

Monograph

Understanding Return Expectations

Antti Ilmanen, PhD
Thomas Maloney

CFA Institute Research Foundation

Understanding Return Expectations

Antti Ilmanen, PhD
Principal and Global Co-head of Portfolio Solutions
AQR Capital Management

Thomas Maloney
Managing Director, European Head of Portfolio Solutions
AQR Capital Management

CFA Institute
Research
Foundation

Statement of Purpose

CFA Institute Research Foundation is a not-for-profit organization established to promote the development and dissemination of relevant research for investment practitioners worldwide.

© 2026 CFA Institute Research Foundation. All rights reserved.

Neither CFA Institute Research Foundation, CFA Institute, nor the publication's editorial staff is responsible for facts and opinions presented in this publication. This publication reflects the views of the author(s) and does not represent the official views of CFA Institute Research Foundation.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission of the copyright holder. Requests for permission to make copies of any part of the work should be mailed to: Copyright Permissions, CFA Institute, 915 East High Street, Charlottesville, Virginia 22902. CFA® and Chartered Financial Analyst® are trademarks owned by CFA Institute. To view a list of CFA Institute trademarks and the Guide for the Use of CFA Institute Marks, please visit our website at www.cfainstitute.org.

CFA Institute does not provide investment, financial, tax, legal, or other advice. This report was prepared for informational purposes only and is not intended to provide, and should not be relied on for, investment, financial, tax, legal, or other advice. CFA Institute is not responsible for the content of websites and information resources that may be referenced in the report. Reference to these sites or resources does not constitute an endorsement by CFA Institute of the information contained therein. The inclusion of company examples does not in any way constitute an endorsement of these organizations by CFA Institute. Although we have endeavored to ensure that the information contained in this report has been obtained from reliable and up-to-date sources, the changing nature of statistics, laws, rules, and regulations may result in delays, omissions, or inaccuracies in information contained in this report.

Photo credit: Getty Images / Moment RF / Kieran Stone

ISBN: 978-1-952927-86-7

AUTHOR BIOS

Antti Ilmanen is a principal and global co-head of the Portfolio Solutions Group at AQR Capital Management. Prior to joining AQR, he worked at Brevan Howard and at Salomon Brothers/Citigroup.

Dr. Ilmanen began his career as a central bank portfolio manager in Finland. He has advised many institutional investors over the years, including Norway's Government Pension Fund Global and the Government of Singapore Investment Corporation.

Dr. Ilmanen has published extensively in finance and investment journals and has received several awards for his articles. He has written two books, *Expected Returns* (2011) and *Investing Amid Low Expected Returns* (2022).

In 2017, Dr. Ilmanen received the CFA Institute Leadership in Global Investment Award, and in 2026 he was appointed as an honorary fellow at Cambridge Judge Business School. He holds an MSc in economics and law from the University of Helsinki and a PhD in finance from the University of Chicago.

Thomas Maloney is managing director and European head of the Portfolio Solutions Group at AQR Capital Management. In this role, he uses AQR's capabilities to enhance client portfolios, contributes to published research, and engages clients on topics such as strategic asset allocation and capturing alternative sources of return.

Mr. Maloney is author and coauthor of many published articles, including "Market Timing: Sin a Little" (*Journal of Investment Management* 2017), "Value and Interest Rates" (*Journal of Portfolio Management* 2021), and "Honey, the Fed Shrunk the Equity Premium" (*Journal of Portfolio Management* 2023). He is also a published novelist.

Prior to joining AQR, Mr. Maloney was a senior quantitative analyst and portfolio manager at Brevan Howard Asset Management, specializing in quantitative macro strategies and portfolio construction. He earned an MPhys in physics with first class honors from the University of Oxford.

© 2026 CFA Institute Research Foundation. All rights reserved.

CONTENTS

Foreword viii

Preface x

Chapter 1. How Do Investors Form Long-Run Return Expectations? 1

Chapter Summary 1

Introduction 1

Visual Evidence Related to Equity Market Expected Returns 4

Contrasting Different Expected Return Formation Approaches 8

What We Cover 12

Chapter 2. Exceptional Expectations: US Versus Non-US Equities 13

Chapter Summary 13

Introduction 13

Historical Evidence on US Return Edge, Growth Edge, and Valuation Changes 14

Historical Return Decomposition 18

Conclusion 21

Chapter 3. Why Are Bond Investors Contrarian While Equity Investors Extrapolate? 22

Chapter Summary 22

Introduction 22

Visual Empirical Evidence 23

What Causes This Different Reaction to Past Performance in Bonds and Stocks? 28

The Really Long View: Should We Expect Asset Richening Trends to Persist? 29

Chapter 4. How Did We Get Here? A Brief History of Expected Returns Formation 33

Chapter Summary 33

Early Developments 33

Investor Practices Since 1980 35

Academic Thinking: A Related Pendulum Shift 39

CFA Institute

PROFESSIONAL LEARNING QUALIFIED ACTIVITY
This publication qualifies for 3.5 PL credits under the guidelines of the CFA Institute Professional Learning Program.

© 2026 CFA Institute Research Foundation. All rights reserved.

Chapter 5. Equity Market Focus: Interrogating the Historical Data **44**
Chapter Summary 44
Why Look Back? 44
Searching for Patterns 45
Is Faster Earnings Growth Here to Stay? The Message from the Data 49
Impact of Valuation Changes 51

Chapter 6. Equity Market Focus: Objective Expected Returns **53**
Chapter Summary 53
Introduction 53
Popular Models and Components 53
Assessing Predictive Power 56
Can We Do Better? 60
Concluding Thoughts 62
Appendix: On Various Earnings Measures 62

Chapter 7. Equity Market Focus: Subjective Expected Returns **67**
Chapter Summary 67
Introduction 67
Subjective Versus Objective Expectations 67
Do Patterns Vary Across Investor Groups, Investment Horizons, or Asset Classes? 69
Explanations for Observed Expectations Formation Patterns 74
Concluding Thoughts 77
Appendix: Detour on Economic Survey Expectations 77

Chapter 8. Bond Market Focus: Understanding Treasury Yields with Survey Data **79**
Chapter Summary 79
Introduction 79
The Yield as a Sum of Parts 80
Concluding Thoughts 84

Chapter 9. Bond Market Focus: Yield Curves and Mean-Reverting Rate Expectations **85**
Chapter Summary 85
Introduction 85
What Drives the Yield Curve? Alternative Theories 86
Empirical Evidence on the Yield Curve's Predictive Ability 86
Challenges 87

The Role of Mean-Reverting Rate Expectations 88
Mean-Reverting Expectations Turned Out Wrong, Ex Post 91
Contrasting Bond and Equity Return Expectations Formation 92
Appendix: Understanding Yield Curve Components 93

Chapter 10. Diversifying Alternatives and the Rearview Mirror 96

Chapter Summary 96
Objective Expectations for Long–Short Strategies 96
Subjective Expectations: Performance Chasing and the Hunt for Manager Skill 98
Navigating the Market Cycle 99
Ways to Encourage Patient Investing 101
Finally . . . How to Embrace Active Risk Without Big Directional Bets 102
Appendix A: Illiquid Alternatives and the Rearview Mirror 103
Appendix B: Data and Methodology 105

Chapter 11. Tying It All Together 106

Chapter Summary 106
Four Different Sources for Return Expectations 106
Combining the Estimates 107
Empirical Evidence of Return Predictability: Spotlight on Carry 108
Why Are Returns Predictable at All? 111
How Patterns Vary over Time and Across Asset Classes or Investor Groups 111

References 115

FOREWORD

Where did the concepts of expected return and return expectations come from?

The first person who made a loan at interest or, some millennia later, bought a bond almost certainly expected to earn a return equal to the interest rate on the loan or bond—minus, if they were thinking carefully, an allowance for the possibility of default. (Some of the first large loans were for shipping, and ships sink.)

For investments with widely dispersed and random-seeming outcomes such as equities, however, the idea that one can estimate the statistically expected return is fairly new. In this monograph, Antti Ilmanen and Thomas Maloney explore this topic in depth. As best I can tell, the idea was introduced around 1900 by Louis Bachelier, a half-forgotten doctoral candidate in Besançon, France, who wanted to know how to price options. Although Bachelier was a mathematician who proposed highly formal solutions to the problems he investigated, he intuited that the fair price of an option is one that makes the expected return for buyers and sellers equal. In that context, expected return is the profit or loss under each possible outcome, multiplied by the probability of that outcome occurring.

We now think of the expected return on an investment in terms of a rate of return per year per dollar (or some other currency) invested. That definition, however, simply restates Bachelier's concept. Expected return is still an average over unknown outcomes. It is an application or special case of the more general notion of expected value, which Pierre-Simon Laplace first defined in 1814, solving a problem that originated two centuries earlier in (no surprise) the theory of gambling and that had gone unsolved for that whole time.

A half-century after Bachelier's proposal, Harry Markowitz, the dean of finance, forced us to think in terms of expected return when analyzing an investment: "It occurred to me that investors should be concerned with risk as well as return."[1] By "return" he meant, of course, the statistically expected return on a security.

This insight had eluded the greatest investment thinkers up to that time, including Benjamin Graham and David Dodd, authors of the 1934 classic *Security Analysis*. Graham and Dodd framed their analysis in terms of determining the fair price of an asset: If this price exceeds the current market price by a "margin of safety," you should buy the asset; otherwise not.

Since the time of Markowitz's discoveries, expected return has commanded the attention of everyone concerned with investing. Until Ilmanen and Maloney's work, however, few thinkers turned their attention to the question of where expected returns *come from*. By turning the phrase around—that is, "return expectations"—the authors seek a new perspective, emphasizing the mind of the investor rather than the properties of the investment.

If return expectations are in the mind of the investor, how do they form there? Do investors make them up? Do they rely on feelings? On the opinions of experts? On the wisdom of crowds? Do investors assess the probability of each outcome and multiply by that outcome's

---

[1]As quoted in Stephen C. Sexauer and Laurence B. Siegel, "Harry Markowitz and the Philosopher's Stone," *Financial Analysts Journal* 80 (2024): 1–11.

 • © 2026 CFA Institute Research Foundation. All rights reserved.

financial consequences, as Bachelier would have them do? How does expectations formation differ between equity and bond investors and between institutions and individual investors?

In this monograph, titled *Understanding Return Expectations*, Ilmanen and Maloney explore all these possibilities and many more, applying their wisdom gained through decades of collective experience in the markets. With a special emphasis on surveys as a source of information about how investors form expectations, the authors bring a behavioral and human perspective to the many questions they raise. We at CFA Institute Research Foundation are extraordinarily proud to present this work, and all investors and those advising them would do well to pay close attention.

Laurence B. Siegel
Wilmette, Illinois, and Del Mar, California

April 2026

PREFACE

Much of this monograph was originally published in 2025 as a series of AQR Capital Management white papers. CFA Institute Research Foundation took an interest in the series and offered to publish it in its entirety as the monograph you are now reading. We converted this series into a monograph, extended most of the data to December 2025, and added a final chapter that connects the various threads. This monograph has greatly benefited from superb editing by the Research Foundation director of research emeritus, Laurence Siegel. Thank you, Larry!

We thank authors Spencer Couts, Andrei Gonçalves, and Johnathan Loudis (2026); Magnus Dahlquist and Markus Ibert (2026); Elroy Dimson, Paul Marsh, and Mike Staunton (2026); John Graham and Campbell Harvey (2018); Robin Greenwood and Andrei Shleifer (2014); Sebastian Hillenbrand and Odhrain McCarthy (2024; as well as Odhrain McCarthy and Sebastian Hillenbrand 2025); Paul Schmelzing (2020); and Michael Smolyansky (2023) for the permission to use data or charts from their articles. We also thank Robert Shiller and Ed Yardeni for the use of data or charts from their websites.

We thank our AQR colleagues, led by Cliff Asness, for helpful discussions over the years on the topics in this monograph. We also thank Alfie Brixton and Mehul Sachdev for excellent research assistance. We are employees of AQR Capital Management, LLC, which is a global investment management firm that may or may not apply similar investment techniques or methods of analysis as described herein. The views expressed in this article are our own and not necessarily those of AQR.

The title is a play on Antti's early claim to fame, a seven-part series titled *Understanding the Yield Curve*, written at Salomon Brothers in the mid-1990s. *Understanding Return Expectations* highlights our emphasis on subjective survey-based investor expectations, in contrast to the more objective market yield–based *Expected Returns* (Ilmanen 2011).

This wide-ranging project has been an enjoyable way to mark 20 years of working together, first at Brevan Howard and then at AQR. Any errors or omissions are the other one's fault.

Antti Ilmanen and Thomas Maloney
Portfolio Solutions Group, AQR Capital Management

 • © 2026 CFA Institute Research Foundation. All rights reserved.

CHAPTER 1. HOW DO INVESTORS FORM LONG-RUN RETURN EXPECTATIONS?

Chapter Summary

In this monograph, each chapter seeks to understand how investors actually form long-run return expectations. We contrast "objective" yield-based expected returns, which historically display some predictive ability, with "subjective" rearview-mirror expectations, which excessively extrapolate the past 3- to 10-year returns or growth rates. We use the terms "objective" and "subjective" somewhat loosely because all return expectations are to some degree subjective, but those based on forward-looking measures have a greater claim to objectivity. We will refine this distinction as we go along.

Objectively feasible expected returns are low when market valuations are high and when starting yields are low. Yet surveys reveal that the consensus expectations of some market participants (individual investors and equity analysts, in particular) can exhibit the opposite pattern. The tension between objective and subjective expectations was most pronounced near market peaks (as in 2000, 2021, 2025) and troughs (2009).

This story is nuanced: Academics and practitioners may be referring to different measures when they talk about expected returns. Some subjective expectations appear more rational and less extrapolative, such as those formed at institutions and those based on interest rates. Even rational predictions work only on average, and they can fail for a long time.

Expectations formed by merely extrapolating past returns, which we call a rearview-mirror approach, have made many investors too optimistic about risky and private assets after the good times following the 2008 Global Financial Crisis. These same expectations have made investors too cautious about liquid diversifiers, such as long–short stock selection and trend-following strategies. The dangers of a rearview-mirror mindset are most pronounced in the case of US equities versus the rest of the world.

Introduction

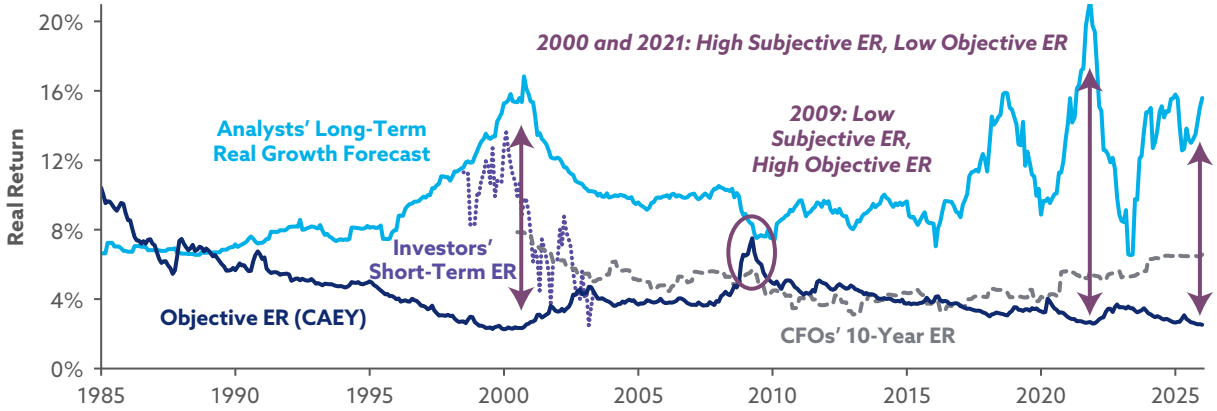
Antti has already published two books on expected returns. What more could there be to say?[2] Plenty, it turns out. Foremost, the expected returns that those works studied (in line with most academic research and capital market assumption [CMA] providers) are objectively feasible expectations that are rationally held by investors and set by the market in aggregate. They can be contrasted with subjective return expectations, formed by various investor groups and individuals, which may be quite heterogeneous and sometimes unrealistic and irrational.

Indeed, many surveys of subjective equity market expectations (light blue, dotted, and dashed lines in **Exhibit 1.1**) peaked in 2000, 2021, and perhaps 2025 after strong bull markets, just

[2]See Ilmanen (2011, 2022).

© 2026 CFA Institute Research Foundation. All rights reserved.

Exhibit 1.1. Great and Not-So-Great Expectations: Subjective and Objective Real Return Expectations for the US Stock Market, January 1985–December 2025



Sources: AQR, Blue Chip Economic Indicators, Consensus Economics, Credit Suisse, Graham and Harvey (2018), McCarthy and Hillenbrand (2025), I/B/E/S, and Shiller Data (Shiller n.d.).

Notes: Analysts' long-term real growth forecast is the I/B/E/S consensus forecast of three- to five-year growth in the earnings per share (EPS) of US large-cap stocks. (As a return proxy, it omits dividend income but compensates for this omission 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 University of Michigan's consumer survey over 2000–2006 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 Duke University and the Richmond Federal Reserve. All survey series subtract expected 1- or 10-year inflation on the basis of consensus forecasts. Objective real expected return proxy CAEY is the cyclically adjusted (real) earnings yield (i.e., inverse of the cyclically adjusted price-to-earnings ratio [CAPE] described in Shiller 2016).

when objective expected return measures (dark blue line) troughed based on high valuations and low starting yields. Conversely, subjective expectations can fall during times such as 2008–2009, when objective expected returns rose in response to lower valuations.

Apparently, many practitioners associate high expected returns (for the equity market overall or for certain sectors or single stocks) with high cash flow growth rather than with high required returns or discount rates (the relevant expected returns according to academic logic). So subjective expectations are dominated by high growth optimism in good times, and objective expectations are driven by high required returns in bad times.

When Asness (2024) argued that markets have become less efficient in recent decades, he did not use these market-level expectations as his prime evidence. The extreme relative value divergence between cheap and expensive stocks was even more compelling, as were other signs of speculative excess in meme stocks, cryptotrading, and other practices. It is no coincidence, however, that such extremes tend to, well, coincide. They are all signs of animal spirits having a party.[3]

[3]Meme stocks and cryptos are just the prime examples of high animal spirits. In recent years, we have also seen high concentration of returns (and profits—thus at least partly fundamentally justified) as well as exceptionally high correlations between many market-directional themes. Examples include the "Magnificent Seven" versus 493 other stocks in the S&P 500 index, growth versus value style, tech versus other US sectors, and US versus non-US stock markets. In all, such concentration of risks makes diversification harder to maintain, a topic we cover later.

A related distinction is between forward-looking and rearview-mirror expectations. The former are often based on current market yields and valuations, whereas the latter are based on historical returns. The rearview mirror is especially harmful when it extrapolates the past 3 to 10 years' experience instead of using longer or shorter windows that could be empirically more justifiable.

Why should investors care? Long-run expectations formation may sound abstract and privileged, but these issues have become topical in the mid-2020s. Investor memories and rearview-mirror expectations are dominated by the benign market experience since the 2008 Global Financial Crisis (GFC). Such a rearview-mirror approach can result in aggressive bullishness on risky assets and US exceptionalism along with cautions against diversifying alternatives. Relatedly, expert providers of CMAs to institutional investors based on objectively feasible forward-looking expectations served investors well in the aftermath of the 1999–2000 tech bubble, but they have had some large misses since the early 2010s. Investors may now be losing faith in CMAs and going all-in with the rearview-mirror mindset just when dangerous bumps may be appearing in the road ahead.[4]

The rest of this monograph considers these broad themes, addressing the following questions:

- **What sources can we use to estimate return expectations?** The list includes market yields and valuations, historical average returns and regression-based estimates, survey-based evidence, and economic theories. We will be especially interested in survey-based subjective expectations—evidence "from the horse's mouth"—and whether they differ meaningfully from objectively feasible expected returns. (They do, and it is sometimes a comically inverse relationship.)
- **How do investors actually set their long-run return expectations?** Clearly, they do so in diverse ways, but how important is extrapolation of past growth or returns compared with more forward-looking and often contrarian yields and valuations? (The answer varies.) Which approach has served us better over long histories? (The latter.) Has the academic and practitioner use of these approaches changed over time? (Yes: "What have you done for me lately?" matters here as well.) Does the answer differ for different asset classes? (Yes: Equity return expectations tend to be extrapolative, whereas interest rate expectations tend to be more mean reverting.) Does the answer differ across investor groups? (Yes: Individual investors tend to be more extrapolative, whereas many institutions are more contrarian.)
- **Can this analysis shed light on the current market outlook?** Can this analysis help us understand strong post-GFC risky asset returns, the US equity market's outperformance compared with the rest of the world, the shifting of major yield curves between upward slopes and inversions over time, the dwindling popularity of liquid diversifiers, and the surging and, in our view, excessive popularity of private assets? (Yes to all.) One lesson is to quantify the impact of sample-specific valuation changes, because it is dangerous to extrapolate these further.

This first chapter is an appetizer. In the subsequent chapters, we dig deeper into the aforementioned topics and provide plentiful references. We hope this monograph will find an audience not only among CMA providers and users but also among investors evaluating current market

[4]See Asness (2025) for a shorter and more humorous way of fighting the rearview-mirror mindset at this critical juncture. In a sense, this monograph is a complement that provides multifaceted historical analysis for that fight, in addition to offering a framework for understanding your own and other investors' return expectations.

opportunities and risks—even if we do not opine on the latest policy debates and market gyrations at the time of writing.

Visual Evidence Related to Equity Market Expected Returns

Most readers are keener on empirics than on theory, so we present visual evidence before drilling into methods of forming and measuring expected returns. We focus on US equities and use very long histories.[5] Zooming out is essential when we want to judge 10-year return predictions. One decade or even a few can provide anecdotes but not meaningful statistics.

For setting long-term expected returns, in broad terms, two competing approaches exist: (1) a rearview-mirror vision using historical average return and (2) a forward-looking estimate based on market yields and valuations. If we have just experienced a bullish decade, these two approaches will point in opposite directions, as was the case in 2000. Because the bearish forward-looking forecast trounced the bullish rearview-mirror forecast in the subsequent decade, most CMA providers since that time have used the forward-looking yield-based approach. The scales have tipped the other way in recent years, however, and a "what have you done for me lately?" mindset may now favor the rearview-mirror approach. With that said, the rearview-mirror approach gave terrible next-decade predictions in both 2000 and 2010.

We at AQR, and many other CMA providers, try to use a consistent forward-looking approach. For equities, this approach is based on either the cyclically adjusted earnings yield (CAEY) or the sum of payout yield and expected payout growth (in the spirit of the dividend discount model, although with much debate about the details). If, instead, a rearview-mirror approach is followed for the total equity return or the growth component, we argue that long histories are needed. Using the past decade's mirror is especially dangerous (prone to reversals), but it may be quite common.

Exhibit 1.2 thus contrasts the long-run predictive ability with respect to the next decade's market returns of

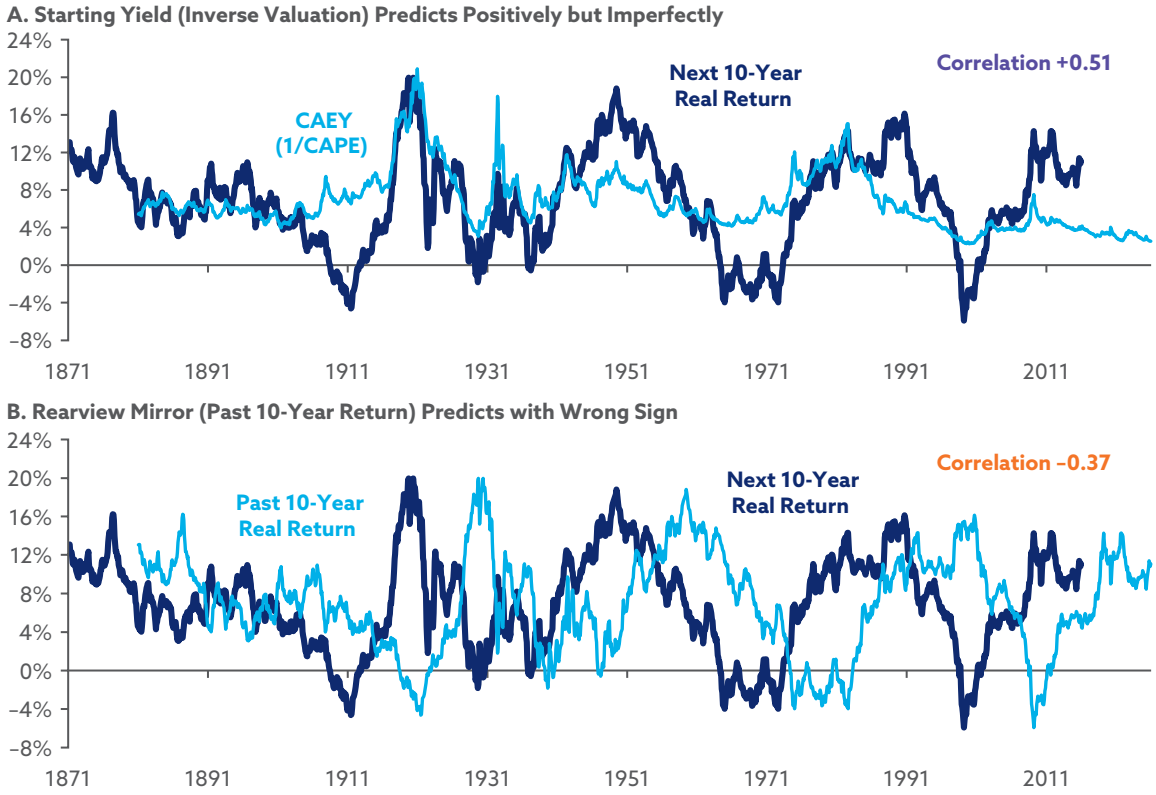
- a common yield-based expected return measure—namely, the inverse of Shiller's cyclically adjusted price-to-earnings ratio (CAPE)—in the upper panel and
- a common rearview-mirror indicator, the past decade's real market return, in the lower panel.

The yield-based measure is not always close to the subsequent return (the most recent decade produced one of the larger errors), but it wins this competition hands down. Its predictive correlation is 0.51, whereas the rearview mirror's correlation has the wrong sign (−0.37). Therefore, the empirical evidence suggests that the forward-looking approach objectively gives a better expectation.

On the surface, the key reason for the poor predictive record of past-decade returns is the mean-reversion tendency in market valuations. The deeper, underlying explanation, however,

[5]The empirical focus on predicting US equity markets in this series reflects all readers' familiarity with this large market and its better and longer datasets. We are not implying that anyone's investment process should focus on US market timing. If anything, we counsel bold diversification, including the use of many low-correlation rewarded market-neutral long–short strategies. Moreover, long-term forecasts, such as CMAs, are not the best raw material for market timing. They are more useful for anchoring long-run beliefs.

Exhibit 1.2. Predicting Next-Decade US Stock Market Returns, January 1871–December 2025



Source: Shiller Data.

Notes: All series are for the S&P 500 and predecessor indices. CAEY is the inverse of the CAPE. Forecast error for any point in time is the vertical gap between the two lines.

may be equity investors' tendency to overextrapolate past earnings growth, which can lead to overpricing after strong growth phases, as implied by Exhibit 1.1.

Supporting this contention, we observe that analyst forecasts of US large-cap stocks' long-term (three- to five-year) earnings growth are overoptimistic and overextrapolative. That is, they expect strong or weak past-decade growth to continue (correlation +0.2) even though the actual growth autocorrelation across decades is negative (−0.3). As a result, the subjective analyst forecast has a negative correlation (−0.5) with next-decade actual growth. Instead, it is highly correlated (+0.8) with the Shiller CAPE, with both series reflecting excessive growth optimism in 2000 and 2021 (and perhaps in late 2025).

Equity analysts are just one example of a group for whom subjective equity market expectations peaked when market valuations were at a record high and objective return expectations were thus at a record low (recall Exhibit 1.1). Ilmanen (2011), Greenwood and Shleifer (2014), and McCarthy and Hillenbrand (2025) show that individual investor survey estimates of future equity market returns were similarly procyclical.

Digging deeper into overextrapolation patterns, we find the following:

- Further evidence points to the overextrapolation of earnings growth at the level of single stocks and maybe sectors and countries. When it comes to single stocks, sorted into "growth" and "value" buckets based on valuation multiples or past cash flow growth, a past growth edge does predict a future growth edge, but typically it does so for a few years only. The market expects or discounts a more persistent growth edge, and when those expectations eventually fail to materialize, "growth" stocks tend to underperform "value" stocks (Chan et al. 2003; updated in Rasmussen 2025).
- Like many other regularities, the value–growth strategy only works on average; the 2010s turned out to be a prolonged exception. Larry Summers once suggested that the real danger is when overextrapolative investors get it right for a while, become overconfident, and anticipate an ever more persistent growth edge, creating a bubble in growth stocks. This is what happened in 2020–2021, sending value spreads (relative valuations between growth and value stocks) to all-time highs.[6] Value spreads have since partly normalized but remain above average.
- Extrapolation may be empirically justified at short horizons because of continuation patterns in multimonth returns. Our focus, however, is on multiyear return expectations, and those are more likely to exhibit reversal tendencies. Asness (2014) observed that it is sadly common for investors to act like momentum investors at reversal horizons, using a 3- to 10-year rearview mirror when chasing returns or capitulating after poor performance. If historical averages are used to assess future long-run growth, very long histories are needed.[7]
- Not all fundamental developments are extrapolated. In chapter 3, we will contrast extrapolative equity market expectations with mean-reverting rate expectations in bond markets.
- It is possible to naively extrapolate past returns or, somewhat more thoughtfully, past growth in fundamental variables. Extrapolative investors may not be sufficiently discerning about whether a past multiyear return outcome has resulted from changes in fundamentals or valuations; the latter are probably more prone to reversal. Investors should avoid the rearview-mirror mindset, especially when past outperformance mainly reflects richening valuations.

As of this writing, the biggest rearview-mirror dangers involve the following:

- A too-positive directional view of risky and private assets. If we examine longer histories, we find that many risky assets offer a positive premium but a slimmer one than usual at high valuations such as prevail in recent years (especially versus cash or bond yields) or after an abnormally bullish decade.

---

[6]As with most bubbles, this one had a reasonable underpinning: the structural shift from a physical to a digital world. As usual, markets took things too far, finding a digital winner (presumed to be winner-take-all) with a presumed 10- to 20-year abnormal growth within every industry. Most of growth stocks' outperformance in the late 2010s and early 2020s reflected such overoptimistic expectations and relative richening, rather than actual improvement in relative fundamentals. The growth bubble would have likely burst more dramatically after 2021 (and value spreads narrowed faster) had ChatGPT and the artificial intelligence (AI) boom not come to the rescue.

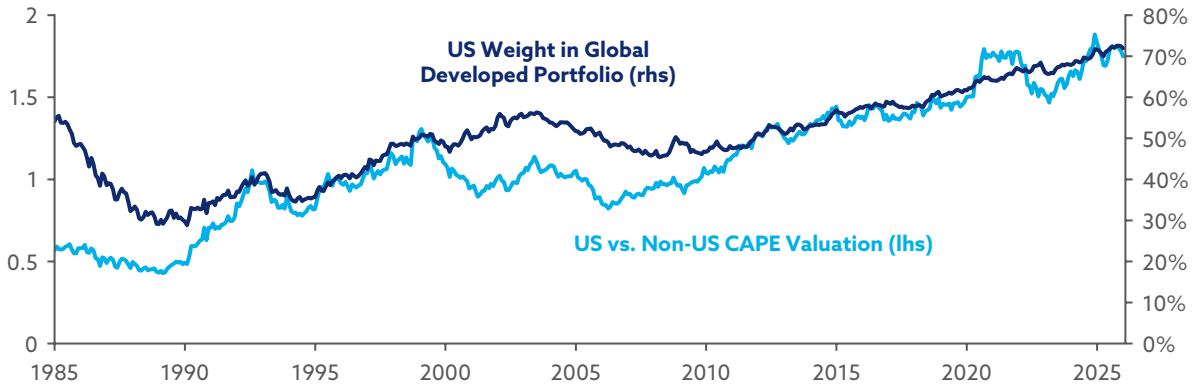
[7]That said, if evidence from recent decades suggests a structural change, this could justify a shorter history. Smolyansky (2023) argues that we should not extrapolate recent decades' growth experience. He observes that US earnings growth has been abnormally fast (4% real compound) in the past 30 to 40 years, but he can attribute this fully to one-off drops in corporate tax rates and interest rates. If we do not extrapolate further falls in tax and interest rates from already-low levels, Smolyansky argues that the long-run average growth rate near 2% is a better prediction than the recent 4%. He adds that recent decades were exceptionally corporate-friendly, as (above-average) earnings growth clearly exceeded (below-average) GDP growth—a trend that cannot last indefinitely.

- A too-negative view on various diversifying alternatives, such as long–short strategies and commodities, which disappointed in the 2010s. Many liquid diversifiers have a great long-run history—in standalone performance but even more so in portfolio return smoothing or risk mitigation (helping when most needed). And their relative performance compared with stock and bond portfolios displays a decadal reversal pattern.
- A too-positive relative view on US equity market exceptionalism over other markets.

In sum, the rearview mirror mindset is (1) more pronounced if overextrapolators recently got it right and became more confident, (2) more typical for stocks than bonds, (3) more vulnerable when looking back 3 to 10 years (acting like a momentum investor at reversal horizons), (4) more misleading when past outperformance mainly reflects richening valuations that have reached extreme levels, and (5) more dangerous when "the times they are a-changing" (e.g., with the high macro-policy and geopolitical uncertainty of the mid-2020s).

All these features coincide, at the time of this writing, in the US versus rest-of-the-world equity trade. Not surprisingly, then, US relative valuations reached almost twice the level of other developed markets in late 2024, having been at half the valuation level of non-US stocks in 1990 and close to parity between 1995 and 2010. Despite record-high relative valuation, investors accepted a record-high 72% US weight in the MSCI developed markets index (see **Exhibit 1.3**).[8] Only mild valuation convergence has occurred since then.

Exhibit 1.3. US Stock Market Weight and Valuation Versus Non-US Markets, January 1985–December 2025



Sources: AQR, Bloomberg, and MSCI.

Notes: The US weight within MSCI World is displayed together with the ratio of the cyclically-adjusted price-to-earnings ratios (CAPEs) for the United States and the eight largest markets in MSCI World excluding the United States: Japan, Australia, Canada, United Kingdom, Germany, France, Netherlands, and Switzerland. The left-hand *y*-axis measures the US relative CAPE valuation to non-US markets, and the right-hand *y*-axis measures the US weight in global developed portfolios.

[8]This relationship is partly mechanical, because persistent US outperformance boosted both its relative valuation and its portfolio weight. Still, it would be more sustainable to earn the large weight mainly through growth rather than repricing, and some investors may want to diversify away from one dominating market, especially at near-record valuations. We are not denying the US edge in AI and tech innovation (or other sources of US exceptionalism); however, echoing Asness (2025), we suggest investors consider the possibility that during the coming decade, US exceptionalism in innovation may be dominated by US exceptionalism in overvaluation.

Contrasting Different Expected Return Formation Approaches

Academics and practitioners often misunderstand each other. The term "expected returns" is a case in point. What academic textbooks mean by "expected returns"—which Ilmanen learned at the University of Chicago from Professors Fama, French, and Cochrane and then used in Ilmanen (2011, 2022)—is really the returns required by market participants collectively, which are also the objectively feasible returns that rational investors can expect. This concept might be more aptly called "required returns," since demanded and supplied returns must match for the market to clear.

Let's spell out this concept. The discounted cash flow (DCF) model of asset pricing states that the fair price of any asset reflects its expected future cash flows, discounted by a risk-appropriate discount rate. The relevant expected returns are thus the required discount rates in the denominator, *not* the expected cash flows in the numerator.

Rearview-mirror investors' "expected return"

$$\textbf{\textit{Price}} = \frac{\textbf{\textit{Expected Future Cash Flows}}}{(1+\textbf{\textit{Required Discount Rate}})}. \qquad (1.1)$$

Academic textbook "expected return"

These DCF models imply that high asset prices or valuations today reflect some mix of high (earnings or dividend) growth forecasts and low required discount rates. We cannot know for sure, however, what that mix is.[9]

In contrast to objective expected returns, survey evidence on individual investors' subjective return expectations suggests that investors are often bullish (on the market or on single stocks) after a period of high realized returns or high cash flow growth. Such apparently irrational investors seem to extrapolate the past uncritically into the future, and they seem to associate expected returns more with cash flow growth than discount rates. Academics and well-informed investment professionals would argue that high cash flow growth is already "priced in" and does not boost expected returns. If anything, investors' overextrapolation tendency may mean that that high past growth leads to overpricing and lower objectively feasible returns.

The tension between these approaches was most pronounced during the 1999–2000 tech bubble, when both market valuations and many subjective equity expectations peaked just when objectively feasible expected returns were very low. The converse happened in early 2009.

---

[9]Predictive regressions and survey evidence can give us some guidance on whether high valuations reflect mainly growth optimism or strong risk appetite. Exhibit 1.1 points to the former (irrational) explanation.

The DCF model equations can also be reshuffled to state that the rational expected return on equities (ER) equals the sum of yield income (Y) and expected cash flow growth (G). (One could also add the return from any expected change in valuation, but for simplicity, we assume none.) Thus, ER = Y + G. These statements apply both to the simple Gordon growth model (which assumes constant growth and discount rates) and to the more sophisticated Campbell–Shiller model (which allows time-varying cash flow growth and discount rates).

Objectively feasible expected returns anchor on what is realistically available in the market given current asset valuations or yields, but they may also take into account historically reasonable patterns relating to expected growth rates or past average returns.[10] Note that the objective expected return measures can also be wrong for a long time, if the market keeps reaching ever higher (or lower) valuations.

The cleanest and most timely way to discern subjective return expectations is through the use of surveys. Subjective expectations can differ across investor groups and may change in the reverse direction from objective expectations because of growth overextrapolation. They can also be optimistically biased (as seems to be the case with analysts' earnings forecasts at horizons beyond a year and with individual investors' market forecasts). Debiasing would be needed before such surveys could be used as part of realistic CMAs, although poor timing from overextrapolation would remain.

Although textbooks emphasize objective expected returns, in this monograph, we explore more deeply the role of subjective return expectations. Academics used to have serious doubts about the usefulness of survey data in the 1900s, arguing it was too noisy and irrelevant.[11] They claimed it was better to use market yields despite the difficulty of separating the role of required returns (which are arguably proportional to risk) and expectations on fundamentals (which have more to do with growth). Attitudes have changed, however: A burgeoning academic literature is now using survey-based expectations, and more survey data are available to study (see Bachmann et al. 2022; Gennaioli and Shleifer 2018).

Not all investor groups appear irrational. Although individual investors' subjective return expectations tend to be extrapolative and procyclical, institutional investors' and CMA providers' expectations tend to be more rationally anchored and contrarian, as shown by Dahlquist and Ibert (2024, 2026) and Couts et al. (2026). **Exhibit 1.4** juxtaposes these contrasting tendencies.

The contrast between objective and subjective return expectations is arguably a distinction between normative and descriptive expectations. In the spirit of Kahneman's (2011) fast versus slow thinking, past performance comes to mind with relative ease but required discount rates need more effortful thinking. Objective expected returns are often rational and anchored to forward-looking market yields, which are more visible for bonds than for stocks. In contrast, actual subjective expectations can be irrational and driven by a rearview-mirror mindset.

---

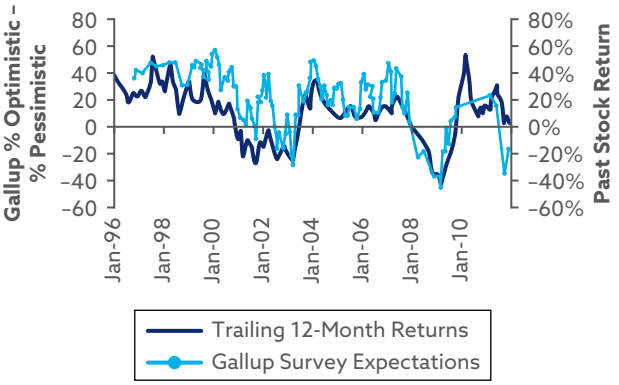
[10]Historical average returns should not be naively extrapolated. Thoughtful statistical analysis favors long histories unless structural changes make old data irrelevant. Such analysis may adjust past returns for sample-specific valuation changes and other one-time effects, and it considers the impact of possible investor irrationality or learning on past returns, as well as the prospective impact of momentum or mean-reversion forces (the way that past returns tend to predict future returns). No wonder there is little agreement on the optimal statistical forecast.

[11]A personal anecdote from Antti Ilmanen: In 1992, as a young doctoral student, I was in my thesis adviser Eugene Fama's office and suggested I might use some survey evidence on interest rate expectations in my research on bond markets. Fama smiled and asked, "Do you want to know what I think of survey data?" He took a sheet of paper, crumpled it into a ball, and threw it over his shoulder, hitting the garbage bin (nothing but net; pretty impressive).

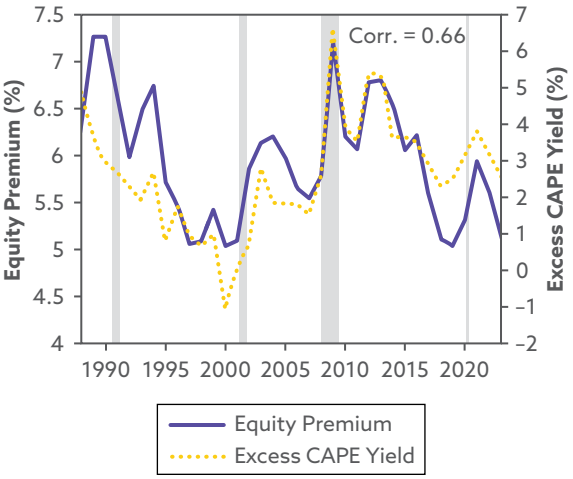
Understandably, I did not use survey data in my doctoral thesis, but I retained my interest. Fama's attitude reflected then-common academic belief in rational expectations and suspicion that investors may not bother to answer surveys carefully or truthfully. Yet, later research shows that investors *do* tend to put their money where their mouths are: Survey responses and portfolio flows are correlated, and results from different surveys of similar groups produce consistent patterns (see Bachmann et al. 2022).

