, which may result in different strategic allocation structures.
- For each plan, the selected asset allocation structure should reflect the trustees’ preferences for optimal tradeoffs (e.g., portfolio return vs. portfolio risk, plan-specific “success” vs. plan-specific downside scenarios, etc.)

<p><u>6/2023 Retirement Plan</u>                  Assets = \$85.0 billion  <b>Liabilities = \$107.8 billion*</b></p>	<p><u>6/2023 Health Care Plan</u>                  Assets = \$4.8 billion                  Liabilities = \$2.8 billion</p>	<p><u>6/2023 DC Plan</u>                  Assets = \$2.6 billion</p>
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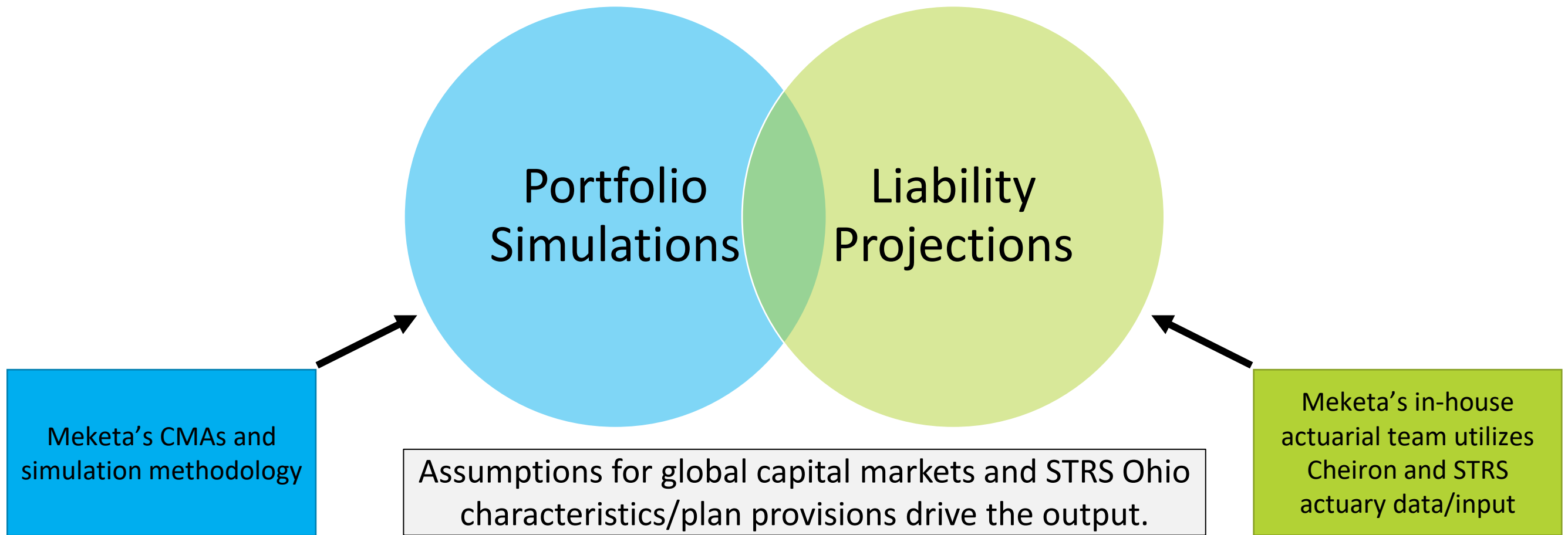
\*Includes combined plan liabilities

## Approach to Asset-Liability Studies

- An asset-liability study is a dimension reducing exercise.
  - Take the immense complexities of a defined benefit system and the global capital markets and reduce them to a digestible form.
- We are continually improving our methodologies and models to better reflect the real world and the full dynamics of retirement systems.
  - Be humble, but rigorous, about the models.
  - There is “error” at every level of the modeling process (inputs, outputs, etc.).
  - “As simple as possible but as complex as necessary”

Approach to Asset-Liability Studies

→ Asset-liability studies are the intersection of asset and liability projections.



Changes in Funded Status

- The actuarial value of assets (AVA) and actuarial accrued liability (AAL) change from one year to the next in a formulaic fashion.
- Note: actuarial losses/gains are important considerations that are generally related to experience vs. assumptions.

Example: Change in AVA and AAL	
AVA at Beginning of Year	AAL at Beginning of Year
+ Contributions	+ Service cost (benefits accrued during year)
+ Actual return (accounting for any smoothing)	+ Interest cost
- Benefits paid	+/- Actuarial losses/gains during the year
- Expenses	- Benefits paid
<b>= AVA at End of Year</b>	<b>= AAL at End of year</b>

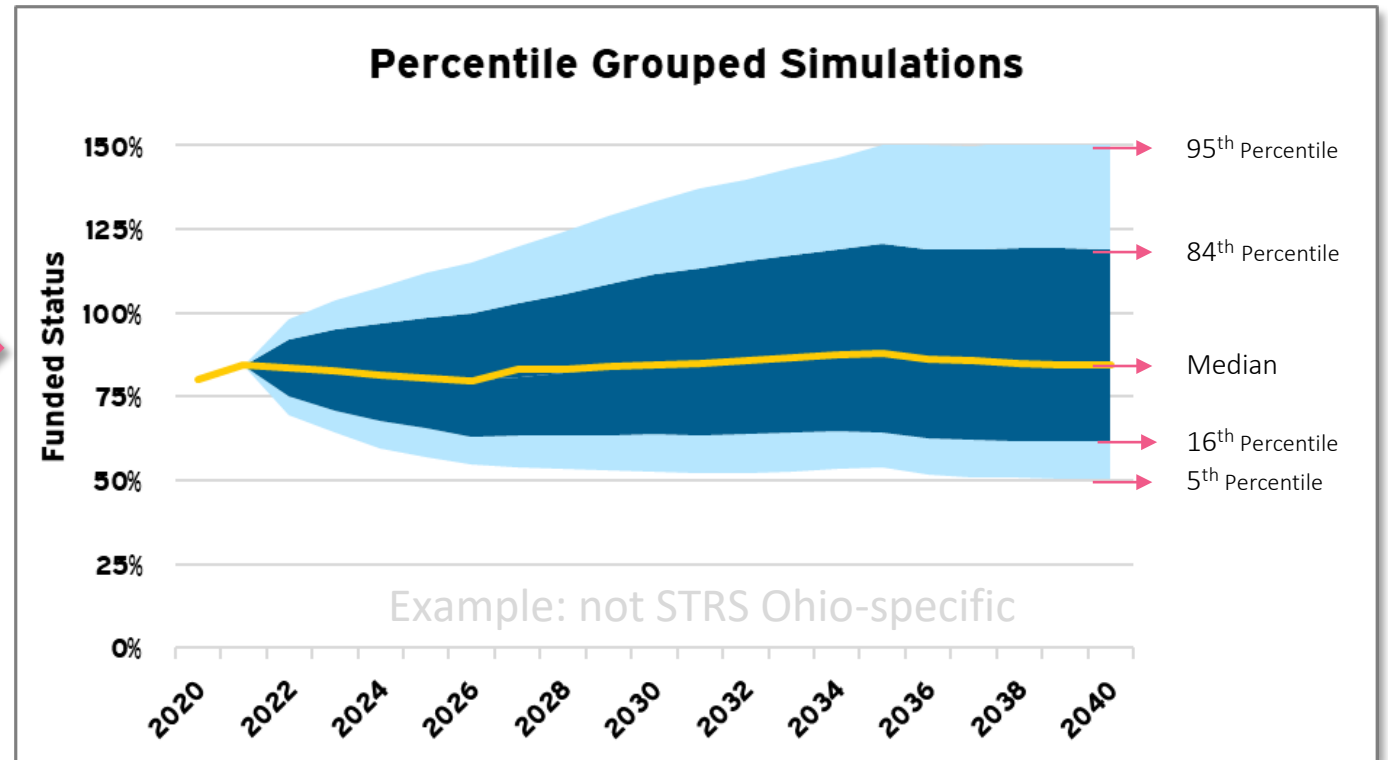
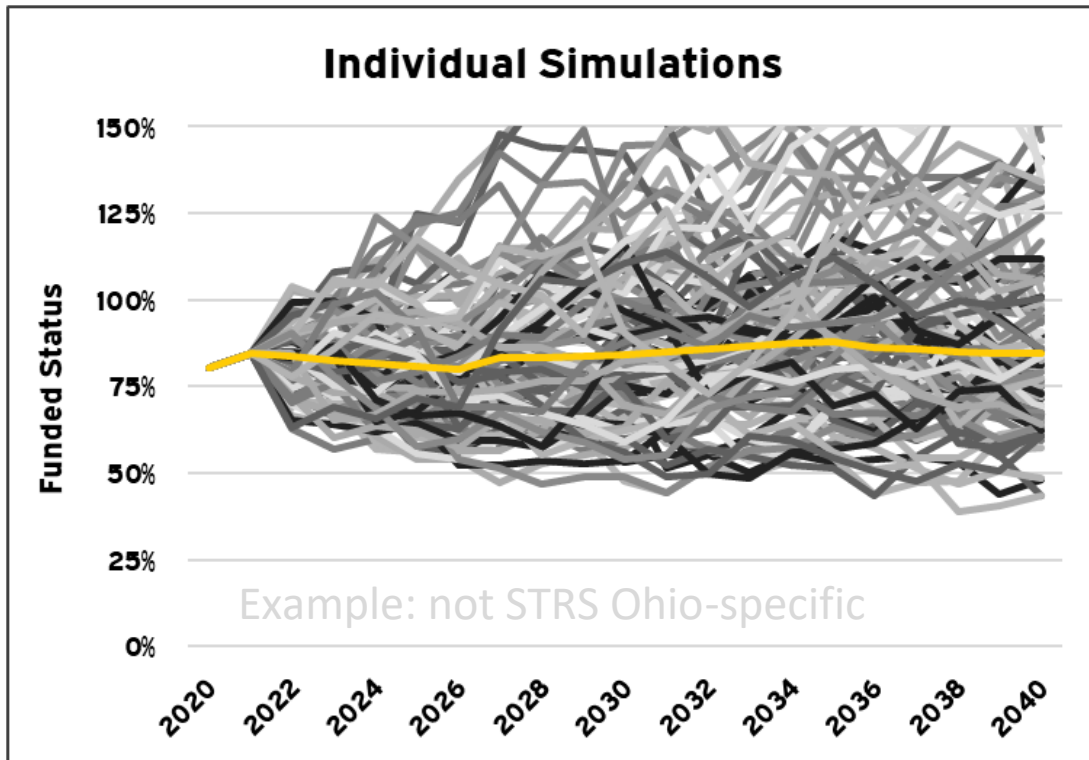
Asset-liability studies examine a wide range of modeled returns and corresponding impacts.





