Investment Advisory Committee (IAC) Meeting

Wednesday, 11/4/2026
9:00 AM - 12:30 PM ET

1. **Approval of Minutes (August 12, 2026)**
   IAC Meeting Minutes 08122026 - Page 2
2. **CIO Report**
   CIO Report - November 2026 - Page 5
   Performance Summary 8-31-2026 - Page 18
   Asset Allocation Report - August 2026 - Page 19
   Daily Asset Allocation Report 10-27-2026 - Page 20
   New Investments and Terminations 11-04-2026 - Page 21
3. **Expected Return Considerations**
   Understanding Return Expectations_Presn_Q4 2026_VRS - Page 23
4. **Capital Market Assumptions Update**
   CMAs and Scenario Analysis 2026 11 -- withPublicEq Update - Page 85
5. **Private Market Program Reviews**
   Private Markets Overview IAC Nov 4 2026 - ver 12 - FINAL - Page 93
   Real Assets November 2026 IAC Presentation, 103026 - Page 100
   Private Equity - IAC Nov 4 2026 Reading Deck vF - Page 119
   Credit Strategies IAC Presentation November 2026, 103026 - Page 146
   PIP November 2026 IAC Meeting Slides_final_SW - Page 165
6. **Private Market Roundtable on Current Topics**
   Private Markets - Roundtable - Page 174

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Minutes

A meeting of the Investment Advisory Committee of the Virginia Retirement System was held on August 12, 2026 with the following members present:

Larry Kochard
Eric Baggesen
Theodore Economou, joined remotely under § 2.2-3708.3(B)(3)
Palmer Garson
Thomas Gayner
Nancy Leake (joined at 9:04 a.m.)
Bryan Lewis
Rod Smyth
Hance West

The following Board members were present:

Susan Gooden
John Bennett (remote)
Clifford Foster
Jessica Hood
William Leighty

The following staff members were in attendance:

Trish Bishop, Andrew Junkin, Chung Ma, Stephen Adelaar, Advait Apte, Parham Behrooz, Brock Bell, Lee Buchanan, Caroline Caldwell, Ryan Carlson, Warren Chang, Perry Corsello, David Cotter, Sara Denson, Valerie Disanto, Curtis Doughtie, Kenji Epling, Laurie Fennell, Laura Fields, Antonio Fisher, Katherine Grawe, JT Grier, Mehtab Haleem, Greg Hines, Dane Honrado, K.C. Howell, Wendy Jenkins, Robert Irving, Ross Kasarda, Kristina Koutrakos, Mengting Kim, Matt Lacy, Vu Le, Daniel Lipock, Jennifer MacKnight, Kidus Molla, Scott Mootz, Peter Murphy, Walker Noland, Greg Oliff, Laura Pugliese, Garret Rhodes, Greg Salvati, Daniel Schlussler, Michael Scott, Joe Shaver, Trib Singh, Richard Slate, Virginia Sowers, Nathan Thomas, Korey Turner, Dan Whitlock, and Steve Woodall.

Also in attendance was John Kevin Balaod of With Intelligence, Doston Bradley of Cerberus Capital, Antoine Chambers of HumanBiology.org, Thomas Cosmer of MetLife, Bill Elcock and Tayler Kent of Wellington Management, Alex Jannson of JLARC, Mitchell King and Haley Messick of Blackrock, Andrew Putt of Lifestyle Sovereign Partners, and Michael Siciliano of Principal.

Mr. Kochard called the meeting to order at 9:00 a.m.

Mr. Kochard took a roll call of each Committee member for attendance purposes:

Mr. Baggesen - present
Mr. Economou – present
Ms. Garson – present
Mr. Gayner - present
Ms. Leake – not present (joined after roll call)
Mr. Lewis – present
Mr. Smyth – present
Mr. West – present
Mr. Kochard – present

Mr. Kochard reminded attendees that no public comments will be received by the IAC at this meeting. Any member of the audience who disrupts the meeting and is unwilling to comply with the Committee's rules related to the conduct of its business will be asked to leave the room. The IAC encourages any member of the public who wishes to submit comments to do so in writing. All written comments submitted to the IAC will be reviewed by the Committee, Board or VRS staff, as appropriate.

Minutes

A motion was made by Mr. Smyth seconded by Mr. Gayner to approve the minutes from the April 8, 2026 Committee meeting. The motion was unanimously approved.

CIO Report

Mr. Junkin began his report with a market overview. Mr. Junkin then discussed the total fund performance and asset allocation. Last, Mr. Junkin reviewed the New Investments and Terminations Report.

Portfolio Solutions Group

Mr. Ma provided a review of the Portfolio Solutions Group. Review topics included an overview of the program, the team, and markets.

Mr. Mootz provided a review of Risk Management at VRS. Review topics included an overview of the team, importance of risk management, the VRS approach to risk management, and forward-looking risk estimates.

Mr. Bell provided a review of Portfolio Integration and Treasury. Review topics included an overview of the team, leverage deployment, current

funding channels, future funding sources, funding optimization, Treasury enhancements, and Treasury initiatives in progress.

Mr. Kasarda and Ms. Koutrakos provided a review of the Diversifying Strategies program. Review topics included an overview of the team, the role of Diversifying Strategies, portfolio construction framework, evolution of the program, program results, and future plans.

Ms. Grawe provided a review of the Exposure Management Portfolio. Review topics included an overview of the objectives, process review, performance, and looking ahead.

Forward Returns and Scenario Analysis

Mr. Ma provided a review of forward returns including state plans and external forward returns, and long-term VRS forward returns. Mr. Ma introduced Ms. Denson to assist in discussing various scenario analyses including a review of confidence bands and economic scenarios, specifically baseline, stagflation, fiscal dominance, and AI productivity scenarios.

The Committee members engaged in general discussion throughout the reviews provided.

Adjournment

Mr. Gayner made a motion to adjourn the meeting. Mr. West seconded the motion. Mr. Kochard asked for the Committee members to vote on the motion, and the motion was unanimously approved.

The meeting was adjourned at 11:52 a.m.

_____

Larry Kochard, Chairperson

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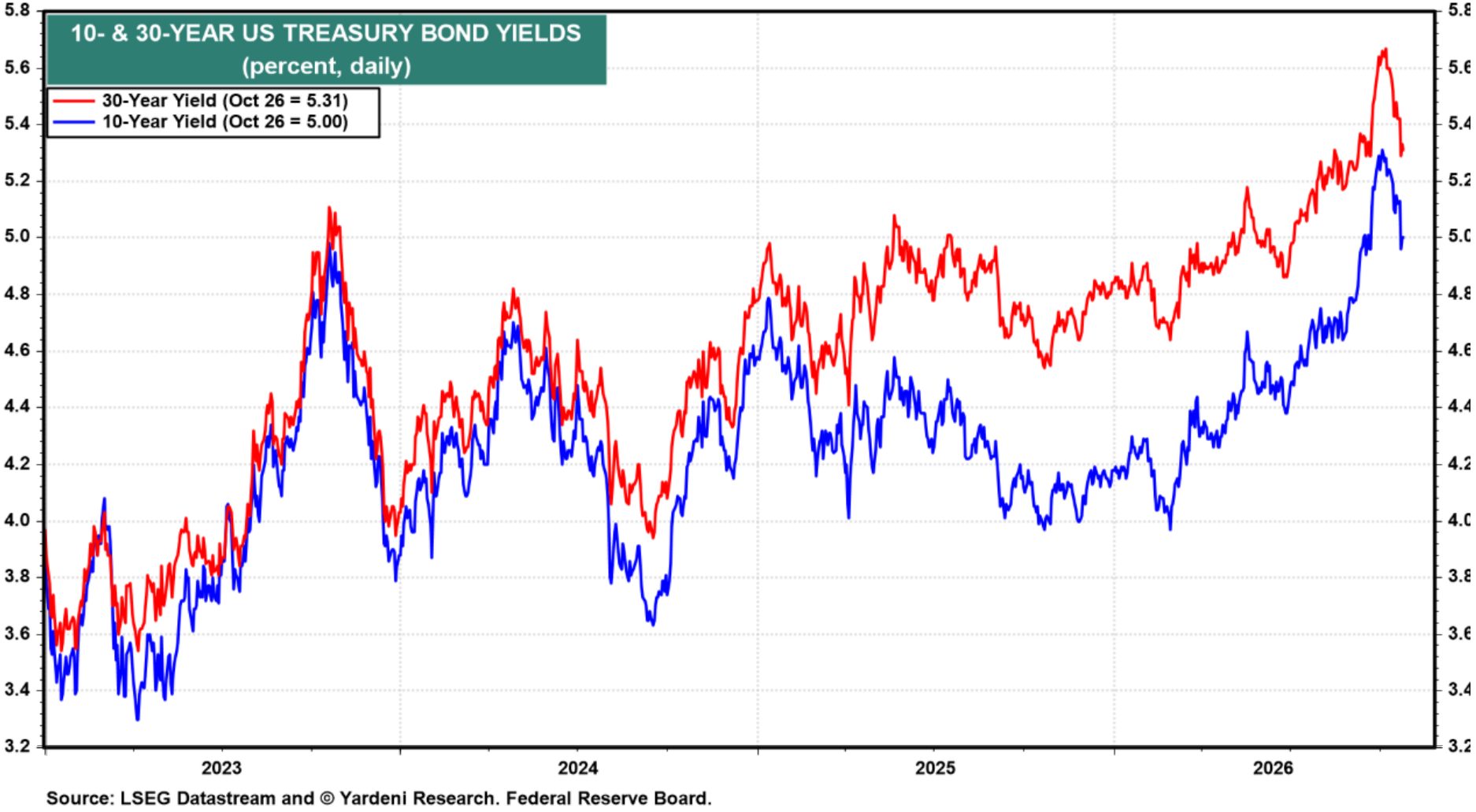


Chief Investment Officer Report

Market Review – November 2026

Andrew Junkin

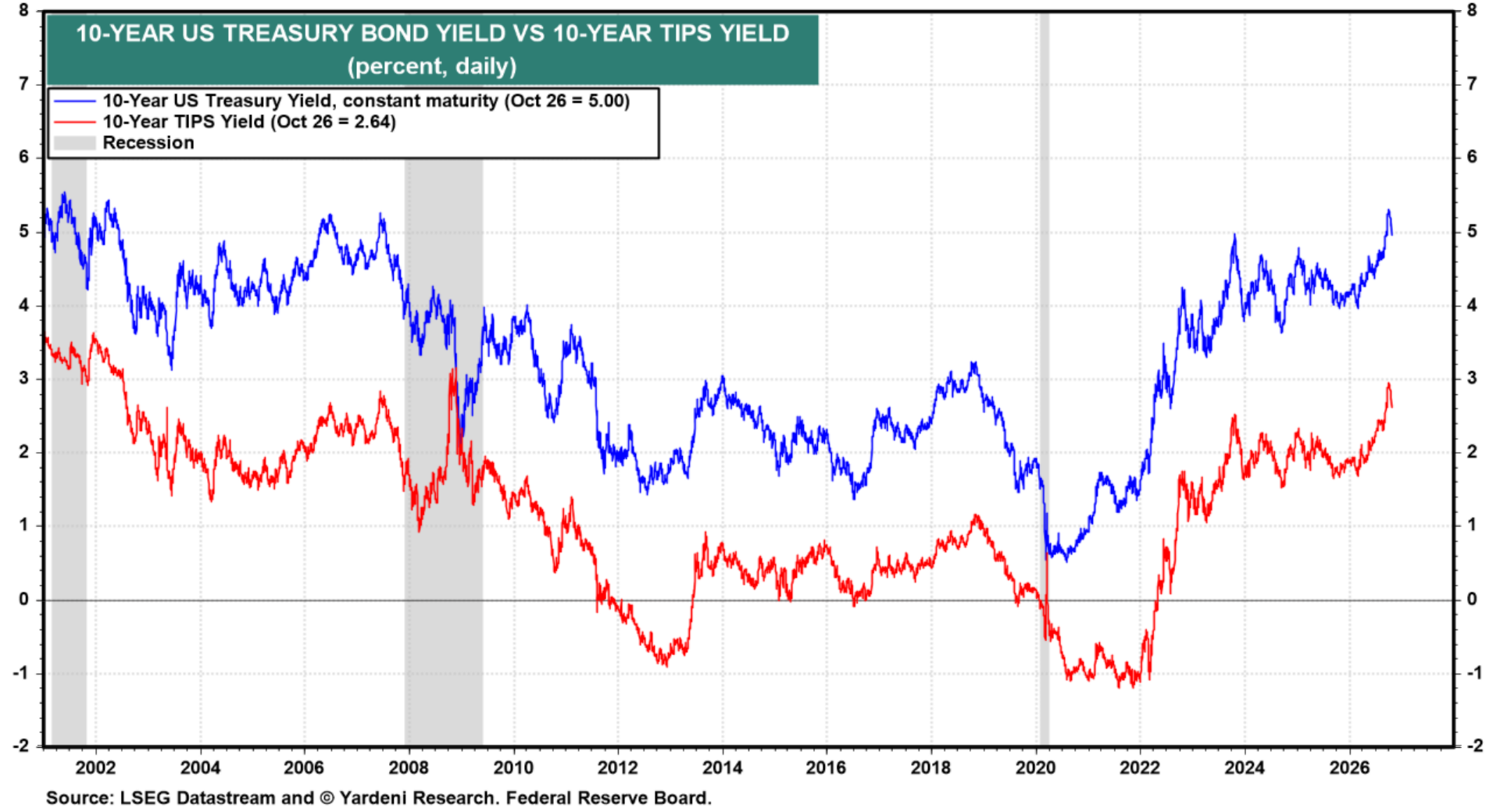
Interest Rates Rising



Source: LSEG Datastream and © Yardeni Research. Federal Reserve Board.

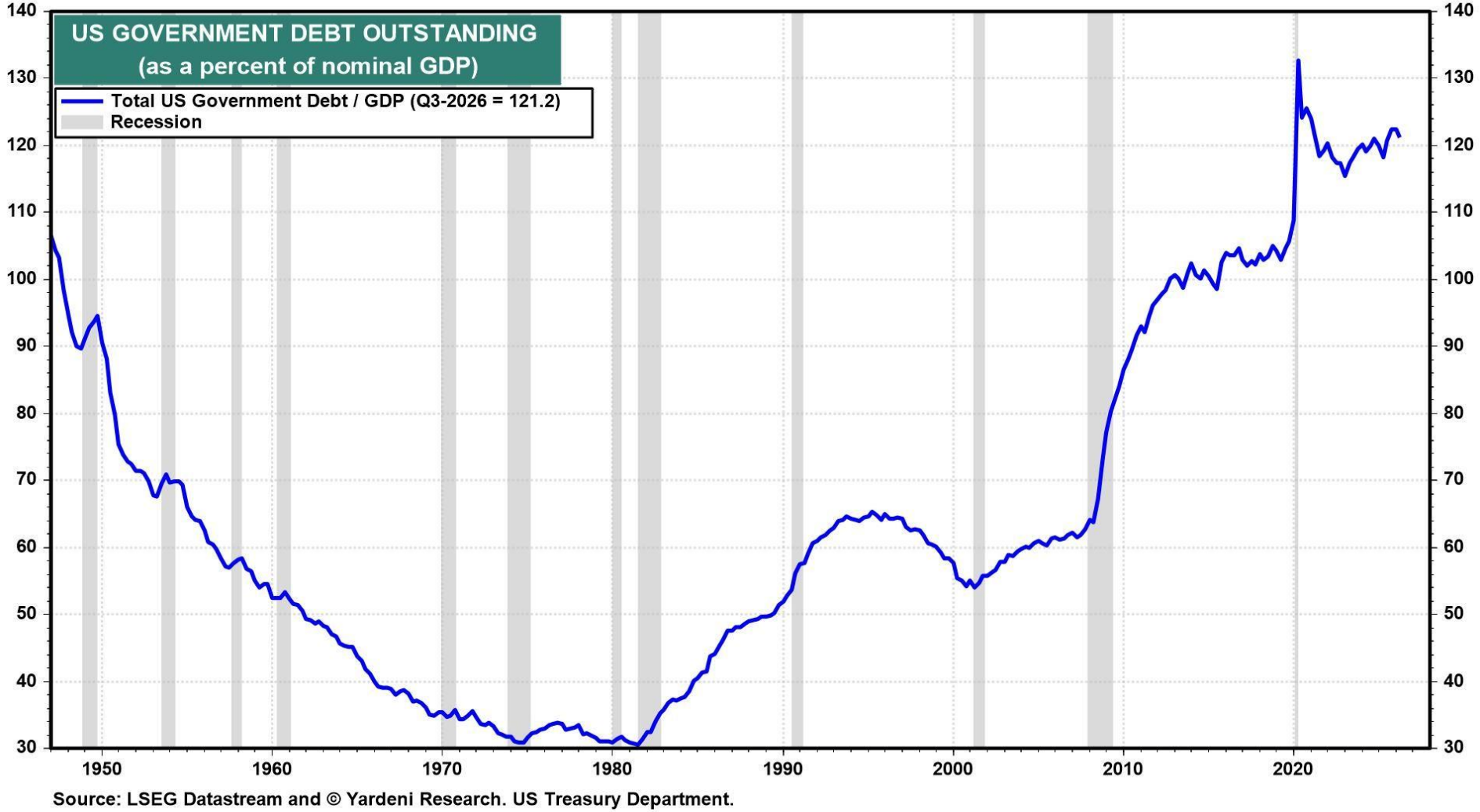
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Real Interest Rates Rising



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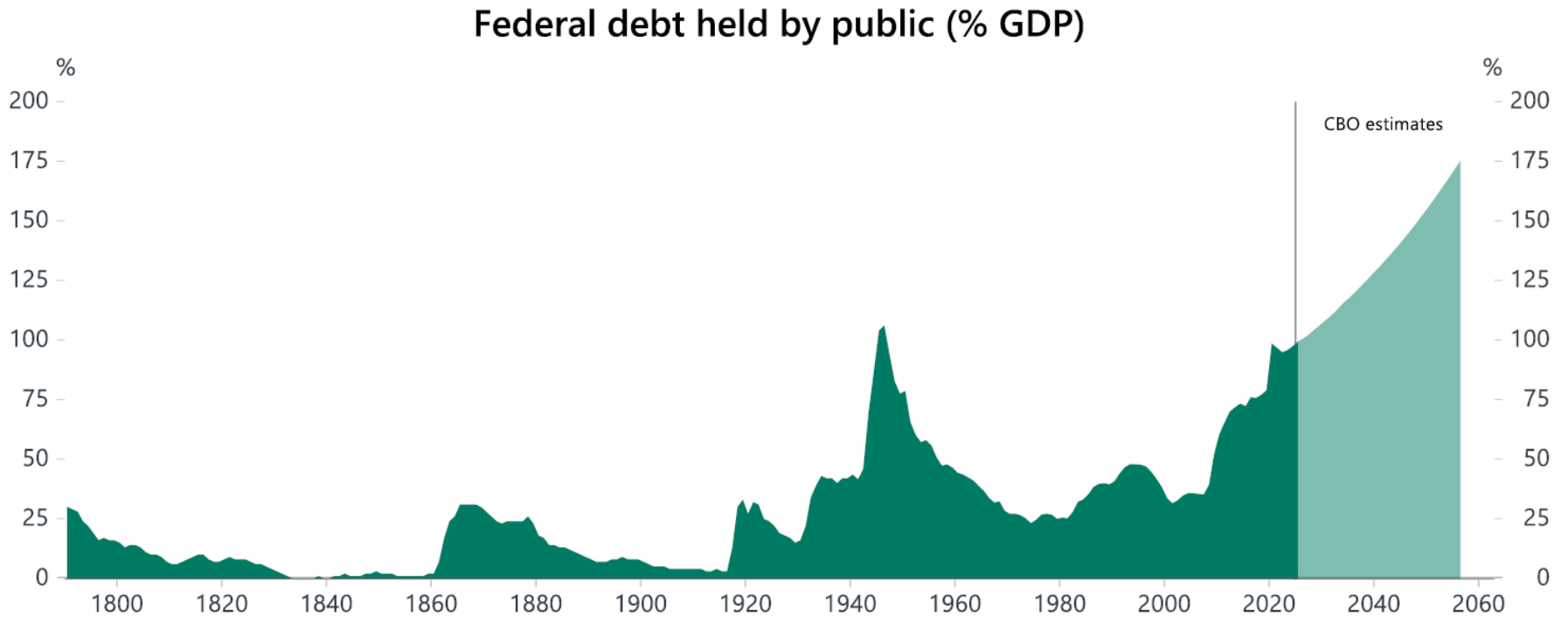
Debt Load of the Economy



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Forecasted to Increase

APOLLO



Source: U.S. Congressional Budget Office (CBO), Macrobond, Apollo Chief Economist

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Inflation “Driver”

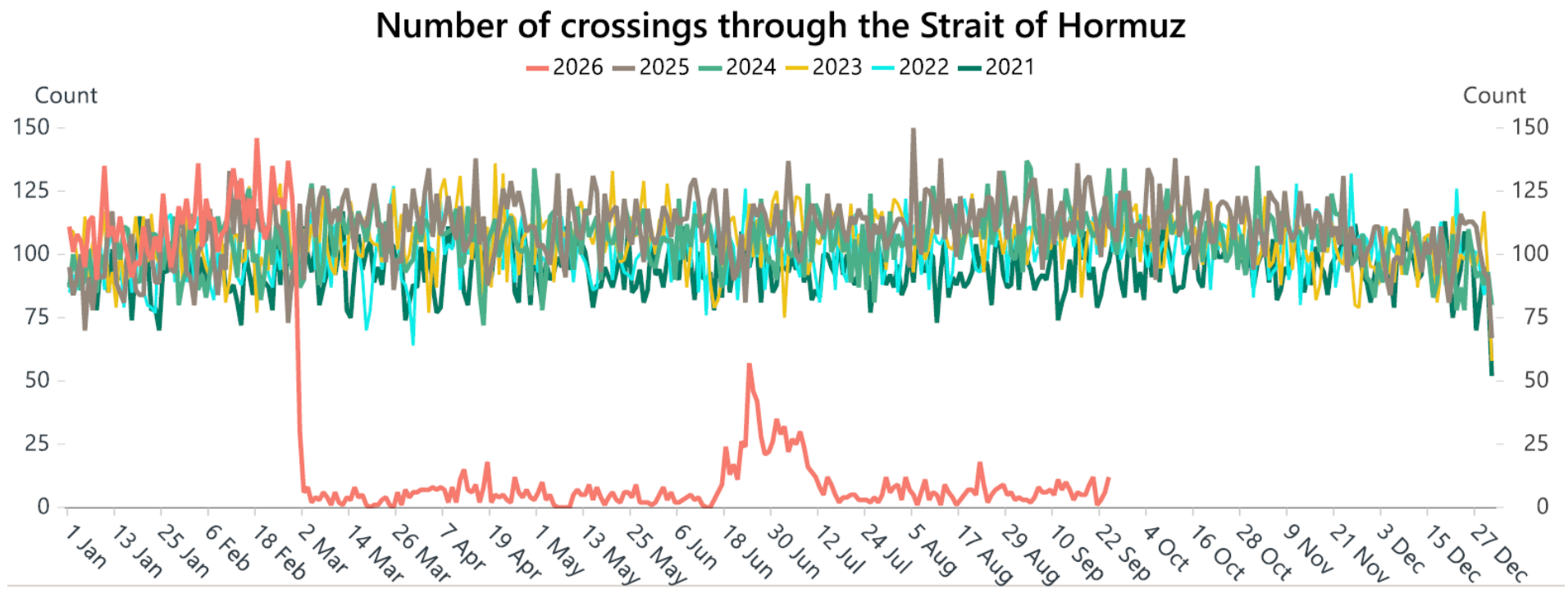


Source: LSEG Datastream and © Yardeni Research. Energy Information Administration (EIA).

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Oil is Flowing, Just Not Through Strait of Hormuz

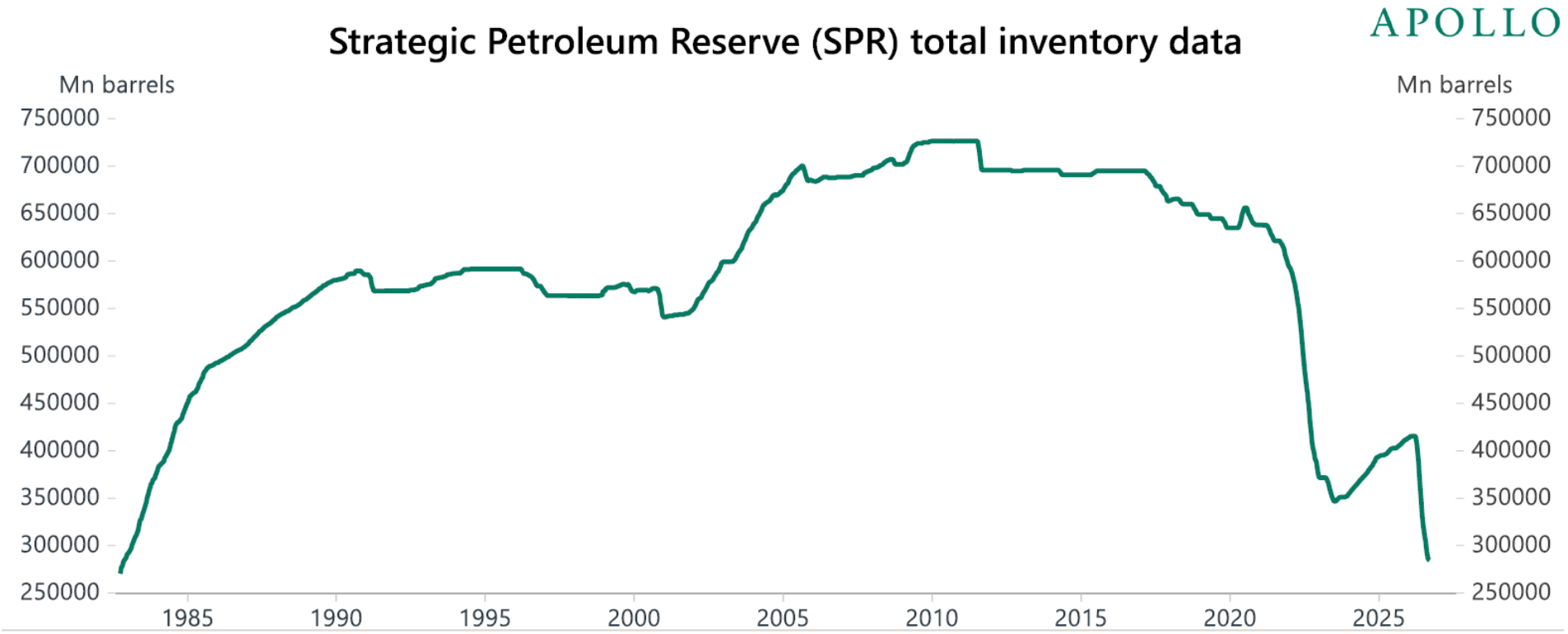
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Source: Bloomberg, Macrobond, Apollo Chief Economist

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Will Take Years to Restock

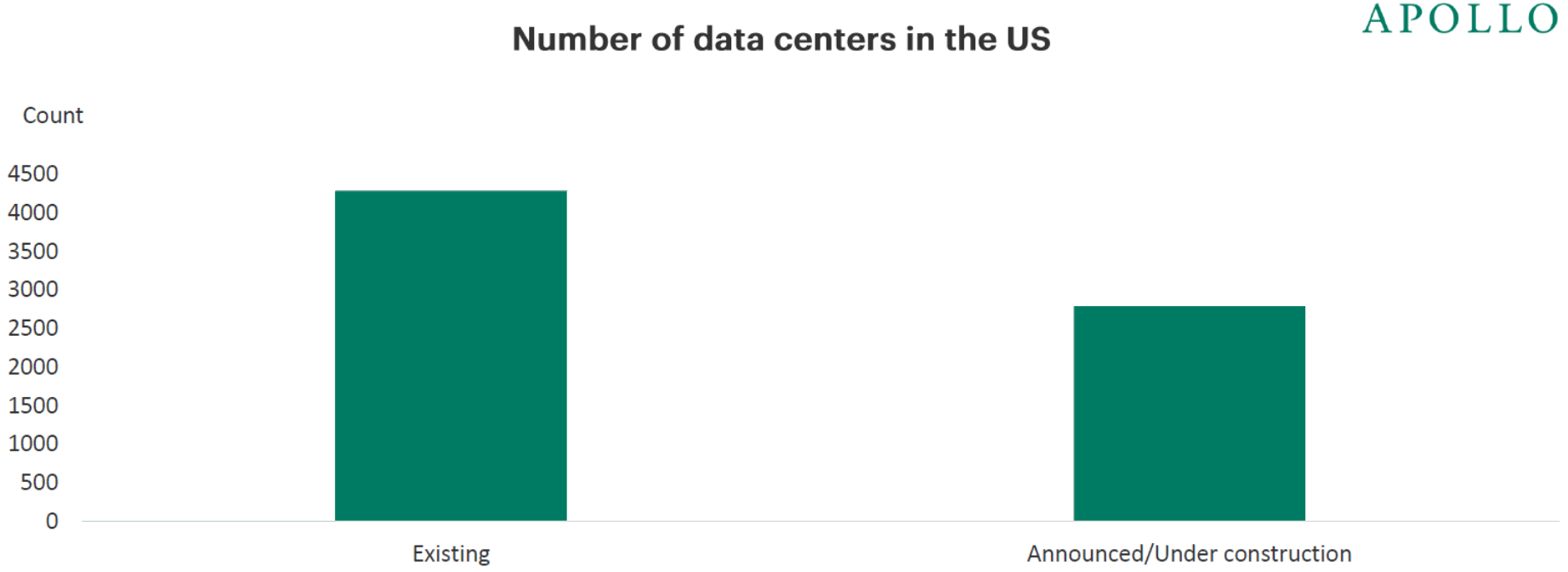


Source: Bloomberg, Macrobond, Apollo Chief Economist

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AI Buildout

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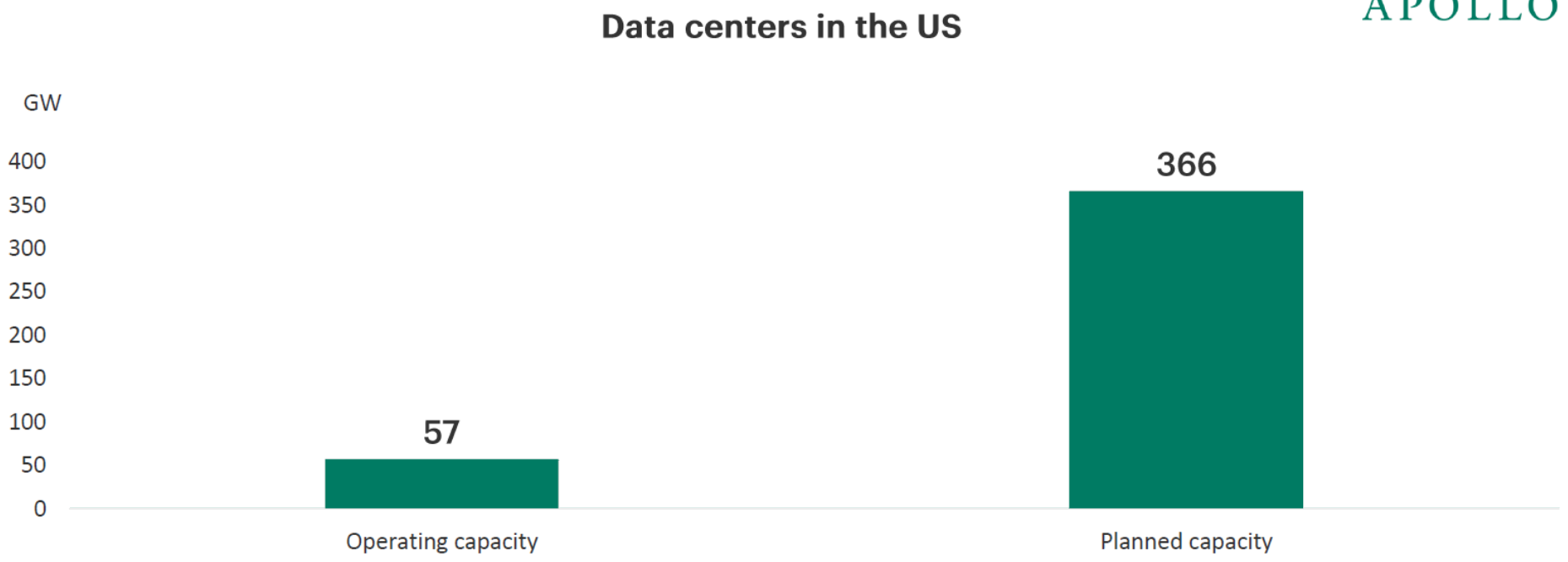
Source: Americas-AI-Surge-Powering-Growth-in-Every-State.pdf, Data Centers – Database, Apollo Chief Economist

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Requires Power

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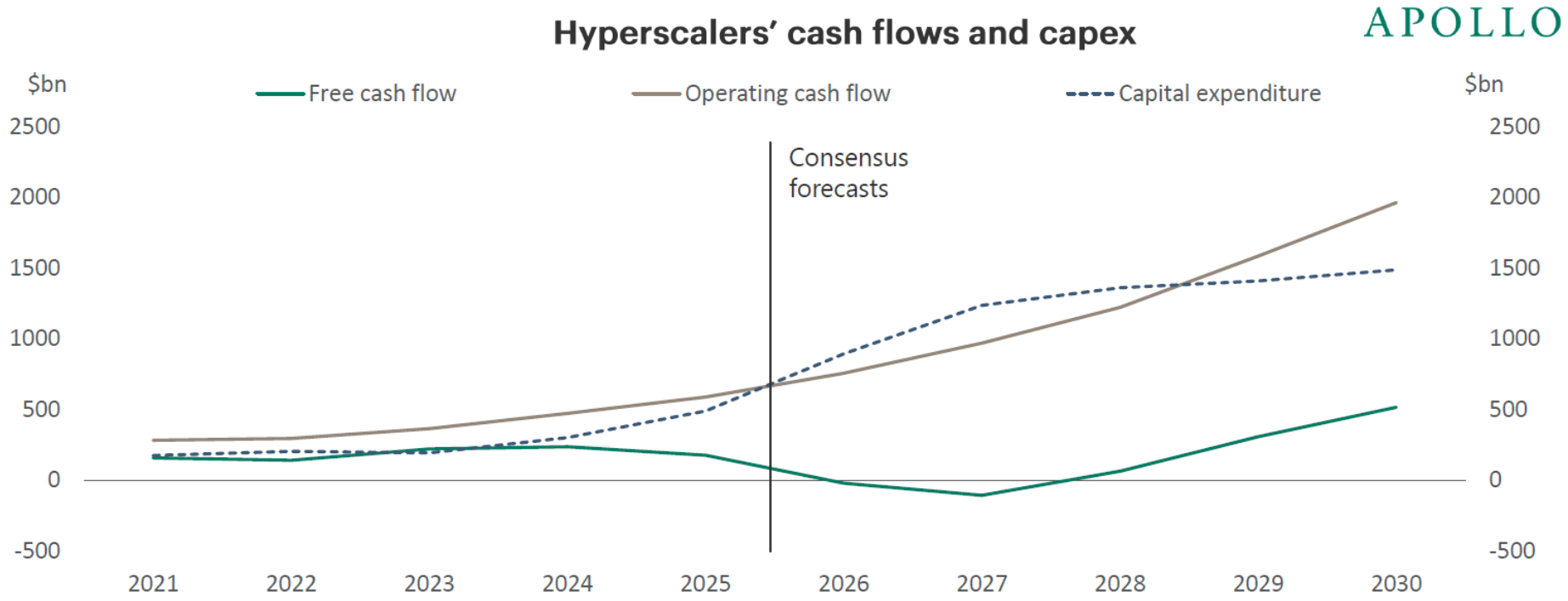


Source: US Data Center Map — Project List & Tracker, Cleanview, Apollo Chief Economist

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Should Drive Cash Flow



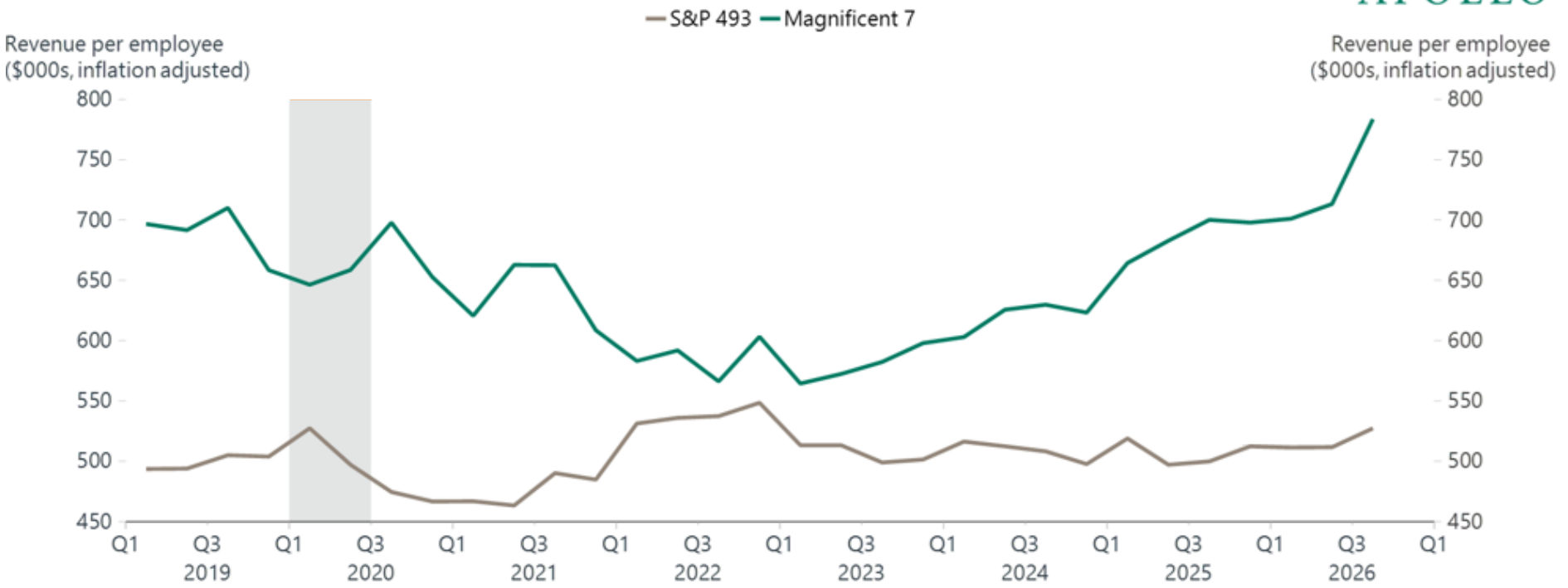
Note: Hyperscalers are: Google, Meta, Amazon, Microsoft, and Oracle. Source: Factset, Apollo Chief Economist

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Non-Hyper Scalers

Revenue per worker moving up for tech but not for the rest of the economy

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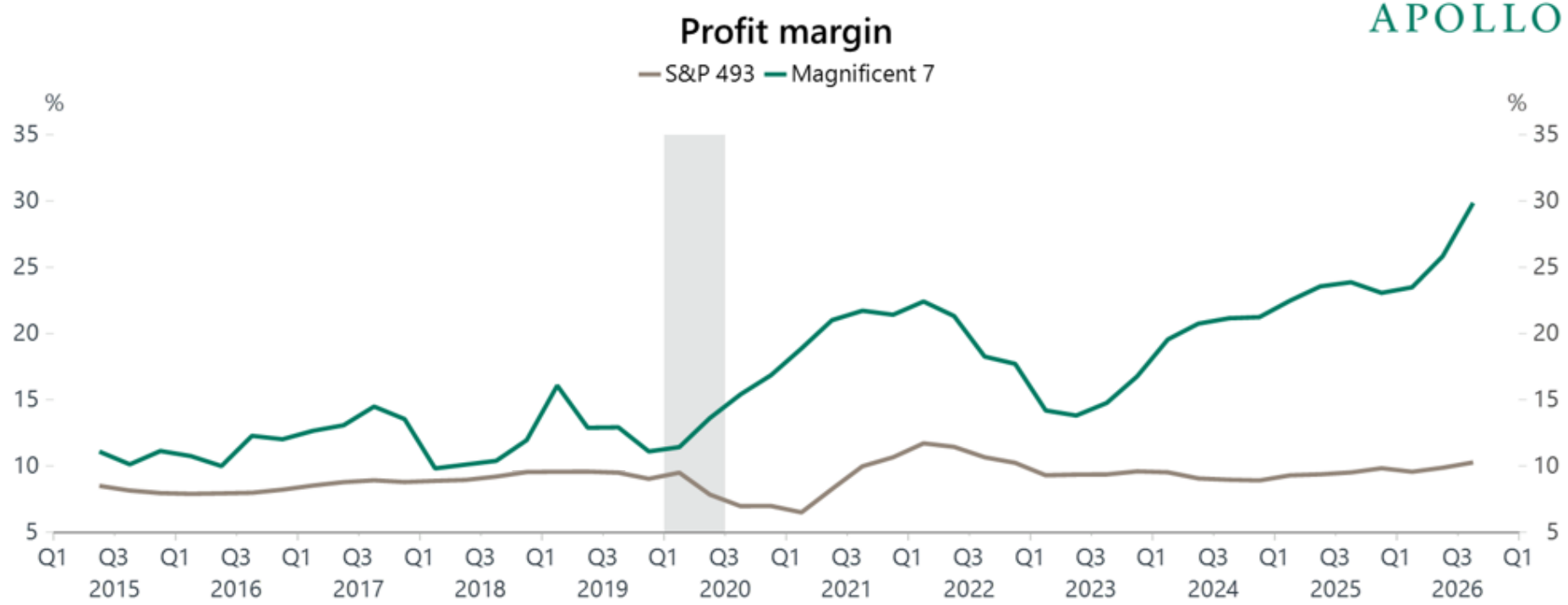


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Profits

No signs of profit margins going up outside the tech sector

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PERFORMANCE SUMMARY
Rolling Periods Ending
August 31, 2026

TOTAL FUND PERFORMANCE

(Net of Fees)

	10 Yr	5 Yr	3 Yr	1 Yr	Qtr	Month	Fiscal YTD	Cal YTD	Market Value ($MM)
Total Public Equity	**12.4**	**11.6**	**21.5**	**23.0**	**3.6**	**2.5**	**3.0**	**15.2**	**47,486**
Benchmark	12.2	10.4	19.6	21.2	2.6	2.9	2.9	14.4	
Total Private Equity	**13.9**	**8.3**	**5.6**	**5.3**	**-1.2**	**0.1**	**0.1**	**0.6**	**19,296**
Benchmark	14.4	10.9	21.5	26.0	4.8	3.8	11.9	12.3	
Total Real Assets	**6.8**	**5.7**	**2.4**	**6.5**	**1.6**	**0.0**	**0.0**	**4.2**	**17,985**
Benchmark	4.8	3.2	1.1	5.0	1.9	0.6	1.3	3.6	
Total Credit Strategies	**7.3**	**7.2**	**9.6**	**8.1**	**1.5**	**0.2**	**0.6**	**2.7**	**19,504**
Benchmark	5.7	5.3	7.8	5.1	1.5	1.0	1.3	3.0	
Total Diversifying Strategies	**n/a**	**4.9**	**7.4**	**9.2**	**1.8**	**0.8**	**2.8**	**4.8**	**7,686**
Benchmark	n/a	4.1	7.7	6.5	1.8	0.9	1.3	4.4	
Total Private Investment Partnerships	**9.1**	**9.0**	**8.9**	**9.7**	**2.3**	**0.0**	**0.0**	**4.7**	**1,859**
Benchmark	8.4	6.8	9.7	11.6	2.8	1.8	4.7	6.2	
Total Fixed Income	**2.4**	**0.6**	**5.2**	**3.1**	**-0.4**	**0.5**	**-0.9**	**0.3**	**20,423**
Benchmark	1.6	0.0	4.5	2.3	-0.6	0.4	-0.8	0.0	
Total Fund	**9.0**	**7.6**	**10.9**	**11.7**	**1.6**	**1.0**	**1.2**	**6.6**	**136,295**
VRS Custom Benchmark	8.5	6.9	12.4	13.1	2.1	1.9	3.1	7.8	

Effective July 2013, the VRS Custom Benchmark is a blend of the Asset Class Benchmarks at policy weights.

Effective January 2024, the Total Fund includes leverage.

The VRS Cash Account, the Treasurer Short-Term Investment Account, the VRS Rebalancing Account, transition activity and accounts with market values of less than $1 million are included in the Total Fund's market value. Differences in market value totals are due to rounding.

The Performance Report may differ from the VRS Annual Comprehensive Financial Report (ACFR) due to each report's requirements and objectives.

Leverage Cost Measurement Information

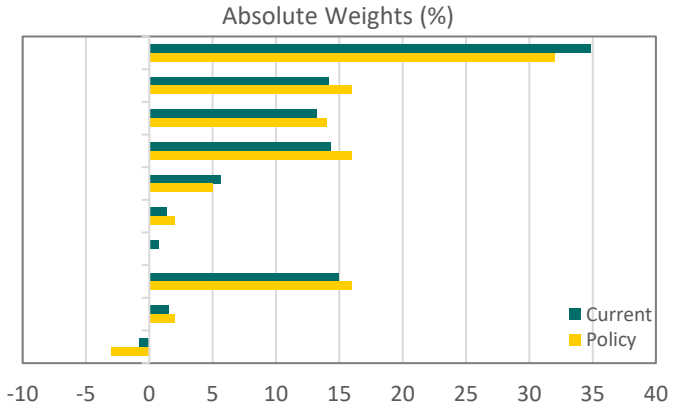
(Information provided for purposes of monitoring the cost effectiveness of leverage implementation.)

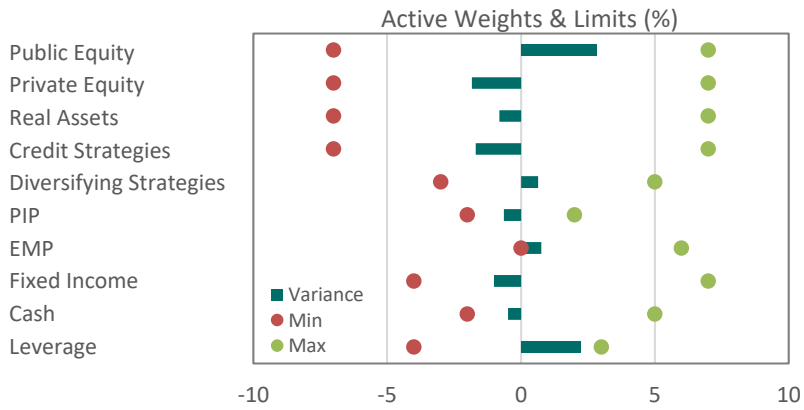
	10 Yr	5 Yr	3 Yr	1 Yr	Qtr	Month	Fiscal YTD	Cal YTD	Market Value ($MM)
Leverage	**n/a**	**n/a**	**n/a**	**4.3**	**1.1**	**0.4**	**0.7**	**2.8**	**(1,047)**
Benchmark	n/a	n/a	n/a	4.4	1.1	0.4	0.7	2.8	

Effective January 2024, the Leverage Custom Benchmark is the Secured Overnight Financing Rate (SOFR) plus 50 basis points per annum.

Asset Allocation Report

August 31, 2026





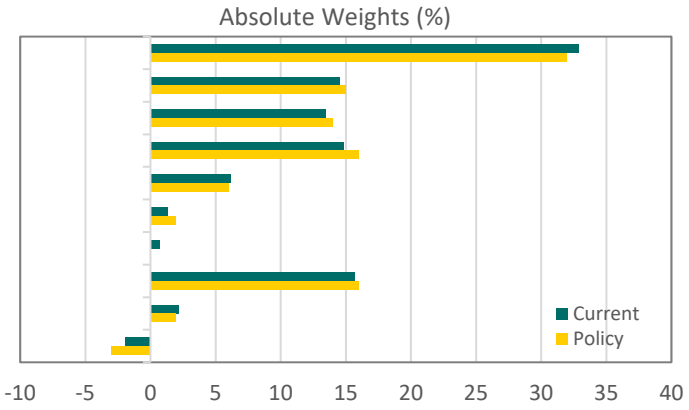
Tracking Error (%)	
5Yr Fund	2.3
5Yr Public	1.5

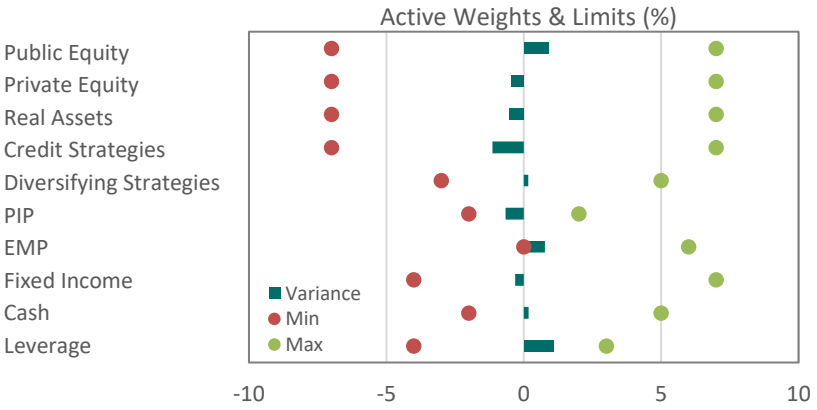
		Weights (%)					
Asset Class	Billions ($)	Current	Policy	Variance	Min	Max	Internal
Public Equity	47.5	34.8	32.0	2.8	25	39	52
Private Equity	19.3	14.2	16.0	-1.8	9	23	15
Real Assets	18.0	13.2	14.0	-0.8	7	21	19
Credit Strategies	19.5	14.3	16.0	-1.7	9	23	6
Diversifying Strategies	7.7	5.6	5.0	0.6	2	10	0
Private Investment Partnerships (PIP)	1.9	1.4	2.0	-0.6	0	4	0
Exposure Management Portfolio (EMP)	1.0	0.8	0.0	0.8	0	6	0
Fixed Income	20.4	15.0	16.0	-1.0	12	23	95
Cash	2.1	1.5	2.0	-0.5	0	7	0
Leverage	-1.0	-0.8	-3.0	2.2	-4	0	0
Total Fund (Net Market Value)	**136.3**	**100.0**	**100.0**	**0.0**	**n.a.**	**n.a.**	**38**
Total Fund (Gross Market Value)	137.3	100.8	103.0	-2.2	n.a.	n.a.	0
Exposures by Policy Groups							
Public + Private Equity	66.8	49.0	48.0	1.0	38	58	n.a.
Fixed Income + Cash	22.5	16.5	18.0	-1.5	12	27	n.a.