Exhibit 1.4. Individual Investors Extrapolate; Institutional Investors Act Like Contrarians

A. Individual Investors' (Near-Term) Return Expectations Versus Past-Year Market Return



B. Institutions' (Long-Term) Return Expectations Versus Valuation-Based Yield



Sources: Panel A: Greenwood and Shleifer (2014, figure 6); Panel B: Couts et al. (2026, figure 3). Reprinted with the authors' permission.

Note: Panel A plots the trailing 12-month returns against Gallup survey consensus expectations, 1996–2011. Panel B plots the subjective equity premium aggregated across institutions surveyed on their CMAs together with the excess CAPE yield (CAEY minus real Treasury yield).

In this monograph, we especially emphasize the choice between forward-looking and rearview-mirror expectations, favoring the former. Both the length of the perspective in that rearview mirror and the investment horizon matter, however.

- **30 years and more.** If the rearview perspective is several decades long and the planning horizon is likewise long, historical average return can be a useful anchor for forming return expectations. It is better justified if expected returns are assumed to be constant over time or if current valuations are not far from historical norms.
- **3 to 10 years.** If the rearview mirror and investment horizon are shorter than a decade, then the yield-based approach has tended historically to be more successful (although not in the post-GFC period, because some richening trends have persisted). Even without assuming mean-reverting valuations, a yield-based approach has a contrarian flavor because high valuations imply low starting yields and thus low expected return through low income.
- **Less than a year.** For a few months-long rearview perspective and horizon, momentum tendencies tend to dominate. Objective expected returns take this tendency into account, so extrapolation can make sense for near-term predictions. Short horizons are not our focus, however.

For some asset classes, such as many commodities, no useful yield measures exist. For others, such as hedge funds and other active strategies, yield or valuation measures cannot matter much because asset turnover is high. In these cases, forward-looking metrics do not make good anchors of future returns, and it is better to use some combination of historical evidence,

finance theory, and comparisons with other asset classes to determine objectively feasible expected returns.

Exhibit 1.5 details a scheme that summarizes many distinctions between objective and subjective expectations, each of which we explore in later chapters. Anyone can have subjective expectations, but here we refer to a stereotype such as the analyst growth forecasts shown in Exhibit 1.1. Not all features can fit neatly into this binary scheme. As previously noted, some investors' subjective expectations appear rational (e.g., many institutions' long-term CMAs track objective expectations), and even some rearview-mirror expectations can be rational if they use a very long history and if expected returns truly are constant (or approximately so). Structural changes create problems for any expectation-setting method.

Exhibit 1.5. 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's designation	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 using 3- to 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 purer expectations (for some investor groups); may help disentangle premia
Main information in high market valuations	Low required risk premia (making discount rates low)	Exuberant growth optimism (making cash flow expectations 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 expectations of . . .	Institutions	Individual investors
More typical expectations for . . .	Bond markets	Equity markets
How can structural changes trip up investors?	By shifting long-run valuation or growth anchors	By making long-run or recent mean return misleading

Source: AQR.

What We Cover

The rest of this monograph unfolds as follows. Chapter 2 immediately turns to the most pressing application of these ideas: expectations for US equities versus the rest of the world. Chapter 3 explores the striking difference between extrapolative equity return expectations and mean-reverting rate expectations. Chapter 4 takes a step back to describe evolving investor practices and academic thinking on setting long-run CMAs.

We next focus on US equity markets. Chapters 5 through 7 study in turn historical return decompositions, objective forward-looking expected returns (based on valuations or starting yields), and subjective return expectations (based on surveys of different investor groups).

Then, chapters 8 and 9 focus on bond markets. In chapter 8, we review the Treasury yield history through the lens of survey-based rate expectations and term premia, stressing how learning of gradual structural changes may explain the persistent forecast errors in surveys and forward rates. We highlight the topical danger of deanchoring inflation expectations on bond yields through both expectations and term premia channels. Chapter 9 emphasizes the role of mean-reverting rate expectations in shifting the sign of the yield curve from positive to negative over time.

Chapter 10 explores expectations on diversifying alternatives, again highlighting the dangers of excessive reliance on the rearview mirror. Finally, chapter 11 focuses on commonalities and differences across asset classes in the patterns we highlight and draws other final lessons.[12]

Some caveats are always warranted when discussing expected returns. Despite our deeper understanding of expected returns and their drivers, unexpected returns are always lying in wait. The return forecasting effort combines art and science. Thoughtful observers may disagree with each other—but they understand why, and their estimates tend to be in the same ballpark. Yet even the best expected return estimates can be humbled by subsequent reality. Luck trumps skill, chance beats edge, and unexpected returns overcome expected returns (even for uncomfortably long horizons), especially if structural shifts materialize. Humility is appropriate, but evidence suggests that if we must assess long-run expected returns, the forward-looking methods we discuss are our best starting point. To describe the challenge elegantly, we copy the late, great Peter Bernstein (1998) in recalling G. K. Chesterton's words:[13]

> The real trouble with this world of ours is not that it is an unreasonable world, nor even that it is a reasonable one. The commonest kind of trouble is that it is nearly reasonable, but not quite. Life is not an illogicality; yet it is a trap for logicians. It looks just a little more mathematical and regular than it is; its exactitude is obvious, but its inexactitude is hidden; its wildness lies in wait. (p. 331)

---

[12]One consistent framework that reveals many similar patterns across asset classes involves assessing how well carry/value measures predict future excess returns or fundamentals (see Cochrane 2011; Ilmanen 2011, chap. 22; and Koijen et al. 2018). All forward-looking carry/value measures reflect some (unlikely constant) mix of required risk premia and expectations on fundamentals (e.g., equity growth, credit defaults, bond interest rates, currency spot rates). Surveys or predictive regressions can disentangle how much of each might be present.

[13]This monograph bypasses deeper topics regarding the nature (frequentist versus Bayesian) or existence of probabilities and the possibly futile quest to predict the future in a random (unstable and possibly chaotic) world. See Spiegelhalter (2024) for a readable treatment of these subjects. Financial market forecasts are further plagued by diverse actors who respond to predictions and accentuate or offset them. Famous examples include Keynes's beauty contest, Soros's reflexivity and positive-feedback trading, and the Fed's countercyclical policy efforts.

CHAPTER 2. EXCEPTIONAL EXPECTATIONS: US VERSUS NON-US EQUITIES

Chapter Summary

In recent years, allocators to global equities have faced the conundrum of how to respond to persistent US outperformance. Some investors serenely maintained market-cap weights despite ever more extreme relative valuations. Others pursued the contrarian view implied by yield-based expected returns. And still others gave up entirely on investing in the rest of the world because the United States seemed so strongly placed to foster technological innovation, earnings growth, and investor returns. We address this highly topical regional question by analyzing the drivers of relative performance—in particular, the different roles of fundamentals and valuations—and assessing the most likely implications for future returns.

Introduction

In this chapter, we cut straight to a decision that is topical in 2026: the allocation between US equities and equities from the rest of the world, mainly focusing on developed markets.

US equities outperformed other markets in the 1990s, and they have done so again since 2009. The prolonged latter episode reinforced a belief in US exceptionalism, tied to entrepreneurial culture and market-friendly institutions. It led many investors, especially home-biased US ones, to ask whether they should bother with international diversification when it seemed to be such a return drag. Big names such as Warren Buffett and John Bogle have been proud US-only proponents, and this view has paid off.

We can pose several counterarguments. We show that US outperformance since 1990 primarily reflects richening relative valuations.[14] By the end of 2024, relative valuations were at a historically extreme level, and we argue that some mean reversion is a sounder assumption than extrapolation of further richening.[15]

Moreover, although many investors have no firsthand memories of the pre–Global Financial Crisis (GFC) investment landscape, they should know that the US equity market has underperformed the rest of the world for extended periods (e.g., in the 1970s, 1980s, and 2000s). That said, the US market has enjoyed an average return and growth edge over the past 50 or

[14]Using MSCI data, the 35-year outperformance from January 1990 to December 2024 was 4.7% per year. Relative valuation change contributed 3.8%, real EPS growth advantage 1.1%, dividend yield differential −0.6%, and real interest rate differential −0.3%. Later in this chapter, Exhibit 2.4 shows similar decompositions for other windows and also for dividend-based decompositions with Dimson–Marsh–Staunton (DMS) data.

[15]Of course, this debate is not new. The pro-diversification literature includes Asness et al. (2011), who show global diversification helps over long horizons; and DMS (2021), who explore the role of luck, with the United States being on the winning side of world wars and the Cold War and its related economic competition, and having no wars on its own soil, revolutions, or hyperinflations. Asness et al. (2023) find that most US outperformance since 1990 reflects relative cyclically adjusted price-to-earnings ratio (CAPE) valuation increases.

© 2026 CFA Institute Research Foundation. All rights reserved.

100-plus years, although not as large as implied by recent valuations. We suspect that the recent high valuations and predicted abnormal growth edge partly reflect investors mistaking the richening-driven return outperformance for growth-driven outperformance, the latter of which would be more reasonable to extrapolate.

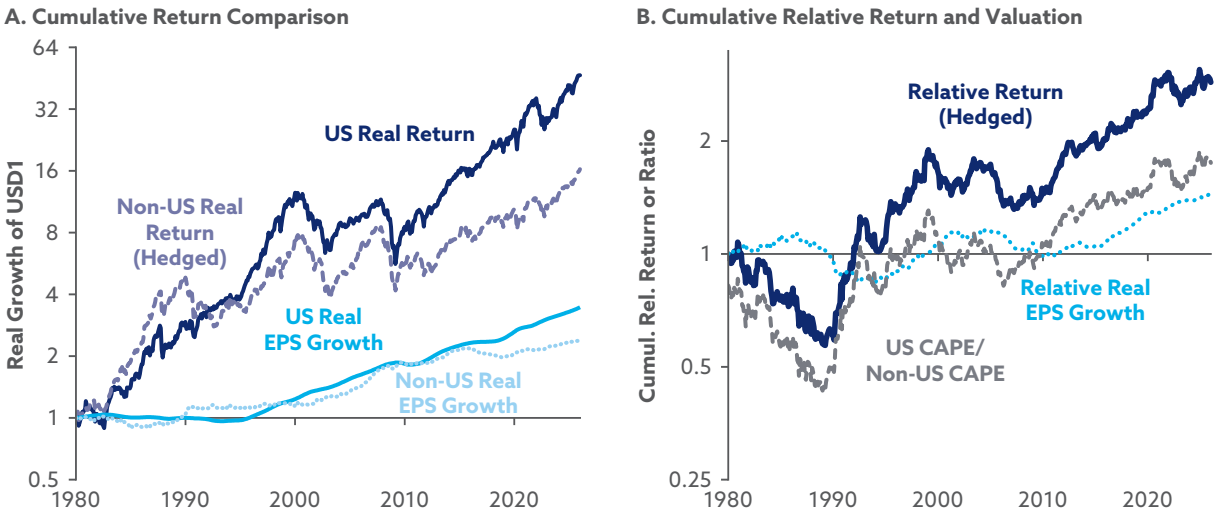
We acknowledge that in the past decade, valuation-based capital market assumptions (CMAs) have given forecasts of absolute and relative US market performance that turned out to be too pessimistic. We also show that over longer histories, such CMAs have been more often right than wrong, whereas rearview-mirror expectations (extrapolating, say, the past decade's relative performance) have hurt investors. An investor's current view on "US versus the rest" functions as a Rorschach test on whether they care more about one recent observation or longer-term statistical evidence.

We also briefly discuss diversification and luck arguments, as well as the implications of the US Magnificent Seven stocks, the existence of a technology edge, and "America First" economic policies.

Historical Evidence on US Return Edge, Growth Edge, and Valuation Changes

Exhibit 2.1, Panel A, shows cumulative returns and earnings growth for US and non-US developed markets since 1980. On both metrics, the United States has left the rest of the world in the

Exhibit 2.1. US Versus Non-US Real Equity Market Return and EPS Growth, January 1980–December 2025



Sources: AQR, Bloomberg, and I/B/E/S.

Notes: US and non-US equities are represented by the MSCI USA and MSCI World ex USA indices, respectively. Real returns are total returns in excess of US CPI inflation. Real EPS (earnings per share) growth is 10-year smoothed. Non-US EPS and cyclically adjusted price-to-earnings ratio (CAPE) are estimated using the eight largest non-US developed markets (Australia, Canada, France, Germany, Japan, the Netherlands, Switzerland, and the United Kingdom).

dust since the GFC. Exhibit 2.1, Panel B, displays cumulative relative returns, relative earnings growth, and relative valuation changes. The dark blue line shows that although the US outperformed non-US markets over the full period, it underperformed in the 1980s and 2000s. Thus, the US edge is not ironclad.[16,17]

The other two lines in Exhibit 2.1, Panel B, show that relative performance evolves closely with relative valuation but is also positively correlated with relative earnings growth. Both drivers matter, but valuations matter more. We focus first on the relative valuation series (gray dashed line). The US CAPE was less than half the non-US CAPE in the late 1980s, at the peak of the Nikkei bubble when Japanese valuations were very high and Japan had a large weight. Valuations converged in the 1990s and hovered near parity until the GFC. Since then, the United States has gone on a further (absolute and relative) richening spree, and by the end of 2024, its CAPE was nearly twice the non-US CAPE. This relative richening (fourfold since 1989 and double since 2009) boosted US outperformance by nearly 4% a year.

What would need to happen to return valuations to parity? A 45% drop in US stock prices from their December 2024 levels would do the trick. More realistically, a combination of a positive-but-disappointing US growth edge (e.g., 1% a year) and relative repricing of 5% a year over a 10-year period would also work. In practice, of course, any mean reversion is sure to be a rocky road.

Should investors worry about the historically extreme relative US valuation as of this writing? Yes. The valuation edge is partly understandable given the realized outperformance of US equities in both returns and earnings growth, especially after the GFC, as well as the compelling stories of US tech stars and lead in the AI race. (For instance, the combined Magnificent Seven market cap exceeded all European stocks by the end of 2024.) Indeed, about half of US outperformance in the past 15 years and of the relative richness of the United States at this time can be attributed to the difference between its sector composition and that of the rest of the world, mainly resulting from a larger tech sector in the United States.

Yet, ominously, we may recall what happened to the non-US index 35 years ago, after it enjoyed double the valuation of the United States. More systematically, **Exhibit 2.2**, Panel A, illustrates that the relative US/non-US CAPE has predicted quite well the next decade's relative performance.[18] The predictive correlation is −0.5 over an admittedly short sample (only four or five independent observations).

So here too—and even more than with single-market performance predictions—empirical evidence suggests that starting yields and valuations are reasonable (but not infallible) anchors for objective return expectations. Thus, it is not surprising to see in Exhibit 2.2, Panel B, and **Exhibit 2.3**, Panel A, that the consensus of CMA providers, since 2011, has consistently

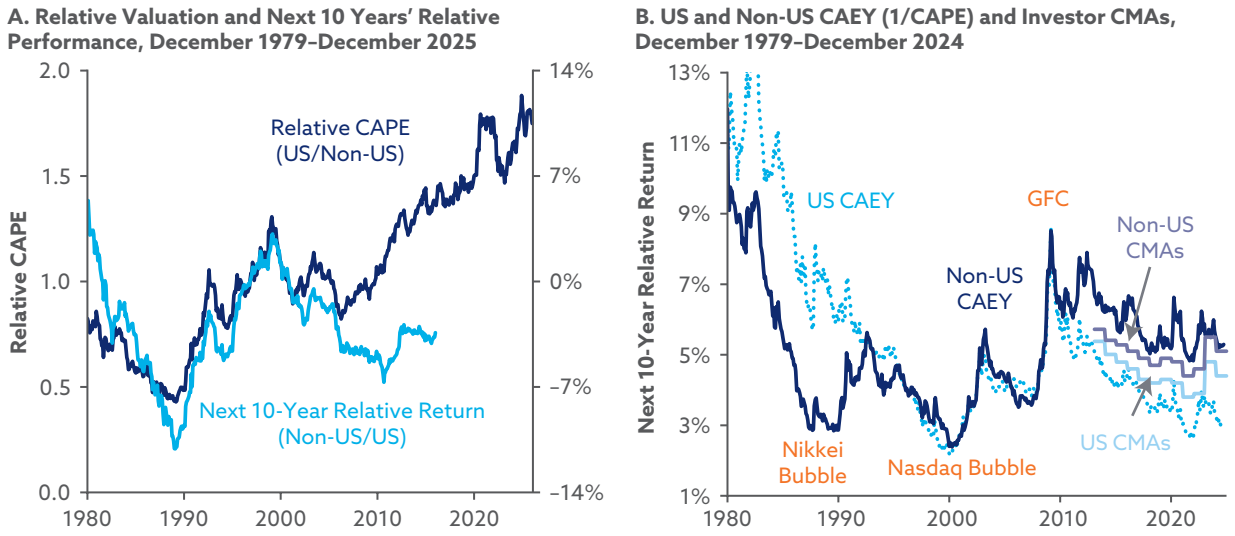
---

[16]Exhibit 2.1 shows the differential in 10-year smoothed real EPS growth to match the earnings in the CAPE. This matching ensures that the components aggregate to the relative compound return, once we include the dividend yield differential and real interest rate differential shown in Exhibit 4. It also means we "lose" the 1970s decade, when US equity returns lagged non-US by a cumulative 16%.

[17]We focus on a currency-hedged comparison because the CAPE valuations are directly related to currency-hedged returns. The unhedged performance has similar contours as the hedged performance, as later analysis of DMS unhedged returns attests.

[18]In Exhibit 2.2, the relative CAPE in Panel A and the two CAEY series in Panel B do not always seem visually consistent, which is because of the inversion math. Generally, carry or income is best measured as a yield spread, whereas for mean-reversion prospects, a valuation ratio matters more.

Exhibit 2.2. Expected Return Implications of the US Versus Non-US Valuation Gap



Sources: AQR, Bloomberg, Horizon Actuarial (2025), and I/B/E/S.

Notes: US and non-US equities are represented by the 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. CMAs in Panel B are real return estimates from the Horizon Actuarial (2025) investor survey.

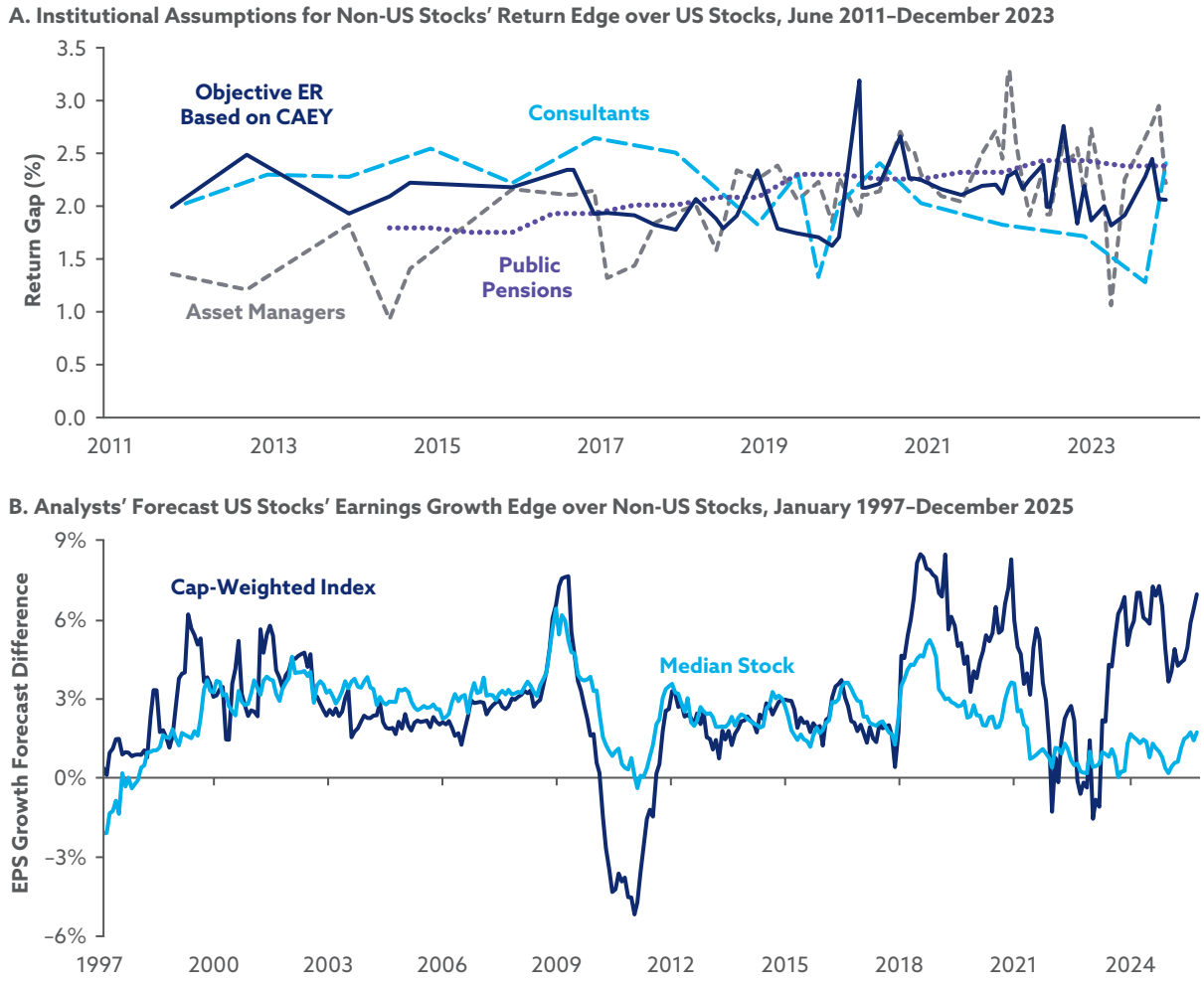
assumed lower future returns for US equities than for non-US equities, reflecting the higher US valuation and lower starting yield (the objective return edge estimate in Exhibit 2.3, Panel A).

This prediction has not panned out well for the past decade, however. We know this with hindsight, but let us give credit to those who predicted the exceptional US tech-led edge in advance. It is interesting to see that the CMA gap in favor of non-US equities in Exhibit 2.3, Panel A, broadly matches the 2% gap predicted by inverse CAPEs, although the gap is only 0.5% in the Horizon Actuarial (2025) survey shown in Panel B. Some CMA methods, including ours, assume an offsetting growth edge for the United States, although not enough to predict US outperformance. Equity analysts have predicted an earnings growth advantage for US stocks, recently more so for the Magnificent Seven stocks that dominate cap-weighted indices than for the median stock (see Panel B).

What investors take away from this evidence depends on how much they care about recent experience versus longer-run patterns, or about stories versus statistics. The more they lean toward the former, the more they will ignore the warning from current valuations and the more they will lean toward seductive growth stories that favor the United States. Until the mid-2020s, the US bulls were proved right in the post-GFC era.

The higher the relative valuations become, the harder it is to satisfy the high (relative) growth expectations embedded in them. At some point, it takes only a small catalyst to shift sentiment.

Exhibit 2.3. Evolution of Various Forecasts of US Versus Non-US Equity Market Performance



Source: AQR, Dahlquist and Ibert (2026), I/B/E/S.

Notes: Panel A shows CMA gaps by asset manager, consultant, and public pension subgroups. Subjective risk premia are fitted values from a panel regression of subjective equity risk premia over Treasuries on forecaster and time fixed effects. Objective expected return (ER) is CAEY minus real US Treasury yield. Panel B shows equity analysts' long-term (three- to five-year) EPS growth forecast for large-cap stocks in the United States (Russell 1000 Index) and EAFE (MSCI Europe, Australasia, and Far East Index). Panel A highlights the CMA expected return edge for non-US equities, and Panel B highlights analysts' expected growth edge for US equities.

Remember, however, that these valuation-based predictions are more useful for the next 5 to 10 years than for the next year. Shorter-term predictions need a catalyst in addition to a value-based signal. The US Federal Reserve has historically been the most common catalyst to prick bubbles or growth stock booms, but other possibilities include regulation, competition, sentiment, and geopolitics. Notably, the current Trump administration's policies have raised tariff-related uncertainty and possibly the risk of stagflation in the United States.

Conversely, the more persistent the US growth edge seems and the more consistently US equities outperform, thereby embarrassing valuation-anchored CMAs, the more we may see investors losing faith in CMAs and global diversification, instead of going "all-in" with US equities. Maybe even CMA methods will be modified to create more US-friendly outcomes. This might be a humanly understandable extrapolative reaction, but it is also giving in to rearview-mirror expectations at a dangerous time when relative valuations are historically extreme.

Although institutional CMAs have had a contrarian spirit (predicting lower returns for US equities), it is less clear that institutional portfolios reflect this view. As we showed in chapter 1, by the end of 2025, the weight of US stocks in global portfolios stood at near-record highs (since 1970): 72% of the developed market MSCI World and 63% of the broader MSCI ACWI. Thus, investors in aggregate must have embraced the rearview mirror for the market to clear with these weights.

Some evidence suggests that US pension funds have kept the US weight in their global equity portfolios quite stable during the past 15 years, even as the US weight in global indices increased.[19] Not letting the US weight in portfolios drift higher as its market-cap weight has risen would be consistent with some respect being paid toward valuation-based CMAs' message, even if many anecdotal counterexamples exist.

Historical Return Decomposition

We now decompose historical US outperformance into three components: yield, growth, and valuation change. What period is most relevant? Views on this choice may differ, so we present results for various historical periods, all ending in December 2025.[20] **Exhibit 2.4**, Panel A, shows, on the left-hand *y*-axis, MSCI earnings-based decompositions for selected periods up to 45 years (also showing the impact of the interest rate differential), and, on the right-hand *y*-axis, the Dimson–Marsh–Staunton (DMS) dividend-based decompositions, which cover up to 126 years of history. Panels B and C show the same decompositions visually but for every possible starting point.

[19]See pension fund allocation studies in Milliman (2025) and Thinking Ahead Institute (2025). Any interpretation is clouded by the fact that the largest asset allocation change for public pensions and other institutions in the past decade is the increase in allocations to private equity, venture capital, and other private assets. The US bias in the private portfolios is significant, so the stable US share in public equities may conceal a rising US share in the total portfolio. Even ignoring private assets, it is conceivable that the stable domestic equity share reflects the net impact of two offsetting trends that are not driven by expected return views: (1) passively following market-cap weights (US share up), and (2) gradually reducing home bias (US share down).

[20]Multiple windows serve as useful robustness analysis. The backward-expanding perspective may be unfamiliar; however, it is especially useful when we know we care about the recent ending point but are not sure how far back to look. Remember that all samples end in 2025, a time of extreme relative richness and strong recent performance, which is hardly a neutral endpoint. For an opposite and more conventional time perspective, a forward-expanding chart would show annualized outperformance starting from 1900 for different ending years. The outperformance since the DMS sample inception exceeded 4% after the roaring 1920s and after World War II, but it then edged down to near 2% by the 1970s. It has hovered near that level ever since, with a 1.1% trough at year-end 1988 and a 2.2% peak at year-end 2024.

The United States does have a long-run growth edge of around 1% per year over the past century, but in recent decades, its return edge has been significantly boosted by relative repricing. Although the long-run annual return edge is near 2%, outperformance has been much larger since the GFC, mainly reflecting relative valuation change but also a larger growth edge and dollar appreciation. Another peak coincides with samples starting near the top of the Nikkei bubble in the late 1980s. US outperformance has been more modest starting after its own relatively strong decades, such as the 1920s, 1940s, and 1990s.

Exhibit 2.4, Panel C, shows that the United States has enjoyed an elevated return edge and growth edge in more recent history, and the gap between the return edge and growth edge has increased (as more of the return edge has come from repricing). The combination of using a shorter-distance rearview mirror and ignoring the impact of valuation changes can

Exhibit 2.4. Decomposing US Versus Rest-of-World Outperformance

A. Annualized Returns: Various Start Dates to 31 December 2025

		MSCI Earnings-Based Decomposition					DMS Dividend-Based Decomposition			
Start Year	Years in Sample	Relative Return (Hedged)	Dividend Yield Differential	Real EPS Growth Differential	Valuation Change Impact	Real Interest Rate Diff.	Relative Return (Unhedged)	Dividend Yield Differential	Real Dividend Growth Diff.	Valuation Change Impact
1900	126	–	–	–	–	–	2.1%	0.0%	1.6%	0.5%
1926	100	–	–	–	–	–	1.4%	–0.1%	0.7%	0.8%
1951	75	–	–	–	–	–	0.6%	–0.3%	–0.8%	1.7%
1981	45	2.2%	–0.1%	0.8%	1.7%	–0.1%	2.4%	–0.2%	0.4%	2.2%
1991	35	3.5%	–0.7%	1.4%	2.6%	0.2%	3.8%	–0.6%	0.8%	3.7%
2001	25	2.6%	–1.0%	1.0%	2.5%	0.2%	2.1%	–0.9%	1.2%	1.9%
2011	15	4.0%	–1.2%	2.5%	2.9%	–0.2%	5.9%	–1.0%	3.0%	3.8%
2016	10	3.5%	–1.3%	3.1%	2.4%	–0.6%	4.7%	–1.1%	0.1%	5.7%

B. MSCI Earnings-Based Return Decomposition: Various Start Dates to 31 December 2025

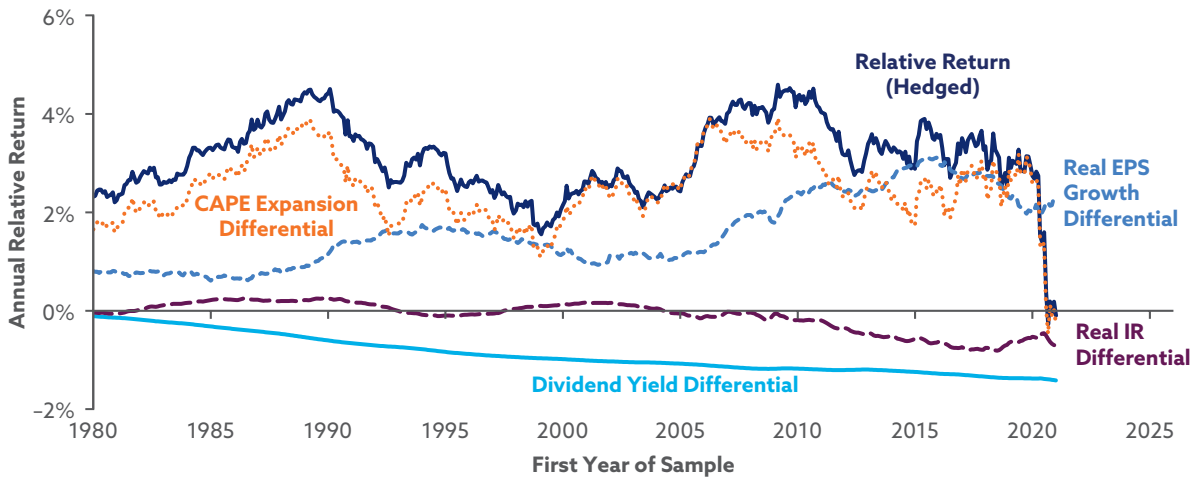
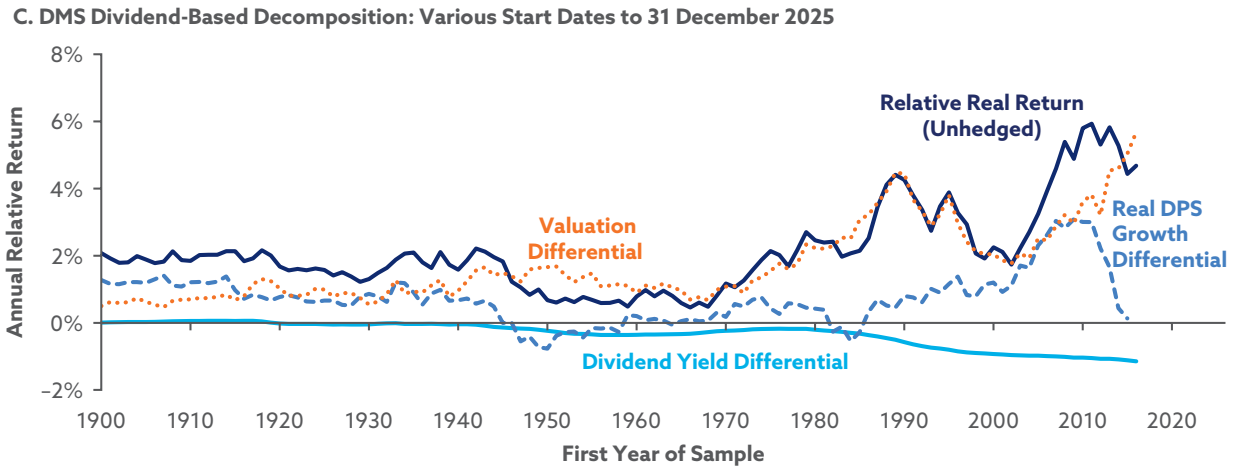


Exhibit 2.4. Decomposing US Versus Rest-of-World Outperformance *(continued)*



Sources: AQR, Bloomberg, I/B/E/S, and DMS (2026).

Notes: MSCI decomposition uses 10-year smoothed EPS, consistent with the CAPE metric, with non-US EPS estimated using the eight largest non-US developed markets. Foreign exchange (FX) hedging impact is captured by the real interest rate differential for this real return decomposition. DMS non-US return includes 89 countries and is unhedged; FX impact is not captured in the components shown. Real dividend growth includes 34 countries.

make extrapolative investors form overly optimistic expectations on the future US growth and return edge.

Even the past decade's exceptional US growth edge is not good news for US stocks in the future because both valuation changes and abnormal growth have negative autocorrelation at a decadal horizon. As noted in chapter 1, subjective growth expectations are often extrapolative, but objectively, a strong decade of growth predicts a weaker decade ahead.

One warning on Exhibit 2.4: Although all observations in the relative return series are positive, this does not mean that the United States always outperforms. An upward bias is evident from the 2025 endpoint, following an exceptional period of US outperformance.

The main message from these decompositions is that United States has had a long-run growth edge of, say, 1% (more if we start in 1900 but less if we start after World War II). It is probably fair to assume some continued growth edge for the United States in the future, but it seems that markets are discounting a much larger one.

How much larger? The different ways to quantify this will produce different answers. One approach is to ask what growth edge would bring CAPE valuations to parity over some horizon (see earlier discussion in this chapter). Another is to ask what growth edge would be needed over the next decade for the US market to deliver the same return as the non-US market, assuming no change in valuation of either market. Using AQR's CMAs as of December 2025, we calculate a required growth edge of 2% a year for US equities to earn the same return

as non-US equities hedged to the US dollar.[21] Note that this calculation assumes the exceptionally wide gap in valuations persists; any assumption of convergence toward more equal regional valuations would lead to a larger estimate of the required US growth edge.

Conclusion

The outperformance of US over non-US equities during the past 35 years mainly reflects relative richening, as US market valuations rose from roughly half those of non-US markets to double those of non-US markets. Equity investors tend to extrapolate past growth and past returns, and post-GFC US outperformance has been exceptionally consistent. It may be fair to extrapolate some growth edge (e.g., 1% a year) because the United States has enjoyed such an edge over long histories, and today's AI tailwinds may well justify a continued edge. Markets, however, seem to expect even more. We suspect that few investors appreciate how much of the past absolute and relative performance reflects repricing, which really should not be extrapolated—especially when the 2020s' extreme valuations point the other way.[22] Rearview-mirror expectations may be strongest just when they are most dangerous.

[21]Our real return assumptions were 3.9% and 5.7% for US and hedged non-US equities, respectively, a gap of 1.8%. This already assumed a modest US growth edge of 0.2%, so a total edge of 2% a year would be needed to give equal returns. If instead we assume that US and non-US stocks should deliver the same premium over their respective local risk-free rates, we calculate a similar result.

[22]Our focus has been on a currency-hedged comparison. The more common unhedged trade is also influenced by dollar moves against other currencies. The two trades move relatively closely because it is rare that currency moves overwhelm equity moves. In any case, today's richness of US equities is reinforced by the richness of the US dollar, so the story remains the same for an unhedged trade.

CHAPTER 3. WHY ARE BOND INVESTORS CONTRARIAN WHILE EQUITY INVESTORS EXTRAPOLATE?

Chapter Summary

Survey data reveal a striking difference in how investors form long-run expectations in equity and bond markets. Equity investors tend to extrapolate recent trends in returns and earnings growth, whereas bond investors tend to expect mean reversion in rates. In this chapter, we explore the contrast and possible explanations for this difference, proposing information salience as the key driver. We also examine very long-term trends in financial market variables and potential implications for the future.

Introduction

One theme that runs through this monograph is the distinction between (1) forward-looking expectations based on current market valuations or yields and (2) rearview-mirror expectations guided by the last 3 to 10 years of realized performance (see chapters 1 and 2). The former has a contrarian or countercyclical bent, while the latter an extrapolative or procyclical bent.

Which approach is more common in practice? How do most investors form their long-run return expectations? If we have just experienced a very bullish decade, as with stocks in 2000 or 2021 or 2026, these two approaches point in opposite directions (see Exhibit 1.1).

The current chapter makes what we believe is an original claim, which we explore more in depth in subsequent chapters: Investors form their expectations very differently when they invest in bonds or interest rates than when they invest in stocks.[23] Specifically, we argue that bond investors tend to expect reversals whereas stock investors expect continuations. After a long bull market in bonds that has brought yields to abnormally low levels, bond investors rarely get excited but instead recognize that low starting yields are likely to imply low returns. (Bond investors even acknowledge the possibility of mean reversion in yields, which would further reduce near-term returns.) In contrast, after a long bull market in stocks that has brought valuations to abnormally high levels (and thus starting equity yields to low levels), equity investors are more likely to react with exuberance and growth optimism than with fears of market valuations reverting down to past norms.

In this chapter, we will show some visual evidence supporting this claim of contrasting expectation formation patterns in the two major asset classes. Moreover, we will propose an explanation for these patterns. Although we discuss some other candidate explanations, we conclude that salience is the main reason. The simplest story: Bond investors are used to thinking about market yields, which are inherently forward-looking. The 10-year Treasury bond is

[23]There is some segmentation in the clienteles: Bond investors are stereotypically more conservative, and stock investors more speculative and aggressive. We think the claim works, however, even if we consider the same investor investing in both asset classes.

 © 2026 CFA Institute Research Foundation. All rights reserved.

not discussed in the media or among investors in terms of its price (e.g., 1,017/32) but rather in terms of its yield of 4.20%. In contrast, equity investors are more exposed to prices and recent realized returns, and past strength inspires expectations of more strength.

Although this core claim may seem intuitive and obvious, try finding it in the academic literature. This contrasting expectation formation pattern for bonds and stocks is a new idea for academics, as far as we know (and we do follow the literature).[24] We hope to receive profuse thanks from the authors of some journal article to be published in 2027 or at least from a doctoral student for a great dissertation topic.[25]

Visual Empirical Evidence

We start with bond markets. Connoisseurs know that many respectable term structure models embed an assumption of mean-reverting rate expectations.[26] This practice has been hard to stick with through decades when mean reversion rarely happened. Bond investors and experts were criticized in the 1960s and 1970s for not anticipating or recognizing the decades-long uptrend toward ever-higher inflation rates and bond yields. The next generation of forecasters was then criticized for missing the 40-year downtrend between 1981 and 2021.

We have more to say about bond analysts' forecast errors in Chapter 9, but for now, we note that these extremely persistent up and down outcomes (which truly were surprising) made mean-reverting rate expectations and their proponents look foolish. Many readers have seen "the folly of forecasting" highlighted with hair charts, such as the ones in **Exhibit 3.1**. Through decades of falling rates, expert economists kept expecting rates to rise (i.e., normalize), but the rise never happened (well, until 2022). The story looks quite similar whether we examine 10-year Treasury yields or three-month bill rates.

The decades-long bull market in bonds produced bountiful gains because bonds provided both positive carry when the yield curve was mostly upward sloping and capital gains when yields fell. The only way investors could lose was if they chose to be bearish on bonds. And many did. Consensus expectations toward rising rates turned out to be wrong, wrong, wrong for a long time.