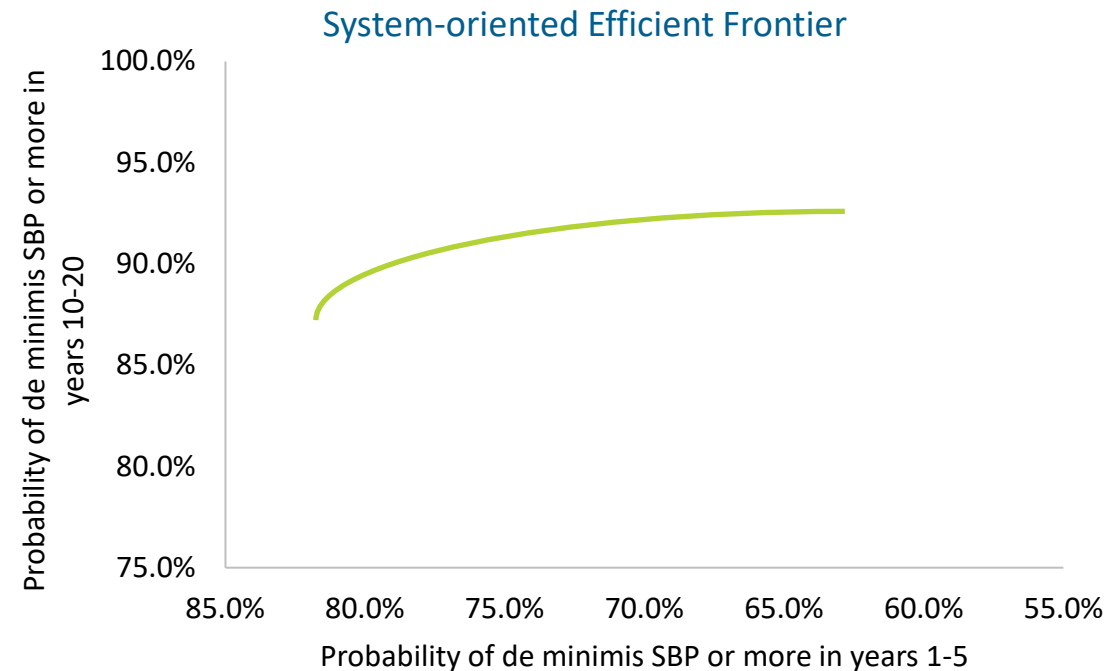
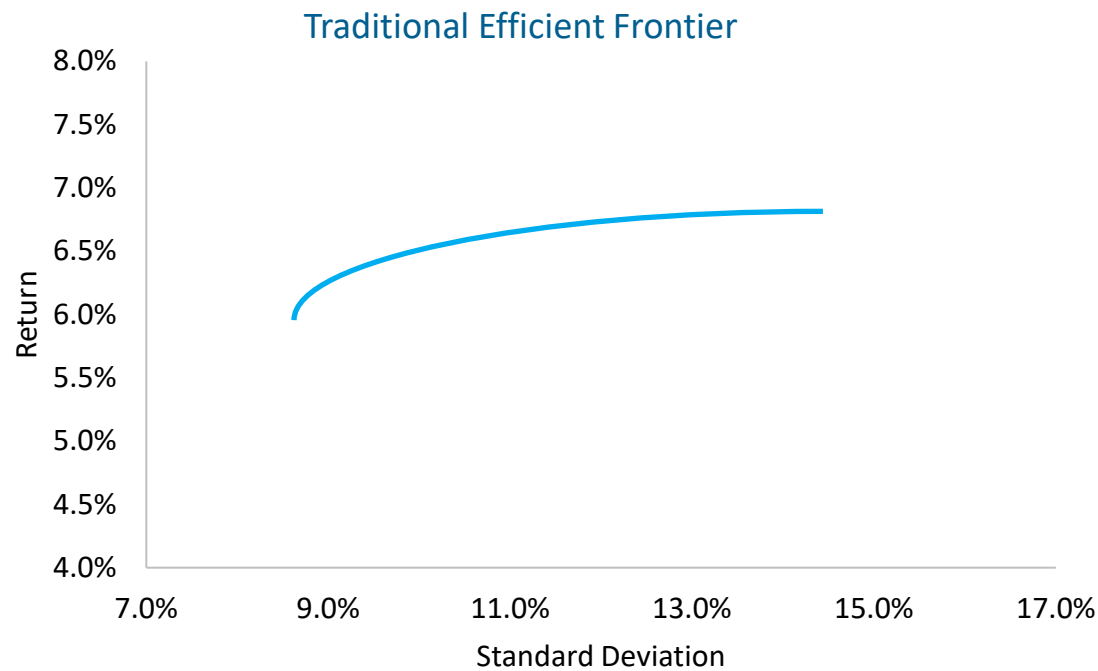
Example Asset-Liability Output

- Individual simulations that explore major asset-liability metrics (e.g., funded ratio) are combined into corridors of percentiles.
- Discussions shift to focus on probabilities/groupings rather than point estimates.



**Reframing the Efficient Frontier**

- Portfolio allocation changes are commonly based on traditional efficient frontiers (return-risk tradeoff).
- STRS Ohio’s asset-liability study will also examine various system-oriented efficient frontiers (measures of success compared to measures of risk).



**Other Example System-oriented Metrics**

- Long-term vs. short-term funded status probabilities
- Frequency of funded status threshold breaches vs. severity
- Expected median vs. 5<sup>th</sup> percentile total contributions

Risk and Implementation Survey Takeaways

→ There is far more agreement in the survey results than what comes through during Board meetings.

→ Areas of investment focus:

- Impacts A/L modeling inputs and/or outputs**

  - Continue making funding progress with the goal of outperforming the actuarial rate, which in-turn will achieve SBP-related budgets.
  - Negative net cash flow/liquidity is a critical consideration when selecting an asset allocation.
  - Pursue a portfolio of similar risk level (compared to current policy) but also explore portfolios with less risk.
  - Subject to diversification and risk/return goals, maintain some level of exposure to private markets asset classes
  - Provide realistic scenarios for downside funded ratio thresholds – a subset of trustee viewpoints on this topic may be unrealistic.
- Relevant to implementation and monitoring**

  - Compare merits of a Global equity portfolio compared to a US-centric portfolio.
  - Explore the pros/cons of passive management within Public Equity and Public Fixed Income.
  - Avoiding contradictions related to market efficiency will be a key concept for STRS Ohio.
  - Examine additional mechanisms to improve portfolio/asset class understanding (e.g., Alternative Investments).

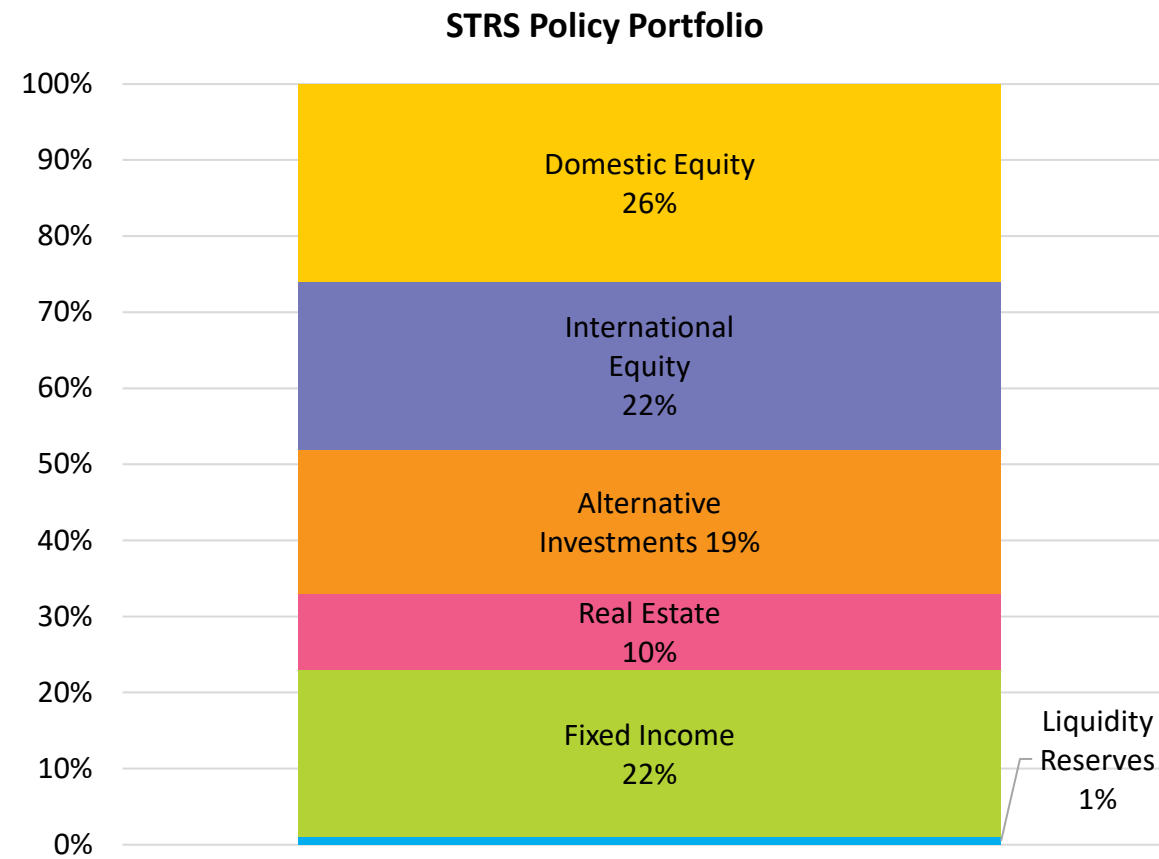
## Scope Summary

- The ultimate goal of an asset-liability study is to select a new strategic asset allocation (i.e., policy portfolio).
  - Specific implementation considerations are discussed after the asset allocation is selected.
- For STRS Ohio, the DB and HC plans will be separated in the modeling process, which may or may not result in different asset allocations for the two plans.
- Both the DB and HC plans will utilize similar modeling methodologies:
  - Thousands of multi-year simulations, where the balance sheet of the corresponding STRS plan is updated during each year of the simulation to account for asset returns, cash-flows, and liability projections.
  - Actuarial data (i.e., cash-flow and liability projections) are provided by Cheiron but Meketa will independently model STRS Ohio (results will be compared to Cheiron for consistency).
- The STRS Ohio Board will review different asset allocation options and corresponding metrics which will include traditional risk/return statistics as well as system-oriented measures of success and risk.
- Once strategic asset allocation decisions are made (i.e., completion of the asset-liability study), transition timelines, risk budgets, and implementation plans will be discussed.

## **Asset Class Considerations**

Current Strategic Allocation

- The current STRS Ohio policy portfolio was an outcome of the 2022 Asset-Liability Study.
- The STRS Ohio Board selected this asset allocation/policy portfolio to best achieve STRS’s objectives.



Class Sub-Components

→ Several of STRS’s asset classes contain sub-components. This categorization scheme is a matter of preference and can be changed.

Asset Class	Sub-Components
International Equity	<ul style="list-style-type: none"> <li>• Developed International Equity</li> <li>• Emerging Markets Equity</li> </ul>
Alternative Investments	<ul style="list-style-type: none"> <li>• Private Equity</li> <li>• Opportunistic (i.e., Private Credit)</li> <li>• Diversified (i.e., Liquid Alternatives)</li> </ul>
Real Estate	<ul style="list-style-type: none"> <li>• Private Core Real Estate</li> <li>• REITS</li> </ul>
Fixed Income	<ul style="list-style-type: none"> <li>• Core Plus Fixed Income</li> <li>• Intermediate Treasuries</li> </ul>

→ For modeling purposes, Meketa recommends modeling at the sub-component level and grouping into asset classes after.

Potential New Asset Classes/Components

- One of the results from the *Risk & Implementation Survey* was that trustees were open to potential new asset classes.
- STRS Ohio’s portfolio structure already contains a wide opportunity set of asset classes, however, Meketa and STRS Staff will explore isolating certain components of the Fixed Income universe for explicit allocations.

Example Fixed Income Benchmark	Additional Information
<p><i>Bloomberg Universal</i></p>	<ul style="list-style-type: none"> <li>• The <i>Bloomberg Universal</i> benchmark contains both Core Fixed Income (i.e., investment-grade Treasury, Corporate, and Securitized bonds) as well as “plus” sectors. The “plus” sectors include areas such as High Yield Bonds and certain Emerging Markets Debt securities.</li> <li>• As an exploratory exercise, Meketa will examine the various sectors of the benchmark for potential explicit allocations. Examples include:               <ul style="list-style-type: none"> <li>○ High Yield Bonds</li> <li>○ Emerging Markets Debt</li> <li>○ Maturity-based segmentation of Treasuries (e.g., Long Treasury Bonds).</li> </ul> </li> <li>• An explicit allocations may represent an over/underweight at the policy level compared to the market capitalization-based <i>Bloomberg Universal</i> benchmark.</li> </ul>

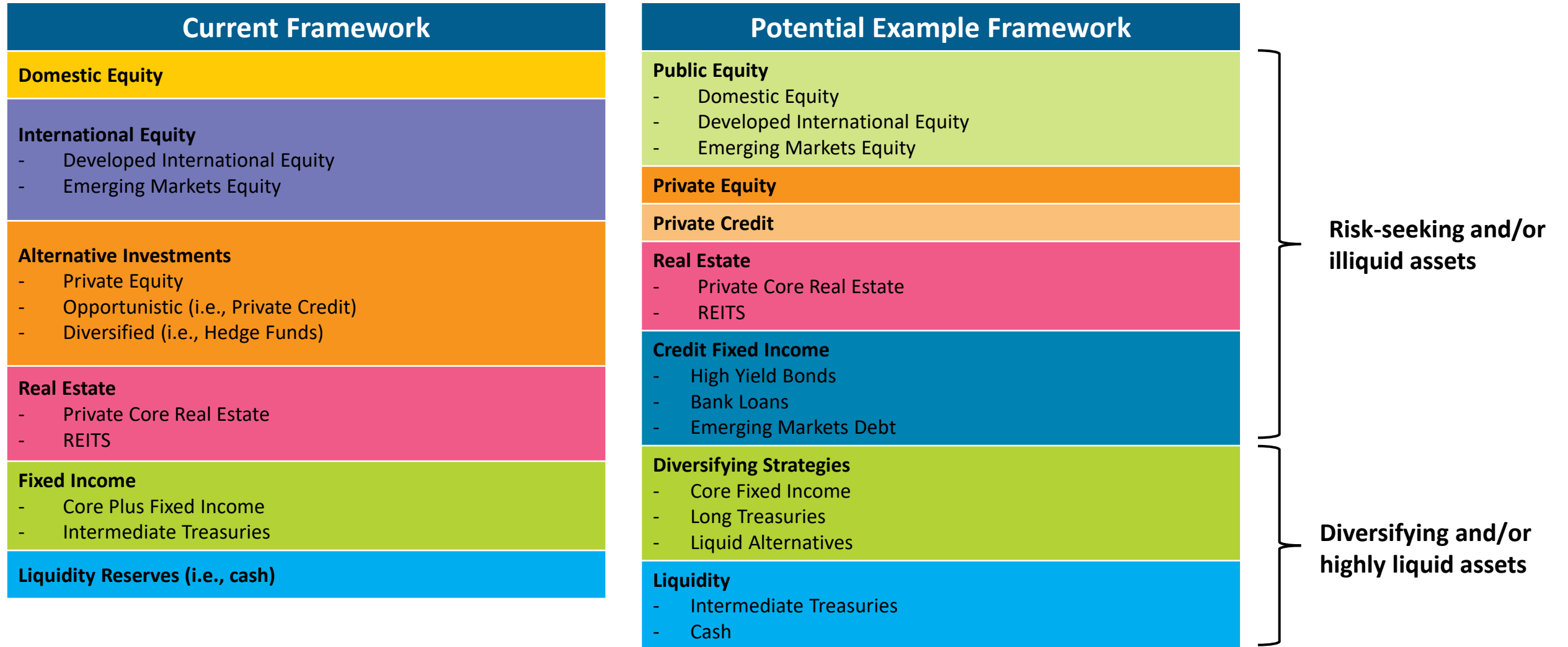


## Potential New Allocation Framework

- An additional result from the *Risk & Implementation Survey* was that trustees desired increased understanding of what is in certain classes.
- A partial solution to this challenge will be a new allocation framework (an example is provided on the following page).
  - An allocation framework is the grouping/buckets of asset classes into higher-level classes.
- Allocation frameworks do not impact asset-liability results nor expected return/risk figures, but they can improve trustee understanding and portfolio comparisons (e.g., peer allocation comparisons).