- Total Fund includes the following amount held by the Treasurer of VA: $ 288 million
- The values shown for each asset class on this report may reflect adjustments related to derivative positions in the Rebalance Account, pending transactions and certain accruals, in order to provide a more descriptive representation of the true economic exposure to each asset class (0 adjustments applied)
- The VRS Defined Benefit Plan Investment Policy Statement established the total fund tracking error range as the allowable observed tracking error calculated quarterly using 5 years of history as of 06/30/2026.
- Differences in totals are due to rounding

Daily Asset Allocation Report

October 27, 2026





Tracking Error (%)	
5Yr Fund	2.3
5Yr Public	1.5

		Weights (%)					
Asset Class	Billions ($)	Current	Policy	Variance	Min	Max	Internal
Public Equity	44.9	32.9	32.0	0.9	25	39	51
Private Equity	19.8	14.6	15.0	-0.4	8	22	16
Real Assets	18.4	13.5	14.0	-0.5	7	21	19
Credit Strategies	20.3	14.9	16.0	-1.1	9	23	6
Diversifying Strategies	8.4	6.2	6.0	0.2	3	11	0
Private Investment Partnerships (PIP)	1.8	1.3	2.0	-0.7	0	4	0
Exposure Management Portfolio (EMP)	1.0	0.8	0.0	0.8	0	6	0
Fixed Income	21.4	15.7	16.0	-0.3	12	23	96
Cash	3.0	2.2	2.0	0.2	0	7	0
Leverage	-2.6	-1.9	-3.0	1.1	-7	0	0
Total Fund (Net Market Value)	**136.4**	**100.0**	**100.0**	**0.0**	**n.a.**	**n.a.**	**36**
Total Fund (Gross Market Value)	139.0	101.9	103.0	-1.1	n.a.	n.a.	0
Exposures by Policy Groups							
Public + Private Equity	64.7	47.5	47	0.5	37	57	n.a.
Fixed Income + Cash	24.4	17.9	18	-0.1	12	27	n.a.

- Total Fund includes the following amount held by the Treasurer of VA: $ 428 million
- The values shown for each asset class on this report may reflect adjustments related to derivative positions in the Rebalance Account, pending transactions and certain accruals, in order to provide a more descriptive representation of the true economic exposure to each asset class (0 adjustments applied)
- The VRS Defined Benefit Plan Investment Policy Statement established the total fund tracking error range as the allowable observed tracking error calculated quarterly using 5 years of history as of 6/30/2026
- Differences in totals are due to rounding

Program	Action	Effective Date	Commitment/ Current Value	Funding/ Defunding Period	Description
Private Equity	Hired	09/03/2026	$200 Million	5 Years	**Audax PE VIII –** The Fund will make control investments in middle- and lower-middle-market companies across business and financial services, healthcare, industrial services and technologies, and software and technology.
Private Equity	Hired	09/14/2026	$30 Million	6 Years	**Monomoy Family Fund -** A smaller fund concept where Monomoy will use their value orientation along with operational improvement capability to make control investments in family-owned and corporate carve-outs of lower middle market companies.
Private Equity	Hired	09/18/2026	$145 Million	6 Years	**Spectrum XI -** The Fund will target growth stage companies that have proven, scalable business models and exhibit high growth with recurring revenue and profitability across software, AI, and data businesses.
Private Equity	Hired	08/04/2026	$75 Million	5 Years	**NorthSands Capital I –** A fund focused on single-asset continuation vehicles targeting well-known sectors including industrials and industrial services companies.
Private Equity	Hired	09/21/2026	$100 Million	6 Years	**ICONIQ Strategic Partners VIII –** The Fund will make venture and growth equity investments in technology companies globally from early stages through IPO and beyond.
Private Equity	Hired	09/25/2026	$50 Million	5 Years	**Cap91 CV Sleeve –** A fund focused on single-asset continuation vehicles of private equity backed companies in the middle and lower middle markets.
Private Equity	Hired	10/15/2026	$150 Million	5 Years	**NGP Natural Resources XIV –** The Fund will make investments in the upstream and midstream energy sectors including, without limitation, the exploration and/or production of hydrocarbons, and the processing, transportation, storage, and/or logistics relating to hydrocarbons.
Real Assets	Hired	08/28/2026	$43.2 Million	Immediate	**Lime Rock Resources Fund III Continuation Vehicle –** A closed-end fund continuation vehicle investing in domestic oil and gas assets.

Program	Action	Effective Date	Commitment/ Current Value	Funding/ Defunding Period	Description
Real Assets	Hired	10/18/2026	€125 Million	4 Years	**Igneo European Diversified Infrastructure Fund IV –** A commingled fund focused on core and core-plus middle market infrastructure assets in Europe.
Credit Strategies	Hired	09/29/2026	$300 Million	3 Years	**Castlelake Asset-Based Private Credit IV** – A commingled fund focused on asset-based investments in specialty finance, real assets, and aviation.
Public Equity	Hired	08/14/2026	$200 Million	2 Years	**ValueAct Strategic Global Fund II** – A co-investment vehicle.
Public Equity	Hired	10/01/2026	$250 Million	Immediate	**Atalan Capital -** A concentrated, fundamentally driven global long-only strategy.
Exposure Management Portfolio	Terminated	08/31/2026	$591 Million	Immediate	**AQR Market Neutral Value Fund** – A systematic long/short value strategy.
Exposure Management Portfolio	Hired	09/22/2026	$400 Million	Immediate	**JP Morgan Hybrid Growth** - A strategy investing in public and private growth companies.
Exposure Management Portfolio	Hired	10/01/2026	$100 Million	Immediate	**Irenic Vantage EMP** – A co-investment vehicle.
Diversifying Strategies	Hired	07/01/2026	$25 Million	Immediate	**NISA Systematic Strategies** – A multi-asset absolute return strategy.
Diversifying Strategies	Hired	10/01/2026	$25 Million	Immediate	**Irenic Vantage DS** – A co-investment vehicle.

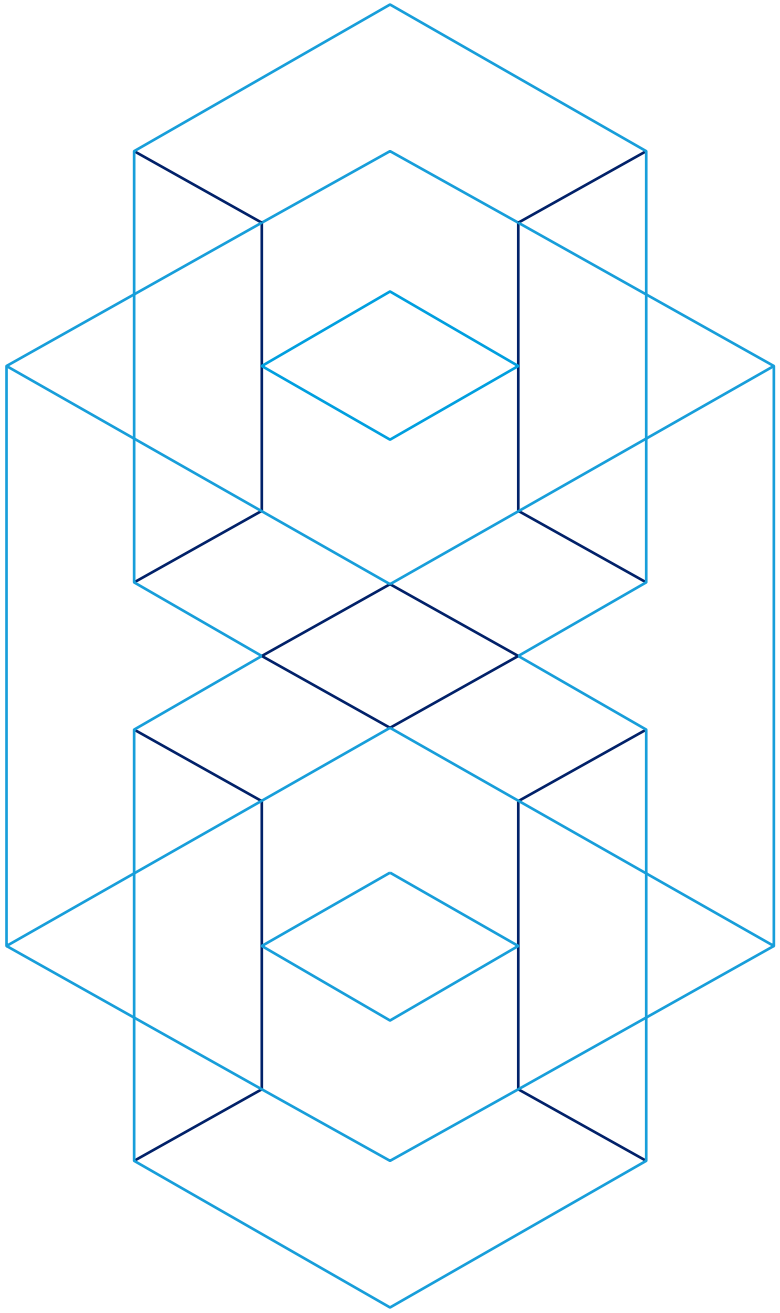
Understanding Return Expectations

And the implications in today's markets

Antti Ilmanen

Principal, Global Co-Head of Portfolio Solutions Group

Q4 2026



AQR Portfolio Solutions Group

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Investment Challenges Ahead – But Investors Don't See Them

Why is this, and what are the implications?

Outline

First, Today's Capital Market Environment

How Do Investors *Actually* Form Long-Run Return Expectations?

U.S. vs. Non-U.S. Equities

Why Are Bond Investors Contrarian While Equity Investors Extrapolate?

A (Very) Brief History of Expected Returns Formation

Equity Market Focus

- Historical Trends
- Objective Expected Returns
- Subjective Expected Returns

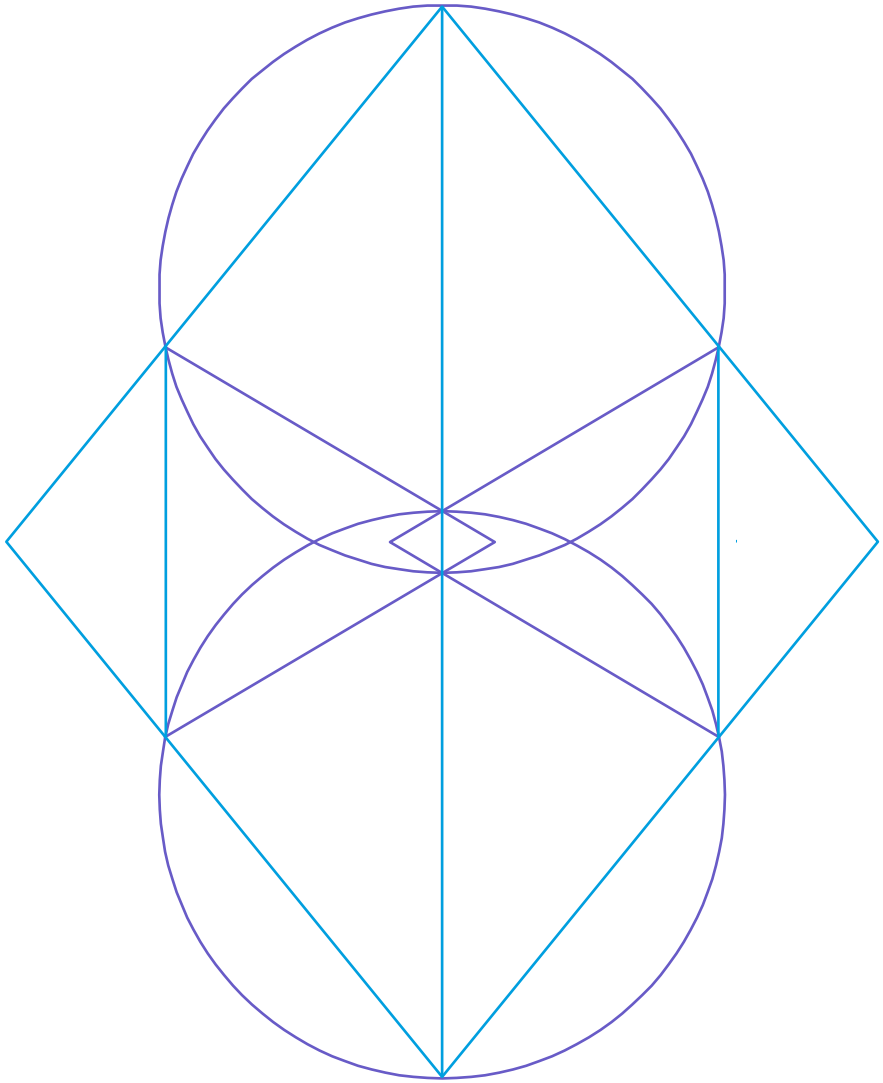
Bond Market Focus

What About Liquid Alternatives?

Conclusion

Source: AQR.

Today's Capital Market Environment

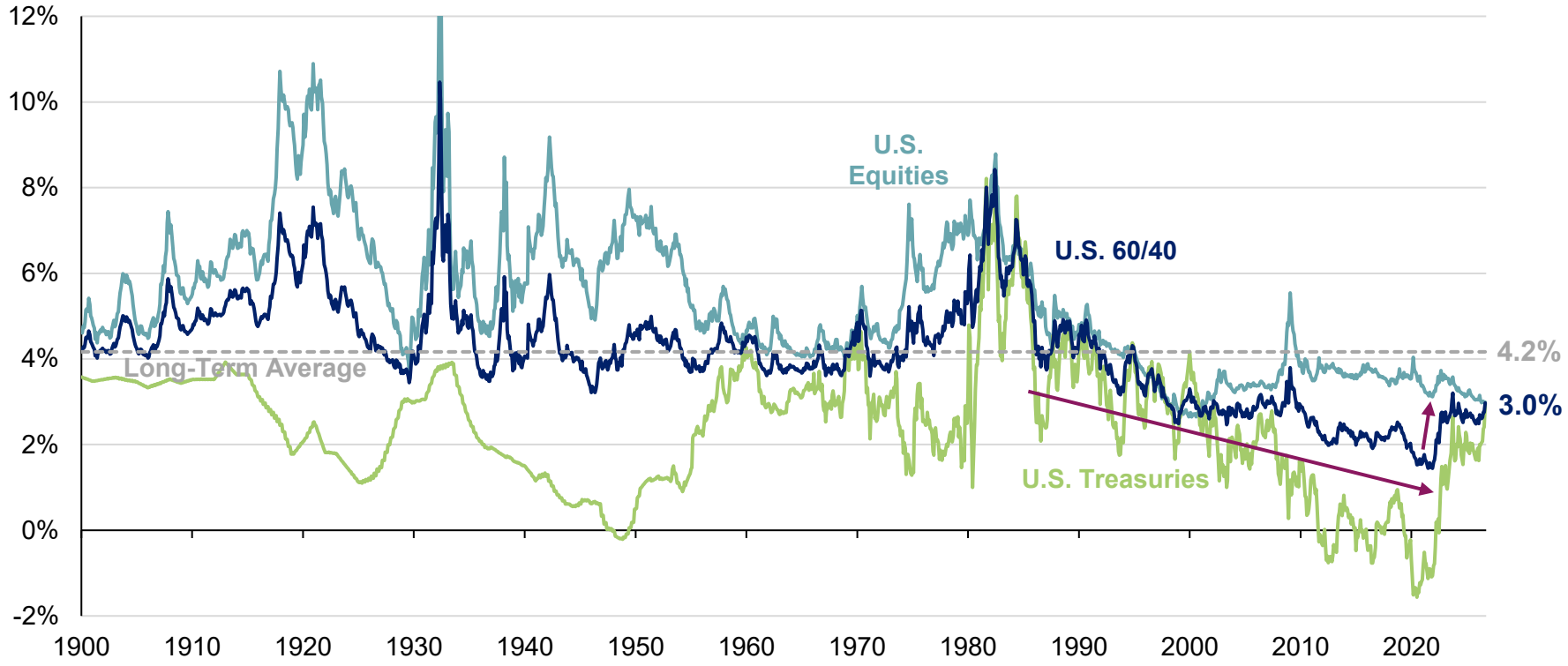


Long View: Expected Returns Up for Bonds, Still Low for 60/40

Meeting real return objectives likely challenging from this starting point

Simple Expected Real Returns for Stocks, Bonds, and 60/40 Portfolios

January 1, 1900 – September 30, 2026



These yield-based metrics are of little use for market timing

BUT they do give a useful anchor for next 5-10-year returns (better than recent realized returns!)

Source: AQR, Bloomberg, Robert Shiller's Data Library, Ibbotson Associates (Morningstar), Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics. Earnings data through 6/30/2026. Note that to achieve a 125-year history, these charts uses simpler expected return measures than AQR's official capital market assumptions published annually in our *Alternative Thinking series.* U.S. 60/40 portfolio is 60% U.S. equities and 40% long-dated Treasuries. U.S. equities is the S&P 500 index and predecessor large-cap indices. Real equity yield is simple average of two measures: (0.5 * Shiller E/P * (1+g*5) + g and Dividend/Price + g. The g term is assumed long term real earnings per share (EPS) growth which is 1.5% up until 2010 after which it incrementally increases to 1.8%; 1+g*5 multiplier accounts for EPS growth during 10-year earnings window; 0.5 multiplier reflects long-term payout ratio. Real bond yield is yield on long-term U.S. Treasury bonds minus long-term expected inflation based on Blue Chip Economic Indicators, Consensus Economics and Federal Reserve Bank of Philadelphia. Before survey data became available in 1978, expected long-term inflation is based on statistical estimates and on 1-year ahead Livingston inflation forecasts. Charts are for illustrative purposes only. Past performance is not a reliable indicator of future performance. Please see Appendix for important disclosures around expected returns.

Overview of Our Latest Estimates

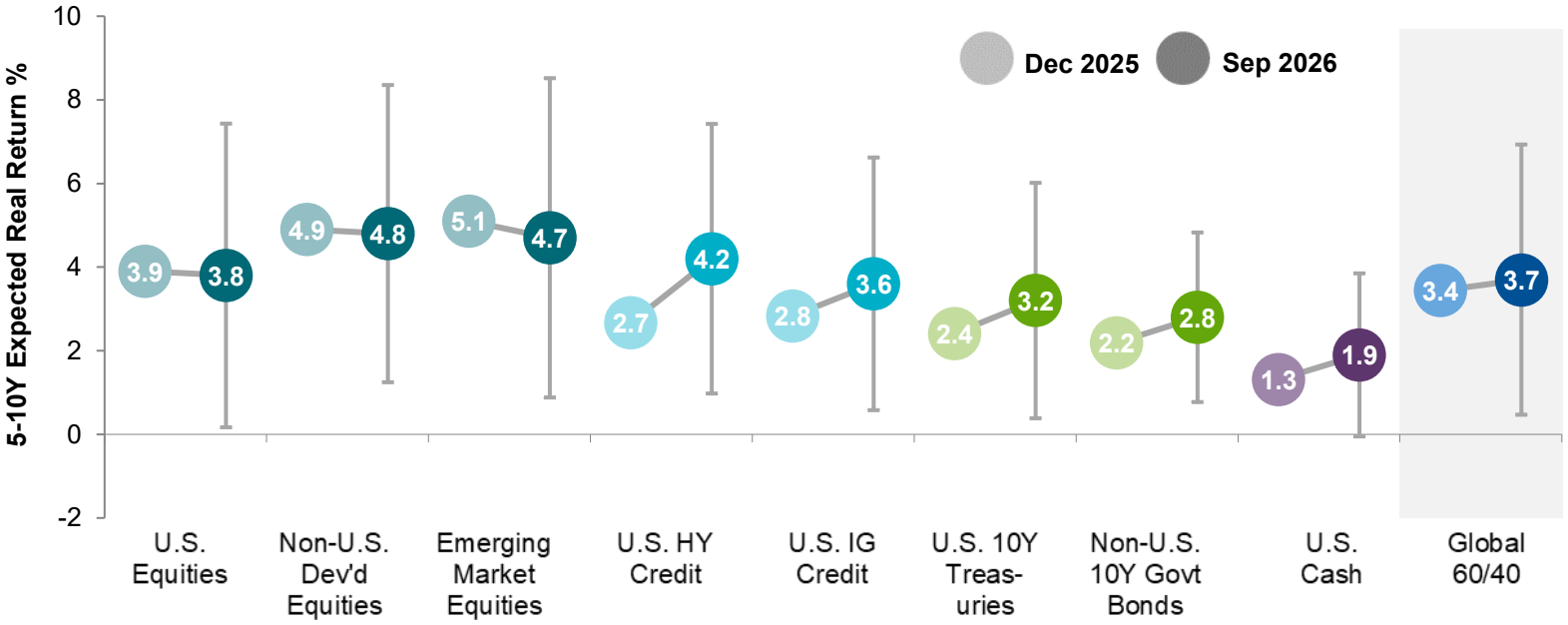
As of September 30, 2026

We present local real (inflation-adjusted) annual compound rates of return for a horizon of 5 to 10 years

During 2026 YTD, expected real returns were

- Slightly lower for **equities**
- Sharply higher for **government bonds**, **credit** and **cash**
- Higher for **global 60/40**

Medium-Term Expected Real Returns for Liquid Asset Classes



Source: AQR; see *Alternative Thinking* 2026 Issue 1 'Capital Market Assumptions for Major Asset Classes' for further details. Estimates as of **September 30, 2026** are local real annual compound rates of return for a horizon of 5 to 10 years. "Non-U.S. developed equities" is cap-weighted average of Euro-5, Japan, U.K., Australia, Canada. "Non-U.S. 10Y govt. bonds" is GDP-weighted average of Germany, Japan, U.K., Australia, Canada. Global 60/40 is 60% Global Equities and 40% Global Bonds. Error bars cover 50% confidence range, based on analysis from Alternative Thinking Q1 2018 and adjusted for current expected volatilities. These are intended to emphasize the uncertainty around any point estimates. Not only are the return forecasts uncertain, but also any measures of forecast uncertainty are debatable. Forecasting requires humility at many levels. Estimates are for illustrative purposes only, are not a guarantee of performance and are subject to change. Not representative of any portfolio that AQR currently manages. Please see Appendix for important disclosures around expected returns.

Public Equity

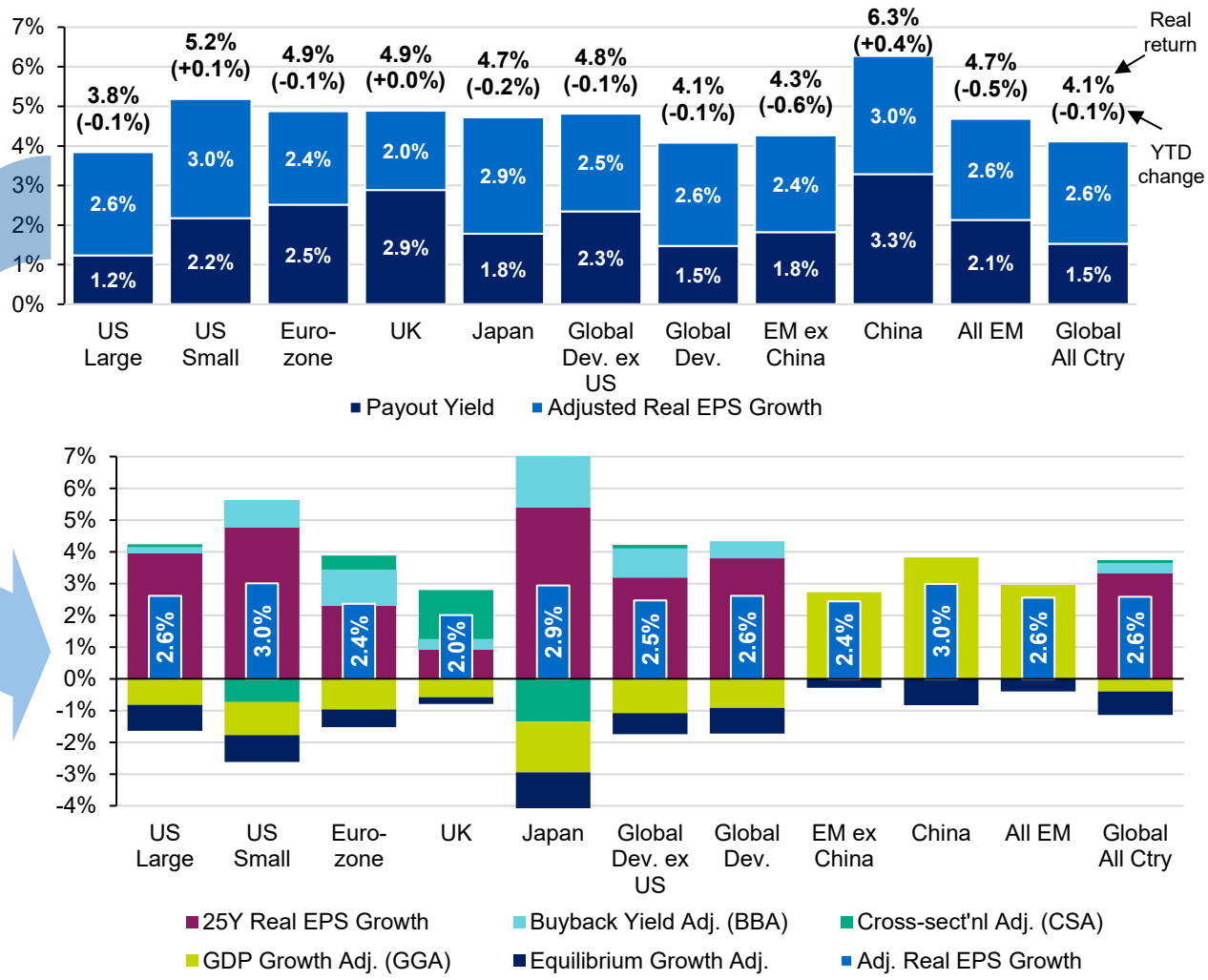
Building 5- to 10-year local real return estimates, as of September 30, 2026

Real Return Estimate and Main Components

- Real return is "**yield** plus **growth**" (we assume no change in valuation)
- **Payout yield** is average of (1) dividend yield and (2) estimate derived from CAEY (1/CAPE)

Components of the Real EPS Growth Assumption

- Growth estimate starts from **historical EPS growth** then adjusts for:
  - **Trends in use of buybacks**
  - **Sample-specific cross-sectional patterns**
  - **GDP growth anchor**
  - **Sample-specific time-series patterns**



Source: AQR, Consensus Economics, Bloomberg. Estimates and methodology as of September 30, 2026. Upper chart shows two main components of real return estimate. Lower chart shows finer decomposition of growth estimate. Eurozone is a cap-weighted average of large-cap indices in Germany, France, Italy, Netherlands and Spain. Global estimates are cap-weighted averages. Emerging market growth estimates are just forecast GDP growth (average of aggregate and per capita) averaged with 2.2% equilibrium growth. Estimates for illustrative purposes only, not a guarantee of performance and not representative of any portfolio that AQR currently manages. Please see appendix for more information around expected returns and definitions of all indices referenced herein.

Public Equity

Building 5- to 10-year local real return estimates, as of September 30, 2026

Real Return Estimate and Main Components

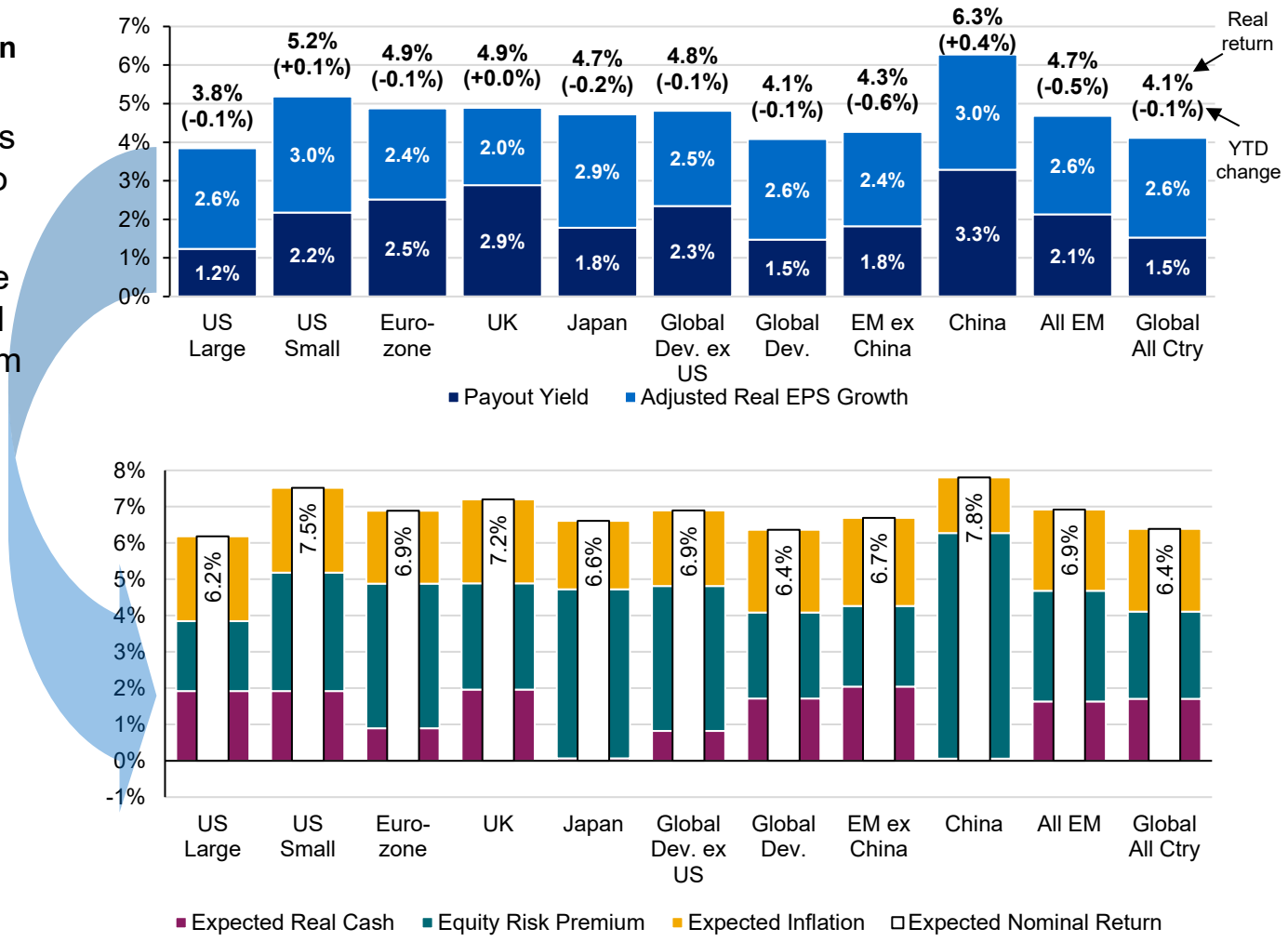
- Real return is "**yield** plus **growth**" (we assume no change in valuation)
- **Payout yield** is average of (1) dividend yield and (2) estimate derived from CAEY (1/CAPE)

Nominal Return Estimate and Equity Risk Premium

We can decompose the real return into

- **Exp. real cash return**
- **Equity risk premium** (US ERP compressed further in 2026 YTD)

To get the nominal return we add **expected inflation**



Source: AQR, Consensus Economics, Bloomberg. Estimates and methodology as of September 30, 2026. Upper chart shows two main components of real return estimate. Lower chart shows finer decomposition of growth estimate. Eurozone is a cap-weighted average of large-cap indices in Germany, France, Italy, Netherlands and Spain. Global estimates are cap-weighted averages. Emerging market growth estimates are just forecast GDP growth (average of aggregate and per capita) averaged with 2.2% equilibrium growth. Estimates for illustrative purposes only, not a guarantee of performance and not representative of any portfolio that AQR currently manages. Please see appendix for more information around expected returns and definitions of all indices referenced herein.

Understanding Return Expectations

A new series of articles available at aqr.com

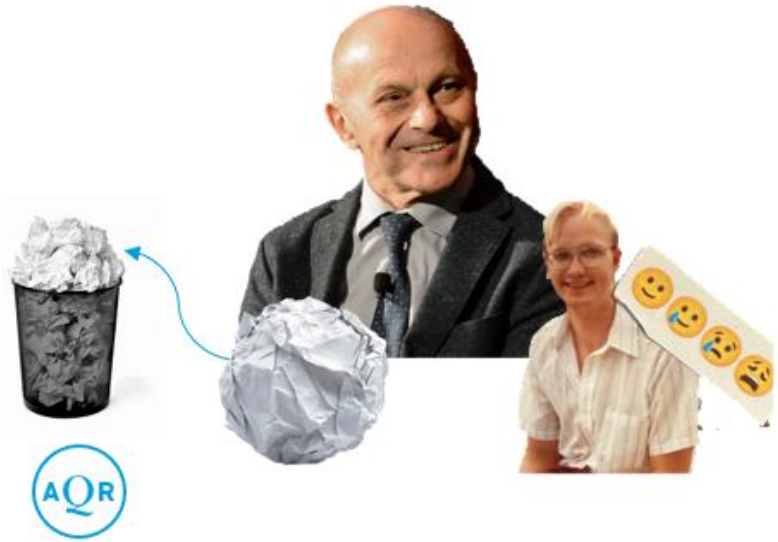


Source: AQR. For illustrative purposes only.

How Do Investors Actually Form Long-Run Return Expectations?

… and why do I care?

(a sad tale from the Univ. of Chicago in 1991)



Sources: CNBC.

How *Do* Investors Form Long-Run Return Expectations?

And why this matters now

Objective expected returns



- Objectively feasible expectations rationally held by investors, set by the aggregate market
- Should have positive predictive ability
- Focus of academics and institutional CMAs
- Inferred from market yields or valuations

Subjective expected returns



- Subjective expectations of different investor groups
- Heterogeneous, sometimes irrational
- Inferred from surveys
- Some agree with objective ERs (institutional CMAs)
- Others vary inversely with objective ERs (retail investors and equity analysts)

Yield-based forecasts are supported by long-run evidence, yet extrapolation comes to us more naturally

Analogous to Kahneman's slow and fast thinking, or Dr Spock and Captain Kirk

Spoiler: I oppose rearview mirrors and will go to the barricades against multi-year return-chasing! ☺



We analyze long-run expected returns and the historical evidence can exceed a century...

...But the topic is **highly timely** for overall market direction, for the role of diversifiers, and especially for the U.S. vs. rest of the world equity trade

AQR

Source: AQR. As of June 30, 2025. Expectations are subject to change at any time without notice. There is no guarantee, express or implied, that long-term return and/or volatility targets will be achieved. Realized returns and or volatility may come in higher or lower than expected. Please read important disclosures in the disclosures section.

Subjective Expectations Can Get It Backwards At Extremes

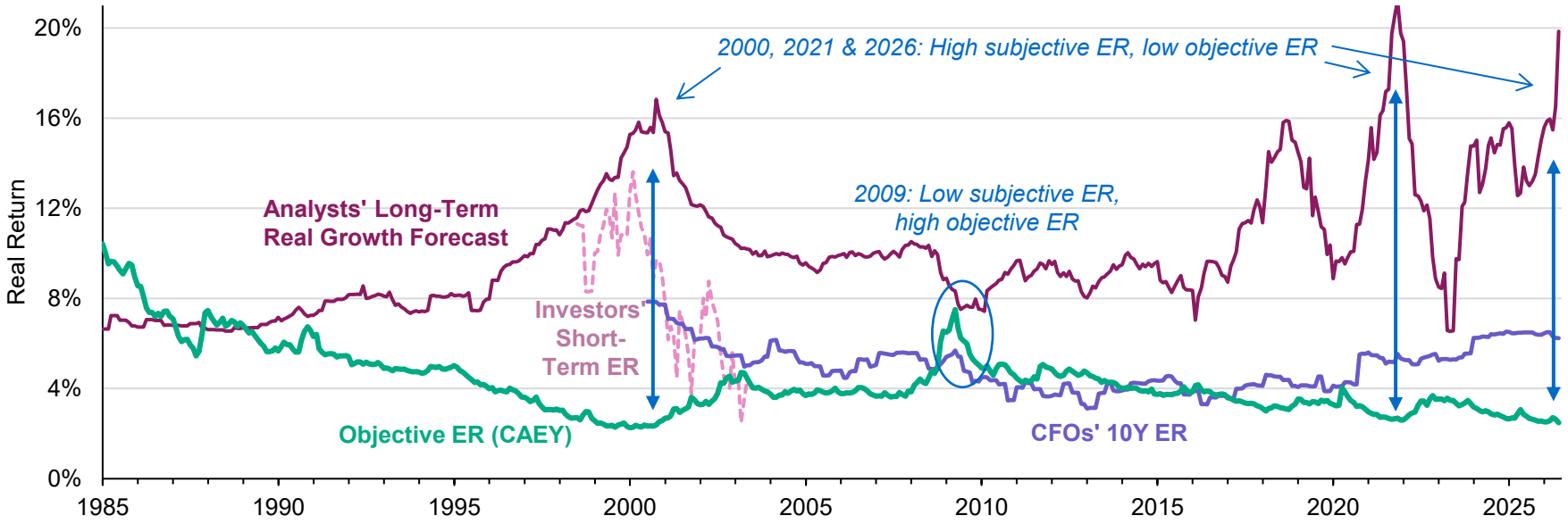
We can try to understand *why* this happens

"Expected return" to many investors

$$Price = \frac{Expected\ Future\ Cash\ Flows}{(1 + Required\ Discount\ Rate)}$$

"Expected return" to academics

Great and Not-So-Great Expectations: Subjective and Objective Real Return Expectations for the US Stock Market
January 1, 1985 - May 31, 2026



Sources: AQR, Blue Chip Economic Indicators, Consensus Economics, Credit Suisse, Graham-Harvey "The Equity Risk Premium in 2018" (2018), Hillenbrand-McCarthy "Heterogeneous Beliefs and Stock Market Fluctuations" (2022), IBES, Robert Shiller's website. Notes: Analysts' Long-Term Growth Forecast is the IBES consensus forecast of 3-5 -year growth in the earnings per share of US large-cap stocks. (As a return proxy it omits dividend income but compensates this with abundant growth optimism.) Investors' Short-Term Expected Return is the UBS Gallup individual investor survey consensus forecast of next-year expected market return from June 1998 to April 2003. (Individual investor surveys do not have long histories but the U.Michigan's consumer survey 2000-06 shows a similar expected return peak in 2000.) CFOs' 10-year Expected Return is the consensus forecast in the Graham-Harvey CFO survey conducted by the Duke University and Fed Richmond. All survey series subtract expected 10-year or 1-year inflation based on consensus forecasts. Objective real expected return proxy CAEY is the cyclically-adjusted (real) earnings yield (i.e. inverse of the cyclically-adjusted price/earnings ratio CAPE).

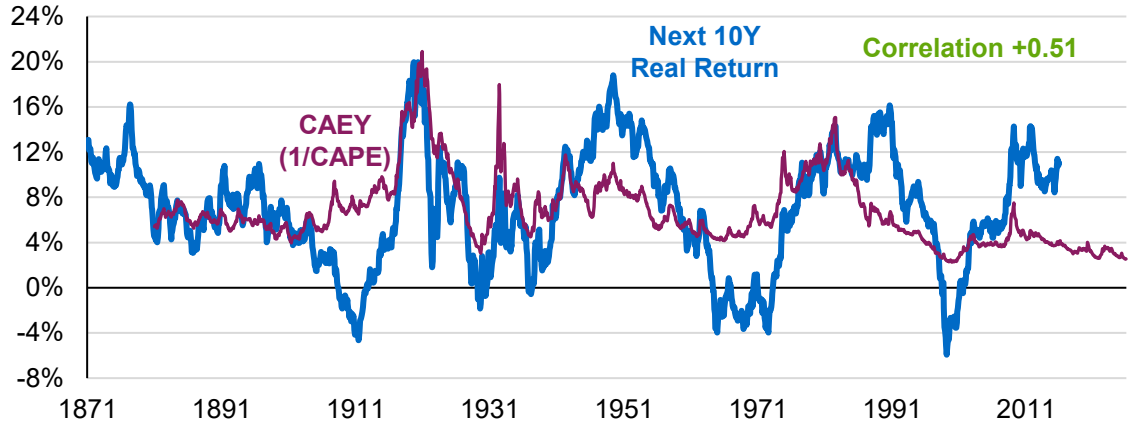
Visual Evidence on Market Return Predictions

Yield-based ERs are objectively better predictors than the rearview mirror

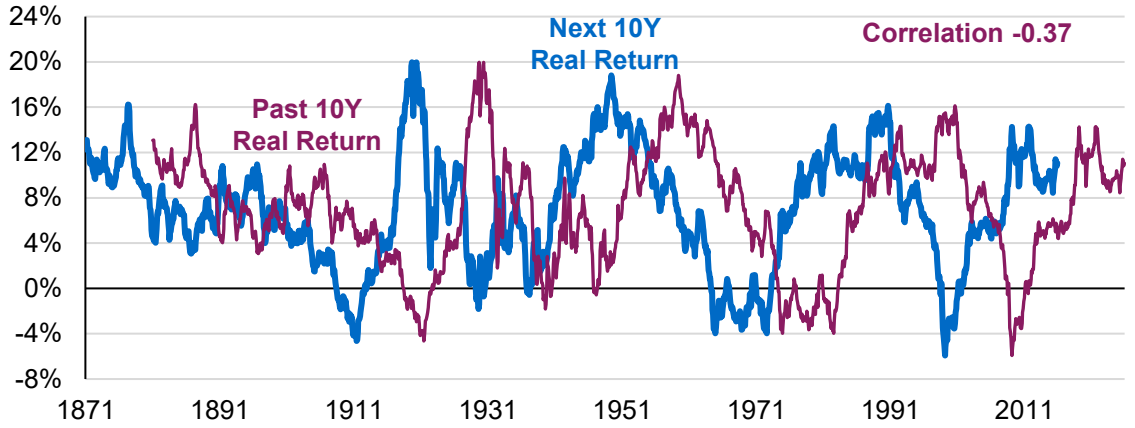
- We must use very long histories to evaluate 10-year return forecasts
- One decade or even a few can provide anecdotes but not statistics
- Yield-based CMAs performed poorly in the last decade, encouraging investors to favor the rearview mirror
- But long-run evidence is clear
- Key reason for poor predictive record of past-10Y returns is mean-reversion tendency in market valuation
- Deeper, underlying explanation may be equity investors' tendency to **overextrapolate past earnings growth**

Predicting Next-Decade US Stock Market Returns Jan 1, 1871 – Dec 31, 2025

A. Starting Yield (Inverse Valuation) Predicts Positively but Imperfectly

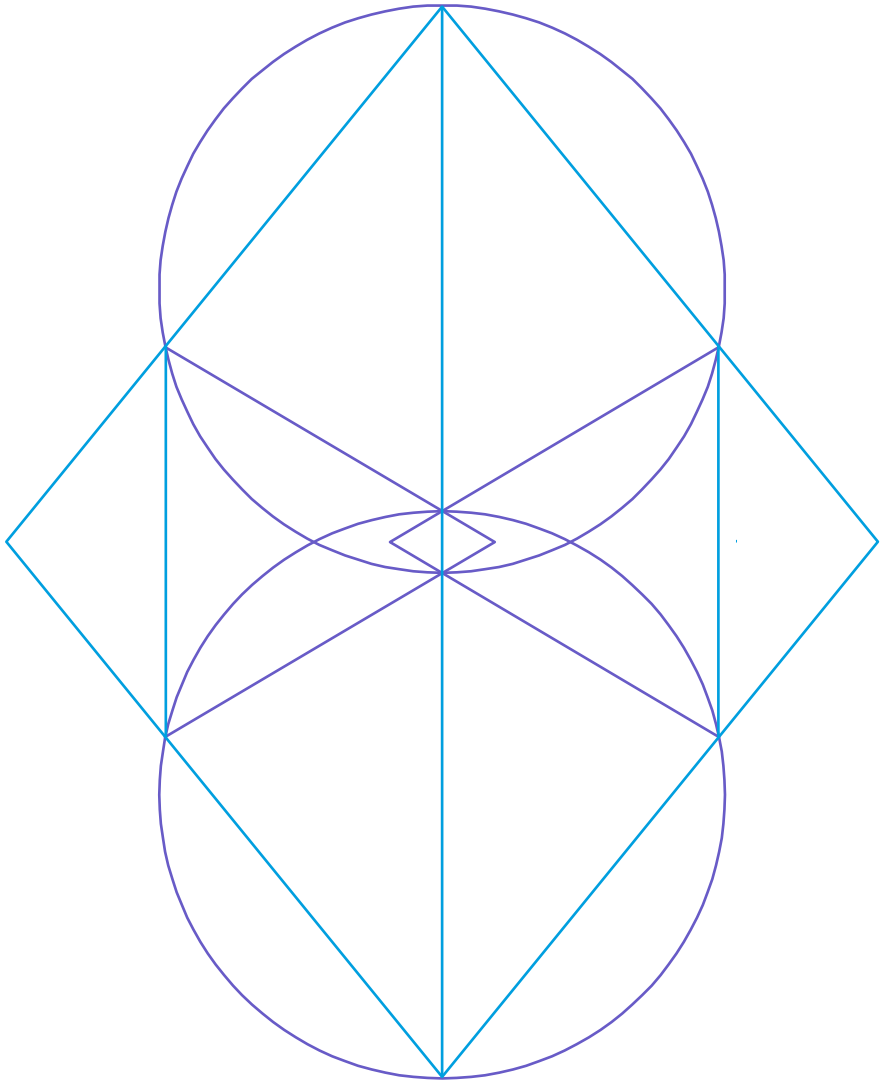


B. Rearview Mirror (Past 10Y Return) Predicts with Wrong Sign



Source: Robert Shiller's website and AQR. As of December 31, 2025. Notes: All series are for the S&P 500 Index. CAEY is the cyclically-adjusted earnings yield (i.e. inverse of the cyclically-adjusted price/earnings ratio CAPE). Forecast error for any point in time is the vertical gap between the two lines. Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

Exceptional Expectations: U.S. vs. Non-U.S. Equities

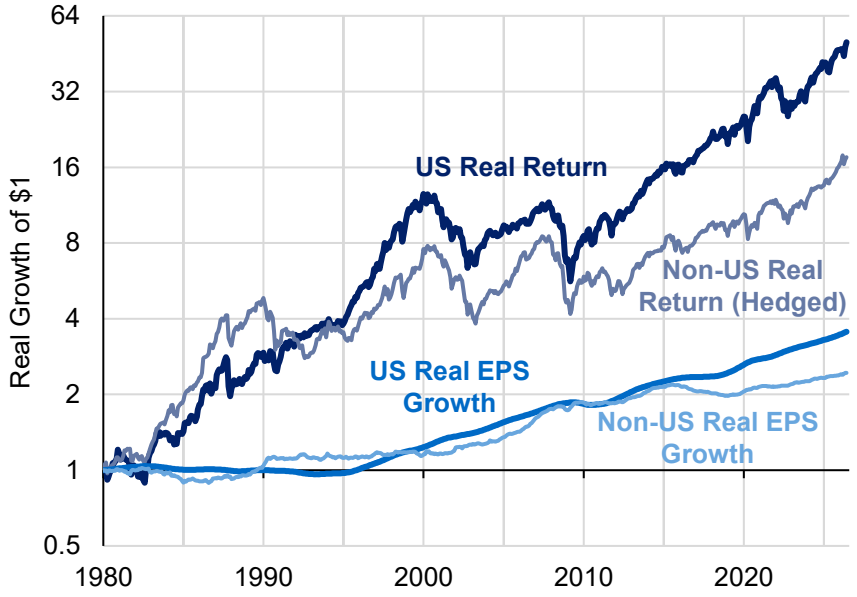


Historical Evidence on the US Return Edge

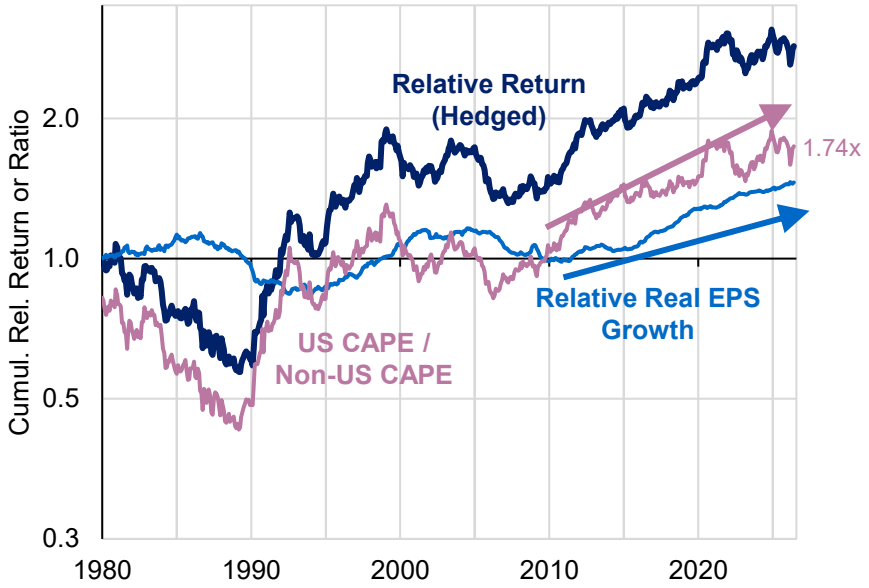
US vs. Non-US valuation nearly doubled from 2010 to 2024

U.S. vs Non-U.S. Real Equity Market Return and EPS Growth January 1, 1980 – May 31, 2026

Cumulative Return Comparison



Relative Return, Growth and Valuation



Scenarios that could bring valuations back to parity, from December 2024 peak:

- A 45% drop in the US market with Non-US flat (!)
- A positive-but-disappointing US growth edge of 1% p.a. combined with relative repricing of 5% p.a. over a 10-year period (5% repricing occurred from Jan 2025 to May 2026)

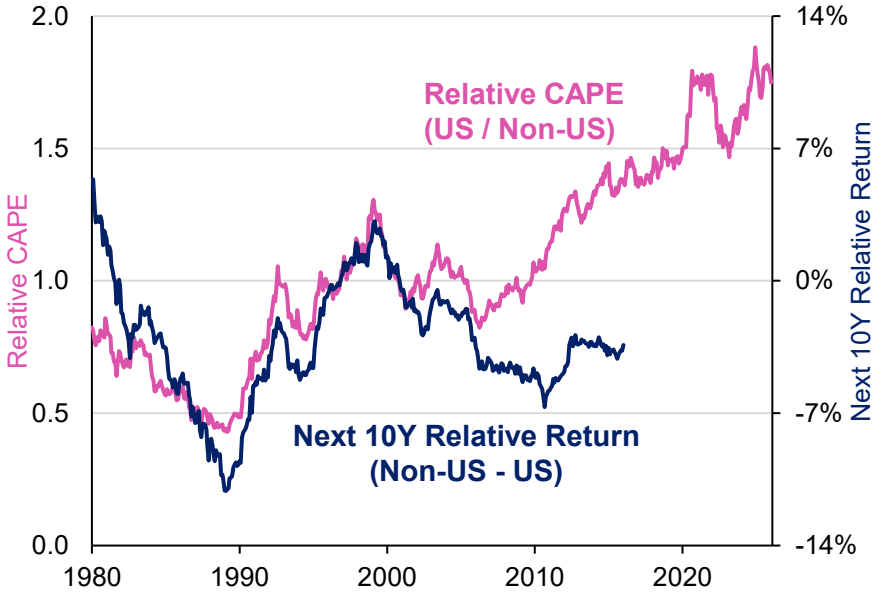
Source: AQR, Bloomberg, IBES. US and Non-US equities are represented by MSCI USA and MSCI World ex USA (hedged) indices, respectively. Non-U.S. EPS (earnings per share) and CAPE (cyclically-adjusted price-to-earnings) are estimated using the eight largest non-U.S. developed markets (Australia, Canada, France, Germany, Japan, Netherlands, Switzerland and UK). Real EPS (earnings per share) growth is 10-year smoothed to match the CAPE.