Instead of becoming a laughingstock, the expert forecasters would like you to know that any "all-knowing" market predictions from forward rates were no smarter (see chapter 9) and that at least they got some details right. The consensus forecast predicted that most rates would rise when rates were the lowest, and after some temporary rate rises, economists predicted normalization to the downside. Predictions that pointed downward are shown

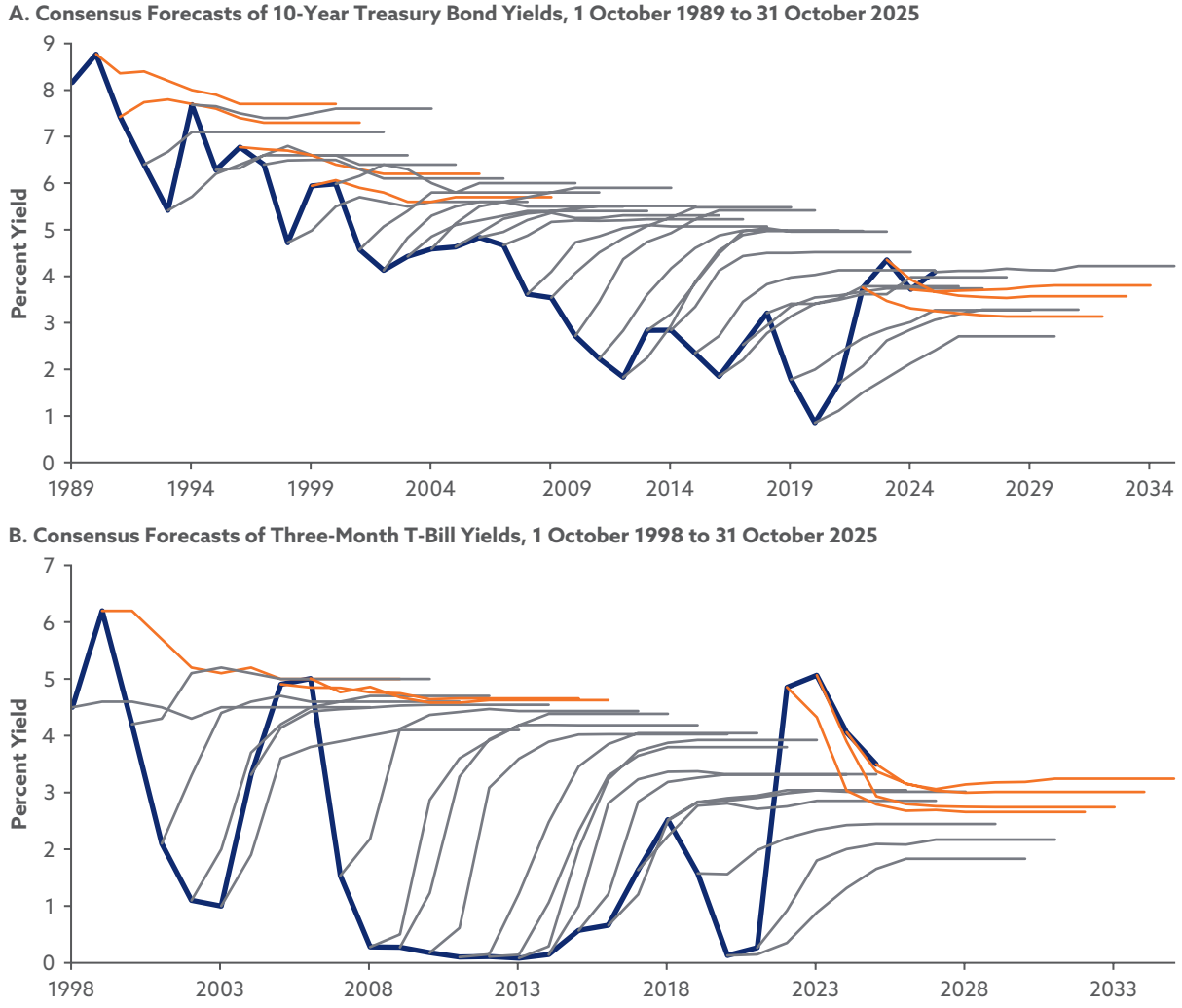
---

[24]Actually, the extrapolative camp extends beyond stocks to private asset classes, commodities, and hedge funds with no salient yield data. It really is rates versus the rest.

[25]It might also be that bond investors are more rational and quantitatively oriented whereas equity investors are more prone to animal spirits and oriented toward stories, but this distinction, too, may trace back to salience. Long-horizon returns of a bond investment are logically and empirically well anchored to starting yields, whereas for equities, a good growth story can always justify the continuation of a bull market. Maybe the key distinction is not bonds versus stocks but cash flows versus discount rates (see chapter 1). We can tell more-memorable stories about cash flow opportunities than about discount rates. So, the future doctoral student could also explore whether all cash flow expectations are inherently extrapolative whereas all discount rate expectations are inherently contrarian.

[26]For example, Vasicek (1977) and Cox et al. (1985).

Exhibit 3.1. Mean-Reverting Rate Expectations in Bond Markets



Sources: AQR and Consensus Economics.

Notes: The charts show the spot yield in dark blue and forecasters' expectations of the yield curve 10 years out in gray for 10-year Treasury bonds and three-month T-bills for each year across time. Expectations of an inverted yield curve are highlighted in orange.

in orange in Exhibit 3.1. Notice that these predictions occurred after rate rises, and they tended to get the direction right.

The common takeaway from Exhibit 3.1, however, is what economists got wrong, not right. During the long period from 1990 to 2020, rates trended lower while economists persistently predicted rate rises. A typical viewer response to such charts was, "When will they ever learn?"

A more sympathetic reading of Exhibit 3.1 is that the economists displayed mean-reverting rate expectations toward a mean that was gradually shifting lower over time. They did not anticipate

a secular downtrend. The downtrend that materialized reflected a truly unpredictable sequence of surprises when both inflation expectations and the neutral real rate kept edging lower. By this reading, economists behaved rationally and consistently with the best information they had at the time, expecting a reversal toward the past-decade (or longer) mean. No significant reversal arrived until 2022, however.

Bottom line: Both the experts (the economist consensus forecast) and the market (the yield curve) exhibited mean-reverting rate expectations, which made sense ex ante but looked irrational ex post after decades of repeated downward surprises on inflation and real rates.[27] For our purposes (i.e., trying to understand how investors form expectations), the key point is that bond investors have a clear contrarian mindset.

Although expectations of mean reversion dominate bond market participants' headspace, equity market participants think differently. Their version of learning from history is to emulate it and extrapolate from it, instead of bucking it.

One example of equity market participants for whom we can observe long-term (well, not 10-year but 3- to 5-year) expectations is equity analysts. These professionals spend most of their time thinking about the stocks of their target companies. And they are incentivized to make good predictions (although, as we will show, this is not their only incentive).

Exhibit 3.2 plots the aggregated consensus of equity analysts' long-run earnings growth forecasts across all US large-cap stocks (for a three- to five-year horizon) and compares it with past realized earnings growth.[28] Clearly, analysts have tended to be overly optimistic: Their predictions have averaged more than double the 6% realized nominal annual EPS growth rate.[29] Such optimism may reflect the analysts' sunny nature, their seat in an investment bank, or their incentives to keep the C-suite at their target companies happy and ensure future access to those occupying it.[30]

What matters to us is that this overoptimism is not constant over time. Analyst forecasts shown in Exhibit 3.2 are extrapolative—and generally unhelpful for market timing. As noted in chapter 1, the extreme growth optimism in 2000 and 2021 (and possibly the start of 2026)

---

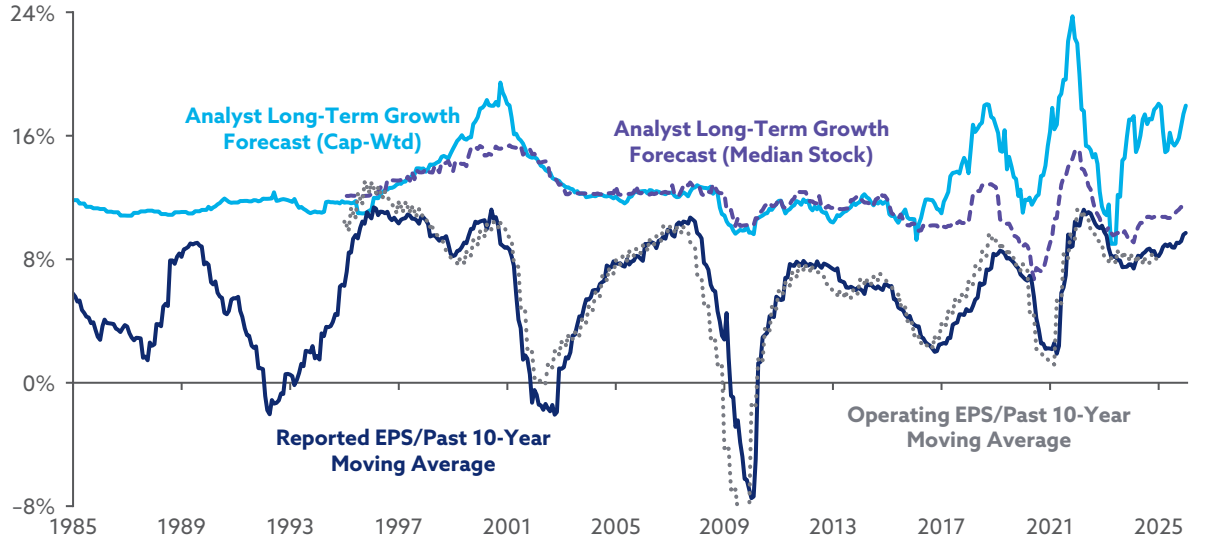
[27]You might suspect that one of us (Ilmanen) is too sympathetic toward these failed rate forecasters because I shared their mistake. You might be right, but although I followed markets closely through these times, I did not need to make rate forecasts. Instead, I have some research pride in having identified a reason other than irrationality for the repeated forecast errors—that is, the difficulty of learning about persistent structural changes in the inflation process (see Ilmanen 2011, box 9.3). Recently, an excellent academic study by Farmer et al. (2024) makes the same argument with much more sophisticated econometric analysis.

[28]Because it is debatable how far back these analysts look into the rearview mirror, we do not pick a particular starting point. Instead, we compare the current earnings level with the 10-year moving average of past earnings. Because this estimate is on average five years stale, we express it as a five-year annualized growth rate.

[29]We emphasize that the I/B/E/S consensus data, which we use in several chapters, surveys bottom-up equity analysts who focus on a narrow set of individual companies. Anecdotally, top-down market strategists display weaker overoptimism (and overextrapolation) tendencies, but there are no comparably long time series of top-down strategists' long-term earnings growth forecasts. However, Park et al. (2025) provide supportive evidence using their one- to two-year forecasts since 2003.

[30]In fact, analysts keep the C-suite twice-happy, first by being overly optimistic on medium-term and long-term earnings forecasts and then by obligingly walking down their estimates in the months before the earnings announcement. Those near-term estimates need to err to the pessimistic side so that the firm's actual earnings can beat the consensus estimate (which happens more than 70% of the time). See Kothari et al. (2016) and Ed Yardeni's website (https://yardeni.com/charts/sp-500-earnings-squiggles-framework) for some visual evidence about the regularity of the walkdown path.

Exhibit 3.2. Equity Analysts' Extrapolative Growth Expectations About US Large-Cap Stocks, 1 January 1985 to 31 December 2025



Sources: AQR, Credit Suisse, I/B/E/S, and Shiller Data.

Notes: Analyst growth forecasts before 1 January 1995 are sourced from Credit Suisse. After 1 January 1995, forecasts are sourced from I/B/E/S and AQR. EPS data are from Shiller Data.

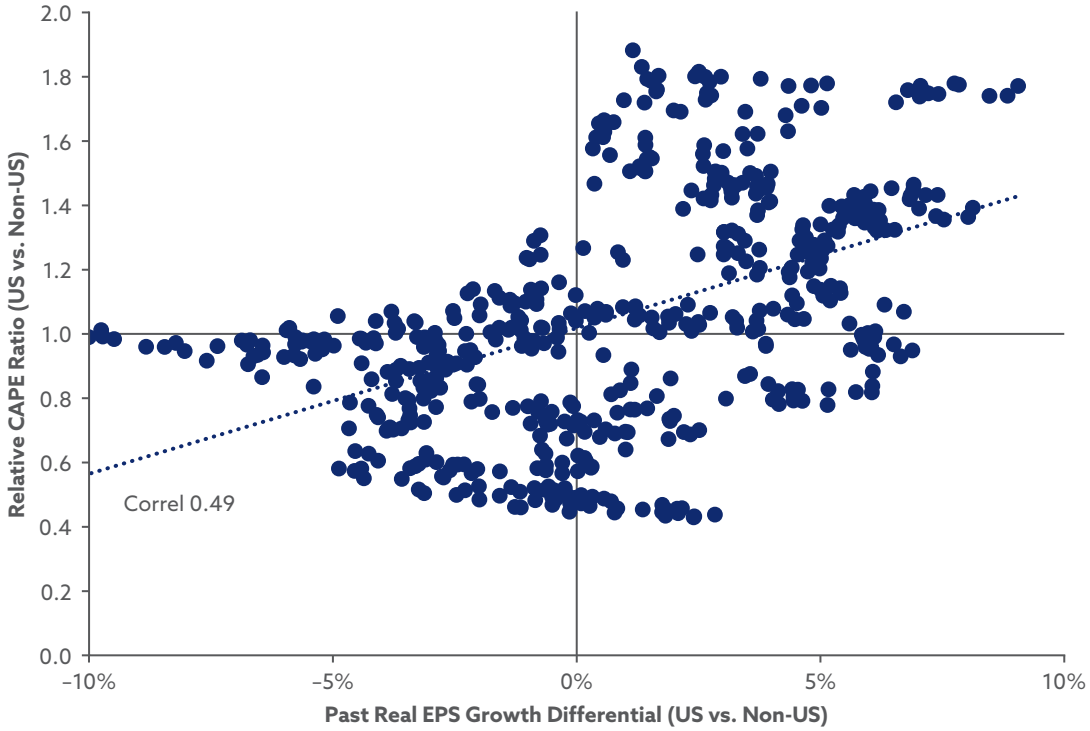
peaked with market valuations and preceded sharp market falls. The correlation between past earnings growth and long-term expectations is 0.3, whereas realized earnings growth exhibits negative long-term autocorrelation.

Moreover, a particular kind of overoptimism—a special layer of US exceptionalism—is saved for the mega-cap tech stars. A comparison of the light blue line in Exhibit 3.2 for cap-weighted stocks and the dashed purple line for the median stock shows a large gap in 1999–2001 and an even larger one since 2017, which is consistent with wide valuation spreads at these times. Although the tech bubble optimism on mega-caps proved badly misplaced, the post-2017 optimism was spot on because of the success of the Magnificent Seven mega-caps.

Other academic evidence supports the existence of excessive growth extrapolation in equity markets. Individual "growth stocks" have enjoyed faster sales or earnings growth in the past, and this growth edge exhibits some persistence. Thus, investors rightly expect the growth edge to continue; unfortunately, however, they extrapolate the edge too far into the future and price these stocks too dearly. After a few years, such extrapolative growth expectations tend to face disappointment and result in below-market returns for growth stocks (Chan et al. 2003).

Separately, we find evidence of directional market return extrapolation, especially by retail investors (see chapter 7). **Exhibit 3.3** provides what appears to be evidence of extrapolative growth expectations influencing relative country valuations. The positive 0.5 correlation in the

Exhibit 3.3. Evidence of Extrapolative Expectations in Equity Country Valuations, December 1979–December 2025



Sources: AQR, Bloomberg, MSCI, and Reuters.

Notes: CAPE is the cyclically adjusted price to earnings ratio, which is calculated by converting MSCI P/E from Reuters into earnings per share (EPS) using the MSCI price index before adjusting for inflation using CPI from Datastream and taking the inverse of the 10-year average real earnings yield. The non-US CAPE is calculated as the market-cap-weighted average of the CAPE of the eight largest MSCI EAFE countries. Past real EPS growth is calculated by taking the ratio of the current level over the past decade's average (as in Exhibit 3.2).

scatterplot indicates that periods of US earnings growth outperformance have given rise to higher US equity market valuations compared with other developed markets.

As we discussed in chapter 2, most of the US outperformance in recent decades can be attributed to richening relative valuations. In 1990, the United States had a CAPE about half that of the remaining developed world. During the 2000s, the US CAPE rose to be slightly richer than the rest, and by the end of 2024, it was nearly twice that of the rest. Those rising relative valuations suggest that US equities should be less, not more, attractive (at least relative to non-US equities) in the future; however, in 2024–2025, investors collectively were willing to raise their US allocations to an all-time high of 72% of the global equity portfolio. We can only make sense of these allocation choices if investors have assigned a record-high prospective growth advantage for the United States over others, guided by an extrapolative mindset.

What Causes This Different Reaction to Past Performance in Bonds and Stocks?

Why, then, is it common to expect fixed income returns to reverse after a long period of gains while expecting an equity bull market to continue? One plausible explanation is that these patterns have been the historical norm. Yet this claim conflicts with the long-run historical evidence shown in **Exhibit 3.4**. Total returns of US equities have exhibited decadal reversals (−0.1 autocorrelation since 1800, −0.3 since 1900) and bonds have exhibited decadal continuation (+0.5 autocorrelation since 1800, +0.6 since 1900).[31] Clearly, actual historical experience is not the answer.[32]

Instead, we argue that salience explains the difference. Academic research has emphasized the role of information salience (memorability, easy access) in expectations formation.[33] Bonds are quoted in yields but equities are quoted in prices. Many information sources and market commentaries reinforce the focus on bond yields but on realized equity returns. Bond yields are easy to access and understand, whereas equity yields (if they are even available) require the use of academic models that make obscure judgments about how much those yields reflect required returns versus realistic growth prospects. A case in point: When investors in the 2020s look back to the 2010s, they tend to recall the low interest rates (an ex ante measure) and the strong equity returns (an ex post measure).

Many bond investors find today's interest rates abnormally high and expect rates to mean-revert toward the lower levels of the 2010s. This logic explains the 2022–2024 yield curve inversion and more generally the shapes of the curve over time (a mostly upward slope from

Exhibit 3.4. Historical Patterns Do Not Support an Equity Continuation or Bond Reversal Mindset

	Nominal		Real		
	Equities	Bonds	Equities	Bonds	Inflation
Decadal autocorrelation since 1800	−0.09	0.49	−0.37	0.31	0.24
Decadal autocorrelation since 1900	−0.31	0.57	−0.48	0.24	−0.03

Sources: Equity and bond return series provided by McQuarrie (2024a, 2024b).

Note: Decadal autocorrelations are across 22 10-year cumulative returns of US asset classes between 1800 and 2019.

[31]Decadal autocorrelations of real returns are a bit lower for both asset classes. They are even more negative when measuring the relative performance of US versus non-US equities. As we will show in chapter 6, decadal earnings growth series also exhibit negative autocorrelation.

[32]The last section of this chapter ("The Really Long View") digs deeper into the very long trends of falling real yields and richening asset valuations, which partly explain the observed positive autocorrelation for bonds shown in Exhibit 3.4. We argue that we may have reached some natural limits to asset-richening trends.

[33]For example, see Bordalo et al. (2022b), and Hartzmark and Solomon (2022) on the influence of the way returns are displayed on investor choices.

1983 to 2021). Now, if equity investors shared this contrarian mindset, what would happen in the stock market? If investors viewed stocks the same way as bonds, forward-looking estimates would be more cautious after an abnormally bullish decade, predicting softening valuations toward the previous decade's lower levels.

Note that we said "if." Little suggests that equity investors act in this manner, on average, when forming expectations. Their salient memory is not the cheaper valuations of the past but the strong realized returns, so they are more likely to extrapolate recent multiyear performance forward.

Investors would do well to bear these tendencies in mind as they form their expectations for equity and bond market returns as well as regional prospects for the years ahead. A current example is the outperformance of US equities compared with the rest of the world, as discussed in chapter 2.

The Really Long View: Should We Expect Asset Richening Trends to Persist?

One might argue that bond expectations are more contrarian than stock expectations because bond prices are driven only by discount rates whereas stock prices are also driven by expectations of cash flows. Discount rate shocks may be inherently self-correcting: Lower discount rates imply higher valuations but lower future reinvestment rates, a phenomenon that occurs even in the absence of any mean reversion. Cash flow shocks, in contrast, are not self-correcting (or are less so than discount rate shocks).

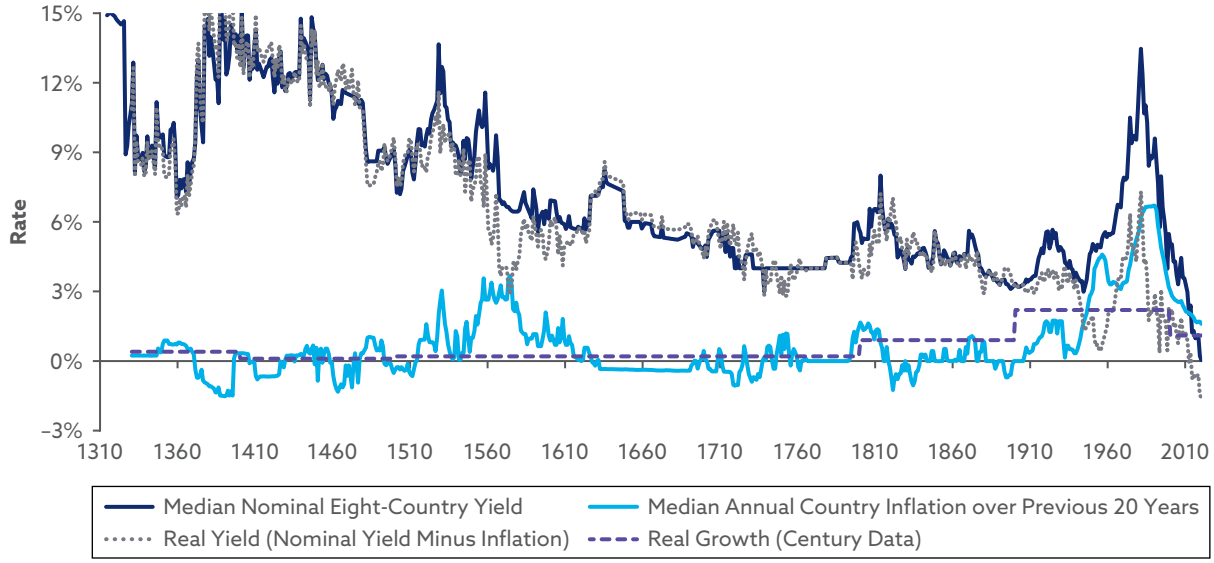
Recent academic research, however, has challenged the notion that real bond yields are mean-reverting. Schmelzing (2020) and Rogoff et al. (2024) document multicentury evidence of ever-falling real bond yields, from double-digit rates in the Middle Ages to negative levels in the 2010s (shown visually in **Exhibit 3.5**).[34] This downtrend may reflect the declining amount of risk in debt, especially in sovereign debt, as national governments have become more stable. It may also reflect increasing investor patience and risk tolerance resulting from higher wealth.

Lower required yields imply higher bond valuations, and lower riskless yields likely boost other assets' valuations. In subsequent chapters, we document the richening of US equity valuations over the past century.

Rogoff et al. (2024) acknowledge that real yields may be characterized by both a secular downtrend and cyclical reversals around this trend. Cyclical variations have lengthened from four- to five-year business cycles to decade-long cycles, partly reflecting the shift from the

[34]Exhibit 3.5 also shows that inflation and real growth hovered near zero before the Industrial Revolution, so macro arguments that explain bond yields by inflation and growth expectations do not adequately explain the high real yields of yesteryear. Risk- and patience-related factors likely dominated many centuries ago, but over time, the inflation and growth environment began to matter more for yields. Precious metal imports from the Americas and the Napoleonic wars raised inflation temporarily above zero. Over the past century, however, sustained positive inflation has become the norm. World wars, the shift to fiat money, and oil shocks explain the main fluctuations in the one inflation history we study. On the growth front, the 1900s and especially the post–World War II era saw unprecedented global economic expansion; recent decades have seen a slowdown in both population and productivity growth, at least in the industrial world. Finally, fiscal deficits matter in crises, but markets often ignore them for a long time: Witness the decline in real yields in recent decades despite rising debt levels.

Exhibit 3.5. A Really Long History of Downward Trending Yields, 1310–2020



Sources: Schmelzing (2020) and the Maddison Project Database (University of Groningen 2020).

Notes: Yield and inflation series are medians of annualized rates from up to eight countries (the United States, the United Kingdom, the Netherlands, France, Germany, Italy, Spain, and Japan) over the period for which Schmelzing (2020) data are available, in many cases before the United States was founded. Nominal yield refers to long-term loans or bonds, and real yield is the difference between nominal yield and median annual country inflation rate over the previous 20 years. Real GDP growth per capita data are from the Maddison Project Database for the same countries and are GDP-weighted.

post–World War II inflationary environment to the more recent disinflationary period when debt became more abundant and cheaper, thanks to friendly central banks.

What cannot go on forever will eventually stop, and the observed secular downtrends in required asset yields may have reached some natural lower limits. This consideration should strengthen reversal tendencies in bond yields and returns. Two key examples follow:

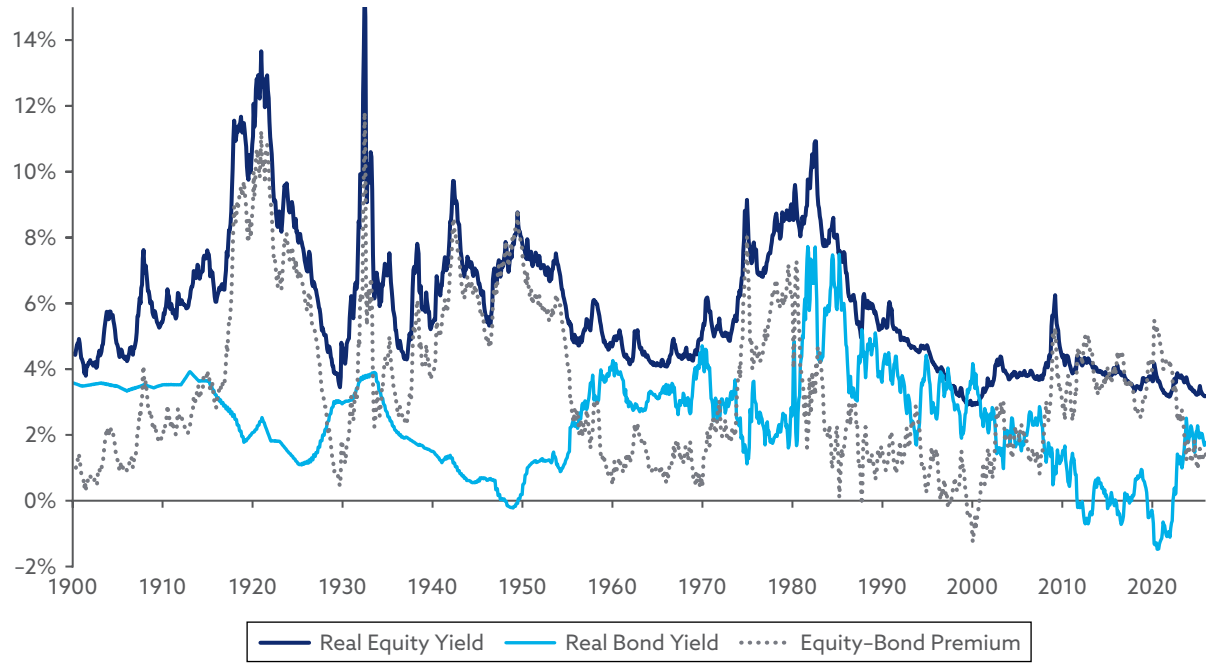
- It was long believed that nominal yields cannot be negative; otherwise, people would put money under the mattress instead of into banks or bonds. Yet, the zero-rate boundary proved porous between 2008 and 2021, as bond yields fell to near zero in the United States and to negative nominal levels elsewhere. Low inflation expectations helped, but the last mile of the downward journey was falling real yields: At the trough, trillions of US dollars of bonds traded at –1% to –2% real yields. Then 2022–2023 saw a sharp correction, when an inflation spike finally forced central banks to tighten monetary policies and yields rose steeply. One can still imagine real rates continuing to fall to ever more negative levels, but most observers believe that the secular downtrend illustrated in Exhibit 3.5 is over. So do we.
- Another article of faith was that equities should always offer a positive forward-looking risk premium over bonds, reflecting the basic risk–reward trade-off. Yet, some measures of the equity–bond premium turned negative in 1999–2000, mainly reflecting irrational exuberance

amid the tech bubble (see **Exhibit 3.6**). The premium then rebounded and widened in the post–Global Financial Crisis period but has narrowed sharply since 2022.

The real equity yield is mechanically the sum of the real bond yield and equity–bond premium, so its natural lower bound reflects both forces. Another anchor may come from the notion that equities provide levered exposure to economic growth, which suggests that the equity market's expected return should exceed 2% real (i.e., be faster than typical economic growth).

What are realistic long-run expectations if we do not assume major valuation trends or reversals? We typically try to address this question based on current market yields, but in this case, we make some comments beyond market yields. Inflation expectations are debatable, but a 2% anchor is supported by central banks unless other forces overwhelm it.[35] Economic growth has been slowing because of demographics and other headwinds but may be saved by AI (even though measured productivity growth has declined in recent decades). Again, 2% might be a decent anchor for real growth. (It is a coincidence to see 2% for both inflation and growth.

Exhibit 3.6. Expected Real Yields of US Equities and Bonds, January 1900–December 2025



Sources: AQR, Shiller Data , Federal Reserve Bank of Philadelphia, Blue Chip Economic Indicators, and Consensus Economics.

Notes: Real equity yield is an average of three series based on cyclically adjusted earnings yield (CAEY), dividend yield (D/P), and real growth proxies for the S&P 500 and predecessor indices. Real bond yield is 10-year Treasury yield minus the survey-based estimate of expected long-term inflation. Equity–bond premium is the difference between the first two series.

[35]This seems a real possibility in 2026, when US economic policies and threats to the Fed's independence might unleash the deanchoring of long-run inflation expectations.

In any case, the sum of the two—4% for nominal growth—is sometimes seen as an anchor for fair bond yields. It is a rather weak anchor.)

The expected real rate on riskless T-bills has varied in the −2% to +2% range in the past decade(s). For the long-run future, 0% to 1% still appears to be a good anchor.

So the expected nominal T-bill rate could be 2%–3% over the long run (mainly to cover expected inflation). On top of that should come required asset premia on riskier assets. Looking back, historical risky-asset returns have been higher, but prospectively, a bond term premium near 1% and an equity premium of 2% to 3% (geometric mean or compound return) seem plausible, while required illiquidity premia should eventually rise from near 0% to 2%.

Why are our expectations more conservative than those of many investors? Because market yields disagree with the optimistic rearview-mirror expectations. Rearview-mirror optimism is especially dangerous when

- recent 30- to 40-year equity returns are boosted by abnormal earnings growth (resulting from one-time decreases in interest rates and corporate tax rates) and richening asset valuations well beyond sustainable yield plus growth;
- economic growth has been boosted by more debt and cheaper debt (until recently) rather than by measured productivity growth;
- debt dependence (already-high public and private debt levels) coincides with large future obligations related to demographics, defense, and decarbonization as well as elevated geopolitical and macro-uncertainty;
- elevated valuations for risky assets (less so for governments) still point to low portfolio expected returns; and
- many investors' key answer to this challenge is to boost allocations to private assets, along with wishful thinking on illiquidity premia and positive alpha for all.

One can debate such discretionary arguments from either side. Ultimately, our conservative return expectations reflect the fact that recent starting yields are low compared with history (after 2022 more so for risky assets than for Treasuries).

CHAPTER 4. HOW DID WE GET HERE? A BRIEF HISTORY OF EXPECTED RETURNS FORMATION

Chapter Summary

This chapter presents our history of expectation formation: How have investors formed long-run return expectations over time, and how have academics perceived that investors do it—or ought to do it?

A better awareness of this history, and the way market outcomes have reshaped thinking over the decades, helps investors to make sense of prevailing expectations at any point in time (including the present day) and to gauge the implications for their portfolios.

Early Developments

The history of return expectations is characterized by two tendencies: first, by the broadening of human knowledge, including an expanding historical return experience as well as the development of value indicators and theoretical risk–reward trade-offs, and second, by ever-present human biases (extrapolating from memories, cycles of greed, and fear). Before people had data, they learned from their experiences and from collective experiences through stories. Imitating the successful actions of others, and shunning the unsuccessful ones, was an evolutionarily winning strategy.

Over time, people gained the ability to learn from written histories and numerical data on a particular investment, a class of investments, or (later) an index of investments. Key early studies of past (US) stock and bond returns include Smith (1924), Cowles (1938), Fisher and Lorie (1964), Macaulay (1938), and Homer (1963). It is no coincidence that the first three studies, which were equity-oriented, focused on past returns, while the latter two bond-oriented studies focused on past yields (see chapter 3). These pioneering works were followed by Ibbotson and Sinquefield (1976), Dimson–Marsh–Staunton (DMS 2002), and many others.

These studies analyzed historical patterns as a guide to the future, implicitly or explicitly assuming constant expected returns or premia. Their innovation was not in extrapolating from the past but in building longer historical datasets that could, for the first time, provide more information than noise. Awareness has been increasing that naïve (but hard to resist) rearview-mirror extrapolation from the past few years is dominated by noise and may even be prone to reversals.[36]

The human tendency to extrapolate has long been balanced by some anchoring to perceived fundamental values. Even ancient exchanges required some assessment of "what is this worth,"

[36]Extrapolating from the past few months may, counterintuitively, be a more useful strategy because there is an empirical continuation or trending effect from the past few months to the next few months. Over multiyear horizons, however, reversal patterns are more common, and extrapolation thus tends to be a costly habit.

© 2026 CFA Institute Research Foundation. All rights reserved.

eventually aided by gold or money as a means of exchange. In ancient times, loans and bonds crystallized such concepts as the time value of money, inflation, default risk, and required yield. Land and loans were the main assets. Equity-like assets existed even in ancient times, but recognizable institutions for stock trading began in the 1600s in Amsterdam and London.

Stocks would not become the dominant asset class until limited liability became widespread in the late 1800s, and the market capitalization of equities surpassed that of bonds and land in the 1900s. Stocks were long perceived as highly speculative assets, and their trading had an extrapolative nature: Lefèvre (1923), for example, focused on short-term trading rather than long-term investing.

Value-oriented investing was advocated by Graham and Dodd (1934) and Keynes (1936), helping to gradually make stock investing respectable again after the 1929 Crash and the Great Depression, when stocks lost 80% to 90% of their value and, along with it, their reputation.

Initially, no academic theories suggested that assets might have different expected returns, not even in the early work on random-walk stock prices (Bachelier [1900] 2006) or on DCF models (Williams 1938).

However, the modern portfolio theory of Markowitz (1952), Tobin (1958), Sharpe (1964), and Fama (1970) established the ideas of portfolio risk, the risk–reward trade-off, asset pricing models, and efficient markets. In the once-dominant capital asset pricing model (CAPM), an asset's expected return is the sum of the riskless rate and the asset's market sensitivity (beta) multiplied by the equity premium. The equity premium reflects the fair reward that rational investors require for taking the higher risk in equities instead of nearly riskless cash or bonds. It was natural for pioneering studies (from Fisher and Lorie to Fama to Ibbotson) to estimate the equity market premium from long-run average returns, effectively assuming constant expected excess returns (returns in excess of a varying riskless rate) over time.

Eventually, asset pricing theories became more complicated than the one-factor CAPM, with its constant equity risk premium, allowing multiple risk factors and, in some cases, time-varying risk premia. The biggest change, however, was to relax the assumption of investor rationality, motivated by the behavioral challenge from Daniel Kahneman and Amos Tversky, Robert Shiller, Richard Thaler, and others.

Finally, empirical studies in the late 1900s found long-run evidence supportive of an equity premium in countries outside the United States, as well as systematic rewards for other asset classes (term and credit premia) and for style factors (e.g., size, value, momentum), although the latter are still debated.

Our focus is on expected long-run returns for equities, especially their premia over cash or bonds. In particular, we ask whether these premia should be estimated based on historical average returns (implicitly assuming constant expected returns) or on forward-looking estimates such as those based on current dividend yields and earnings yields (methods that produce time-varying expected returns). This chapter will separately cover evolving investor practices and academic thinking on these topics. Despite some overlap in these evolutions, they do not move hand in hand.

This conversation is also related to debates about market efficiency and investor rationality. Is one of the predictive approaches discussed earlier inherently better and more rational than

the other? To some extent, yes. One can argue that the rearview-mirror approach to forming subjective long-run expectations is irrational while market-based forward-looking estimates are objectively feasible and thus rational.[37] Two caveats:

- If it is hard to accurately measure time variation in prospective returns, then it may be rational to anchor to long-run average returns if those are observed to be almost constant. The chief source of irrationality comes from using a rearview-mirror approach that looks back only 3 to 10 years. Such a period is far too short for estimating a true long-run mean and, worse, may be prone to reversal rather than continuation tendencies.
- Long-run empirical evidence reveals some predictable time variation in expected returns, but the rational predictions may be wrong for a long time. As a case in point, such predictions have favored non-US equity markets over US markets for more than a decade.

Investor Practices Since 1980

Most investment practitioners learned about the aforementioned academic developments after some small delay, but the idea that stocks have higher long-run returns than cash or bonds became widely accepted between the 1960s and the 1980s. Equities began to dominate institutional portfolios: Note that even in the classic 60/40 stock/bond portfolio, stocks contribute around 90% of the total portfolio risk because of their higher volatility.

The magnitude of the historical equity premium was taken directly from studies based on the new CRSP database using data starting in 1926, regularly updated in the popular Ibbotson (later Morningstar) yearbooks. Jeremy Siegel's 1994 book *Stocks for the Long Run* sealed the lure of equities by highlighting not only the consistency of 7% real returns but also the fact that, at 20-year holding periods, US equities never lost money.

The long bull market that began with then–Federal Reserve chair Paul Volcker's policy easing in the summer of 1982 culminated in the late 1990s tech boom. As a result, the estimated equity premium rose in the Ibbotson yearbooks year after year, while rising market valuations raised concerns about prospective returns, at least among a minority of investors. In a December 1996 speech, then–Fed chair Alan Greenspan referred to high valuations and the possibility of irrational exuberance; after a brief hiccup, however, the equity rally picked up pace for another three years. Finally, in 2000, the tech bubble burst, weighed down by record-high valuations and Fed tightening, resulting in rarely seen three successive double-digit loss years for the US stock market.

This period turned out to be extremely important in reshaping investor practices for assessing long-run expected returns. The divergence between historical long-run averages and forward-looking estimates based on current market valuations became extreme by the turn of the millennium. The former (the then-incumbent) approach implied shiny prospects for equity markets, while the latter (the challenger) warned of a bleaker future.

---

[37]Daniel Kahneman's book *Thinking, Fast and Slow* (2012) may help in this regard. Using the rearview mirror is closer to the fast, effortless (if historical data are readily available) thinking that Kahneman calls "System 1" thinking. In contrast, forward-looking estimates may require slow, deliberate, effortful "System 2" thinking. Although Kahneman did not like to frame this dichotomy in terms of irrationality versus rationality, the former may lead to irrational choices and the latter to more rational ones. In chapter 3, we argue that people find it easier to make forward-looking estimates for bonds (through fast System 1 thinking) than for stocks because the former are often quoted in yields and their cash flows are fixed.

Forward-looking estimates were highlighted in, among other places, Campbell and Shiller (1998), which introduced the soon-to-be-famous CAPE. Shiller highlighted the dangers of the extreme market valuations in his incredibly well-timed book *Irrational Exuberance* (2000), as did Asness in his paper "Bubble Logic" (2000). Arnott and Bernstein's (2002) article "What Risk Premium Is Normal?" provided evidence on expected market returns over two centuries using forward-looking estimates. The authors predicted a negative stock–bond premium for the early 2000s.

Only a few practitioners tied these battling schools of thought to the academic debate between constant expected returns (or risk premia) and time-varying expected returns (or premia), but the debates all boiled down to the same thing: A horse race was on. The 2000–2009 period turned out to be a lost decade for stockholders, which prompted investors, especially on the institutional side, to shift their future return expectations from historical averages to forward-looking estimates.

Initially this shift was informal because few institutions formally quantified or reported their capital market assumptions (CMAs). Eventually the practice became more common, in some cases even required by regulators, although CMAs were often outsourced to consultants or guided by academic or practitioner thought leaders.

Thought-leader views on equity premia were summarized in three colloquia in 2001, 2011, and 2021 under the auspices of CFA Institute Research Foundation, and these events made clear that the forward-looking approach has come to dominate state-of-the-art thinking.[38] This conclusion has been supported by surveys, such as Horizon Actuarial (2025), and academic studies (Dahlquist and Ibert 2026; Couts et al. 2026). One simple flag for a yield-based approach is that expected returns are likely to be higher for non-US than for US stocks in recent years.

Even the two best-known annually updated sources of historical returns—the Ibbotson/Morningstar yearbooks on US assets and the DMS global investment return yearbooks—also provide some analysis on forward-looking return estimates.[39]

Exhibit 4.1 summarizes the key methodological choices (for more discussion, see AQR Portfolio Solutions Group 2024). CMA providers can have many nuanced debates regarding the framework and inputs used, but this flowchart covers the most fundamental questions. The most important is whether to use historical average returns (branching left) or forward-looking estimates based on market yields (branching right). For each branch, a secondary question relates to valuation changes:

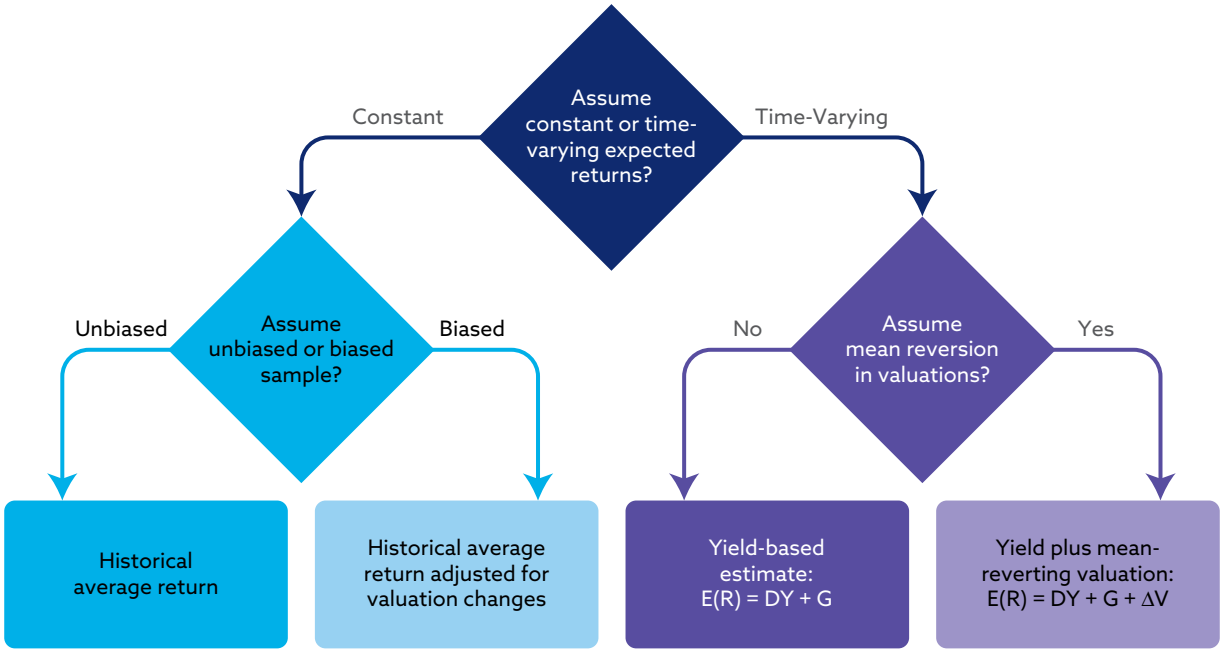
- If the historical sample period involves large valuation changes, it is arguably best to remove their impact unless one expects further valuation changes in the same direction. For example, recent decades saw bond yields fall to record-low levels and US equity valuations rise to near record-highs, providing unexpected windfall gains to asset holders. It is hard to justify extrapolating further asset richening from already extreme valuation levels.[40]

[38]For the latest colloquium, see Siegel and McCaffrey (2023).