Potential New Framework

→ The framework below is just one example. It is not a recommendation.



# Capital Market Assumptions

## Setting Capital Market Assumptions (“CMAs”)

- CMAs are the inputs needed to calculate a portfolio’s expected return, volatility, and relationships (i.e., correlations) to the broader markets.
  - CMAs are also used in mean-variance optimization, simulation-based optimization, asset-liability modeling, and every other technique for finding “optimal” portfolios.
- Consultants (including Meketa) generally set them once per year.
  - Our results are published in January based on December 31 data.
- This involves setting long-term expectations for a variety of asset class/strategy attributes:
  - Returns
  - Standard Deviations
  - Correlations
- Our process relies on both quantitative and qualitative methodologies.

## Developing Expected Returns

- Market practitioners generally make use of three methods for developing long-term expected returns:
- Historical average returns
  - Financial/economic theory (e.g., higher risk = higher returns, capital structures, etc.)
  - Current measures (e.g., starting valuations relative to history)
- In addition to the above, practitioners also incorporate general projections for macroeconomic metrics such as GDP and inflation, among others.
- Meketa's methods are in-line with industry standards and represent a mixture of the three mechanisms.
- Historical average returns play the smallest role in our assumptions.

## Building Forecasts

→ At the firm level, our first step is to develop 10-year forecasts based on fundamental models.

- Each model is based on the most important factors that drive returns for that asset class:

Example Asset Class Category	Major Factors
Equities	Dividend Yield, GDP Growth, Valuation
Bonds	Yield to Worst, Default Rate, Recovery Rate
Commodities	Collateral Yield, Roll Yield, Inflation
Infrastructure	Public IS Valuation, Income, Growth
Natural Resources	Price per Acre, Income, Public Market Valuation
Real Estate	Cap Rate, Yield, Growth
Private Equity	EBITDA Multiple, Debt Multiple, Public VC Valuation
Hedge Funds and Other	Leverage, Alternative Betas

- The common components are income, growth, and valuation.
- Leverage (and cost of debt) is also directly incorporated, where applicable.

## The Other Inputs: Standard Deviation and Correlation

→ Standard deviation:

- We review the trailing fifteen-year standard deviation, as well as skewness.
- Historical standard deviation serves as the base for our assumptions.
- If there is a negative skew, we increase the volatility assumption based on the size of the historical skewness.

### Example

Asset Class	Historical Standard Deviation (%)	Skewness	Assumption <sup>1</sup> (%)
Bank Loans	6.5	-2.9	10.0
FI/L-S Credit	5.8	-2.7	9.0

- We also adjust for private market asset classes with “smoothed” return streams.

→ Correlation:

- We use trailing fifteen-year correlations as our guide.
- Again, we make adjustments for “smoothed” return streams.

→ Most of our adjustments are conservative in nature (i.e., they increase the standard deviation and correlation).

<sup>1</sup>Note that we typically round our standard deviation assumptions to whole numbers.

### Capital Market Assumptions – Examples for STRS Ohio

- The asset classes/components listed below represent the primary STRS Ohio asset classes and potential new components to be modeled in isolation.
- This list may change during the process, and if so, the IC will be notified.

Asset Class/Component	10-year Expected Return (%)	Expected Annual Volatility (%)
US Equity	6.9	17.0
Developed International Equity (50% hedged)	7.7	16.1
Emerging Markets Equity	7.6	22.0
Private Equity	9.9	25.0
Private Credit	9.2	15.0
Hedge Funds	4.5	7.0
Private Core Real Estate	4.8	12.0
REITS	5.6	24.0
Core Fixed Income	4.6	4.0
Intermediate Treasuries	4.0	3.0
Cash Equivalents	2.4	1.0
High Yield Bonds	6.5	11.0
Bank Loans	6.5	10.0
Emerging Markets Debt*	6.7	11.4
Long Treasury Bonds	4.3	12.0

\*50% hard currency  
& 50% local currency



Capital Market Assumptions – Example Correlation Assumptions

	US Equity	Developed Intl Equity	Developed Intl Equity (hedged)	Emerging Markets Equity	Private Equity	Private Credit	Hedge Funds	Private Core Real Estate	REITS	Core Fixed Income	Intermediate Treasuries	Cash Equivalents	High Yield Bonds	Bank Loans	Emerging Market Debt (hard)	Emerging Market Debt (local)	Long Treasury Bonds
US Equity	<b>1.00</b>	0.88	0.86	0.74	0.90	0.71	0.80	0.40	0.76	0.22	-0.12	-0.09	0.76	0.61	0.60	0.65	-0.10
Developed Intl Equity	0.88	<b>1.00</b>	0.91	0.86	0.83	0.69	0.83	0.35	0.69	0.26	-0.08	-0.02	0.76	0.59	0.69	0.78	-0.09
Developed Intl Equity (hedged)	0.86	0.91	<b>1.00</b>	0.75	0.77	0.60	0.80	0.30	0.65	0.11	-0.24	-0.08	0.72	0.63	0.59	0.60	-0.19
Emerging Markets Equity	0.74	0.86	0.75	<b>1.00</b>	0.79	0.64	0.81	0.30	0.59	0.27	-0.05	0.00	0.72	0.57	0.72	0.87	-0.05
Private Equity	0.90	0.83	0.77	0.79	<b>1.00</b>	0.71	0.53	0.41	0.49	0.00	-0.07	0.11	0.66	0.63	0.41	0.47	-0.10
Private Credit	0.71	0.69	0.60	0.64	0.71	<b>1.00</b>	0.74	0.44	0.51	0.07	-0.25	0.04	0.87	0.94	0.48	0.53	-0.35
Hedge Funds	0.80	0.83	0.80	0.81	0.53	0.74	<b>1.00</b>	0.40	0.59	0.12	-0.23	-0.11	0.78	0.75	0.63	0.62	-0.20
Private Core Real Estate	0.40	0.35	0.30	0.30	0.41	0.44	0.40	<b>1.00</b>	0.70	0.25	0.10	0.20	0.45	0.45	0.25	0.20	0.10
REITS	0.76	0.69	0.65	0.59	0.49	0.51	0.59	0.70	<b>1.00</b>	0.36	0.06	-0.06	0.72	0.54	0.63	0.63	0.13
Core Fixed Income	0.22	0.26	0.11	0.27	0.00	0.07	0.12	0.25	0.36	<b>1.00</b>	0.85	0.13	0.35	0.06	0.62	0.50	0.86
Intermediate Treasuries	-0.12	-0.08	-0.24	-0.05	-0.07	-0.25	-0.23	0.10	0.06	0.85	<b>1.00</b>	0.25	-0.06	-0.34	0.28	0.24	0.84
Cash Equivalents	-0.09	-0.02	-0.08	0.00	0.11	0.04	-0.11	0.20	-0.06	0.13	0.25	<b>1.00</b>	-0.11	-0.15	-0.02	0.02	0.10
High Yield Bonds	0.76	0.76	0.72	0.72	0.66	0.87	0.78	0.45	0.72	0.35	-0.06	-0.11	<b>1.00</b>	0.83	0.80	0.70	-0.04
Bank Loans	0.61	0.59	0.63	0.57	0.63	0.94	0.75	0.45	0.54	0.06	-0.34	-0.15	0.83	<b>1.00</b>	0.60	0.46	-0.26
Emerging Market Debt (hard)	0.60	0.69	0.59	0.72	0.41	0.48	0.63	0.25	0.63	0.62	0.28	-0.02	0.80	0.60	<b>1.00</b>	0.82	0.29
Emerging Market Debt (local)	0.65	0.78	0.60	0.87	0.47	0.53	0.62	0.20	0.63	0.50	0.24	0.02	0.70	0.46	0.82	<b>1.00</b>	0.17
Long Treasury Bonds	-0.10	-0.09	-0.19	-0.05	-0.10	-0.35	-0.20	0.10	0.13	0.86	0.84	0.10	-0.04	-0.26	0.29	0.17	<b>1.00</b>

### Summary and Next Steps

- The three pools of assets/plans (DB, HC, and DC) will be separated for the asset-liability study.
- Integrated asset/liability simulations will be examined for both the DB and HC plans.
  - Excluding the decoupling of assets, the DC program is not examined during the asset-liability study.
- Meketa and STRS Staff will explore explicit allocations to isolated Fixed Income sectors as part the modeling process. As the process continues, other asset classes/components may also be examined.
  - The exploration of asset classes/components in modeling process does not mean they will be included in the final Board-selected portfolios.
  - The utilized capital market assumptions represent Meketa's best estimate of forward-looking returns, volatilities, and correlations. These CMAs are presented to each of our 200+ clients and are typically used in respective asset-liability studies.
- As outlined in the timeline, Meketa will begin integrating Cheiron data into the asset-liability model in order to examine preliminary output, which generally focuses on the current policy portfolio and potential metrics for examination/decision-making.

# Appendix

## Liquidity: Role vs. Attribute

**Role**

An asset class's specific assignment or purpose within a portfolio.

**Attribute**

A description or characteristic that may help or impede the role of a class.

**Example: Liquidity (tradability)**

US Treasuries exhibit significant liquidity during all market environments and are much more consistent than Public Equity; *Liquidity is a role.*

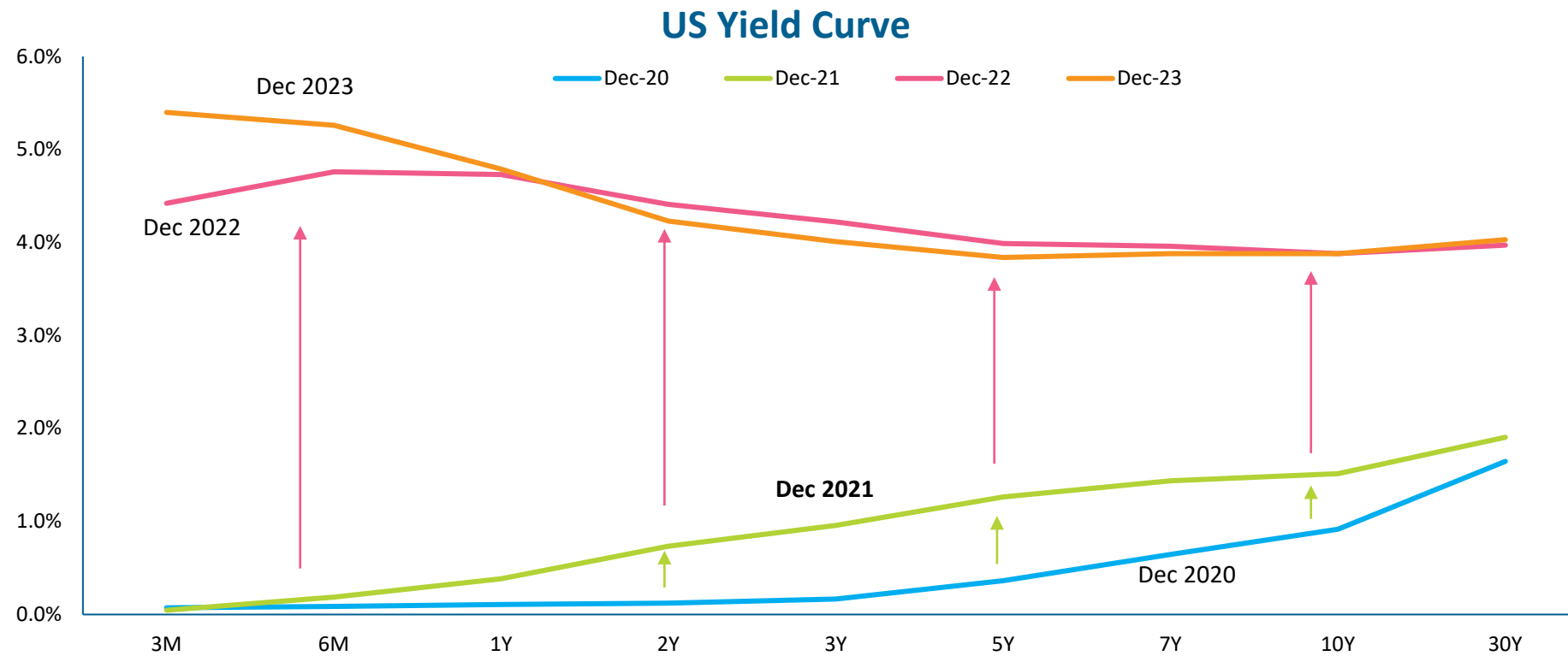
Public Equity happens to be liquid, but such liquidity is not always beneficial (e.g., selling equity during a bear market); *Liquidity is an attribute.*

→ A fully integrated asset-liability study that reflects potential economic realities can help mitigate certain perils.