Expected Return Implications of US vs Non-US Valuation Gap

Yield-based estimates are a reasonable anchor, but not infallible

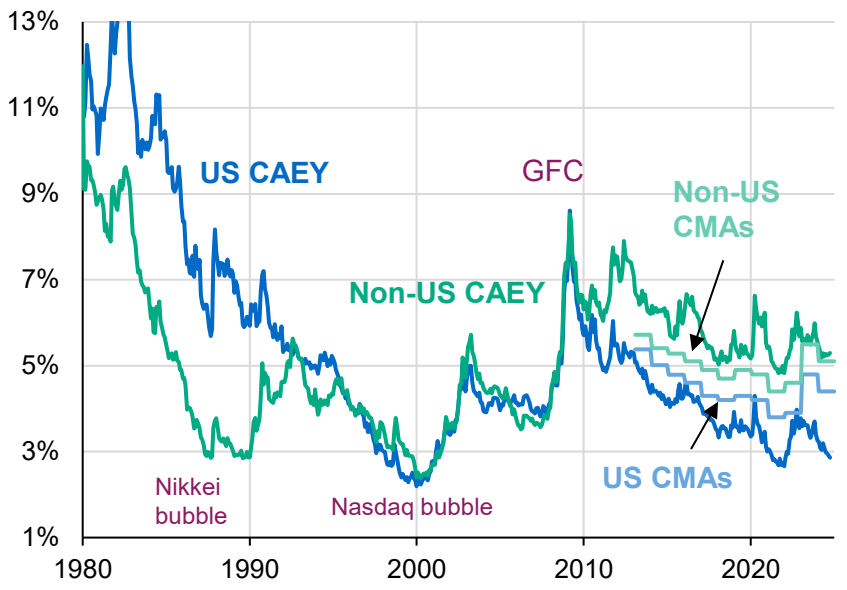
Relative Valuation and Next 10Y Relative Performance

January 1, 1980 – December 31, 2025



US and Non-US CAEY (1/CAPE) and Investor CMAs

January 1, 1980 – December 31, 2024

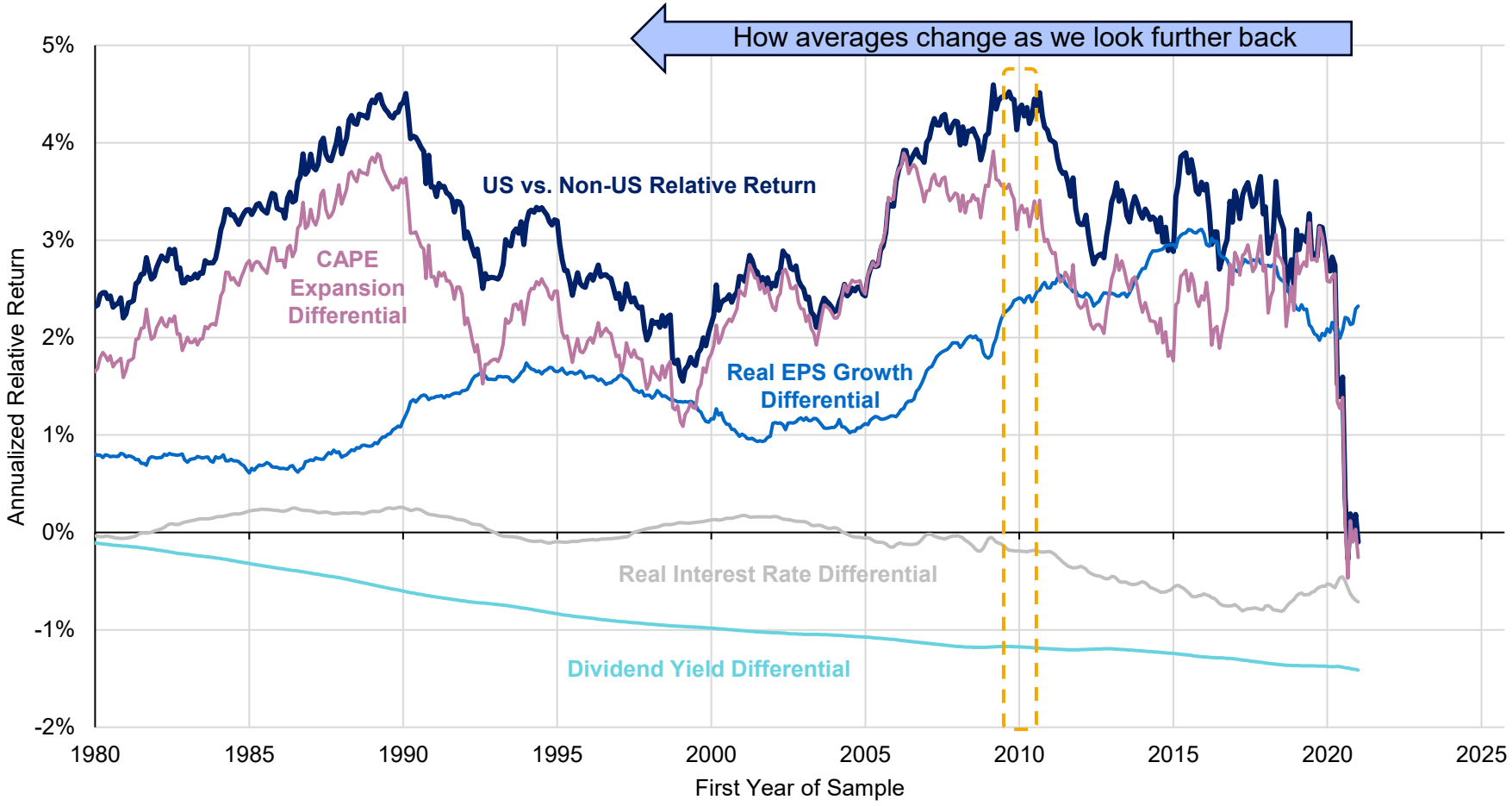


Source: AQR, Bloomberg, Horizon Actuarial, IBES. US and Non-US equities are represented by MSCI USA and MSCI World ex USA indices, respectively. Non-US CAPE and its inverse CAEY (cyclically-adjusted earnings yield) are estimated using the eight largest non-US developed markets (Australia, Canada, France, Germany, Japan, Netherlands, Switzerland and UK). CMAs (capital market assumptions) in right chart are real return estimates from the Horizon investor survey.

Decomposing U.S. vs. Rest-of-World Outperformance

Components of annualized relative return for different start-dates

MSCI Earnings-Based Annualized Return Decomposition Various Start Dates to December 31, 2025



Source: AQR, Bloomberg, IBES. US and Non-US equities are represented by MSCI USA and MSCI World ex USA (hedged) indices, respectively. Non-U.S. EPS (earnings per share) and CAPE (cyclically-adjusted price-to-earnings) are estimated using the eight largest non-U.S. developed markets (Australia, Canada, France, Germany, Japan, Netherlands, Switzerland and UK). Real EPS (earnings per share) growth is 10-year smoothed to match the CAPE. FX hedging cost is captured by interest rate differential (we use real IR to offset inflation in the real EPS component).

U.S. Equities vs. Rest of the World: Key Takeaways

Weighing the long-term evidence

US outperformance over the past 35 years reflects **relative richening** more than it reflects fundamentals

- US market valuation rose from roughly **half** non-US in 1990 to **double** non-US by end-2024
- Some investors underappreciate how much of US outperformance reflects repricing, which should not be extrapolated – especially when valuations are extreme

Equity investors tend to over-extrapolate past growth and past returns

- It may be fair to extrapolate some growth edge, say, 1% p.a
- But simple analysis suggests market expects >2% growth edge, even without any reversion in relative valuations*

A **rearview mirror mindset** may be most tempting just when it is most dangerous

Almost anything could happen in the near term, but over a multi-year horizon, even US bulls should consider whether

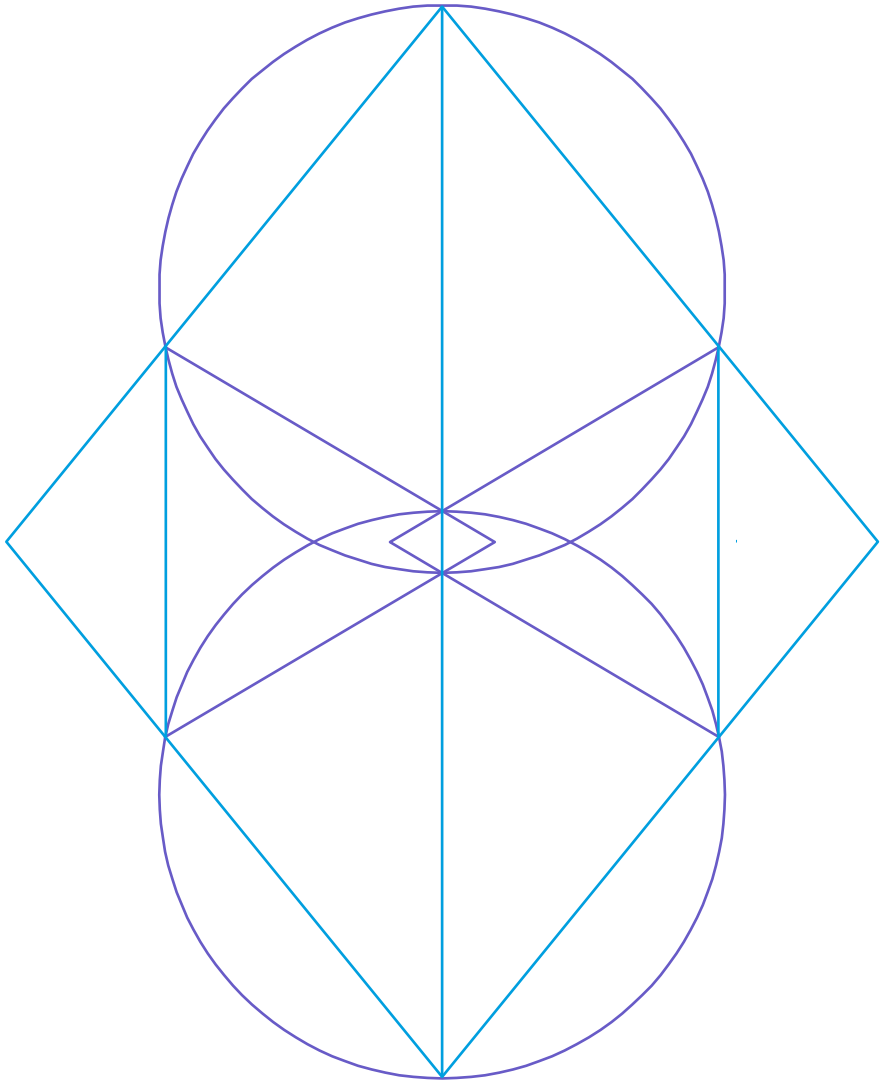
US overvaluation >> US exceptionalism



* Using AQR's capital market assumptions as of December 2025, we can calculate a required growth edge of 2.1% p.a. for US equities to earn the same return as Non-US equities hedged to USD over the following 10 years, with no change in valuations. For more details see AQR *Alternative Thinking* 2026 Issue 1, "Capital Market Assumptions for Major Asset Classes."

Source: AQR. Image source: https://thedailycoach.substack.com/p/looking-back-looking-ahead?s=r. For illustrative purpose only. The use of the logos and pictures is for informational purposes only and is not authorized by, sponsored by or associated with the trademark owners.

Why Are Bond Investors Contrarian While Equity Investors Extrapolate?



Contrarian Expectations Predominate in Bond Markets

Opposite tendency to the extrapolative expectations we see in equity markets

Inverted curves are typical after persistent rate rises

Steep curves after persistent rate falls

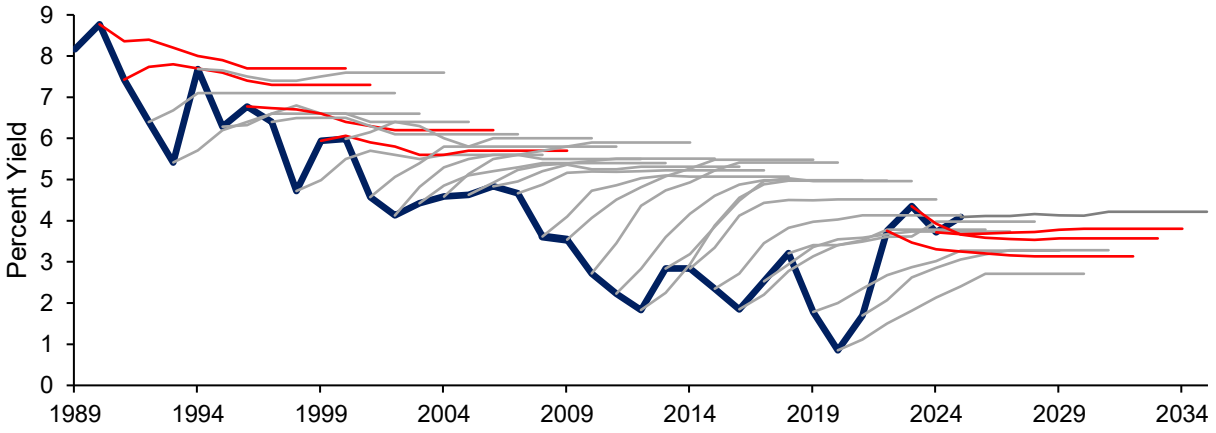
Slope tells us more about rate expectations than about term premia

Typical response to such charts is “When will they ever learn?”

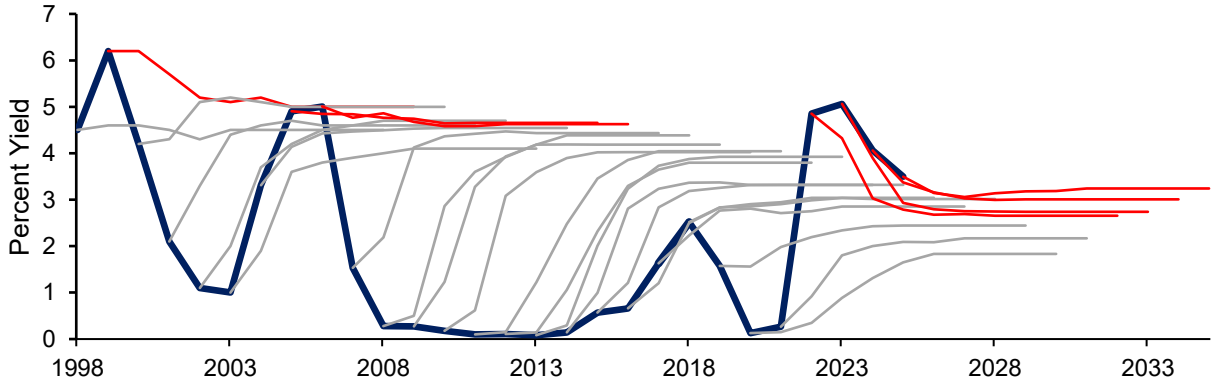
More sympathetic reading: mean-reverting expectations toward a mean that was shifting lower over time due to unforeseeable forces

By this reading, economists behaved rationally

Consensus Forecasts of 10Y Treasury Bond Yields, Oct 1, 1989 – Oct 31, 2025



Consensus Forecasts of 3M Treasury Bill Yields, Oct 1, 1998 – Oct 31, 2025



Sources: AQR, Consensus Economics. The exhibits show the spot yield in blue and forecasters’ expectations of the yield curve 10 years out in gray for 10-Year Treasury Bonds and 3-Month Treasury Bills for each year across time. Expectations of an inverted yield curve are highlighted in red.

Why Expect Reversal in Bonds and Continuation in Equities?

Salience is the key: investors focus on past bond yields, past equity returns

Academic research has emphasized the role of **information salience** in expectations formation

- Bonds are quoted in **yields** but equities in **prices**
- Many information sources reinforce focus on bond yields but on realized equity returns



Investors find today's interest rates abnormally high – expect a return to lower levels of 2010s

- Explains recent yield curve inversion and more generally curve shapes over time

But when it comes to equities, say, US vs non-US, few investors think about relative valuations

- Instead of predicting mean reversion after a strong 15Y, many expect US to continue to outperform

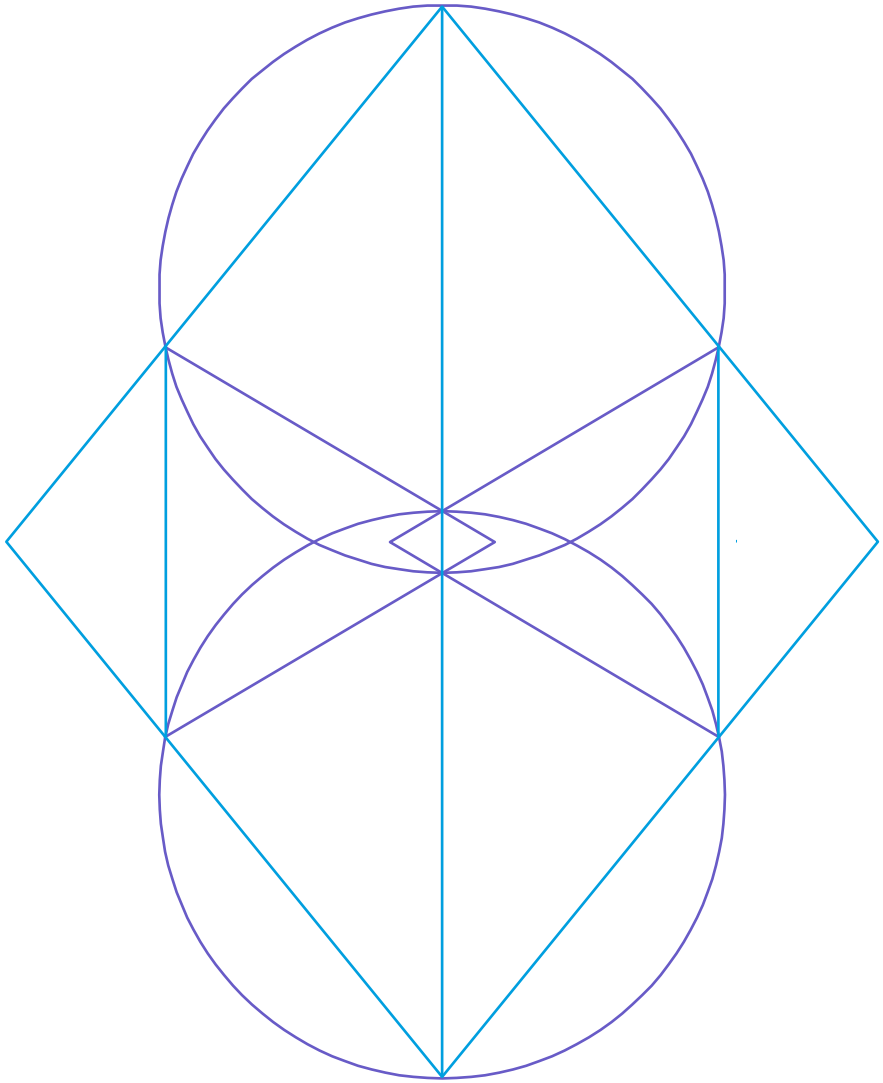
Yet historically, equity and bond markets have shown the **opposite patterns**

- US equity real returns have exhibited decadal reversals
- Bond returns have exhibited decadal continuation

Conclusion: salience appears to trump evidence

Sources: AQR. The use of the logos and pictures is for informational purposes only and is not authorized by, sponsored by or associated with the trademark owner.

How Did We Get Here? A (Very) Brief History of Expected Returns Formation



How Has CMA Expected Return Formation Evolved Over Time?

Preferred method shifted "right" in the 2000s to forward-looking approaches





Assume constant or time-varying expected returns?

Constant

Time-varying

Assume unbiased or biased sample?

Unbiased

Biased

Assume mean reversion in valuations?

No

Yes

Historical average return

Historical average return adjusted for valuation changes

Yield-based estimate: E(R) = DY + G

Yield plus mean reverting valuation: E(R) = DY + G + ΔV

AQR CMAs

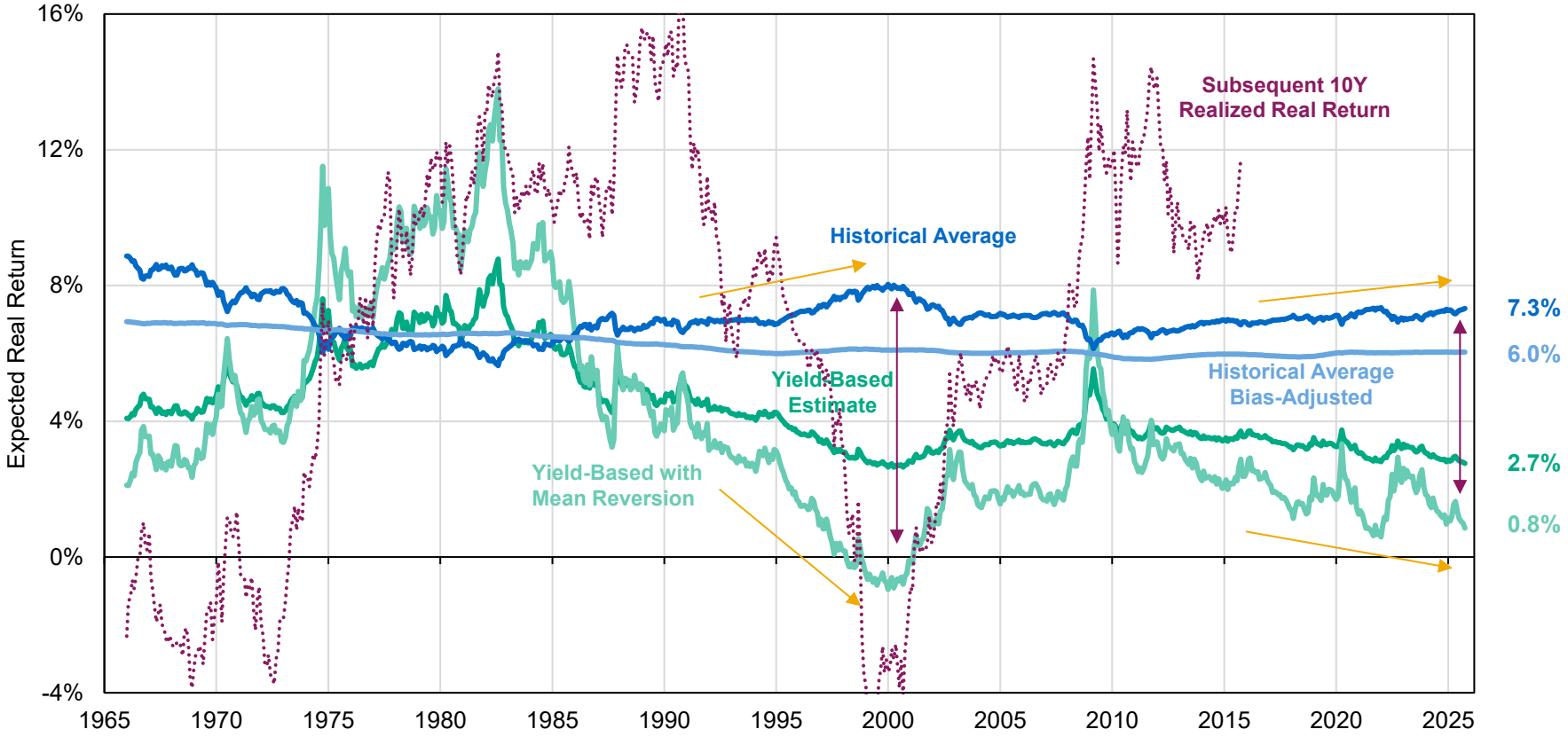
Source: AQR. CMAs refer to Capital Market Assumptions. For illustrative purposes only. The use of the logos and pictures is for informational purposes only and is not authorized by, sponsored by or associated with the trademark owners.

CMA Case Study: The U.S. Equity Market

Opposite reactions from 'rearview mirror' and yield approaches

Point-in-Time Expected Real Return Estimates for U.S. Equities

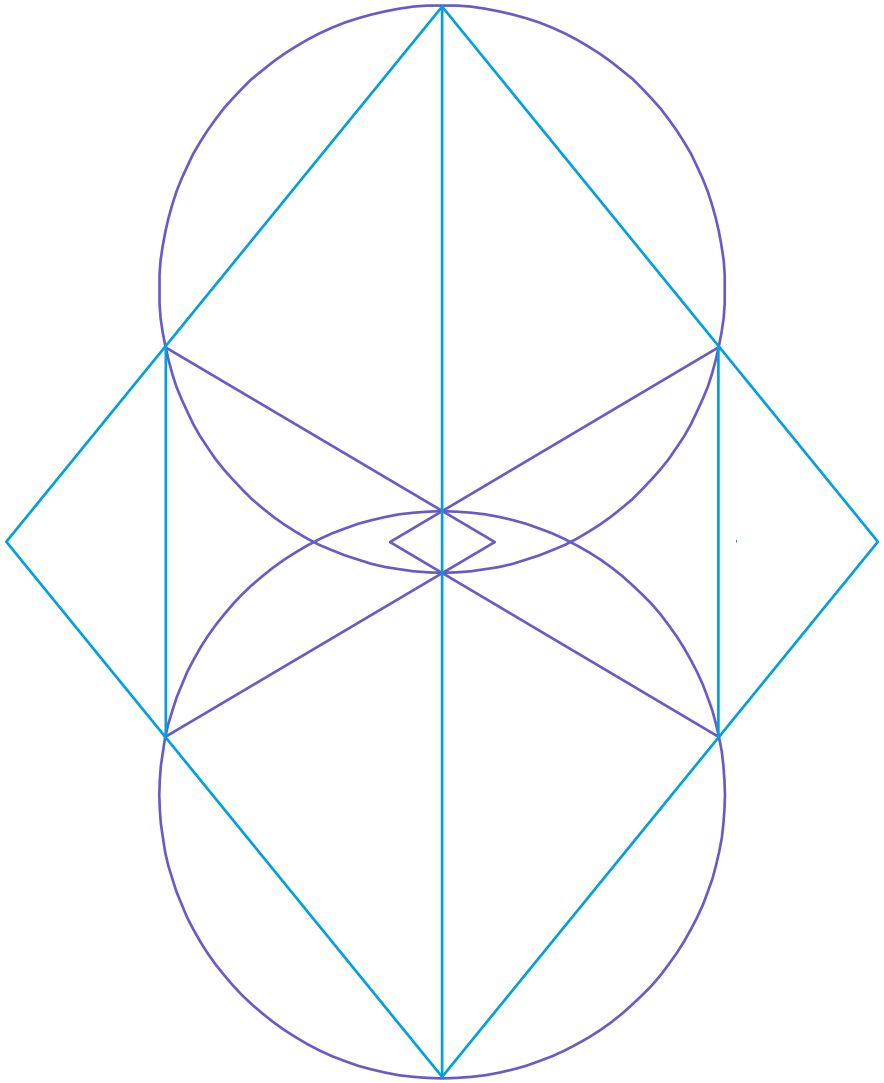
January 1, 1966 – December 31, 2025, based on expanding data since January 1926



Sources: Bloomberg, Robert Shiller's website, AQR. Notes: All series are based on S&P 500. Historical estimates based on expanding window since January 1926. Bias-adjusted estimate subtracts annualized change in CAPE ratio from the historical average. Yield-based estimate is average of CAEY*1.075*0.5 and DY, plus 1.5% real EPS growth. Yield-based with mean reversion assumes CAPE moves halfway to rolling 40-year mean over next 10 years.

Equity Market Focus

- Historical Trends
- Objective Expected Returns
- Subjective Expected Returns



The Historical Record: Return Decomposition Is Revealing

Sources of recent strong market returns point to lower future returns

Long-run average return is best expected returns estimate if we assume constant expected returns

But how far back should we look? 10Y 10%, 25Y 5%, 100Y 7%? "More data is better" vs. "world has changed"

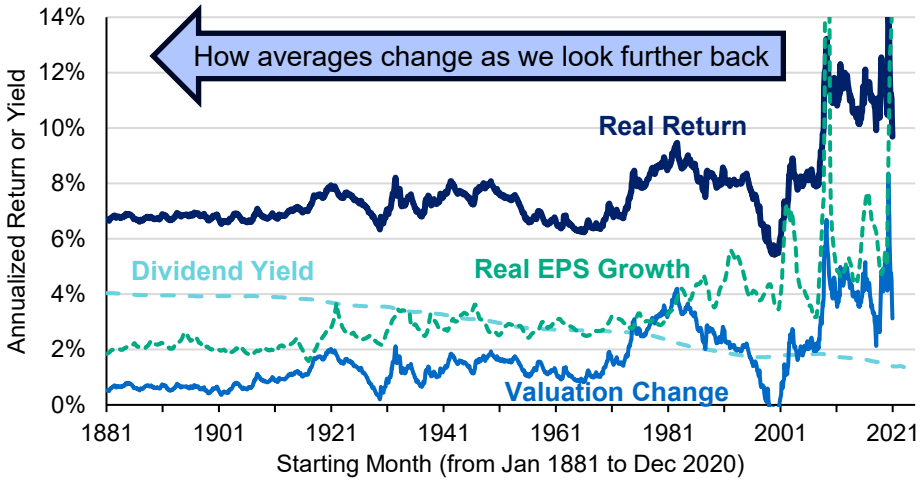
Most common ("DDM") decomposition involves three parts – yield, growth, and valuation change

Short windows starting after 2008 show high realized returns, but from the least repeatable sources

- Valuations rising to near-record highs and real compound growth exceeding the 2% anchor
- Smolyansky (2023) tells why the 4% growth in recent decades cannot be extrapolated
- Low starting yield suggests that we should expect *less* than long-run average return instead of *more*

S&P 500 Real Return Decomposition: Backward-Expanding Averages ***("Pick your window!")*** Jan 1881 - Dec 2025

Samples ending Dec-2025	Real Return	Avg. D/P	Real EPS Growth	Valuation Change
1881 – 2025	**6.7%**	4.1%	1.9%	0.5%
1926 – 2025	**7.3%**	3.6%	2.2%	1.3%
1982 – 2025	**9.5%**	2.2%	2.7%	4.2%
2016 – 2025	**11.1%**	1.6%	4.8%	4.2%
Subperiods				
1800 – 1899	***5.9%***	*5.7%*	*ca. -0.5%*	*0.7%*
1900 – 1949	***5.3%***	*5.4%*	*1.0%*	*-1.1%*
1950 – 1999	***9.1%***	*3.7%*	*2.1%*	*2.9%*
2000 – 2025	***5.4%***	*1.6%*	*4.0%*	*-0.4%*



Sources: Robert Shiller's website. As of December 31, 2025. Everything calculated using only data from Robert Shiller's online sheet, so readers can try to reproduce these numbers. Exception: the 1800s row, from McQuarrie (2021, 2023). Notes: Decomposition is close but not precise (should be multiplying rather than summing the three components). With yield income (D/P) it is debatable whether to use average or starting value; over long horizons reinvestments make the average more relevant, so we use it. Our growth variable is the rarely-used growth in smoothed 10y average real earnings; this choice makes decomposition consistent with our use of Shiller CAPE (P/E10) as the valuation metric. All series but average D/P are converted to annualized returns by putting the cumulative horizon return to the power (1/horizon length in years). Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

Objective ERs Can (Noisily) Predict Long-Run Returns

Being a humble contrarian may be the best we can do over 10-year horizons

Yield-based estimates point to just 3-4% real return (less if we assume mean-reverting valuations)

Higher return expectations require optimistic growth assumptions – say, an AI-driven boom

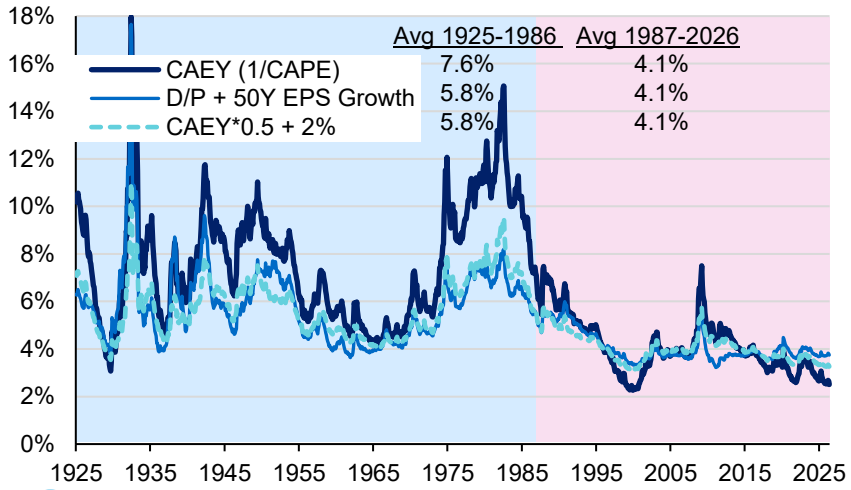
Equity yields like CAEY (1/CAPE) have decent long-run record in predicting 10Y returns

But…

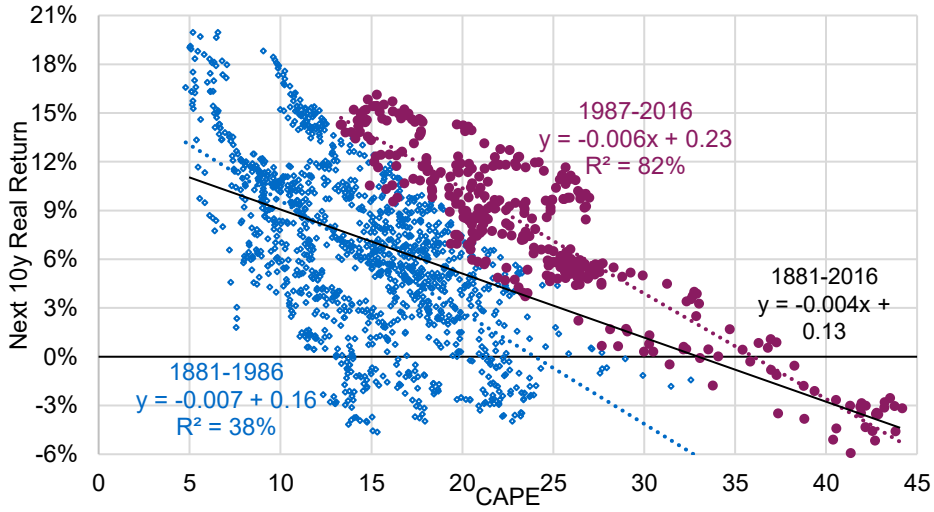
- Structural shift lower in 1980s-90s was poison for contrarians: expected mean reversion never came
- Focusing on post-1980s data overstates the accuracy of valuation-based forecasts
- Statistical evidence is questionable due to small number of 10-year observations

Still, forward-looking metrics like CAEY beat other approaches, and may be the best we have

Expected Real Return Proxies for US Equities, 1924 - 2026



CAPE vs Next-10Y Real Return, Jan 1881 - May 2026



Source: Robert Shiller's website. As of June 30, 2026. Notes: All series are for the S&P500. CAEY is the cyclically-adjusted earnings yield (i.e. inverse of the cyclically-adjusted price/earnings ratio CAPE using real price over 10-year average real earnings). D/P is the dividend yield. G is the 50-year average of 10-year real earnings per share growth. Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

Subjective ERs: Abnormal Growth Is Hard to Predict

Equity analysts try, but tend to be overoptimistic and over-extrapolative

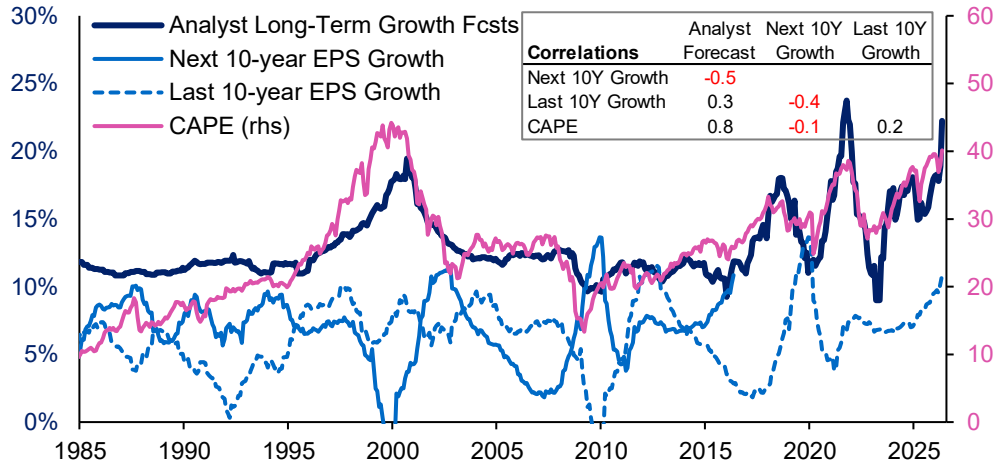
Forward-looking long-term EPS growth estimates by analysts seem ideal G inputs for CMAs. Why not?

- Overoptimism distorts (latest 22% LTG >> long-run realized 7% G) … except for the shortest forecasts
- Worse, over-extrapolation makes them objectively contrarian indicators
- Exuberant growth optimism in good times partly explains peak CAPE valuations in 2000, 2021, 2026(?)
- Extra optimism for mega-cap tech stars shows up in mean vs. median LTG (1999-01, 2017-21, 2024-26)

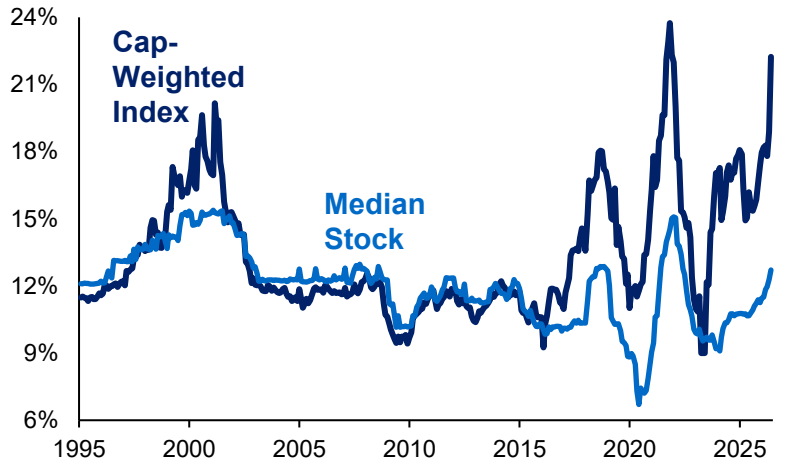
Similar patterns are observed in the cross-section, across countries, sectors and single stocks

- Analysts assume too persistent growth edge for recent stars and eventually get disappointed

Earnings Growth of US Large-Cap Stocks: Past and Future Realized Growth, Analyst Forecast, and Market Valuation Dec 1984 – May 2026

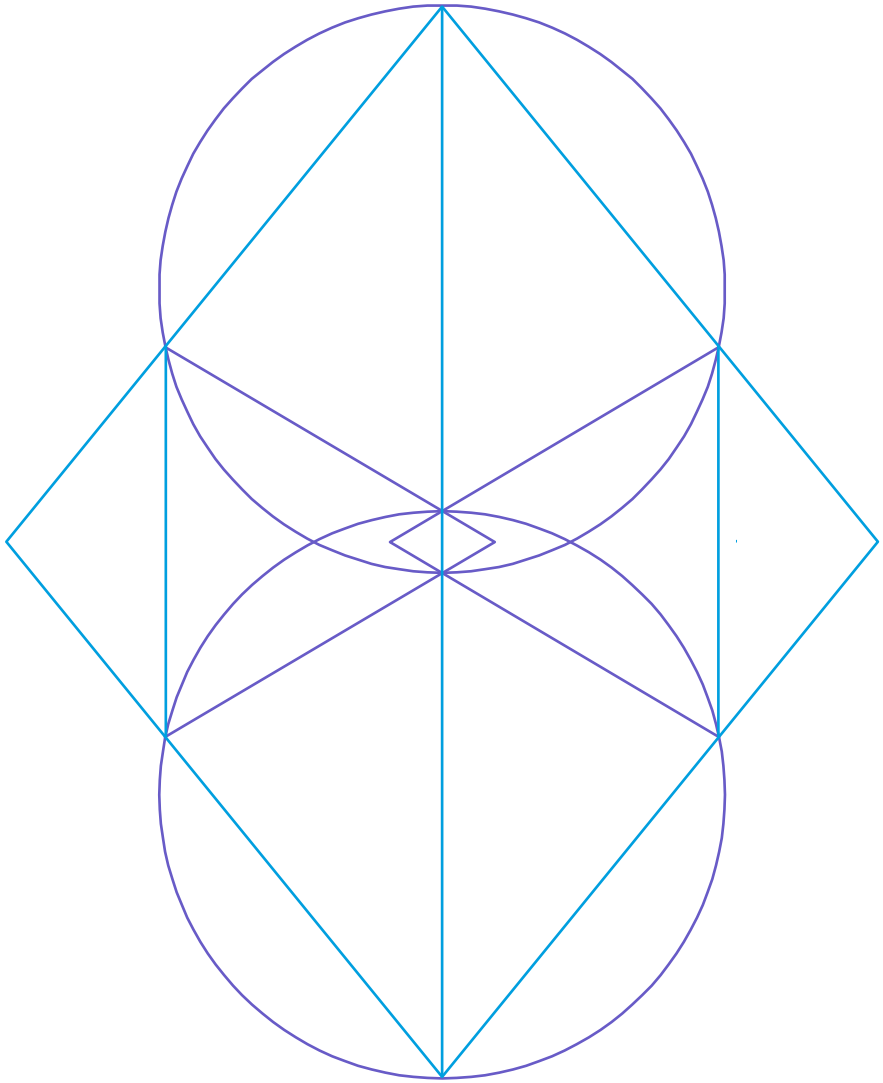


Analysts' Long-Term Growth Forecast for US Cap-Weighted Stocks and Median Stock Jan 1995 – May 2026



Sources: AQR, Bloomberg, Credit Suisse, IBES, Robert Shiller's website. As of May 31, 2026. CMAs are capital market assumptions. Analysts' 3-5 -year "long-term growth" forecast is compiled by IBES for stocks in the S&P500 universe until 2009, thereafter for stocks in the Russell 1000 universe. CAPE is the Shiller cyclically-adjusted price/earnings ratio for the S&P500. EPS is earnings per share. Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

Bond Market Focus



Survey Data Helps Us Understand Treasury Yield Moves

Possible de-anchoring of inflation expectations remains a central risk

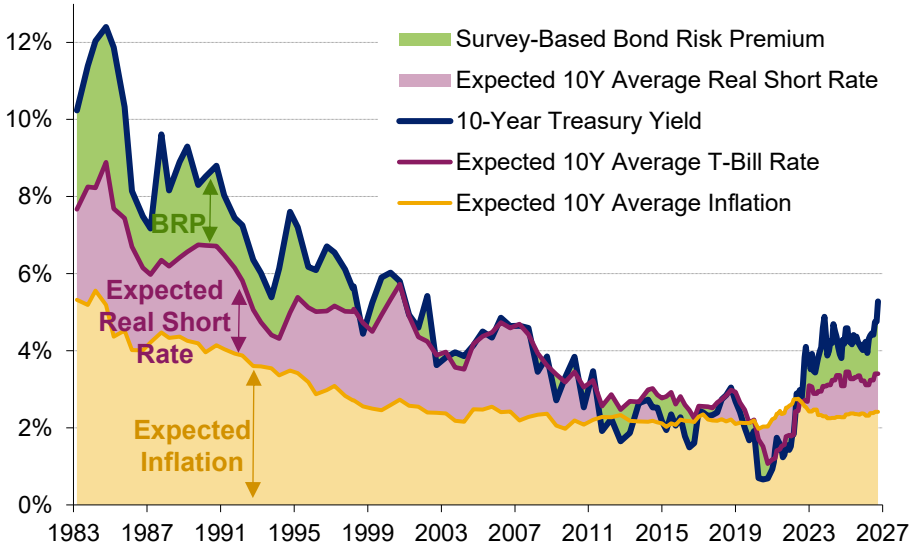
All three components of Treasury yield contributed to the 40-year decline and the rise since 2021 lows

Real policy rate expectations and **required bond risk premia** rose from negative to positive in 2022-3

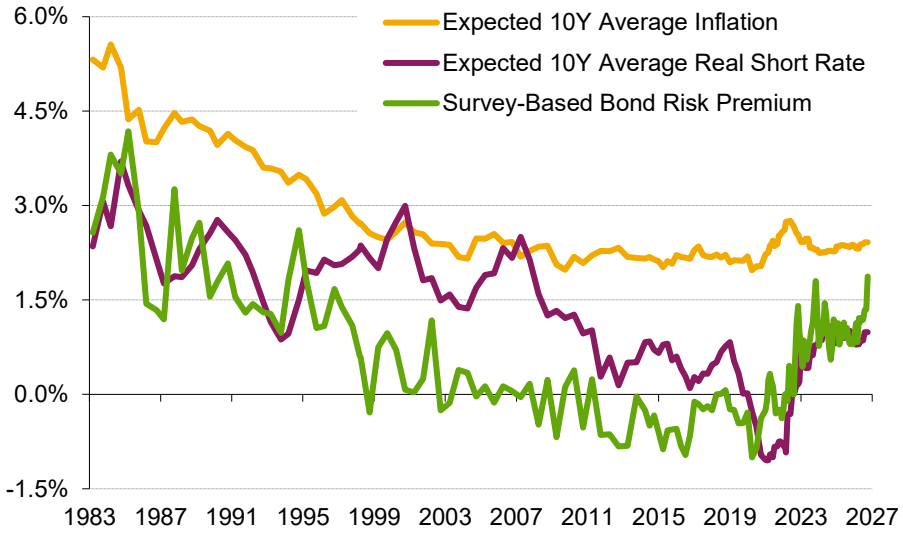
Inflation expectations remained well-anchored in 2022-23; risk of de-anchoring remains:

- Potential "triple-whammy" impact on yields: direct expectations channel, inflation risk premium back, safe-haven premium gone
- Risk is now greater than in decades, given fiscal pressures and threats to Fed credibility

Decomposing the 10Y Treasury Yield Using Survey Data
March 1, 1983 – September 30, 2026



The Three Components of the 10Y Treasury Yield
March 1, 1983 – September 30, 2026



Sources: Bloomberg, Blue Chip Economic Indicators, Consensus Economics. See Best-Byrne-Ilmanen (1998): What Really Happened To US Bond Yields?, *Financial Analysts Journal*.

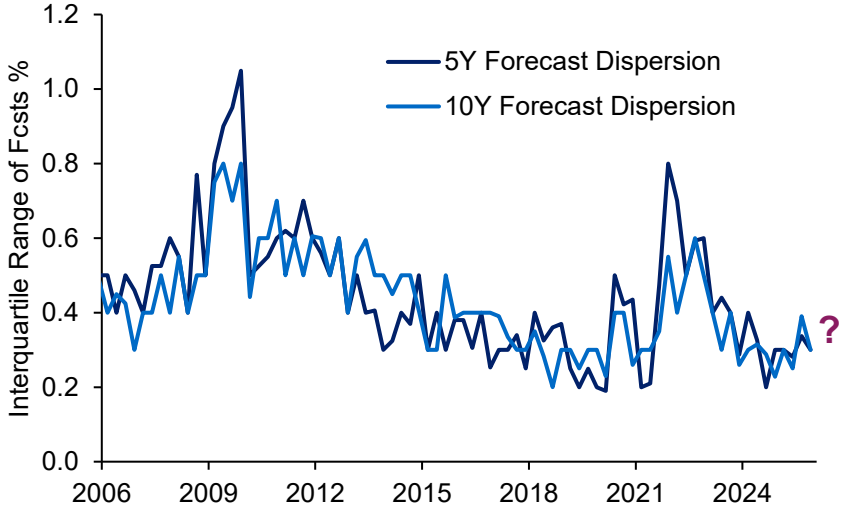
Survey Data Paints Mixed Picture of Inflation Uncertainty

Elevated inflation risks not fully apparent in survey data

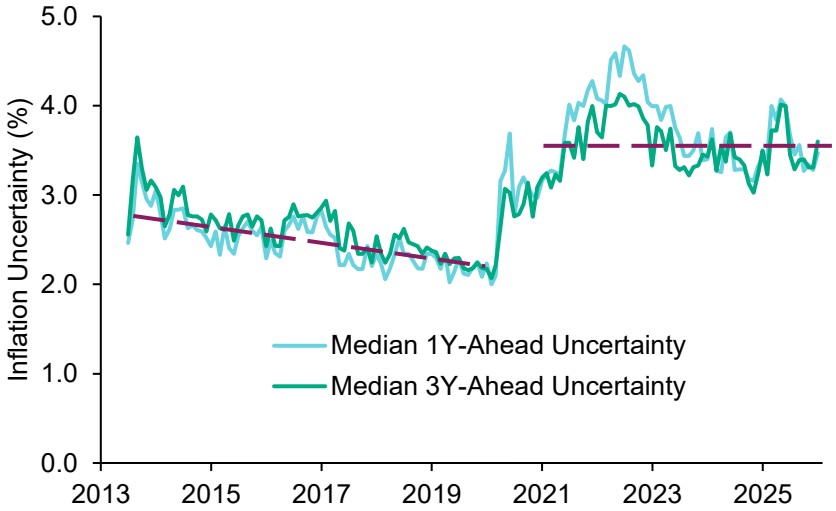
Economists' forecasts became dispersed in 2022…
but returned to close agreement by 2024…
seeing only a small up-tick in 2025

In contrast, consumer uncertainty has remained elevated in the years following the 2022 inflation shock

Dispersion in Economists' Forecasts of Long-Term Inflation
Jan 2006 – Dec 2025



Consumer Inflation Uncertainty
Jun 2013 – Dec 2025

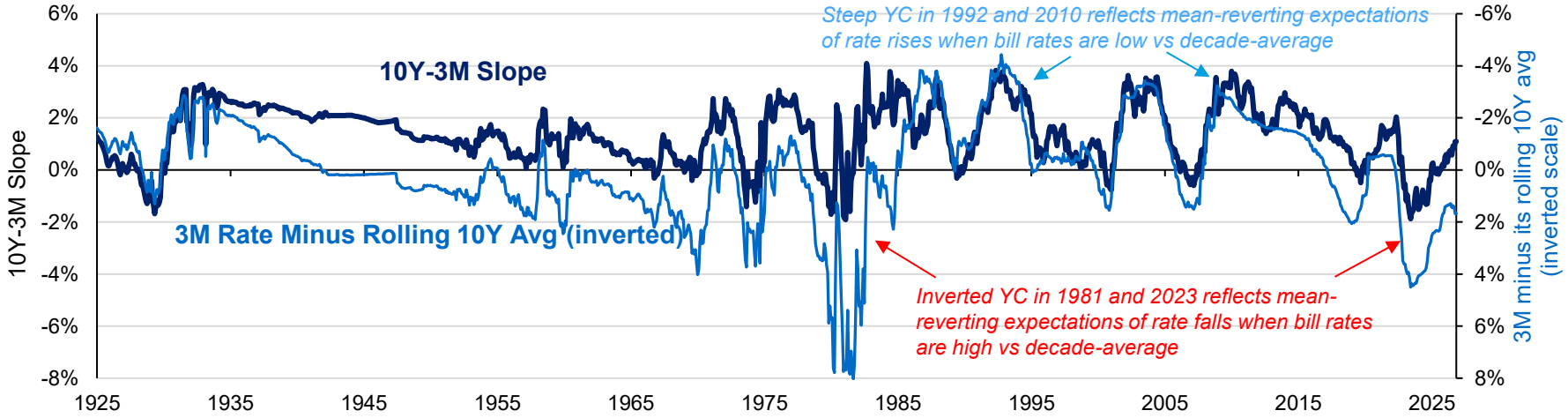


Sources: Federal Reserve Banks of Philadelphia and New York. Left chart shows dispersion among participants in the Survey of Professional Forecasters. Right chart shows an estimated interquartile range based on probabilities assigned by participants to different inflation outcomes, from the Survey of Consumer Expectations.