[39]Forward-looking estimates are also discussed in Ilmanen (2011, 2022), whereas Chambers et al. (2024) focus only on historical returns, as do McQuarrie (2024a) and others.

[40]See Asness (2021) and Ilmanen (2022, section 2.2). Note that removing sample-specific valuation changes only produces a decent estimate of what returns investors were, on average, expecting (requiring) in the past. A high market valuation today may point to a lower expected return than even the bias-adjusted historical average. This is the logic of the yield-based approach.

Exhibit 4.1. Key Decisions Underlying a CMA Framework



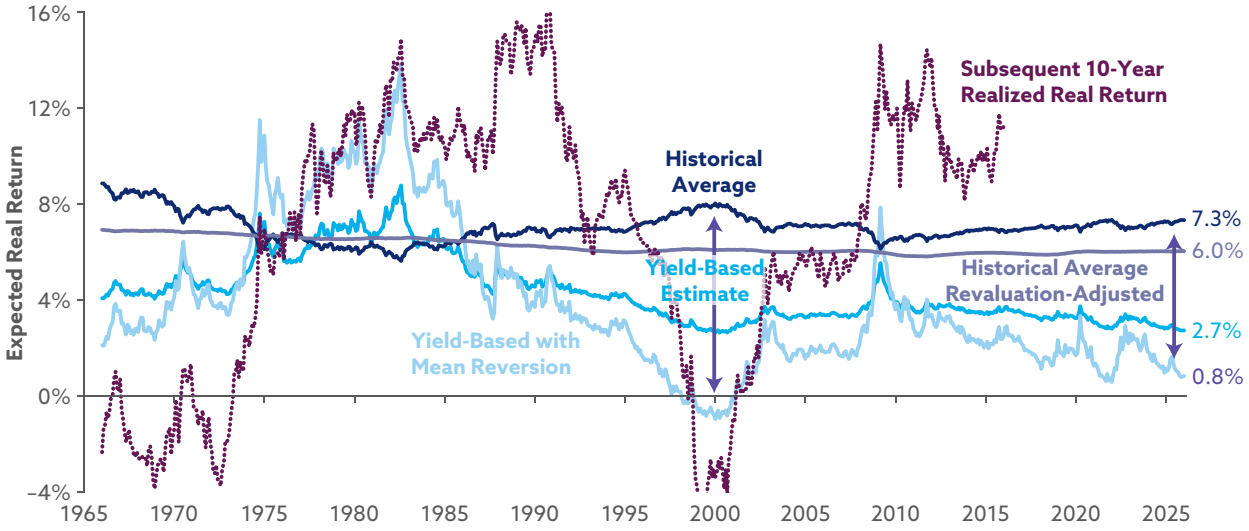
Source: AQR.

- The forward-looking estimate in a DCF framework has three parts: Expected return ≈ Yield income + Expected payout growth + Expected valuation change. Many CMA providers include only the first two, thereby assuming no change in valuations. A minority of CMA providers also assumes that valuations will revert toward some long-run mean.[41]

It is instructive to compare the real return expectations generated by each of these four choices for US equities in recent decades. **Exhibit 4.2** provides all four series and also includes the realized return over the subsequent decade (dotted line). Starting with the dark blue line, the commonly used approach of measuring long-run average returns would have given ever more optimistic real return prospects as the bull market advanced between 1982 and 1999 (with the expected real return rising from 5% to 8%). If the return history had been adjusted for sample-specific valuation changes, the estimate would have been more constant, at around 6% (solid purple line). During that same bull market period, the forward-looking estimate based on yield plus growth fell from 9% to 3% (medium blue line). If mean-reverting valuations were also assumed, the drop was even more dramatic, from 14% in 1982 to −1% in 1999 (lightest blue line). The outcome over the decade starting in 1999 turned out to be even more negative than this forecast.

[41]Including the third component results in more time variation and more extreme highs and lows. A high valuation implies low future yield income and therefore low expected returns, even if the valuation is not expected to cheapen to more normal levels. Adding a mean reversion assumption accentuates the impact of abnormally low (or high) income levels by augmenting them with expected capital losses (or gains).

Exhibit 4.2. Point-in-Time Expected Real Return Estimates for US Equities, December 1965–December 2025



Sources: AQR, Bloomberg, and Shiller Data.

Notes: All series are based on the S&P 500 and predecessor indices. Historical estimates are based on the expanding window since January 1926. The revaluation-adjusted estimate subtracts annualized change in CAPE from the historical average. The yield-based estimate is the average of the cyclically adjusted earnings yield (CAEY) × 1.075 × 0.5 and the dividend yield (DY), plus 1.5% real EPS growth. Yield-based with mean reversion assumes the CAPE moves halfway to the rolling 40-year mean over the next 10 years.

The tension between the old historical return approach and the forward-looking approaches peaked at the turn of the millennium (see the first arrow in Exhibit 4.2). Because the forward-looking approaches "won that round" decisively, it is not surprising that most CMA providers shifted toward them, migrating from the left branch of Exhibit 4.1 to using one of the approaches on the right branch or something related. One common simple approach involves using the CAEY (the inverse of the Shiller CAPE) as a return predictor. It helped that the success of the right branch in the 2000s was not an isolated incident: Adherents of the forward-looking approach could point to long-run benefits from such return prediction exercises in historical back-tests.

Unfortunately, forward-looking CMA approaches can also produce forecasts with large realized errors. Exhibit 4.2 visualizes what many readers already know: The forward-looking methods fared poorly in the latest round, for US stocks in particular. If we consider the decade starting from the early 2010s, the yield-plus-growth approach predicted about a 4% real return. Mean-reverting expectations pointed even lower. Yet the subsequent realized return reached double digits. The main driver of this forecast error was the market valuation increasing from mildly above average to wildly above average (CAPE almost doubled from near 20 to the high 30s, a level it had exceeded only in 1999–2000). For the past decade, the rearview mirror turned out to be a better guide.

We have done a careful postmortem on this humbling experience and will revisit it in chapter 9. Our main takeaways are (1) this is a good reminder of how hard it is to predict returns, even over decadal horizons, but also (2) the broader historical evidence still suggests that the forward-looking approach is the best starting point.[42] That said, we are not surprised to see some investors lose faith in yield-based CMAs "because they have been wrong for a whole decade" (which, incidentally, is only a single data point for 10-year forecasts).[43]

The rearview-mirror mindset influences the choices shown in Exhibit 4.1. "What have you done for me lately" matters even here, although we do our best to discourage investors from letting it matter too much. Published CMAs still tend to rely on forward-looking methods (e.g., see Couts et al. 2026; Dahlquist and Ibert 2026), but it seems that many investors ignore these CMAs in their actions. For example, many have large allocations to US equities despite their much higher valuations and lower CMAs than the rest of the world.

Academic Thinking: A Related Pendulum Shift

Although practitioner interest in forward-looking CMAs has risen and fallen, we can also observe a similar pendulum shift toward time-varying required returns and then away from them among academic researchers. For them, the main motive for this pendulum shift has not been recent performance—it seems academics do not make their judgments based on the last decade's market moves. The main motives are questions about whether the predictable variation of long-horizon returns is consistent with the null hypothesis of investor rationality, as well as about the econometric robustness of the predictability evidence. If such debates are not your cup of tea, feel free to skip this section.

Our review of academic research earlier in this chapter ended in the early 1980s. Around that time, Robert Shiller (1981) found evidence of "excess volatility" in asset returns (more volatility in asset prices than in relevant future fundamentals). The behavioral camp took this finding as evidence of irrational fluctuations in growth sentiment, whereas the rational camp explained it with a nonconstant discount rate (time-varying required risk premium). Separately, DeBondt and Thaler (1985) found evidence of a three- to five-year mean reversion in relative returns across stocks (past multiyear laggard stocks tended to later outperform, and vice versa for leaders), and Poterba and Summers (1988) found comparable mean reversion in market returns over time.

---

[42]Chapter 6 emphasizes that there are (sorry!) many "devils in the details" and that the long-run evidence on the predictive ability of forward-looking measures such as the Shiller CAPE is not as compelling as it may at first seem. Still, it is fair to say that it has beaten the alternatives (such as assuming a constant expected return or using a rearview-mirror approach focused on only the past decade).

[43]Attention spans have shortened in recent decades, and "the long run" is judged on increasingly short histories. See, for example, John Authers's blog post from November 2024, titled "In the Long Run, We're All Revised Projections." It is striking that even a writer as experienced and thoughtful as Authers implies so strongly that long-run expectation formation methods should be changed, given their poor performance over the past decade. He does not mention the other possibility: that the outcomes over this decade were unexpected. Authers's history shows only one or two independent observations of decadal outcomes, so in the future, it may still be best to use these forward-looking models, although perhaps with more humility.

Fama and French (1988) documented even stronger predictability of long-horizon market returns using valuation ratios (dividend yields).[44] They later linked this variation to business cycles and conjectured that time-varying risk aversion may cause investors to require a higher equity premium in bad times, such as recessions or bear markets. Campbell and Shiller (1988, 1998) provided further evidence of return predictability and transformed the classic dividend discount model with constant growth into a more dynamic model with time-varying growth and returns. They showed that time variation in market valuation ratios can predict either future growth or future returns. The answer could also be a mix, but from around 1990 to around 2010, various empirical studies gave a stark answer: High equity market valuations predicted low future returns rather than high future growth.

The pendulum on the central role of time-varying required returns swung to one side when John Cochrane (2011) summarized the generational turnaround in academic thinking in his Presidential Address to the American Finance Association: "Previously, we thought returns were unpredictable, with variation in price–dividend ratios due to variation in expected cashflows. Now it seems all price–dividend variation corresponds to discount-rate variation" (p. 1047).[45] The pendulum has swung back since then in several ways:

- Recall the behavioral explanation of Shiller's excess volatility puzzle: It could reflect irrationally volatile growth expectations. Andrei Shleifer and his coauthors show that they can explain the time-series predictability of the US equity market with equity analysts' time-varying growth optimism in a model with constant expected returns (Bordalo et al. 2019, 2022a, 2024).[46] **Exhibit 4.3** shows that analysts' long-term EPS growth forecasts peaked along with the CAPE in 2000 and 2021. Such an explanation would still leave us with a profitable trading opportunity. The reason, however, would not be rationally time-varying

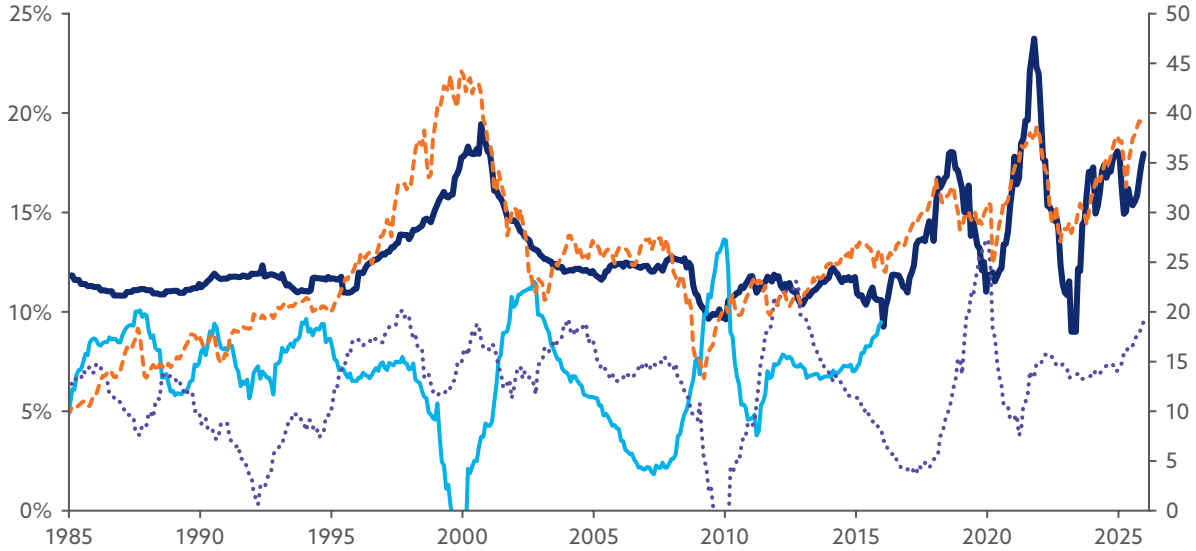
[44]Dividend yields were the favored market timing signals of academics and young finance students in the 1980s and 1990s, until it was understood that the increasing use by firms of share buybacks pushed dividend yields lower, beyond the general richening of other valuation measures. One of us (Ilmanen) was among those students (overconfident and unsuccessful market timers) who could not stomach buying stocks in the 1990s because the market's dividend yield was near record lows (and kept falling). The Shiller CAPE became the favored market timing tool only in the late 1990s, and by then, it too was emitting strongly bearish signals (prematurely at first, but with Shiller's book publication in 2000, successfully for a while).

[45]Stated differently, a generation ago, researchers overwhelmingly thought expected returns (or risk premia) were constant and that time-varying valuations reflected evolving growth prospects. Now, they principally think expected growth is constant and that time-varying valuations reflect evolving required returns. Besides this equity market directional context, Cochrane (2011) showed that a related change in thinking applies to stock selection (where cheaper "value" stocks were found to provide higher average returns than their richer peers instead of slower future earnings growth) and to bond markets (where a steep yield curve was found to predict high future returns rather than future yield increases). Comparable evidence was found in currency and other markets. Profitable carry or value strategies in all these markets could be explained by rationally varying required returns, although there was always an alternative irrational explanation. See Cochrane (2011), Ilmanen (2011, chaps. 13 and 22), and Koijen et al. (2018).

Early literature used predictive regressions to disentangle the relative impact of required premia and market expectations on future fundamentals in carry and valuation measures, such as dividend yield for stocks and yield curve steepness for bonds. Research after 2011, however, shows that such regressions are tainted by hindsight (they presume full-sample information and rational expectations). For example, structural changes can cause persistent forecast errors even for rational Bayesian learners, as happened with bond yields over many decades of falling rates. Surveys may thus be better than "hindsighted" predictive regressions at disentangling the relative roles of risk premia and expectations.

[46]Apart from explaining the time-series predictability of market returns with analysts' extrapolative earnings expectations, Bordalo et al. (2019) offer a cross-sectional parallel: They find that analyst overextrapolation of single stocks' past earnings growth can explain value-versus-growth strategy profits.

Exhibit 4.3. Analysts' Long-Term Earnings Growth Forecasts Are Extrapolative: US Equity Analysts' Forecasts, Realized EPS Growth, and Valuation, January 1985–December 2025



Correlations	Analyst Forecast	Next 10-Year Growth	Last 10-Year Growth	CAPE
Analyst Forecast	1.0			
Next 10-Year Growth	–0.5	1.0		
Last 10-Year Growth	0.2	–0.4	1.0	
CAPE	0.8	–0.5	0.3	1.0

Sources: AQR, Bloomberg, Citi, Credit Suisse, I/B/E/S, and Shiller Data.

Notes: Analyst forecast for nominal earnings growth is compiled by I/B/E/S for stocks in the S&P 500 universe until 2009 and the Russell 1000 thereafter. CAPE is for the S&P 500. Because few independent observations are included here, many of the correlations are not statistically significant.

risk aversion but irrational sentiment cycles between exuberance and gloom (overextrapolation of recent years' growth news after good times and bad).

- Some later empirical analysis showed that higher valuations were partly the market's correct forecast of higher future growth, which in turn weakened return predictability. (This phenomenon happened "out of sample" with respect both to market direction and to the value-versus-growth stock selection strategy in the 2010s. Strong earnings growth, overall and especially among expensive "growth stocks," hurt contrarian market timing and stock selection.)

- The empirical evidence on long-horizon return predictability is plagued with statistical problems. The central issue is that we have very few independent observations of 10-year returns. Even if we assume that, say, all Shiller data since the 1870s are relevant and not tainted by structural changes, we only have 14 independent observations. Boudoukh et al. (2019) show that using overlapping data can raise the effective sample size, but only marginally (to about 20). Their research also highlights a host of other potential econometric challenges.

Research by Cochrane and the Shleifer research team provides useful endpoints in a spectrum of debate about the extent to which time variation in valuations reflects time-varying required returns versus time-varying earnings growth expectations. For example, in 2000 when the CAPE peaked and forward-looking objective expected returns were very low, this dynamic may have reflected exceptionally low investor risk aversion or exceptionally optimistic growth expectations (or some of both). The former relates to the denominator of the following present value relation,

$$P \approx D \times \frac{1+G}{1+ER},$$

and the latter to its numerator.

Irrespective of the reason, the bearish return predictability signal was there, and on that occasion, its prediction worked out. In the Cochrane storyline, objective and subjective expectations agree, but in the Shleifer storyline, they are opposite. Both interpretations agree on the objective prospects, and both suggest that measures such as CAPE are useful predictors of future long-run returns.

Cochrane (2008) and Shleifer's research team agree that it is objectively nigh impossible to predict time variation in earnings and dividend growth rates. Yet, Shleifer and his coauthors argue that irrational analysts and investors try to do this and their overoptimistic growth expectations sometimes push market valuations to ridiculously high levels. Many investors may not care much whether CAPE's ability to predict future returns reflects irrational growth expectations or rational variation in market risk aversion—they care only about whether it works.[47]

The story would be different if we believed in constant expected returns (over time or across assets). Then, higher market valuations would imply low income returns or expected mean-reversion losses that could precisely offset any expected growth advantage (e.g., see Ibbotson and Chen 2003). This assumption brings us close to the solid purple line in Exhibit 4.2, a near-constant expected return even when forward-looking metrics are highly time-varying. Objective growth prospects would have to have been especially high in 2000 to offset the low measured expected return. To get back to a 6% real expected return, the 3% forward-looking expected return (medium blue line, reflecting high market valuations and assumed near-constant long-run growth) would need to be augmented by an objectively feasible 3% a year extra growth at that point in time.[48] Thus, if we assume that expected real returns are

[47]It *does* work, although we add some qualifiers later in this book. And quite a few investors *do* care whether a given predictability pattern is explained by irrational behavior or by rational risk premia. They assume that patterns with behavioral explanations are less sustainable because of investor learning or arbitrageur activities. In contrast, we take the view that behavioral patterns can persist long after they are documented.

[48]It is important to be clear about whether we refer to objective or subjective expectations. We know from Exhibit 1.1 in chapter 1 that equity analysts' growth forecasts and many investors' return forecasts were subjectively high in 2000. But here we refer to objective growth forecasts. Could those have been justifiably high in 2000? At least in hindsight, they were not (although bubble skeptics had to be patient in waiting for it to burst).

constant over time, then CAEY's time variation reflects only expected "yield-offsetting" variation in long-run growth prospects, and CAEY has no ability to predict returns. Thanks to long-run empirical evidence, and despite some academic doubts expressed earlier in this section, this view has lost out.

By assuming fairly stable growth rates and no mean reversion in valuations, CMA reports such as AQR Portfolio Solutions Group (2026) can try to balance the risks of overextrapolation, excessive optimism, and mean reversion against the possibility of genuine structural changes. An adaptive learning approach helps in the rare cases when "this time (really) is different." Today, the structural change story is AI.[49]

[49]Gradual changes in growth or valuation anchors are hard to capture, and they are a minefield for contrarian strategies. Using shorter historical windows, weighing signals based on their past performance, learning from repricing-adjusted returns, and including complementary momentum strategies can help even if we cannot identify a particular structural change (such as a persistent decline in required bond or stock yields or a shift to faster EPS growth in the United States partly in response to the buyback revolution). Leaning too far in this direction can make an investor too eager to follow the herd; investors should vigilantly seek a good balance. But this topic is beyond our focus on long-run return expectations.

CHAPTER 5. EQUITY MARKET FOCUS: INTERROGATING THE HISTORICAL DATA

Chapter Summary

Historical average returns can be useful estimates of future expected returns (only) if expected returns are constant and the sample is unbiased. For US equities, the long-run average real return is near 7%, but prospects are lower.[50] A decomposition of S&P 500 returns into yield, growth, and valuation change effects is instructive. The most relevant predictor, the equity market's starting yield, is historically low, while the less sustainable contributions of growth and repricing have risen in recent decades.

Why Look Back?

Having covered topics ranging from the United States versus the rest-of-the-world opportunity, to how expectations formation differs between equity and bond markets, and to the history of long-run return expectations, we now address equity market returns in more detail from three distinct angles. This chapter focuses on the historical record, and chapters 6 and 7 will cover valuation-based (objective) and survey-based (subjective) expectations, respectively.

Equity investors can use the market's history to guide their expectations if they assume prospectively a constant real return or premium, but it is unclear how much history they should use.[51] Even without this assumption, both systematic and discretionary forward-looking analysis can benefit from a better understanding of the market's drivers. Market returns can be decomposed in many ways; we will use the three-part decomposition introduced in chapter 2:[52]

Real Return ≈ Dividend Yield Income + Real EPS Growth + Change in Valuation.

We now focus on the US equity market, performing this decomposition over different sample periods and discussing how these histories can guide forward-looking analysis. Some components are "stickier" than others and thus are more suitable to extrapolate. The more that past returns reflect yield income and growth rather than repricing and the more "normal" that

---

[50]See Exhibit 5.2 for more detail.

[51]A too-short history is dominated by noise from unexpected returns and a biased sample. A too-long history may contain data that are no longer relevant if the investment world has changed structurally in relevant ways. We favor studying long datasets, although we do not necessarily suggest that distant data should receive equal billing with more recent data.

[52]Some technical details: This decomposition is really an accounting identity based on the definition of returns as a sum of income yield and capital gains. It is in the spirit of the dividend discount model, but we use it with Shiller's CAPE valuations and corresponding 10-year smoothed real EPS growth. It could be a classic Gordon growth model with constant growth rates, payout rates, and required returns, or it could be a more dynamic Campbell–Shiller (1988) model with time-varying relationships and some loglinear approximations (some terms should actually be multiplied or logged, but we sum them here). Returns can be real or nominal and realized or expected (the equation can be converted to rational expected returns by taking expectations of both sides). See Ilmanen (2022, pp. 64–65 and pp. 174–75) for more details.

 © 2026 CFA Institute Research Foundation. All rights reserved.

current yields and growth expectations are by historical standards, the more reliably investors can extrapolate past performance into the future.

Unfortunately, even decadal past returns tend to be dominated by valuation changes, which are more likely to revert toward historical averages than they are to continue to change in the same direction for decades. Perhaps worse for investors in 2026, yields are historically low (and valuations high), whereas recent decades' exceptional growth has led to high subjective expectations.

As discussed in chapters 1 and 2, analysis of historical data suggests that the current time frame is a particularly dangerous one for relying on rearview-mirror expectations, especially if the rearview focuses on the recent (say, past decade) period of strong growth and rising valuations. In short, US market bulls have been right for 15 years, an exceptionally long time. Although they may continue to be right, the longer historical record is not on their side.[53]

Searching for Patterns

Over the very long run, US equities have earned almost a 7% real annual compound return (as we will document shortly) and rolling 10-year returns have rarely been negative (dark blue line in **Exhibit 5.1**, Panels A and B). Even decadal returns vary a lot over time, however, with compound annual returns for the decade ranging from −5% to +20% (and the record is worse outside the United States). If you do not care about the distant past, focus on the right-hand portion of each panel, which covers roughly the post–World War II period.

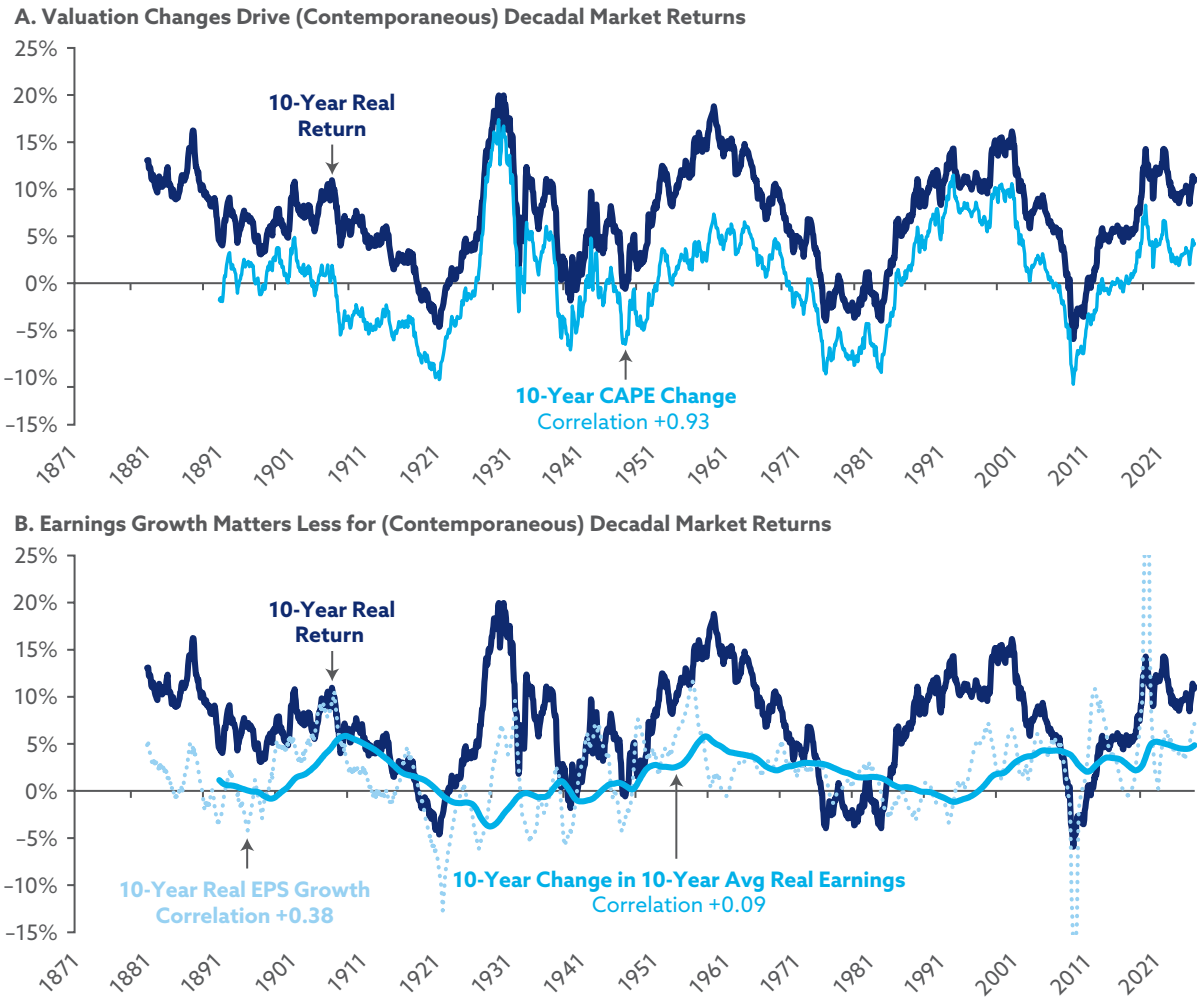
By comparing Panel A with Panel B, we can clearly see that decadal market returns are driven more by contemporaneous valuation changes (correlation 0.93) than by variations in EPS growth (0.38). The discount rate effect is powerful: Rising valuations—that is, falling expected returns or equity discount rates (lower CAEY [cyclically adjusted earnings yield] = 1/CAPE [cyclically adjusted price-to-earnings ratio])—produced windfall gains that boosted realized annual real returns to double-digit levels in the 1920s, 1950s, 1980s, 1990s, and 2010s. Conversely, falling valuations pushed realized real returns to negative levels in the 1910s, 1930s, 1970s, and 2000s.

Our focus is on understanding and explaining contemporaneous relationships, but we detour briefly to predictive analysis. We showed in chapter 1 that low decadal returns are often preceded by high valuations (the predictive correlation of CAPE with the next decade's real market return is −0.51) and by strong previous-decade returns (predictive autocorrelation of −0.37). Extrapolating strong past market performance is especially dangerous if it reflects high and rising valuations, but high past-decade EPS growth is not much better (predictive return correlation of −0.21 and growth autocorrelation of −0.28). Yet many analysts and investors seem to overextrapolate past growth.

Back to contemporaneous analysis. **Exhibit 5.2** shows return decompositions for different historical periods all ending in December 2025 and with the following start dates: the beginning of the full sample in 1881; a century ago; the post–World War II CAPE trough in summer 1982, when Volcker's Fed began a long easing period; and a decade ago. The last four rows show four

[53]See chapter 2 for a fuller discussion of US versus non-US equity market prospects.

Exhibit 5.1. Major Drivers of Equity Market Returns, January 1881–December 2025



Sources: AQR and Shiller Data.

Notes: All returns and rates of change are annualized. All series are for the S&P 500 and predecessor indices. CAPE is cyclically adjusted P/E (price over the past decade's inflation-adjusted average annual earnings).

more subperiods: the 19th century, two halves of the 20th century, and the first quarter of the 21st century (which started near the post–World War II CAPE peak in 2000).[54]

For example, the century-long sample from 1926 to 2025 shows that half of the 7.3% real return could be attributed to the dividend yield. Real EPS growth added slightly more than 2%, and the

[54]For insightful examples of more elaborate decompositions, see L'Her et al. (2018) and Mauboussin and Callahan (2023).

Exhibit 5.2. S&P 500 Real Return Decomposition over Different Periods, January 1881–December 2025

Sample Periods Ending December 2025	Real Return	Average Dividend Yield	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: AQR, Shiller Data, and McQuarrie (2024a).

Notes: All returns and rates of change are annualized. All calculations are based on Shiller's dataset, except the 1800s row from McQuarrie. Decomposition math is not perfect, because of compounding effects. With dividend yield income, it is debatable whether to use average or starting value. Over long horizons, reinvestment of dividends makes the average more relevant, so we use it. EPS growth uses 10-year smoothed real earnings to be consistent with Shiller's CAPE10 (price divided by a 10-year average of real earnings) as the valuation metric. All series except average dividend yield are converted to annualized compound rates of return (geometric means).

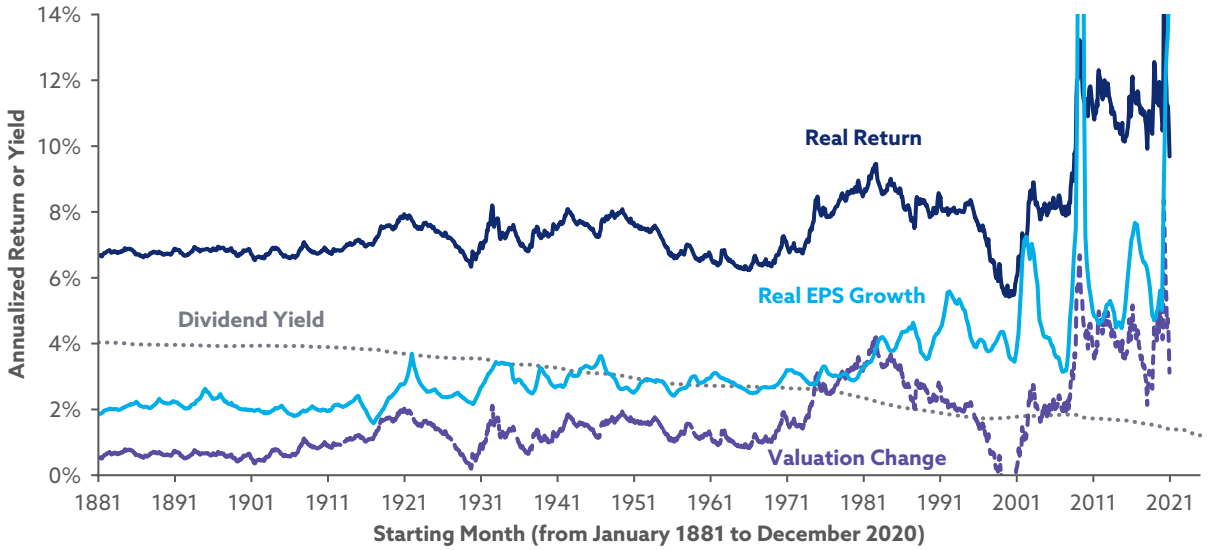
impact of multiple expansion was a sizeable 1.3% a year (even over a century) as CAPE richened from 11.2 to 39.4. Extrapolate this last component, which is much larger for the more recent samples, at your peril.

You can pick your preferred time window from among the rows in Exhibit 5.2. In **Exhibit 5.3**, we offer even more options and present the decomposition visually, which will help the reader to interpret change over historical time. This exhibit shows the "backward-expanding" average annualized return for each series, always ending in December 2025 but starting the sample in any month between 1881 and 2021. Looking from right to left, you can infer the impact of extending the sample farther back in time.[55]

[55]This chart type is useful when you want to end with the latest observation but are less sure when to start. One downside is that observations are not independent: The sample always ends at the end of 2025, at high valuations after some capital-friendly decades.

Many other design choices are available when plotting historical returns. Returns may be annualized or cumulative; the latter is often preferred when a presenter wants to highlight the large compound edge of one investment over another. A log scale is usually preferable for analyzing compound returns (it gives all parts of the history equal visual weight), but some market analysts use a linear scale to highlight the impact of compounding. It can be helpful to remove some common element such as inflation, or to study relative performance. Finally, with decompositions, it is worth exploring whether the components are better shown individually or stacked.

Exhibit 5.3. S&P 500 Real Return Decomposition: Backward-Expanding Averages, January 1881 (or later) to December 2025



Sources: AQR and Shiller Data.

Notes: See notes for Exhibit 5.2. All samples end in December 2025.

If your rearview-mirror perspective begins any time after the 2008 Global Financial Crisis, you will see double-digit real returns. Exhibit 5.3 might cure you of such optimism by reminding you that (1) longer histories point to single-digit real returns near 7%, (2) recent returns were as high as they were because of rising valuations and an exceptionally benign growth environment occurring simultaneously, and (3) high valuations at the time of writing imply yield income well below long-run norms, even if the coming years do not bring the pain of mean-reverting valuations.[56]

Following are a few big-picture takeaways from the decomposition in Exhibit 5.3:

- Realized average returns have moved closely with valuation changes, as we saw with decadal returns in Exhibit 5.1. Let's return to this point later.
- The impact of dividend yield income has trended lower, and the impact of growth has trended higher, if we move from left to right to shorter (more recent) sample periods. The sum of yield plus growth is nearly flat.

[56]Studying only the top line in Exhibit 5.3 might lead one to believe that assuming a 6% real market return for the future is conservative because the range for different sample periods is roughly 6% to 12%. This idea is misleading, however, because all samples end in the benign high-valuation year of 2025. Even a peek at Exhibit 5.1 would remind you that historically, about half of the decadal experiences have been below 6% real annual return. Worse, the forward-looking picture starting from 2026 may not match long-run norms, given the high valuations and thus low starting yields. Brooks (2023) offers a related take on the dangers of a rearview-mirror perspective in this situation.

- The lower average dividend income in more recent samples reflects both the general equity richening over time (all market multiples have risen) and the particular impact of share buybacks replacing dividends as payouts.[57]
- The higher average EPS growth rate in more recent samples warrants its own section.

Undoubtedly you are now wondering, "What happened in the 1800s? Why doesn't the Shiller dataset go back even farther?"[58] Fortunately, more and better analysis is available on distant histories published by authors such as Ed McQuarrie and Bryan Taylor. Chambers et al. (2024) recently surveyed the evidence on very long-run asset returns, acknowledging lower data quality and relevance (because the world has changed substantially over time) but highlighting important substantive results. A big-picture summary of the 1800–1899 period is that both US stocks and bonds promised and delivered about a 6% return (so virtually no premium existed between the two asset classes) while nominal and real returns were quite similar given near-zero average inflation.[59] Moreover, income yields explain nearly all of the realized return over the century.[60]

Is Faster Earnings Growth Here to Stay? The Message from the Data

Long-run real EPS growth in the United States has averaged near 2% but has been edging higher over time, clocking 4% in the 21st century so far. Some arguments can be made for this rapid growth to persist, such as the greater use of share buybacks, which boosts EPS as the share count falls. Counterarguments also can be made: Smolyansky (2023) shows that the doubling of the EPS growth rate since the late 1980s can be mostly explained by sharp falls in corporate tax rates and interest rates, which should hardly be extrapolated.

These lower interest rates and corporate tax rates were part of a capital-friendly policy environment, which along with globalization and technological advances gave a strong tailwind to companies and equity markets beginning in the 1980s. **Exhibit 5.4** shows that S&P 500 EPS growth has clearly outpaced economic (GDP) growth since 1990, while the opposite was true in

[57]Net issuance was 1% to 2% a year for much of the 1900s, but it has been closer to zero in the 2000s because of the growing use of buybacks. See Bernstein and Arnott (2003), Straehl and Ibbotson (2017), and Ilmanen (2022, figure 4.8), which suggests a 1.4% dilution for the 1900s and 0.3% over the 2000–2020 period.

[58]Or perhaps you are not—but maybe you should be. If you use a rearview-mirror approach, make its view both long (not only the past decade) and broad (not only the United States).

[59]The lack of a meaningful equity–bond premium partly reflects the riskiness of bonds in the 1800s (US government bonds were not perceived as riskless until the early 1900s) as well as slower growth. Still, bond volatility was almost half that of stock volatility (7% versus 13%) in the 1800s, so the similarity in returns for the two asset classes is surprising.

[60]Sources differ on whether stocks or bonds earned a bit more, on whether stock price gains were mildly positive or negative, and on whether there was mild inflation or deflation over the century. In all cases, however, the different views in these debates produce results within +/−1% a year of each other, so they hardly change the big picture. Specifically, McQuarrie's (2024a) data show a 5.5% nominal (5.9% real) return for equities and 6.2% nominal for bonds, and thus a −0.6% equity–bond premium. Taylor's (2023) data show somewhat higher equity returns and lower bond returns, and thus a positive equity–bond premium of 1.2% (and a similar premium in the United Kingdom). McQuarrie (2021) shows that the US dividend yield (averaging 5.7% over the century) fully explains the 1800s equity return, but the dividend yield's contribution fell during the 1900s. Both the dividend yield and bond yield fell during the 1800s, roughly halving from 6% to 3%. The resulting repricing gain of 0.7% a year for stocks was offset by the impact of a mildly negative real earnings growth rate as many companies failed. We include one admittedly speculative row in Exhibit 5.2 for the 1800s using McQuarrie's data: The growth impact is inferred from the other series.

Exhibit 5.4. Exploring the Stability of US Real Growth Rates over Time, January 1871–December 2024

	Dividend per Share	Reported EPS	Street EPS proxy	EBIT (nonfinancial)	Corporate Profit	GDP	CPI Inflation
January 1871–December 2024	1.6%	2.0%					2.1%
January 1871–March 1947	0.6%	0.8%					0.7%
March 1947–December 2024	2.6%	3.2%			3.1%	2.8%	3.5%
March 1947–December 1989	2.3%	2.7%			1.7%	3.4%	4.2%
March 1965–December 1989	0.4%	0.9%	1.1%	1.8%	1.1%	2.9%	5.7%
December 1989–December 2024	2.9%	3.8%	3.9%	2.1%	4.8%	2.1%	2.7%

Sources: Shiller Data, St. Louis Fed (FRED database), Smolyansky (2023), and Hillenbrand and McCarthy (2024). Dividend per share, reported EPS, and CPI inflation are from Shiller; street EPS is from Hillenbrand and McCarthy; EBIT for nonfinancial firms is from Smolyansky; and corporate profit and GDP are from FRED.

Note: All compound growth series are deflated with CPI for consistency.

the post–World War II decades. The pattern is even stronger for corporate profits in the national accounts, resulting in a high share of capital versus labor income and persistently high profit margins.[61]

Similar growth patterns show up in dividends and operating or "street" earnings (see chapter 6 for a discussion of different earnings metrics). Smolyansky (2023) stresses that EBIT (earnings before interest and taxes) real growth has been better anchored near 2%, while one-way interest rate and corporate tax rate trends explain recent strong decades for EPS growth (as well as the weak preceding decades). According to a macro-consistency issue, aggregate earnings (not EPS) growth in excess of GDP growth cannot persist indefinitely, or else the corporate sector will take over the economy, leaving nothing for other claimants, such as labor and the government.

[61]Corporate profits in the national accounts cover the whole corporate sector, public and private, not just the S&P 500 universe. Importantly, they are based on very different data sources than EPS. Put simply, firms have the incentive to play up their earnings to boost the share price but to play down their taxable profits.

Thus, although the full-history anchor of 2% real EPS growth could be too conservative, the 3% to 5% real growth from recent decades is likely to be unsustainable and a poor guide for the future.

Of course, AI or unconventional economic policies may cause further surprises in the coming years. In the spirit of a pre-mortem analysis, if we are proven wrong and see rapid growth for the next decade, AI is most likely to be the catalyst. We merely note that AI's productivity tailwinds will have to overcome headwinds from several Ds: demographics and deficits for sure, and maybe also defense, deglobalization, and decarbonization. Exhibit 5.4 reminds us that EPS growth rates before 1947 (when national accounts statistics became available) were much more modest.

Few other countries have as wonderful a growth history as the United States, the focus of this chapter. The experience of stock markets outside of the United States reinforces our choice to anchor near 2% real.[62] Looking back, one can fairly debate how much US outperformance reflects sustainable edges related to corporate-friendly institutions and entrepreneurial spirit and how much resulted from one-off luck (e.g., having avoided calamities such as a war on its own soil, hyperinflation, or revolution). Wide valuation gaps persisting in 2025 suggest that investors have overextrapolated the recent US growth edge, as we discussed in chapter 2.

Impact of Valuation Changes

We next examine the impact of valuation changes. **Exhibit 5.5** shows that with the impact of valuation changes removed, the historical average real return (gray dotted line) is 6%–7% for any backward-expanding period except the most recent era. The backward-expanding impact of repricing (light blue line) is largest for the recent period of richening, but it also has surprisingly long legs. Who would have guessed that, even over a 100-year period, around one-fifth of the market's real return of 7.3% would be attributable to rising valuations?