### Interest Rate Changes

→ Interest rate changes were a dominant storyline of 2023. While short-term rates increased throughout 2023, intermediate and long-term rates experienced significant volatility but ultimately finished the year at similar yields to where they started.

→ Rates remained materially higher as of 12/31/2023 compared to 2020 and 2021.

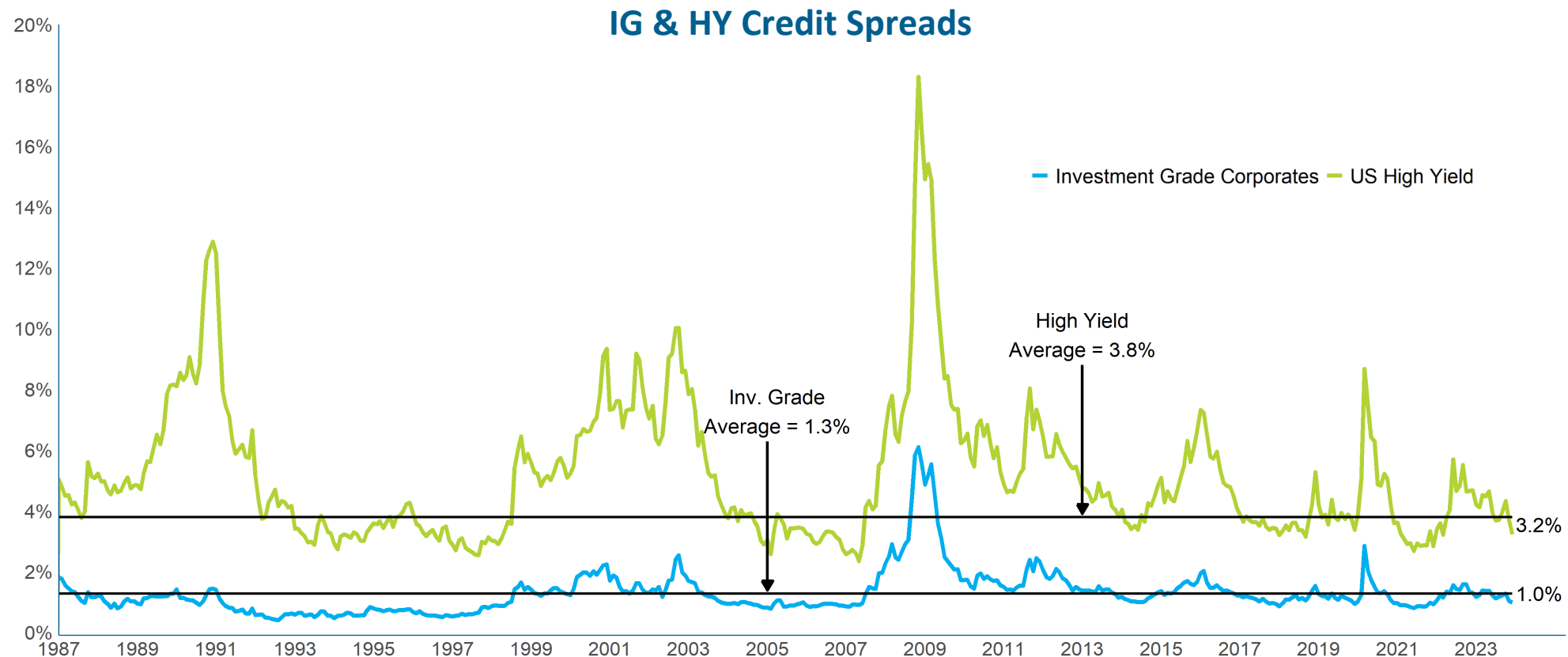


Source: Bloomberg. Data is as of December 31, 2023.

Credit Spread Compression

→ Credit spreads tightened slightly in 2023, though they remain close to their long-term averages.

- Lower quality credit spreads experienced a more substantial tightening. The spread for high yield bonds declined from 469 bp to 323 bp.



Source: Bloomberg. High Yield is proxied by the Bloomberg High Yield Index and Investment Grade Corporates are proxied by the Bloomberg US Corporate Investment Grade Index. Spread is calculated as the difference between the Yield to Worst of the respective index and the 10-Year US Treasury yield. Data is as of December 31, 2023.

Similar or Lower Yields (12/23 vs 12/22)

- Short-term interest rates were higher than one year ago, while the 10-year Treasury yield ended the year where it started it.
- Similar levels of interest rates combined with tighter credit spreads results in slightly lower yields for most sectors of the global bond market.

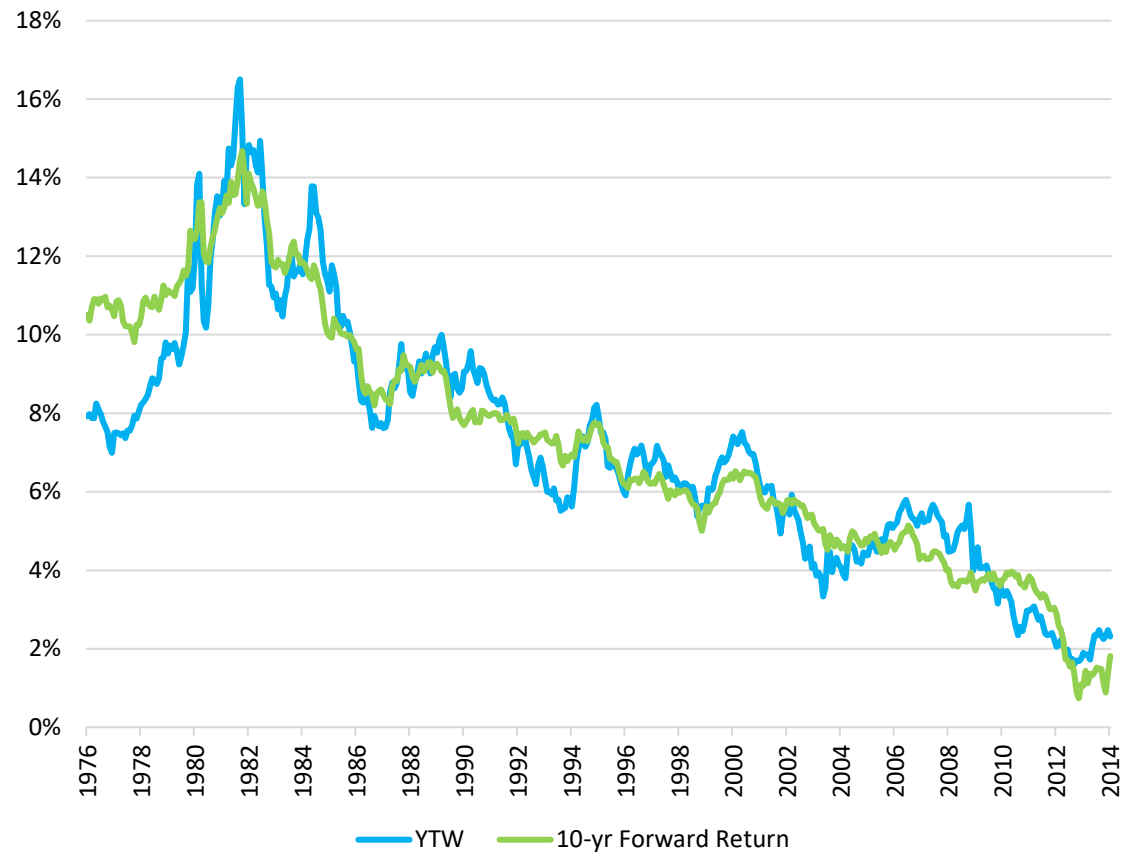
Index	Yield to Worst 12/31/23 (%)	Yield to Worst 12/31/22 (%)	Yield to Worst 12/31/21 (%)	Yield to Worst 12/31/20 (%)
Fed Funds Rate	5.25-5.50	4.25-4.50	0-0.25	0-0.25
10-year Treasury	3.88	3.88	1.52	0.93
Bloomberg Aggregate	4.53	4.68	1.75	1.12
Bloomberg Corporate	5.06	5.42	2.33	1.74
Bloomberg Securitized	4.72	4.75	1.98	1.25
Bloomberg Global Aggregate	3.51	3.73	1.31	0.83
Bloomberg EM Local Currency Government	4.08	4.42	3.83	3.20
Bloomberg EM Hard Currency Aggregate	6.77	7.26	3.96	3.20
Bloomberg US Corporate High Yield	7.59	8.96	4.21	4.18

Source: Bloomberg.

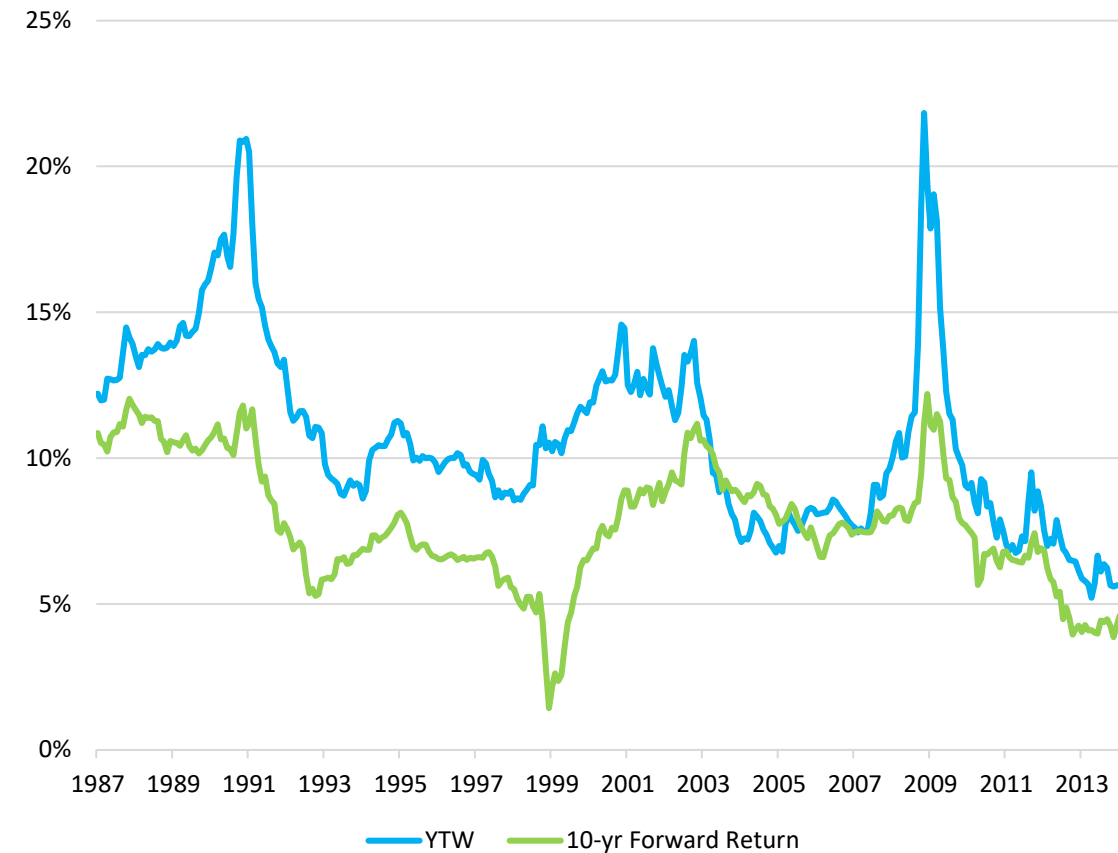
## Yields Drive Future Returns

→ Changes in interest rates matter because yields are a very good predictor of future returns for bonds<sup>1</sup>, at least over a 10-year horizon.