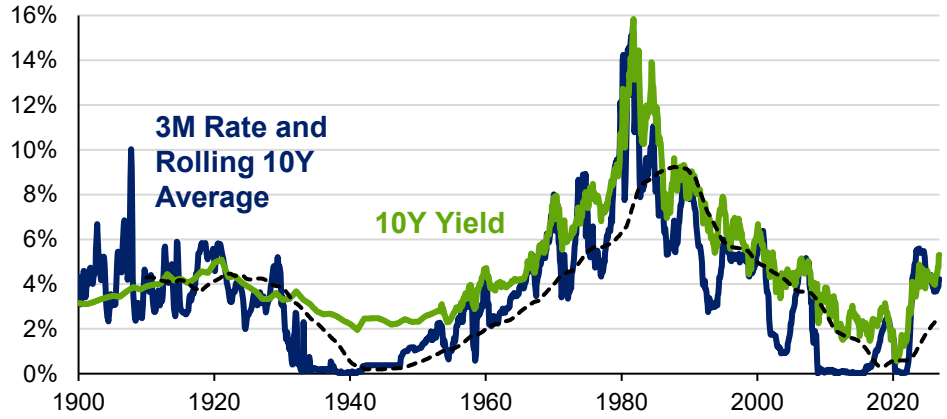
Mean-Reverting Rate Expectations Drive the Yield Curve Slope

...even if those mean-reverting expectations turned out wrong for decades

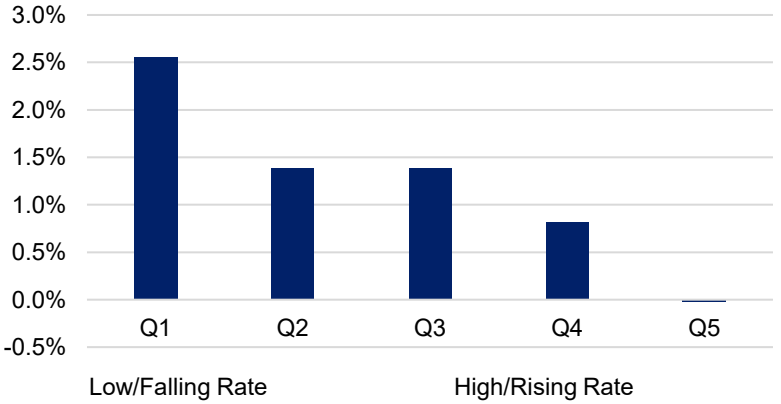
US YC Slope vs. 3M Deviation from 10Y Rolling Average, Jan 1925 – Sep 2026



US 3M Rate and 10Y Yield Jan 1900 – Sep 2026

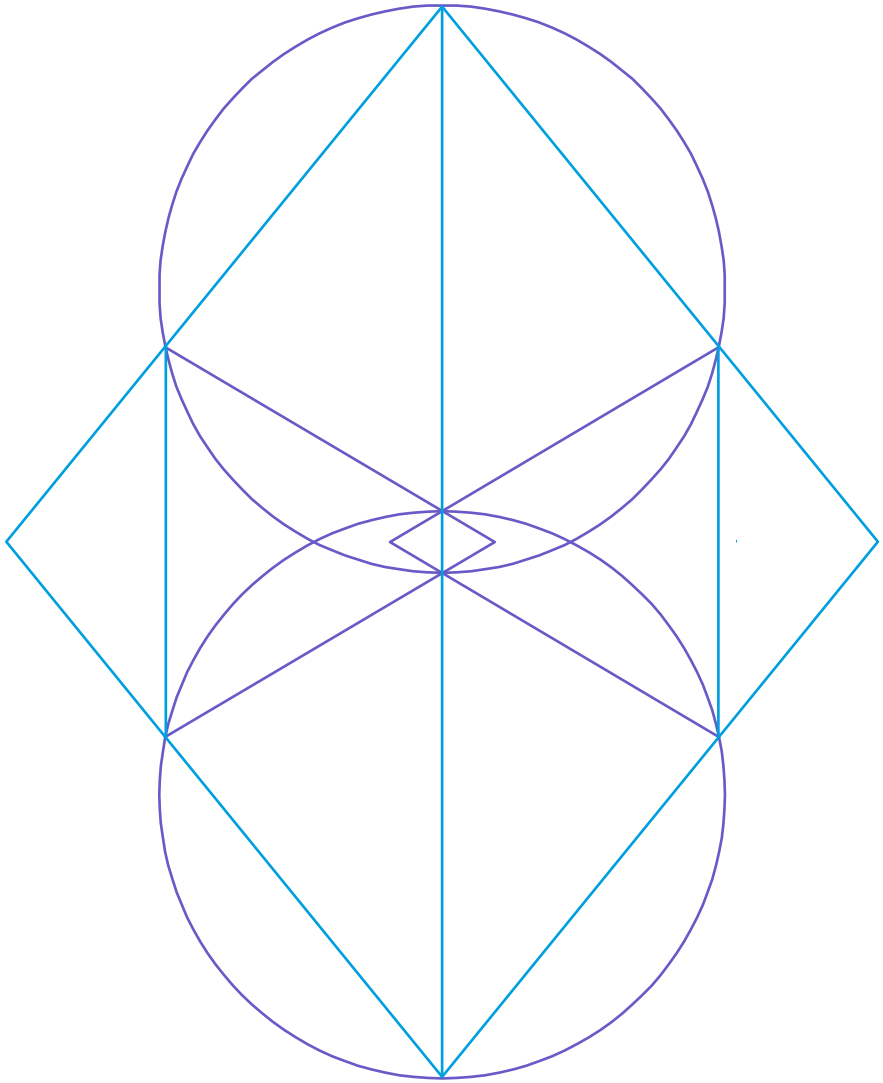


Average YC Slope for Quintiles of Demeaned 3M Rates
Jan 1910 – Sep 2026



Sources: AQR, FRED database (St Louis Fed), Farmer-Nakamura-Steinsson "Learning About the Long Run" (2024), and Ilmanen "Investing Amid Low Expected Returns" (2022).
Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

What About Liquid Alternatives?



Demand for True Diversifiers Varies with the Rearview Mirror

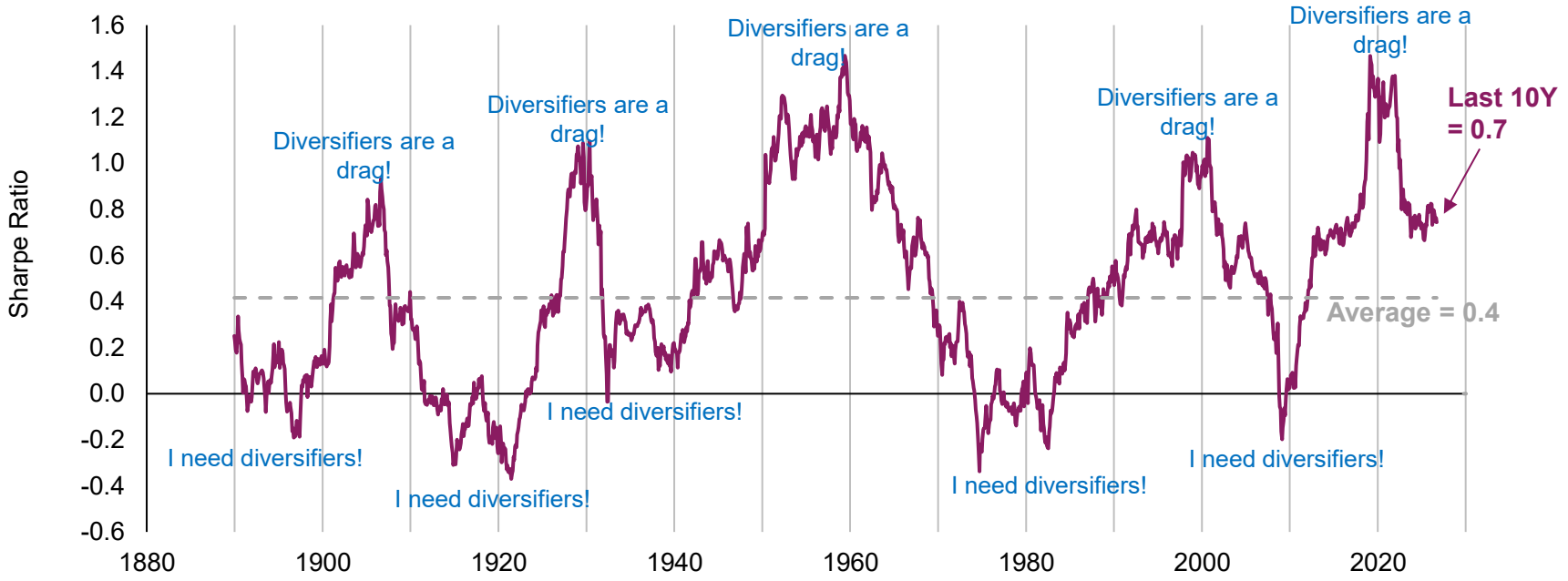
Now may well be a great time to embrace diversification

The 2010s decade was exceptionally good for core portfolios (dominated by US stocks)

Many diversifiers did not meet this high bar and were inevitably shunned by investors

Some evidence suggests that market premia and long/short diversifier returns "take their (decadal) turns"

Rolling 10-Year Performance of U.S. 60/40 Portfolio January 1, 1880 – September 30, 2026

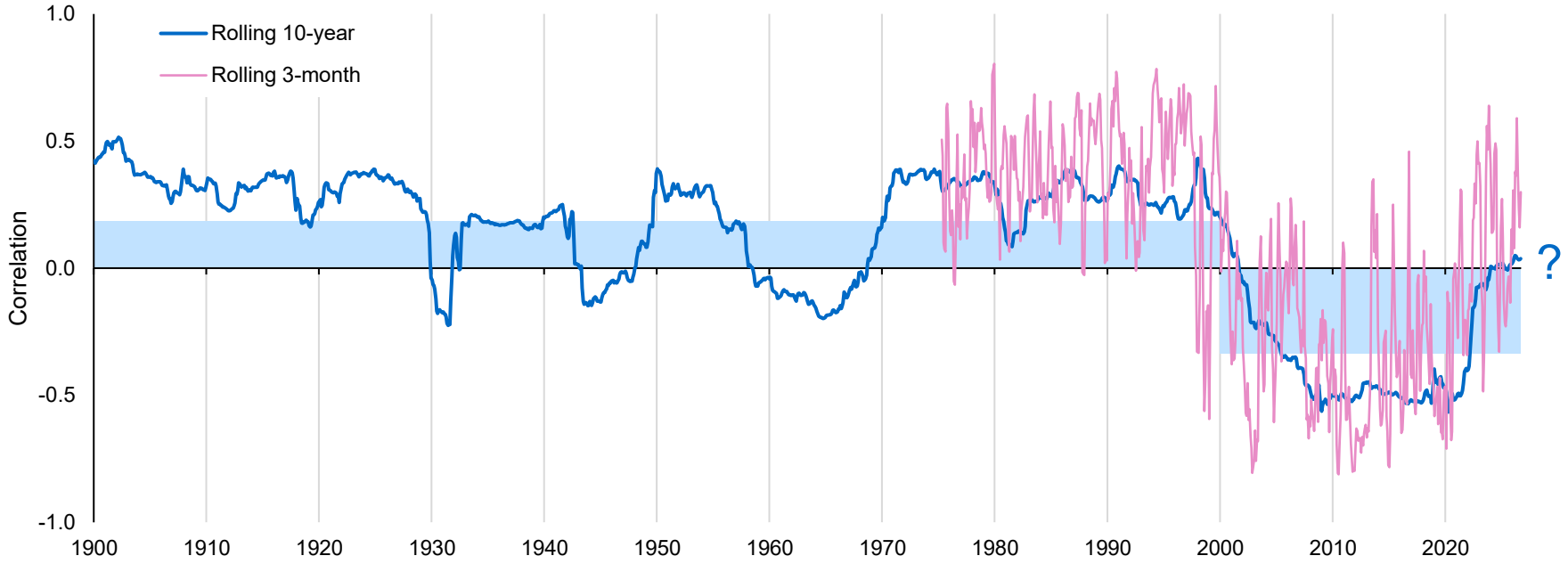


Sources: AQR, Global Financial Data. Notes: U.S. 60/40 portfolio is 60% U.S. large cap equities, 40% U.S. Treasuries, with monthly rebalancing and monthly data. GFC refers to Great Financial Crisis. Risk-free rate is U.S. 3-month T-Bill. Gross of fees and costs. Diversification does not eliminate the risk of experiencing investment losses. Please read important disclosures in the disclosures section. Past performance is not a guarantee of future performance.

End of the Benign Era?

Negative stock/bond correlation threatened by inflation uncertainty

Rolling Correlation Between U.S. Equity and U.S. Treasury Returns
January 1, 1900 – September 30, 2026



Negative correlation from 2000 to 2020 was a consequence of low inflation risk (compared to growth risk)

Shift to sustained positive correlation IF we get longer-term inflation uncertainty and/or further supply-driven inflation shocks and/or monetary policy errors. This scenario remains a tail risk for investors.

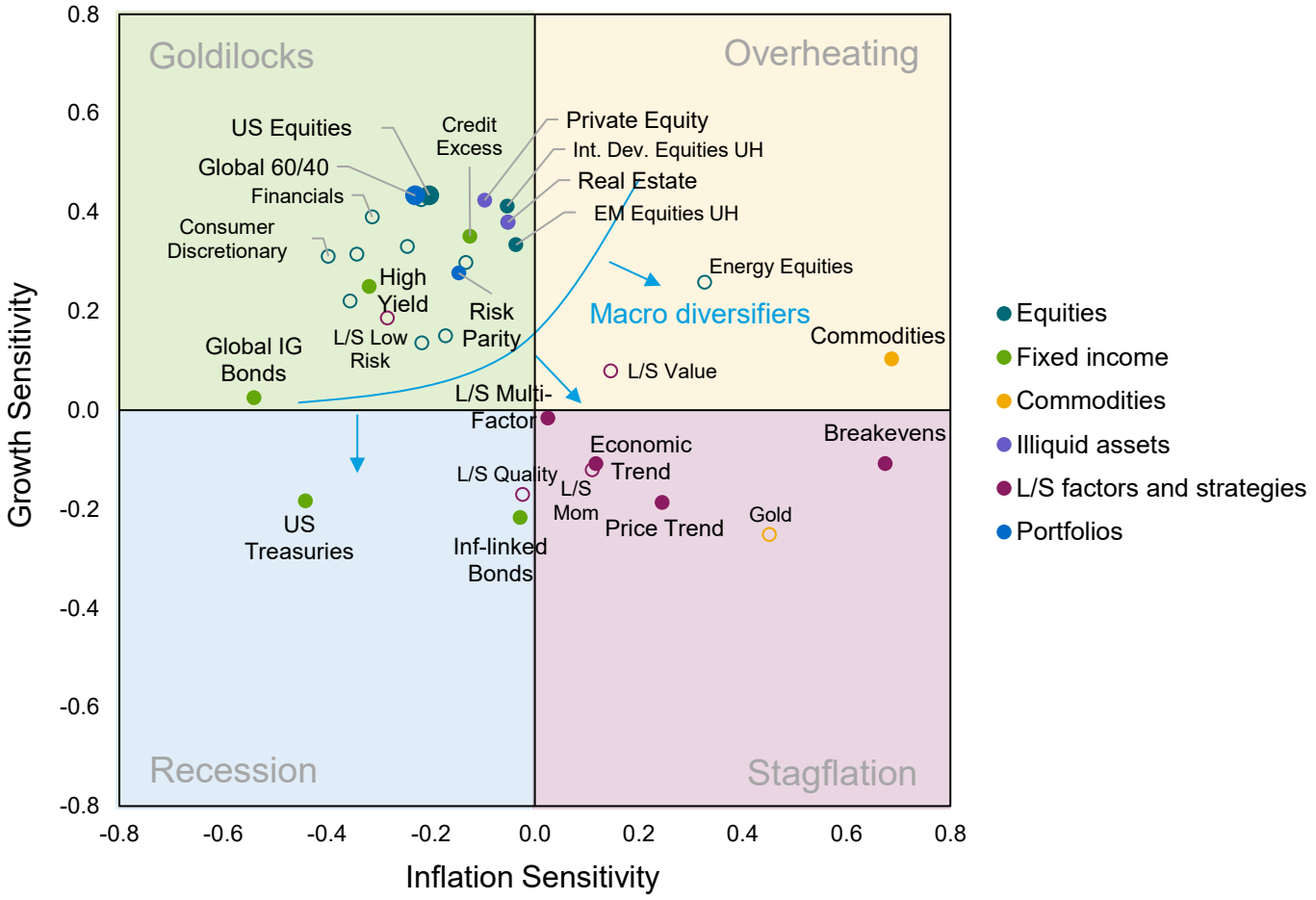
Source: Global Financial Data, Bloomberg and AQR. Rolling 10-year series based on overlapping 3-month returns at monthly frequency. Rolling 250-day series based on overlapping 3-day returns at daily frequency. Shading shows average correlations in 20th and 21st Centuries. For illustrative purposes only.

Hope (That We Stay in the Goldilocks Quadrant) Is Not a Strategy

Most portfolios imply a bet on falling inflation and positive growth

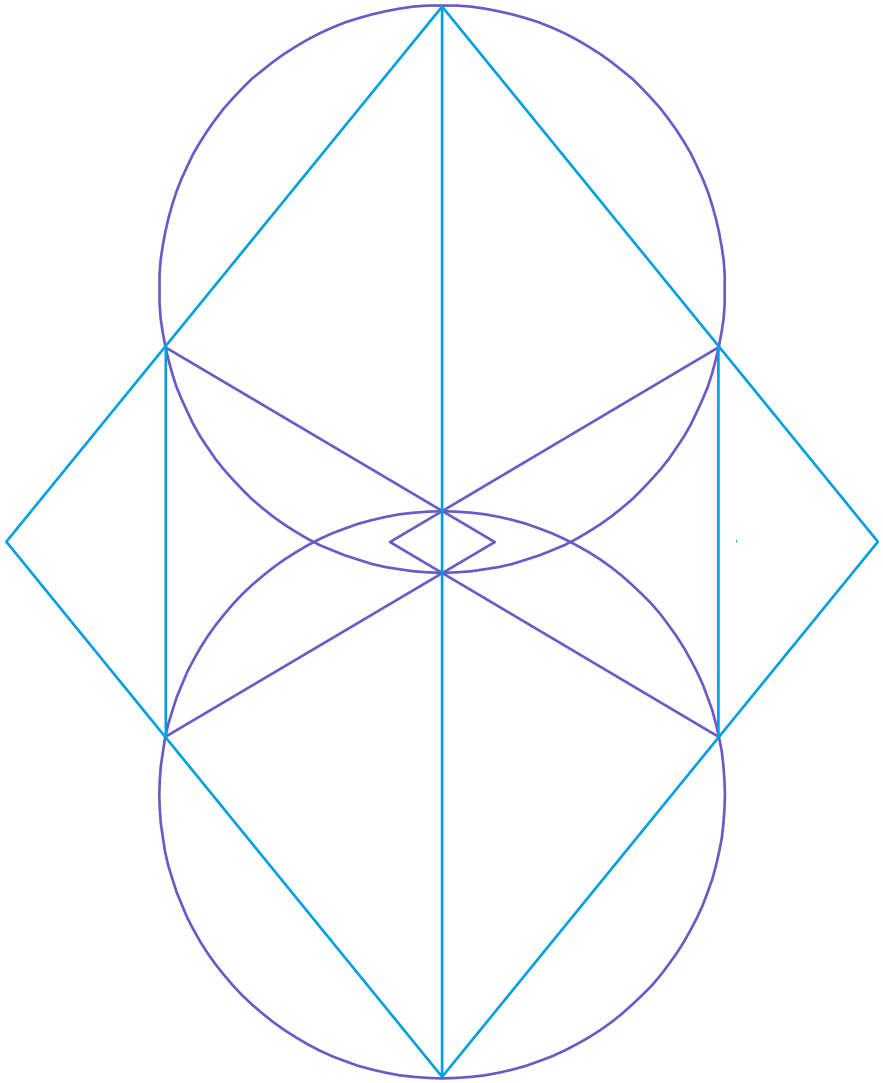
Growth and Inflation Sensitivities of Assets and Hypothetical Strategies

January 1, 1972 – June 30, 2026



Source: AQR, Bloomberg, Survey of Professional Forecasters, U.S. Bureau of Labor Statistics. Sensitivities are two-factor partial contemporaneous correlations to inflation and growth metrics, where each metric is an equal-risk combination of 12-month changes and 12-month surprises vs. survey forecasts. Based on rolling 12-month periods at quarterly frequency. Unfilled markers indicate sub-sectors or sub-strategies. Global 60/40 is 60% global equities, 40% global IG bonds. UH is unhedged. Results for 11 GICS equity sectors (unfilled teal markers) are based on data from February 1974 to June 2026, with correlations adjusted to match full sample by subtracting the difference in market correlations over the two samples. See Appendix for asset class proxies and construction of hypothetical portfolios. Hypothetical performance results have certain inherent limitations, some of which are disclosed in the Appendix.

Conclusion



Why We Should Resist the Rearview Mirror in 2026

Many biases coincide in the US vs Non-US equity trade, tech sector, Mag-7

Rearview mirror mindset is…

- ⚠ **Most pronounced** when over-extrapolators recently got it right and become more confident
- ⚠ **Most misleading** when past performance mainly reflects changing valuations
- ⚠ **Most vulnerable** when looking back 3-10 years, and when times-they-are-a-changing

Dangers of rearview mirror expectations in 2026:

- A **too-positive** directional view of risky and private assets given the post-GFC experience
- A **too-positive** relative view on US equity market exceptionalism over other markets
- A **too-negative** view on various diversifying alternatives

Timeless lessons:

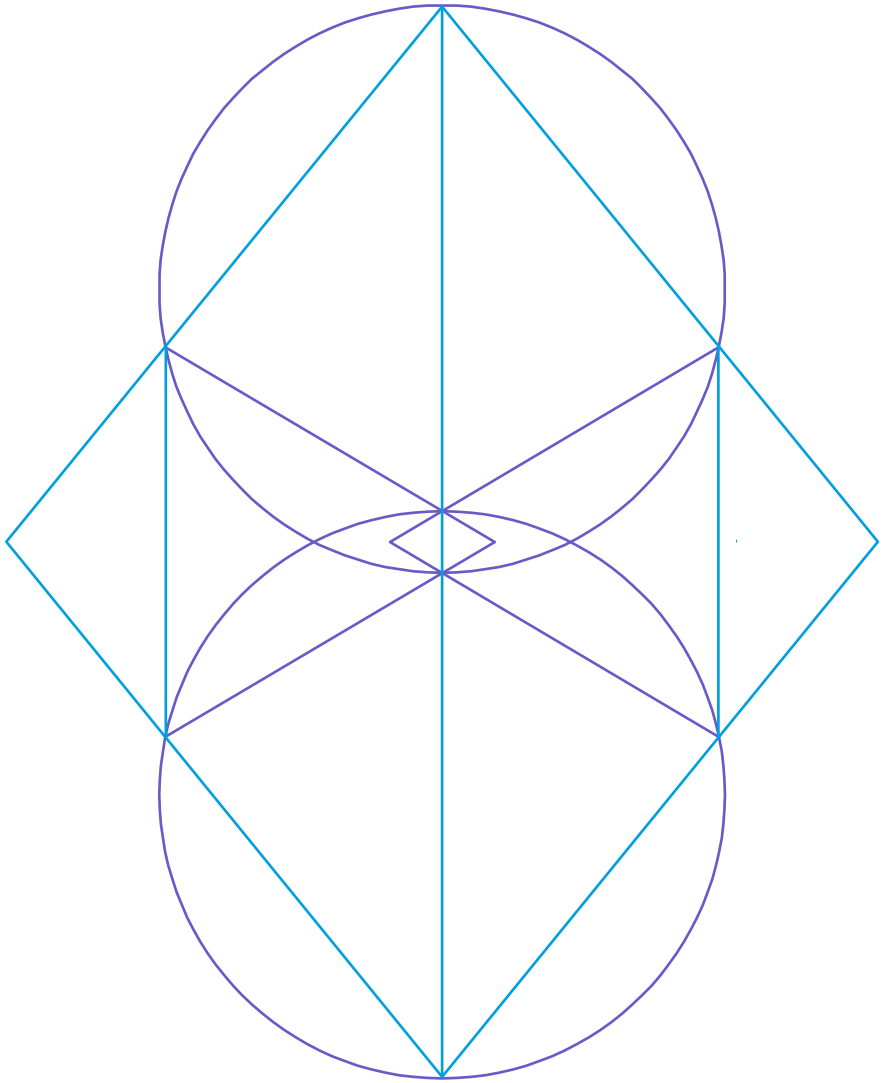
- **Long-term investors should try to patiently hold rational expected returns** and not get caught up with extrapolative rearview-mirror expectations
- Any tactical market timing based on contrarian or other **views should be sized in a humble way** because the forecast errors can sometimes be large
- **Broad diversification** is a better recipe for creating and retaining long-run wealth than aggressive market timing or concentrated risk taking

AQR

Sources: AQR.

Additional Slides

- on capital market environment
- on investors' return expectations



Objective and Subjective Expectations – Will They Ever Meet?

A simplified scheme of contrasting types of long-run expectations

	Objective Expectations	Subjective Expectations
Rationality	Rationally feasible	Often irrational/infeasible (but some groups make rational forecasts)
Kahneman jargon	Slow thinking (system 2)	Fast thinking (system 1)
Main use of expectations	Normative	Descriptive
Main source of expectations	Market yields or valuations	Surveys
Directional tendency	Contrarian (more so if mean-reverting valuations are assumed)	Extrapolative (most unhelpful if use 3-10 -year rearview mirror)
Academic premise	Time-varying expected returns, i.e., time-varying required risk premia	Irrational growth expectations (or assumed constant premia)
Role of risk premia	Market prices reflect a blend of expected fundamentals and required risk premia	Surveys reveal exp's for given investor group; may help disentangle premia
Main information in high market valuations	Low required risk premia (making discount rates low)	Exuberant growth optimism (making cash flow exp's high)
Return expectations amid high valuations after a long bullish run	Low expected returns (more often turn out correct)	High return expectations (more often turn out wrong)
More typical exp's of…	Institutions	Individual investors
More typical exp's for…	Bond markets	Equity markets
How can structural changes trip investors?	By shifting long-run valuation or growth anchors	By making long-run or recent mean return misleading



Source: AQR, Ilmanen (2022, 2025). Expectations are subject to change at any time without notice.

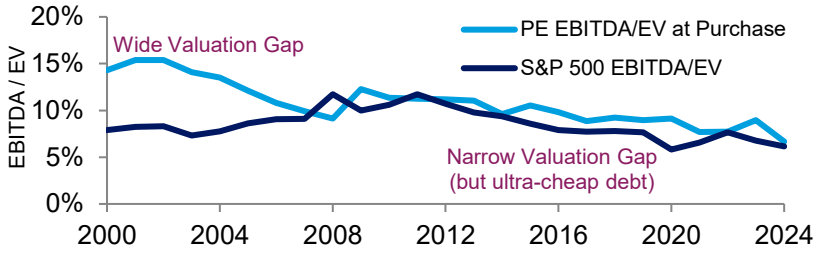
Why Illiquidity Premia on Private Assets May Be Overrated

Prospects tempered by high valuations and end of cheap leverage

Limited long-run evidence for **illiquidity premium**, after adjusting for factor and sector exposures

Most PE outperformance occurred before popularity of endowment model and narrowing of valuation gap. Cheap leverage sustained the PE edge until 2022.

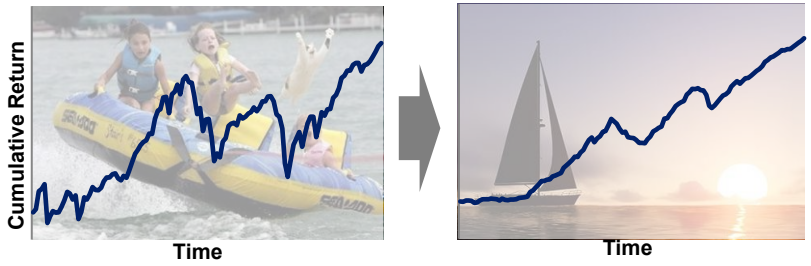
Ex Ante Valuation Gap Between Public and Private Equity
January 1, 1998 – December 31, 2024



Paying more for a "smoothing service" may offset some of the fair illiquidity premium in private assets

Investors may know reported risks are understated, yet still value them for regulatory or accounting reasons

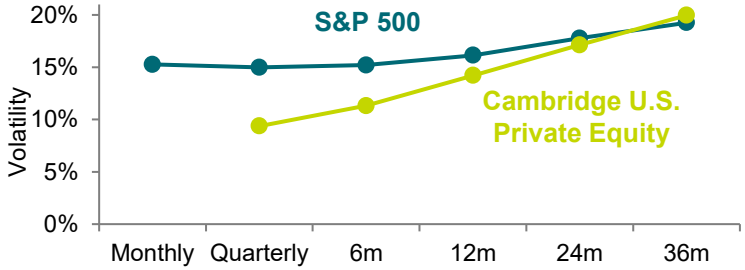
Investors Prefer Smooth Sailing to a Bumpy Ride



Beware 'slow beta': true risks of illiquids show up at longer horizons

Private equity is equity; private credit is credit

Annualized Volatility at Different Frequencies of Return
January 1986 – June 2025



Source: Top chart uses data from PitchBook Data Inc., Bain & Company, Dan Rasmussen, Verdad, Bloomberg. The data shown is that used in the 2019 AQR paper "Demystifying Illiquid Assets: Expected Returns for Private Equity". EBITDA/EVs from 2009 to 2019 are calendar-year averages of the median EBITDA/EV from Pitchbook and the average EBITDA/EV from Bain & Company (2020). PE EBITDA/EV from 1998 to 2008, and S&P 500 EBITDA/EV from 1998 to 2018 are proprietary datasets from Dan Rasmussen, Verdad. S&P 500 EBITDA/EV for 2019 is from Bloomberg. For illustrative purposes only and not representative of a strategy that AQR currently manages. The use of logos and pictures is for informational purposes only and is not authorized by, sponsored by or associated with the trademark owners. Please read important disclosures in the disclosures. Past performance is not a guarantee of future performance.

Pendulum Shifts in Practitioner and Academic Thinking

Faith in yield-based contrarian expected returns may be weakening

Investor Practices



Tech bubble and subsequent "lost decade" for equities helped change investor anchors from **historical averages** to **forward-looking estimates**

Yet predictability is weak enough that Capital Market Assumptions (CMAs) too can experience large forecast errors over single decades

Are some investors abandoning yield-based CMAs?

Academic Thinking



Shift from constant expected returns toward **time-varying risk premia** given empirical results since 1980s

Thus, equity premium was increasingly gleaned from market yields rather than long-run average returns

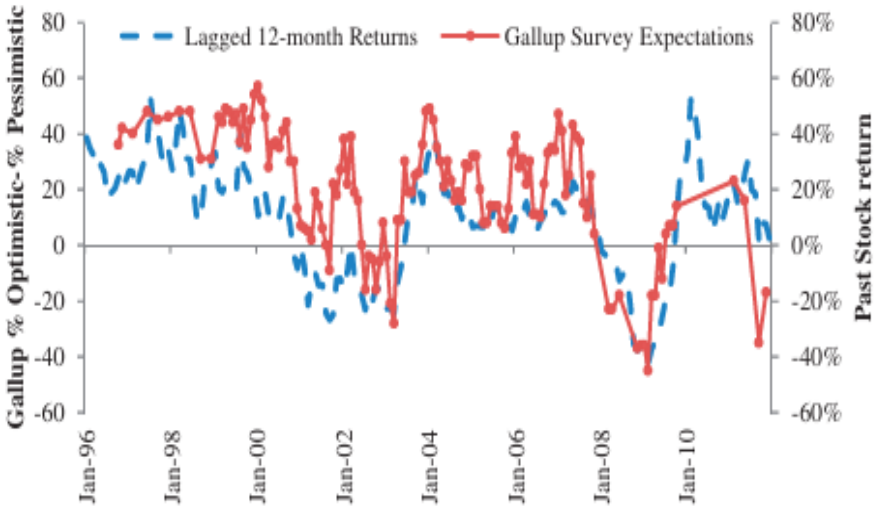
The next debate has been whether empirical results reflect **rationally time-varying risk aversion** or **irrationally time-varying growth optimism**

Source: AQR.

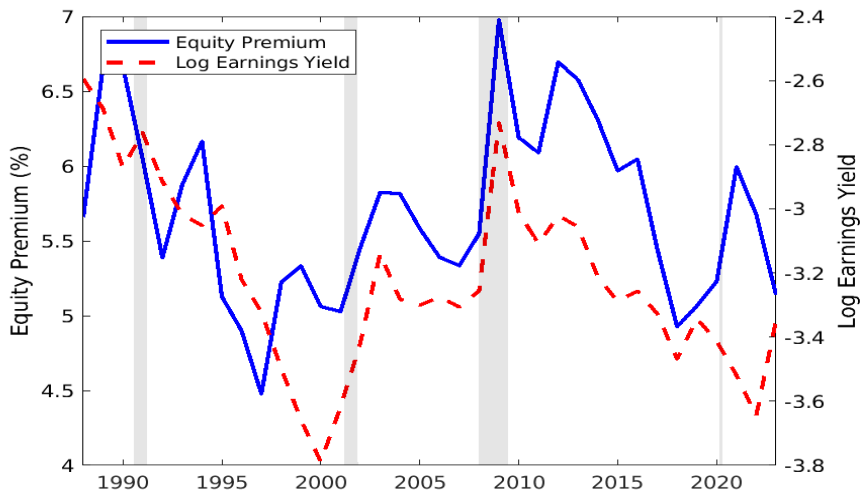
Subjective ERs: Contrasting Different ER Formation Approaches

Individual investors extrapolate, institutional investors act like contrarians

Individual Investors' (Near-Term) Return Expectations vs. Past-Year Market Return (Greenwood-Shleifer (2014))



Institutions' (Long-Term) Return Expectations vs. Valuation-Based Yield (Couts et al. (2023))



Sources: Greenwood-Shleifer (2014), Couts-Goncalves-Loudis (2023). Notes: Left chart plots the lagged 12-month returns versus Gallup survey consensus expectations, 1996-2011; Figure 6 ("The Role of Past Stock Market Returns in Explaining Survey Expectations") of the Greenwood-Shleifer 2014 article "Expectations of Returns and Expected Returns" in the Review of Financial Studies (Oxford University Press) reused with permission). Right chart plots the subjective (CMA) equity premium aggregated across surveyed institutions together with the S&P 500 earnings yield, proxied with log(1/CAPE); Figure 2 ("The Aggregate Subjective Equity Premium From Institutions") in Couts-Goncalves-Loudis (2023) working paper "The Subjective Risk and Return Expectations of Institutional Investors" reused with permission.

Overlapping Risks from Market Concentration to Market Direction

Harder to diversify when Mag-7/Tech/Growth/US tilts are so similar

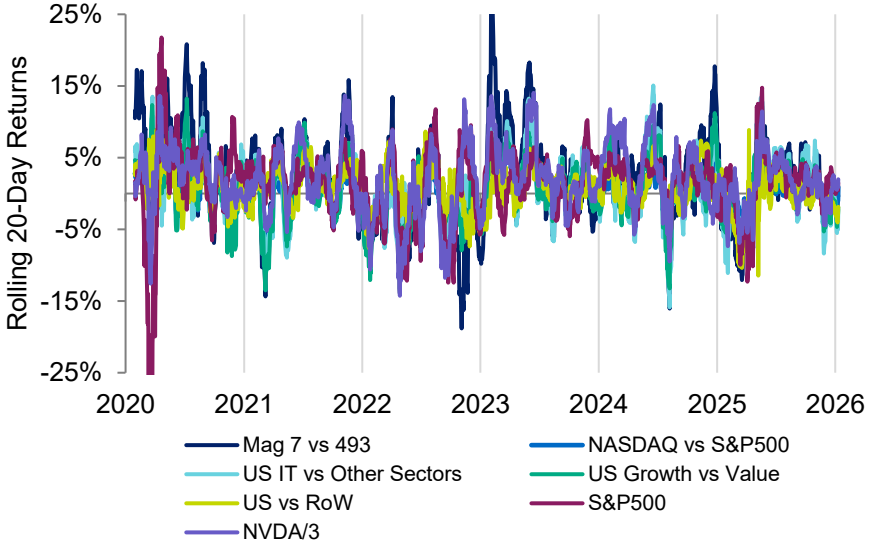
Would you want to ride the market concentration (Mag-7), related sector/style/country tilts, and bullish market direction up to the peak and then turn when they all revert? So would many others … not easy. Valuations are stretched but AI may extend the ride. These trades have low ex-ante-Sharpe-ratio, even if they have driven ex-post performance during the past decade.

Poor diversification among these trades makes the task even harder (see synchronous moves and high correlations below).

Quants may diversify better and make portfolios' total and active risk exposures come from a wider range of sources and thus be more resilient to this overlapping trade cluster.

Overlapping Themes For Many Common Trades

January 1, 2020 – January 9, 2026



Heightened Correlations in Recent Years

January 1, 2020 – January 9, 2026

	Mag 7 vs 493	NASDAQ vs S&P500	US IT vs Other Sectors	US Growth vs Value	US vs RoW	S&P 500
Mag 7 vs 493						
NASDAQ vs S&P500	0.9					
US IT vs Other Sectors	0.8	0.9				
US Growth vs Value	0.9	0.9	0.9			
US vs RoW	0.5	0.4	0.5	0.5		
S&P500	0.4	0.2	0.3	0.2	0.3	
NVDA/3	0.6	0.6	0.7	0.6	0.4	0.7

Sources: AQR, Bloomberg. Mag-7 vs Other 493 compares Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla against the next-largest 493 US stocks. NASDAQ vs S&P 500 compares these two indices. US IT vs Other Sectors compares Information Technology against an average of ten other sectors. US Growth vs Value compares these two style indices among Russell 1000. US vs RoW (rest of the world) compares MSCI US and the unhedged MSCI All-Countries World Index ex-US. The S&P 500 index and Nvidia stock performance is tracked standalone. The correlation matrix uses 3-day returns to mitigate the impact of nonsynchronous market closes. Past performance is not a guarantee of future performance. Please read important disclosures in the disclosures. For illustrative purposes only. Diversification does not eliminate the risk of experiencing investment losses.

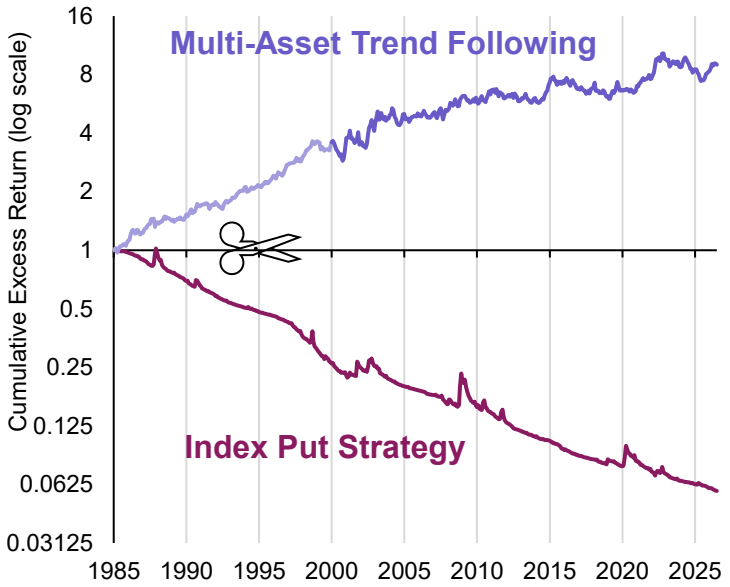
Which Strategies Helped When It Mattered Most?

Equity risk dominates most portfolios, and bear markets can be prolonged

Largest Drawdowns of the U.S. Equity Market and Risk-Mitigating Strategies' Performance January 1, 1920 – June 30, 2026

Peak	Trough	Length (Months)	Depth (%)	Puts	Trend	Treas-uries	Gold	L/S Quality
Mar-1920	Aug-1921	17	-26%		19%	-4%		
Aug-1929	Jun-1932	34	-84%		50%	-1%		
Jan-1937	Mar-1938	13	-50%		-5%	6%		
May-1946	Nov-1946	6	-22%		6%	-1%		
Jul-1956	Dec-1957	17	-18%		15%	-1%		1%
Nov-1961	Jun-1962	7	-23%		11%	0%		0%
Jan-1966	Sep-1966	8	-18%		10%	-2%		2%
Nov-1968	Jun-1970	19	-37%		57%	-13%		34%
Dec-1972	Sep-1974	21	-50%		102%	-11%	129%	5%
Nov-1980	Jul-1982	20	-35%		26%	-6%	-59%	13%
Jun-1983	Jul-1984	12	-15%		6%	-6%	-28%	17%
Aug-1987	Nov-1987	3	-31%	23%	-4%	0%	7%	4%
Aug-1989	Oct-1990	14	-18%	-6%	24%	-1%	-4%	29%
Apr-1998	Aug-1998	4	-15%	11%	14%	4%	-12%	12%
Mar-2000	Sep-2002	30	-49%	11%	32%	23%	5%	96%
Oct-2007	Feb-2009	16	-52%	31%	25%	14%	14%	53%
Apr-2011	Sep-2011	5	-16%	9%	-2%	10%	4%	20%
Dec-2019	Mar-2020	3	-20%	27%	1%	10%	4%	1%
Dec-2021	Sep-2022	9	-24%	3%	35%	-14%	-10%	10%

Contrasting Long-Term Performance of Hypothetical Put and Trend Strategies
January 1, 1985 – June 30, 2026



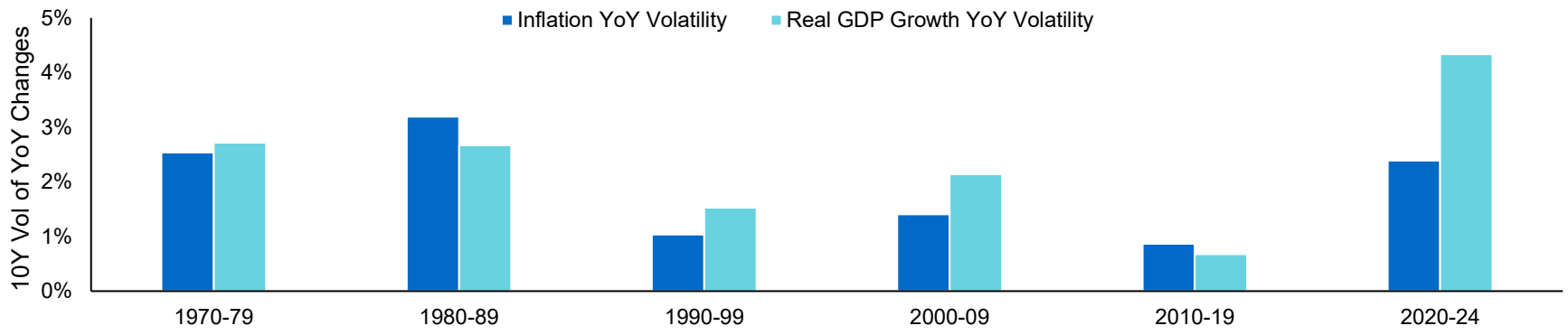
Source: AQR, Bloomberg, CBOE, Commodity Systems Inc., Datastream, Global Financial Data, and Option Metrics. Based on monthly data. All returns, including the S&P 500 index used to measure equity market drawdowns, are in excess of cash (US 3-month LIBOR) or using self-financed futures/forwards and are before trading costs (except for Trend). The list of drawdown episodes for the S&P500 index includes a few cases where the equity market excess return had not yet quite reached the past peak but had recovered most of the way before losing half of their value (1937-8, 1972-74, 2007-9 bear markets are such famous second legs). Treasuries is the excess return of 10-year Treasuries over T-bills, sourced from Global Financial Data, Bloomberg, and Datastream. Gold is the Gold futures return (excluding cash) from Bloomberg. Multi-Asset Trend is the SG Trend Index from January 2000, and a hypothetical Trend Following strategy before that (both net of fees). The hypothetical Put Buying, Trend Following, and U.S. Stock Selection Quality strategies are described in the Appendix. These are not the returns to an actual portfolio AQR manages and are for illustrative purposes only. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix hereto.

Higher Macro Volatility Further Challenges Core Portfolios

The 2010s was an exceptionally benign decade for stock/bond portfolios

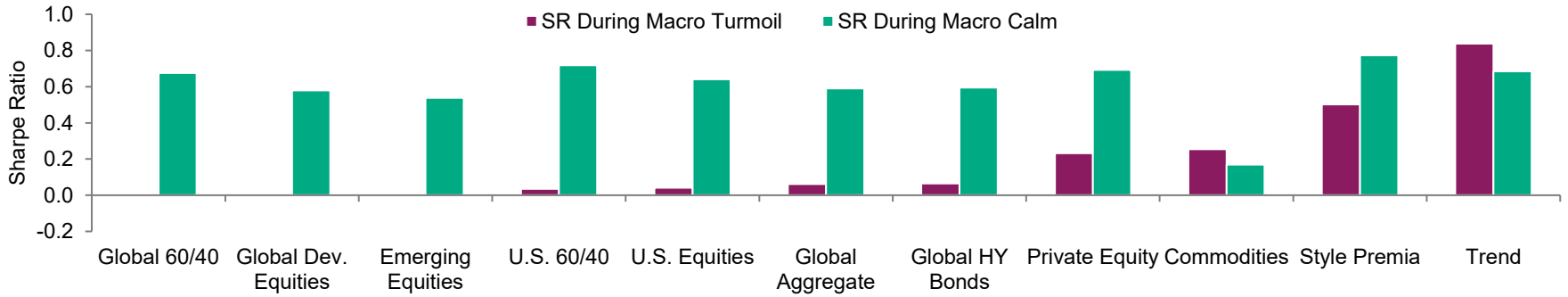
Hypothetical U.S. Macro Volatility Per Decade

January 1, 1970 – December 31, 2024



Relative Performance of Asset Classes and Hypothetical Strategies During Macro Turmoil

January 1, 1972 – December 31, 2024



Sources: AQR, Federal Reserve, Bloomberg. Macro Turmoil is defined as 12-month period for which macro news magnitude exceeds full sample mean. Based on 12-month returns at quarterly frequency. Hypothetical Style Premia is Century of Factor Premia returns net of fees scaled to 12-vol. See Century of Factor Premia disclosures in the disclosures for additional information. Trend is Hypothetical Price-Based Trend-Following Strategy net of fees, as described in the disclosures until 12/31/1999. See Trend Following backtest disclosures in the disclosures for additional information. From 1/1/2000 onwards, Trend is the SG Trend Index. Please see Asset Descriptions for Macro Analyses slide in the disclosures for a description of the rest of the asset classes. Macro news magnitude measure is based on YoY Change in RGDP, YoY Change in CPI, CPI Surprise Past 12M, RGDP Surprise Past 12M and IP Surprise Past 12M.* Last observation covers only 3.5 years. Hypothetical data has certain inherent limitations, some of which are disclosed in the disclosures hereto.

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Broad-based securities indices are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index.

The **S&P 500 Index** is a market-capitalization-weighted index of 500 leading publicly traded companies in the U.S.

The **Bloomberg Barclays Global Aggregate Index** is a market-weighted index of global government, government-related agencies, corporate and securitized fixed-income investments.

The **MSCI World Index** is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets.

The **Bloomberg Barclays Global Treasury Index** tracks fixed-rate local currency government debt of investment grade countries.

The **Bloomberg Barclays US Aggregate Bond Index** is a broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency).

The **Russell 1000 Index** measures the performance of the 1,000 largest U.S. companies by market capitalization and is designed to represent the U.S. large-capitalization equity market.

The **MSCI USA Index** is designed to measure the performance of large- and mid-capitalization stocks in the United States, representing a broad segment of the U.S. equity market.

The **MSCI All Country World Index ex USA** is designed to measure the performance of large- and mid-capitalization stocks across developed and emerging markets outside the United States.

The **SG Trend** Indices are designed to measure the performance of diversified, rules-based trend-following strategies across global futures markets, including equities, fixed income, currencies, and commodities.