Valuation changes are hard to predict.[63] If anything, the long-run history suggests mild decadal mean-reversion patterns. When the opposite happens and rich assets become richer, as happened in the past decade, yield-based forecasts (the subject of chapter 6) can dramatically undershoot return outcomes. These are probably the worst possible moments to abandon them in favor of an extrapolative approach. We hope that by now, we have hammered that point home.

If investors choose to use historical average returns to guide future expectations, we suggest they adjust the history for valuation changes[64] or use a long history for which market repricings have a smaller annualized impact.[65] These choices can give a better estimate of the returns

---

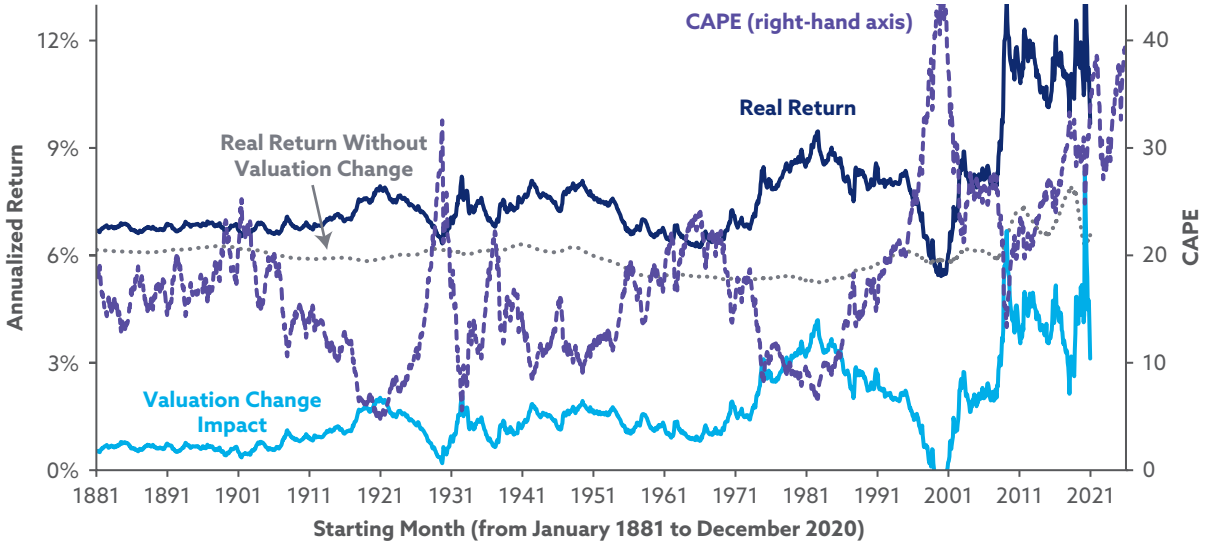
[62]In his previous books, Ilmanen (2011, 2022) emphasized that 2% real compound growth can equate to a 7% to 8% nominal arithmetic mean growth rate, so the assumption is not as stingy as it first sounds. He also emphasizes that any debates about numbers should start with a clarifying discussion on what is being measured. The "gory details" of arithmetic versus geometric mean, nominal versus real terms, and so on matter quite a bit.

[63]Turning points appear obvious with hindsight but are much harder to identify in real time. True seers can become very rich.

[64]That is, use the dotted line in Exhibit 5.5. A similar suggestion appears in Asness (2021).

[65]Beware shorter windows: Past-decade returns and EPS growth have historically exhibited more of a reversal than a continuation tendency.

Exhibit 5.5. Backward-Expanding Return, With and Without Impact of Valuation Change, January 1881 (or later) to December 2025



Sources: AQR and Shiller Data.

Notes: See notes for Exhibit 5.2. All samples end in December 2025.

investors tended to require in the past, on average. They can still give a poor forecast for the future, however, if today's valuations are far from the historical average. In that case, it is better to use forward-looking estimates, such as CAEY, unless you are convinced that the higher valuations today reflect realistically higher growth prospects than in the past (and thereby offset the lower dividend/earnings yields).

The dotted line in Exhibit 5.5 is nearly flat, but its forward-looking counterpart—yield plus growth, with zero expected valuation change—varies substantially over time. In Exhibit 4.2 in chapter 4, our yield-based estimate of the objectively feasible next-decade real return had a range of 3% to 8%. We expand on this finding in the next chapter.

CHAPTER 6. EQUITY MARKET FOCUS: OBJECTIVE EXPECTED RETURNS

Chapter Summary

In this chapter, we review the predictive ability of popular "objective" estimates of the US equity market's multiyear return and explore different ways of potentially improving them. Estimates based on equity valuations or yields are a good starting point, although their track record can be overstated. Estimates based on past or predicted earnings growth have, if anything, been harmful.

Introduction

We now tackle forward-looking long-run expected returns that are objectively feasible. Why are we revisiting this question? Didn't we cover this topic in chapters 1, 2, and 3? (Yes, albeit superficially.) Didn't Antti write two books on this subject? (Yes, although not only on this.) Didn't we write several other pieces on this topic elsewhere? (Yes, again, including Asness et al. [2017].) And isn't this monograph trying to influence reader perception of subjective return expectations that are not always rational? (A meek yes.)

Despite all those protests, objectively feasible expected returns are so central to the purpose of this monograph that we feel a review is needed. After all, some unfortunate readers may not have read all the works listed in the preceding paragraph, and they might appreciate a summary here. We will try to be succinct, although some level of greater detail is unavoidable when it comes to assessing the predictability of long-horizon returns.

Popular Models and Components

The most common forward-looking expected (real) return measures for equity markets are based on the dividend discount model or the cyclically adjusted earnings yield (CAEY), which is the inverse of the Shiller CAPE. More sophisticated versions explore the role of share buybacks and look at more refined measures of growth, as well as possible mean reversion or structural changes in valuation or growth (see Ilmanen 2011, 2022; and AQR Portfolio Solutions Group 2026).[66]

- **Dividend discount model (DDM).** The expected real return on equities is given by $E(R) \approx D/P + G + E(\Delta V)$, where D/P = dividend yield, G = long-term or trend growth in real dividends per share (DPS) or EPS, and $E(\Delta V)$ = expected change in valuation multiples. This is a one-stage model that assumes a single rate of growth essentially forever; a DDM

[66]The CAPE compares the current market price with past 10-year inflation-adjusted average earnings. Realism and diversification arguments point to more complex models and model averaging; ease of communication points to simple models. It is important to understand what precisely is measured: whether the quoted expected return is a total return or in excess of inflation or in excess of the return on cash or bonds; in which currency (and whether a foreign asset is hedged or not); and whether it is expressed as a compound (geometric mean) rate of return or simple average (arithmetic mean).

© 2026 CFA Institute Research Foundation. All rights reserved.

can also be constructed with different growth rates at different future times. Valuation change is a dominant driver ex post but hard to forecast ex ante. We usually set it to zero, so E(R) ≈ D/P + G.[67] Because deviations from the long-run growth rate are also hard to forecast, we use only mildly time-varying G, which means that evolving dividend yield drives most of the time variation in our expected returns.[68]

- **CAEY.** If we make the restrictive assumption that firms' retained earnings (that part of earnings not paid out as dividends) grow at the cost of capital, then E(R) equals the earnings yield.[69] Because annual earnings are volatile, forward-looking analyses often use the smoother CAEY. CAEY can proxy for the long-run real equity return. Alternatively, some portion of the CAEY (representing the portion of earnings paid out as dividends or other cash flows) can be used as a proxy for the dividend yield in the DDM.

Exhibit 6.1 plots three plausible proxies for the expected real return of US equities over the past century.[70] It uses the CAEY and two simple "yield-plus-growth" series: dividend yield plus a slow-moving estimate of historical real EPS growth and a composite consisting of half the CAEY plus a fixed real growth estimate of 2% (we can call this method "half-CAEY"). Using half-CAEY makes the time variation in the observed series less extreme, and it presumes that firms pay out about half of smoothed earnings in dividends or other cash flows, such as buybacks.[71]

Most of the variation in objective expected returns reflects variation in the yield component, either CAEY or D/P. These metrics saw peaks of extreme cheapness in 1932 and 1982 (50 years apart—should we worry about 2032?). They also recorded richness troughs in 1929 and 1999, and ominously, they approached record lows in 2021 and 2025.

In addition to cyclical variations (such as short-lived highs around the 1990, 2001, 2008, and 2020 recessions), there has been a secular downtrend in required returns—that is, an uptrend in market valuations. Contrast the average levels before and after the 1980s shown in Exhibit 6.1. This trend may reflect greater investability (easier access to a diversified market through cheap index funds as well as lower trading costs on single stocks) and higher investor risk tolerance (greater wealth and familiarity with equity investing, with both factors raising equity allocations). It perhaps also signifies a broader decline in real interest rates and in macro-volatility.

---

[67]This "income plus growth" calculation is the Gordon growth model. It implicitly assumes constant expected returns; constant payout ratio (D/E is a constant, k), a constant growth rate (for G_{DPS} and G_{EPS}); and a constant number of shares, so no net buybacks or net new issues. Campbell and Shiller (1988, 1998) extend this model to a more dynamic setting with time-varying expected returns and growth rates. The natural follow-up question of whether changing valuations reflect mainly changing required returns or changing growth expectations is addressed by exploring whether these valuations empirically predict future returns or growth (see chapter 4).

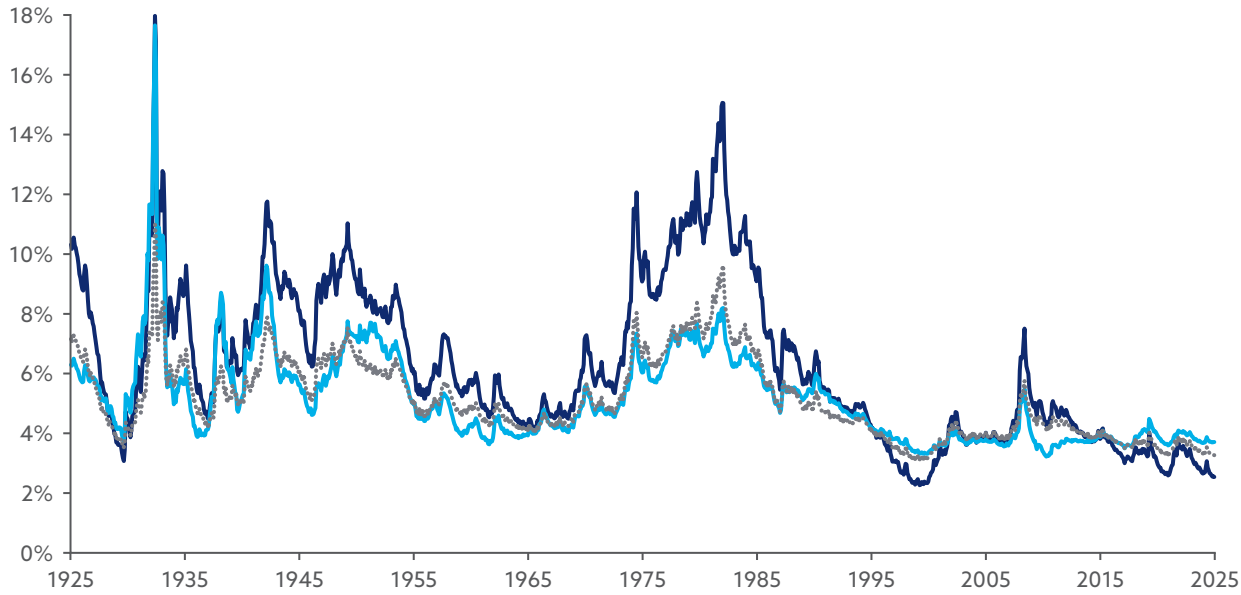
[68]Cochrane (2008) argues that because high dividend yields have no empirical ability to forecast low dividend growth, they must mechanically predict high future returns. (Later studies can tease out some growth predictability from data, but empirical evidence broadly supports Cochrane's claim.) If we want to let other terms than starting yield (D/P) matter for expected return variation, we might include mild mean reversion in valuations (one can debate to which mean), as well as mild extrapolation of recent decades' growth trend. Cochrane's proposition leaves open the question of what is meant by "yield"—dividends only or cash flow to the investor (which includes net buybacks).

[69]On a single-stock level, market clearing requires that investors' equilibrium expected/required return matches a firm's discount rate or equity cost of capital. This logic can be aggregated to the market index level.

[70]Although the empirical examples in this chapter focus on US equity market direction, the same approach can also be used in relative value contexts. For example, see chapter 2 for US versus non-US comparisons.

[71]Some readers accustomed to following the latest market developments may wonder about our use of a century (or more) of data. Zooming out is essential when evaluating the accuracy of long-term forecasts. Too often we see 10-year estimates evaluated based on only one or two realizations.

Exhibit 6.1. Expected Real Return Proxies for US Equities, January 1925–December 2025



	Average 1925–1986	Average 1987–2025
CAEY (1/CAPE)	7.6%	4.1%
D/P + 50-Year Average EPS Growth	5.8%	4.1%
CAEY × 0.5 + 2%	6.4%	4.1%

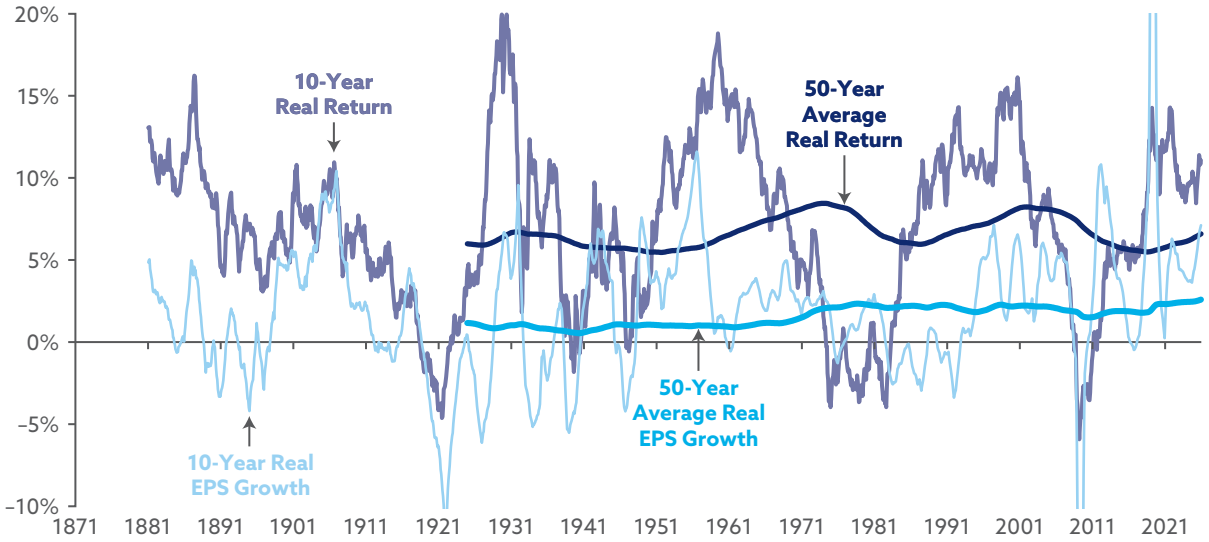
Sources: AQR and Shiller Data.

Note: All series are for the S&P 500 and predecessor indices; 50-year average EPS growth is the rolling 50-year average of the annualized rolling 10-year compound EPS growth rate.

What about the growth component? In Exhibit 6.1, all of the variation in CAEY is assumed to reflect changes in required returns (while expected growth is assumed to be constant). In reality, the decline in CAEY over time may also reflect greater growth optimism (whether rational or not). The second proxy allows for some variation in growth prospects based on rolling 50-year historical growth, which has tended to range around 1% to 2% (compound real EPS growth). Equity pricing reflects very long horizons, so the expected growth rate should move very slowly. Because the literature shows limited predictability in long-run growth rates, a long-run average may be our best forecast. Our G proxy trended gradually upward, reaching a record-high 2.5% in 2024.

Exhibit 6.2 shows that 10-year returns and earnings growth rates are far too volatile and reversal-prone to usefully anchor expectations. That said, we should consider if a structural change over recent decades might justify the use of a shorter history. Recent decades saw higher EPS growth rates, but this period was also an exceptionally capital-friendly environment that probably should not be extrapolated, especially because overall economic growth slowed down slightly during those same decades (see chapter 5).

Exhibit 6.2. Rolling Averages of US Equity Real Return and Earnings Growth, January 1871–December 2025



Sources: AQR and Shiller Data.

Notes: All series are for the S&P 500 and predecessor indices. Even 50-year returns or growth can be highly dependent on start and end dates. Here the 50-year series are rolling 50-year averages of 10-year compound returns and growth rates.

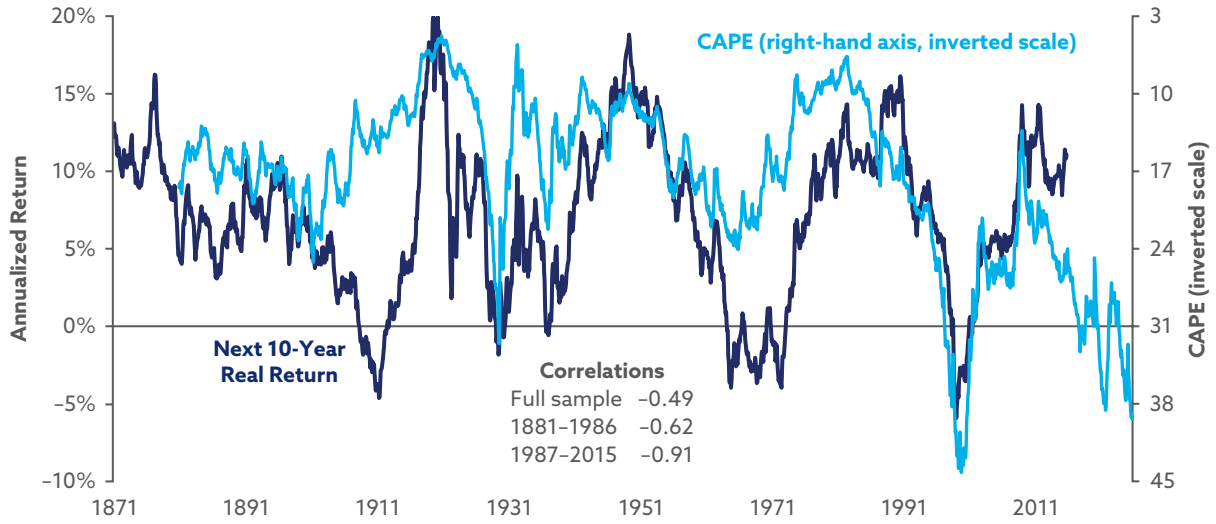
What about the change in valuation term that we set to zero? Recall that high valuations predict low future returns through the yield channel, even when we do not assume mean-reverting valuations. If we assumed such mean reversion, it would further widen the already implausibly wide historical range of next-decade expected return implied by CAEY, which has varied between 2% and 18% over time merely through the yield channel. If the structural changes justifying higher market valuation in the preceding discussion are deemed irreversible, it weakens the case for mean-reverting market valuation. For anyone considering a mean-reversion term, it seems advisable to revert to a rolling mean that can incorporate gradual structural changes in valuation multiples, as well as to assume only partial reversion to that mean.[72]

Assessing Predictive Power

Assessing the predictive power of long-horizon forecasts is a contentious topic. Although this section may seem unnecessarily technical to many practitioners, it may not be technical enough for many academics. **Exhibit 6.3** plots the CAPE along with the subsequent-decade real return

[72]See the sharp decline in CAEY and the falling subperiod averages shown in Exhibit 6.1. In more familiar terms, average CAPE rose from 15 to 26 between the two subsamples, reflecting some mix of lower required return and greater growth optimism. Expected returns fell less for the second series because the growth proxy rose from 1.3% to 2.0% (partly reflecting the greater use of buybacks) and thus offset some of the decline in dividend yields.

Exhibit 6.3. CAPE Imperfectly Predicts Next 10-Year Market Return, January 1871–December 2025



Sources: AQR and Shiller Data.

Notes: Return and CAPE are for S&P 500 and predecessor indices. The left-hand *y*-axis measures the next-10-year real return. The right-hand *y*-axis measures CAPE on an inverted scale.

of the market.[73] It displays a reasonable predictive relationship, which was especially strong between 1990 and 2010.

Exhibit 6.3 shows promising visual evidence for return estimation and thus market timing. The predictive correlations seem impressive, and we add that when CAPE was in its cheapest quintile, the subsequent 10-year real return averaged 11%, compared with just 3% when starting from its richest quintile.

A thoughtful judgment is more cautious than the foregoing evidence implies, but CAPE still sets a predictive benchmark that is hard to beat. We next give both the intuitive and the sophisticated arguments for being cautious about using CAPE as a real-world predictor.

We start with a few statistical facts:

- If we studied monthly or quarterly returns, rather than decadal returns, the dark blue line in Exhibit 6.3 would be extremely jagged and it would be much harder to forecast with slow-moving valuations. CAPE's predictive correlation would be near −0.05, not −0.5. Predicting smoother long-horizon returns with such variables looks easier but may not boost statistical or economic significance.

[73]Because CAPE is displayed with an inverted scale, Exhibit 6.3 looks very similar to Exhibit 1.1 in chapter 1, which shows CAEY.

- Even in this promising picture, forecast errors can be high. CAEY's mean absolute error for predicting 10-year real return is 3.5% a year, and the worst cases are around +/−10%, annualized over 10 years! Did someone say that forecasting long-term returns is easy? In AQR's annual capital market assumption (CMA) report, we include in our charts confidence "whiskers" to highlight the large forecast uncertainty around our point estimates (see AQR Portfolio Solutions Group 2026).
- We estimated the predictive correlations and quintile stats using full-sample data, but real-time investors do not know the future range of the CAPE. This in-sample bias can overstate predictive results. A cleaner approach is to always judge the CAPE versus its history until the time the prediction was made. Such out-of-sample predictions tend not to look quite as good.
- We have few independent observations of decadal returns. The full Shiller history gives us about 14, and many readers would justifiably view the early part of the sample as less relevant today. With so few observations, randomness can dominate. We can try to improve the situation by studying monthly overlapping 10-year returns, which produces about 1,600 observations—but these are clearly not independent. The return from January 2014 to January 2024 will inevitably be very similar to the return from July 2014 to July 2024 because they overlap by 9.5 years. Boudoukh et al. (2019) show that using overlapping observations in this case (with a slow-moving predictor such as CAPE) might raise the effective sample size from 14 to around 20, but certainly not to around 140 years or around 1,600 months.

Exhibit 6.4 revisualizes the dataset as a scatterplot of monthly overlapping periods. The full sample from 1881 to 2015 gives a decent relationship, with a correlation of −0.49 or explanatory power of 24% (−0.49 squared). If we study separately the sample periods before and after 1987 (dark blue and light blue dots),[74] the results look even better, with an especially tight fit among the light blue dots (correlation −0.91, R^2 83%). During this more recent period, top-quintile CAPEs were followed by negative real returns and bottom-quintile CAPEs by double-digit returns.[75] Many observers are ready to be convinced because they consider 40 years to be a fairly long sample and consider the earlier data to be less relevant in any case.

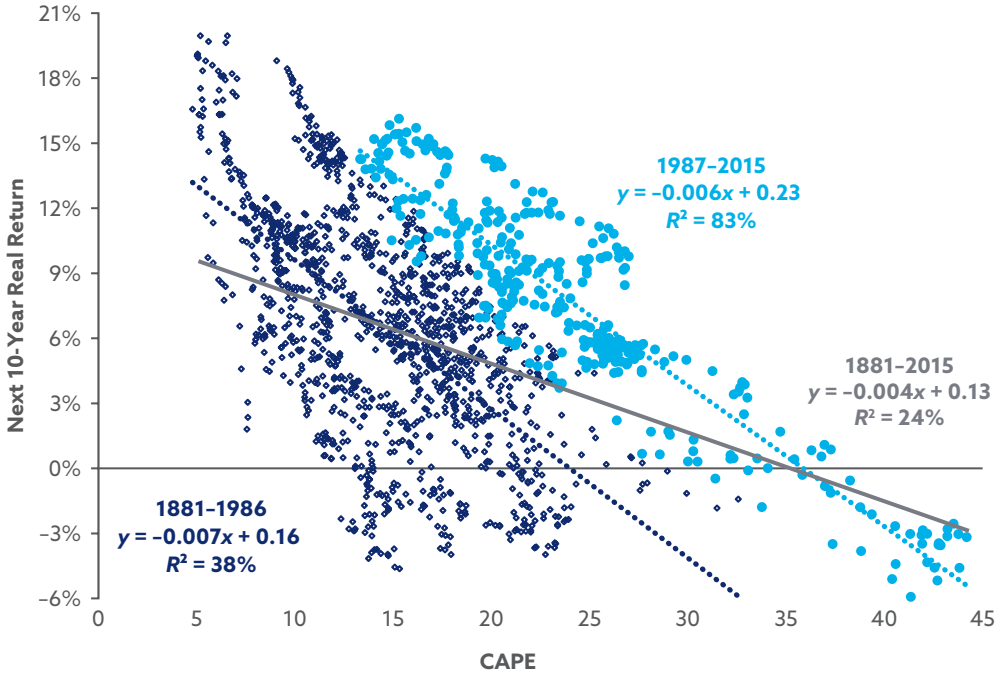
As one might guess, now comes the bad news: Judging the CAPE on 40 years of predictive success is almost as misleading as judging it on the last decade's failure. The large number of light blue dots in Exhibit 6.4 suggests a strong and meaningful relationship, but because there are only four or five effectively independent observations, the true statistical significance is weak. In other words, we cannot reject the possibility that this apparent relationship was a chance alignment of two slow-moving variables.

Worse, if real-time investors since the 1990s had compared CAPE with the full-history mean or even the preceding few decades, stocks would have looked expensive versus history (richest quintile) for most of this period. As a result, a contrarian market timer could have been consistently underweight stocks since 1990, with the resulting drag offsetting any benefit from

[74]The story would be similar for any cutoff year between the mid-1980s and early 1990s.

[75]The predictive correlations for CAEY are similar to those for CAPE (with an opposite sign), but the predictive slope coefficients for CAEY are interesting. Before 1987, the slope was near 1, so the market realized approximately the real return that its real yield proxy predicted. It was a successful carry or income strategy. Since 1987, however, the slope rose to 3.4 as the income gains were augmented by large capital gains when valuations mean-reverted. Admittedly, this full benefit accrued only to the hypothetical investors who had the foresight or luck to ignore the pre-1987 histories and were not discouraged by richer market valuations in the early 1990s. Investors who used shorter histories to judge current market valuations would have suffered less from the structural shift to higher valuations.

Exhibit 6.4. Appearances Can Deceive: CAPE Versus Next 10-Year Real Return, January 1881–December 2025



Sources: AQR and Shiller Data.

Note: Return and CAPE are for S&P 500 and predecessor indices.

being most underweight in 2000 and mildly overweight in 2009. As noted, a structural change occurred in the 1980s and 1990s, whereby the average CAPE rose from the mid-teens to mid-20s. Although we know this with hindsight, investors did not know it in real time.

Such structural shifts are challenging to contrarian investors, who expect the market valuation to revert to the past mean but instead the new mean keeps edging higher. The structural shift between samples also explains why the full-sample correlation is weaker than in either subsample.

Let us not take this criticism too far, however. CAPE gave much higher return predictions in 1990 and 2009 than in 2000, which counts as a major success. Young investors may recall only the past decade, when CAPE gave cautious predictions—and yet US equities delivered double-digit real annual returns, boosted by ever-higher valuations. That's one observation. If the market tanks in the coming decade, CAPE's forecasting record for this century will again look great.

In summary, the long-run evidence shows a positive relationship between CAEY (or other yield-based expected return proxies) and next-decade market return. At the same time, past-decade return and growth (naïve rearview-mirror proxies) have had negative predictive ability, as shown in **Exhibit 6.5**.

Both academic research (e.g., Welch and Goyal 2008) and our research (Asness et al. 2017) suggest that using CAPE, CAEY, and their brethren has not been very helpful for short-term

Exhibit 6.5. US Equity Market Drivers' Predictive and Contemporaneous Relationships, January 1871–December 2025

	10-Year Real Return	10-Year CAPE Change	10-Year Real EPS Growth	Next 10-Year Real Return	Next 10-Year CAPE Change	Next 10-Year Real EPS Growth	CAEY
10-Year Real Return	1.00						
10-Year CAPE Change	0.93	1.00					
10-Year Real EPS Growth	0.38	0.31	1.00				
Next 10-Year Real Return	**−0.37**	**−0.31**	**−0.21**	1.00			
Next 10-Year CAPE Change	−0.37	−0.33	−0.29	**0.93**	1.00		
Next 10-Year Real EPS Growth	−0.11	−0.03	−0.28	**0.38**	0.31	1.00	
CAEY	−0.62	−0.65	−0.40	**0.51**	0.59	−0.06	1.00

Sources: AQR calculations and Shiller Data.

Note: Return and CAPE are for S&P 500 and predecessor indices.

market timing. Market timing is incredibly hard![76] Yet, analyses of long-horizon predictive ability rarely find that any other indicator would work better.[77] The main reason for our cautionary tone is that some evidence may make readers too optimistic about the usefulness of these forward-looking estimates. At the same time, the past decade has made many observers far too dismissive of them.

Can We Do Better?

So, we conclude that CAEY and its brethren can be useful. But can they be improved? For short-term (up to one year) return predictions, momentum and monetary policy indicators may be good complements to valuation indicators.[78]

For longer horizons such as a decade, it is hard to find other systematic predictors to complement yield or value, and again we have too little data to make good statistical judgments. In fact, the "small data problem" means that economic priors have an important role to play in

[76]Recent evidence indicates that machine-learning techniques may help in short-term market timing (see AQR Portfolio Solutions Group 2024), but the "small data problem" is even more of a limitation when it comes to long-horizon forecasting.

[77]See for example Boudoukh et al. (2019) and Ma et al. (2024).

[78]Humility is warranted. We are not saying "never time the market," but we echo Nobel Laureate Paul Samuelson's advice that although market timing is a sin, sometimes you should sin a little. See Asness et al. (2017) and Ilmanen (2022).

judging the past performance of any long-horizon predictors and in deciding which ones to use in the future.[79]

When market valuation indicators perform poorly for a decade, inevitable questions arise: "Is this time different? Has the world changed?" We stress that our CMAs do not presume mean-reverting valuations. To us, it is enough that higher valuations imply lower starting yields and thus lower income returns in the future than in the past, even if valuations stay unchanged. It is possible that faster earnings growth could justify sustainably higher valuations and offset the lower yield income. This outcome has not been historically typical, and it is not our base case, but with AI technology unfolding, nothing can be ruled out.

With hindsight, "hot" periods of rich-to-richer markets, such as the 1990s and the last decade, tend to follow a pattern. The hot market starts with rational grounding in technological change, then proceeds to overexuberance, and finally moves to market correction. We just cannot know if we are now in the fifth or the tenth inning of this game.[80] A dose of momentum can help contrarian investors to navigate such episodes.

What about improving the valuation metrics? As discussed in chapter 4, dividend yield was one of the most popular metrics among academics and practitioners for a long time. But Shiller's CAPE has taken over since the early 2000s, partly because of the impact of share buybacks. Many tweaks to CAPE have been proposed:

- Siegel (2016) argues that accounting changes related to fair-market pricing and goodwill impairments have made the GAAP earnings used in the Shiller CAPE too conservative. He explores the use of NIPA (National Income and Product Accounts) profits as an alternative.
- Jivraj and Shiller (2017) replace the S&P 500 price index in CAPE with a total return index ("total return CAPE"). They propose that this version may better account for the impact of larger share buyback activity in recent decades, which has boosted the EPS growth rate embedded in CAPE. The authors also explore the use of operating earnings, sales, and NIPA profits instead of GAAP earnings.
- Straehl and Ibbotson (2017) deal with the buyback revolution more directly and combine dividend yields with gross buybacks or net buybacks (the latter subtracts share issuance) for total payout yields. Siegel (2018) broadens the discussion to other payouts.
- AQR Portfolio Solutions Group (2017) and Ilmanen (2022) review many different versions of yield-plus-growth estimates. All CMA providers have their own tweaks, as well as varying assumptions of mean-reversion or structural changes. As an example, AQR Portfolio Solutions Group (2026) scales up the CAEY (and, equivalently, reduces the CAPE) mildly to reflect the staleness of the 10-year average earnings today.

---

[79]In the case of valuation metrics such as CAEY, the statistically problematic empirical evidence is supported by economic theory based on DCF math and the importance of valuation in other investment contexts. Market efficiency pressures and the possibility of structural changes point to a more skeptical interpretation.

[80]Much rides on AI. Will it be a fast exception to Amara's law, which states that we tend to overestimate the effect of a new technology in the short run and underestimate the effect in the long run? We are not necessarily doubting AI's revolutionary impact for macroeconomies. Even if AI improves productivity more than any technological predecessors, it is not clear that the main benefits will accrue to today's mega-caps. Bigger beneficiaries could include yet-unformed companies, China, and especially global consumers.

- Rintamäki (2024) finds improved predictive ability using the equity share of a broader multi-asset portfolio. This metric also captures the relative attractiveness of equities versus other asset classes and may be more robust when all asset classes trend richer together. Philosophical Economics (2013) described a related indicator a decade earlier.
- Hillenbrand and McCarthy (2024) explore "street earnings," which exclude "special items" and show less extreme falls than GAAP earnings at times such as the Global Financial Crisis (GFC). Thus, three-year averaging is sufficient (instead of CAPE's 10-year averaging) and allows for more timely estimates with a somewhat better ability to predict future earnings and returns. We discuss various EPS measures in the appendix to this chapter.
- Philips (2024) reviews many versions of CAPE and its relationship to the dividend discount model, while Haghani and White (2024) incorporate the dividend payout ratio into CAPE, and Kim et al. (2025) modify CAPE to use the past decade's earnings of current S&P 500 constituents (rather than the constituents at each point in historical time).
- Ma et al. (2024) evaluate several candidate models as forecasters of next-decade returns. The best out-of-sample performance comes from a three-part DDM: the sum of dividend yield, long-run average dividend growth, and expected mean reversion in valuations using the total-return CAPE metric.

Concluding Thoughts

Instead of tweaking CAPE, we might instead accept that valuations are sustainably higher today than in the 1900s. We have noted some justifications (lower costs, better diversification, higher risk tolerance), and we really do not expect the US CAPE to return to its long-run average in the teens. Record-low bond yields were the most popular explanation for higher equity valuations until bond yields rose sharply in 2022. Then that relationship was conveniently forgotten. US equities managed to reach valuations in late 2024 that were broadly similar to those in 2021 (when CAPE was in the high 30s), even though the 10-year Treasury Inflation-Protected Securities (TIPS) yield had risen from –1% to +2%. Evidently the level of the long-run real riskless rate is not relevant for discounting a long-term real asset such as equities (sarcasm intended).

Although we have highlighted some promising tweaks to CAPE that would have improved the predictive record, none was a real game-changer. Although many CMAs use more complex models, CAPE is good enough for us. In the terms that Asness (2012) once described it, CAPE is still our friend. Despite imperfect track records, CAPE and its cousins remain the best available objective predictors of long-term market returns, and certainly they are better than the rearview-mirror mindset.

Appendix: On Various Earnings Measures

When we discuss various tweaks to the Shiller CAPE's use of GAAP earnings, as we did in this chapter, we throw in several terms that may be unfamiliar to some readers. Other nuances were hinted at in chapter 1 (overly optimistic analysts' growth forecasts compiled by I/B/E/S) and in chapter 5 (Smolyansky's [2023] finding that strong EPS growth in recent decades can be fully explained by shifts to lower interest rates and corporate tax rates since the late 1980s, which hinges on a distinction between EBIT and EPS growth rates). In this appendix, we summarize the key earnings concepts and clarify the jargon.

Academic accounting and finance mainly use reported or GAAP EPS calculated following the principles and guidelines in the generally accepted accounting principles, a standardized set of accounting rules that companies use to prepare their financial statements. This is also what Professor Robert J. Shiller uses on his website, where the Shiller CAPE data are easily available.[81]

In contrast, firm managements and equity analysts focus their communication on less strict pro forma or "street" or I/B/E/S earnings, which exclude supposedly nonrecurring items from Compustat/GAAP data. Unlike GAAP earnings, the choice of excluded items is subjective and is often made to present earnings in the most favorable light, giving this measure the nickname "earnings without the bad news." Among other providers, I/B/E/S compiles analyst estimates of near-term and long-term (up to three- to five-year ahead) EPS, and the I/B/E/S consensus forecasts are widely used.

We have highlighted the notorious biases in analysts' earnings forecasts. Equity analysts have incentives to please the managements of the firms they cover to maintain access, and they do this with beautifully timed optimism and pessimism biases: Forecasts tend to be wildly over-optimistic until the actual earnings announcement approaches, when analysts dutifully walk down their forecasts to the pessimistic side to offer beatable near-term estimates. **Exhibit 6.A1** from Ed Yardeni's website clearly shows this two-year walkdown path at the market level from earnings forecast overoptimism to slight pessimism by the earnings date.

This depiction is a caricature: Analysts do balance their incentives to gain access to management with reputational concerns for accuracy. Data show, however, that this is a reasonable characterization of how the industry works. The overoptimism and overextrapolation biases mean that analysts' growth forecasts are not useful estimates of future growth. If anything, they can serve as contrarian indicators.[82]

Analyst overoptimism varies not only over time but also across market segments. The most prominent distinction is the extra optimism sometimes showered on mega-cap stars, such as the Magnificent Seven. **Exhibit 6.A2** highlights the difference in long-term earnings growth forecasts between the cap-weighted market (dominated by mega-caps) and the median stock. Although mega-cap mega-overoptimism is not always evident, it has been evident in recent years, echoing the tech boom of the late 1990s.

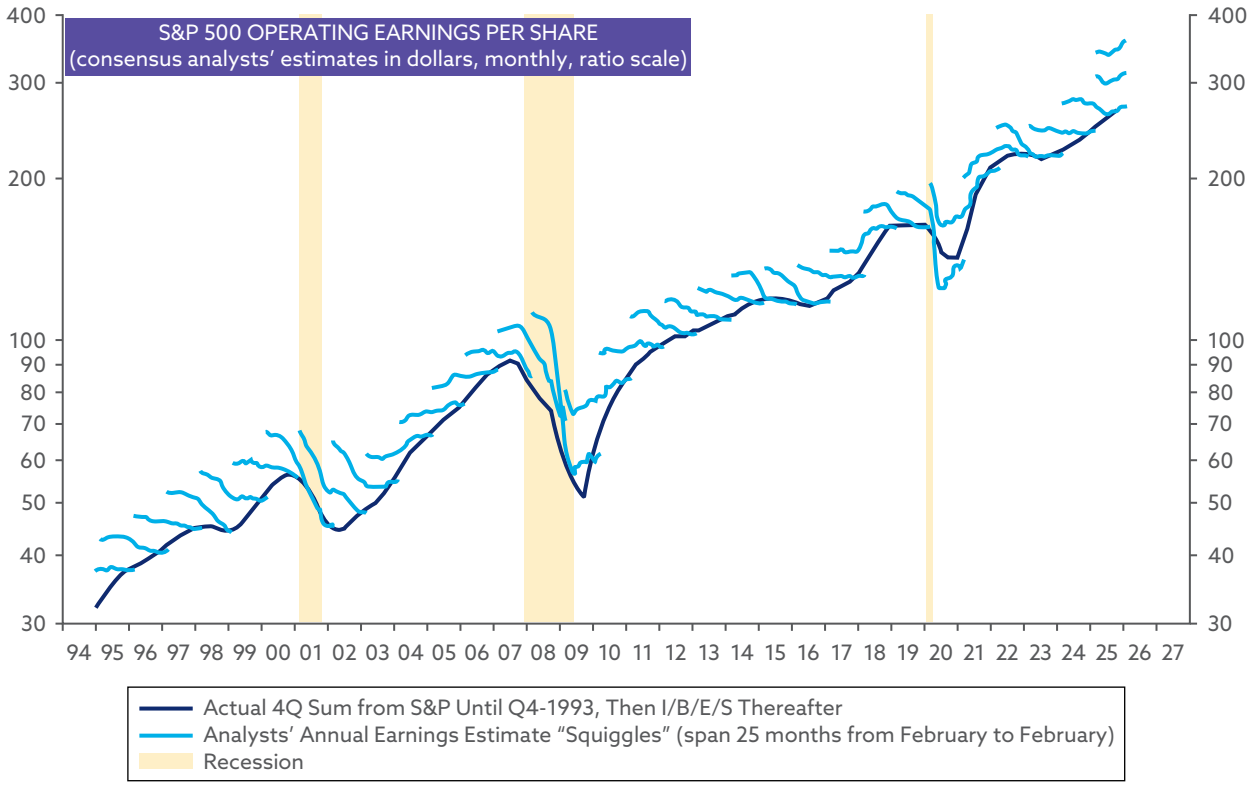
It may be helpful to quote some numbers. How can we reconcile our arguably modest "G" estimates (real EPS growth) of around 2% with the much higher I/B/E/S analysts' long-run EPS forecasts shown in Exhibit 6.A2? Over the past 40 years, analyst forecasts averaged 12.8% and ranged between 10% and 20% most of the time.

---

[81]Instead of using one-year trailing earnings, which can be volatile and even negative in the extreme, Shiller uses the smoother 10-year average; hence, the term "cyclically adjusted P/E" (CAPE). He also adjusts both the price and earnings for inflation. He offers other variants, such as total return CAPE and excess CAPE yield. However, these measures also use 10-year average real earnings as raw material.

[82]Various sources of bias in analysts' forecasts of earnings and in their recommendations have been documented in the literature. See, for example, Kothari et al. (2016).