### YTW and Returns for Investment Grade Bonds



### YTW and Returns for High Yield Bonds



<sup>1</sup> When predicting returns for bonds, default risk should also be taken into account. For example, defaults are why the return for high yield bonds have generally been below the starting yield.

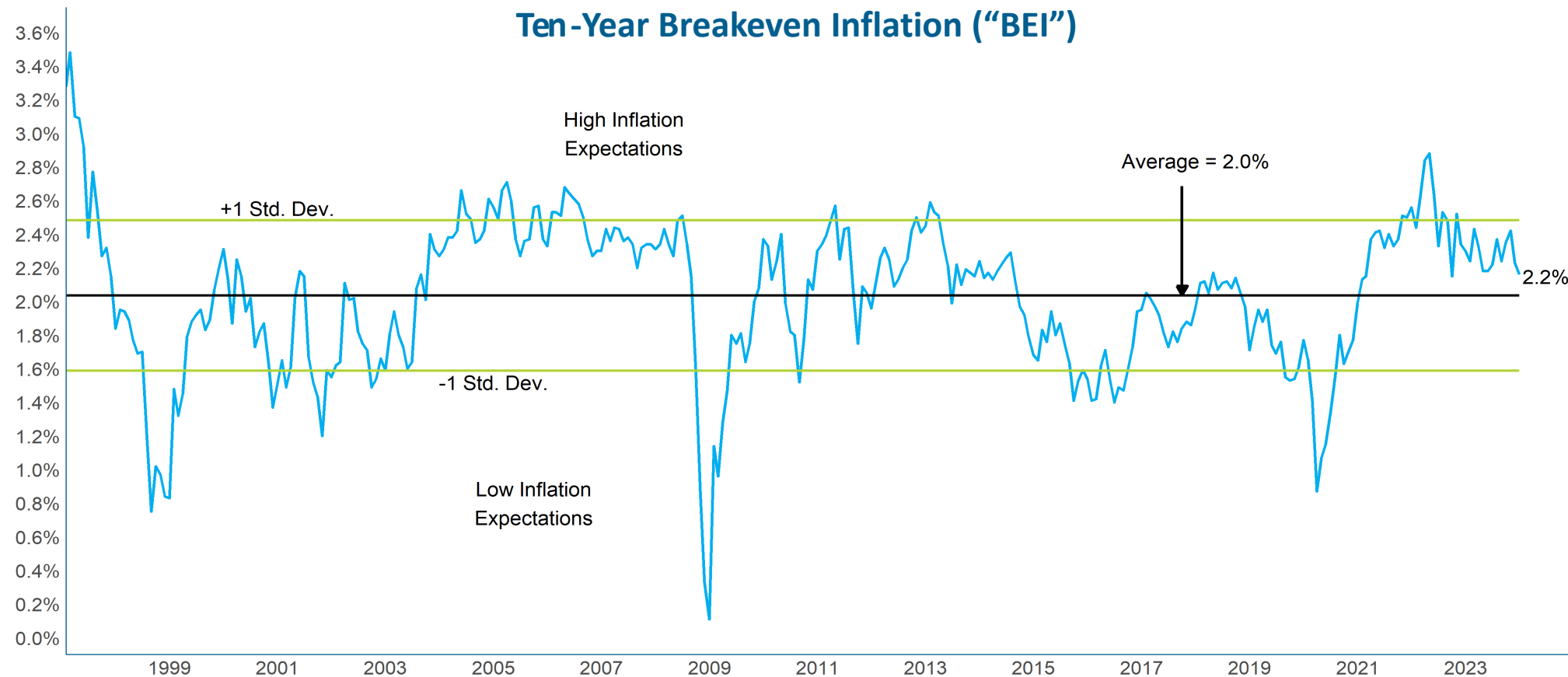
Source: Bloomberg Aggregate and Bloomberg High yield indices. Data is as of December 31, 2023.



## Slightly Lower Inflation Expectations

→ After substantial changes in inflation expectations in recent years, the market's expectations for inflation were little changed at the end of 2023.

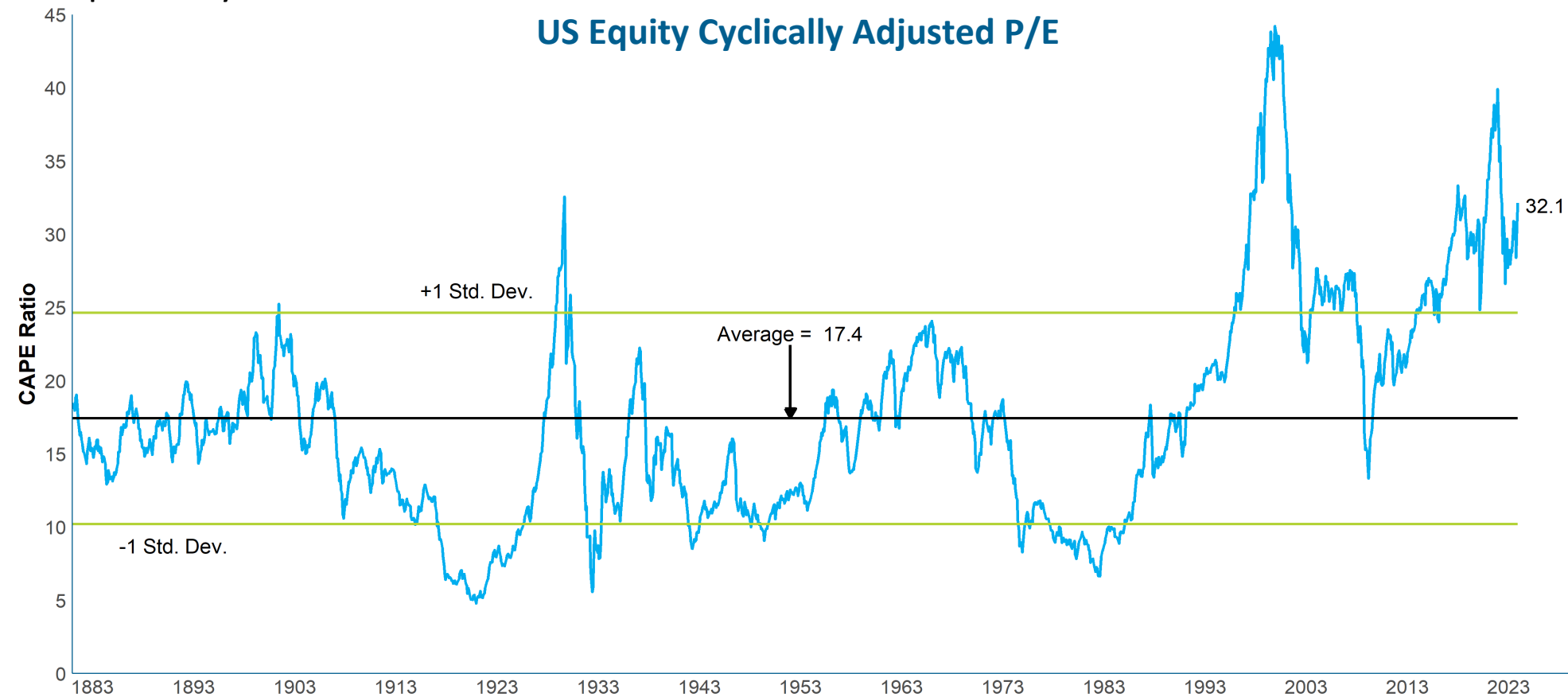
- The 10-year BEI rate dropped from 2.3% to 2.2%. The 5-year BEI was slightly lower, at 2.1%.



Source: US Treasury and Federal Reserve. Inflation is measured by the Consumer Price Index (CPI-U NSA). Data is as of December 31, 2023.

## Higher Valuations for US Equities

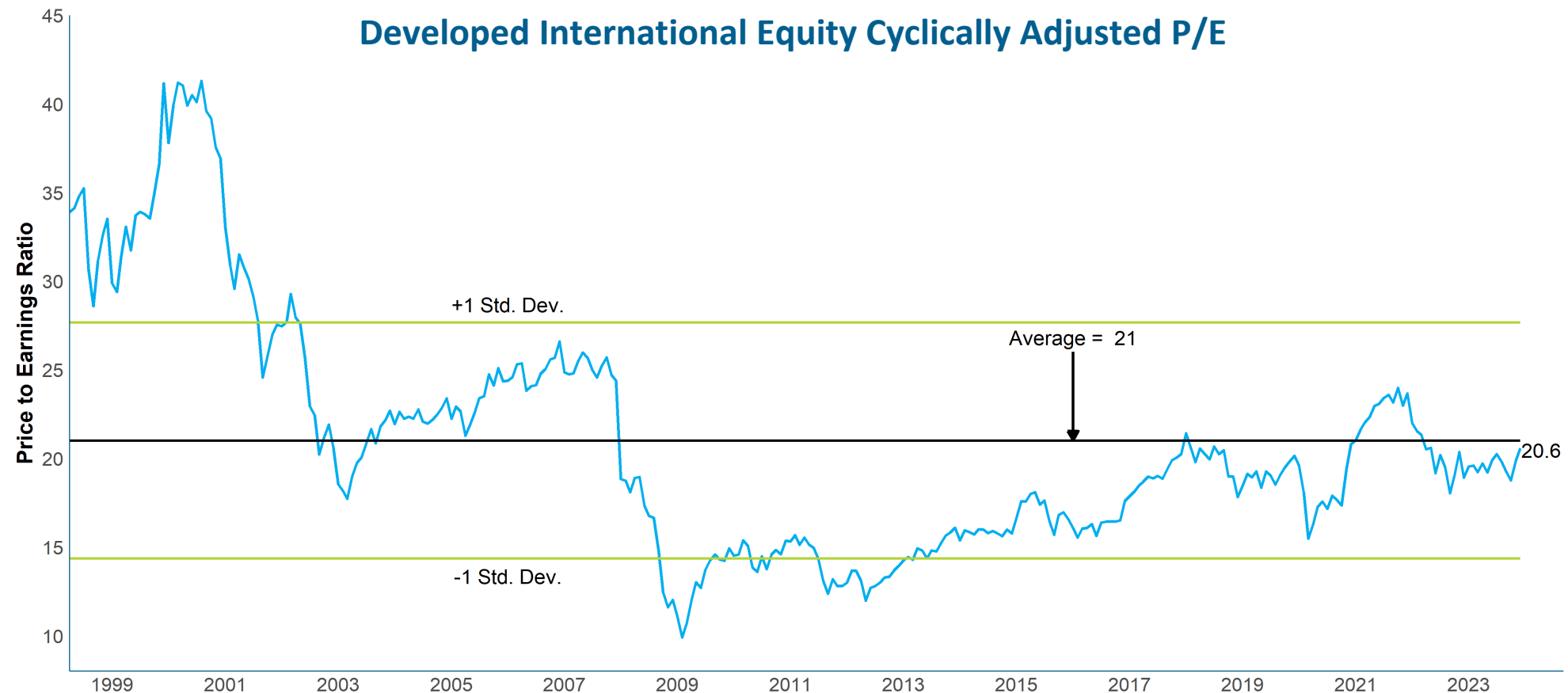
- US stocks had a very good year, with the S&P 500 index gaining 26.3% in 2023.
- Valuations increased and remain elevated relative to their long-term history, though they are much nearer their average for the past 30 years.



Source: Robert Shiller, Yale University, and Meketa Investment Group. Data is as of December 31, 2023.