Asset Descriptions for Macro Analyses

Asset class proxies and hypothetical strategy methodology

Asset Class	Proxy 1	Start Date	Proxy 2	Start Date	Proxy 3	Start Date
Domestic Equity	MSCI US Net TR Index	1/1/1972				
International Dev. Equity	MSCI World ex US Net TR Unhedged Index	1/1/1972				
Emerging Equity	MSCI Emerging Markets Net TR Unhedged Index	1/1/1988	MSCI EAFE Net TR Unhedged Index	1/1/1972		
Domestic Govt Bonds	U.S. 10-year Treasury	1/1/1972				
Global IG Bonds	Bloomberg Barclays Global Agg Bond Index Hedged	2/1/1990	AQR Global Bond Series (vol adjusted)	1/1/1972		
High Yield Bonds	Bloomberg Barclays US High Yield Index	8/1/1983	Barclays US Corporate Bond Index	2/1/1973	AQR US Bond Series	1/1/1972
Inflation-Linked Bonds	U.S. 10-Year TIPS	3/1/1997	Synthetic returns based on nominal Treasury yields and survey-based expected inflation	1/1/1972		
Private Equity	50% Russell 2000 x 1.2 (levered listed small cap index), 50% Cambridge U.S. Buyout (unlisted)	4/1/1986	70% Russell 2000 x 1.2 (levered listed small cap index), 30% Cash	1/1/1972		
Real Estate	50% FTSE NAREIT All REITs Index (listed), 50% NCREIF Index (unlisted)	12/1/1977	60% FTSE NAREIT All REITs Index (listed), 40% Cash	1/1/1972		
Commodities	Bloomberg Commodities Index	1/1/1972				
Gold	S&P GSCI Gold Total Return Index	1/1/1972				
B/E Inflation	Long 10-year U.S. TIPS as defined above, short 10-year U.S. Treasury	1/1/1972				
Long/Short Equity Factors	Value is U.S. HML Devil factor based on B/P (Asness and Frazzini, 2013), constructed to be industry neutral. Momentum is U.S. 'Up Minus Down' factor based on 12M return excluding most recent month, constructed to be industry neutral. Low Beta is U.S. 'Betting Against Beta' factor (Frazzini and Pedersen, 2014), constructed to be industry neutral. Quality is U.S. 'Quality Minus Junk' factor (Asness, Frazzini and Pedersen, 2014), constructed to be industry neutral. All factors are cap-weighted long the 1/3 best stocks and short the 1/3 worst stocks following the methodology of Fama and French (1993), rebalanced annually every January. All factors except Low Beta are dollar long and short. For Low Beta the long side is levered to make the portfolio ex-ante beta-neutral as described in Frazzini and Pedersen (2014). Multi-factor Portfolio is equal-weighted combination of Value, Momentum and Defensive, where Defensive is 50% Low Beta and 50% Quality. Returns are gross of costs and fees.					
Trend Following	Please see the Hypothetical Price-Based Trend-Following Strategy description on the Trend Following Backtest Descriptions slides.					
Macro Momentum	Hypothetical long/short and directional strategies applied to 15 equity indices, 9 government bond markets, and 9 currencies, with signals based on the following macro momentum themes as described in A Half Century of Macro Momentum by Brooks (2017): Business Cycle, International Trade, Monetary Policy, Risk Sentiment. The strategy goes long assets for which fundamental momentum is favorable and short assets for which it is unfavorable. Returns are net of estimated transaction costs and 2 & 20 fees.					
Cash	Carry on 3m T-Bills	1/1/1972				

Source: AQR

A Century of Multi-Asset Factor Premia
Data sources and definitions

Factor Premia Asset Data

U.S. Stocks: Individual stock-level data from the CRSP database from July 1926 for Value, July 1927 for Momentum, and July 1931 for Defensive strategies.

Equity Indices: Returns on equity indices from 23 equity markets international which include all countries in the MSCI World Index as of 10/31/2016. Since most countries have multiple equity indices, we use the index that is investable, has the most coverage of the total stock market of that country, and has the longest history. We source monthly total returns from Global Financial Data and futures returns from Bloomberg and Datastream.

Fixed Income: Nominal yield and total returns data of 10-year local currency government bonds as well as 3-month interest rates for 13 countries covering North America, Northern Europe, Japan, and Australia/New Zealand, sourced from Global Financial Data, Bloomberg, and Datastream.

Currencies: Spot and 1-, 2-, 3-, and 6-month forward exchange rates from AQR's production data base and interpolate the forward exchange rate for the next quarterly IMM date. This simulates a strategy of buying and holding the forward contract maturing at the near IMM date and rolling to the far contract 5 days before the maturity date. Before 1990, we use changes in spot exchange rates plus the carry of the currency for the total return. This includes data from 20 developed market currencies (Australia, Eurozone, Canada, Japan, Norway, New Zealand, Sweden, Switzerland, United Kingdom, and the U.S., and Belgium, Spain, Finland, France, Germany, Ireland, Italy, Netherlands, Austria, and Portugal).

Commodities: Monthly futures prices of 40 commodities starting in 1877, sourced from the Annual Report of the Trade and Commerce of the Chicago Board of Trade, Commodity Systems Inc., and Bloomberg. For base metals and platinum, rolled return series from the S&P, Goldman Sachs, and Bloomberg are used.

U.S. Equity Market Data: Prior to 1926, the U.S. Equity series is constructed by adding price-weighted capital appreciation returns of NYSE stocks collected by Goetzmann, Ibbotson, and Peng to U.S. equity dividend returns recorded by the Cowles commission. The series consists of returns of the S&P 90 from 1926 to 1957 and returns of the S&P 500 from 1957 onwards.

Global Equities: GDP-weighted return of equity index futures of 11 developed countries.

Global Fixed Income: GDP-weighted return of 15 government bond indices of 8 developed countries scaled to a constant duration of 4 years.

Factor Premia Definitions

U.S. Stocks: Value: Book-to-Price Ratio; Momentum: Past 12 Month Return, Excluding Last Month; Defensive: Beta

Equity Indices: Value: Cyclically-Adjusted Earnings-to-Price Ratio; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Dividend Yield; Defensive: Beta

Fixed Income: Value: Real Bond Yield; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Term Premium; Defensive: Beta

Currencies: Value: Purchasing Power Parity; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Short Term Interest Rate

Commodities: Value: 5 Year Reversal; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Futures Curve Rolldown; Defensive: Beta

Multi-style is an equal weighted portfolio of the factor premia within each asset class.

The **multi-asset multi-style composite** is based on equal risk weights across asset classes, using long-run volatilities; it also includes a shorter history of International Stocks.



Source: AQR, Global Financial Data, Bloomberg, Datastream, Chicago Board of Trade, Commodity Systems Inc. The full sample period starts in 1/1920 (all assets become available in 1920s except for currencies in 1974). All factor premia reflect a backtest of theoretical long/short style components based on AQR definitions applied in several asset group contexts. The results shown do not include advisory fees or transaction costs but are in excess of cash (US treasury bills).

A Century of Multi-Asset Factor Premia

Methodology for macroeconomic sensitivity analysis and factor timing

Macroeconomic Indicator Definitions

Inflation: Average of the past 12 month change in CPI in the U.S. and the rate of change of the past 12 month CPI in the U.S

Growth: Average of the past 12 month change in real GDP in the U.S. and the rate of change of the past 12 month real GDP in the U.S

Volatility: Past 24 month realized volatility of developed equities

Macroeconomic Sensitivity Analysis Methodology

First, we form the Inflation, Growth, and Volatility indicators by capping extreme values at the 95th and 5th percentiles for each indicator and then normalizing. The full sample is then split into two categories for each indicator. If the indicator is above its median for that period, it is classified as a "high" period (if it is less than or equal to its median, it is classified as a "low" period). This ensures there is an equal number of "high" and low" periods in the analysis. Next, the style and market returns are converted to rolling annual returns. The returns are separated into two buckets for each indicator— returns in the "high" environments and returns in the "low" environments. We then calculate Sharpe ratios as the simple average of the rolling returns divided by the volatility of the rolling returns. We calculate Sharpe ratios in the full sample, the "high" and "low" inflation environments, the "high" and "low" growth environments, and finally the "high" and "low" volatility environments. We then compare these Sharpe ratios.

Factor Timing Methodology

The timing backtest is based on an expanding panel regression of factor returns on four standalone timing variables: value spread, past 12-month returns, business cycle proxy *based on U.S. real GDP growth level and change), and inverse volatility. The regression betas are used to compute predicted factor returns. The timing multiplier is based on the expanding z-score of predicted factor returns. The timing is applied to each style and asset class separately and these timed returns are then aggregated into a portfolio. The sign-constrained regressions impose non-negative sign for value spread, factor momentum and inverse volatility, thus implying no position if the regression shows a negative beta. The full model approach uses all of the above timing variables, while the other approaches use each signal standalone.

Timing Strategies from Century Study

We use the following timing methodologies: z-score, out-of-sample regression with no sign restrictions, out-of-sample regression with the restriction that a given factor have the same sign across all asset classes for a given timing variable, out-of-sample regression with both an economic sign and factor restriction (e.g., value spreads should have a positive coefficient and be the same for a given factor across all asset classes), and finally a full sample regression (in-sample) that places no restrictions on any coefficients. The timing variables are the value spread, past 12-month return on each factor (factor momentum), average characteristic of the factor itself (factor spread), which is the value spread for value portfolios, the momentum for momentum portfolios, the average carry for the carry portfolios, and the average negative beta for the defensive portfolios, five-year reversals (negative of past five year return on the factor), inverse volatility (where volatility is estimated over the prior 36 months of returns), inverse variance, business cycle (an ex ante measure that seeks to identify stages of the business cycle – contraction, recovery, slowdown, expansion – where we use both the level and change of GDP growth, compute a rolling 10-year z-score of level and changes in GDP growth, and identify the turning point of a business cycle as whether the z-score breaks +/-1.0 to identify each of the four periods), growth momentum (moving average of annual GDP growth), inflation momentum (moving average of inflation growth), CAPE, and "VIX" (realized volatility of the market over the last 36 months). We also report a simple average of all the timing strategies as well as a timing strategy based on the "full model" that incorporates all timing variables into one model, under each methodology, to time the factors.



Century of Factor Premia

Dates of pre-, original, and post-sample periods

Asset Class	Style	Pre-Sample Period	Original Sample Period	Post-Sample Period
Multi-Asset	Value	Mar-1926 - Dec-1963	Jan-1963 - Dec-1990	Jan-1990 - Dec-2019
Multi-Asset	Momentum	Feb-1926 - Dec-1964	Jan-1964 - Dec-1989	Jan-1989 - Dec-2019
Multi-Asset	Carry	Feb-1926 - Dec-1973	Jan-1973 - Dec-1981	Jan-1981 - Dec-2019
Multi-Asset	Defensive	Feb-1926 - Dec-1960	Jan-1960 - Dec-2009	Jan-2009 - Dec-2019
Multi-Asset	Multi-style	Feb-1926 - Dec-1960	Jan-1960 - Dec-1990	Jan-1990 - Dec-2019
U.S. Stocks	Value	Jul-1927 - Dec-1963	Jan-1963 - Dec-1990	Jan-1990 - Dec-2019
U.S. Stocks	Momentum	Feb-1928 - Dec-1964	Jan-1964 - Dec-1989	Jan-1989 - Dec-2019
U.S. Stocks	Defensive	Mar-1928 - Dec-1960	Jan-1960 - Dec-2009	Jan-2009 - Dec-2019
U.S. Stocks	Multi-style	Jul-1927 - Dec-1960	Jan-1960 - Dec-1990	Jan-1990 - Dec-2019
Commodities	Value	Jan-1920 - Dec-1963	Jan-1963 - Dec-1990	Jan-1990 - Dec-2019
Commodities	Momentum	Jan-1920 - Dec-1964	Jan-1964 - Dec-1989	Jan-1989 - Dec-2019
Commodities	Carry	Jan-1920 - Dec-1973	Jan-1973 - Dec-1981	Jan-1981 - Dec-2019
Commodities	Defensive	Jan-1920 - Dec-1960	Jan-1960 - Dec-2009	Jan-2009 - Dec-2019
Commodities	Multi-style	Jan-1920 - Dec-1960	Jan-1960 - Dec-1990	Jan-1990 - Dec-2019
Equity Indices	Value	Feb-1925 - Dec-1963	Jan-1963 - Dec-1990	Jan-1990 - Dec-2019
Equity Indices	Momentum	Feb-1923 - Dec-1964	Jan-1964 - Dec-1989	Jan-1989 - Dec-2019
Equity Indices	Carry	Feb-1923 - Dec-1973	Jan-1973 - Dec-1981	Jan-1981 - Dec-2019
Equity Indices	Defensive	Feb-1923 - Dec-1960	Jan-1960 - Dec-2009	Jan-2009 - Dec-2019
Equity Indices	Multi-style	Feb-1923 - Dec-1960	Jan-1960 - Dec-1990	Jan-1990 - Dec-2019
Fixed Income	Value	Mar-1923 - Dec-1963	Jan-1963 - Dec-1990	Jan-1990 - Dec-2019
Fixed Income	Momentum	Feb-1923 - Dec-1964	Jan-1964 - Dec-1989	Jan-1989 - Dec-2019
Fixed Income	Carry	Feb-1923 - Dec-1973	Jan-1973 - Dec-1981	Jan-1981 - Dec-2019
Fixed Income	Defensive	Feb-1923 - Dec-1960	Jan-1960 - Dec-2009	Jan-2009 - Dec-2019
Fixed Income	Multi-style	Feb-1923 - Dec-1960	Jan-1960 - Dec-1990	Jan-1990 - Dec-2019

Asset Class	Style	Original Sample Period	Post-Sample Period
Currencies	Value	Jan-1974 - Dec-1990	Jan-1990 - Dec-2019
Currencies	Momentum	Jan-1974 - Dec-1989	Jan-1989 - Dec-2019
Currencies	Carry	Jan-1974 - Dec-1981	Jan-1981 - Dec-2019
Currencies	Multi-style	Jan-1974 - Dec-1990	Jan-1990 - Dec-2019

Source: AQR. Please refer to the disclosures for descriptions of the data sources used and definitions for each style.
Note: International stocks are added as another asset class since July 1984, but not included in the pre/post/original comparisons.

Historical Long Run Risk Premia
Data Sources and Definitions

Data Sources

Equities: GDP-weighted return of equity index futures of 11 developed countries

Bonds: GDP-weighted return of 15 government bond indices of 8 developed countries scaled to a constant duration of 4 years.

Commodities: equal weighted return of a basket of 29 commodities

Credit Excess: excess return of US corporate bonds over duration-matched US treasury bonds

Value: equal risk weight of a value strategy (as described in later slides) in equity indices, stocks, fixed income, commodities, and currencies

Momentum: equal risk weight of a momentum strategy (as described in later slides) in equity indices, stocks, fixed income, commodities, and currencies

Carry: equal risk weight of a carry strategy (as described in later slides) in equity indices, stocks, fixed income, commodities, and currencies

Defensive: equal risk weight of a defensive strategy (as described in later slides) in equity indices, stocks, fixed income, commodities, and currencies

Trend: equal weighted combination of 12-month time series momentum strategies for 67 markets across four major asset classes – 29 commodities, 11 equity indices, 15 bond markets, and 12 currency pairs.

Descriptions of Style Premia in each asset class

U.S. Stocks: Value: Book-to-Price Ratio; Momentum: Past 12 Month Return, Excluding Last Month; Defensive: Beta

Equity Indices: Value: Cyclically-Adjusted Earnings-to-Price Ratio; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Dividend Yield; Defensive: Beta

Fixed Income: Value: Real Bond Yield; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Term Premium; Defensive: Beta

Commodities: Value: 5 Year Reversal; Momentum: Past 12 Month Return, Excluding Last Month; Carry: Futures Curve Rolldown; Defensive: Beta

Asset class data descriptions for Style Premia

U.S. Stocks: Individual stock-level data from the CRSP database from July 1926 for Value, July 1927 for Momentum, and July 1931 for Defensive strategies.

Equity Indices: Returns on equity indices from 23 equity markets international which include all countries in the MSCI World Index as of 10/31/2016. Since most countries have multiple equity indices, we use the index that is investable, has the most coverage of the total stock market of that country, and has the longest history. We source monthly total returns from Global Financial Data and futures returns from Bloomberg and Datastream.

Fixed Income: Nominal yield and total returns data of 10-year local currency government bonds as well as 3-month interest rates for 13 countries covering North America, Northern Europe, Japan, and Australia/New Zealand, sourced from Global Financial Data, Bloomberg, and Datastream.

Commodities: Monthly futures prices of 40 commodities starting in 1877, sourced from the Annual Report of the Trade and Commerce of the Chicago Board of Trade, Commodity Systems Inc., and Bloomberg. For base metals and platinum, rolled return series from the S&P, Goldman Sachs, and Bloomberg are used.



Source: AQR, Global Financial Data, Bloomberg, Datastream, Chicago Board of Trade, Commodity Systems Inc. See Hurst-Ooi-Pedersen (2014) for global equities and government bonds (GDP-weighted composites of country indices), commodities (equal-weighted across and within sectors) and trend-following, Asvanunt-Richardson (2015) for U.S. credit (in excess of matched Treasuries), and Moskowitz, Katz, Thapar, and Wang (2017) for market-neutral style premia. The full sample period starts in 1/1920 and ends in 12/2016 (all assets become available in 1920s except for currencies in 1974). Value, Carry, Momentum, and Defensive all begin in March 1926, Credit excess begins in January 1926. All alternative risk premia reflect a backtest of theoretical long/short style components based on AQR definitions applied in several asset group contexts. The results shown do not include advisory fees or transaction costs but are in excess of cash (US treasury bills).

Trend Following Backtest Descriptions

Hypothetical Price-Based Trend-Following Strategy

The Hypothetical Price-Based Trend-Following Strategy model uses data from January 1880 onward. The investment strategy is based on trend-following investing which involves going long markets that have been rising and going short markets that have been falling, betting that those trends over the examined look-back periods will continue. The strategy was constructed with an equal-weighted combination of 1-month, 3-month, and 12-month trend-following strategies for 67 markets across 4 major asset classes: 29 commodities, 11 equity indices, 15 bond markets, and 12 currency pairs. Since not all markets have return data going back to 1880, we construct the strategies using the largest number of assets for which return data exist at each point in time. We use futures returns when they are available. Prior to the availability of futures data, we rely on cash index returns financed at local short rates for each country. Please see Figure 2 for additional details. The strategy targets a long-term volatility target of 10% but does not limit volatility during periods where realized volatility may be higher or lower than this number.

Hypothetical performance is net of advisory fees and net of transaction costs, unless stated otherwise. In order to calculate net-of-fee returns, we subtracted a 1.25% annual management fee and a 20% performance fee from the gross-of-fee, net-of-transaction-cost returns to the strategy. The transactions costs used in the strategy are based on proprietary estimates of average transaction costs for each of the four asset classes, including market impact and commissions. The transaction costs are assumed to be twice as high from 1993 to 2002 and six times as high from 1880–1992. The transaction costs used are shown in Figure 1.

This model is not based on an actual portfolio AQR manages.

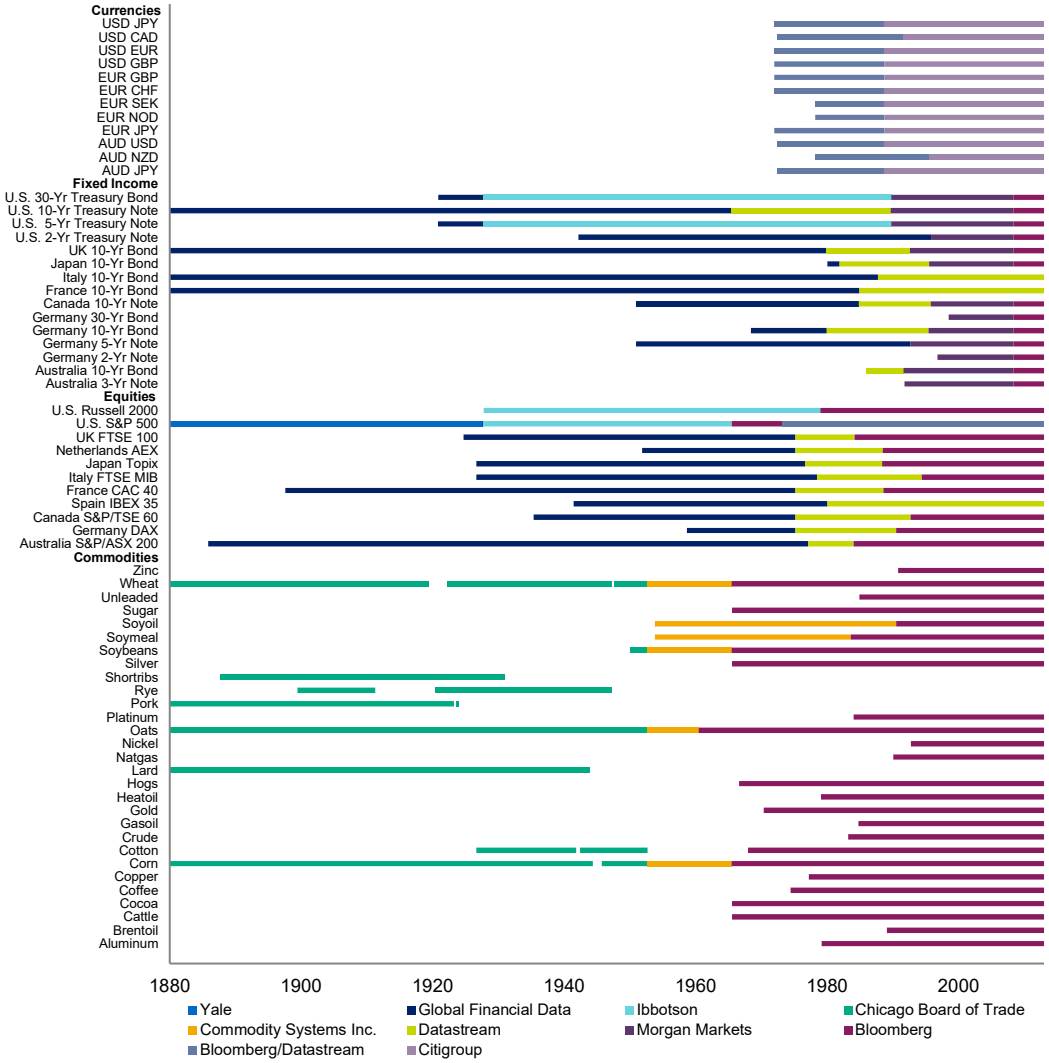
The benchmark and relevant cash rate is assumed to be ICE BofA 3-Month T-Bill. Prior to 1929 when 3-month Treasury bills became available, the benchmark and relevant cash rate is assumed to be the NYSE call money rates (the rates for collateralized loans) through 1920 and returns on short-term government debt (certificates of indebtedness) from 1920 until 1929.

Figure 1

Asset Class	Time Period	One-Way Transaction Costs (as a % of notional traded)
Equities	1880 – 1992	0.34%
	1993 – 2002	0.11%
	2003 – Present	0.06%
Fixed Income	1880 – 1992	0.06%
	1993 – 2002	0.02%
	2003 – Present	0.01%
Currencies	1880 – 1992	0.18%
	1993 – 2002	0.06%
	2003 – Present	0.03%
Commodities	1880 – 1992	0.58%
	1993 – 2002	0.19%
	2003 – Present	0.10%

Trend Following Backtest Descriptions

Figure 2



Trend Following Backtest Descriptions

Limitations of Backtested Performance. The returns presented reflect hypothetical performance an investor would have obtained had it invested in the manner shown and does not represents returns that any investor actually attained. The information presented is based upon the following hypothetical assumptions.

Hypothetical Economic Trend-Following Strategy Backtest Construction

The Hypothetical Economic Trend-Following Strategy uses data from January 1970 onward. The investment strategy is based on trend following which for each theme (Growth, Inflation, International Trade, Monetary Policy, Risk Aversion) and within each asset class, takes a long position in assets in which economic trends are improving and a short position in assets in which economic trends are deteriorating. Each individual position is sized to target the same amount of volatility, both to provide diversification and to limit the portfolio risk from any individual market. The theme portfolio across all assets is scaled to target 10% forecasted annual volatility.

Not all markets and assets have returns going back to 1970; details outlined on the following page.

Growth: Growth trends are captured using one-year changes in forecasts of real GDP growth. From 1990 onward forecast data is from Consensus Economics. Prior to 1990, we use one-year changes in realized year-on-year real GDP growth, lagged one quarter (this definition is equivalent to changes in forecasts assuming that real GDP growth follows a random walk). The series is from the OECD. Increasing growth is assumed to be bullish for equities (cash-flow impact), commodities (increasing demand), and currencies (Balassa-Samuelson hypothesis), and bearish for fixed income (both government bonds and interest rates) via both inflationary pressures and upward pressure on real interest rates.

Inflation: Inflation trends are captured using one-year changes in forecasts of CPI inflation. From 1990 onward forecast data is from Consensus Economics. Prior to 1990, we use one-year changes in realized year-on-year CPI inflation, lagged one quarter (this definition is equivalent to changes in forecasts assuming that CPI inflation follows a random walk). The series is from the OECD. Increasing inflation is assumed to be bearish for equities (see Katz and Lustig (2017)), bullish for currencies (see Clarida and Waldman (2008)), and bearish for fixed income.

International Trade: International trade trends are captured using one-year changes in spot exchange rates against an export-weighted basket. Data is from DataStream. A depreciating currency is bullish for equities (exports become more competitive), bearish for currencies (very similar to price momentum), bearish for fixed income (other things equal, a depreciating currency reduces the pressure on a central bank to reduce interest rates), and bearish for commodities (depreciation of the currencies of commodity consumers means commodities, which are generally priced in USD, are effectively more expensive).

Monetary Policy: Monetary policy trends are captured using one-year changes in the front end of the yield curve. From 1992 onwards, I use two-year yields, while prior to 1992 I use Libor and its international equivalents. Both data series are from Bloomberg. Expansionary monetary policy is bullish for equities (see Bernanke and Kuttner (2005)), bullish for currencies (see Eichenbaum and Evans (1995)), bullish for commodities, and bearish for fixed income.

Risk Aversion: Changes in risk sentiment are captured using one-year equity market excess returns. Data is from DataStream. Increasing risk sentiment — i.e., strong equity market returns — is bullish for equities, commodities, and currencies, and bearish for fixed income.



Trend Following Backtest Descriptions

The model employs relatively simple measures as they afford long data availability and are less susceptible to concerns about data mining. The strategy is therefore intended as a proof of concept, and can potentially be enhanced by employing additional and improved measures of economic trends.

Backtest returns are hypothetical net of transaction costs and fees. In order to calculate net-of-fee returns, we subtracted a 1.25% annual management fee and a 20% performance fee from the gross-of-fee, net-of-transaction-cost returns to the strategy. Even after adjusting for transaction costs and fees, backtest returns are likely overstated, despite best effort to employ simple and transparent signals, due to unavoidable hindsight bias. Hypothetical data has inherent limitations, some of which are disclosed herein.

As the backtest is constructed to take a long position in assets in which economic trends are improving and a short position in assets in which economic trends are deteriorating, the strategy would likely underperform in a period of sharp reversals across asset classes and investment themes or in an environment in which price trends and economic trends diverge. However, due in part to the diversification benefits of the four asset classes and four investment themes, the performance of the backtest has been consistent over a wide variety of macroeconomic and financial environments over the last 50 years.

Hypothetical Economic Trend-Following Strategy Universe:

Equity index return data is from Bloomberg. Start dates are the earliest available date of the series:
- 1970: Australia, Germany, Canada, Spain, France, Italy, Japan, Netherlands, U.K., U.S.
- 1975: Switzerland
- 1980: Denmark, Hong Kong, Sweden
- 1988: New Zealand

Government bond return data is from Bloomberg and DataStream. Start dates are
- 1970: Germany, Canada, U.K., U.S.
- 1980: Japan
- 1981: Switzerland
- 1985: Denmark
- 1986: Australia
- 1987: Sweden

Currency return data is from Citi and Reuters. Start dates are
- 1971: Germany, Japan, Switzerland, U.K.
- 1972: Australia, Canada
- 1978: New Zealand, Sweden

Interest rate futures return data is from IFS. Start dates are
- 1987: U.S.
- 1988: U.K.
- 1989: Australia, Europe (Euribor)
- 1991: Canada, New Zealand, Switzerland

Commodity futures return data is from Bloomberg. Start dates are
- 1970: Cattle, Corm Cotton, Hogs, Soybeans, Soymeal, Soyoil, Sugar, Wheat
- 1974: Coffee
- 1979: Heat Oil
- 1983: Crude Oil
- 1984: Gas Oil
- 1985: Unleaded
- 1989: Brent Oil
- 1990: Natural Gas
- 1991: Zinc
- 1993: Nickel



Risk Mitigating Strategies Backtest Descriptions

Hypothetical Backtest Descriptions for Risk Mitigating Strategies

The **Hypothetical Put Buying strategy** is a backtest which involves buying a 5% out-of-the-money one-month put on the S&P 500 index (pre-1996 on the S&P100) at mid-month and rebalancing into a new put at expiry. Since 2022 we use the CBOE Protective Put index in excess of the S&P 500. Put returns are expressed as a percentage of the underlying index NAV, gross of trading costs and fees. For comparability, the series is scaled to 10% volatility based on the 6% volatility of the unlevered return over the full sample, implying leverage of 1.67.

The **Hypothetical Trend strategy** return is a backtest, gross of fees but net of estimated transaction costs, as in Hurst-Ooi-Pedersen (2017) until 12/31/1999 (the strategy applies trend following at 1-, 3- and 12-month windows in four asset classes and targets overall portfolio volatility of 10%), from 1/1/2000 onwards the trend return is the SG Trend Index.

L/S Quality is a **hypothetical U.S. Stock Selection Quality strategy** or the quality-minus-junk factor for U.S. stock selection. This is a broad composite long/short portfolio based on 16 quality metrics within profitability, growth, and safety subgroups. The factor was developed by Asness-Frazzini-Pedersen (2019) and is regularly updated in aqr.com.

These are not the returns to an actual portfolio AQR manages and are for illustrative purposes only. Hypothetical data has certain inherent limitations, some of which are disclosed in this appendix.

Hypothetical trend following strategy descriptions:
See Hypothetical Price-Based and Economic Trend-Following Strategy slides within this Appendix.

Asset descriptions for macro analyses and other hypotheticals

Asset Class	Proxy 1	Start Date	Proxy 2	Start Date	Proxy 3	Start Date
Dev. Equity	MSCI World ex US Net TR Unhedged Index	1/1/1972				
Emerging Equity	MSCI Emerging Markets Net TR Unhedged Index	1/1/1988	MSCI EAFE Net TR Unhedged Index	1/1/1972		
U.S. Treasuries	U.S. 10-year Treasury	1/1/1972				
Investment Grade	Bloomberg Barclays Global Agg Bond Index Hedged	2/1/1990	AQR Global Bond Series (vol adjusted)	1/1/1972		
High Yield	Bloomberg Barclays US High Yield Index	8/1/1983	Barclays US Corporate Bond Index	2/1/1973	AQR US Bond Series	1/1/1972
U.S. TIPS	U.S. 10-Year TIPS	3/1/1997	Synthetic returns based on nominal Treasury yields and survey-based expected inflation	1/1/1972		
Commodities	Bloomberg Commodities Index	1/1/1972				
Trend Following	Hypothetical trend following strategy as described in A Century of Evidence on Trend-Following Investing by Hurst, Ooi and Pedersen (2017). The strategy goes long markets that have been rising and going short markets that have been falling, betting that those trends over the examined look-back periods will continue. The strategy was constructed with an equal-weighted combination of 1-month, 3-month, and 12-month trend-following strategies for 67 markets across 4 major asset classes: 29 commodities, 11 equity indices, 15 bond markets, and 12 currency pairs. Returns are net of estimated transaction costs and 2 & 20 fees.					
Cash	Carry on 3m T-Bills	1/1/1972				

Disclosures

Simple Yield-Based Forecasts of Expected Returns

Sources for historical equity and bond expected returns are AQR, Robert Shiller's data library, Kozicki-Tinsley (2006), Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, Consensus Economics and Morningstar. Prior to 1926, stocks are represented by a reconstruction of the S&P 500 available on Robert Shiller's website which uses dividends and earnings data from Cowles and associates, interpolated from annual data. After that, stocks are the S&P 500. Bonds are represented by long-dated Treasuries. The equity yield is a 50/50 mix of two measures: 50% Shiller E/P * 1.075 and 50% Dividend/Price + 1.5%. Scalars are used to account for long term real Earnings Per Share (EPS) Growth. Bond yield is 10-year real Treasury yield minus 10-year inflation forecast as in *Expected Returns* (Ilmanen, 2011), with no rolldown added.

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Forward Returns

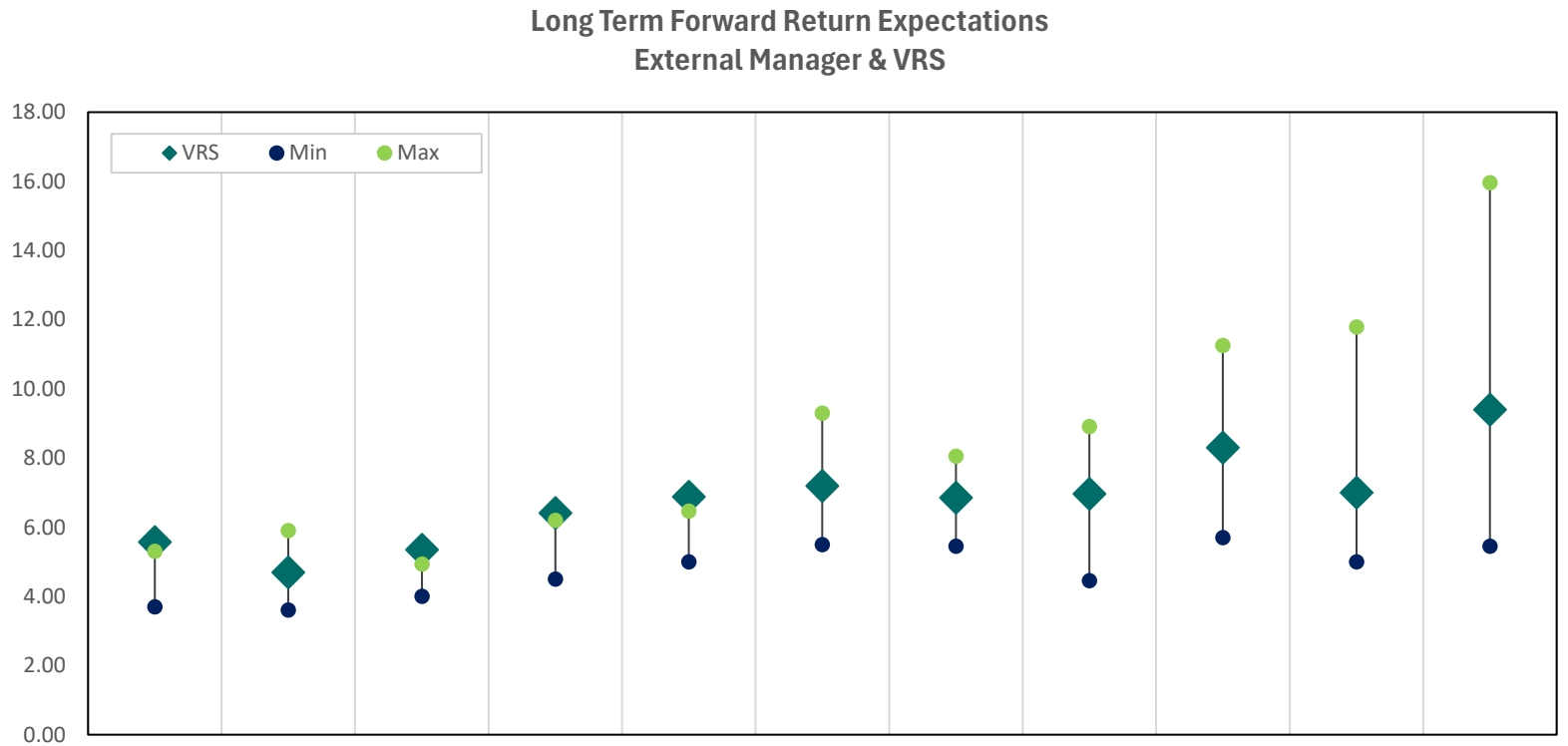
Chung Ma
Deputy CIO

Daniel Whitlock
Program Director

Agenda

- Forward Returns Comparison
- VRS Long Term Forward Returns

Long Term Forward Return Expectations External Managers and VRS



TIPS	US Govt Bonds All Mat	US Agg Bonds Inv Grade	USD Em Mkts Debt	US HY Bonds	US Real Estate Core	Developed non-US Equity	US Lg Cap Equity	Emerging Markets Equity	Global Direct Lending	US Private Equity
VRS Forward Return Expectations										
5.6	4.7	5.4	6.4	6.9	7.2	6.9	7.0	8.3	7.0	9.4

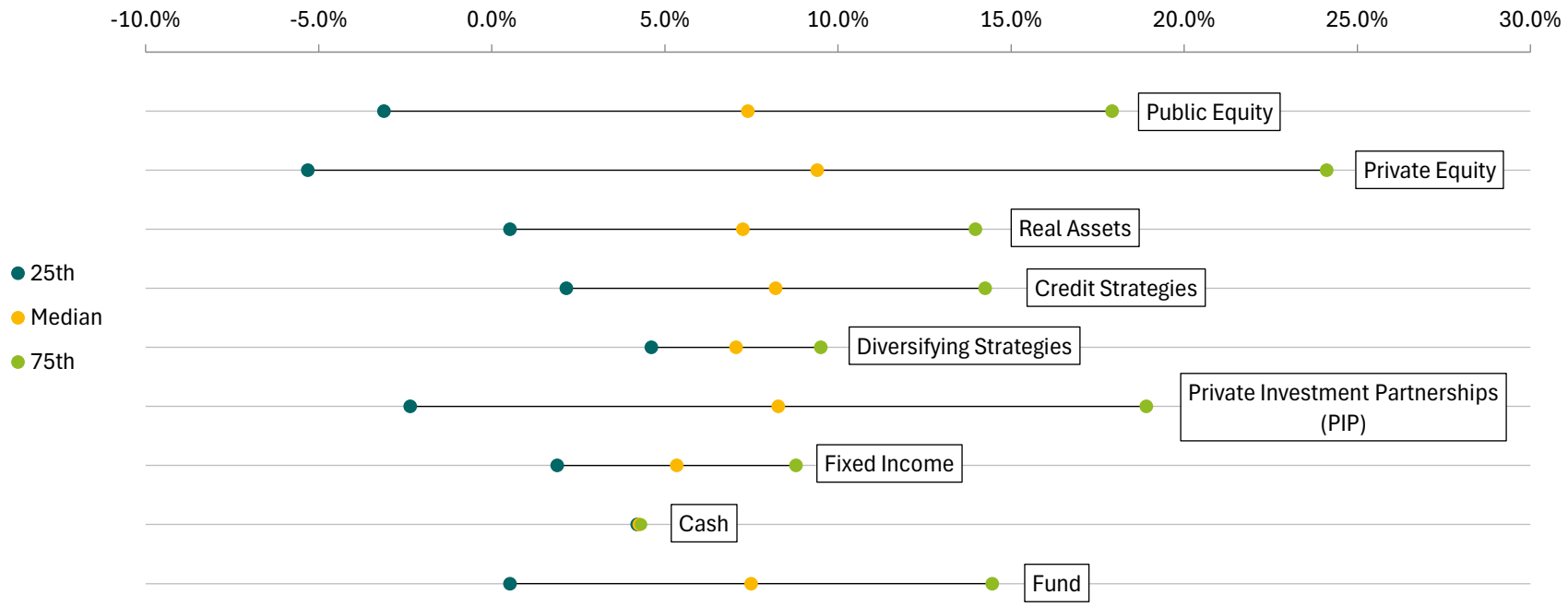
Virginia Retirement System®

Forward Returns and Volatilities By Asset Class (20 year)

Asset Class	6/30/2026 Wt.	6/30/2026 Exp.Ret	6/30/2026 Exp.Vol	6/30/2025 Wt.	6/30/2025 Exp.Ret	6/30/2025 Exp.Vol
Public Equity	32%	7.4%	15.6%	32%	6.6%	15.5%
Private Equity	15%	9.4%	21.8%	16%	8.6%	22.4%
Real Assets	14%	7.2%	10.0%	14%	7.1%	10.2%
Credit Strategies	16%	8.2%	9.0%	16%	8.2%	6.3%
Diversifying Strategies	6%	7.1%	3.6%	5%	6.8%	4.2%
Private Investment Partnerships	2%	8.3%	15.8%	2%	7.9%	16.1%
Fixed Income	16%	5.3%	5.1%	16%	5.1%	5.4%
Cash	2%	4.3%	0.1%	2%	4.1%	0.1%
Leverage	-3%	4.8%	0.1%	-3%	4.6%	0.1%
Total Fund		**7.5%**	**10.3%**		**7.1%**	**10.5%**

Virginia Retirement System®

VRS Forward Returns By Asset Class
Annualized 20 Year Expected Returns



P	PubEq	PvtEq	RA	CS	DS	PIP	FI	Cash	Fund
P25	-3.1%	-5.3%	0.5%	2.2%	4.6%	-2.4%	1.9%	4.2%	0.5%
P50	7.4%	9.4%	7.2%	8.2%	7.1%	8.3%	5.3%	4.3%	7.5%
P75	17.9%	24.1%	14.0%	14.3%	9.5%	18.9%	8.8%	4.3%	14.5%

Virginia Retirement System®

Public Equity Forward Returns

Process Reminder: Two Equally Weighted Approaches

50% Growth and Income Approach

Low Twitch

Nominal Earnings Growth

2 years of consensus earnings, followed by a long-term growth assumption

Income

Dividend yield, payout ratio change, and the impact of long-term earnings growth changes

Excess Returns

50% Reversion Approach

Fast Twitch

Earnings

Reversion to terminal profit margin targets

Valuation

Reversion to the terminal P/E assumption

Excess Returns

Asset Allocation uses the 20-year Global Equity assumptions only.
The 10-year regional assumptions help inform the 20-year view, but regional returns are not included.

Virginia Retirement System®

Strengths, Weaknesses, and Assumptions

What the Framework Does Well, Where It Is Limited, and What It Relies On

Strengths

- Robust fundamental approaches
- The ensemble of multiple models provides broader perspectives
- Staff can have views and debates around assumptions

Weaknesses

- Assumptions are difficult to project
- Currency impact is assessed at the total-plan level
- ACWI IMI view, with separate Min Vol and China modeling as a check

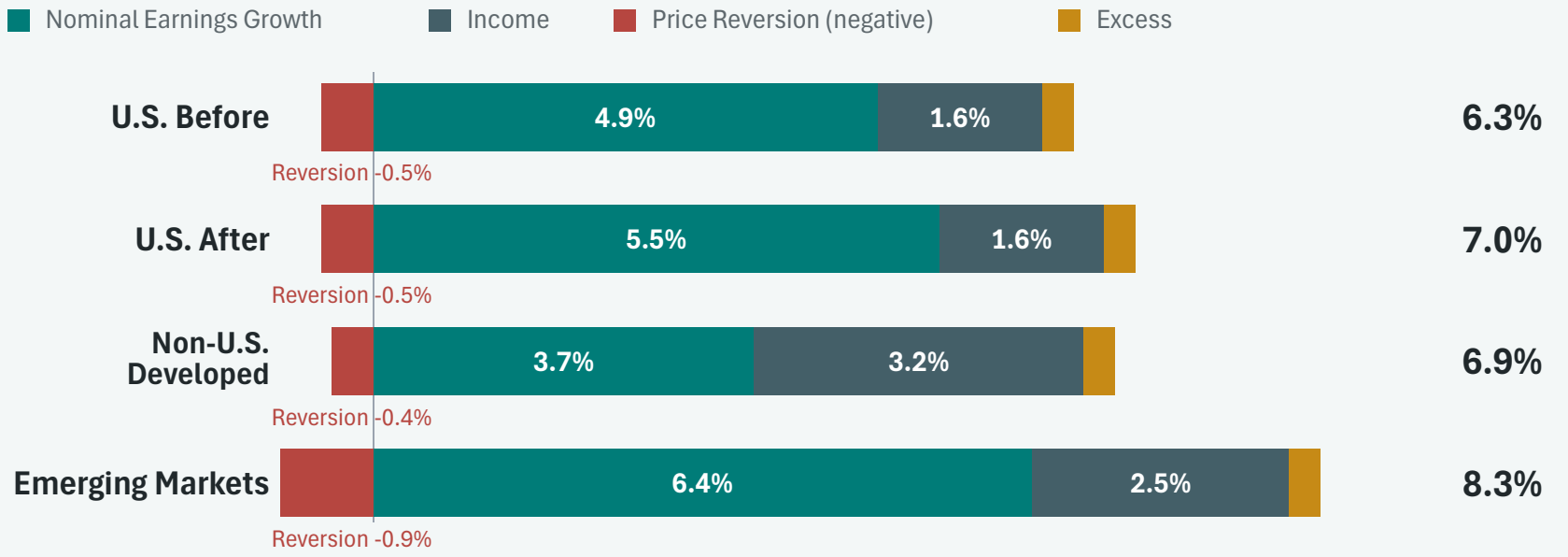
Assumptions

- Long-term real earnings growth
- Inflation
- Terminal profit margins
- Terminal P/E

Change to Earnings Growth Assumption and Impact

U.S. real earnings growth assumption: 1.8% to 2.5%

10-Year Forward Return Breakdown



20-Year Forward Returns, Global: Before 6.8% → After 7.4%, an increase of 0.6% in the long-horizon global equity return used for Asset Allocation

Virginia Retirement System®

Private Assets Program Reviews

K.C. Howell
Managing Director



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Agenda:
Private Assets Program Reviews

- Overview (K.C. Howell, Managing Director) — 5 min
- Real Assets (Walker Noland, Program Director) — 15 min
- Private Equity (John Alouf, Program Director) — 15 min
- Credit Strategies (Steve Woodall, Program Director) — 15 min
- Private Investment Partnerships (PIP) (Steve Woodall, Program Director)

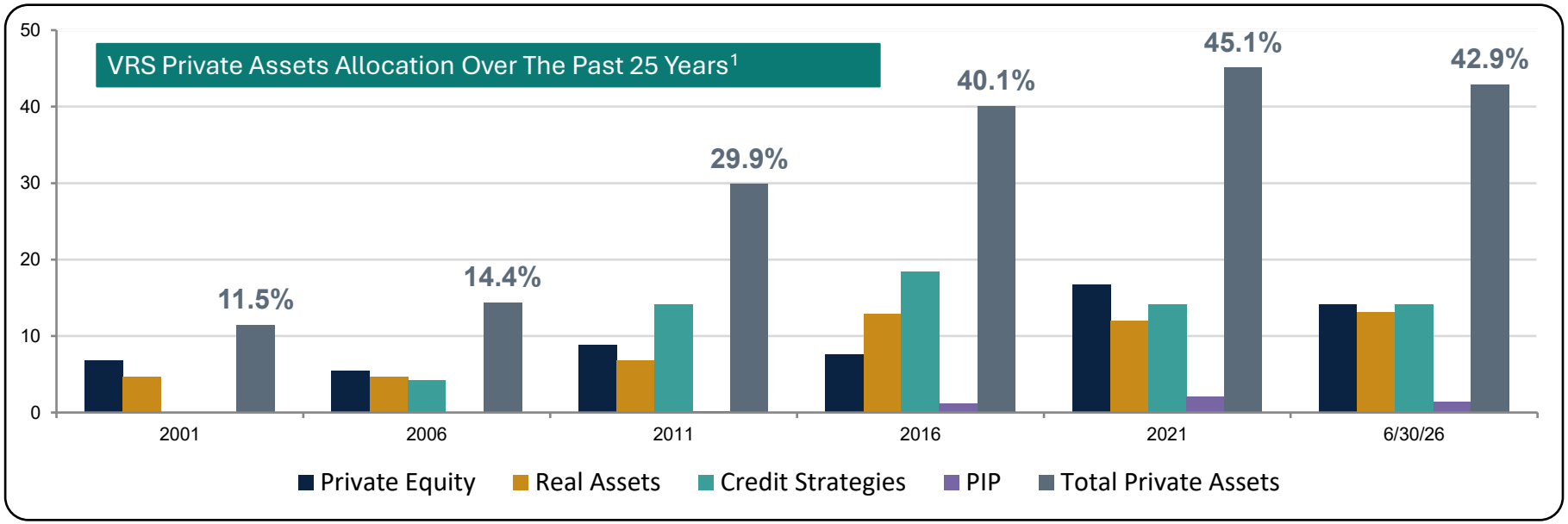
VRS Total Private Assets Overview

Long-Term Attributes

- **Enhance absolute & relative returns**
- **Capture illiquidity premium**
- **Reduced risk via diversification**
- **Public to private migration**

Current Environment

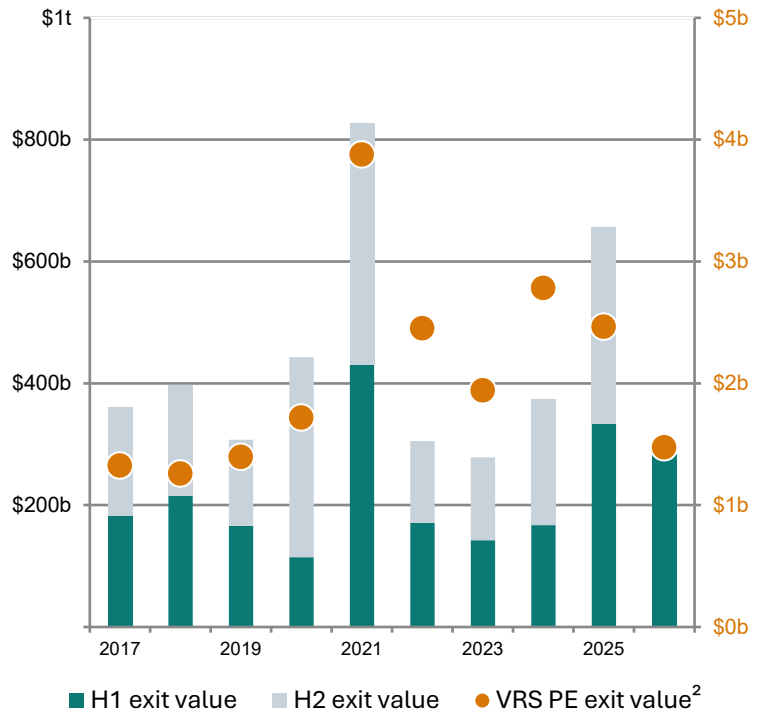
- **Liquidity**
- **Cost of Capital**
- **Dispersion**
- **Structural Demand**



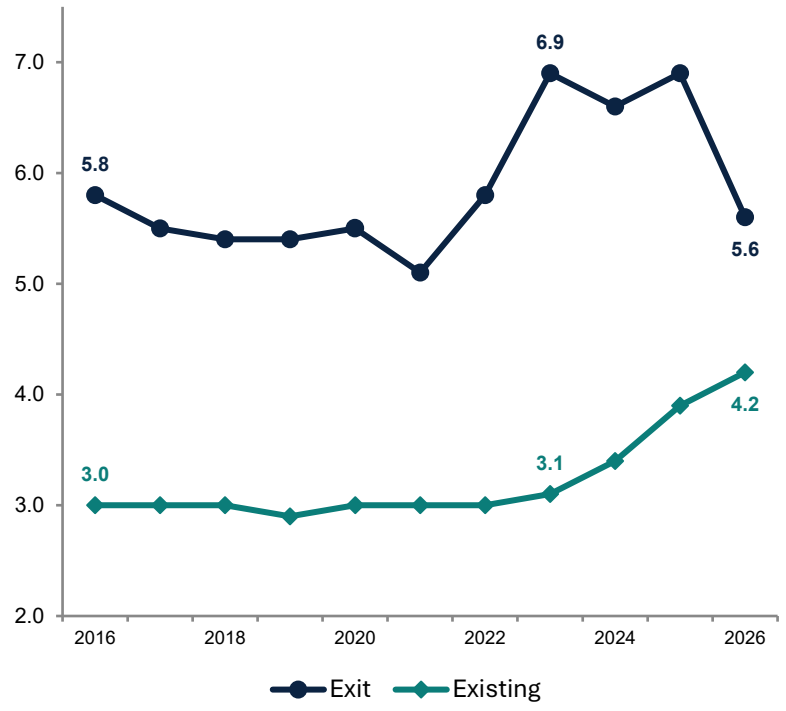
1 BNY

Private Equity Distribution Drought: PE Exits Improving, Backlog Still Aging

H1 VS. H2 EXIT MARKET VALUE (USD, BILLIONS)[1,2]



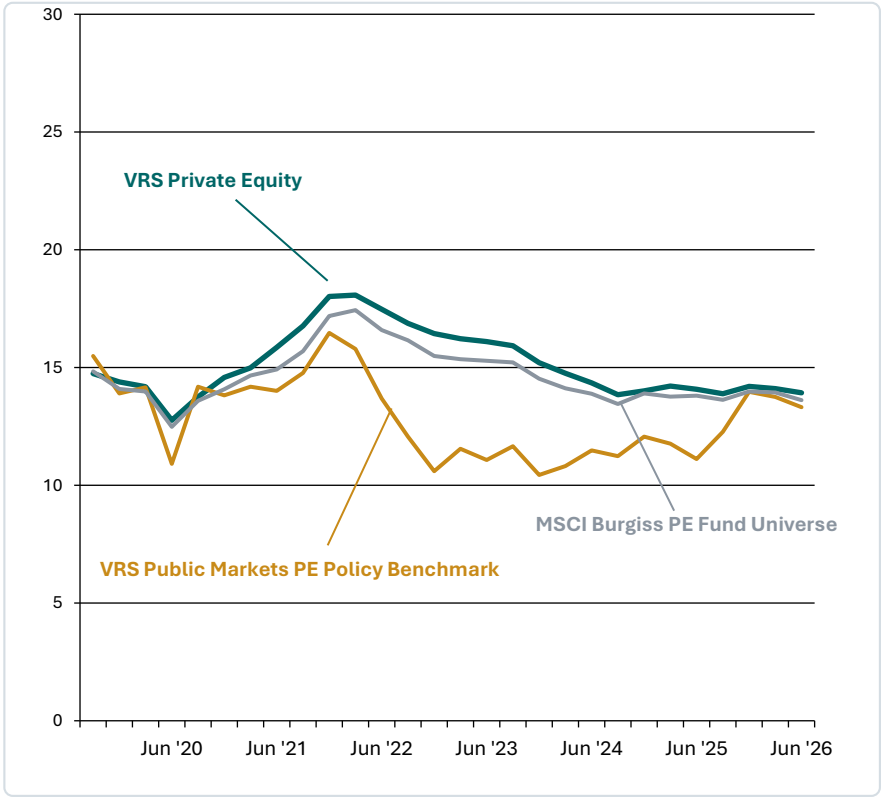
MEDIAN EXIT & EXISITING HOLDING TIME (YEARS)[1]



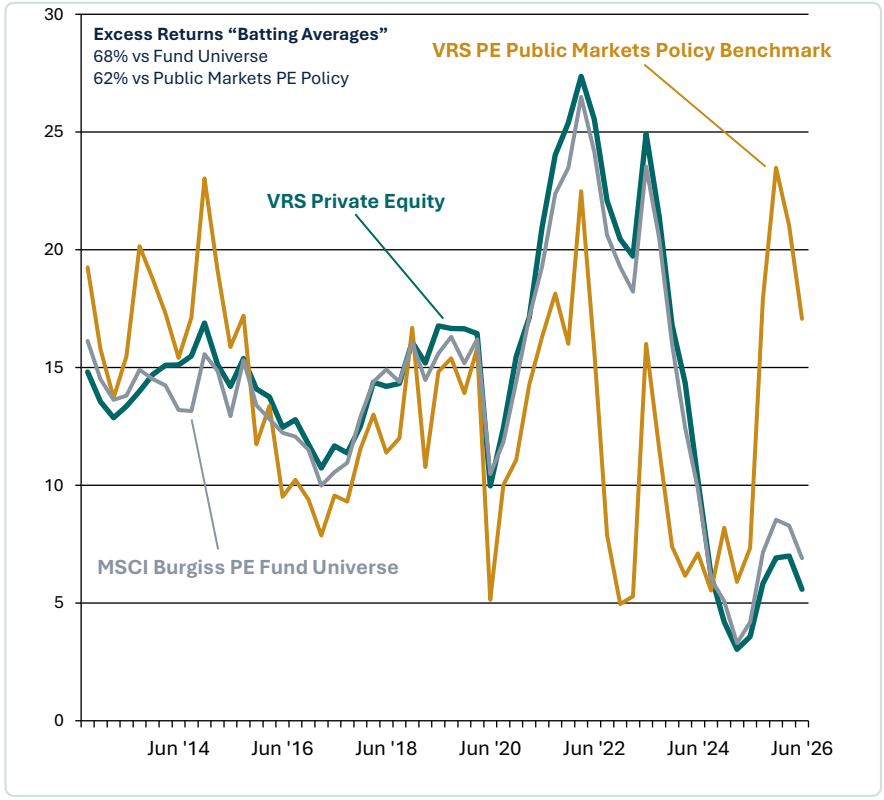
1 PitchBook, Q2 2026 and Q3 2026 US PE Breakdown
2 VRS PE portfolio data

Private Equity Policy Benchmark Migration:
Measuring Manager Selection, Not Public-Market Cycles

ROLLING 10-YEAR ANNUALIZED RETURNS, QUARTERLY (%)[1]



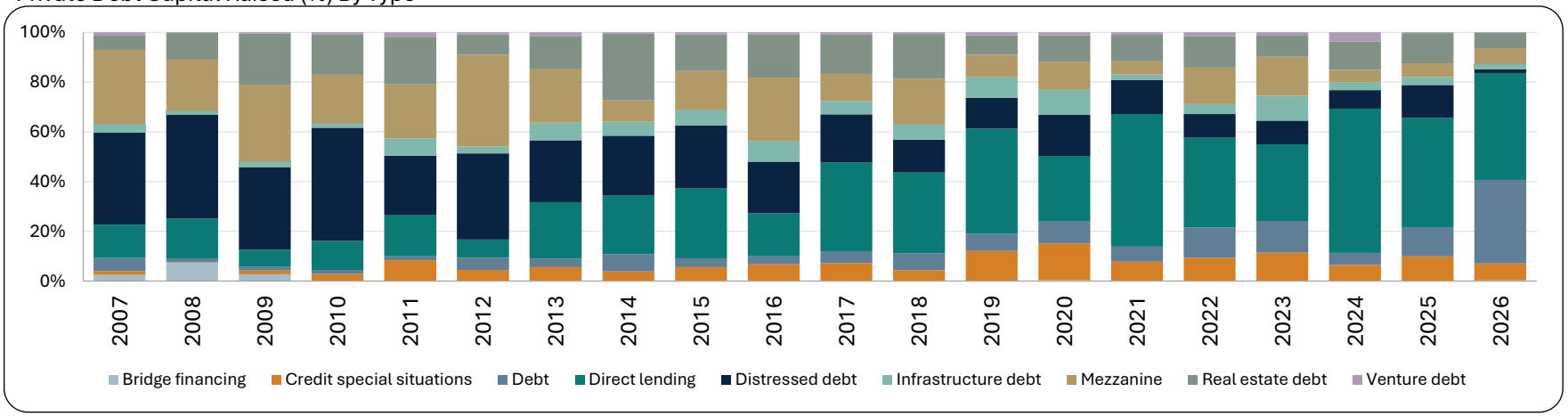
ROLLING 3-YEAR ANNUALIZED RETURNS, QUARTERLY (%)[1]



1 BNY and MSCI, 6/30/26

Private Credit: Not a Monolithic Market

Private Debt Capital Raised (%) By Type[1]



Why Private Credit: The Case In Four Parts

Income
Contractual cash yield - not exit-dependent appreciation - delivers most of the return.