Exhibit 6.A1. Walkdown Path from Mega-Optimism Toward Mild Pessimism in Analysts' S&P 500 EPS Expectations Each Year as Earnings Date Approaches, January 1995–December 2025



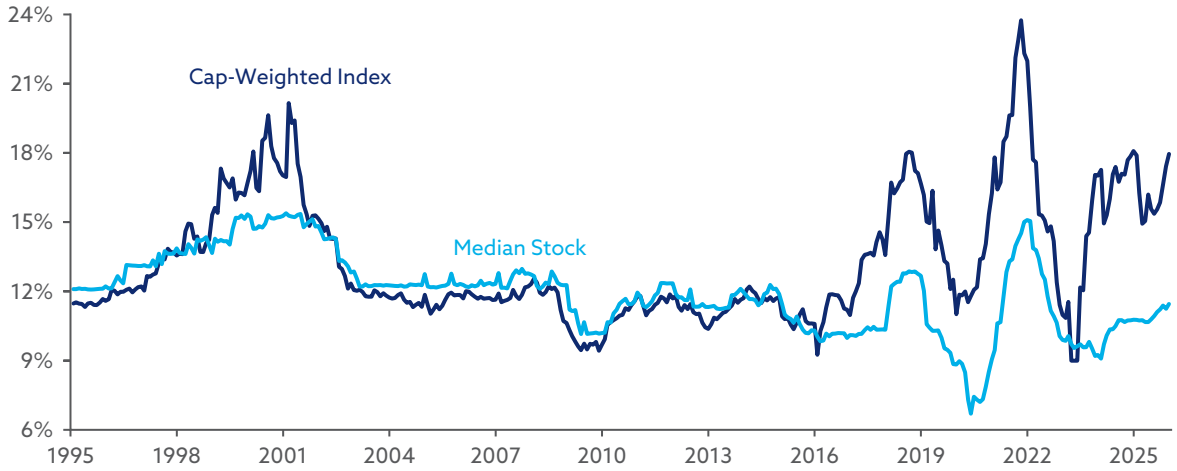
Sources: LSEG Datastream and Yardeni Research (charts available at https://yardeni.com/charts/sp-500-earnings-squiggles-framework).

To reconcile these numbers, first note that we quote real compound GAAP EPS growth, whereas analysts quote nominal operating EPS growth and many surveyed analysts may think about arithmetic means or stable earnings.[83] We could quote 3.6% G to reflect the benign recent sample (over 40 years), which is roughly double the full-sample compound growth rate of 1.8% (over 140 years). Then we must add around 2% for volatility drag (last 40-year real growth rates are 3.6% compound and 5.5% arithmetic) and around 3% inflation to produce

[83]The term "operating earnings" can sow further confusion because in accounting, this expression is used for reported EPS before interest and taxes are deducted (i.e., EBIT). In Wall Street jargon, however, it may be used for street earnings (i.e., including interest and taxes but excluding nonrecurring items). For example, S&P Global regularly shares its operating earnings series whose histories go back to the 1980s as its best-practice pro forma composite. And, as noted, Hillenbrand and McCarthy (2024) have created an apparently well-fitting proxy for street earnings by removing "special items" from Compustat GAAP-reported earnings. The details are described in their study, and we depict the series here.

Analysts are guided to answer surveys with compound growth rates but may lean toward arithmetic means. If they do provide compound growth rates, their overoptimism is larger than we estimate here.

Exhibit 6.A2. Mega-Optimism: Analysts' Long-Term Earnings Growth Forecast for US Cap-Weighted Market and the Median Stock, January 1995–December 2025



Source: I/B/E/S.

Note: This exhibit illustrates equity analysts' long-term (three- to five-year) EPS growth forecast for stocks in the Russell 1000.

a nominal arithmetic return of 8% to 9%. The remaining 4% to 5% gap resulted mainly from the notorious overoptimism in analysts' one- to five-year growth forecasts.

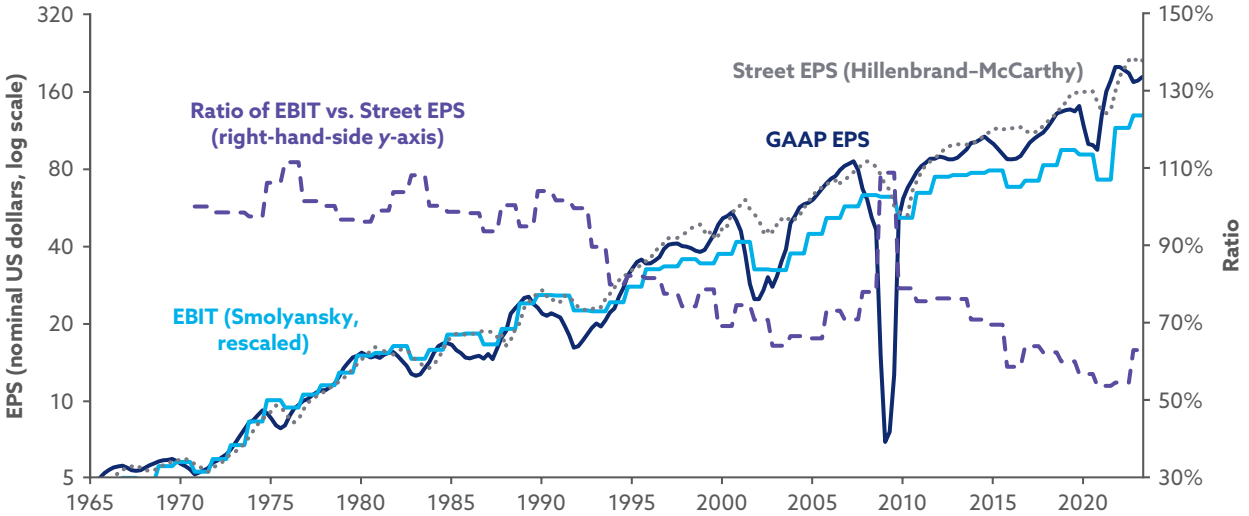
Today's optimism has some reasoning behind it, but double-digit expectations remain as silly as they ever were.

To analyze or compare P/Es, it is vital to understand the measure of earnings being referenced. In early 2025, for instance, the S&P 500 CAPE was 38, but the expected operating or street P/E was just 23. The gap reflects some mixture of the time discrepancy involved in six years of earnings growth (past-decade average earnings versus next-year earnings), the optimism gap (the inherent conservatism of GAAP earnings versus the rose-tinted glasses of operating earnings, generously spiced with analyst overoptimism about the future), and a small inflation impact (CAPE adjusts past earnings for inflation).

Exhibit 5.4 in chapter 5 provided historical real growth statistics for several related series: GAAP EPS and DPS from Robert J. Shiller's website (Shiller Data); the Hillenbrand and McCarthy (2024) proxy for street earnings (which tracks very closely to S&P Global's operating earnings series over the common history since 1988); the EBIT series Smolyansky (2023) uses to highlight the wedge between EPS and EBIT growth, caused by falling interest rates and corporate tax rates; the corporate profit series from national accounts,[84] which Siegel (2016) suggests might replace

[84]One aspect of the corporate profit series may be worth highlighting. It is an aggregate series, whereas the S&P earnings are always described as EPS. In the past, the gradual increase in the share count through issuance diluted EPS growth compared with aggregate earnings growth by 1% to 2% annually. The growing use of share buybacks has offset issuance and has brought net dilution to near zero. In the future, we may expect aggregate earnings and EPS to grow at similar long-run rates.

Exhibit 6.A3. Comparing Different Measures of Earnings Growth, January 1965–December 2024



Sources: Smolyansky (2023), Hillenbrand and McCarthy (2024), AQR, and Shiller Data.

GAAP earnings in the CAPE; and GDP, which anchors all economic growth (although with only tenuous links to earnings growth or equity market returns).

Three of these series are shown in **Exhibit 6.A3**. The common patterns are obvious, but the differences are interesting. During the GFC, GAAP-reported earnings fell much more sharply than did street earnings, excluding extraordinary items. Long-run growth rates are nonetheless quite similar for the different EPS series, whereas the EBIT series has systematically grown more slowly since 1990, as Smolyansky indicated. A temporary correction appears around 2008, likely because Smolyansky used a nonfinancials universe for EBIT, and avoiding financials was clearly helpful during the GFC.

CHAPTER 7. EQUITY MARKET FOCUS: SUBJECTIVE EXPECTED RETURNS

Chapter Summary

Earlier chapters introduced some key insights regarding subjective return expectations, and in chapter 7, we finally explore this understudied topic in detail. Although objective expectations are typically inferred from market prices or yields (with the help of some model or assumptions), subjective expectations are best inferred from survey data. We highlight interesting differences across investor groups in their tendency to overextrapolate or to be overoptimistic.

Introduction

Many academics used to frown on survey data ("talk is cheap; show us how they invested") and simply assumed rational expectations. Over time, surveys have attracted more attention, partly because of the growth of behavioral economics, partly because of the greater availability of survey data, and partly because of new evidence that survey participants do "put their money where their mouth is" (i.e., they tend to act in a manner consistent with their survey responses).[85]

Surveys can also separate expectations of future fundamentals from required risk premia, whereas market-based expectations blend those together. For example, high equity market valuations reflect some mix of optimistic growth expectations and low required equity premia, just as a steep yield curve reflects some mix of rising rate expectations and high required term premia.

Subjective Versus Objective Expectations

The "expected returns" commonly analyzed by academics and capital market assumption (CMA) providers are objectively feasible expectations rationally held by investors. High asset valuations (low asset yields) tend to predict low future returns, so market yield–based or valuation-based expected returns are considered objective. Objective equity market return predictions tend to be lower after a decade of strong returns and rising valuations (think 1990s or 2010s).

In contrast, some survey-based subjective return expectations are particularly optimistic after such a bullish decade, as well as pessimistic after bad times such as the Global Financial Crisis (GFC), just when objective return expectations rise. We will show evidence of such procyclicality

[85]See, for example, *Handbook of Economic Expectations* (Bachmann et al. 2022) and Gennaioli and Shleifer (2018). Ilmanen notes the following: I am pleased with the increased interest in surveys because I have encouraged their use and have used them actively in my own books (Ilmanen 2011, 2022). This may be repentance after my cowardly nonuse of survey data as a doctoral student (see the Eugene Fama anecdote in chapter 1, footnote 11). I truly believe we have much to gain in reviewing evidence "directly from the horse's mouth" instead of inferring expectations from asset prices, empirical regressions, or theoretical models—even when some survey expectations are not only irrational but also biased in ways that need to be adjusted for.

© 2026 CFA Institute Research Foundation. All rights reserved.

in individual investor surveys of return prospects and in equity analysts' expectations of multiyear earnings growth.

The 2000 tech boom peak is justly characterized as a period when many market participants' subjective return expectations were high while objective return prospects were low (see Exhibit 1.1 in chapter 1). That was an extreme example of subjective and objective expectations divergence. Other survey-based expectations, notably institutional investors' CMAs, are more contrarian and align better with objective return estimates. Such apparent rationality hardly means that those investors are always right, but the long-run odds are on their side.

Arguably the most important bias in subjective expectations is multiyear overextrapolation. Extrapolating past earnings growth and extrapolating past returns are distinct but overlapping behaviors. Some degree of extrapolation (directionally at the market level or in relative terms across single stocks) is rational when asset returns exhibit some continuation tendencies (as they do, up to about a one-year look back) or when, say, earnings growth exhibits some persistence (as it does, up to two or three years for firm-specific abnormal growth compared with the market).

The problem—that is, the irrationality—arises when investors or equity analysts overextrapolate beyond these horizons. Such overextrapolation seems common based on survey data on analysts' growth expectations, and predictive regressions of future returns on market valuations suggest the same. Indeed, value strategies (from directional market timing to stock selection between "value" and "growth" stocks) tend to outperform in the long run precisely because cheap assets eventually tend to outpace their low growth expectations while expensive assets tend to disappoint their high growth expectations.

Although this scenario happens on average, during some lengthy periods, the overextrapolators "get it right." The follow-up danger, as noted in chapter 1, is that these investors then become overly confident and overextrapolate even more, leading to a market bubble or a growth-stock bubble, as happened in 1999–2000 and 2020–2021.[86]

Here is one way to intuit why growth overextrapolation is such a common mistake. Some evidence indicates that survey respondents confuse good companies with good investments, or cyclically good growth prospects with high expected returns. Subjective expectations then equate expected returns with the numerator (expected cash flows) rather than with the denominator (required discount rate) of the present-value equation. This approach does not recognize that any growth edge may already be (over)discounted in the market price.

Conversely, one could criticize academics for a poor choice of words in their use of "expected returns." Objective expected returns are driven by investors' risk preferences rather than by their subjective expectations about fundamentals. For example, higher risk aversion in bad times makes investors demand a higher risk premium for equities. Market prices must then fall to make it rational to expect higher prospective returns—not because we began to like stocks more but because higher risk aversion pushed down equity valuations. This terminology is

[86]Larry Summers highlighted this danger in a personal communication to Ilmanen. His observation echoes analysis of currency markets in Frankel and Froot (1990), when dollar-bullish chartist expectations became ever more popular after they trounced dollar-bearish fundamentals-based predictions for several years up to the 1985 dollar peak.

counterintuitive to many laypeople, which is why we sometimes argue that objective "expected returns" should be more appropriately called "required returns."

Apart from overextrapolation, other costly expectational errors include underreaction and money illusion. Initial underreaction to market-level or company-specific news is common, but it tends to be at most a multimonth phenomenon, whereas overextrapolation is a multiyear phenomenon. Together these errors explain the pervasive predictability patterns in long-run empirical data: one-year momentum and multiyear reversal.

Money illusion refers to investors confusing nominal and real variables. One incessant example is the so-called Fed Model, in which equity earnings yields, which are a real quantity, are compared with nominal Treasury yields. Discounting real equity cash flows with nominal yields may have contributed to lower market valuations during the inflationary 1970s.[87] Both investor surveys and predictability patterns based on market prices are consistent with underreaction and money illusion.[88]

Do Patterns Vary Across Investor Groups, Investment Horizons, or Asset Classes?

Whose expectations are we talking about here?[89] Surveys at best reach a subset of market participants, and it is not clear how different respondents or investor types should be weighted. Presumably, it makes sense to weight them by their wealth or by their marginal role in setting market prices.

We will highlight some interesting differences among investor group behavior. As noted, individual investors tend to be more extrapolative than institutional investors. They likely are also more overoptimistic, more short-termist, and more subject to sentiment. Overall, individual investors are less rational.

Exhibit 1.4 in Chapter 1 juxtaposed individual and institutional investors' opposite expectations formation patterns using charts published elsewhere. Early evidence summarized in Ilmanen (2011), Amromin and Sharpe (2014), and Greenwood and Shleifer (2014) highlighted the extrapolative tendencies in individual investors' return forecasts. We detected a strong whiff of irrational exuberance when these surveys showed peak optimism in 2000, a time when the rearview-mirror perspective looked great but high market valuations gave an objective warning

[87]Modigliani and Cohn (1979) made a powerful case, now mostly forgotten, that the low stock valuations in the 1970s bear markets resulted from this phenomenon.

[88]Other costly habits are related to investor risk preferences rather than biased expectations. Apart from general overconfidence, more specific examples include liking lotteries and disliking leverage. Both contribute to the low (from a CAPM perspective, surprisingly low) objective expected return of the riskiest stocks and relatively high expected return of defensive stocks. See Ilmanen (2011, chap. 6) and Ilmanen (2022, chap. 17) for a fuller treatment on behavioral finance and investor bad habits.

[89]In general, market expectations represent different investor groups, and participants across them and within them can be quite heterogeneous. Too often, investors ignore the accounting identity that all net flows and overweights/underweights must add to zero (for every buyer, there is a seller; for every investor overweight an asset, there is another who is underweight). Likewise, if surveys reveal that "everyone is bullish" (or running to the exit), this revelation cannot influence net flows, but it can move market prices. One must decide which groups' views are worth following and which are contrarian market indicators. More color is provided in chapter 8, section 4 of Ilmanen (2022).

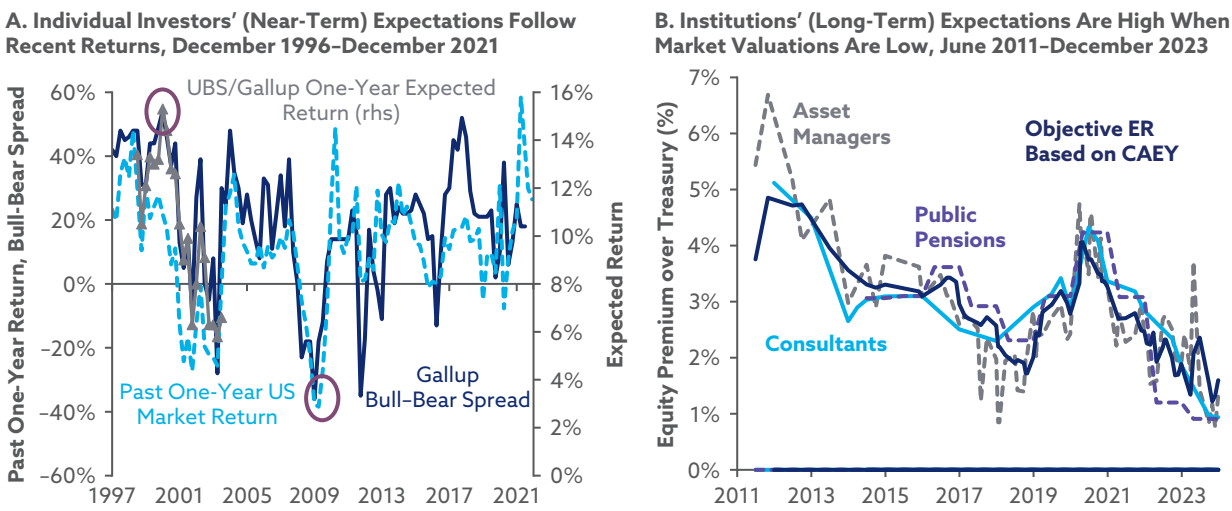
signal about prospective returns. Similar surveys revealed much gloomier expectations in 2009 after the GFC market decline, which made valuations appear cheap.

In contrast, later research by Dahlquist and Ibert (2024, 2026) and Couts et al. (2026) found that institutional investors' multiyear CMAs tend to be contrarian, more rationally aligning with objective expected return measures such as the CAEY.

We create in **Exhibit 7.1** our own charts based on other researchers' data, but the story remains the same: highly extrapolative retail investor expectations and more contrarian institutions. Panel A is inspired by Greenwood and Shleifer (2014) but uses McCarthy and Hillenbrand (2025) data for a longer history. The short history (1998–2003) when investors were specifically asked about their next-year return expectations tracks so closely with the Gallup bull–bear spread that it seems reasonable to use the latter as an expected return proxy since 2003. Panel B uses Dahlquist–Ibert (2026) data to show institutional CMAs co-moving with the CAEY.

So, it appears that retail investors are more extrapolative and institutional investors more contrarian.[90] Or is it that short-term forecasts are more extrapolative than long-term forecasts? The two effects are confounded because of an apparent natural division of labor—that is, retail surveys focus on near-term prospects and institutional investor surveys focus on

Exhibit 7.1. Individual Investors Extrapolate; Institutional Investors Act Like Contrarians



Sources: Panel A uses UBS/Gallup survey data in Greenwood and Shleifer (2014) and McCarthy and Hillenbrand (2025). Panel B uses CMA surveys among asset managers, consultants, and public pensions in Dahlquist and Ibert (2026).

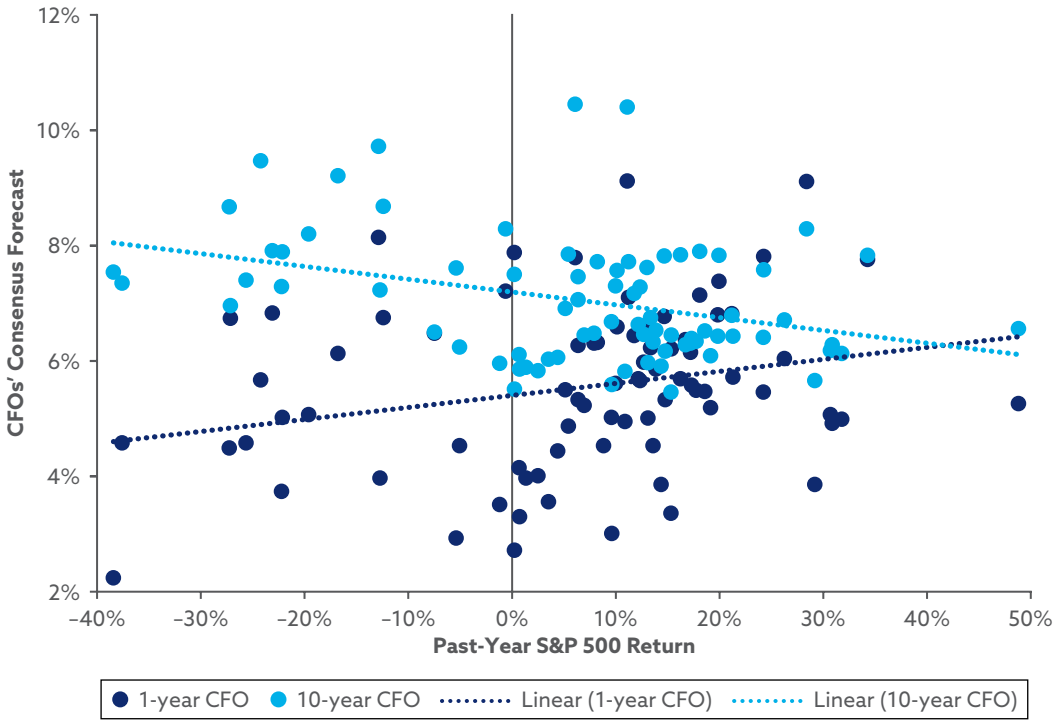
Notes: CAEY is cyclically adjusted earnings yield. Surveys do not specify whether expected returns are gross or net of fees. All expectations and returns are for the S&P 500.

[90]Even institutional investors may not always follow their contrarian-leaning CMAs. For example, Ang et al. (2014) and Jones (2017) document procyclical behavior—multi-year return chasing—among institutions and exhort them to do better.

long-term prospects. It is hard to say whether the different degree of extrapolation is caused by horizon length (short versus long) or by investor type (retail versus institutional). The answer may be a bit of both.

Fortunately, the US chief financial officer (CFO) survey (conducted since 2000) asks respondents for both 1-year and 10-year forecasts, so it gives us the most direct evidence. After a strong year for the S&P 500, the 1-year CFO forecasts tend to be above average and the 10-year CFO forecasts below average, as shown in **Exhibit 7.2**.[91] This finding supports the idea that short-term forecasts are more extrapolative and long-term forecasts are more contrarian, broadly in line with empirical return patterns. In contrast, we find that equity analysts' long-term (three- to five-year) EPS forecasts have an extrapolative tendency whereas bond investors are long-term contrarians (as discussed in chapter 3).[92]

Exhibit 7.2. Short-Term Extrapolation and Long-Term Reversal Biases in the US CFO Survey, June 2000–December 2019



Sources: Graham and Harvey (2018) and personal communication, Philadelphia Fed.

Note: The survey does not specify whether expected returns are gross or net of fees.

[91]New research highlights CFO overconfidence on their (one-year) forecast quality. And CFOs display no learning over time to reduce overconfidence (Boutros et al. 2025).

[92]If we used analyst forecast earnings growth as one input in our predictive regressions or CMAs, its procyclical pattern (e.g., peaking in 2000 with high CAPE) would offset the countercyclical predictive ability of CAPE.

The relative weights of individual and institutional investors could determine the overall extent of extrapolative action in financial markets. Again, there is heterogeneity: A subset of individual investors is surely contrarian, whereas a subset of institutions is extrapolative. Each investor's or group's tendency to lean either way may also vary over time. If we focus on institutional investors such as pension funds, we find that the increasing use of constant-notional targets such as 60/40 stock/bond weights or age-dependent asset class shares in target-date funds points toward rebalancing behavior (soft contrarianism). Common use of yield-based CMAs since the 2000s may have prompted even stronger contrarian behavior (underweighting asset classes or countries with higher valuations and lower forward-looking returns).

Many investors' disappointment with CMAs in the past decade (i.e., being caught underweight the outperforming US equity market), however, may have more recently prompted less adherence to those CMAs (i.e., letting the US weight in a global portfolio rise with its valuation). In chapter 2, we argue against overextrapolating the past decade's trends.

Next, we more closely examine long-horizon equity market forecasts by presumably rational investors. **Exhibit 7.3** presents such forecasts for US equities (compound total returns over the next decade) from CFOs, economists, and CMA providers and compares these forecasts with objective estimates based on equity market yields. All series show a general decline in prospects during the 1990s and the 2010s, in line with the objective measures.

Exhibit 7.3. Prospective US Equity Market Returns Based on Surveys, CMA Composites, and Objective Market Yields, January 1992–December 2025



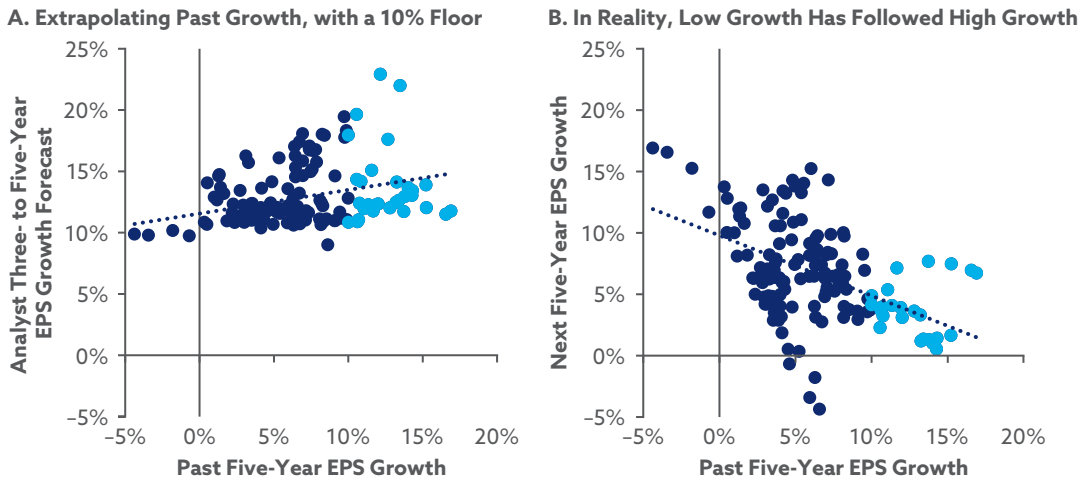
Sources: Dahlquist and Ibert (2026) (for their composite among CMA providers, last observation October 2024); Horizon Actuarial (for their survey among CMA providers, last observation January 2025); Philadelphia Fed (for the Survey of Professional Forecasters economist survey, last observation January 2025); Graham and Harvey (2018) and Richmond Fed (for the Duke University CFO survey); and Shiller Data and Consensus Economics (for objective expected return).

Notes: Surveys and CMAs refer to next-decade returns of the S&P 500. Objective expected return is a sum of the average of three expected real return proxies (see chapter 6 of this monograph) and the consensus forecast of next-decade inflation.

More recently, CFOs and economists turned more optimistic after the COVID-19 pandemic, whereas objective expected returns stayed flat given unchanged high equity valuations.[93] So, the adherence of subjective expectations to objective measures seems mixed, at best—perhaps because these measures turned out to be too conservative during the post-GFC roaring bull market.

The most compelling evidence of irrational expectations is found in equity analysts' earnings growth forecasts and retail investors' return forecasts. Equity analysts keep offering overly optimistic and extrapolative EPS growth forecasts (10% to 20% expected growth, when realized EPS growth has averaged 7%–8%, with procyclical peaks in 2000 and 2021). In earlier chapters, we summarized this evidence.[94] Here we simply add **Exhibit 7.4**, which illustrates both the overoptimism and the overextrapolation in a different way. Analyst consensus has a positive-sign slope to past growth, whereas reality has a negative-sign slope. The light blue circles illustrate opposite responses when past EPS growth has exceeded 10%.

Exhibit 7.4. Equity Analysts' Long-Term Forecasts Are Untroubled by the Evidence, December 1984–December 2024



Sources: AQR, Bloomberg, Citi, Credit Suisse, Hillenbrand and McCarthy (2024), I/B/E/S.

Notes: Analyst forecast for nominal three- to five-year earnings growth is compiled by I/B/E/S for stocks in the S&P 500 universe until 2009 and the Russell 1000 thereafter. Light blue circles denote observations for which past annualized EPS growth (of street earnings) exceeded 10%.

[93]Equity premia over bonds became compressed when real riskless rates rose from negative 1%–2% to positive 1%–2% between 2021 and 2024, whereas the US equity market valuation was unchanged. This math in objective expected return measures seems obvious to CMA providers but not to the surveyed CFOs or economists. The main rational explanation would be if their growth expectations rose more than discount rates. It is also possible that some respondents simply add a constant equity–bond premium over observable bond yields. (Maloney [2024] shows empirically that this approach is not a good idea.)

[94]See Exhibit 1.1 in chapter 1, Exhibit 3.2 in chapter 3, Exhibit 4.3 in chapter 4, and Exhibits 6.A1 and 6.A2 in the chapter 6 appendix.

Evidence on retail investors' return expectations is sporadic, but it is interesting to contrast surveys of long-run return expectations by Natixis (2025) and Vanguard (2025).

- Natixis documents classic overoptimism in its global surveys of individual investor long-term return expectations, which show average (real!) annual returns near 9% to 10% in 2014–2018 and 12% to 14% in 2019–2023, well above professional investor estimates. The US investor subset became even more optimistic in 2023, expecting a 15.6% real long-term return compared with a 12.8% global average and professional investor estimates in the high single digits. Later on, the US investor expectation fell in 2025 to 12.6% and the global expectation fell to 10.7%.
- Vanguard has polled its fund investors since 2017, and the evidence supports the notion of Vanguard investors being their own breed—either more knowledgeable or less excitable (take your pick) than other investors. Vanguard investors' 10-year return expectations for US stocks are in single digits. Yet even these have risen from 6.5% a year in 2017–2018 to nearly 8% in late 2024, while rising market valuations pointed the other way.

These patterns rhyme with investors embracing an ever-higher weight of US stocks in global portfolios despite ever-higher absolute and relative valuations (see chapter 2). Together, this information causes us to suspect that many investors are giving up on objective CMAs, which have implied underweights on US stocks. Extrapolating a past return advantage is even more appealing when it has worked for a while.

Explanations for Observed Expectations Formation Patterns

The evidence on predictable asset returns (over time or across stocks) led to academic debates about whether the main cause was a rational reward for risk or investor irrationality. Time-series predictability was rationally explained as time-varying risk premia—that is, investors demanding higher risk premia in bad times than good. For example, the Campbell and Cochrane (1999) model, with time-varying risk aversion, could explain the occurrence of countercyclical risk premia (high market valuations and low expected returns in 2000 and the opposite in 2009).

Survey evidence challenges this logic, however, when it shows that many investors have high subjective return expectations in good times (2000) and low subjective return expectations in bad times (2009). (As noted earlier, institutional investor expectations are more fully driven by empirical evidence about predictability and align with countercyclical required risk premia.)

Academics then proposed another rational answer: Growth expectations of rational learners may deviate from "full information" expectations because of fading memories or gradual structural changes (Nagel and Xu 2022, 2023; Farmer et al. 2024). These ideas could explain the growth optimism observed in 2000, even though it turned out to be unwarranted.

Although these rational explanations may play a role in explaining how investors actually form expectations, the empirically more compelling arguments come from behavioral finance.

Irrational overextrapolation of past growth or past returns seems to fit the survey evidence and can explain the classic cross-sectional value–growth anomaly.[95]

At the root of overextrapolation bias is the representativeness heuristic, our tendency to judge the likelihood of an occurrence by similarity to a mental stereotype.[96] This tendency leads us to overweight in our judgment memories that come to mind quickly. Bordalo et al. (2019) propose a "diagnostic expectations" model where probability judgments are formed with a representativeness bias. In this model, expectations contain a "kernel of truth" in that they exaggerate true features of reality; they move in the correct direction but by too much. Just as doctors overestimate the probability of sickness after a positive test result, leading to overdiagnosis and overtreatment, so too do investors overestimate the probability of a good future state when the current news is good.

The key implication is overreaction to news—that is, excessive extrapolation of recent outcomes (and eventual reversals of related expectation errors).[97] "Recent" can mean anything from minutes to years; current expectations may be estimated by assigning lower weights to more distant observations. Calibrations of survey-based growth or inflation expectations to past realizations suggest that multiyear memories matter. This idea fits the earlier finding that analyst growth expectations are related to past-decade growth, overshooting after a strong decade. For more, see Gennaioli and Shleifer (2018) and Bordalo et al. (2019, 2024).[98]

---

[95]Also see the review of academic debates in chapter 4. We focus here on interpreting the time variation in expected returns, whereas the academic literature focused more on the source of cross-sectional predictability patterns. A close parallel to our discussion is the decades-old Fama–French (1993) versus Lakonishok–Shleifer–Vishny (1994) debate on whether the value factor reflected a risk premium or irrational mispricing. Bordalo et al. (2019, 2024) provide evidence for the latter, with analysts overextrapolating past growth of single stocks (analysts use information about past performance but overreact by predicting too many Apples or Googles with extrapersistent growth). The Cochrane and Shleifer schools of thought in chapter 4 cover both the time-series and cross-sectional predictability angles.

[96]Tversky and Kahneman (1974) identified heuristics such as representativeness, availability, and anchoring as evolutionarily useful rules-of-thumb that deviate from rational Bayesian decision-making and mostly work well, but on occasion trip us.

[97]Selective memory recall is not only about recency, however. Overreactions might also be associated with salient easy-to-access news and extreme experiences (also on the downside, such as the Crash of 1987 or the GFC). Overweighting certain episodes is likely reinforced by familiarity (one's portfolio gyrations are more vivid than vicarious experiences; Japanese people recall the Nikkei boom and bust better than Americans do), perceived similarity to the current situation, and merely memorable stories.

[98]The diagnostic expectations model is mainly about extrapolating multiyear fundamentals and thus is relevant for the long-horizon focus of this book. In contrast, Greenwood and Shleifer (2014) and Barberis et al. (2018) are mainly about short-term return extrapolation, which is more relevant for bubbles and crashes where positive-feedback loops dominate (taking markets "too far," above or below fair values, leading to eventual reversals). Such positive-feedback dynamics are most common in the advanced stages of bull or bear markets, whereas the early stages are driven by true fundamental news in which underreaction to news is more common. Both features contribute to prevalent short-term momentum patterns (not our focus). Researchers keep trying to understand when overreactions and underreactions matter more as expectations errors (e.g., see Coibion and Gorodnichenko 2015; Gennaioli and Shleifer 2018). Our partial takeaway is this: stronger underreaction to less salient news and also stronger underreaction amid regime changes than within a regime.

Turning back to the diversity of expectation formation patterns, we highlight two recent working papers that drill into the contrasting mindsets of extrapolators and contrarians.[99]

- McCarthy and Hillenbrand's (2025) "Heterogeneous Beliefs and Stock Market Fluctuations": Stock prices aggregate the beliefs of different investors. The authors model a market with three investor types: extrapolators of past earnings growth (equity analysts), extrapolators of recent returns (individual investors), and rational somewhat-contrarian investors (CMA followers). Using the model to estimate the fraction of stock market investors holding each type of beliefs suggests that 42% of investors hold beliefs matching those of equity analysts and 25% hold beliefs as observed in individual investor return surveys. Only 33% of investors hold objectively rational beliefs. These three groups' cash flow expectations explain, respectively, 29%, 23%, and 13% of stock market fluctuations over time. Together with a common time-varying risk aversion feature (22%), these diverse beliefs explain 87% of stock market fluctuations.
- Andre et al.'s (2024) "Mental Models of the Stock Market": The authors write,

> Investors' return expectations are pivotal in stock markets, but the reasoning behind these expectations is not well understood. This paper studies economic agents' mental models—their subjective understanding—of the stock market by conducting surveys with the general population, retail investors, financial professionals, and academic experts. Respondents forecast and explain how future returns respond to stale news about the future earnings streams of companies. While academic experts view stale news as irrelevant, households and professionals often believe that stale good news leads to persistently higher expected future returns. Relatedly, academic experts refer to market efficiency to explain their forecasts, whereas households and many professionals directly equate higher future earnings with higher future returns, neglecting the offsetting effects of endogenous price adjustments. The latter respondents are unfamiliar with the concept of equilibrium pricing. We use panel data on household expectations to show that this neglect predicts previously documented belief anomalies such as return extrapolation and pro-cyclicality. (p. 1)

Bond investors may be more rational than equity investors, perhaps because the asset's expected return is better anchored by observable yields or because a less speculative asset class is less likely to inspire animal spirits. Chapters 8 and 9 cover rate expectations and inflation expectations, showing that "expert" expectations tend to be adaptive, broadly reflecting the past decade's experience in actual inflation and aligning with market estimates.

These expectations may turn out to be incorrect for a long time and look ex post irrational if we experience persistent surprises such as the decades-long inflation until 1981 and the subsequent decades-long disinflation. Recent research, however, can explain the repeated forecast errors as rational learning when economies experience gradual structural changes.[100]

---

[99]"Heterogeneous Beliefs and Stock Market Fluctuations" is summarized, and "Mental Models of the Stock Market" is directly quoted.

[100]Farmer et al. (2024) show that a rational Bayesian learner would have made similar forecast errors on interest rates as economists if he or she had been faced with a pernicious gradual structural change such as that which characterized recent decades. As opposed to the full-information rational-expectations assumption often made in economic models and econometric analyses (whereby observers have all relevant information and make the same rational predictions as the relevant economic theory), this analysis treats observers as boundedly rational without foresight on full-sample outcomes; instead they do their best as rational Bayesian learners of structural changes. For equity market applications, see Nagel and Xu (2022, 2023).

On the less rational front, individuals' inflation expectations have been higher than expert views, and surveys reveal interesting patterns across investors (age, gender, politics). The chapter appendix reviews some empirical highlights that take us away from our core themes.

Concluding Thoughts

Although surveys can be useful inputs for CMAs (objective expected return estimates), one must carefully consider which surveys fit this purpose. Economists' inflation forecasts are an easy yes, and analysts' growth forecasts are an easy no. Logically, the latter would be a natural real-time input for the earnings or dividend growth rate (G), but in practice, these forecasts are so badly distorted by analysts' overoptimism and overextrapolation biases that they could only be used as inverse predictors.

New research provides both empirical evidence and theoretical insight regarding different extrapolation versus contrarian tendencies across investor groups. Let's watch this space!

Appendix: Detour on Economic Survey Expectations

This section draws heavily on Bachmann et al.'s (2022) *Handbook of Economic Expectations*.[101] Although survey data are a valuable source of information for better understanding investor behavior, it would be wrong to uncritically use any survey-based expectations as inputs for market expectations.

We have touched on different expectations formation patterns across investor groups as well as on outside influences such as equity analyst incentives (which may bias their survey responses away from their true expectations). It is also clear that the best proxies of market expectations would be somehow "wealth-weighted" to represent the most relevant market participants. In this sense, it is comforting to see that the New York Fed's surveys on interest rate expectations find broadly similar consensus forecasts from primary dealers or market participants as are found in the typical economist surveys (see Bauer and Rudebusch 2019).

Following are some "fun results" (okay, perhaps fun is in the eye of the beholder) on inflation expectations and other economic concerns:

- Expert views on inflation have been quite well anchored to market expectations (e.g., inflation swap rates) and on central bank projections. Consumer responses can deviate a lot from these expert views, however, and apparently in quite systematic ways. Consumers tend to expect higher inflation than the typical expert's expectation of 2% to 3%. A clear gender pattern also exists: On average, women predict 0.5% higher inflation than men. This bias has been traced back to the fact that despite some gender role shifts over many decades, women still do more of the grocery shopping than men, and seeing repeated price changes raises inflation expectations (see D'Acunto et al. 2022).

[101]The handbook covers many aspects of expectations. We highlight asset-class-focused chapters on equities (Adam and Nagel 2022), rates (Crump et al. 2022), and housing (Kuchler et al. 2023), as well as one on inflation (D'Acunto et al. 2022).

- Age matters for inflation expectations, but the sign of the error or misunderstanding depends on the inflation experience of each cohort. In many contexts, the evidence suggests that our lifetime experience influences our expectations. Pioneering studies by Malmendier and Nagel (2011, 2016) showed that so-called Depression babies (whose formative years fell during the Great Depression) tended to be frugal and conservative throughout their lifetime, with lower equity market allocations. Turning to inflation, the cohorts that lived through the 1970s and 1980s inflationary period had higher inflation expectations, even in the 2010s, than did their children born in the 1990s who grew up in a low-inflation environment. Notice that such wedges are found at a given point in time for cohorts of different age.[102] Such lifetime memories matter even among experts: A similar pattern is found in the hawkishness of Fed monetary policy voting behavior between older and younger cohorts (see Malmendier and Nagel 2016).
- Politics also matters. US inflation expectations and broader economic sentiment vary predictably depending on whether "your side" (a Democrat or a Republican) is in the White House. When the "other side" is in power, individuals expect the economy to do worse (including higher inflation). The observed sign-flips around presidential turnover events are eye-catching and have increased over time, a depressing sign of growing political polarization in the United States (see Mian et al. 2023).
- Education matters. Very broad surveys are democratic but may have little market relevance. When many respondents assume that the Fed's inflation target is above 10% (the most common answer is the better "I don't know"), financial literacy is clearly low. On average, inflation expectations are inversely related to education level (see Coibion et al. 2020; D'Acunto et al. 2022).
- Last, on a slightly different topic, we must be grateful for the overoptimism and overconfidence among our entrepreneurs, a key ingredient in US exceptionalism. When entrepreneurs launching a new business are asked to assess the likelihood of business failure for any firm in similar circumstances, they are way more optimistic than objective facts would suggest. And when they are asked about their own chances compared with that generic firm, their perceived odds of success are even higher (see Hyytinen and Pajarinen 2008). It seems likely that people extrapolate salient success stories rather than true averages.

[102]Strong enough personal memories last beyond one lifetime in collective memory. Braggion et al. (2025) show that German households living in regions that experienced worse hyperinflation in the 1920s still expect higher inflation today, a century later.

CHAPTER 8. BOND MARKET FOCUS: UNDERSTANDING TREASURY YIELDS WITH SURVEY DATA

Chapter Summary

Survey data help us decompose the Treasury yield into three parts: inflation expectations, real rate expectations, and required bond risk premia. All three key drivers fell sharply from the early 1980s to the early 2020s. The latter two have since risen from negative to positive levels. Inflation expectations have remained well anchored, but this benign situation faces substantial risks amid today's policy challenges.