### Slightly Higher Prices in Non-US Equities, too

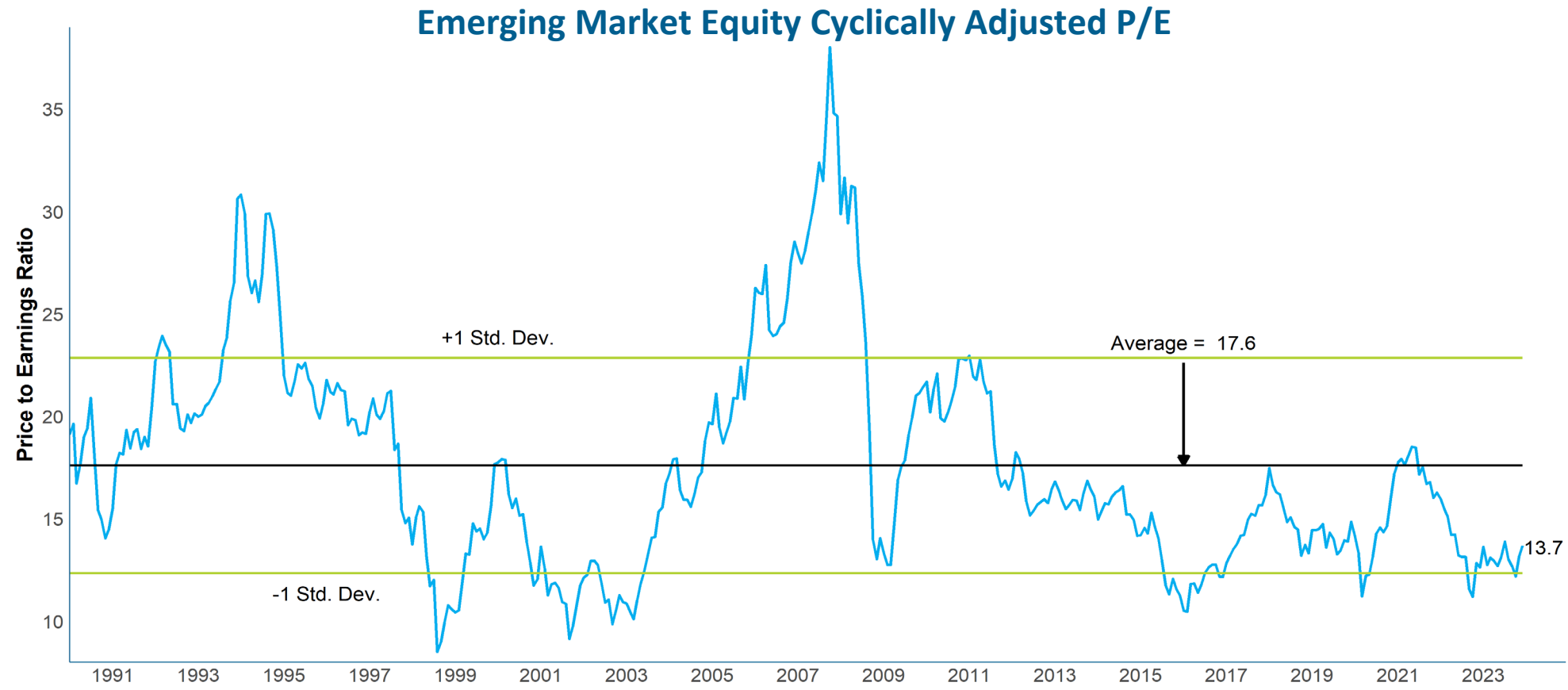
- EAFE equities gained 18.2% in USD terms in 2023, benefiting slightly from a currency tailwind.
- Despite increasing from one year ago, EAFE valuations remain close to their 25-year historical average.



Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years. Data is as of December 31, 2023.

### And Slightly Higher Prices in Emerging Market Equities

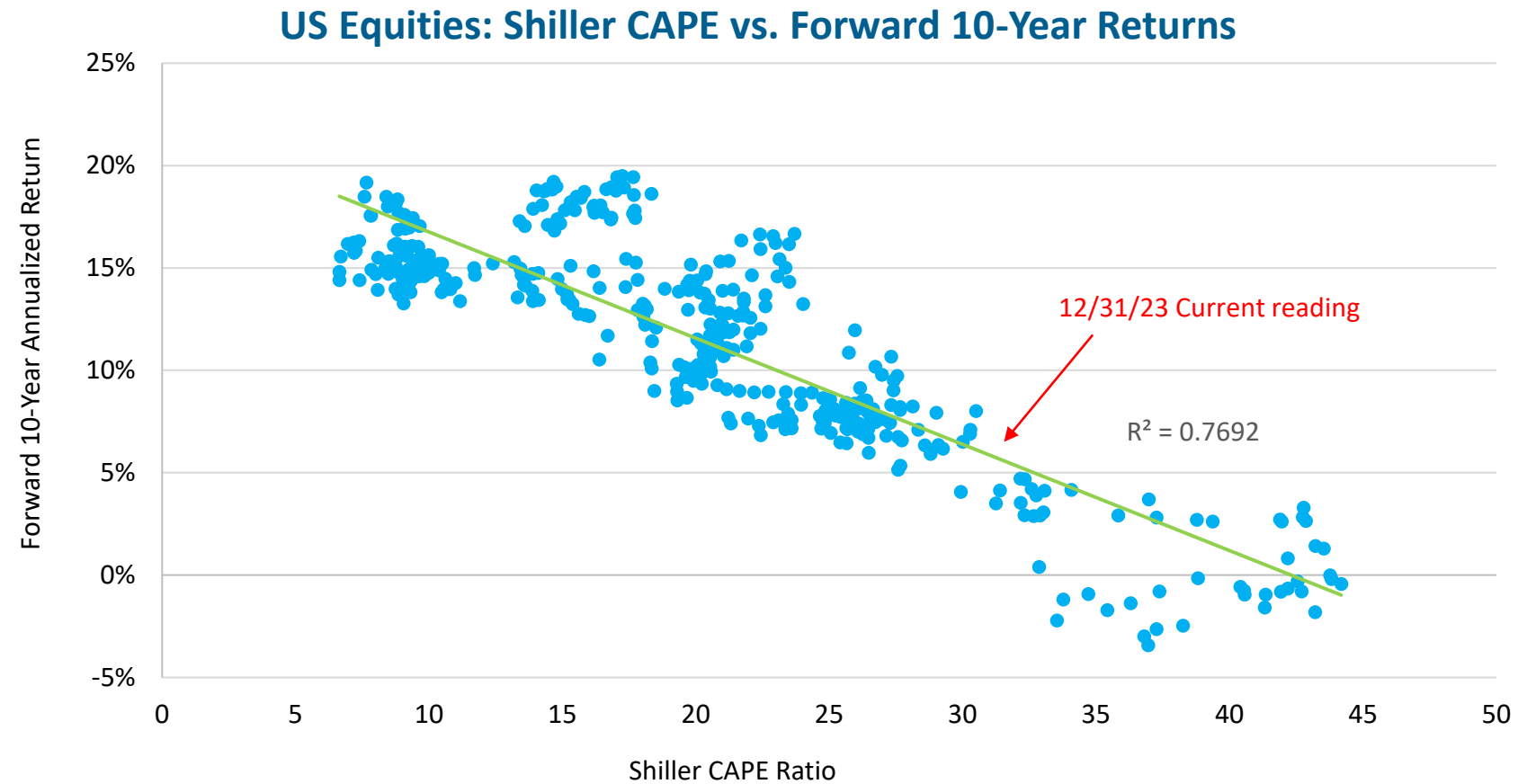
- Emerging market equities gained 9.8% in 2023, despite Chinese equities declining -11.2%.
- EM equity valuations remain well below their long-term average, though there is a significant difference between EM ex-China and China valuations.



Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years. Data is as of December 31, 2023.

## Higher Prices Imply Lower Returns for Equities

- Relative prices have been indicative of future equity returns.
- Higher prices have led to lower future returns, and vice versa.

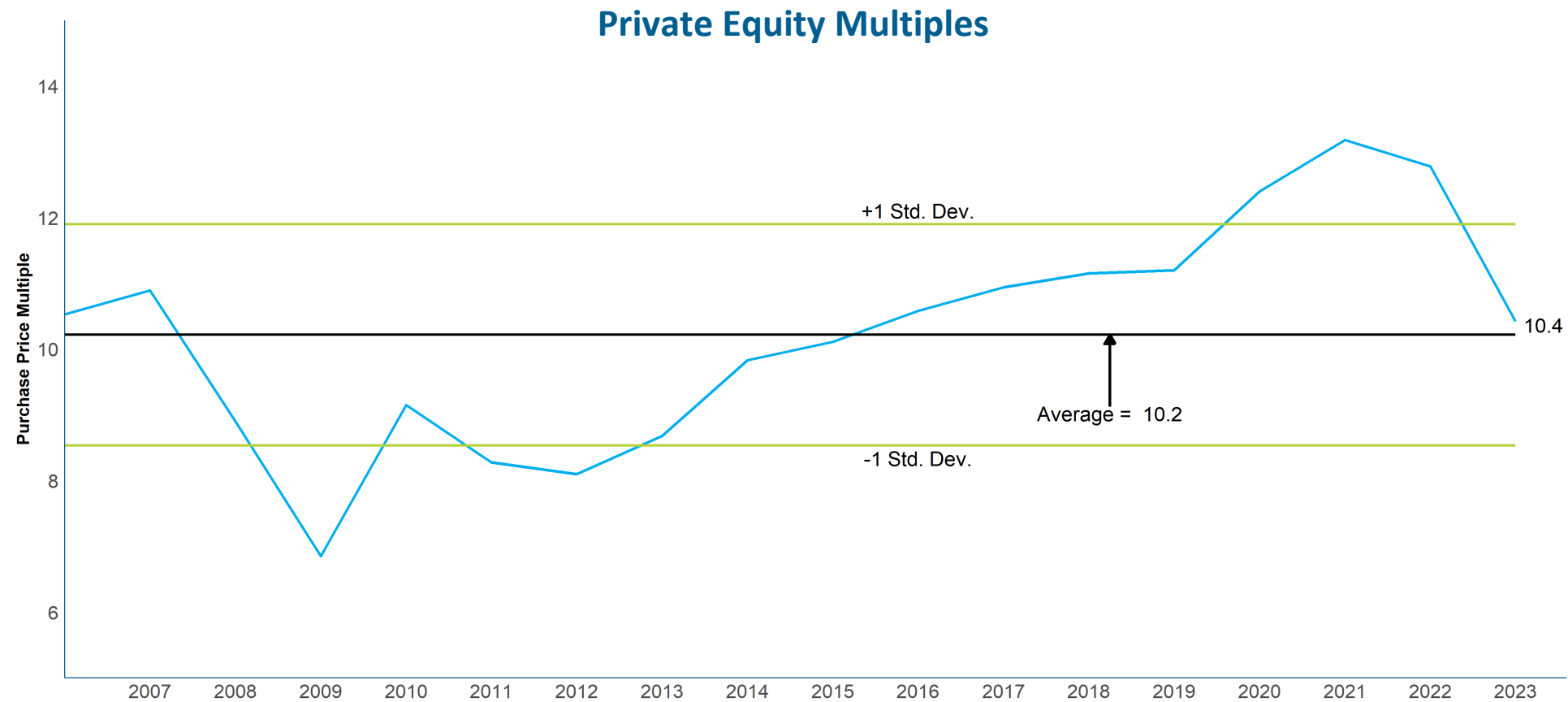


Source: Robert Shiller, Yale University, and Meketa Investment Group. Data is based on monthly returns and Cyclically Adjusted P/E ratio on S&P 500 Index for the period from January 1980 through December 2023.

## Private Equity Prices Coming Back Down

→ EBITDA multiples fell in the first half of 2023 for buyouts.

- Valuations remained above their post-GFC average.



Source: Preqin Median EBITDA Multiples Paid in All LBOs, as of June 30, 2023.

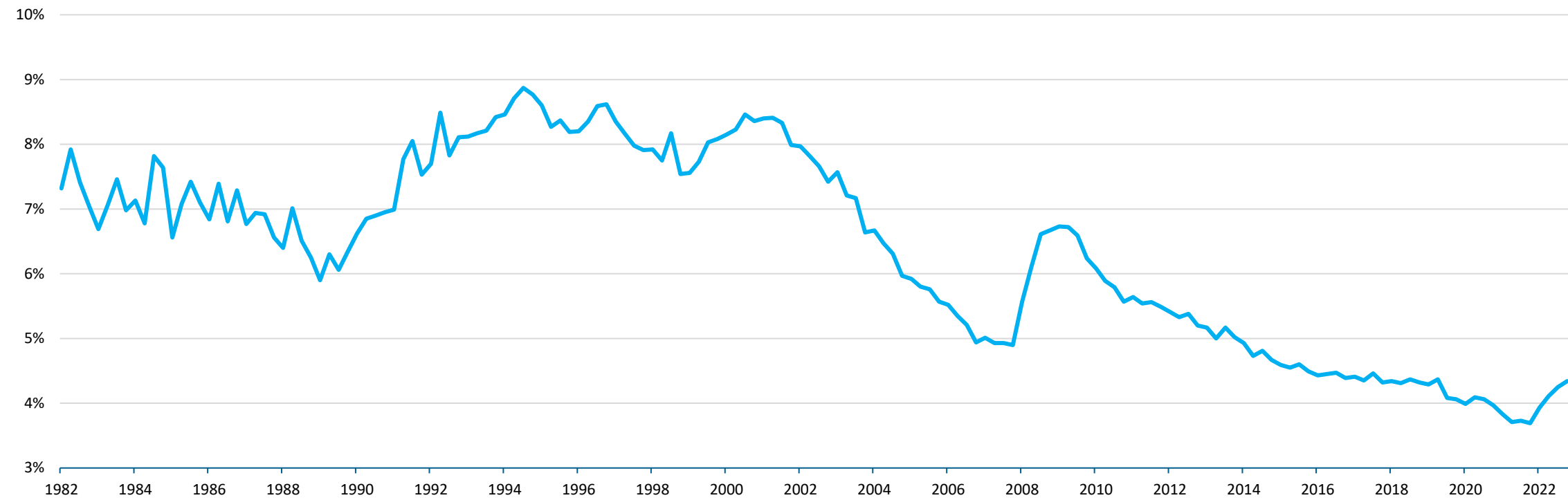
## Increasing Real Estate Yields

→ Real estate cap rates are similar to an earnings yield (the inverse of the P/E ratio) for equities.