Protection
Seniority, collateral, covenants and the equity cushion convert structure into downside protection.

Diversification
The opportunity set runs well past direct lending into asset-backed, specialty and opportunistic credit.

Illiquidity Advantage
As a pension with a long-term horizon, patient capital is paid when others retreat.

VRS' Approach to Private Credit Portfolio Construction

Diversification
Across asset classes, managers, strategies and vintages of the credit stack.

Structure
Collateral, senior positioning, lender protections and contractual covenants.

Selectivity
Managers with proven sourcing, underwriting and portfolio management.

Cash Pay
Favors cash-pay coupons over payment-in-kind structures.

Conservative Leverage
Selective, non-recourse, non-mark-to-market leverage only.

Liquidity Management
Long-duration holdings balanced with regular distributions.

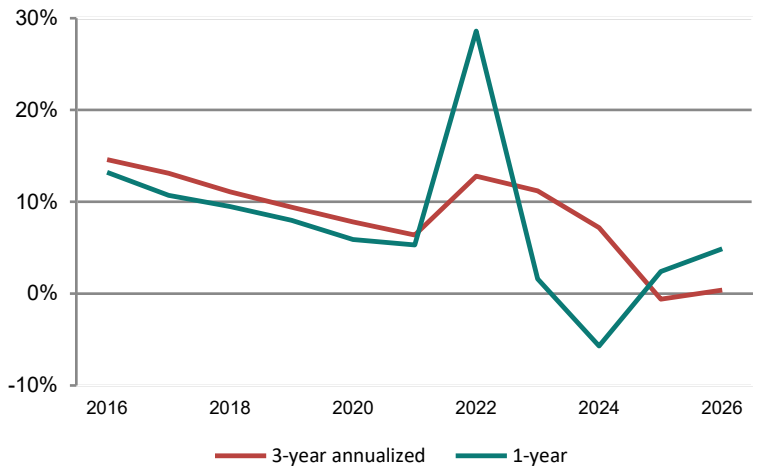
1 PitchBook, Q2 2026 Global Private Market Fundraising Report

Real Assets:
Areas of Slow Recoveries and Strong Demand

VRS REAL ESTATE: 10-YEAR RETURN HISTORY[1]

Rolling returns: June 30, 2016 – 2026

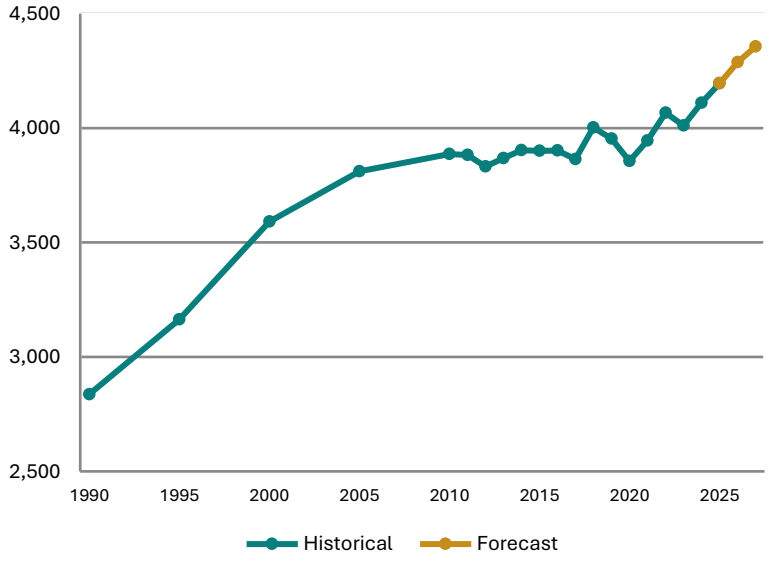
1Y rebound: +10.6 pp since 2024. 1Y–3Y spread: +4.5 pp.



$12B	4.9%	+320 bps
VRS private real-estate value | 6/30/26[1]	1-year net return | 6/30/26[1]	3-year excess vs. benchmark | 6/30/26[1]

U.S. ELECTRICITY CONSUMPTION[2]

Annual consumption, billion kWh



1990–2025 history. Pre-2010: five-year observations.
2026–2027 forecast: 4,288 and 4,356 billion kWh.
Forecast vintage: October 2026.

1 BNY
2 EIA, Monthly Energy Review, September 2026, Table 7.1 (End Use Total). Forecast: October 2026 STEO

Real Assets

Walker Noland
Program Director
Real Assets



Virginia Retirement System®

Agenda:
Real Assets Annual Review Topics

- Overview
- Markets
- Exposures
- Results
- Co-investments
- Managers
- Looking Forward

Overview: Team Members

Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Walker Noland	**Program Director**	**MBA**	**CFA**	**26**	**16**
Tom Coleman	Senior Portfolio Manager	BS	CFA, CAIA	26	15
Warren Chang	Portfolio Manager	MBA, MS	CFA	29	11
Jummai Sarki-Hurd	Portfolio Manager	MBA, MS	-	20	13
Lee Buchanan	Investment Officer	BA	CAIA	10	2
Kenneth Fleming	Investment Analyst	BBA	CFA Level 1 – Pass	3	2
Cecilia Jones	Portfolio Assistant	BA	-	2	2

Overview: Objectives

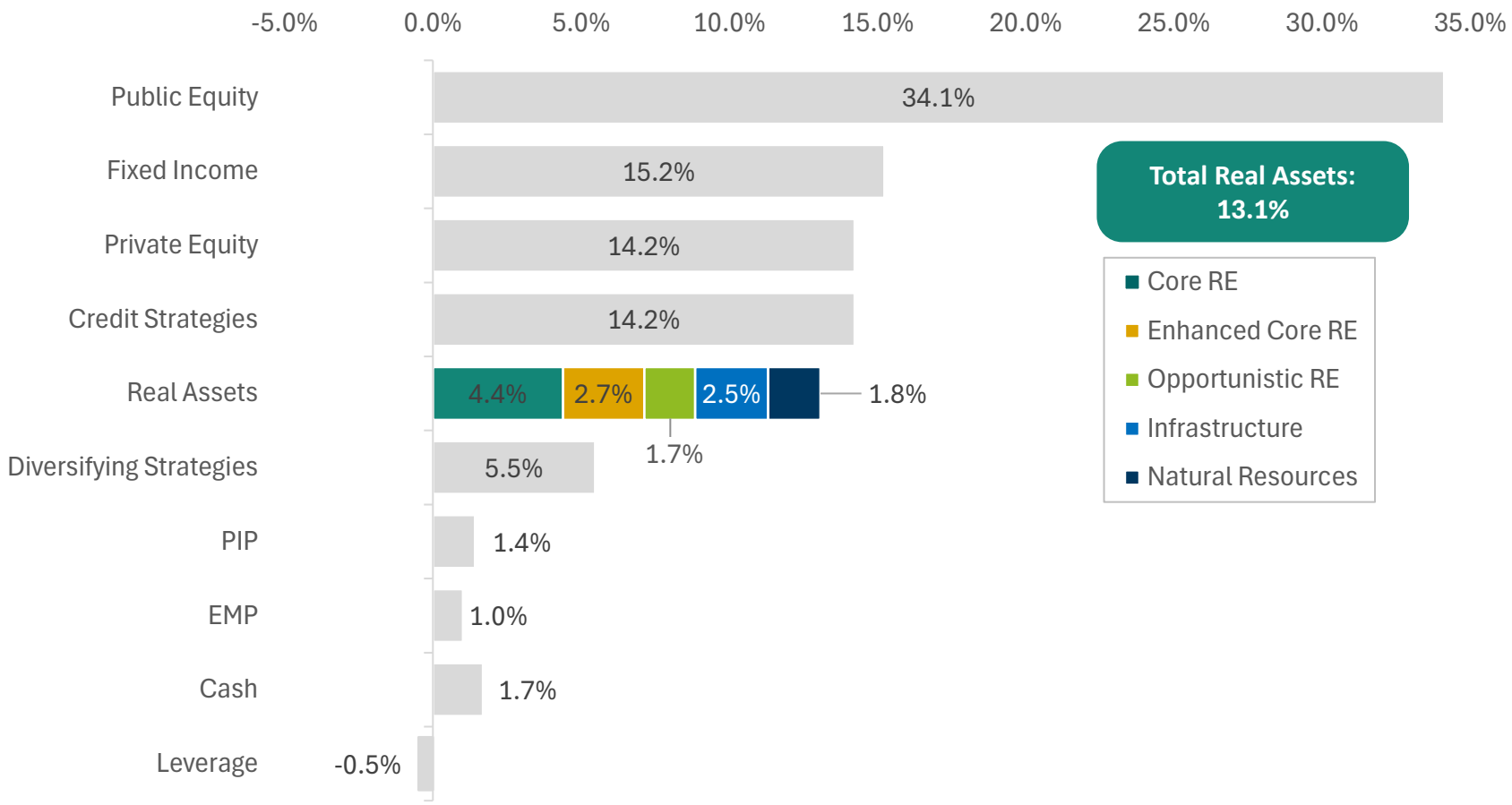
- **Diversification – historically, low correlation to global equities as shown below**
- **Competitive Returns – strong historical returns**
- **Cash Flow – many investments tend to distribute cash quarterly**
- **Inflation Linkages – varies by sector & asset type, but some ability to pass through inflation**

Correlations

	Global REITs	U.S. Commercial Real Estate	Timberland	Farmland	Energy Equities	Mining Equities (ex. Gold & Silver)	Gold	Infra-structure Equities	Global Equities	IG Corp Bonds	CPI
Global REITs	1.00										
Commercial Real Estate	0.32	1.00									
Timberland	0.03	(0.09)	1.00								
Farmland	0.20	0.06	0.29	1.00							
Energy Equities	0.43	0.16	0.33	0.21	1.00						
Mining Equities	0.61	0.16	0.24	0.09	0.69	1.00					
Gold	0.18	(0.06)	0.11	0.25	0.06	0.29	1.00				
Infrastructure Equities	0.83	0.29	0.11	0.25	0.62	0.67	0.26	1.00			
Global Equities	0.76	0.24	0.21	0.03	0.52	0.72	0.14	0.79	1.00		
IG Corp Bonds	0.16	(0.19)	0.20	(0.17)	(0.27)	(0.15)	0.43	0.21	(0.03)	1.00	
U.S. CPI	0.10	0.16	0.32	0.08	0.23	0.20	0.16	0.16	0.09	(0.17)	1.00

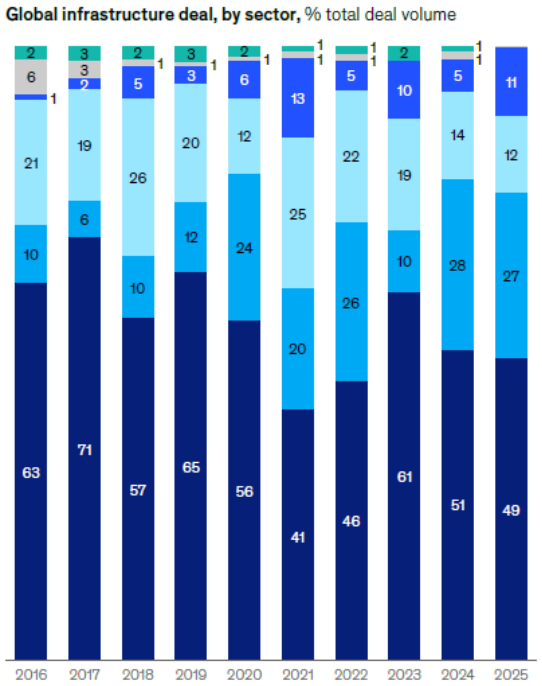
Source: Bloomberg (public markets data). NCREIF (private markets data).
Notes: Private Commercial Real Estate returns de-smoothed. Correlations based on quarterly data, except Timberland and Farmland, which are based on annual data since those assets are generally appraised only once per year.

Overview:
Asset Allocation – 6/30/26



Markets: Fundamentals

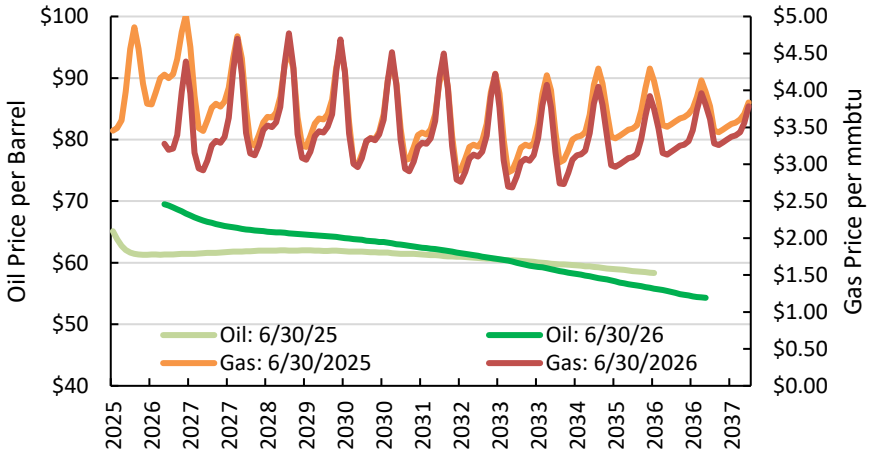
Infrastructure Investment Types Over Time



	2016–25 CAGR, %	2024–25 growth, %
Total	–2.6	23.1
Waste and water	–26.7	–78.4
Other	–35.5	–86.6
Cross-sector	28.5	166.9
Transport	–7.8	7.1
Telecommunications	9.7	20.1
Energy	–5.0	19.5

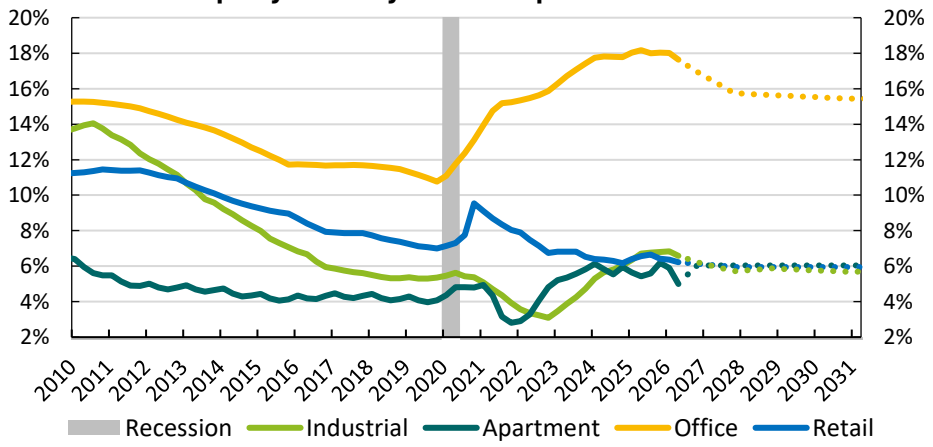
Source: McKinsey & Company, Preqin

Oil & Gas Forward Curves



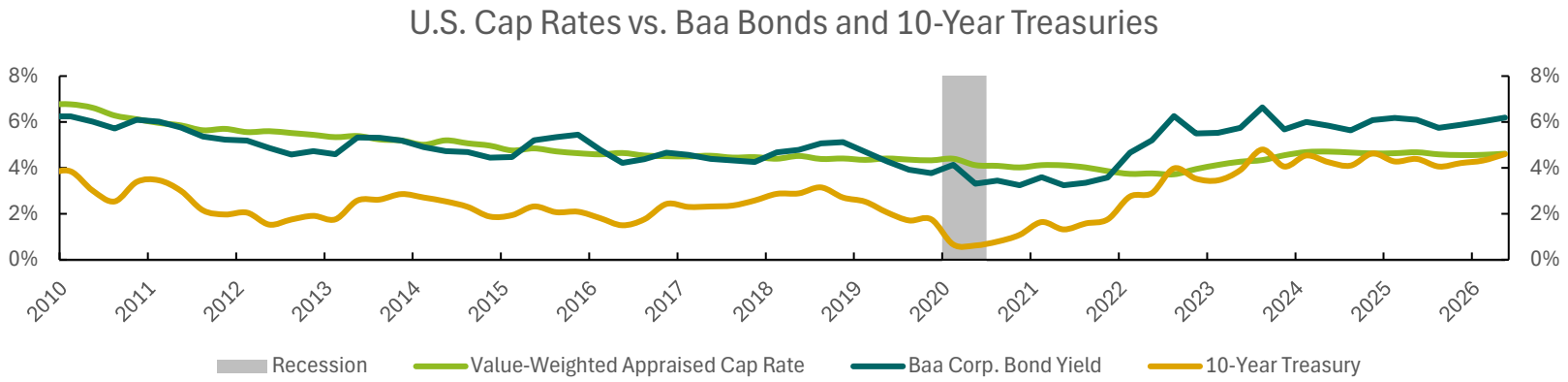
Source: Bloomberg

Property Vacancy Rates – Top 50 U.S. Markets

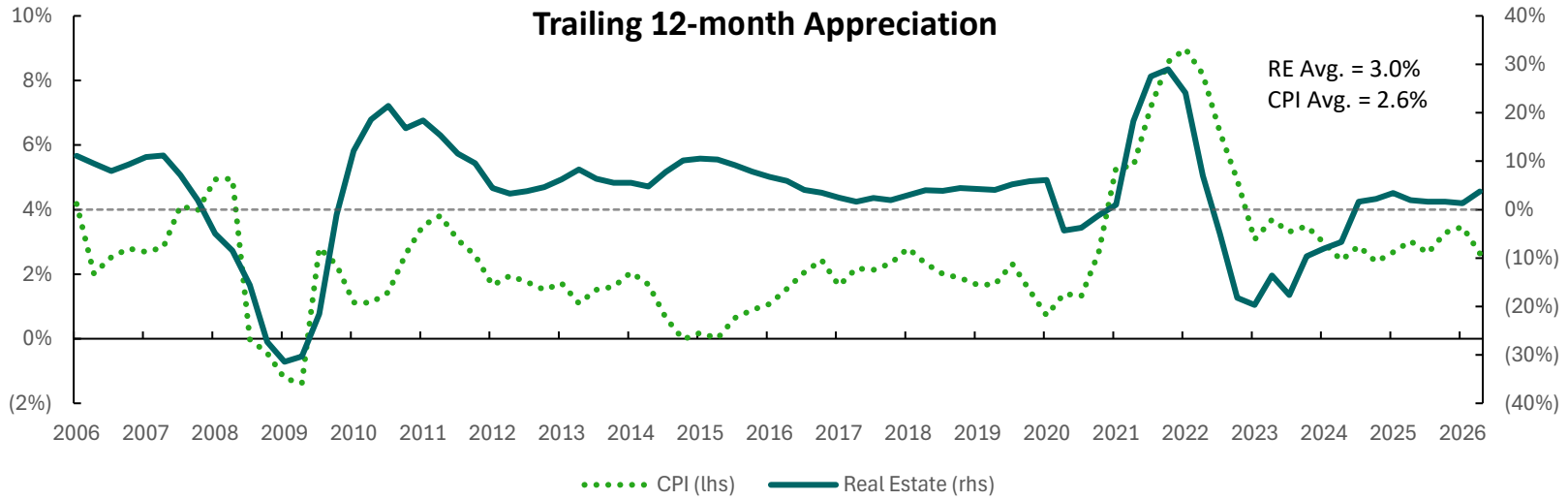


Sources: Green Street Advisors, Federal Reserve Bank of St. Louis as of June 2026

Markets:
Cap Rates, Appreciation, & Inflation



Sources: NCREIF All Properties Appraised Cap Rates, Moody's, Board of Governors of the Federal Reserve System

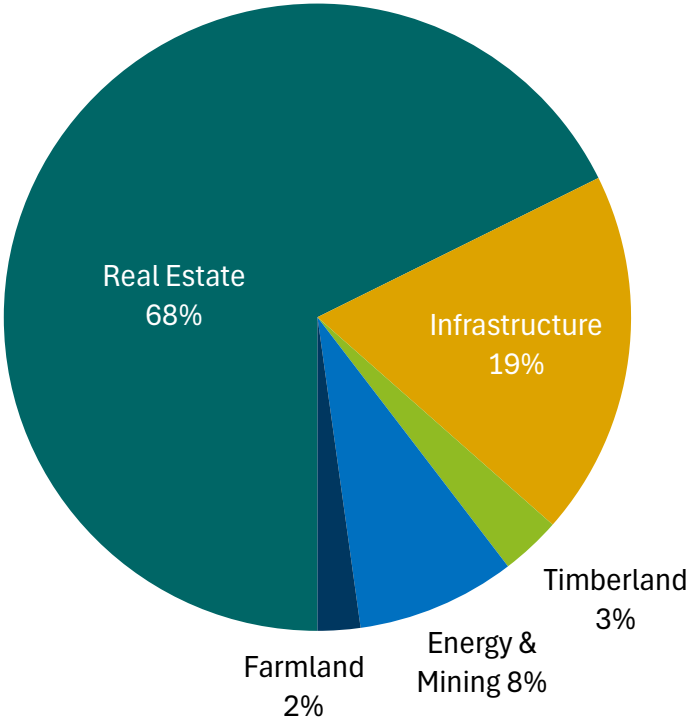


Source: Green Street Advisors, Federal Reserve.

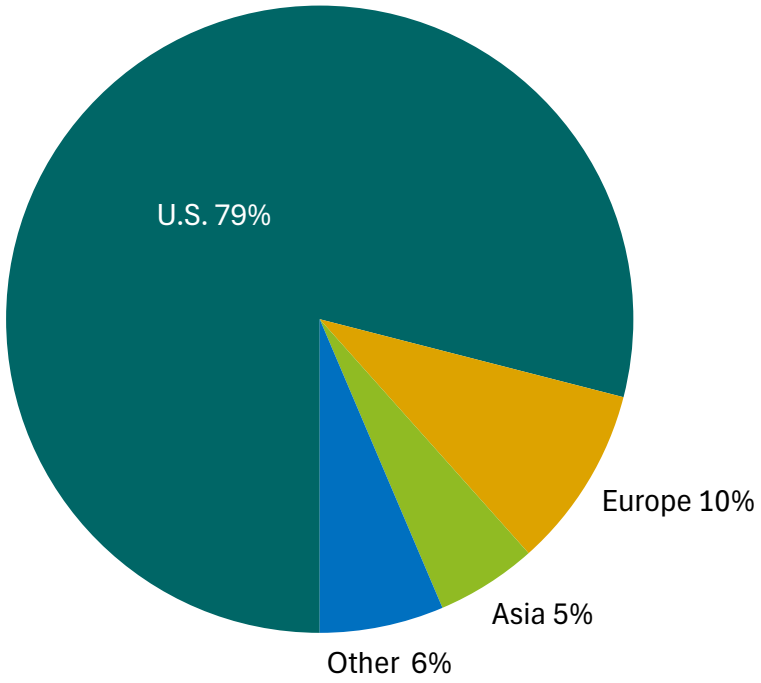
Exposures:
Sectors & Geography – 6/30/26

Current Market Value: $17.7 Billion

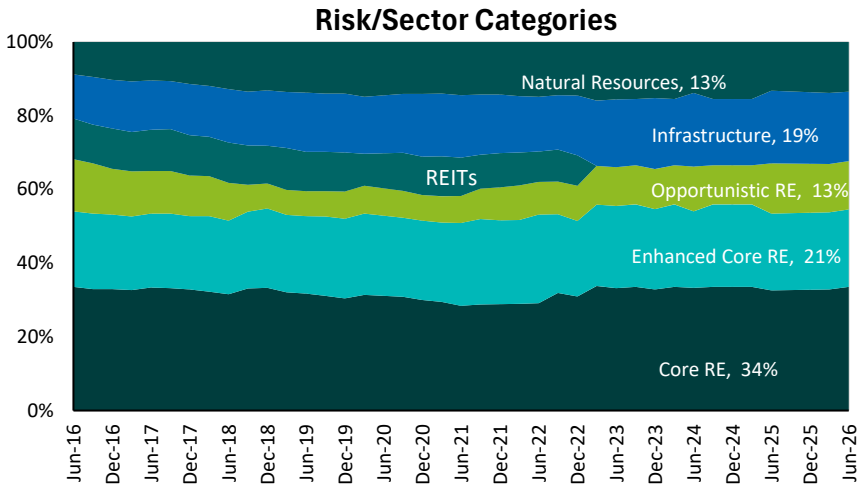
Sectors

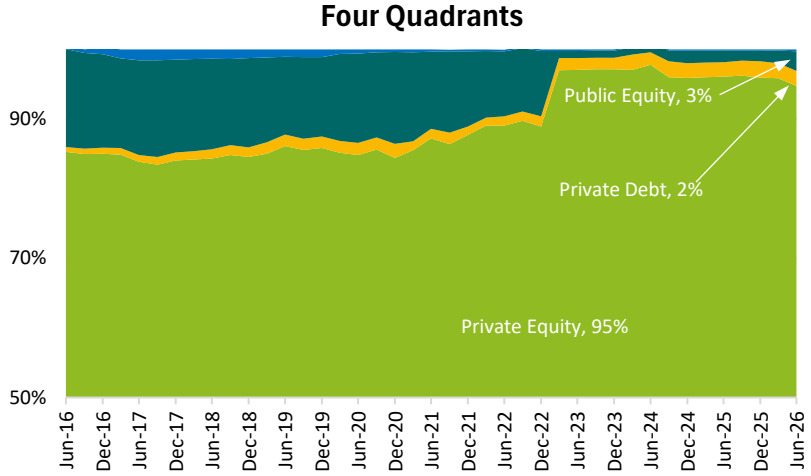


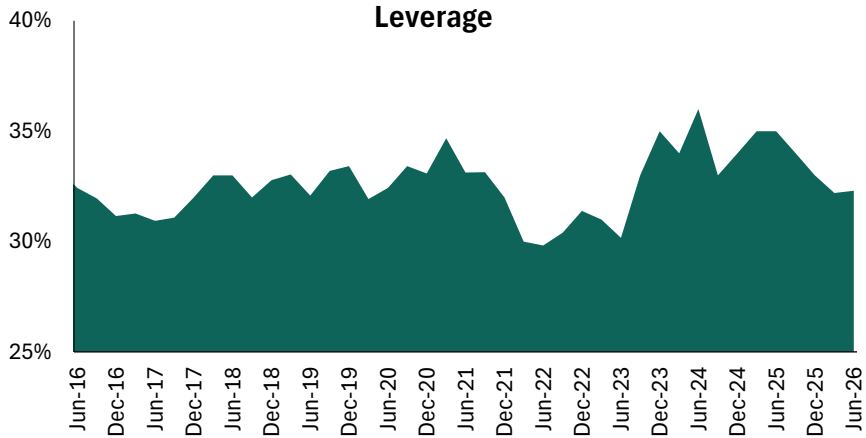
Geography

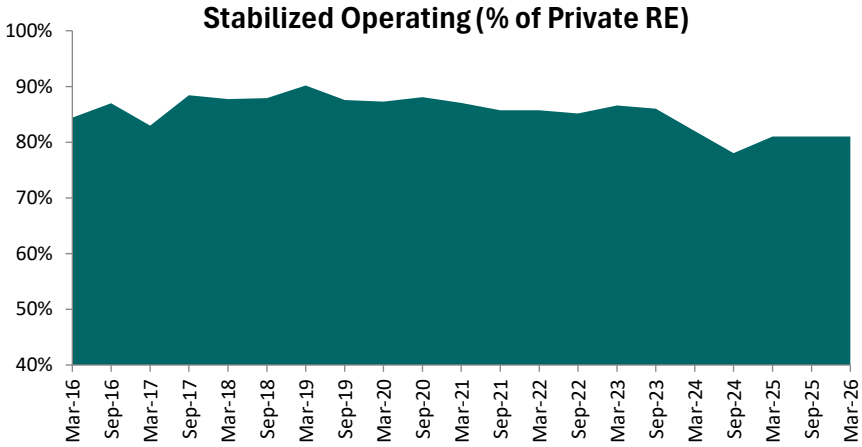


Exposures:
Risk Metrics – 6/30/26



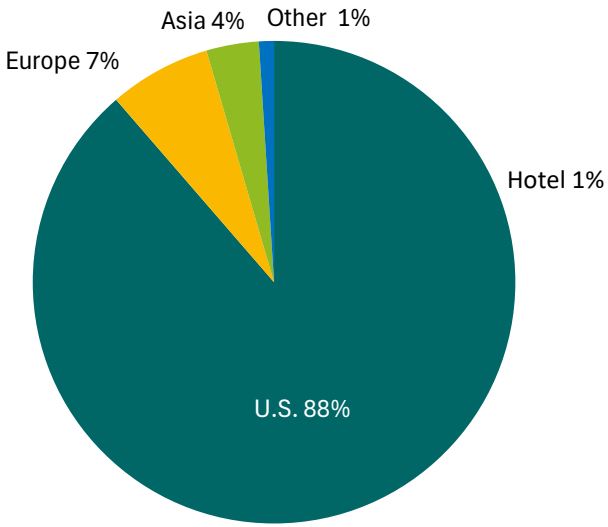




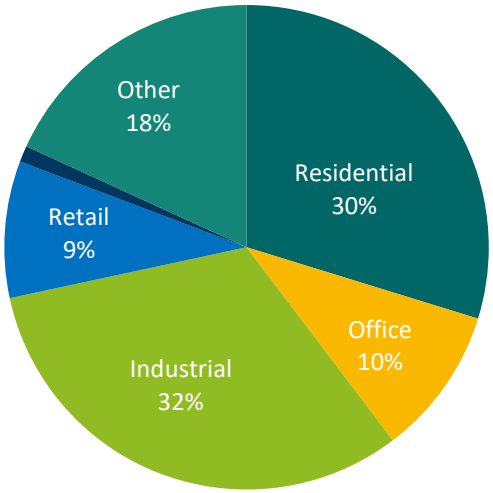


Exposures:
Real Estate – 6/30/26

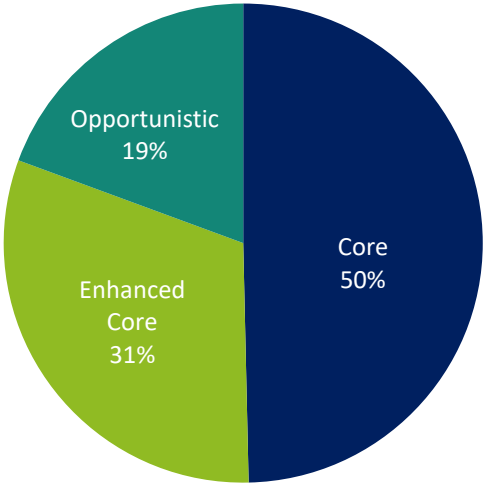
Geography



Property Type



Category

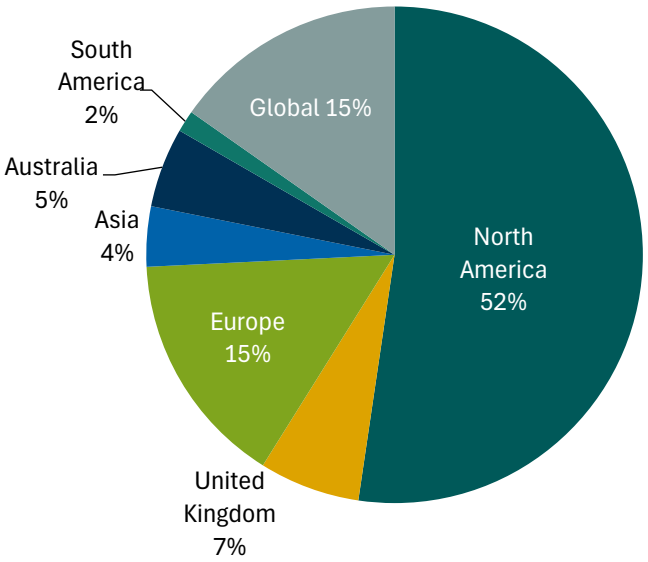


Market	# Accts.	Market Value ($MM)	Market Value %	Unfunded Commitment/Allocation ($MM)
Private	79	11,968	100	2,648

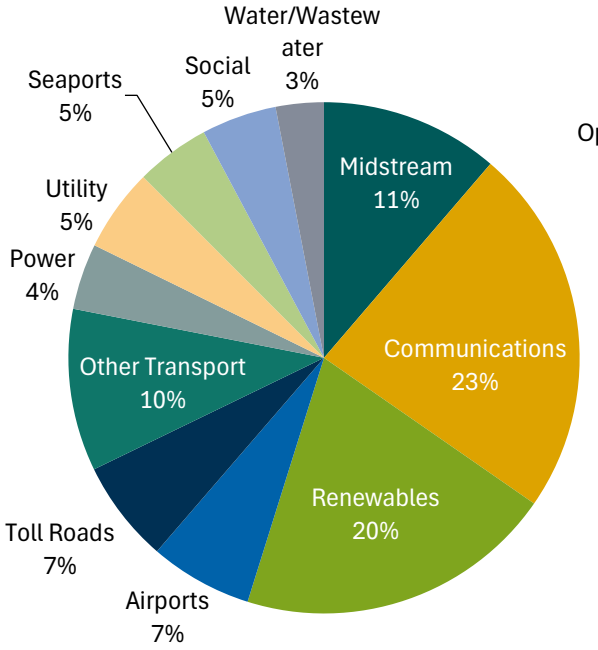
Source: BNY Mellon

Exposures: Infrastructure – 6/30/26

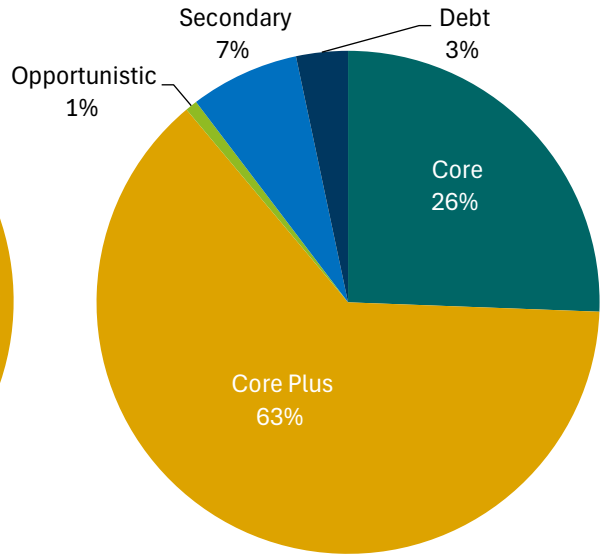
Geography



Sector



Strategy

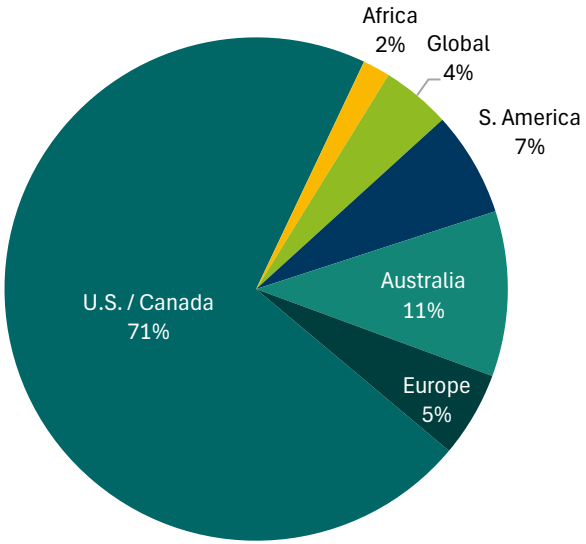


Market	# Accts.	Market Value ($MM)	Market Value %	Unfunded Commitment/Allocation ($MM)
Private	45	3,329	100	1,696

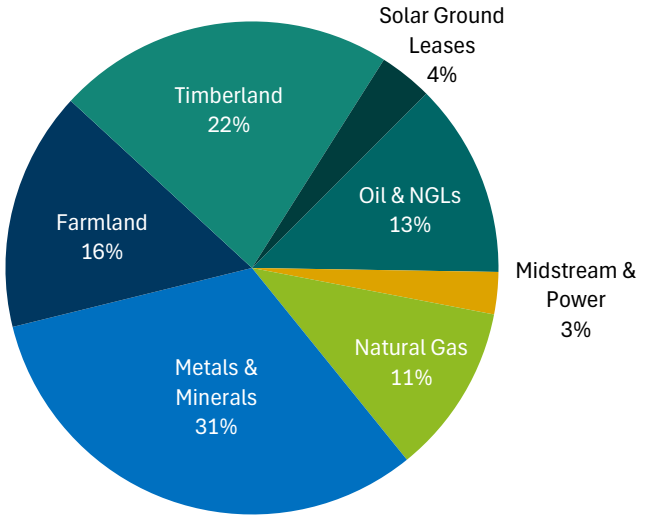
Source: BNY Mellon

Exposures:
Natural Resources – 6/30/26

Geography



Sector



Market	# Accts.	Market Value ($MM)	Market Value %	Unfunded Commitment/Allocation ($MM)
Private	32	2,278	95	895
Public	1	109	5	0
Total	**33**	**2,387**	**100**	**895**

Source: BNY Mellon

Results:
Portfolio Returns – 6/30/26

	10 Year	5 year	3 Year	1 Year	MV ($MM)
Total Real Assets	**6.9**	**5.8**	**2.3**	**6.7**	**17,684**
Strategic Benchmark	4.8	3.5	0.4	4.4	
Excess Return	2.1	2.3	1.9	2.3	
Private Real Estate	**6.8**	**5.8**	**0.4**	**4.9**	**11,968**
Benchmark	3.8	2.3	-2.8	3.1	
Excess Return	3.0	3.5	3.2	1.8	
Infrastructure	**10.0**	**8.6**	**6.7**	**6.9**	**3,329**
Benchmark	7.3	8.5	7.0	7.3	
Excess Return	2.7	0.1	-0.3	-0.4	
Natural Resources	**7.3**	**8.6**	**5.4**	**15.9**	**2,387**
Benchmark	7.3	8.5	7.0	7.3	
Excess Return	0.0	0.1	-1.6	8.6	

Source: BNY Mellon

Results: FY 2026

Tailwinds/Headwinds

Tailwinds: Diversity of the Real Assets portfolio
Strong fundamentals and operating cash flows within Core RE
Very strong energy & mining performance

Headwinds: Elevated interest rates pressured levered real estate and infra cash flows
Pressures on timberland valuations and harvest. Farmland headwinds

Largest Absolute Return Contribution:

	Absolute Return	% Contribution
Core RE	7.4%	2.4%
Energy & Mining	25.5%	2.0%
Infrastructure	6.9%	1.3%
Opportunistic RE	3.9%	0.5%
Enhanced Core RE	1.7%	0.3%
Timberland	3.4%	0.1%
Farmland	3.1%	0.1%
Total Real Assets		**6.7%**

Largest Relative Return Contribution:

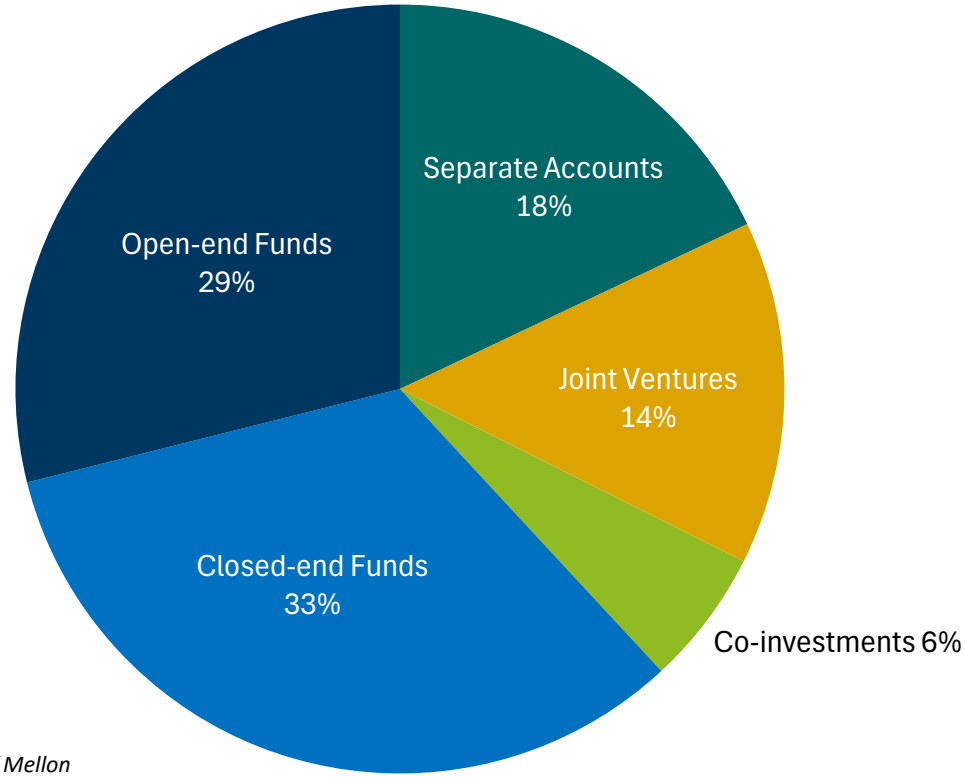
	Relative Return	% Contribution
Energy & Mining	18.2%	1.4%
Core RE	4.3%	1.4%
Opportunistic RE	0.8%	0.1%
Infrastructure	-0.5%	-0.1%
Timberland	-3.9%	-0.1%
Farmland	-4.2%	-0.1%
Enhanced Core RE	-1.4%	-0.3%
Total Real Assets		**2.3%**

Note: Exact figures vary due to rounding. Source: BNYM June 2026.

Co-investments: Real Assets Approach

- Objective is to fine-tune portfolio exposures and sector allocations by investing incremental capital alongside existing managers, generally with lower (or no) fees. Targeting approx. 1% (of RA program) in new activity per year
- Target investment size of +/- $30MM per co-investment (could be larger for portfolios)
- Real Assets team member responsible for the manager relationship runs point on co-investment activity from that manager. Deal teams formed as needed
- VRS staff makes the go/no-go call on investments in consultation with CIO and Managing Director of Private Assets. Investment authority sits with CIO
- Manager remains fiduciary
- Continual evaluation of co-investment processes across Private Assets for more consistency within VRS

Co-investments: Structure – 6/30/26



Source: BNY Mellon

Sector	Fiscal Year 2026 Commitments
Private RE	Five Co-investments – $296 Million
Infrastructure	One Co-investment – $35 Million
Natural Resources	One Co-investment – $10 Million

Managers:
Top 10 Investment Managers

Manager	# of Mandates	% of Program
PGIM	3	10.00%
Morgan Stanley	5	7.58%
Blackstone	12	6.70%
Clarion	1	5.19%
Industry Funds Management	3	4.59%
JP Morgan	2	4.29%
Carson Companies	4	3.60%
Pantheon Ventures	4	3.55%
Harrison Street	3	3.11%
Pritzker Realty Group*	2	2.99%

**DIME (Diverse Investment Management Engagement) firm*

Managers: Diverse Investment Management Engagement (DIME)

Resources				
Townsend	**Artemis**	**Hamilton Lane**	**Pantheon**	**Aksia**
▪ Real Estate ▪ Infrastructure	▪ Real Estate	▪ Real Estate	▪ Infrastructure ▪ Nat Resources	▪ Infrastructure ▪ Nat Resources

15 interactions with 14 potential DIME managers in the 12 months ending 6/30/2026

Manager	Sector	Vintage	Comm./Alloc. ($MM)
Capri/EGM JV	Real Estate	2014	300
Grain Infra	Infrastructure	2012	75
Pritzker JV	Real Estate	2012	232
Pritzker JV II	Real Estate	2015	200
Sheridan Production Partners III	Natural Resources	2014	72
		Total	**879**

Note: In addition to chart above, Real Assets had three additional DIME managers within the Artemis Income & Growth II and Hamilton Lane Separately Managed Accounts as of June 30 split between three fund commitments and one co-investment.