Introduction

Although investors' main focus tends to be on equity markets, government bonds are at the heart of monetary policy and the basis for pricing riskier assets, given their perceived status as riskless assets. Indeed, the US 10-year Treasury is sometimes called the most important asset in the world. We now turn to understanding government bond markets, starting with the key determinants of the 10-year Treasury yield. The most common decomposition is to split the 10-year yield into the short rate and yield curve slope. We will cover the slope in chapter 9, including the evidence on its predictive abilities. In this chapter, we focus on the bond yield level.

Government bond yields can be decomposed in many ways. Subtract the short rate, and we get the term spread or slope. Subtract expected average inflation over the life of the bond, and we get the real bond yield. Subtract the expected average short rate over the life of the bond, and we get the required term premium (or bond risk premium, BRP).[103]

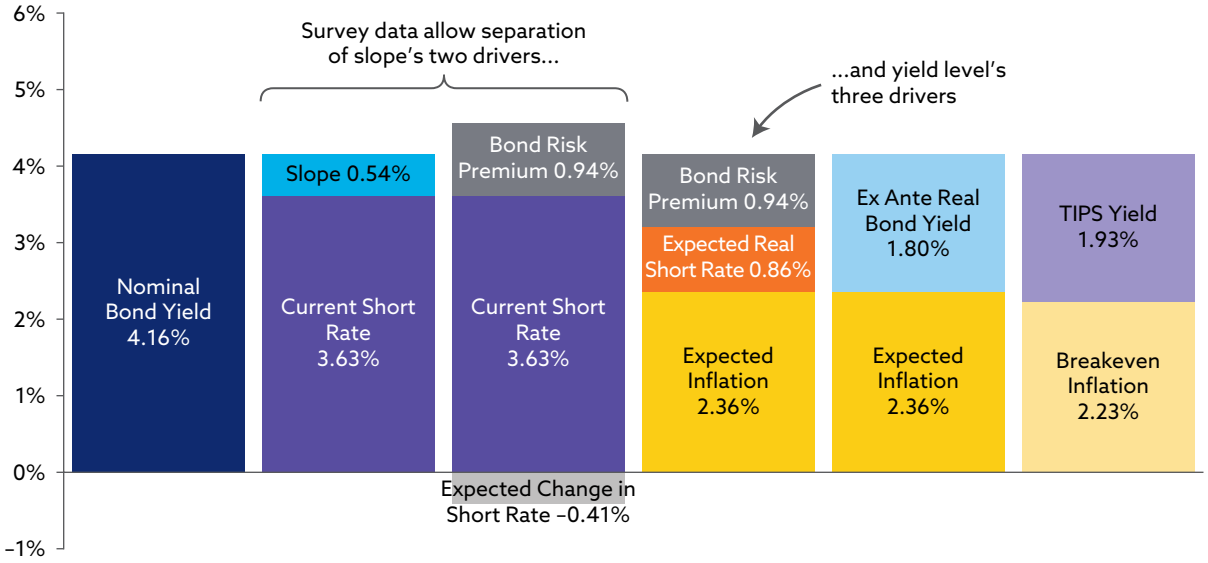
Exhibit 8.1 shows all of these decompositions for the US 10-year Treasury yield at the end of 2025, based on both survey and market data. We see that the slope of 54 bps results from two offsetting components: expected rate cuts and a positive BRP. Some components have survey and market estimates. These estimates can diverge for various reasons, but both measures of inflation expectations are near 2.3% at the end of 2025.[104]

[103]The decomposition is approximate because we ignore convexity and credit risk effects, but it captures the key elements of government bond yield behavior. For details, see Best et al. (1998) and Ilmanen (2011, chap. 9).

[104]One criticism of survey-based rate estimates is that economists may not be representative of the market. So it is comforting that the New York Fed has been running two practitioner surveys since 2013–2014, finding no systematic differences of opinion between economists' and investors' or primary dealers' rate forecasts. These survey-based expectations also move closely with model-based rate expectations (and resulting BRP) run by Fed researchers. The Kim and Wright (2005) and Adrian et al. (2013) term structure models' estimates are updated regularly on Fed websites: Term premium estimates were 0.57% and 0.77%, respectively, as of December 2025. These models presume mean-reverting rate expectations, although their estimate of the target mean may include some hindsight.

© 2026 CFA Institute Research Foundation. All rights reserved.

Exhibit 8.1. Decomposing the 10-Year Treasury Yield Using Survey Data as of 31 December 2025



Sources: Bloomberg, Consensus Economics, and AQR.

Note: All data are for 10-year maturity or averaged over a 10-year horizon, except the short rate, which is the three-month T-bill.

Arguably, we gain the best understanding by decomposing the bond yield into three parts: expected average inflation, the expected average real short rate, and the BRP (the fourth column of Exhibit 8.1). This division will be our focus.

The Yield as a Sum of Parts

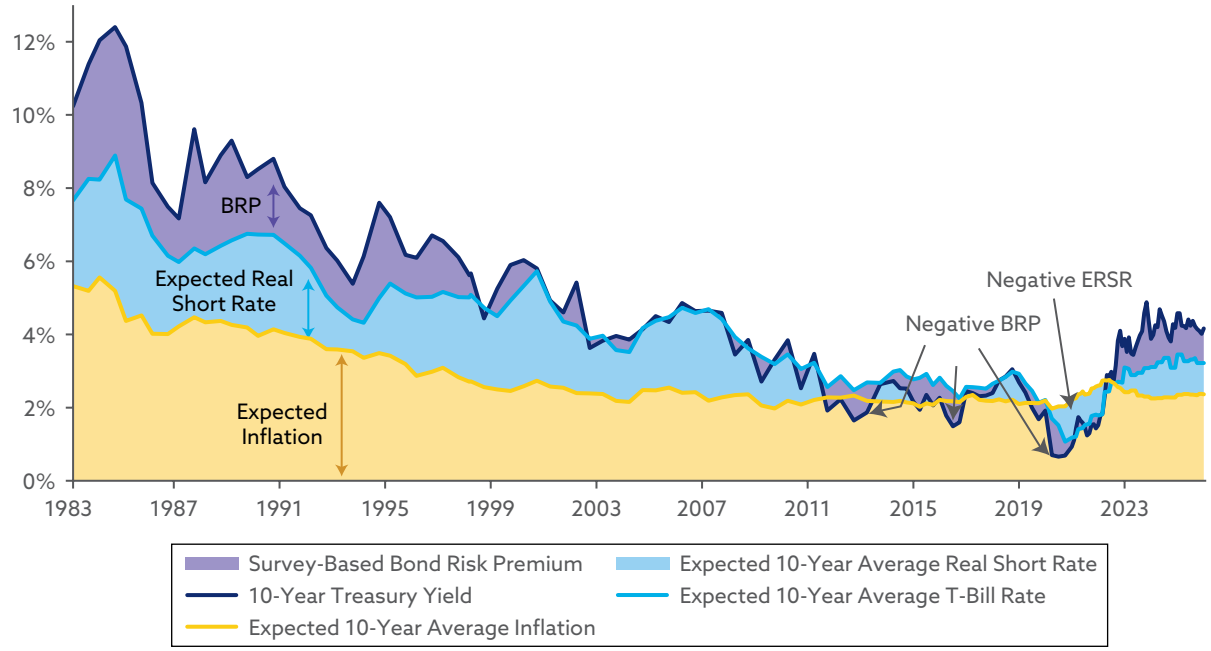
Exhibit 8.2 shows the key three-part decomposition since 1983, stacking the components to give the 10-year yield.[105] **Exhibit 8.3** plots them individually.[106] All three components contributed to the decline in Treasury yields over four decades, but they fell at different times:

- Inflation expectations fell mainly during the first two decades, from near 5% in the early 1980s to below 3% in 1998. They have since been stable in the 2%–3% range.

[105]Because of survey data availability, this history covers only the multidecade yield decline since the early 1980s, and it thus misses the preceding rising-yield decades. The decomposition relies on Treasury yields and economist rate surveys published in Blue Chip Economic Indicators and Consensus Forecasts. Other data suggest that all three component series display a mountain shape since the 1950s, peaking in the early 1980s (see Ilmanen 2011, 2022). Longer evidence based on the Livingston survey's short-term forecasts of short-dated Treasury-bill rates goes back to the mid-1900s, while decade-ahead inflation and Treasury-bill rate surveys have been available since 1978 and 1983, respectively. Market-based decompositions became possible only after inflation-linked TIPS were issued in 1997. Outside the United States, comparable survey datasets are shorter, starting in 1990 for inflation expectations and 2016 for short rates.

[106]Readers wanting to see even longer yield histories than four decades should refer to chapter 3. Exhibits 3.5 and 3.6 display evidence of centuries of falling real yields—although we argue that this downtrend may have reached its natural limits.

Exhibit 8.2. Decomposing the 10-Year Treasury Yield Using Survey Data, January 1983–December 2025



Sources: AQR, FRED database (St. Louis Fed), Blue Chip Economic Indicators, and Consensus Economics.

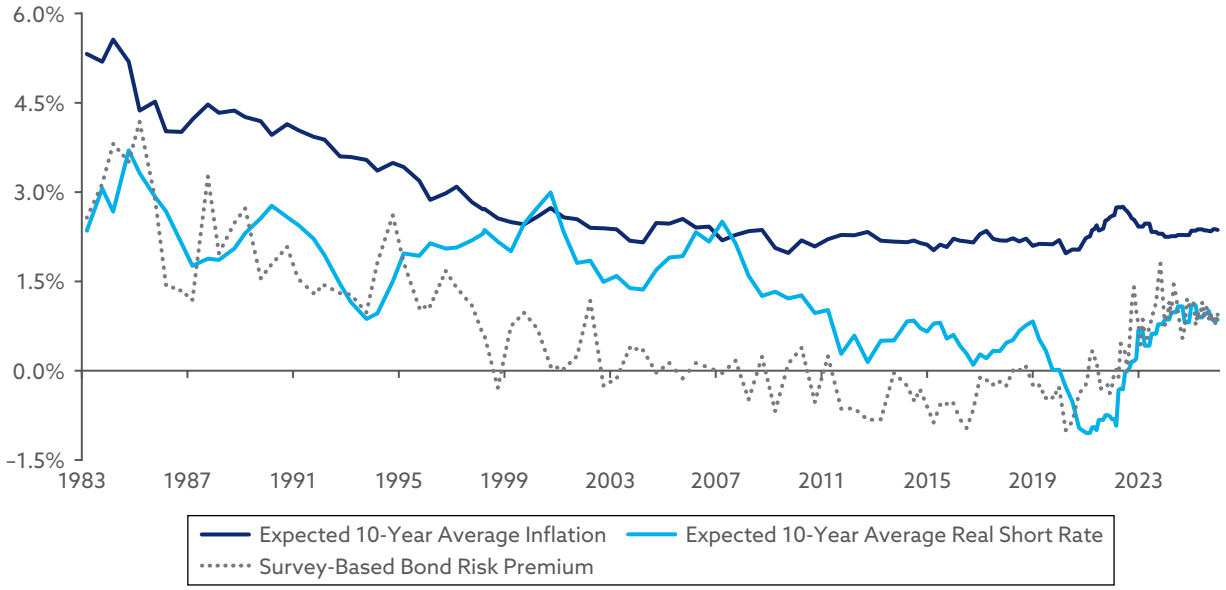
Notes: Data are as of 31 December 2025. In addition to the actual 10-year Treasury yield, the chart includes consensus forecasts of the next-decade average three-month Treasury-bill rate and the consumer price inflation rate.

- The expected real short rate fell mainly during the last two decades, from 2%–3% in the early sample to below 1% in 2010 (after the Global Financial Crisis and the zero-rate policy and quantitative easing in its aftermath) and below 0% in 2020 (during the COVID-19 pandemic). This series is a good proxy for so-called R^*, the neutral real policy rate.
- The required bond risk premium fell the most gradually, from near 3% in the early sample to below 1% in the late 1990s and to negative levels for much of the 2010s. Ilmanen (2011, 2022) suggests that a loosely level-dependent inflation uncertainty premium was the key reason for the BRP fall in the 1990s, whereas the fall to negative levels reflects some mix of bonds' improved safe-haven role (negative stock–bond correlation since 2000) and the Fed's bond purchases (quantitative easing).

The 10-year yield and all three of its components reached multidecade record lows in 2020–2021. US inflation then rose to 9% in mid-2022, for reasons that are still debated, before falling back to near 3% a year later. Long-run inflation expectations remained quite well anchored through this episode, however, presumably thanks to the Fed's credibility.

As of this writing in 2025, economist surveys and markets ("breakeven inflation" or the difference between nominal and inflation-linked Treasury yields) seem quite complacent to us.

Exhibit 8.3. The Three Components of the 10-Year Treasury Yield, January 1983–December 2025



Sources: AQR, FRED database (St. Louis Fed), Blue Chip Economic Indicators, and Consensus Economics.

Note: Data are as of 31 December 2025.

Consumers' inflation expectations have risen well above economists' expectations, even more than normally.[107]

Although economists' long-run inflation expectations did not move much in recent years, the 10-year Treasury yield rose from its 0.7% trough in 2020 to above 4% during much of 2023–2025. This rise reflects both higher real policy rate expectations and required bond risk premia. Both series rose from negative levels in 2021 to positive 1% or higher levels. These increases reflect economist perceptions of a higher neutral or natural interest rate, R^* (given no recession despite tighter monetary policy), and investor requirements of a higher BRP (given the stock–bond correlation's switch from negative to positive as well as widening concerns about lax fiscal policy).

The danger of deanchored inflation expectations seemed (to us) acute in 2025, when the Fed's independence was being challenged (aggressive calls for rate cuts and threats of firing Fed personnel), coinciding with loose fiscal policies and unprecedented tariff policies. The current Trump administration seems to enjoy playing with fire, as rising inflation expectations could have a triple-whammy impact on long Treasury yields. Beyond the direct impact through

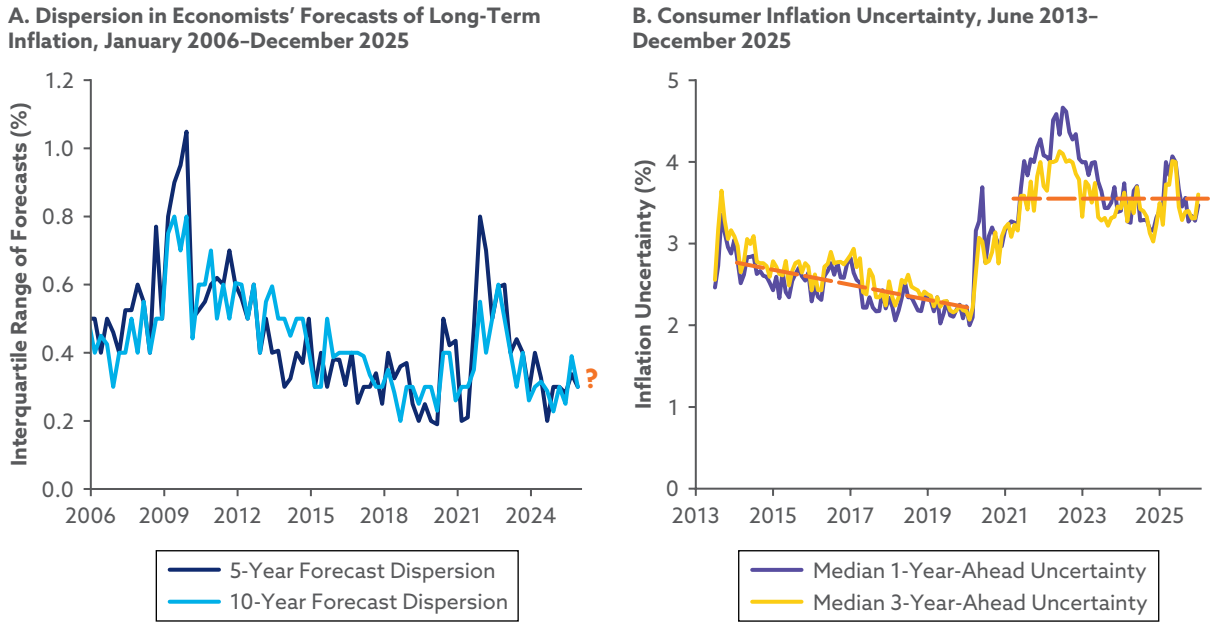
[107]We use economists' long-term inflation expectations throughout this book to convert between nominal and real expectations of prospective asset returns. It is thus useful that these expectations appear broadly rational. (In contrast, the chapter 7 appendix presents evidence of consumers' less rational expectations, and elsewhere in that chapter we highlight the possibility of money illusion in equity investors' return expectations.)

inflation expectations, the level-dependent inflation uncertainty premium would presumably rise. Our research on stock–bond correlation shows that rising inflation uncertainty would likely push this correlation higher, hurting Treasuries' role as safe-haven assets.[108] These outcomes would be harmful to all risky assets: What happens in Treasuries does not stay in Treasuries.

This dangerous predicament is not fully apparent in survey data of inflation uncertainty, as **Exhibit 8.4** illustrates. Economists' forecasts became dispersed in 2022 but returned to close agreement by 2024, seeing only a small uptick in summer 2025 (Panel A). In contrast, consumer uncertainty remained elevated in the years following the 2022 inflation shock (Panel B).

Survey datasets are increasingly available for other major markets. **Exhibit 8.5** shows the same three-part decomposition as the earlier exhibits for seven major government bond markets. The survey data make clear that the large yield rises since 2021 have been driven by rising expected real short rates and bond risk premia, not by higher long-term inflation expectations (except in Japan).

Exhibit 8.4. Tracking Inflation Uncertainty with Survey Data

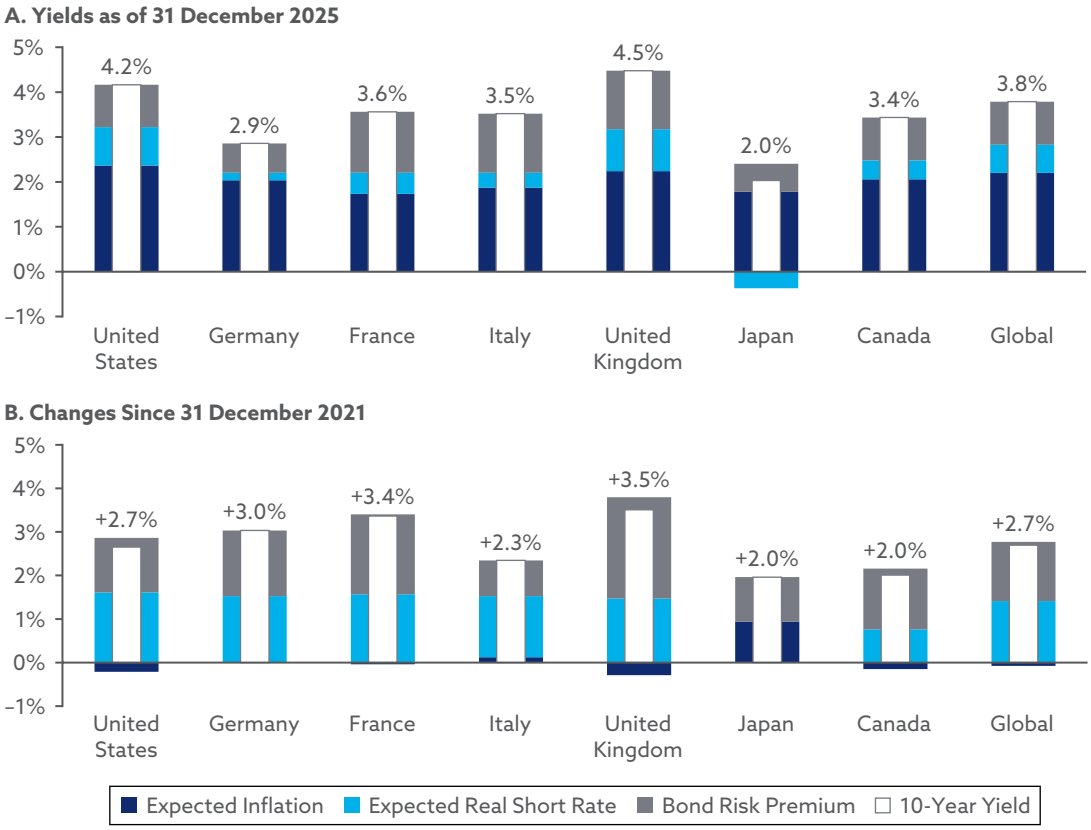


Sources: Federal Reserve Banks of Philadelphia and New York.

Notes: Panel A shows dispersion among participants in the Survey of Professional Forecasters. Panel B shows an estimated interquartile range based on probabilities assigned by participants to different inflation outcomes, from the Survey of Consumer Expectations.

[108]See Brixton et al. (2023).

Exhibit 8.5. Decomposing Global Bond Yields



Sources: Bloomberg, Consensus Economics, and AQR.

Notes: All data are for 10-year maturity or averaged over a 10-year horizon. Global is a GDP-weighted average of the seven countries shown.

Concluding Thoughts

Survey-based decompositions of the 10-year Treasury yield over time help us better understand the sources of bond yield variations, including the multidecade decline since the 1980s and the sharp rise since 2021. In light of the ongoing challenges to Fed independence and credibility, inflation expectations at the time of this writing (2025) seem complacent to us, while real Treasury yields seem more fairly priced. The impact of the rise in real yields since 2021 on real long-term assets, such as public and private equities, has been surprisingly muted, however.

CHAPTER 9. BOND MARKET FOCUS: YIELD CURVES AND MEAN-REVERTING RATE EXPECTATIONS

Chapter Summary

Unlike in equity markets, in which investors and analysts tend to extrapolate returns even at long horizons, in bond markets, investors and economists exhibit mean-reverting rate expectations. A decades-long debate explores whether the evolving yield curve shape mainly reflects the market's rate expectations or time-varying term premia. The answer is shifting toward rate expectations, even if those expectations were wrong for decades, predicting rising rates that did not materialize. The new debate focuses on whether those rate expectations were irrational or if they reflected rational learning when investors faced repeated one-way surprises.

Introduction

In chapter 8, we turned from equity markets to a bond market focus and drilled into the key determinants of 10-year Treasury yields with the help of survey data. In this chapter, we focus on the determinants of the yield curve. Yield curve steepness or slope is often proxied by the yield difference between the 10-year Treasury and a short-term (say, three-month) T-bill.

The yield curve (YC) reflects some mix of (1) the market's expectations of future changes in interest rates and (2) required term premia (also called bond risk premia, duration premia, or maturity premia). The YC is steep if the market expects rising short-term rates or requires a large amount of compensation for bearing interest rate risk. The YC is inverted if the market expects rate declines or is prepared to pay a negative term premium (e.g., because long bonds are exceptional safe-haven assets or are required to match pension funds' long-duration liabilities). In practice, the YC tends to be upward sloping, but its slope varies over time and is sometimes inverted for prolonged periods.

Investors and academics have long debated and tried to estimate how much the YC reflects rate expectations versus term premia. The mix likely varies over time, but for decades, central bankers and investors spoke as if the YC was driven only by rate expectations (the pure expectations hypothesis). Yet, empirical research in the 1980s and afterward suggested that the evolving YC shape reflects time-varying term premia (which would imply random-walk rate expectations and thus unchanged rates as the base case).

The latter conclusion deserves a reassessment. Survey data give us direct estimates of interest rate expectations, and survey predictions can differ meaningfully from a forecast of no change in rates. Notably, a consensus of economists incorrectly predicted rising rates through several decades of falling rates, starting in the early 1980s and continuing through the zero-rate era of the 2010s. These persistent forecast errors look foolish in hindsight but were not exclusive to economists: The market (YC shape) and some investor surveys made similar errors. These forecast errors in turn boosted the YC's ability to predict future bond returns; such predictability was not caused only by time-varying required term premia.

© 2026 CFA Institute Research Foundation. All rights reserved.

We will provide evidence that the time variation in the slope and sign of the YC is largely explained by mean-reverting rate expectations: a steep YC amid low short rates (say, the 2010s) and an inverted YC amid high short rates (say, 2023). The expectations were often correct in capturing predictably countercyclical monetary policy, but they missed the secular decline in rates.

The next question is whether the forecasters were irrational or, instead, whether they can be partly excused by the abnormality of truly surprising rate declines, one decade after another. Ilmanen suggested this interpretation in prior work (Ilmanen 2011, 2022), and new academic research confirms that a rational Bayesian learner would have made similar forecasts (and errors). We conclude by arguing that although both equity and bond investors have made persistent forecast errors in recent decades, it seems likely that the former errors will continue while the latter will not.

We have highlighted the extrapolative nature of equity investors' and analysts' return and growth expectations, and chapter 3 contrasted this pattern with the contrarian nature of mean-reverting rate expectations in bonds.[109] In this chapter, we explore the latter story, while enhancing our understanding of the key drivers of YC steepness. In contrast, in chapter 8, we described our best understanding of the yield level's drivers by decomposing yields with the help of survey data (separation of rate expectations and required term premia, as well as separation of inflation and real rate expectations).

What Drives the Yield Curve? Alternative Theories

The appendix to this chapter covers some simple bond math relating to bond yields and yield curves. The crux of it is that the yield curve reflects the market's rate expectations and required bond risk premia, and a decades-long debate continues about how much each factor contributes. So which of the two components has a larger influence on the YC shape? To interpret the YC, one can usefully contrast two hypotheses:

- The classic pure expectations hypothesis (PEH) makes the extreme assumption that bond risk premia are zero. It is consistent with the idea of investors' risk-neutrality. One can then virtually read the market's rate expectations off the YC. According to the PEH, a particularly steep YC indicates that the market expects short rates and bond yields to rise sharply (to exactly offset longer bonds' initial yield advantage; thus, all bond investments have the same expected return).
- The random-walk hypothesis makes the opposite extreme assumption: An upward-sloping yield curve reflects only required compensation for bearing duration risk and contains no information about the market's rate expectations. It implies that rates of any given maturity follow a random walk.

Empirical Evidence on the Yield Curve's Predictive Ability

Because both the market's rate expectations and required risk premia are unobservable, economists have long debated the relative importance of the two components. For decades,

[109]We proposed salience as a key reason for this difference in expectations formation patterns across the two asset classes. Bonds are quoted in yields, making a forward-looking and mildly contrarian mindset more natural, whereas stocks are quoted in prices and mainly discussed in terms of realized returns, making an extrapolative rearview-mirror mindset more natural.

investors and central bankers seemed to take the PEH as a given, equating the YC shape with the market's rate expectations, despite accumulating contrary evidence. Yet, when empirical studies in the 1980s (e.g., Fama and Bliss 1987) ran direct comparisons between the two hypotheses, the results were clearly in favor of the random walk: An upward-sloping YC predicts high future excess bond returns rather than rising yields.[110]

Empirical patterns may have weakened over time, but newer analysis confirms that the YC predicts near-term excess bond returns rather than near-term bond yield changes. The YC has a positive correlation with the former and a negative correlation with the latter.[111] Although the YC is a poor forecaster of near-term changes in long-dated yields (the wrong sign for the PEH!), it is better at forecasting gradual changes in short rates over multiyear horizons (more in line with the PEH), as shown by Campbell and Shiller (1991).

Evidence of return predictability in other asset classes reinforced the idea that the YC predicts excess bond returns. It was just one of the positive-carry strategies that seemed to work in the long run, providing consistent evidence against risk-neutral models that assumed initial yield advantages would be offset by changing fundamentals or capital losses.[112]

Given all this evidence, the academic consensus gradually shifted away from the PEH and toward time-varying risk premia. The pendulum probably shifted too far.[113] We argue that mean-reverting rate expectations have a greater role to play in YC behavior than the academic consensus appreciates, and we observe signs of that consensus changing.

Challenges

The challenges came from many directions:

- When survey data made it possible to obtain a cleaner proxy of the BRP, it became apparent that the YC is a poor proxy for the long-run BRP, despite its near-term return prediction ability (see Best et al. 1998; Kim and Wright 2005; and Ilmanen 2011). The survey-based BRP's postwar evolution, shown in Exhibits 8.2 and 8.3 in chapter 8, shares broadly the mountain shape of bond yields (see the three-month and 10-year yields in **Exhibit 9.1**): a secular rise up to the early 1980s, followed by a subsequent secular fall. The mountain shape is

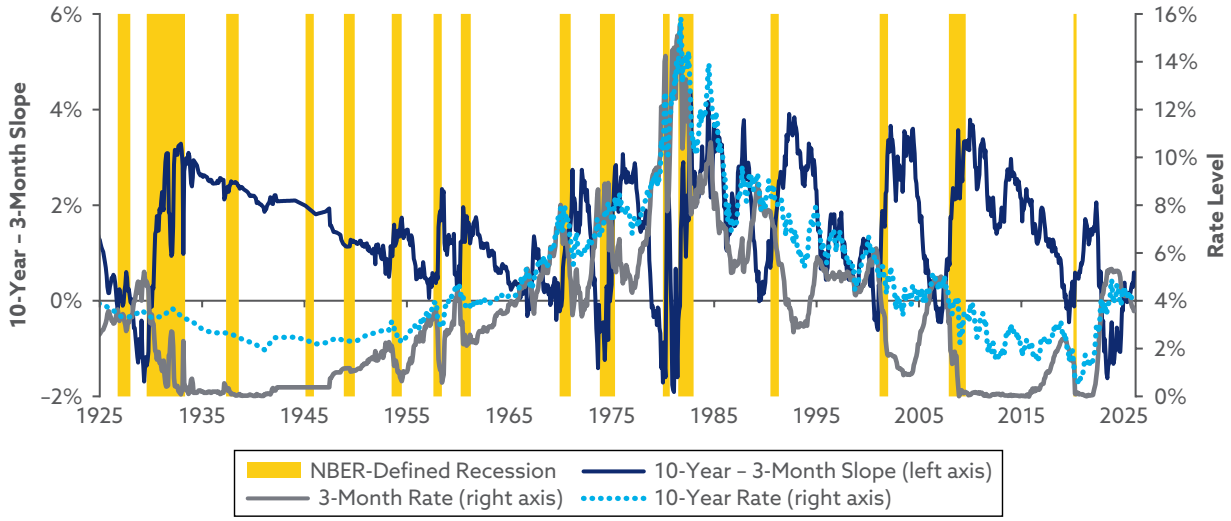
[110]Macaulay (1938) found, as long ago as the pre–World War II era, that capital losses resulting from increases in bond yield do not seem to offset an initial yield advantage when YCs are upward sloping. Instead, capital gains tend to augment it through yield declines. Fama and Bliss (1987) confirmed this finding with postwar data.

[111]See Ilmanen (2011, chaps. 9 and 22). A review shows that the rolling decadal correlation between the YC and the near-term excess bond return was pretty consistently positive over the past century. The two exceptions were after sharp bond bear markets in 1958–1959 and 2021–2022, each of which began when the YC was very steep.

[112]The best-known parallel was the Uncovered Interest Parity hypothesis in foreign exchange markets, which assumed that currency depreciation would offset any initial short-rate (carry) advantage across countries. Empirical evidence in currency and bond markets and broader evidence of carry strategies' long-run profitability was consistent with positive carry predicting future excess returns rather than being offset by predicted rate or fundamental changes. It was debated, though, whether the cause was rationally time-varying risk premia or irrational biased expectations. See Cochrane (2011), Ilmanen (2011, chaps. 13 and 22), and Koijen et al. (2018).

[113]The same evidence guided us a decade ago to use so-called rolling yields for bonds in our capital market assumptions, effectively assuming unchanged (random-walk) yield curves, which gives long bonds carry and rolldown advantage amid upward-sloping yield curves. We may revisit this choice and give some weight to PEH by using a rolldown return that is partial at most. For our cash assumptions for the next decade, we include a mix of a random-walk assumption and the PEH, recently adding survey-based forecasts as a third input.

Exhibit 9.1. US Yield Curve History, with Its Two Components, January 1925–December 2025



Sources: AQR, National Bureau of Economic Research (NBER), and the St. Louis Fed (FRED database).

apparently related to the level of inflation expectations, level-related inflation uncertainty, and the resulting inflation risk premium.[114] In contrast, the YC has not exhibited any secular uptrend or downtrend but rather has displayed lots of cyclical variation between −2% and +4%. Worse, the YC was deeply inverted when inflation uncertainty and the survey-based BRP peaked in the early 1980s. Conversely, the YC was steep in the 2010s when the survey-based BRP was negative.

- Although the YC kept predicting future bond returns reasonably well until 2022, many other carry strategies disappointed during and after the Global Financial Crisis (GFC), which weakened the broad supportive evidence.
- Academic researchers came up with rational learning models that were effective at explaining why forecast errors in rate direction had been so persistent: truly unpredictable structural changes. This analysis suggests that the YC's ability to predict future bond returns had been boosted by these forecast errors and that we have little reason to assume continued systematic errors. We should still expect the YC to predict bond returns but not as well as in the past.

The Role of Mean-Reverting Rate Expectations

Exhibit 9.1 showed that the US YC has tended to be upward sloping—that is, positive. The past-century average YC slope is 1.4%, likely reflecting a positive average bond risk premium

[114]See Ilmanen (2011, chap. 9) and chapter 8 of this book.

(term premium). YC inversions have been rare but famously predictive of forthcoming recessions, probably indicative of tight Fed monetary policy intended to battle high inflation.[115]

Markets and economists have been pretty good at predicting short-rate moves related to monetary policy cycles. In contrast, they have been less able to predict the secular uptrend and downtrend in yields. The YC was not particularly steep during the rising-rate decades (1945–1981, average YC steepness 1.0%) nor particularly flat during the falling-rate decades (1982–2021, average steepness 1.8%). If anything, the curve predictions were opposite to these long-run yield trends.

In the 2010s, so-called hair charts became a popular way to visualize the forecasting failure of both economists and markets when it came to the direction of rates. Exhibit 3.1 in chapter 3 showed both 10-year yields and three-month rates falling to ever-lower levels in the 1990s and 2000s and then staying near zero in the 2010s until 2021, while economists' consensus forecasts continued to predict rising rates. Being so persistently wrong in forecasts led to questions such as, "How could they be so dumb?"

We will now show that market-based forecasts (inferred from the forward rate path implied by the YC) were no smarter than those from economists. We will also offer a sympathetic explanation of what drove these expectations, however, and why they may have been rational at the time the forecasts were made.

Exhibit 9.2 shows the hair chart history of the one-year US Treasury yield and its forward ("expected") paths at each midyear.[116] The prevalence of rising hairs is evident even during the falling-rate decades. When we mark in gray the rare exceptions when the hairs are inverted (falling), however, it becomes apparent that such inversions occur only when the one-year rate is abnormally high compared with the recent past. Those inversions were typically followed by a falling one-year rate. Thus, the forward paths are not such bad rate predictors after all.

It appears that the variation in YC slope over time mainly reflects mean-reverting rate expectations (plus a relatively stable term premium, which gives the YC and the hairs their typical upward slope). This result is very different from the Fama and Bliss (1987) finding that variation in the YC shape over time reflects time-varying term premia, which became academic conventional wisdom in recent decades.

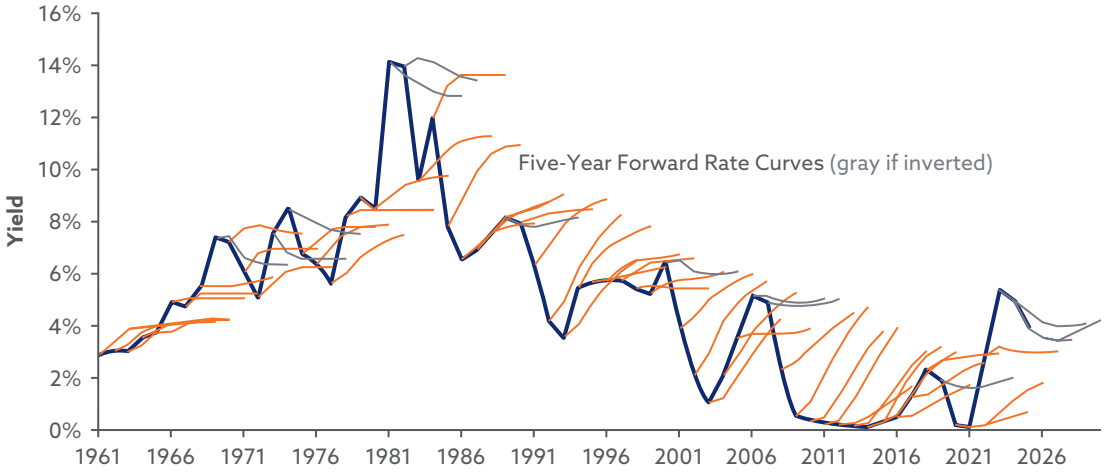
Eyeballing the hairs in Exhibit 9.2 hints at a further human pattern. All investors are sometimes humbled by the markets, and such humbling can reduce our (over)confidence. Instead of seeing particularly strong mean-reversion forecasts in 1981 (which would have been correct), we see only mildly lower rate predictions from the 1981–1982 double-digit rate levels and even a

---

[115]The lead time between YC inversion and a subsequent recession has been increasing in recent decades. The latest inversion began in late 2022, and no US recession has appeared as of late 2026. Before the 2020s, the only false alarm since the 1950s was 1966, when YC inversion was followed by a mere slowdown as Vietnam War–related fiscal expansion supported economic growth. See AQR Portfolio Solutions Group (2019) for further discussion.

[116]This chart is personal for Ilmanen, and not only because I have tried to understand the yield curve for several decades. Conveniently, the Fed regularly updates the daily spot rate histories and breakeven forward rate paths of many maturities based on the Gürkaynak et al. (2007) study. The sample period happens to cover my lifetime, and I chose midyear forward paths to start each year on my birthday—displaying more frequent "hairs" (forward paths) would make the chart very messy. Recall that the forward paths reflect market expectation of future short rates if we assume there are no term premia. Thus, the forward paths closely follow the YC shape; if the 5Y–1Y slope is positive, the hair slopes upward.

Exhibit 9.2. A Big Mistake? Hair Chart of One-Year Treasury Yield and Its Five-Year Forward Rate Paths Each Year, 30 June 1961 to 30 June 2025



Source: Gürkaynak et al. (2007).

predicted rise from 1984. Having been humbled in the 1970s by failing to forecast the huge rise in rates, investors no longer made mean-reversion forecasts as confidently as before.

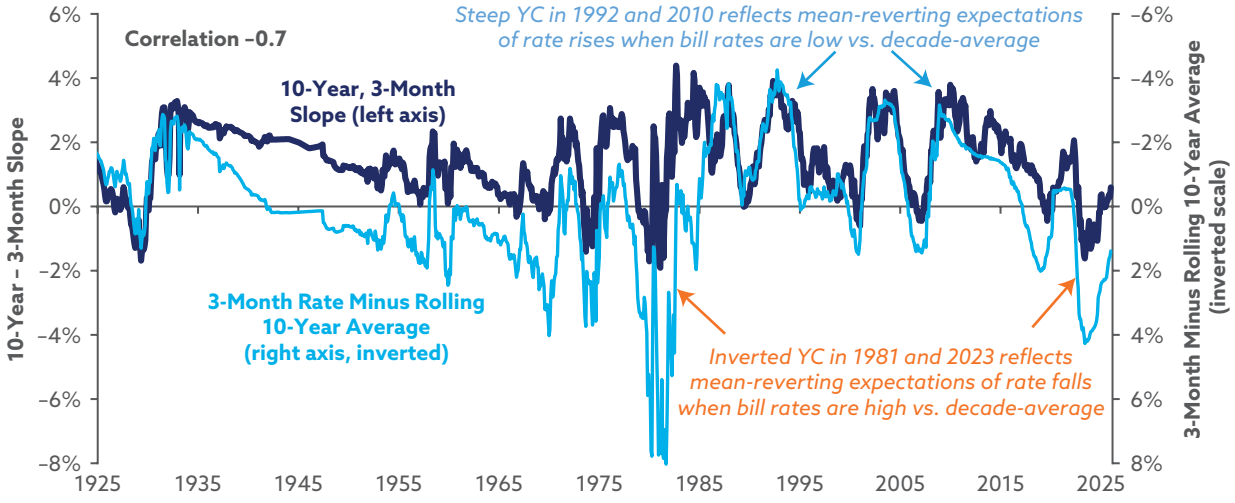
Something similar happened in 2020–2021. Rates were at record lows, yet investors' mean-reversion expectations (that rates would rise) were muted by their humbling experience with past predictions of rising rates. Even our expectations formation on long-run returns seems to care too much about "what have you done for me lately."

Exhibit 9.3 tells the same story in a different way. It plots the YC with a detrended short-term rate (the latter on the right-hand axis with an inverted scale). The close co-movement is visually impressive. It also explains why the yield curve was inverted in 2022–2024: People expected normalization toward the near-zero rates of the 2010s, because our most salient memories are for the immediate past decade. Just as an inverted YC is typical when short rates are elevated relative to recent history, an abnormally steep YC (as in the early 2010s) is typical when short rates are abnormally low relative to recent history.[117]

This evidence strongly suggests that the evolution of the YC over time mainly reflects mean-reverting rate expectations. The mean, however, has not been constant over time. It shifted gradually higher for decades until 1981 and then shifted gradually lower, reflecting secular trends in both expected inflation and expected real rates (as discussed in chapter 8). As noted in chapter 3, survey-based economist forecasts show patterns similar to those for market

[117]The chart shows a negative correlation (−0.7) between the two series. We can also sort the detrended short rate series into five quintiles ranging from −2.6% to +2.6%. The average YCs for these quintiles are 2.7%, 1.7%, 1.6%, 1.0%, and 0.2%.

Exhibit 9.3. Mean-Reverting Rate Expectations Drive Yield Curve Evolution, January 1925–December 2025



Source: St. Louis Fed (FRED database) and AQR.

forward rates, and these patterns apply to both short rates and long yields. Further analysis (not shown here) suggests that mean reversion is stronger in real rate expectations than in inflation expectations.

Mean-Reverting Expectations Turned Out Wrong, Ex Post

So, mean-reverting rate expectations are good at explaining how bond investors form their expectations. We will soon return to the subject of this pattern being very different from extrapolative equity return expectations. But first we will address the question, "How could they get it so wrong for so long?" Both economists' and the market's predictions of rate rises (back toward past norms) were persistently wrong from the 1980s to 2021. The anticipated mean reversion did not materialize until 2022.