- Cap rates are indicative of future returns.

→ While cap rates have been gradually declining for decades, they have recently increased largely due to lower core real estate prices.

## Core Real Estate Cap Rates



Source: NCREIF NPI value-weighted cap rates. As of September 30, 2023.

### CMA Development Example: Public Equities

→ We use a fundamental model for equities that combines income and capital appreciation:

$$E(R) = \text{Dividend Yield} + \text{Price Return} + \text{Currency Effect}$$

$$\text{Price Return} = \text{Earnings Growth} + \text{Multiple Effect}$$

→ We use the current dividend yield on the respective index.<sup>1</sup>

→ Earnings growth is a function of real GDP growth, inflation, and exposure to foreign revenue sources.

→ We use three approaches to calculate the multiple effect.

- The models assume reversion to the mean or fair value.

→ We arrive at our preliminary 10-year assumption (in local currency)

$$\text{US Equity } E(R) = 1.5\% + [(1 + 6.4\%) \times (1 - 1.0\%) - 1] = 6.9\%$$

→ For non-US equities, we add the expected currency effect vs. the US Dollar to the local expected return.

<sup>1</sup> The source for dividend yields is S&P 500 for the US and MSCI for non-US equities.



### CMA Development Example: Bonds

- The short version for most investment grade bond models is:  $E(R) = \text{Current YTW (yield to worst)}$
- The longer version accounts for the expected term structure in the future.
  - If the average duration is roughly five years, we calculate the expected yield in five years.
  - The net effect tends to be minimal, since higher income in years 5 to 10 is offset by price declines in years 1 to 5.
- For corporate bonds, we assume the spread vs. Treasuries will revert most of the way back to their mean since 1990.
- For cash, we use an average of the current rate and the rate suggested by the Taylor Rule (inputs are current & potential GDP, current & desired inflation).
- For TIPS, we add the real yield for the TIPS index to the expected inflation rate used in the equities models.
- As with equities, we also make currency adjustments when necessary.
  - This currently provides a tailwind to foreign and EM local currency debt.

### CMA Development Example: Bonds (cont'd)

→ For anything with credit risk, we also take into account the expected default & recovery rates.

	Inv. Grade Corporate (%)	LT Corporate (%)	Foreign Debt (%)	EM Debt (major) (%)	EM Debt (local) (%)	High Yield (%)	Bank Loans (%)
Default Rate	0.08	0.08	0.09	1.78	0.40	2.50	2.50
Loss Rate	50	50	50	50	50	45	40

→ As a guide, we use Moody's historical global default & recovery data for each bucket as it is currently rated.

*ex: EM Debt*

*(local currency)*

Rating	Weighting (%)	Default Rate (%)	Weighted Default (%)
Aa	6.2%	0.06%	0.00%
A	29.3%	0.09%	0.03%
Baa	44.1%	0.27%	0.12%
Ba	18.9%	1.06%	0.20%
B	1.5%	3.40%	0.05%
<b>Total Weighted Average Default Rate:</b>			<b>0.40%</b>

### CMA Development Example: Private Equity

- For Buyouts, we start with public equity expected returns.
- We add a premium or discount based on the pricing of buyouts relative to stocks.
  - EBITDA multiples provide an indication of pricing.
  - 2022 and 2023 have seen the first meaningful reduction in multiples since the GFC.
- We add a premia for control (e.g., for greater operational efficiencies) and leverage.
  - We assume leverage of 1.4x - 1.6x.
- We subtract borrowing costs and estimated fees.
  - We assume borrowing costs are consistent with the yield on bank loans.
- We also look at how closely valuations (through September 30) compared to price changes occurring in the public markets, given that buyouts pricing often lags that of public equities.

### CMA Development Example: Private Equity (cont'd)

→ For Venture Capital (VC), we create a public market proxy that we can compare through time.

- The composite is composed of: traditional technology, biotech, pharmaceuticals, life sciences, IT services, internet, and clean tech & environmental stocks.
  - The weighting to each sector varies through time.
  - The data is an imperfect proxy and the correlation with future returns is not high.
  - Still, this proxy provides some indication of pricing relative to small cap stocks.
- We also look at how VC valuations (through September 30) compared to price changes for public markets.

→ For Growth Equity, we infer a return that is between that of buyouts and venture capital.

- The relative weightings place the return closer to that of VC than buyouts.

Aggregate private equity assumption utilizes a weighted average based on a typical institutional allocation to private equity.

Component	Weight	E(R)
Buyouts	65%	9.5%
Growth Equity	10%	10.4%
Venture Capital	25%	10.8%
<b>Private Equity Composite</b>		<b>9.9%</b>

## CMA Development Example: Real Estate

→ For Core Real Estate, we used two models.

- The first model adds a premium to the Cap Rate:
  - Core RE has historically returned approximately 1.0% more than its cap rate at the start of the period over the subsequent ten years.
- The second model combines income with capital appreciation potential.
  - The income for core RE has historically been the cap rate minus 2-3% (for Cap Ex).
  - We assume income (NOI) grows at the rate of inflation.
  - We assume there is some measure of fair value for cap rates relative to bond yields.
    - We make a price adjustment based on the forward yield curve.
- We adjust for leverage, borrowing costs, and fees.

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- **Matters requiring investment committee action:**
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# Securities Lending Program Fiscal Year 2024 Results

Steve Mayes

Sept. 19, 2024



- **What is securities lending?**
  - Securities lending is an important part of capital markets activity that provides incremental income to funds like STRS Ohio
- **Why have an annual review of securities lending?**
  - Although securities lending is widely utilized by all investors it is not without risk
    - Great Financial Crisis (GFC) demonstrated some programs experienced significant losses not only on securities loaned but especially on reinvested collateral
  - Therefore, it is important to review the drivers of income and how risk is mitigated
- **This presentation will outline the STRS Ohio securities lending program strategy and show how the program earns income and manages risk**

- **STRS Ohio securities lending program strategy**
  - STRS Ohio’s securities lending program follows a strategy of intrinsic value lending where the intention is to lend high demand securities for a premium value
  - Risk mitigation: restricting noncash collateral on loans to U.S. Treasuries or Agency securities and controlling the reinvestment of cash collateral
- **Due to the lower risk profile, the program has earned \$349 million in income since its inception in 1992, and has been profitable every year including during the GFC**

- **Brief review of how securities lending works**
- **“Specials” margins stable; overall loan volume decreased**
- **Fiscal year 2024 earnings decreased year over year; total earnings comparable to FY 2022**

# How Securities Lending Works

Securities lending is when we earn investment income by loaning our securities – for a fee – to a borrower



## STRS Ohio Loans

**FY 2024:**

\$1.2 bn Avg. Loans Out.

\$1.1 billion Fixed Income

\$81 million Domestic Equities

\$63 million International Equities



## Bank of NY

Earnings split:  
90% STRS Ohio  
10% BNY

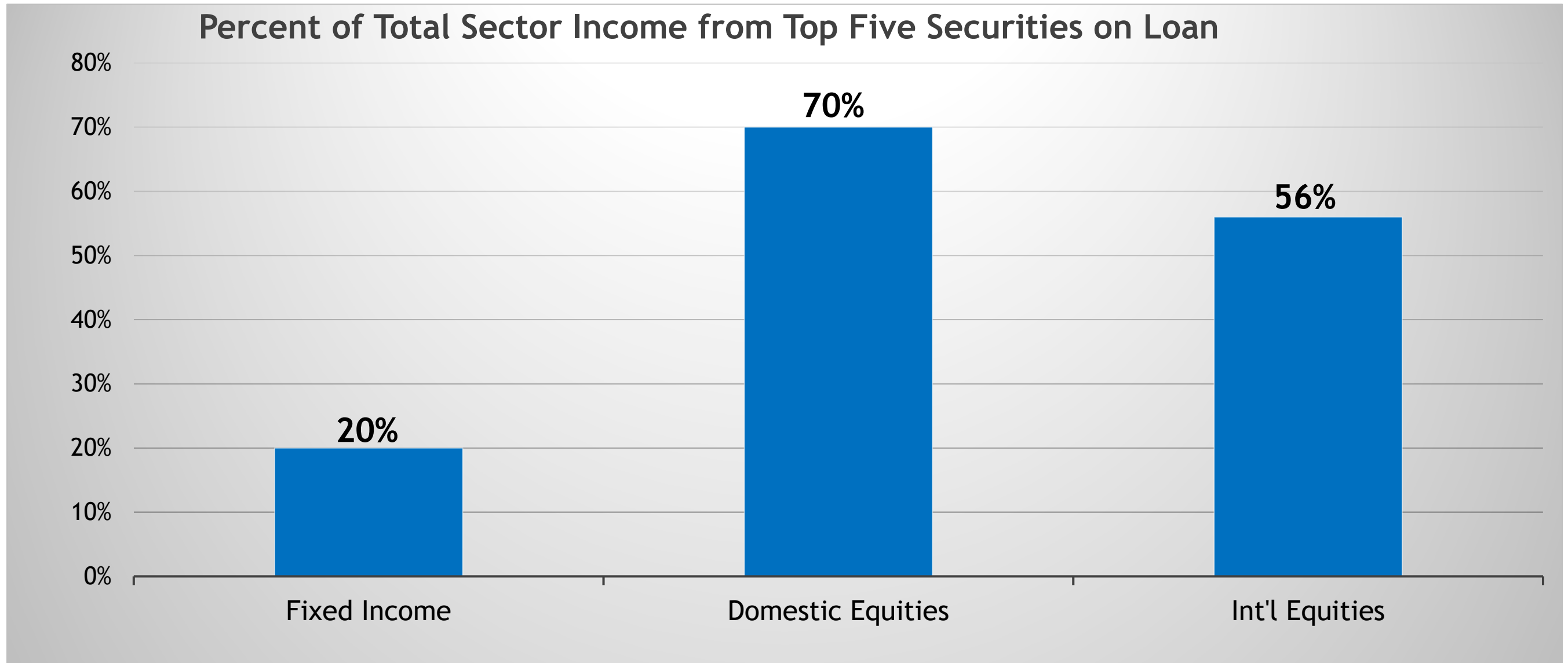


- JP Morgan
- Morgan Stanley
- Goldman Sachs



- Settle trades
- Cover short sales
- Merger/acquisition
- Vote proxy
- Obtain high quality collateral (U.S. Treasuries)

# High Demand Securities “Specials” by Asset Class



High demand securities have a significant impact on overall program earnings

# Top Five Loans = 20% of Fixed Income Earnings

<u>Largest Fixed Income Loans</u>			<u>Earnings</u>
1) U.S. Treasury Bond	4.50%	Feb. 2024	\$224,301
2) Meituan	2.125%	Oct. 2025	\$92,120
3) Stanley Black & Decker	3.000%	May 2032	\$61,563
4) U.S. Treasury Bill	5.500%	Jan. 2024	\$61,284
5) U.S. Treasury Note	4.250%	Jan. 2024	<u>\$38,210</u>
<b>Top Five Sum (20% of Fixed Income Earnings)</b>			<b>\$477,480</b>

# Top Five Loans = 70% of Domestic Equity Earnings

<u>Largest Domestic Equity Loans</u>	<u>Earnings</u>
1) SPDR S&P Biotech ETF	\$275,186
2) B Riley Financial	\$267,280
3) Chargepoint Holdings	\$123,320
4) Johnson & Johnson	\$104,114
5) Novavax Inc	<u>\$35,242</u>
<b>Top Five Sum (70% of Domestic Equity Earnings)</b>	<b>\$805,142</b>