Looking Forward

- Continue active portfolio management – especially given ongoing uncertainty with market conditions where cash flow matters
- Focus on objectives & risk
- Prudent work in continuing to close the underweight to our targeted allocation. Staff continues to be creative to find opportunities in the current market environment

Private Equity

John Alouf
Program Director



Virginia Retirement System®

Agenda:
Private Equity Annual Review Topics

- Overview
- Markets
- Exposures
- Results
- Managers
- Co-investments
- Looking Forward

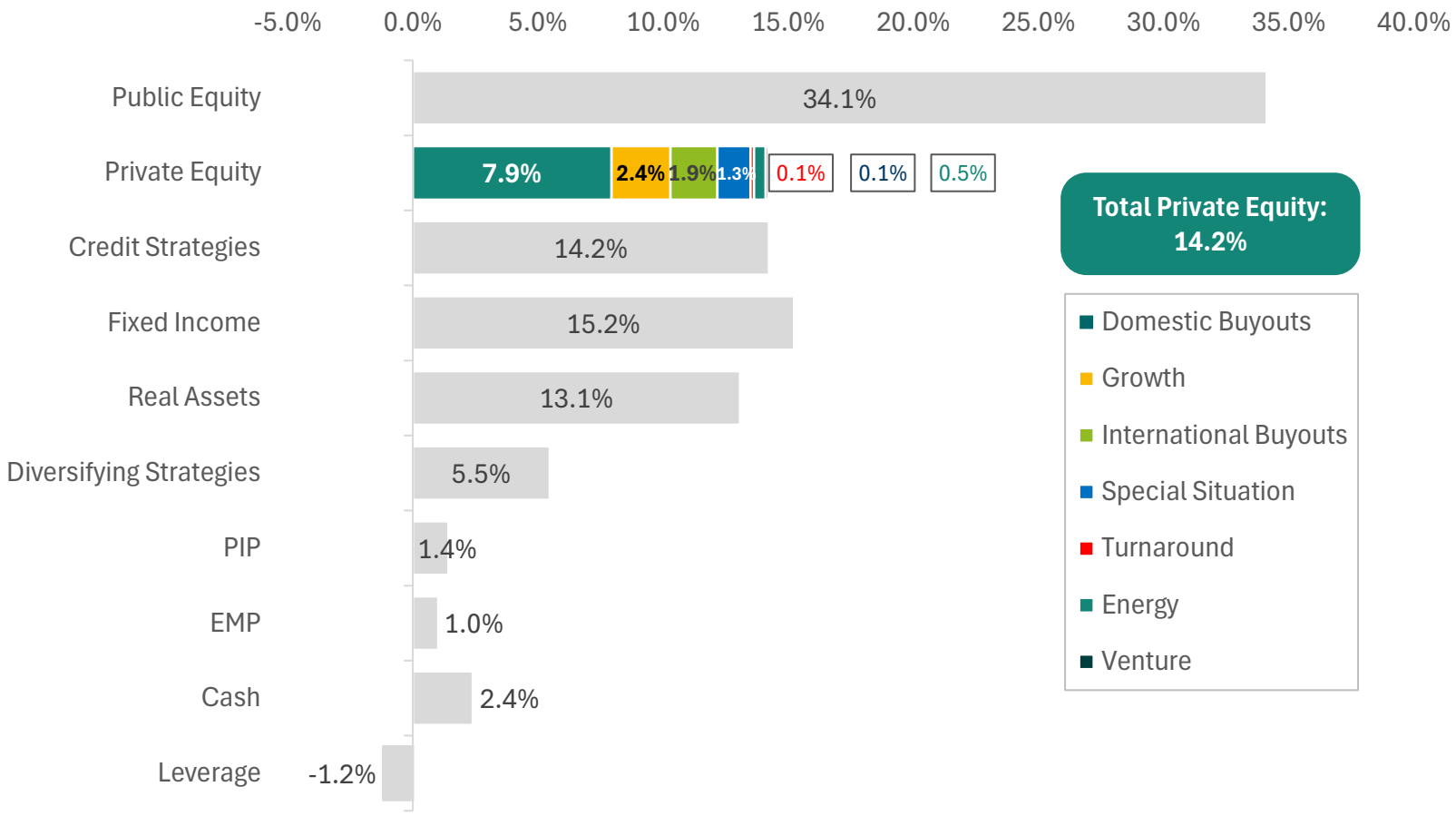
Overview: Team Members

Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
John Alouf	**Director**	**MBA**	**CFA**	**32**	**26**
Peter Murphy	Senior Portfolio Manager	BBA	CFA	26	15
Rob Voeks	Senior Portfolio Manager	PhD		29	12
De'Von Jones	Senior Investment Officer	BBA	CFA	16	7
Taylor Irvin	Senior Investment Officer	BBA	CFA	15	1
Viet Tran	Investment Officer	MS	CFA	6	5
Trib Singh	Senior Investment Analyst	MS		4	2
Cecilia Jones	Portfolio Assistant	BA		2	2

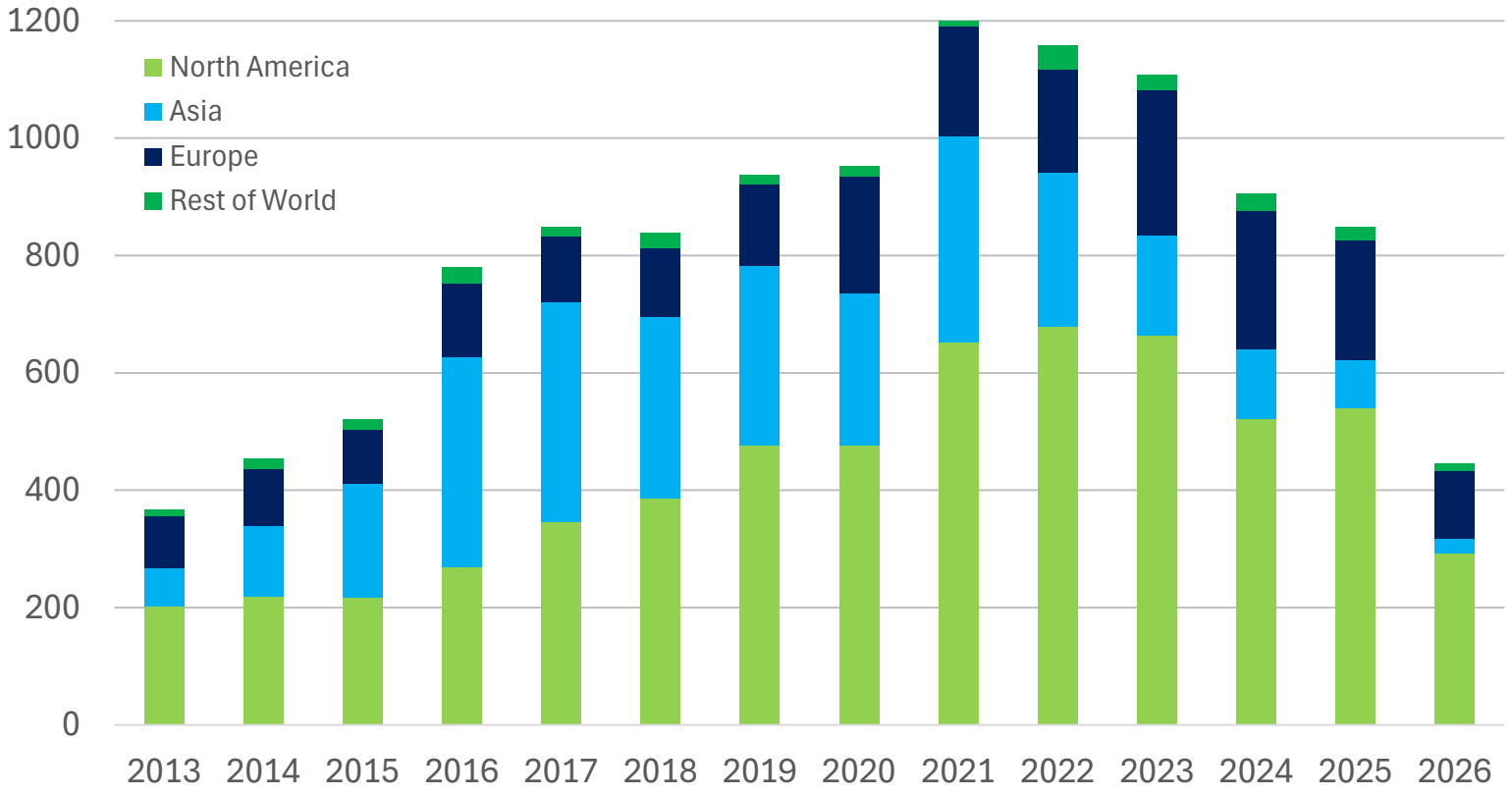
Overview: Philosophy

- Private equity is an active ownership strategy. The allocation is expected to achieve a meaningful long term return premium over the public equity market.
- Allocate capital to managers & strategies in which we have a high degree of confidence, not necessarily to the asset class.
- Disciplined annual commitments helps dampen the impact of market peaks.

Overview:
Asset Allocation – 6/30/26

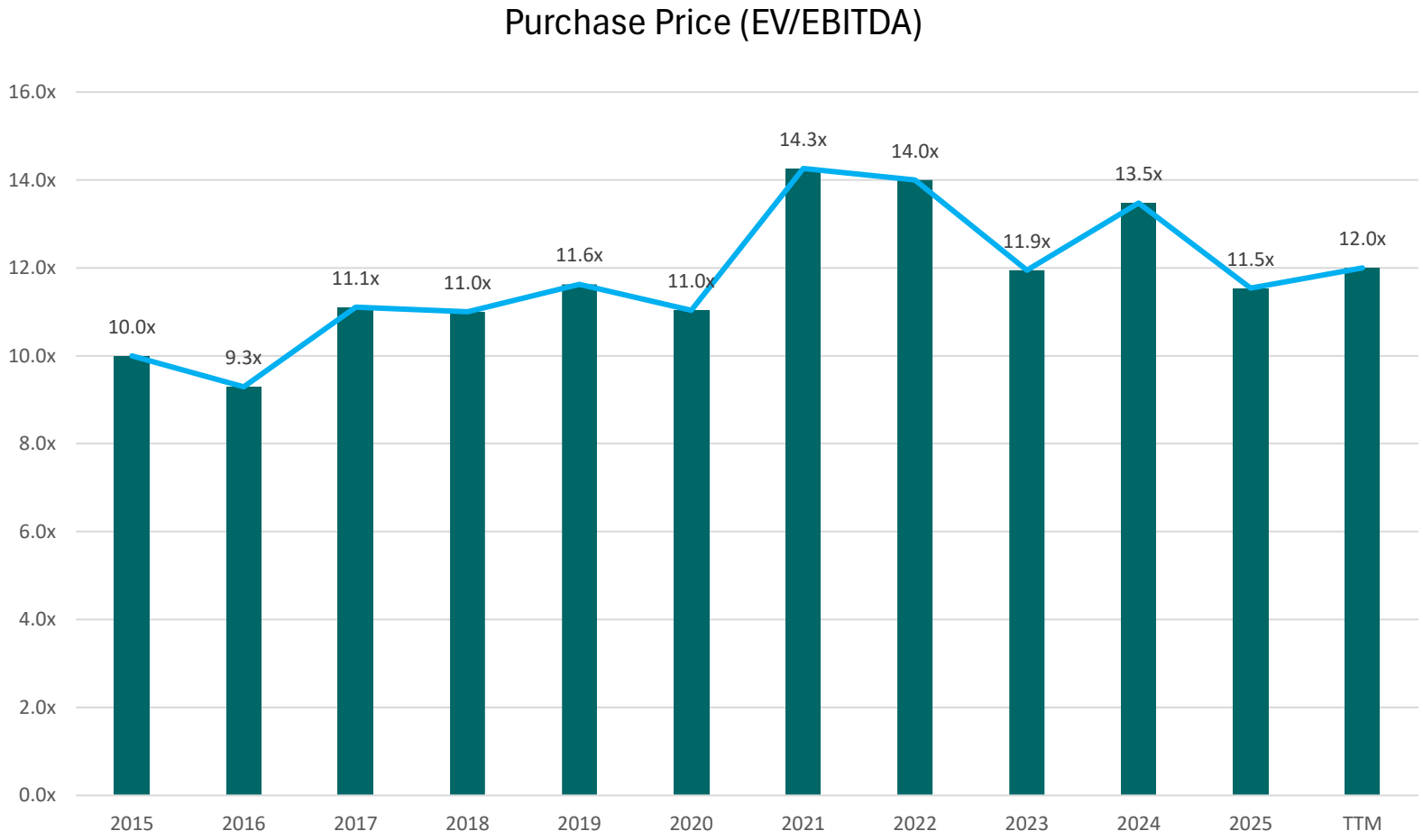


Markets:
Global Private Equity Fundraising ($B)



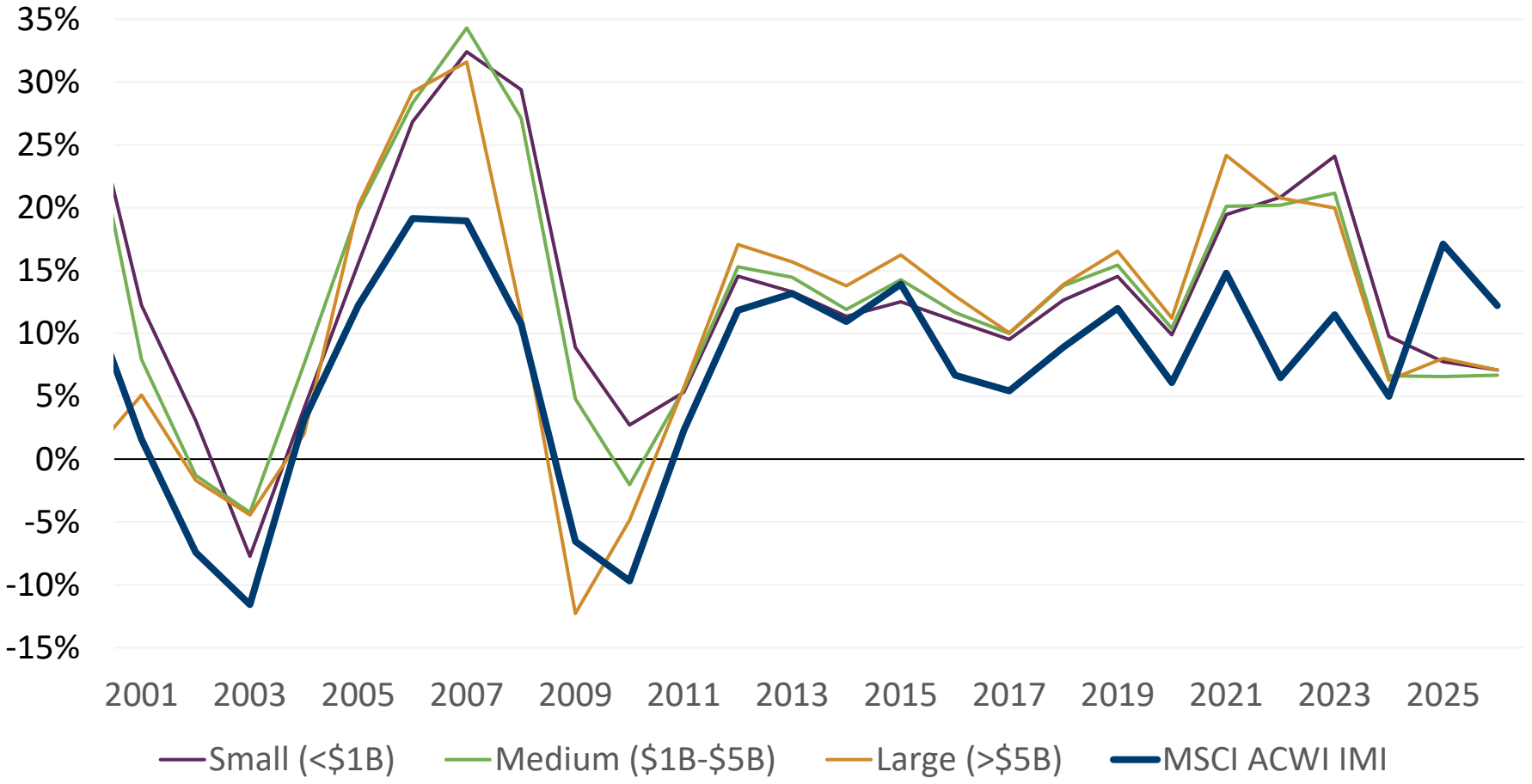
Source: Preqin.
Note: 2026 is through the first six months of the year.

Markets:
Median North America Buyout Multiples



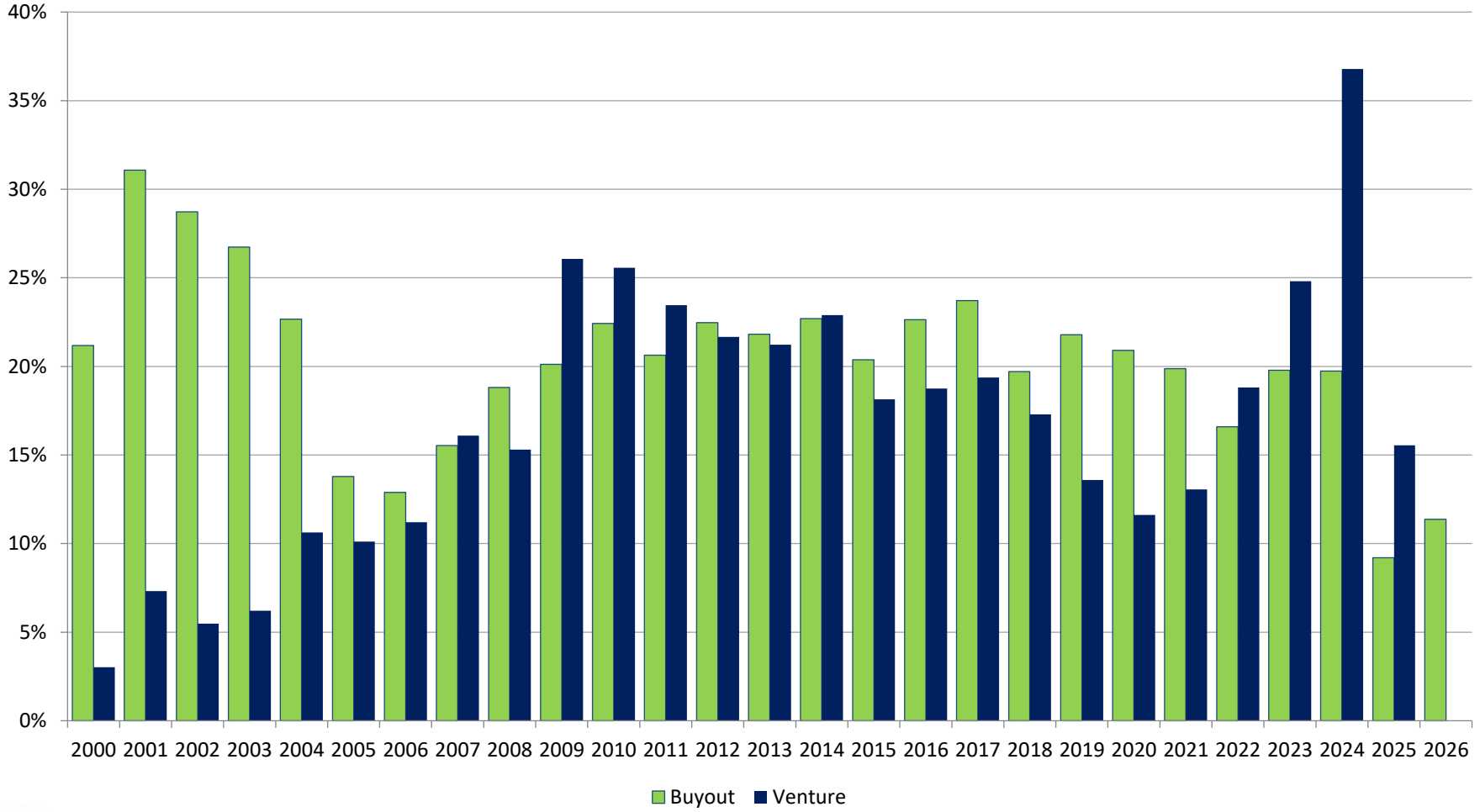
Source: GCM Grosvenor, Pitchbook (6/30/26)

Markets:
Rolling 3-Year Returns By Fund Size



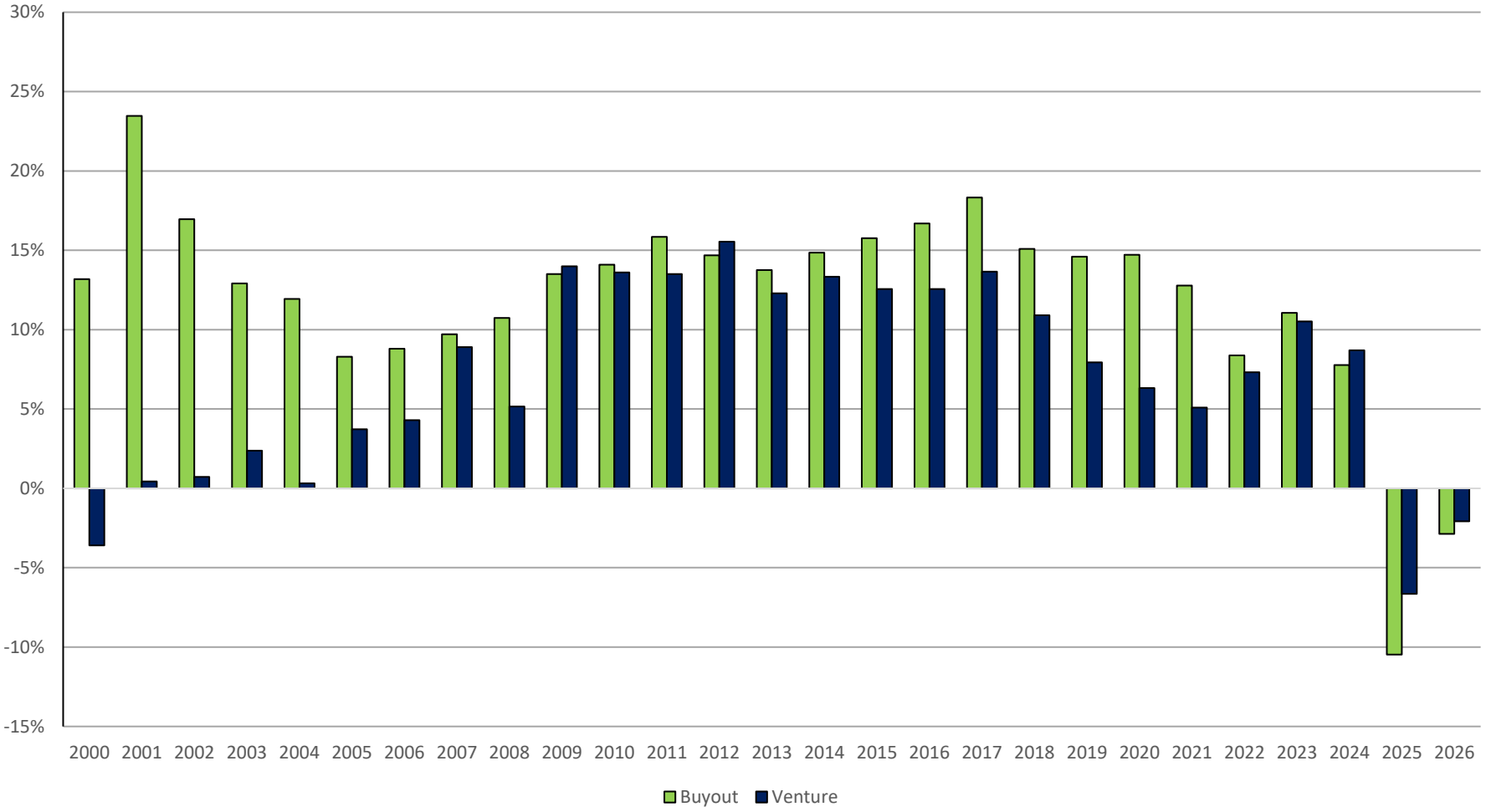
Source: PrivateIQ/ MSCI (Burgiss) – Global Private Equity and MSCI information.
Note: Rolling 3-year returns end 6/30 of each year.

Markets:
First Quartile Returns: Buyout and Venture



Source: MSCI (Burgiss) Global Data

Markets:
Median Returns: Buyout and Venture



Source: MSCI (Burgiss) Global Data

Markets:
Existing Investments & Liquidity

- **Existing Investments**
  - Valuations in line with expectations.
  - Growth has slowed but companies overall are performing.
  - Go forward returns appear attractive.
- **Liquidity**
  - Behind expectations: higher interest rates, buyer/seller valuation spread, AI uncertainty, tariffs, wars, etc.
  - Premier assets are the most actionable
  - Continuation Vehicles

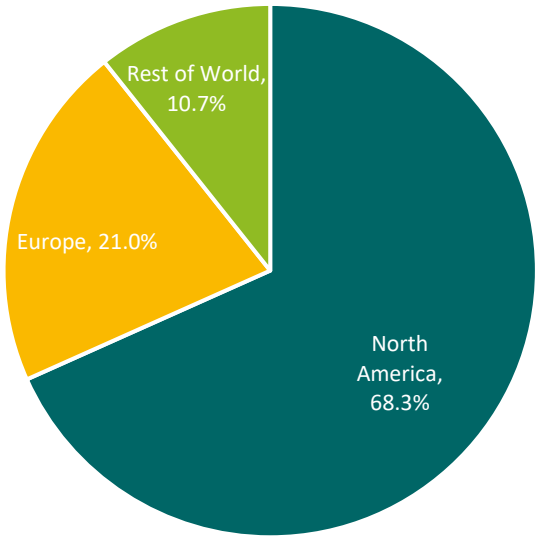
Markets:
Investing in the Midst of AI Uncertainty

- Are there defensive barriers or moats?
  - Proprietary Data
  - High Cost of Failure
  - Highly Regulated
  - High Switching Costs

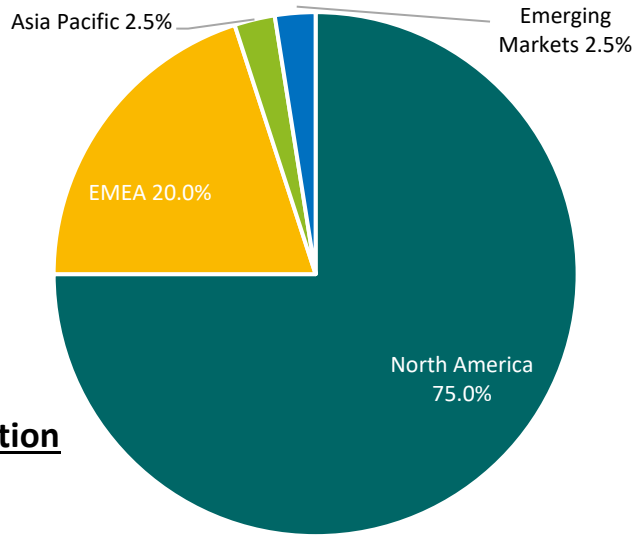
- Revenue Growth: product innovation, pricing evolution, customer expansion, cross-sell activity.
- Margin Expansion: R&D cost reduction, customer support improvement, sales and marketing efficiency.

Exposures: VRS vs. Benchmark

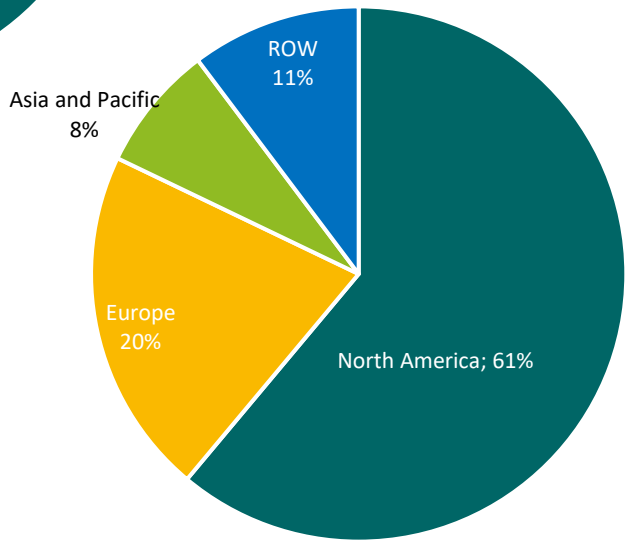
VRS Private Equity



Custom MSCI ACWI IMI



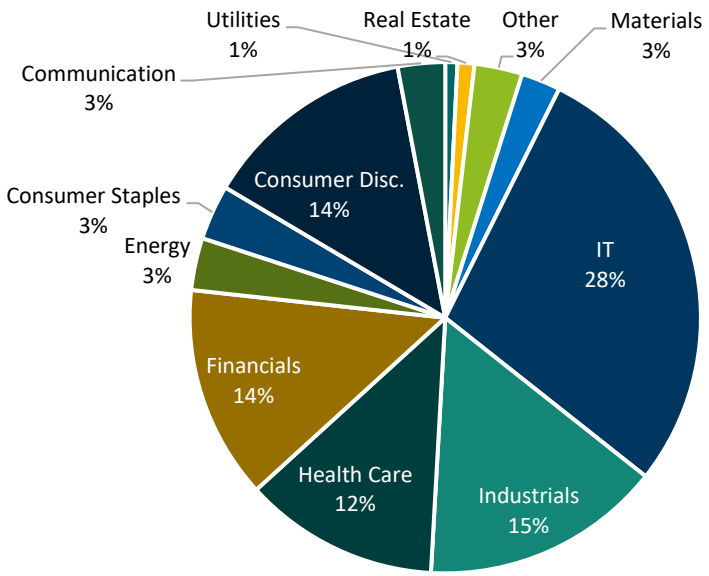
MSCI/Burgiss PE BM Allocation



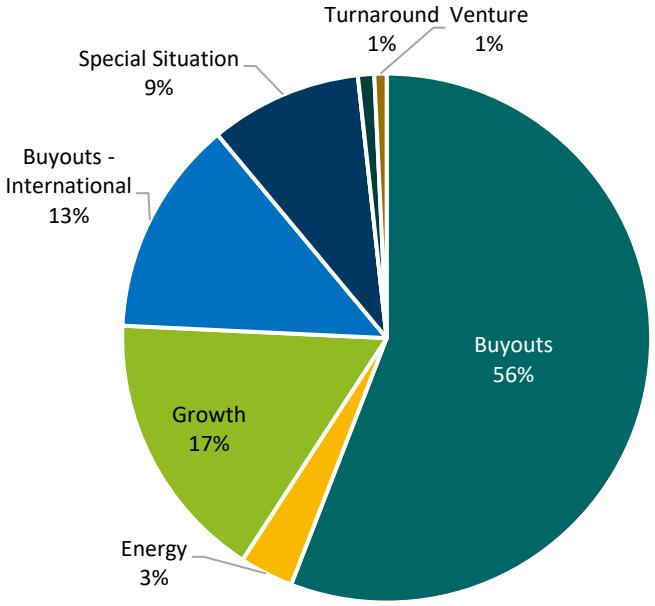
Information based on 6/30/2026 manager information.
Custom MSCI ACWI IMI benchmark removes countries deemed "foreign adversaries". Burgiss PE

Exposures: Position Weighting

Industry

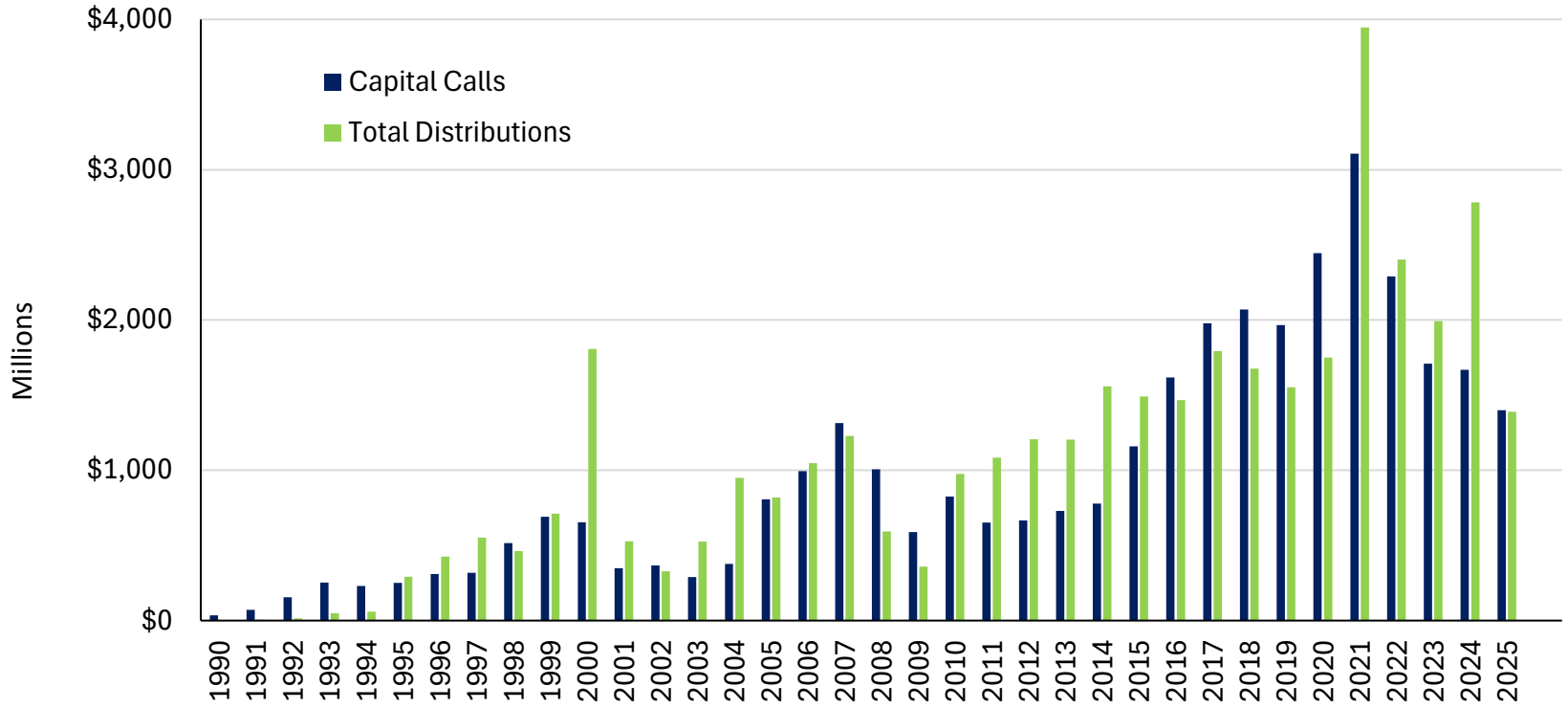


Sector



Industry chart based on 6/30/2026 manager information. Sector chart based on 6/30/2026 BNY Mellon information.

Results: Annual Cash Flows ($MM)



Since inception, net cash flow to VRS of $5.9 billion

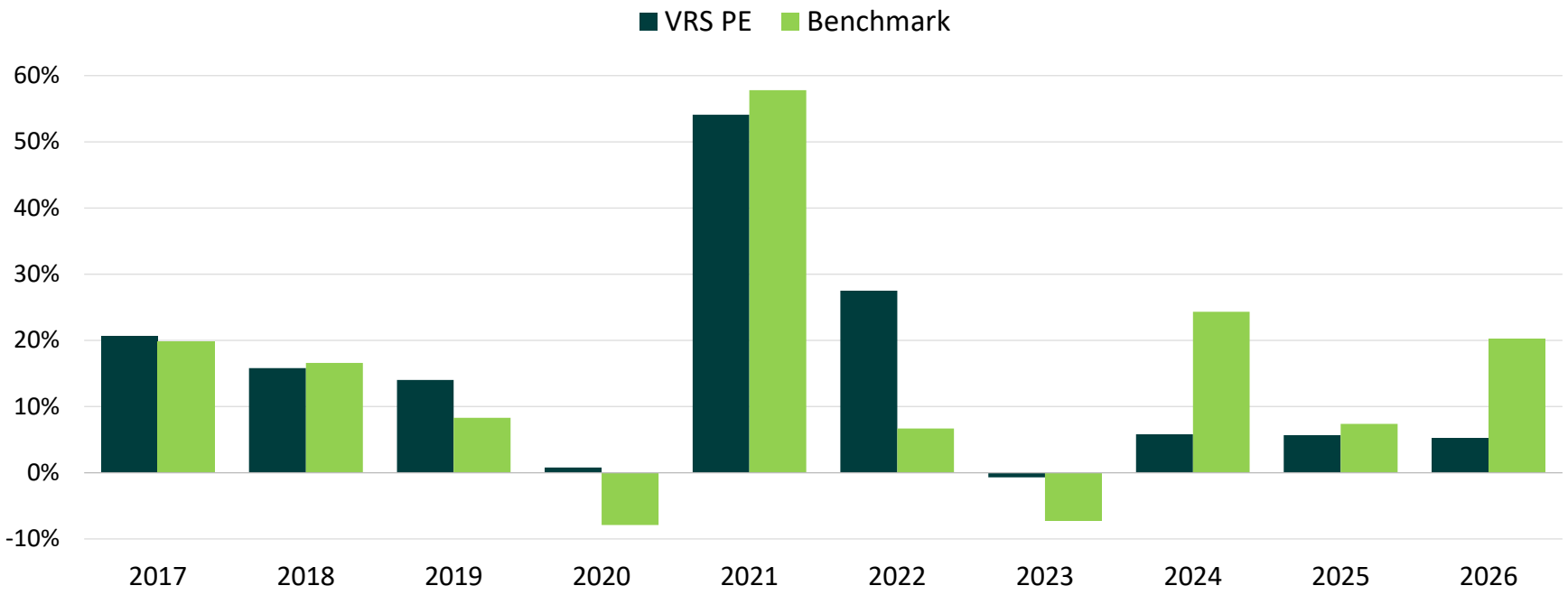
Note: 2026 is through the first seven months of the year.

Results:
Time-Weighted Performance – 6/30/26

	10 Year	5 year	3 Year	1 Year	MV ($MM)
Total Private Equity	13.9	8.3	5.6	5.2	**19,217**
Strategic Benchmark*	13.3	9.7	17.1	20.3	
Excess Return	**0.6**	**-1.4**	**-11.5**	**-15.1**	
Buyouts	14.8	8.2	5.4	4.9	10,737
Energy	7.4	16.1	10.4	15.4	632
Growth	18.6	6.8	6.4	3.6	3,185
Int'l Buyout	12.7	6.7	5.0	4.5	2,538
Special Situations	12.9	10.7	6.2	11.2	1,787
Turnaround	10.1	5.9	-1.9	-11.1	190
Venture	13.0	12.7	6.9	22.2	144

*Note: *Benchmark: Russell 3000 + 250 basis points through 6/30/2013; MSCI ACWI 50% hedged + 250 basis points through 6/30/2020; MSCI ACWI IMI through 12/31/2023; MSCI ACWI IMI Special Weighted (75% North America, 20% Europe, and 5% Asia and Emerging Markets) thereafter. Foreign adversaries removed from benchmark as of 7/1/2025. Strategic benchmark is lagged three months to match the delay in private equity reporting.*

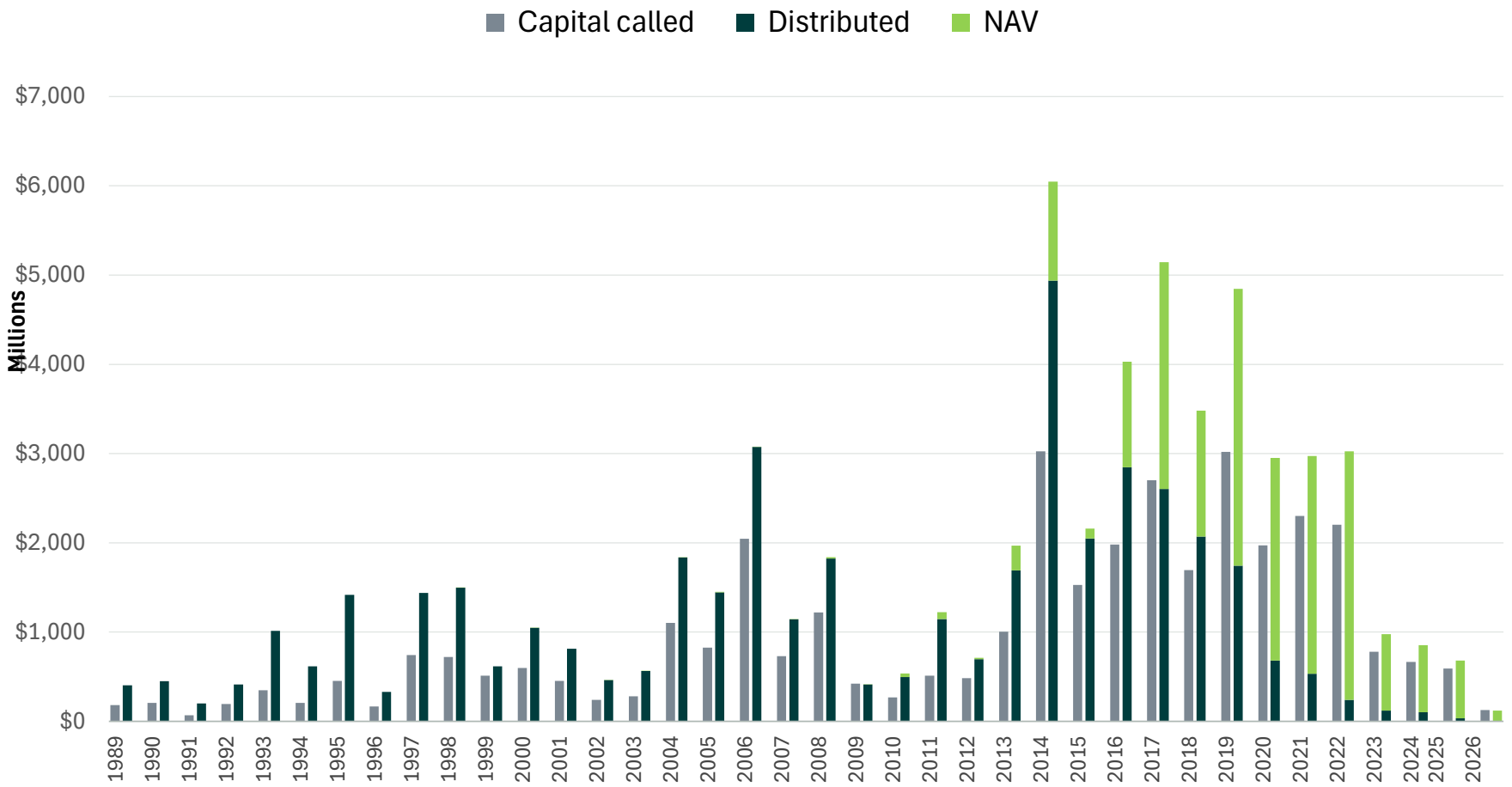
Results:
Fiscal Year Returns



Fiscal year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
VRS PE	20.60%	15.80%	14.00%	0.80%	54.10%	27.50%	-0.70%	5.80%	5.70%	5.20%
Benchmark	19.90%	16.60%	8.30%	-7.90%	57.80%	6.70%	-7.30%	24.30%	7.40%	20.30%
Alpha	0.7	-0.8	5.7	8.7	-3.7	20.8	6.6	-18.5	-1.7	-15.1

Virginia Retirement System®

Results:
Snapshot by Vintage Year



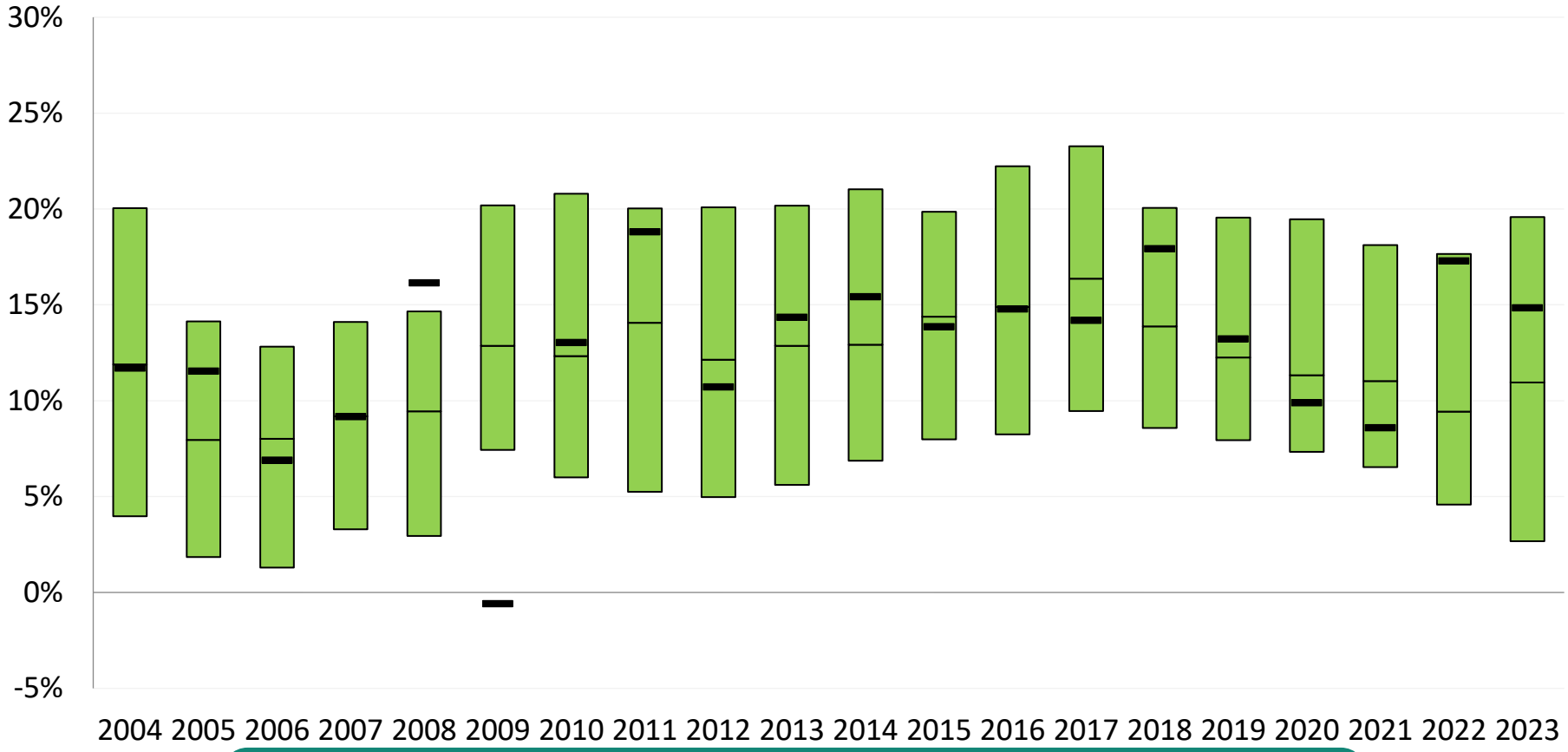
Vintages 2021 and earlier account for **74% of NAV**

Virginia Retirement System®

Results: Headwinds/Tailwinds

- **Tailwinds**
  - Companies with recurring revenue
  - Utilizing AI to improve company performance
  - Overallocated LPs
- **Headwinds**
  - Slowing economic growth
  - Emergence of evergreen structures
  - AI uncertainty
  - Strong public equity returns

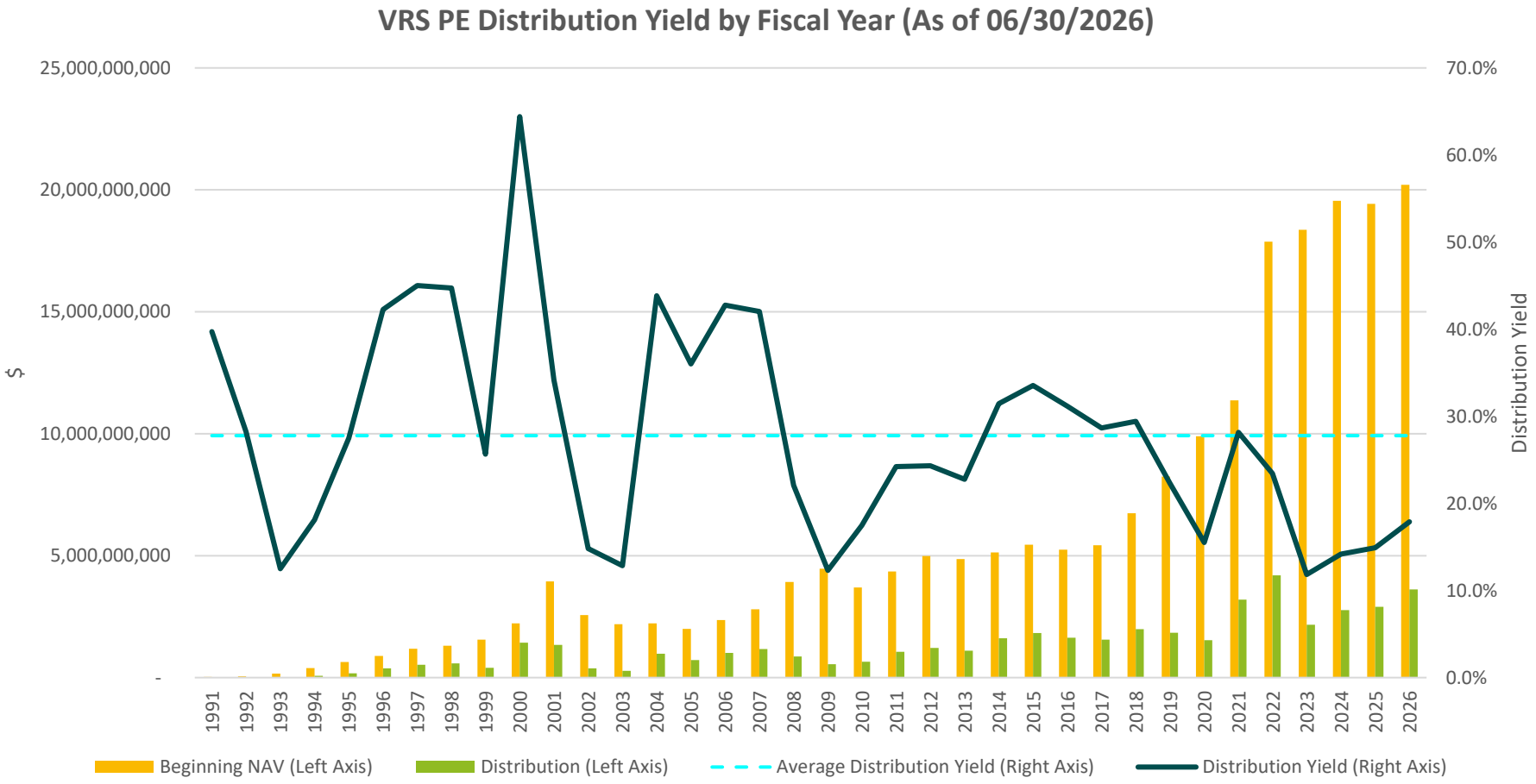
Results:
VRS Relative IRR By Vintage Year



- Floating bars represent quartile return spreads by vintage year. Line in floating bar is the median return.
- VRS vintage year returns marked by "—".