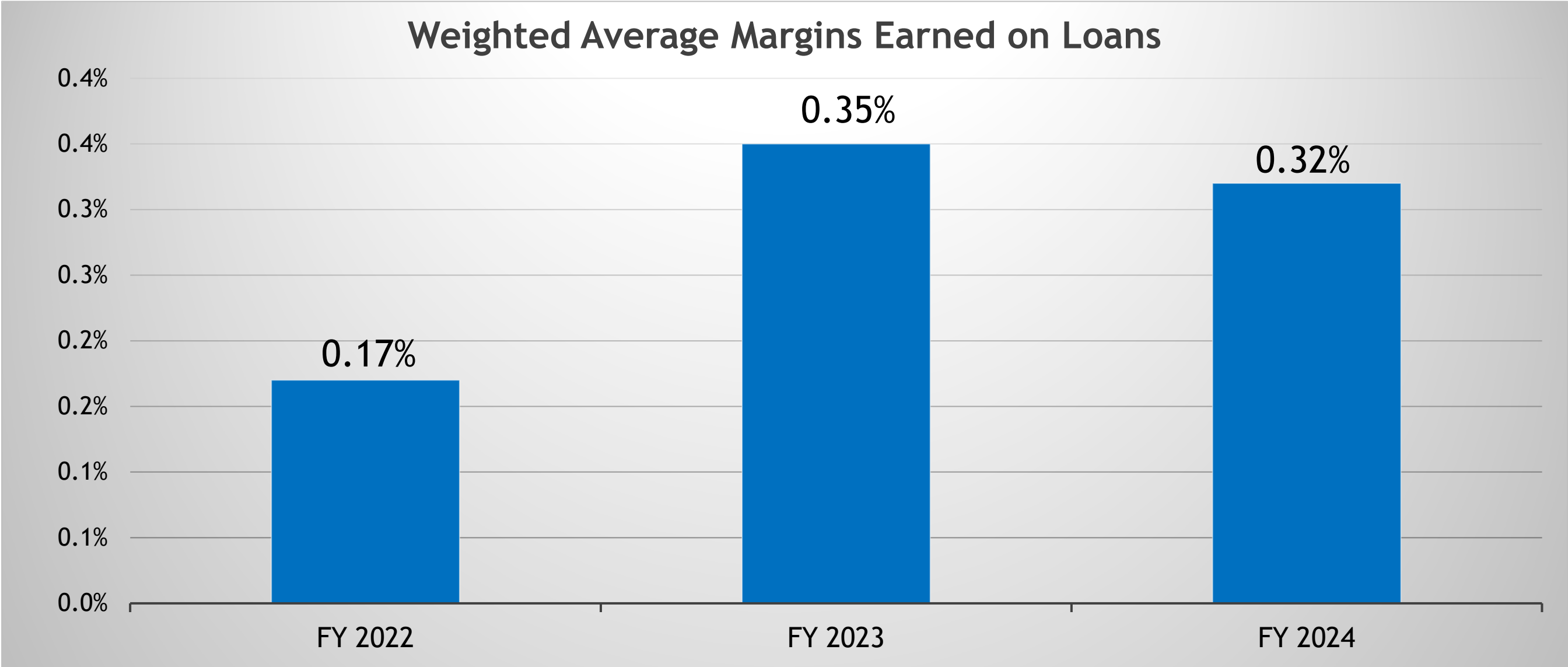
# Top Five Loans = 56% of International Equity Earnings

<u>Largest International Equity Loans</u>	<u>Earnings</u>
1) Sociedad Quimica Y Mine	\$88,143
2) DBX ETF	\$77,870
3) India Fund Inc	\$52,127
4) iShares MSCI EAFE ETF	\$33,936
5) Sendas Distribuidora S A NPV	<u>\$33,159</u>
<b>Top Five Sum (56% of International Equity Earnings)</b>	<b>\$285,235</b>



***Margins in higher earning segments “specials” were stable in fiscal 2024, but loan volume declined resulting in lower overall program earnings compared to fiscal 2023.***

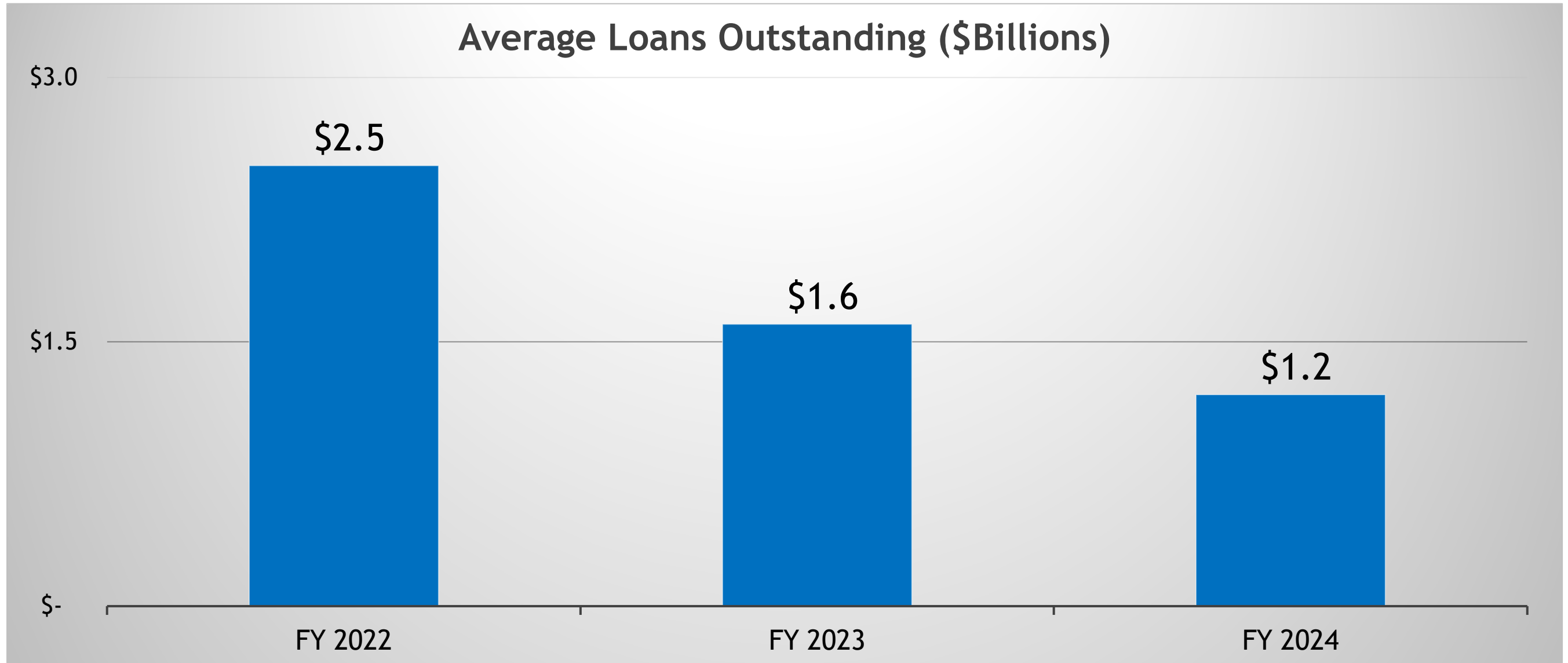
# Loan Margins Earned



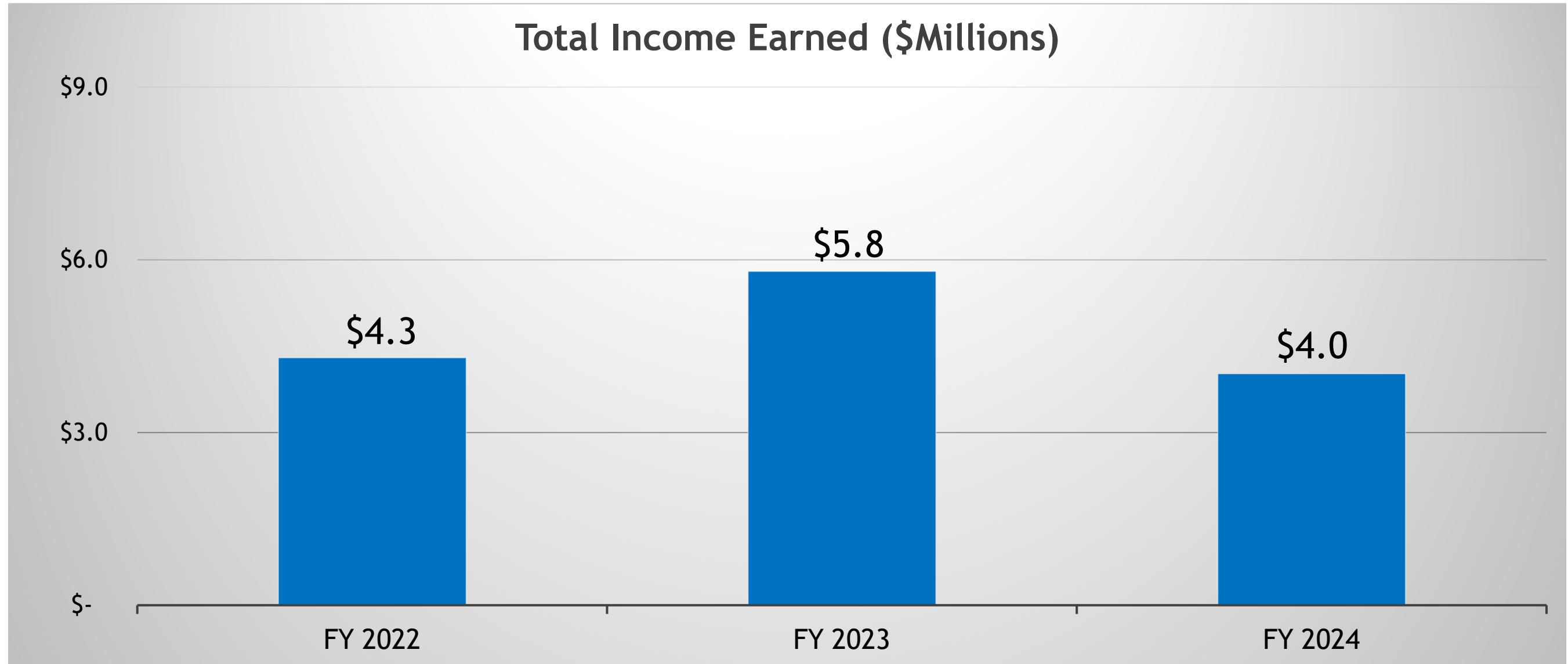
Fiscal 2024 margins declined slightly but remained higher than recent years

# Loan Volume Declined

Average Loans Outstanding (\$Billions)

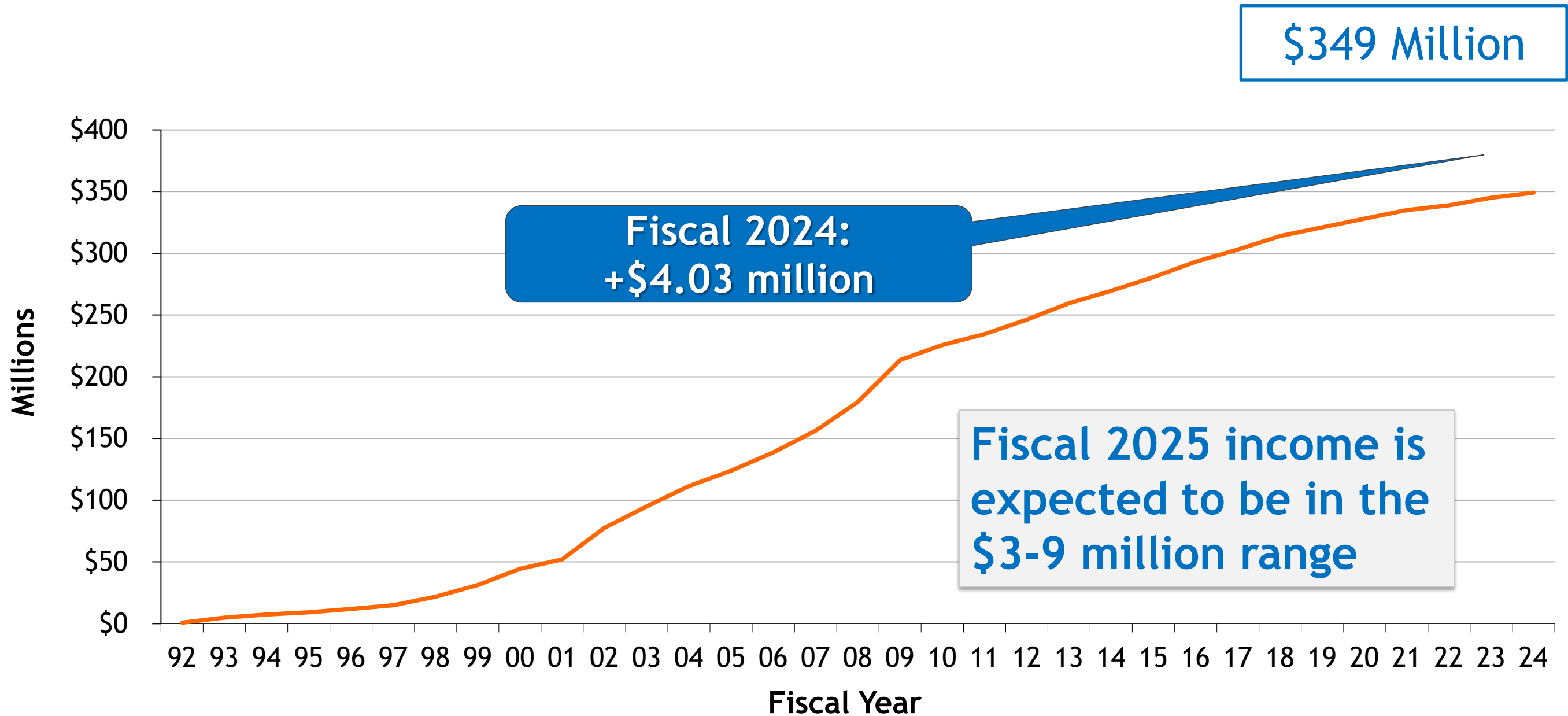


# Total Income Earned from Lending



Fiscal 2024 Income: Lower loan volume compared to FY 2023 resulted in lower earnings 68

# Cumulative Earnings Since Inception





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