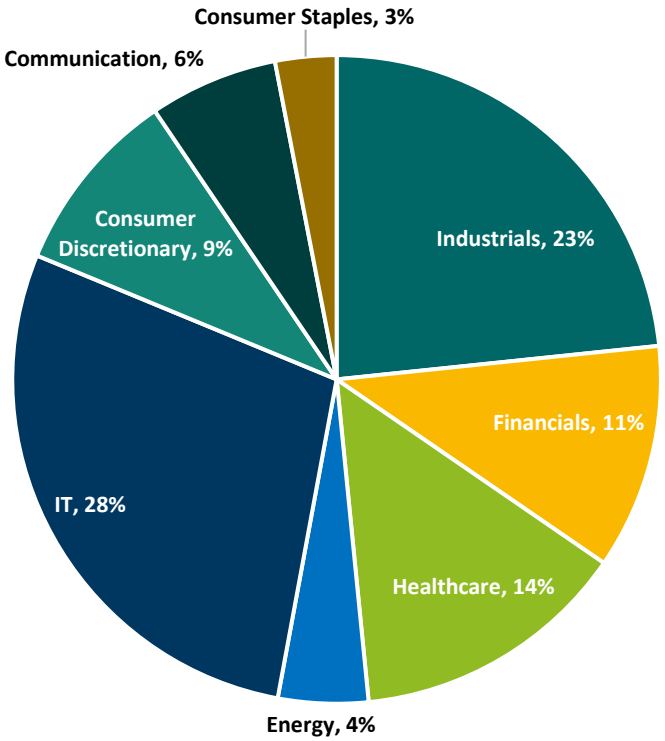
Source: Private I/MSCI (Burgiss) – Global Private Equity.
Note: As of 6/30/2026.

Results:
VRS Distribution Yield by Fiscal Year



Source: Private I/Burgiss.
Note: As of 6/30/2026.

Co-investments: Portfolio Exposures By Sectors(1)



- 102 investments totaling $2.8 billion cost since April 2013
- Investments made with 31 existing GPs
- Size range: $7-60 million ($27 million average size)

Note: As of 6/30/2026.
1. Section exposure based on invested capital.

Co-investments: VRS Co-investment Program

- 1.5 dedicated professionals to manage the initiative with support from the remaining private equity staff
- Anticipated annual commitments of $750 million+
- Target investment size of $20-75 million per investment
- VRS has reviewed approximately 354 potential opportunities from existing and non-existing GPs and has made 102 investments
- Increased company allocations typically with no fees or carry

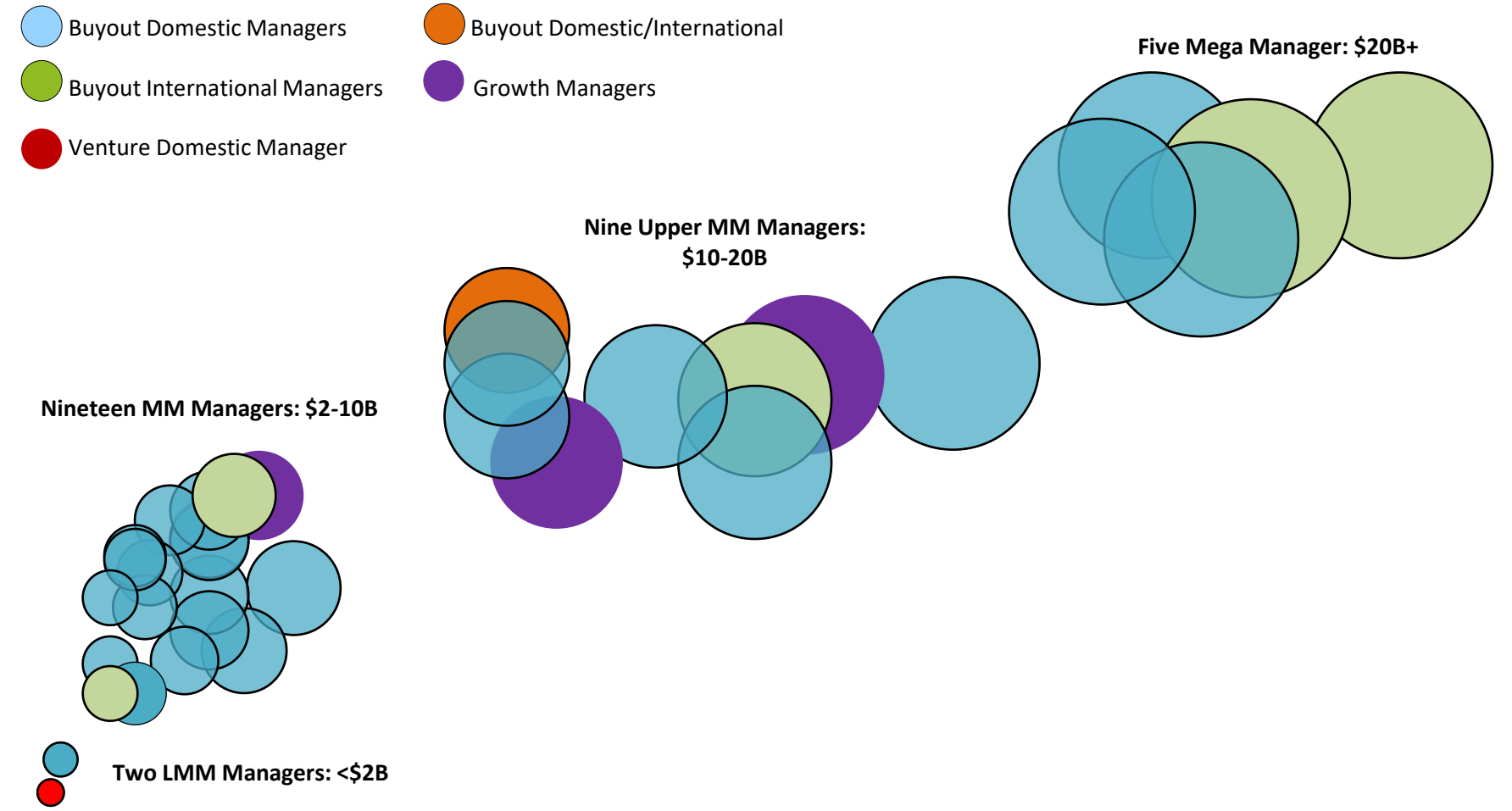
Focused on sourcing & executing opportunities alongside high conviction GPs in which VRS has a commitment

Managers:
Top Ten Investment Managers

Manager	Exposure
VRS Co-Investments	10.6%
GCM Grosvenor	7.6%
Hellman & Friedman	5.1%
TA Associates	4.5%
General Atlantic	4.2%
GTCR	4.0%
Apax Partners	4.0%
Bain Capital Partners	3.7%
Stone Point Capital	3.6%
CVC Capital Partners	3.5%
Total	**50.8%**

Note: Market values as of 3/31/2025 and unfunded commitments through 7/1/26.

VRS GP Diversification: 35 Active Managers



Diverse Investment Management Engagement (DIME)

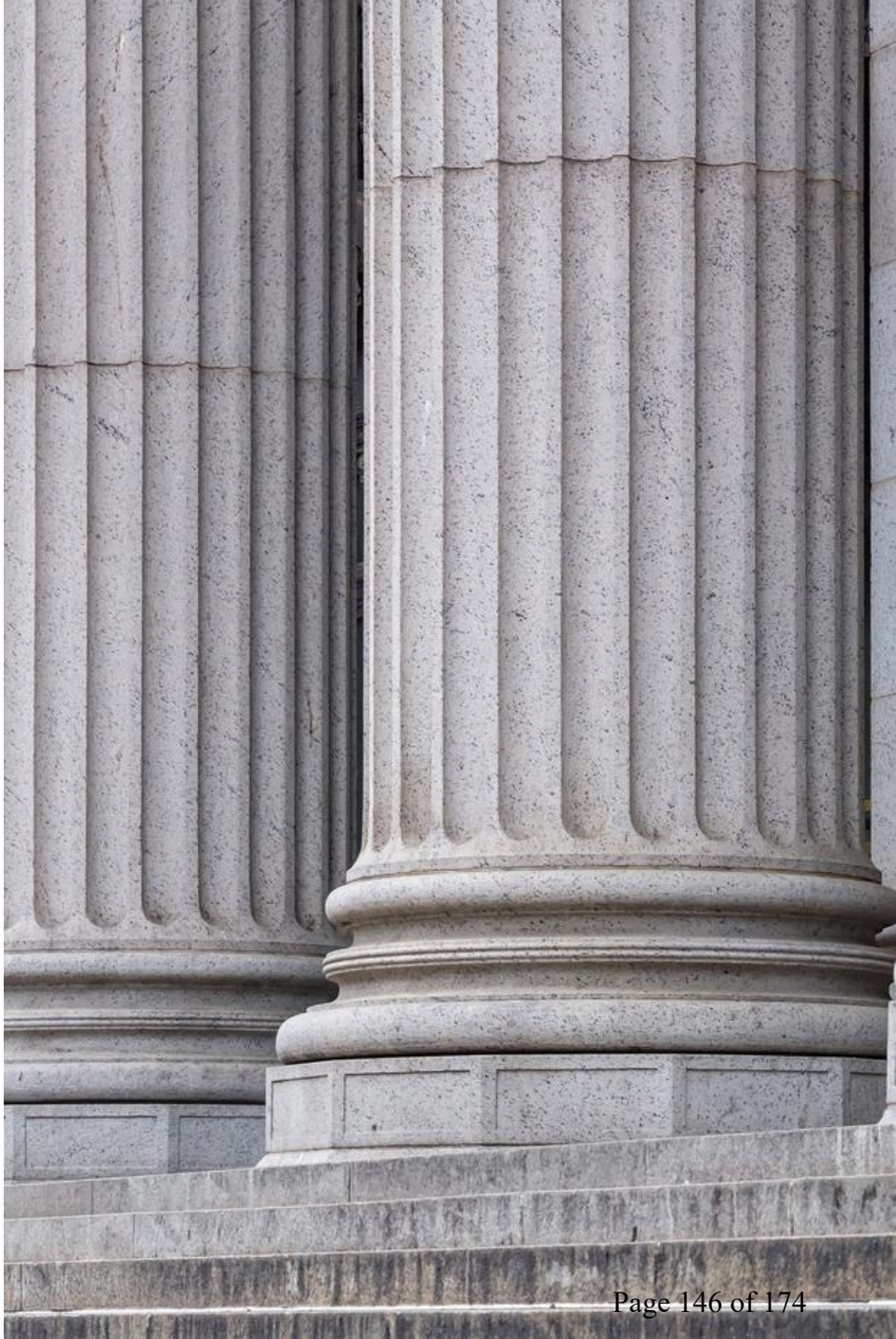
- Seven existing in-house relationships
  - Asia Alternatives
  - Clearlake
  - MBK Partners
  - Siris
  - Sycamore
  - Veritas
  - Vista Equity
- 28 potential manager meetings in FY 2026
- Five relationships through GCM Grosvenor
- Quarterly reports from GCM Grosvenor

Looking Forward

- Maintain modeled commitment pace
- Increase direct/fee advantaged investment allocation
- Lean into conviction
- Selectively add new relationships

Credit Strategies

Steve Woodall
Program Director



Virginia Retirement System®

Agenda:
Credit Strategies Annual Review Topics

- Overview
- Markets
- Exposures
- Results
- Co-investments
- Managers
- Looking Forward

Overview: Team Members

Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve Woodall	**Program Director**	**MBA**	**CFA, CAIA**	**22**	**21**
Perry Corsello	Portfolio Manager	MBA	CFA	36	15
Erica Billingslea	Senior Investment Officer	MA		14	14
Matt Bennett	Investment Officer	MBA		17	17
Kevin Bliss	Senior Investment Officer	MBA		12	5
Shawn Rabalais	Senior Investment Analyst	MSc	CFA III Candidate	4	2
Kelly Baker	Portfolio Assistant	AAS		18	11

Overview: Credit Strategies

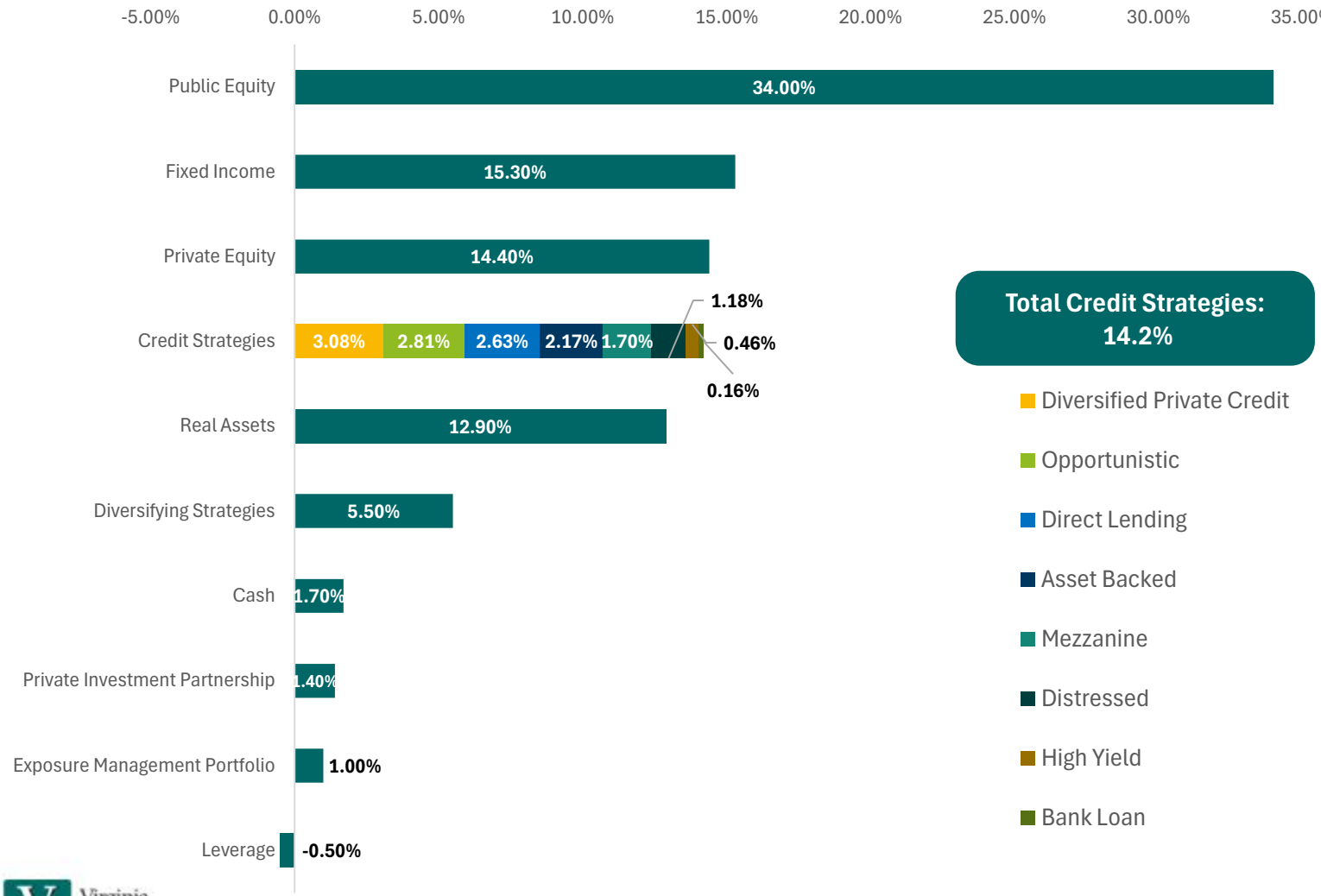
Primary Focus

- Income generation and attractive total returns from investments in privately-originated debt and opportunistic credit strategies

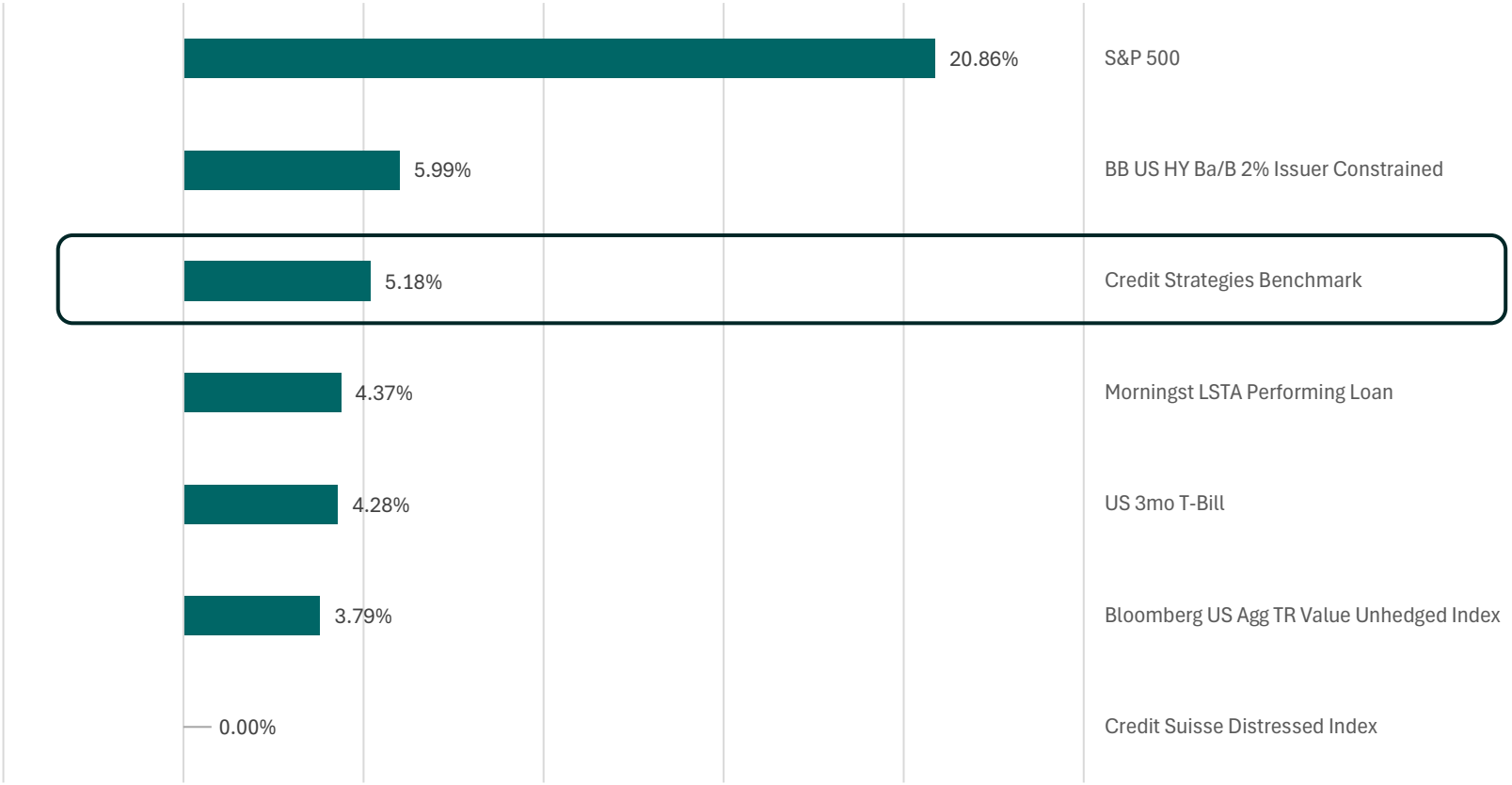
Program Objective

- Generate an attractive risk adjusted return relative to the program benchmark (a 50/50 blend of senior secured term loans and high yield bonds)

Overview:
Asset Allocation - 6/30/26

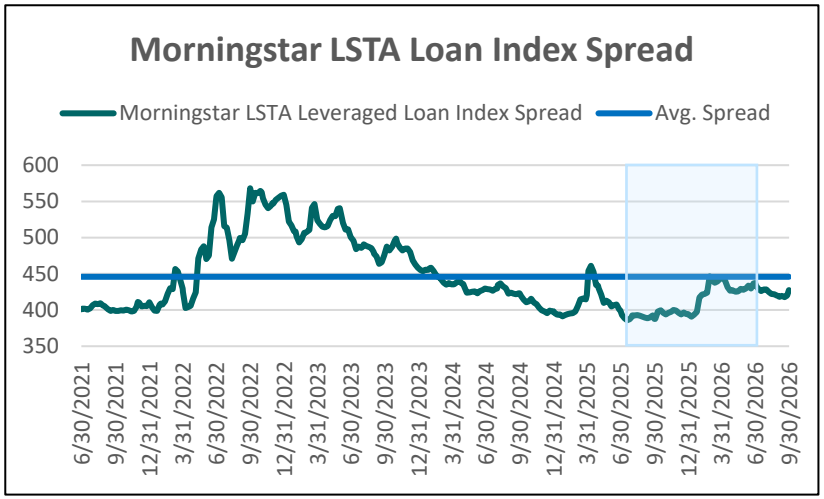


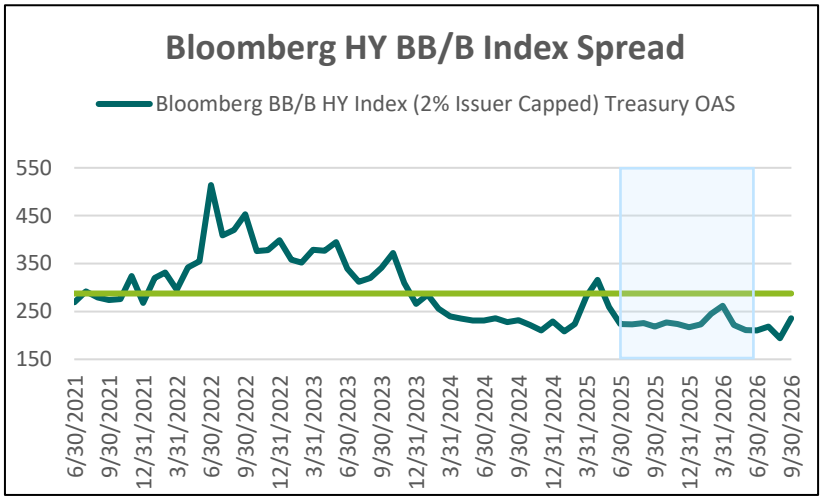
Markets:
FY26 Index Returns

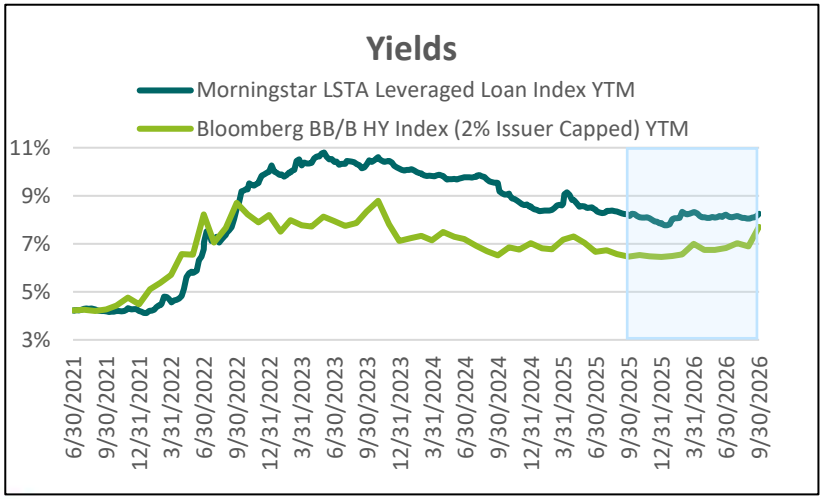


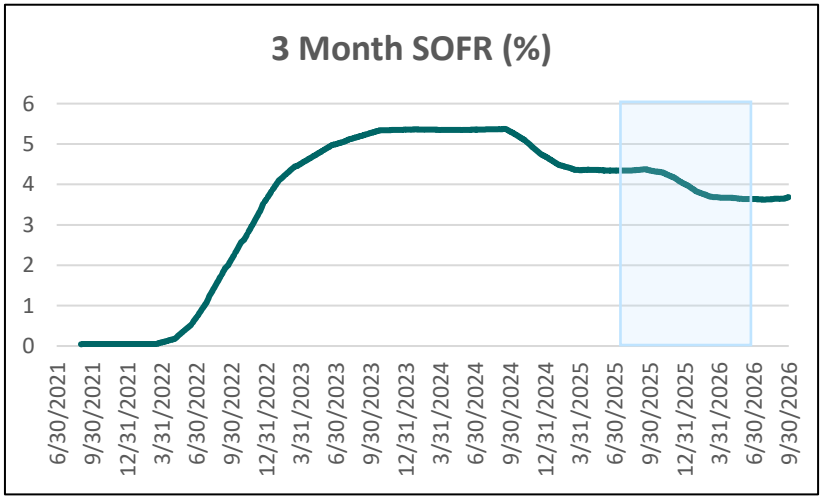
Source: VRS, Bloomberg, Credit Suisse

Markets:
Index Spreads and Yields







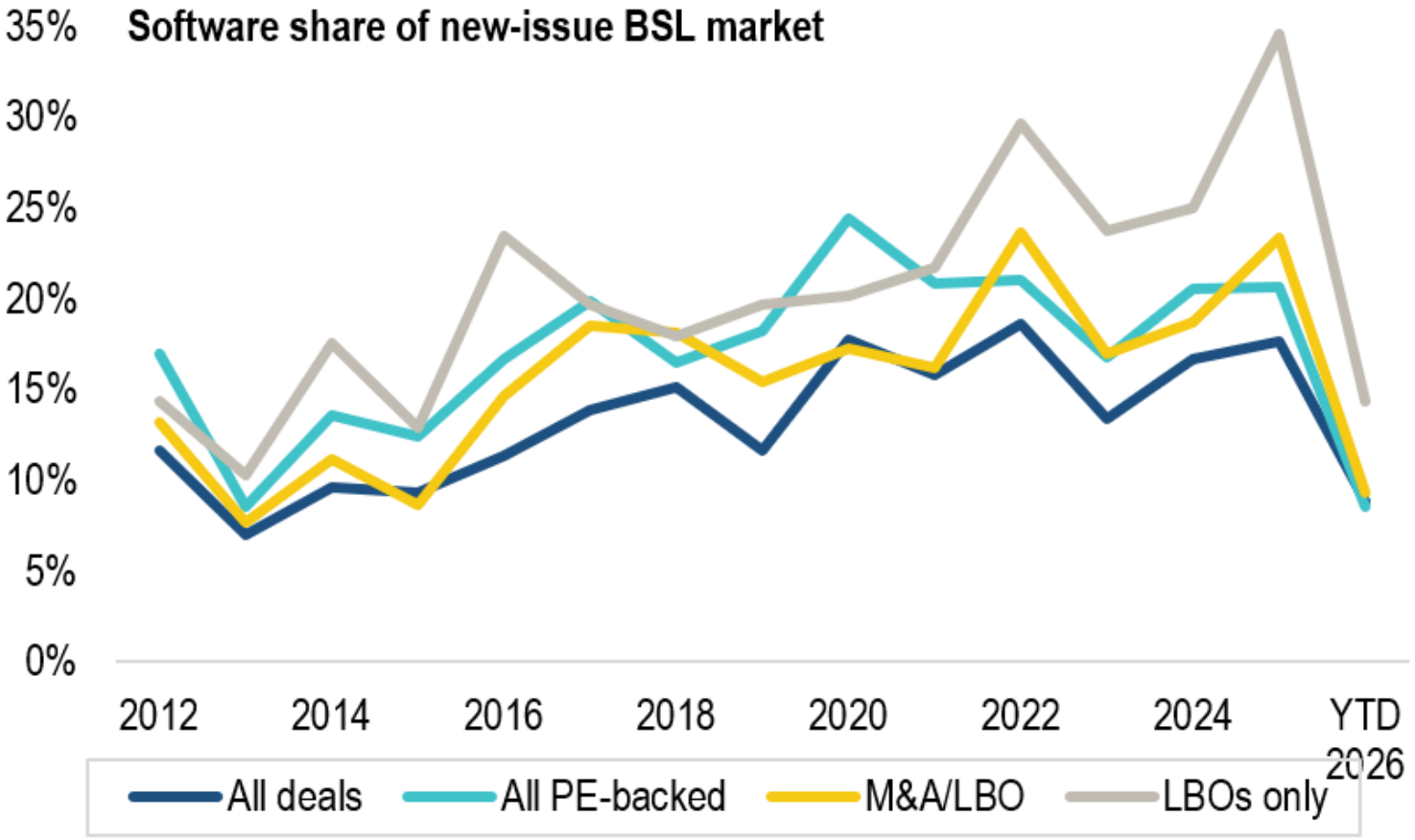


Source: VRS, Morningstar, Bloomberg

Markets:
1H FY26 vs 2H FY26

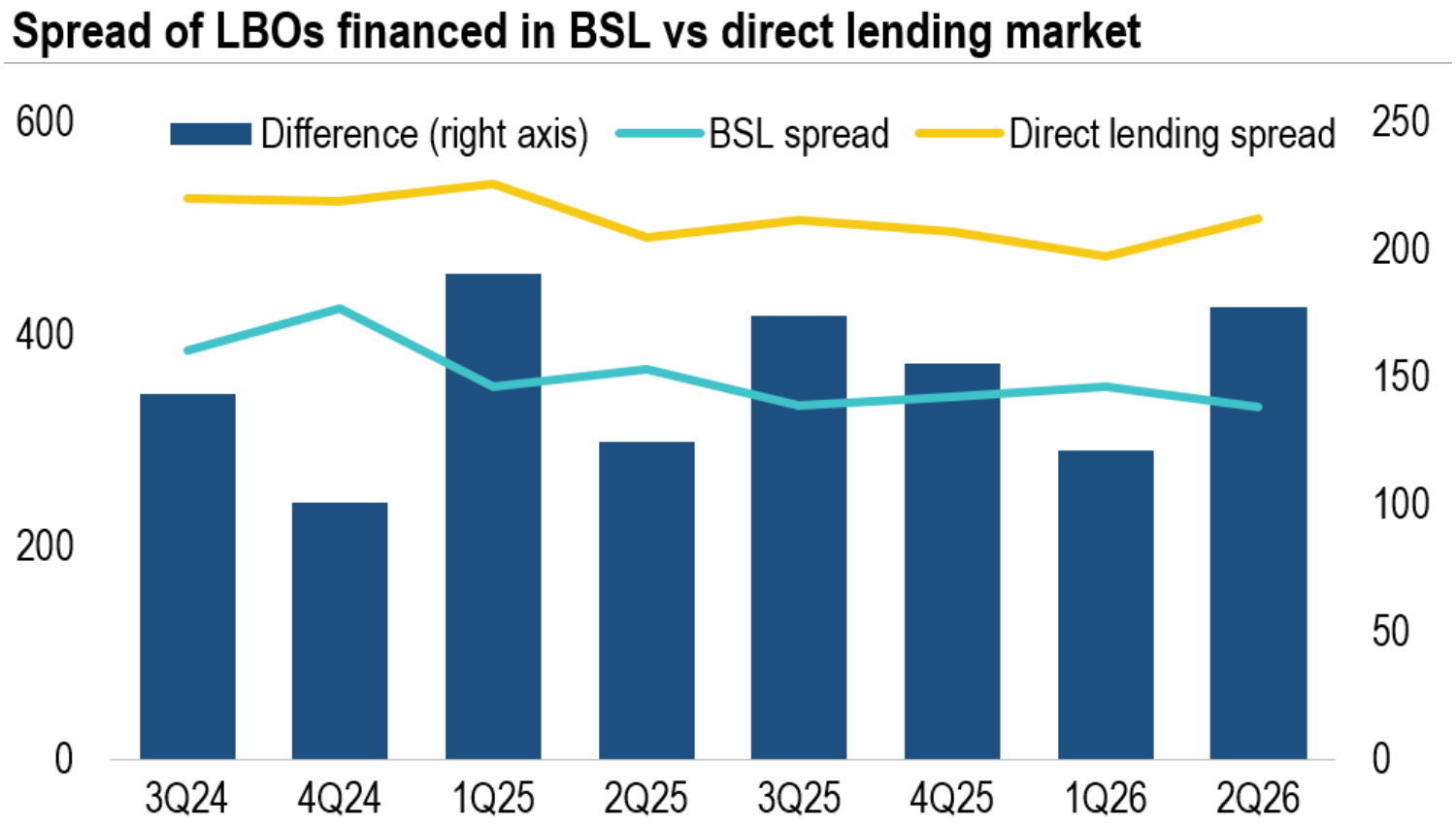


Markets:
Software: A Declining Share of the Loan Market



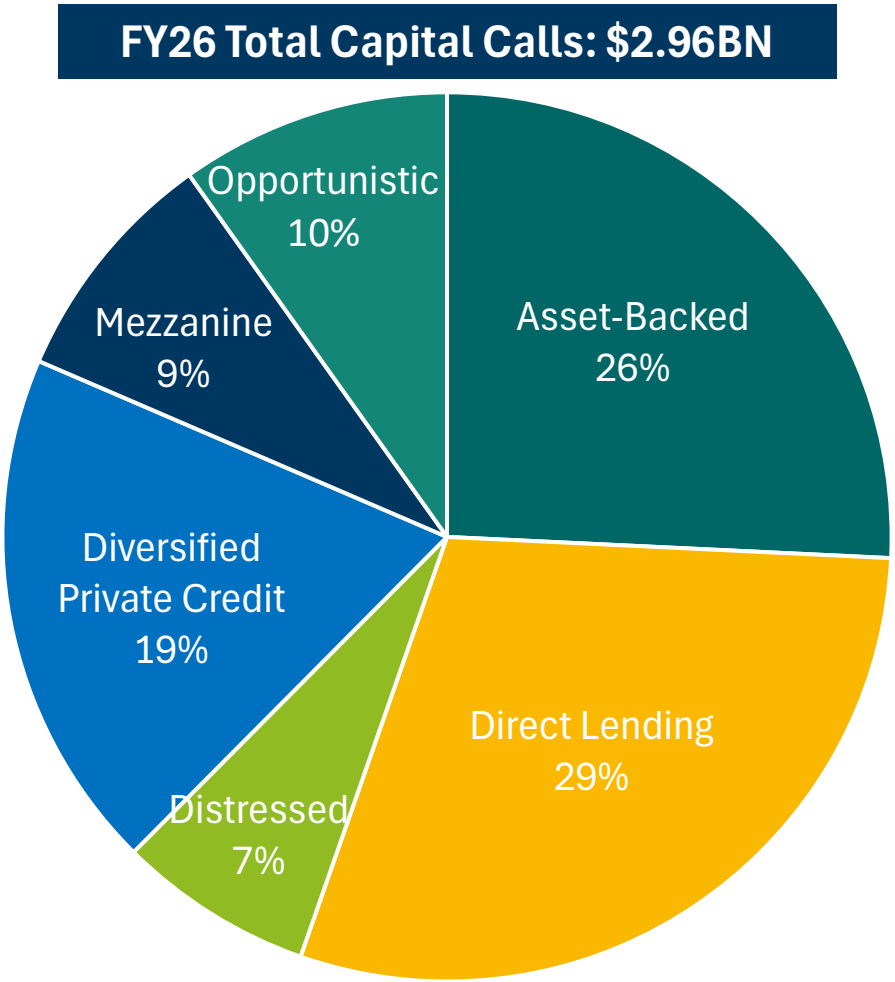
Sources: PitchBook | LCD • Data through June 30, 2026

Markets:
Private Spread Premium



Source: PitchBook | LCD • Data through June 30, 2026
Direct lending analysis is based on transactions covered by LCD News

Markets:
Private Credit Deployment



Exposures:
Change in Sub Strategy Exposures

Sub Strategies	% Allocation 6/30/25	% Allocation 6/30/26	Change
Asset Backed	10.5%	15.3%	+4.8%
Bank Loan	1.2%	1.1%	-0.1%
Direct Lending	25.9%	18.6%	-7.4%
Distressed	8.7%	8.3%	-0.4%
Diversified Private Credit	19.2%	21.7%	+2.5%
High Yield	3.4%	3.3%	-0.1%
Mezzanine	11.7%	12.0%	+0.3%
Opportunistic Credit	19.5%	19.8%	+0.3%
Total	**100.0%**	**100.0%**	**-**

Results:
Total Credit Strategies – 6/30/26

	10 Year	5 Year	3 Year	1 Year	MV ($MM)	
Total Credit Strategies	7.6	7.2	9.7	8.3		
Strategic Benchmark	5.9	5.2	8.1	5.2	**$**	**19,244**
Excess Return	**1.7**	**2.0**	**1.7**	**3.2**		
Asset Backed	7.0	7.1	7.7	7.5	$	2,941
Bank Loan	5.0	5.7	8.0	4.6	$	212
Direct Lending	7.3	8.1	8.7	6.4	$	3,570
Distressed	9.0	8.8	7.6	7.1	$	1,605
Diversified Private Credit	-	10.9	12.5	13.1	$	4,181
High Yield	6.1	4.9	9.5	6.4	$	626
Mezzanine	10.6	10.9	11.3	10.2	$	2,302
Opportunistic Credit	7.4	6.6	9.8	7.2	$	3,807

Source: BNY Mellon

Results: FY 2026

Headwinds/Tailwinds

Increased diversity of return drivers
Lower exposure to software
Positive absolute performance across all strategy categories

Lower level of realizations
Idiosyncratic credit issues

Absolute Return Contribution:

	Absolute Return	% Contribution
Asset-Backed	7.5%	0.8%
Bank Loan	4.6%	0.1%
Direct Lending	6.4%	1.3%
Distressed	7.1%	0.6%
Diversified Private Credit	13.1%	2.7%
High Yield	6.4%	0.2%
Mezzanine	10.2%	1.2%
Opportunistic Credit	7.2%	1.4%
CS Return		**8.3%**

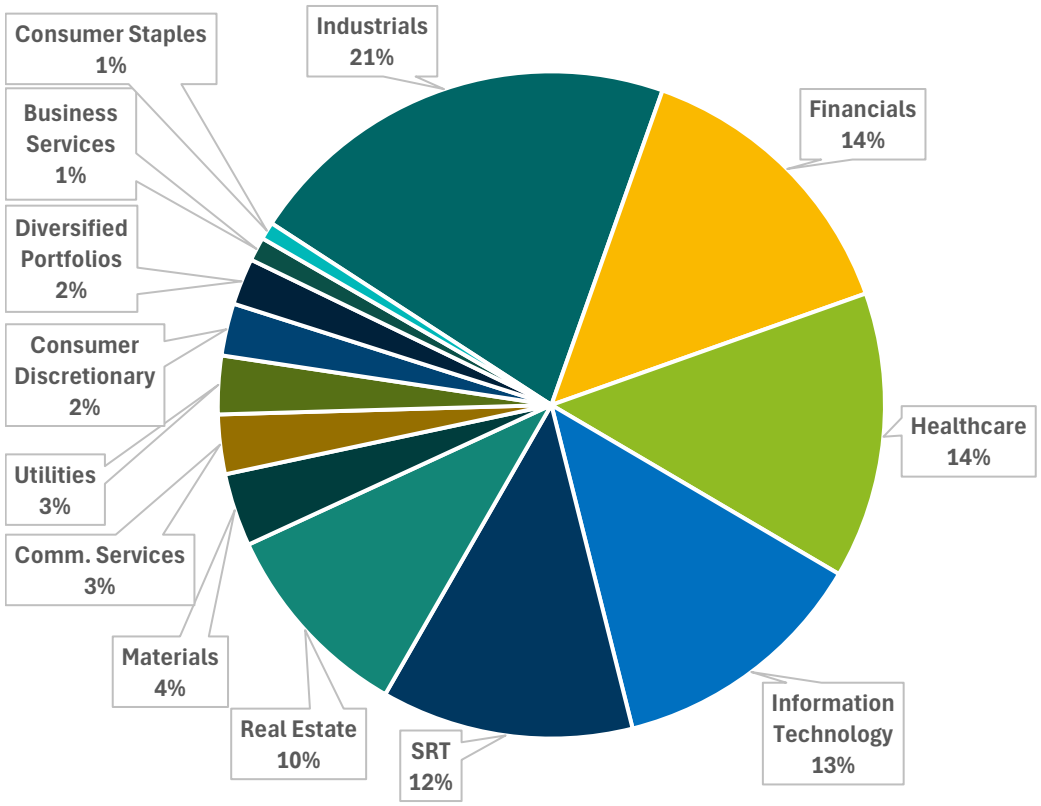
Relative Return Contribution:

	Relative Return
Asset Backed	0.2%
Bank Loan	0.0%
Direct Lending	0.2%
Distressed	0.2%
Diversified Private Credit	1.6%
High Yield	0.0%
Mezzanine	0.6%
Opportunistic Credit	0.4%
CS Excess	**3.2%**

Co-investments: Credit Strategies Approach

- Objective is to invest additional funds alongside existing strategies through a lower fee arrangement
- Separate accounts
- The manager remains fiduciary
- Onboarded a new manager relationship to source credit co-investment opportunities across VRS Private Equity mandates
- VRS reviews and approves all potential investments prior to moving forward

Co-investment: Exposures and FY26 Activity



- As of June 30, 2026, co-investments made up $1.15BN or 6% of CS
- Evaluated 56 co-investment opportunities during FY26
- Committed to 33 transactions totaling $459MM during FY26
- Size range: $3.5MM - $50MM ($13.5MM average size)

Managers:
Top 10 Investment Managers

Manager	Mandates	# Mandates	% Program
Ares	Asset-Backed, Distressed, Mezzanine, Direct Lending, Opportunistic	14	11.1%
HPS	Asset-Backed, Mezzanine, Direct Lending	5	8.5%
Beach Point	Distressed, Opportunistic	4	8.0%
Carlyle	Diversified Private Credit	1	5.6%
Magnetar	Diversified Private Credit	1	5.4%
Aksia	Diversified Private Credit	2	5.0%
Oak Hill Advisors	Bank Loan, Diversified Private Credit	2	4.5%
KKR	Asset-Backed, Distressed	4	4.2%
Sixth Street	Distressed, Opportunistic	5	4.2%
Solus	Opportunistic	2	4.1%

Managers:
DIME Investments

- 18 potential manager meetings/calls/reviews in FY 2026
- Quarterly reports from Aon Hewitt on DIME managers in the asset class
- Aksia relationship has provided more exposure to smaller credit managers
- Six relationships via Aksia-managed account

Looking Ahead:

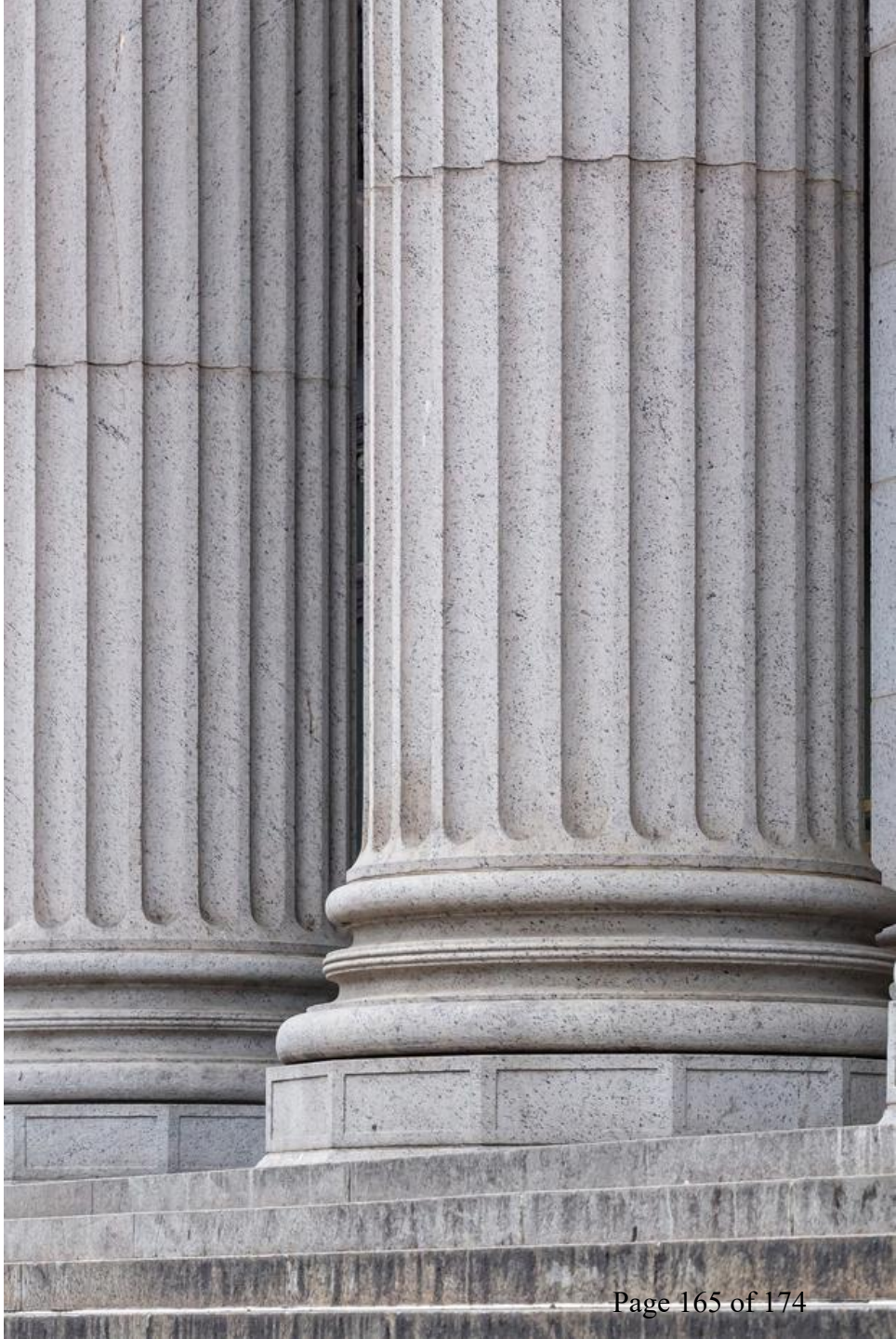
- The evolution of the CS program towards private markets has positioned it well to take advantage of changes in the broader credit markets. CS has maintained a consistent deployment of capital, allowing the program to take advantage of opportunities this past year.

- Today there are compelling investment opportunities in private credit, the expected returns of which exceed the actuarial return of the total fund as well as the asset class benchmark over a multi-year time frame.

- We remain focused on increasing exposure to strategies that deliver high contractual returns while having structural downside protection.

Private Investment Partnerships

Steve Woodall
Program Director



Virginia Retirement System®

Agenda:
PIP Annual Review Topics

- Overview
- Exposures
- Results
- Looking Forward

Overview: Team Members

Professional	Position	Highest Degree	Professional Certifications	Investment Experience	VRS Tenure
Steve Woodall	**Program Director**	**MBA**	**CFA, CAIA**	**22**	**21**
Erica Billingslea	Investment Officer	MA		14	14
Matt Bennett	Investment Officer	MBA		17	17
Kelly Baker	Portfolio Assistant	AAS		18	11

Overview:
Private Investment Partnerships

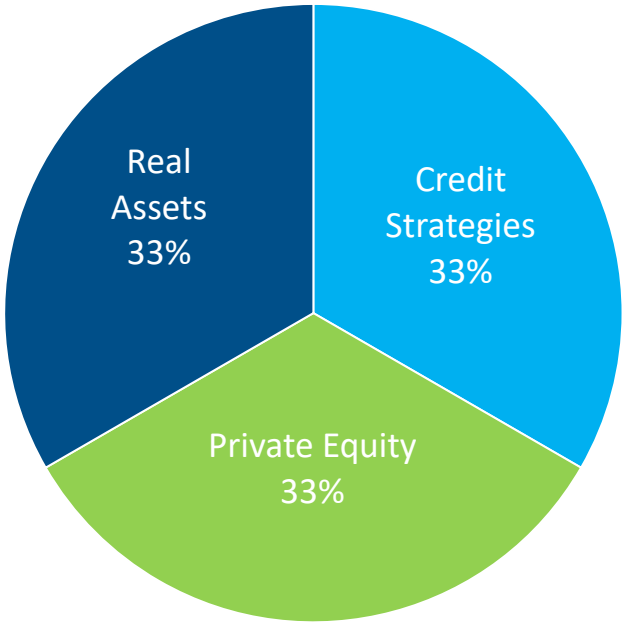
- A diversified investment platform dedicated to private and illiquid investments that invests across private equity, real assets, and credit strategies
- Portfolios that emphasize opportunistic asset allocation, co-investments and reduced investment management fees/carry
- A close relationship between partner organizations that allows for expanded access and an elevated level of inclusion

Exposures: Portfolio Update

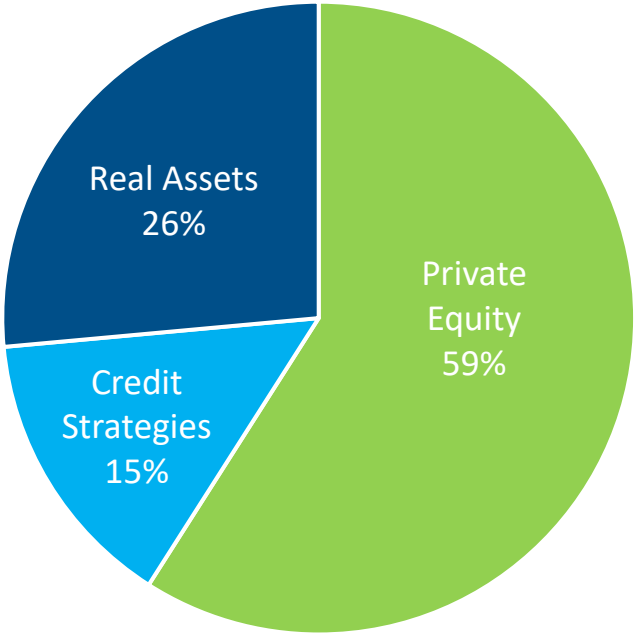
- Asset allocation
- Commitments

Exposures: Asset Allocation

Benchmark – June 30, 2026



PIP Actual – June 30, 2026



Exposures: Strategy Mix FY26

	6/30/25	6/30/2026	Change %
Private Equity	54%	59%	+5%
Real Assets	16%	15%	-1%
Real Estate	17%	12%	-5%
Credit	14%	15%	+1%
Total (MM)	**$2,583**	**$1,979**	**-23%**

Exposures: Commitments ($mm)

	Commitment Amount	Total Funded	Total Unfunded
6/30/2025:	2,750	1,968.1	781.9
6/30/2026:	2,750	2,100.6	649.4
Change ($mm):	**-**	**+132.5**	**-132.5**

Results: Performance – 6/30/26

	Inception (2015)	5 Year	3 Year	1 Year
Total PIP	8.7%	9.0%	8.9%	9.7%
Benchmark	7.6%	6.5%	8.2%	9.7%
Excess Return	**1.1%**	**2.6%**	**0.7%**	**0.0%**

Source: BNY Mellon; 6/30/26 market value and performance are lagged and based on 3/31/26 market values that are adjusted for interim cashflows.

Private Markets Roundtable



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