Some academics ignored survey data and were impressed by the YC's ability to predict near-term bond returns. These academics accepted this apparent ability as evidence of rationally time-varying required term premia.

Once academics turned to survey-based rate expectations, however, the persistence of forecast errors became clear. Both survey and market forecasts overpredicted short rates for multiple decades, after having systematically underpredicted them before the 1980s. The initial interpretation was some form of irrationality in expectations. The most recent research, however, points to a more sympathetic explanation: Rational learning about slow structural shifts, which rates were experiencing during these decades, is really hard.

The return predictability regressions that suggested that the YC predicts bond returns in response to time-varying term premia rely on the so-called FIRE (full information and rational expectations) assumption. The full information assumption can embed substantial hindsight. In this case, the hindsight was about the interest rate process and the gradual shift in the rate mean—first higher until 1981 and then lower. In real time, however, investors and econometricians hardly recognized this shift. It, of course, would have been valuable information at the time, yet such knowledge acquired only in hindsight is presumed to be part of "full information."

A new line of research introduces more realism, recognizing that investors and econometricians face incomplete information about the rates process and therefore must gradually learn about any changes. Gradual structural changes in an unobservable series, such as the long-run target mean of inflation or real rates, are particularly pernicious. A recent study by Farmer et al. (2024) shows that a Bayesian rational learner could have made exactly the kind of forecasts (and persistent forecast errors) described earlier and would have learned only very slowly about the gradually shifting rate level. The observed forecast errors are thus not a sign of irrational expectations but of the exceptionally persistent one-way surprises that seem almost perfectly designed to put forecasters on the wrong foot and make them look foolish with hindsight.[118]

Contrasting Bond and Equity Return Expectations Formation

Bond investors (as proxied by the YC) have had some success in predicting mean-reverting cyclical variation in rate levels, likely related to monetary policy cycles. In contrast, they have made systematic forecast errors in not foreseeing the secular shifts in the long-run rate mean. Whether these forecast errors reflected irrationality or slow rational learning of structural changes (our money is on the latter), they boosted the YC's ability to predict near-term bond returns. Simply put, the upward-sloping YC predicted rising rates partly by mean-reversion logic, yet repeated economic surprises meant that the predicted mean reversion never happened (well, until 2022). Thus, long bonds' positive-carry advantage amid an upward-sloping YC was not offset by capital losses caused by rate rises that the YC predicted.[119]

As we have seen, academics long attributed the YC's predictive ability fully to rationally time-varying term premia and ignored the role of mean-reverting rate expectations. This perspective may explain why the contrasting expectations formation patterns—contrarian for bonds, extrapolative for equities—have gone unnoticed. In chapter 3, we focused on that contrast, arguing that although bond investors tend to expect mean reversion after a bullish

[118]Ilmanen explains: I feel a little smug in having made a similar argument about rational learning amid structural uncertainty in both my 2011 and 2022 books, emphasizing the difficulty of making predictions when the long-run rate level and the persistence of the rate generation process undergo significant changes. Many studies—Bacchetta et al. (2009), Piazzesi et al. (2015), Crump et al. (2022), and Farmer et al. (2024)—have highlighted the usefulness of survey evidence and the difficulty posed by gradual structural changes for real-time forecasters (unlike econometricians, who are assumed to have unrealistic amounts of foresight). Survey evidence suggests that much of the observed asset return predictability in classic predictive regressions is related not to ex ante (survey-based) risk premia but rather to systematic forecasting errors—or perhaps only to hindsight by the econometrician running those predictive regressions.

[119]To be clear, the YC has some return predictive ability that we can still count on: just the average positive YC slope and average term premium, plus likely some predictable time variation in returns. But recent decades displayed more bond return predictability than we should expect in the future. A survey-based BRP should be a better predictor of near-term bond returns than the YC because it cleans the latter from the rates-expectation content.

(falling-rates) decade, equity analysts and investors tend to extrapolate more of the same after a bullish decade.

Chapter 3 also explored reasons for this difference and conjectured that salience arguments dominate.[120] Bonds are quoted and discussed in yields, making bond investors naturally forward-looking and mildly contrarian. Equities are quoted in prices and mainly discussed in terms of past returns, making equity investors naturally more prone to a rearview-mirror mindset and extrapolative expectations.

Thoughtful readers might challenge this critical attitude toward equity analysts' overly optimistic and overly extrapolative growth forecasts, compared with our sympathetic attitude toward bond investors' persistent overpredictions of rates in recent decades. Both groups have made systematic forecast errors, but it is the equity analysts' EPS growth forecasts that we say to avoid as inputs to capital market assumptions. Why?

The key difference is that equity analysts tend to make irrational forecasts that actually display *negative* market timing ability. We should not poison our objective expected return estimates by incorporating analysts' extra bullishness at times such as 2000 and 2021, after a strong decade when market valuations are very high. In contrast, bond investors' rate forecast errors were likely not irrational but, instead, a case of rational learning amid abnormal structural changes. Therefore, we should not expect these same systematic errors to repeat in the future.[121] In short, we can explain past forecast errors in both earnings growth and interest rates, but we can justify only the latter as rational.

Appendix: Understanding Yield Curve Components

In this appendix, we present simple bond math relating to returns, yields, and the yield curve.

Realized and Expected Bond Return

We first describe some identities before turning to theories and evidence, which are more open to debate. For illustration, we use a 10-year maturity to represent the long bond and a 1-year maturity for the short-term rate.[122]

[120]Chapter 3 further explored the possibility that investors have simply learned from history that they should be multiyear contrarian with bonds and multiyear extrapolative with equities. Historical evidence on long-run return autocorrelations suggests the opposite, however. (Interestingly, real bond yields have exhibited a centuries-long downtrend but with cyclical variation around this trend. The zero-rate floor in nominal rates may in any case stop this downtrend.)

[121]There will inevitably be errors, but we cannot know their direction in advance. Regardless, the past errors augmented the YC's ability to predict future returns instead of damaging it. If anything, the new emphasis on the role of mean-reverting expectations suggests that investors should no longer assume that an unchanged YC is the best base case for expectations.

[122]The choice of a one-year horizon allows us to ignore annualization terms in the exposition. The analysis is approximate because we ignore convexity, rolldown, and credit risk effects, but it captures the key elements of yield curve behavior. For details, see Ilmanen (1996). This section follows Ilmanen (2011, chap. 9).

The realized 10-year bond return over a year, designated H10, has two components: the yield income earned over time and the capital gain or loss resulting from yield changes (approximated by minus bond duration multiplied by yield change):

$$H10 \approx Y10 - Duration10 \times \Delta Y10. \quad (A9.1)$$

We can subtract the return of the short-term asset (Y1) and take expectations to calculate a variant of the bond risk premium (or term premium) in next-year expected returns:

$$\begin{aligned} BRP_H &\equiv E(\text{Excess bond return over the one-year riskless rate}) \\ &\approx (Y10 - Y1) - Duration10 \times E(\Delta Y10). \end{aligned} \quad (A9.2)$$

If the yield curve is upward sloping, longer bonds have an initial yield advantage over the risk-less shorter bond, which gives them some cushion against capital losses caused by rising bond yields. Breakeven (forward) yields show how much the bond yield can rise next year before this cushion is just offset. Longer bonds have a smaller cushion because their long duration makes their prices more interest rate sensitive. If no yield changes materialize, bonds will earn their "positive-carry" cushion measured by curve steepness (ignoring rolldown).

Bond Yield

Following is a brief explanation of how bond yields reflect the market's rate expectations and required bond risk premia. Breakeven (forward) rates are, by construction, a sequence of future short rates such that an investor rolling over short-term securities at those rates would earn exactly the same return as the long bond. If investors are risk neutral, these breakeven rates equal the market's expectations and the long yield equals the expected average of future short rates. If not, the long yield also contains a bond risk premium. This observation merely states a consistency requirement for expectations: If the market long-term yield is currently high while future short-term yields are expected to be low, then the long-term bond yield includes a positive required bond risk premium.[123]

$$\text{10-year yield} \approx \text{Expected average 1-year rate over the next decade} + \text{Bond risk premium}, \quad (A9.3)$$

or

$$Y10 \approx E(avgY1) + BRP_Y. \quad (A9.4)$$

This BRP_Y is the average expected return of the bond *over its life* in excess of a sequence of riskless one-year investments. The two BRP variants, BRP_Y and BRP_H, are closely related: BRP_Y is an average of the bond's expected future BRP_H each year (a 10-year bond's BRP_H for the coming year, 9-year bond's BRP_H for the following year, etc.).

[123]We could further slice nominal rate expectations into inflation and real rate expectations, as we did in chapter 8 with its three-way yield decomposition: Y10 ≈ E(avgInf) + E(avgR1) + BRPY.

Curve Steepness

A steep YC reflects market expectations of rising yields or high required bond risk premia—or, more likely, some combination of the two. The rate expectation component can be expressed either in terms of expected multiyear changes in the 1-year yield over the next decade or, alternatively, as the expected next-year change in the 10-year yield, scaled by its (end-of-horizon) duration. The following YC equation focuses on gradual changes in short rates and the yield-based BRP_Y, and the subsequent equation focuses on near-term changes in long yields and the return-based BRPH.

$$YC \equiv Y10 - Y1 = [E(avgY1) - Y1] + BRP_Y = E(\Delta avgY1) + BRP_Y, \quad \text{(A9.5)}$$

or

$$YC \approx Duration10 \times E(\Delta Y10) + BRPH. \quad \text{(A9.6)}$$

CHAPTER 10. DIVERSIFYING ALTERNATIVES AND THE REARVIEW MIRROR

Chapter Summary[124]

Investment strategies whose gains and losses occur at different times from those of major markets are known as diversifying alternatives. They are beloved by portfolio optimizers seeking to maximize risk-adjusted returns. But for human investors, it's more of a love–hate relationship. Stock markets go up most of the time, which means that diversifiers often feel like a drag on returns, even if they improve long-term wealth accumulation.

In this chapter, we explore how the very same investor biases that create opportunities for long–short strategies also make it hard for investors to reap the benefits. We also look at how to overcome them.

Objective Expectations for Long–Short Strategies

We have highlighted the extrapolative nature of equity investors' subjective return and growth expectations, as well as the contrarian nature of mean-reverting rate expectations in bonds. Now we turn to a different corner of the portfolio: alternatives. In this chapter, we focus on long–short alternatives, also known as liquid alternatives or hedge fund strategies. We set aside commodities, another interesting diversifying alternative asset class, discussed elsewhere.[125] We discuss private assets in the appendix.[126]

In previous chapters, we contrasted subjective and objective expected returns. Long–short strategies do not have obvious measures of objective expected returns: Yield-based metrics are unhelpful when the portfolio holdings are continually changing. Some investors might suggest zero as a starting point, citing Sharpe's (1991) arithmetic of active management, which asserts that because all active investors' holdings must add up to the market, the aggregate return of their active positions must be zero (before fees).

Some well-known long–short strategies can be codified and back-tested over decades or even centuries, however, and the average return is very far from zero. Various explanations have been proposed based on compensation for additional risk or on behavioral biases. These "alternative risk premia" or "academic alpha" return sources include factor-based strategies such as value, momentum, and quality, as well as time-series strategies such as trend-following (see **Exhibit 10.1**).

---

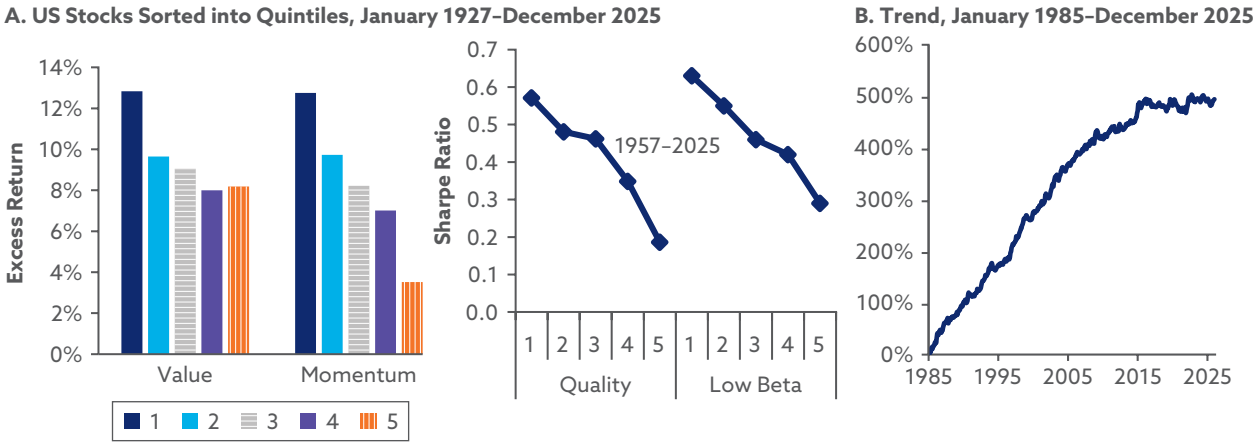
[124]The authors' firm, AQR, is a manager of diversifying alternative strategies. So although this text presents our honest opinion, readers should be aware that of all the chapters in this monograph, this one is the closest to AQR's business interests.

[125]For discussion of commodity return expectations, see Ilmanen (2022).

[126]We exclude private assets from our "diversifying alternatives" category because although they may provide some mild diversification by broadening the opportunity set, they are often exposed to significant equity or credit market risk, especially at medium-term horizons or if the return smoothing is adjusted for.

 © 2026 CFA Institute Research Foundation. All rights reserved.

Exhibit 10.1. Academic Evidence of Positive Returns from Simple Rules-Based Strategies



Sources: AQR and Bloomberg.

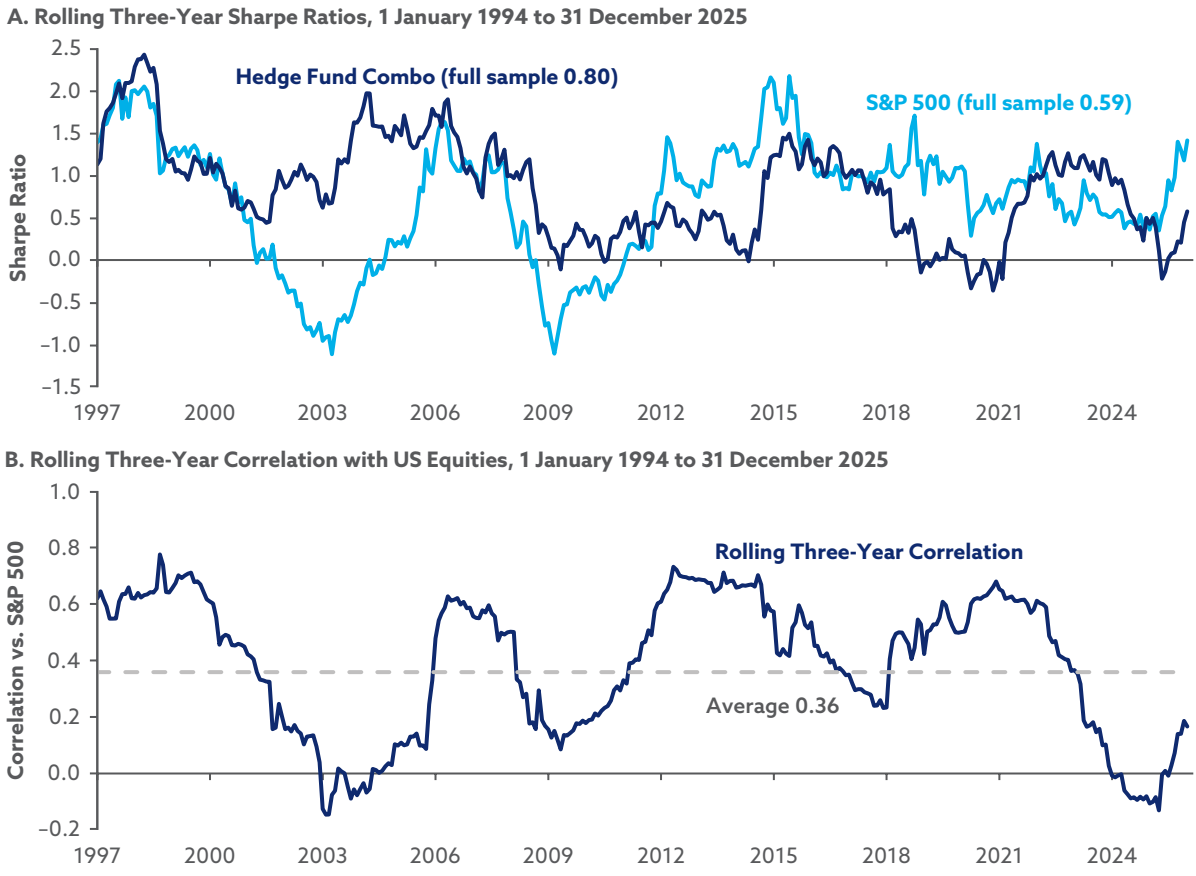
Notes: Quintile portfolio returns are value-weighted excess-of-cash returns of the stocks in that portfolio, gross of costs and fees. Value portfolios are sorted on book-to-market, momentum on 12-month returns. Quality and low beta are described in Asness et al. (2019) and Frazzini and Pedersen (2014). Cash is the ICE BofA US three-month T-bill index. Trend is as described in Moskowitz et al. (2012), undiscounted, excess-of-cash, and gross of fees.

We can also study the historical performance of the hedge fund industry. **Exhibit 10.2** shows the rolling performance of a simple average of two diversifying hedge fund categories that span most of the investment universe: equity market neutral and global macro. This combination has delivered a higher risk-adjusted return than the S&P 500 index (although a lower average return), with milder drawdowns and modest correlations. Other hedge fund categories and broad composite indices have been much more correlated with equity markets.

Even for these well-documented strategies and well-established hedge fund strategies, reasonable objective expectations are highly debatable. How much of the historical average return is attributable to selection biases? How much of the academic "premium" is eroded by implementation costs? And how much is arbitraged away once many managers are competing for it? We would answer "some, but not all" to all three questions, but not everyone agrees.[127] Even the objective expected returns are subjective.

[127]Selection or overfitting bias concerns can be mitigated by finding new supporting evidence in other periods, regions, and asset classes. See Ilmanen et al. (2021) for a comparison of in-sample and out-of-sample performance for major factor premia. Overfitting biases are worst for strategies with several parameters that have been optimized for past performance. Hedge fund indices can suffer from various biases, including survivorship bias and several types of reporting bias. Some index methodologies are less susceptible to biases, and such indices often exhibit more modest performance. Note that a strongly diversifying investment does not need a very high Sharpe ratio to provide portfolio benefits.

Exhibit 10.2. Diversifying Hedge Fund Strategies Have Delivered over Three Decades



Sources: Hedge Fund Research, Bloomberg, and AQR.

Notes: Panel A shows rolling Sharpe ratios of the S&P 500 and a simple average of the HFR Equity Market Neutral Index and the HFR Macro Index, based on monthly returns. S&P 500 returns are gross of fees; hedge fund returns are net. Cash is the ICE BofA US three-month T-Bill index. Panel B shows the correlation between the two series.

Subjective Expectations: Performance Chasing and the Hunt for Manager Skill

Thus, investors are rightly wary of back-test performance and hedge fund indices that may be misleading because of various selection and reporting biases. They are concerned that once-successful strategies might stop working once everyone knows about them. More broadly, investors are aware that it is hard to distinguish skill from luck in manager performance, and this awareness motivates them to review their allocation decisions continuously as new information accumulates.

Unfortunately, on top of these rational considerations, investors are plagued by irrational behavioral biases that make it harder to form reasonable expectations of manager performance. Following are the two main culprits:

- **The law of small numbers.** As Kahneman and Tversky (1971) have documented, investors tend to underestimate the role of sampling variation (i.e., luck) and the breadth of the distribution of possible outcomes, even for a good investment. They also tend to misinterpret outcomes that stand out among many investments, which makes it even harder to allocate rationally and patiently to the most diversifying strategies.
- **Myopic loss aversion.** Investors tend to feel the pain of losses more strongly than they do the pleasure of gains, at irrationally short horizons. This experience tends to cause overreactions to recent losses, as well as excessive manager turnover (e.g., see Kahneman and Tversky 1979; Benartzi and Thaler 1995).

In the face of these powerful biases, illiquidity can be helpful. Private investments do not report painful short-term fluctuations, and investors in this asset class often could not extract their money even if they wanted to. In contrast, liquid diversifiers offer many advantages when it comes to boosting portfolio resilience, but they are easy prey for return-chasing biases.

Navigating the Market Cycle

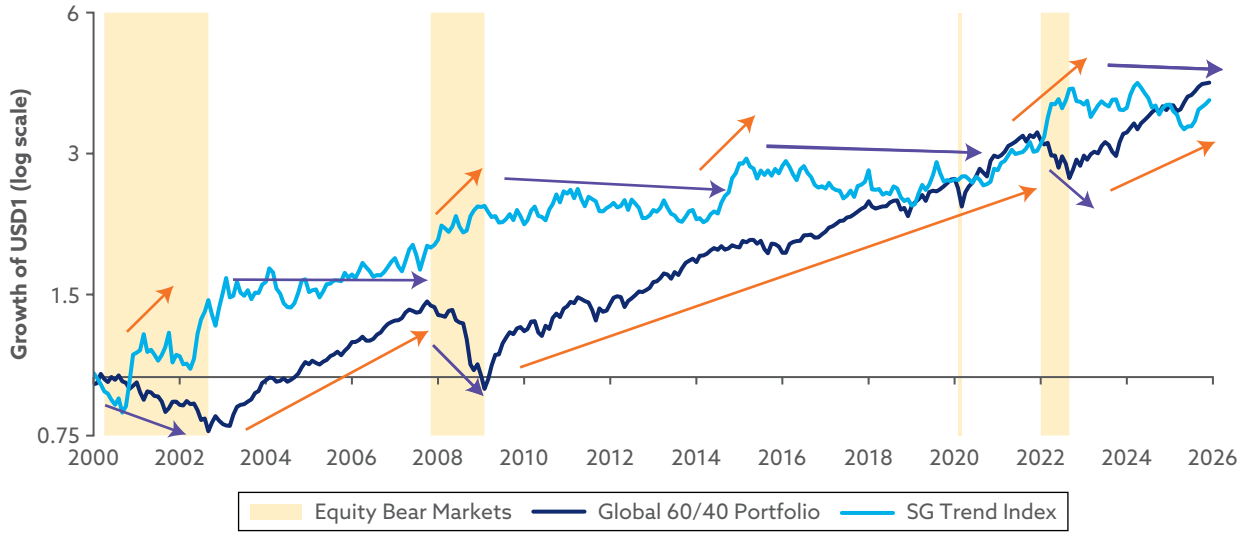
The managers of diversifying alternative investments not only are vying against each other for an investor's attention and assets but also are competing against the rest of the investor's portfolio, especially the largest allocation, which is usually to public and private equities. Equity markets tend to go up most of the time, with occasional episodes of severe losses. In other words, bull markets tend to be longer, whereas bear markets tend to be more intense. During a bull market, equities are hard to beat. This means that most of the time, diversifiers are likely to feel like a drag on returns, even if they deliver long-term benefits.

Some diversifiers, such as trend following, tend to deliver returns in a manner opposite that of equity markets, with gains tending to come "all at once" after long fallow periods (see **Exhibit 10.3**). Patient investing with these strategies can be particularly challenging. Investors often focus on the standalone (line-item) performance of diversifiers and thus miss their portfolio impact (e.g., note how the diversifier in Exhibit 10.3 helped the 60/40 portfolio in all of its major drawdowns).

In addition, investors are always (understandably) more skeptical about complex or unconventional strategies than they are about, say, the equity premium. This makes them more likely to "throw in the towel" on diversification, implicitly reducing their subjective expectation of its benefits to zero, and to instead embrace equity market risk.

Finally, investors' tendency to overextrapolate multiyear equity market performance, discussed in chapters 1, 2, and 7, has implications for their allocations to diversifiers. **Exhibit 10.4** highlights the gap between the past decade's exceptional returns for US large-cap and private equity (dashed-line box on the left) and the more modest forward-looking expectations for those asset classes. In contrast, several diversifying alternatives (dashed-line box on the right) have

Exhibit 10.3. The Magic and the Misery of Great Diversification: Global 60/40 and Trend Following Performance, 1 January 2000 to 31 December 2025



Sources: AQR and Bloomberg.

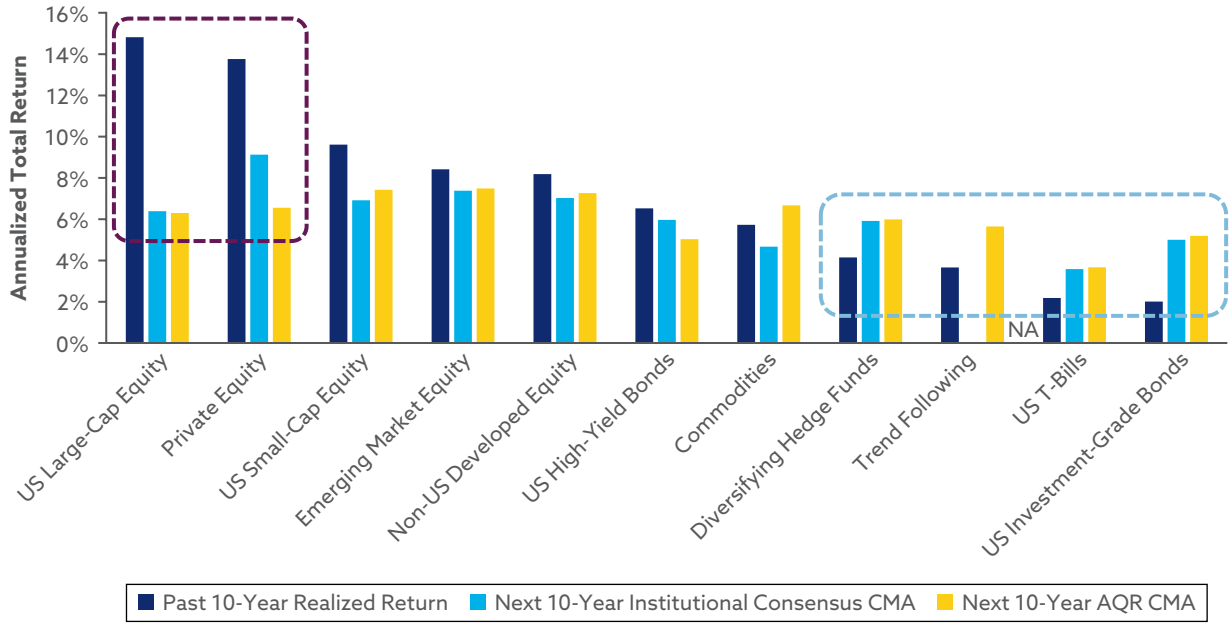
Notes: The SG Trend Index inception date is 1 January 2000. Global 60/40 Portfolio is 60% MSCI World Net Total Return USD Index and 40% Bloomberg Global Aggregate Hedged Total Return Index, rebalanced monthly, gross of fees. SG Trend Index is net of fees. The indices shown are not investable.

delivered abnormally low returns over the past decade. The prevalent rearview-mirror mindset ensures that many investors' expectations are closer to the results shown in the dark blue bars than in the other bars. This mindset has arguably left many portfolios overallocated to equities and underallocated to diversifying alternatives in recent times.

Exhibit 10.5 provides a very long historical perspective by displaying the rolling 10-year Sharpe ratio of the classic 60/40 portfolio starting in 1880. After a strong decade for core investments, such as the 1990s or 2010s, some investors inevitably see diversifiers as a drag on returns. At the same time, the diversifiers experience performance fluctuations and often underperform during bull markets (by definition, the best diversifiers will receive no tailwinds from a buoyant stock market).[128] These cycles often lead investors to abandon diversifiers at the worst possible time. In the next section, we explore ways to encourage patient and strategic diversification throughout the investment process and throughout the market cycle.

[128]See Blitz (2020) for a discussion of the 2010s "lost decade" for popular long–short equity factors (but not for the cap-weighted equity market) and Babu et al. (2020) for an analysis of trend following underperformance in the same decade.

Exhibit 10.4. Mind the Gap! Why Diversifiers May Be Underrepresented in the Mid-2020s: Past 10-Year Return Versus Reasonable Next 10-Year Expectations, as of 31 December 2025



Sources: Bloomberg, Horizon Actuarial (2025), and AQR Portfolio Solutions Group (2026).

Notes: Past 10-year returns are based on proxy indices; see appendix B in this chapter for details. The private equity 10-year sample is lagged by six months because of data availability. Private equity, hedge fund, and trend proxies are net of fees; other asset classes are gross of fees. Institutional consensus capital market assumptions (CMAs) are from the Horizon Actuarial survey dated August 2025. AQR CMAs are as of 31 December 2025 and are based on the methodology described in AQR Portfolio Solutions Group (2026).

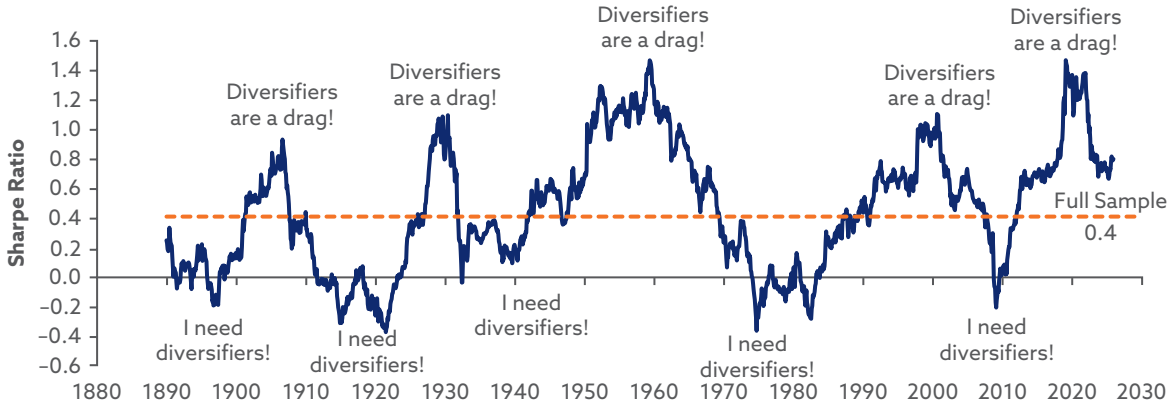
Ways to Encourage Patient Investing

The road to more patient investing (and to resisting the rearview-mirror mindset) starts before the original allocation decision. Following are four broad avenues to consider:[129]

- **Education.** Stakeholders should understand the strategic case for a new allocation, and recent performance should not be the decisive factor. They should also have reasonable expectations for the range of possible outcomes over different horizons: What would constitute a "normal" bad month or bad year for the strategy?
- **Smarter performance reviews.** Once invested, performance reviews can be structured to guard against "line-item thinking" and to encourage a total portfolio mindset. Returns can be expressed as the contribution to the portfolio return, not just on a standalone basis, and diversification statistics such as equity beta or correlations

[129]Also see Ilmanen (2022, chap. 9) on investor impatience and remedies.

Exhibit 10.5. Rearview-Mirror Investors Are Doomed to Miss the Benefits of Diversifiers: Rolling 10-Year Sharpe Ratio of US 60/40 Portfolio, 1 January 1880 to 31 December 2025



Sources: Bloomberg, Global Financial Data, and AQR.

Notes: 60/40 Portfolio is 60% US large-cap equities, 40% US 10-year Treasuries, rebalanced monthly, gross of fees, from Global Financial Data (GFD). Cash is US three-month T-Bills from GFD.

can be reported prominently. Investors' tendency to fixate on the short term can be tempered by focusing commentary on longer rolling periods, even if quarterly performance is reported too.

- **Integrated investments.** Investors can "internalize" diversification by combining strategies with low correlation in an investment that will appear as a single line item. It is easier to be patient with diversifying alternatives when they are combined with equity beta (consider the average of the two lines in Exhibit 10.2) or combined with each other in a multistrategy investment.
- **Gradualism.** Allocating to less conventional diversifying strategies often requires a period of education and due diligence. Once the allocation decision is made, a phased funding approach can act as a "regret minimizer" and increase patience in the case of an early bad draw for the strategy.

Finally . . . How to Embrace Active Risk Without Big Directional Bets

Market timing is hard. Can investors embrace diversifying sources of return without implicitly betting against the equity market and the drivers of the mid-2020s rally—namely, the tremendous potential of AI alongside the competitive advantages of the US economy in general and

the Magnificent Seven giants in particular? The answer is yes. Following are three ways to harness diversifiers without adopting an aggressively contrarian position:

- In active equity portfolios, favor broad alpha-harvesting approaches that avoid large bets for or against particular sectors, such as the pro-AI trade.[130]
- Allocate to diversifying alternatives as overlays, rather than substitutes for equity exposure. Portable alpha or "return stacking" strategies are one increasingly popular method (but watch out for the implementation details).[131]
- Consider dynamic directional strategies, such as trend following, that can go both long and short. These can provide valuable diversification in a range of different "bad outcomes" (including inflation shocks and recessions) without "fighting" a rising market.[132]

Just as the "rearview-mirror mindset" probably pushed US equity market valuations too high in the mid-2020s, it has probably pushed expectations for (and allocations to) diversifying alternatives too low. Although equity markets remain in an exuberant mood, investors may have a golden opportunity to make corrective strategic reallocations at tactically attractive prices.

Appendix A: Illiquid Alternatives and the Rearview Mirror

We focus on real estate and private equity (PE) in this discussion.

Among illiquid assets, residential housing is the largest market and has the longest price histories, but little of this market is investable. Plenty of anecdotal evidence exists to illustrate extrapolative expectations in house prices, such as in the run-up to the Global Financial Crisis (GFC). Academic research using survey data provides support and nuance in this area. Kuchler et al. (2022) summarize the observation that house buyers have underextrapolative expectations in the short term (causing momentum patterns) and overextrapolative expectations in the long term (causing multiyear mean reversion). Bro and Eriksen (2025) add that the main driver of rising house prices is households' overly optimistic income expectations for their holdings rather than their lower required returns. These results echo those for equity markets discussed in earlier chapters.

Among the more investable private asset markets, PE and especially US buyouts have the largest size and longest data histories. The rearview-mirror mindset seems to be alive in this market, although it has focused on long-run evidence that might not be relevant in the 2020s. A large part of PE funds' past success reflects cheap target valuations, limited competition, a richening asset price trend, and cheap leverage—conditions we have not seen in recent years.

---

[130]See Brixton et al. (2025) for a comparison of discretionary stock picker and quantitative approaches to active equity investing.

[131]See Hecht and Cao (2025) for further discussion.

[132]Trend-following has tended to be less effective in short-lived episodes of volatility, such as April 2025, and more effective in prolonged episodes, such as the 2008 GFC and the inflation shock of 2022. It is the prolonged events that cause lasting damage to investment performance. See McQuinn et al. (2021).

On the one hand, PE investors could be at least as extrapolative as public equity investors, given limited data on forward-looking (yield-based) prospective returns and widely disseminated data on past realized returns. On the other hand, the imposed long horizon could give PE investors a contrarian bent. Data quality has justly been questioned. For example, PE firms are good at marketing their since-inception IRRs (internal rates of return) and other misleading numbers. One published study asks how half of PE funds can be in the "top quartile" (Harris et al. 2012).

Although we argue that in public assets, many investors' memories reflect only the post-GFC experience, for PE, the rearview mirror seems to extend farther back. During the 39 years from 1986 to 2025, the Cambridge Associates PE index outperformed the Russell 3000 broad equity index by 3% a year, but nearly all of this outperformance came from the years 2000–2008. Before and after this nine-year PE run of great performance, the two series had nearly the same average return. Broader empirical evidence indicates that both the realized and prospective return edge of private over public equity has narrowed since the 2000s decade, perhaps reflecting increasing inflows into the space.[133]

The strongest evidence of "rearview-mirror behavior" comes from asset-class allocations. Over the past 20 years, institutional investors have dramatically increased the portfolio weights of private assets, including PE. This reallocation reflects not only the perceived past outperformance; other sources of inspiration include the Yale Model, good marketing stories, and the comfort of artificially smooth returns.[134]

Anecdotally, many investors "buy" the stories of 15% to 20% expected returns in PE, but we have limited good-quality survey data. On CMAs, Horizon Actuarial surveys about 40 providers each year and reports their consensus views. The next-decade compound return expectations for PE, reported year by year over 2014–2025, are 9.7%, 9.5%, 9.6%, 9.4%, 8.9%, 9.0%, 9.2%, 9.0%, 9.1%, 9.5%, 9.2%, and 9.2%. This series has a narrow range (0.8%) compared with more volatile bond yields and return expectations. It may also hint at a slight contrarian mindset: PE expected returns are a bit higher in the early years and in early 2023 when valuations were somewhat lower. But the main characteristic is stable confidence, which may have been warranted in the early years but perhaps less so recently. Each year, PE has had a 2% to 3% higher expected return than the next-highest asset classes. That's a lot to live up to.

[133]See Ilmanen (2022, chap. 5). Both private versus public realized outperformance and valuation gap were larger when the PE industry was much smaller. Empirical verdicts on private equity's outperformance over public equity since the GFC differ, depending on the data sources, metrics, and periods used.

[134]Begenau et al. (2025) document both the rise in pension funds' alternative asset weights and a rise in consultants' PE alpha expectations over two decades when objective expectations seemed to go the other way. Also see Ilmanen (2022, chap. 3).

Appendix B: Data and Methodology

Asset Class Proxies for Exhibit 10.4

Asset Class	Proxy Indices (1 January 2016–31 December 2025)
US large-cap equities	S&P 500 index total return
Private equity	Cambridge Associates US Private Equity Index
US small-cap equities	Russell 2000 Index total return
Non-US developed equities	MSCI EAFE Index USD total return
Emerging market equities	MSCI Emerging Markets Index USD total return
US high-yield bonds	Bloomberg US High-Yield Index
Commodities	Bloomberg Commodities Index
Diversifying hedge funds	50% HFR Equity Market Neutral Index, 50% HFR Macro Index
Trend	SG Trend Index
Cash	ICE US Three-Month US T-Bill Index
US IG bonds	Bloomberg US Aggregate Index

AQR CMA Methodology for Exhibit 10.4

Public Equity: Expected real return is the average of (1) the inverse of the cyclically adjusted price-to-earnings ratio (CAPE) (adjusted for earnings growth during 10-year CAPE window) multiplied by a 0.5 payout assumption, plus 1.8% assumed real EPS growth, and (2) dividend yield plus 10-year smoothed net buyback yield plus estimated aggregate payout growth (average of smoothed 30-year earnings growth and forecast GDP growth). A survey-based estimate of long-term expected inflation is added to give the expected nominal return.

Bonds: Expected return is current spread multiplied by a 0.5 "haircut," plus duration-matched Treasury yield, plus Treasury and spread rolldown, plus convexity return, minus variance drag.

Private Equity: Unlevered real return is earnings yield (assumed to be half of EBITDA-to-EV) multiplied by a 0.5 payout ratio, plus 3% assumed real growth. Levered real return is unlevered return plus the product of estimated leverage and the difference between unlevered return and the cost of debt, plus multiple expansion, minus estimated fees. A survey-based estimate of long-term expected inflation is added to give expected nominal return.

Diversifying Hedge Funds: Assumed to deliver a combination of equity beta and alternative risk premia at the industry level.

Cash: Average of three inputs: current cash rate, current 10-year bond yield, and survey-based estimate of the next decade's average short-term interest rate.

CHAPTER 11. TYING IT ALL TOGETHER

Chapter Summary

In this capstone chapter, we describe the various sources used to assess return expectations, describe useful return decompositions, present empirical evidence on return predictability, and explain why such predictability exists. We also note similarities and differences in expected return patterns across asset classes and strategies, across investor groups, over time, and across time window or time horizon lengths.

Four Different Sources for Return Expectations

We have described four alternative or complementary sources for expected returns:

- Historical average return (but for how long a historical time window?)
- Market-based expectations from yields and valuation (but how to interpret them?)
- Survey-based expectations (but whose?)
- Predictions from theories (but which ones?)

Historical average return works best if expected returns are constant (i.e., if cyclical variation and structural shifts are limited) and the sample period is long (thus more likely to be neutral or unbiased). One can debate which historical time period is most useful: All else being equal, it is better to have more data, but a rational reason to limit the time period is that the world may have changed, rendering old data less relevant. It is helpful to divide returns into a riskless part and a risky part and to use separate estimation techniques for each. The expected return for the riskless part can be observed as a market yield on bills or bonds, while the risky part has to be modeled, whether using historical returns or some other method.

Market-based expected returns, based on asset yields or valuations, are especially useful if expected returns vary over time. Such variation may reflect both rational changes in required risk premia—that is, if the amount of risk in the market or general risk tolerance changes over time—and the irrational cycle of fear and greed. Variation in expected returns may also reflect rational or irrational expectations of future fundamentals.[135] These measures are timely, naturally "market weighted," and inherently forward-looking. To use them as expected return measures, however, asset yields require judgment on the extent to which they reflect expected future returns versus market expectations of carry-offsetting changes in capital market conditions (to be explained in the next section).

Survey-based expectations come directly from the horse's mouth. They are thus arguably the best descriptive proxies of subjective return expectations and may help with the judgment described in the previous paragraph. Timely, honest responses may be unavailable, however, and one can debate which group (say, institutions versus retail) is most relevant for market

[135]A note for those who love mathematical precision: We ignore here so-called Jensen's inequality or convexity terms, which are related to nonlinearities in expectations math. They tend to have only second-order effects on expected returns.

 © 2026 CFA Institute Research Foundation. All rights reserved.

pricing or which group has the best predictive ability. Note that surveys can be empirically useful even if some groups' forecasts are consistently poor because such forecasts could be used as contrarian indicators.

Theories can help to determine at least the sign of premia, but they are less helpful with magnitudes. There are simply too many asset pricing theories and behavioral theories and too many ways to convert each of them to an expected return estimate.

Each source has its problems as a predictor of future returns. Historical average return may be distorted by in-sample valuation changes, and today's starting yields may differ sharply from the past average. Market-based yields may need to be adjusted for embedded expectations of future capital losses (e.g., from currency devaluation, credit defaults, or mean-reverting valuations). Survey expectations may be elicited from an irrelevant or misleading group. Theories may be wrong or provide little anchor. All sources may be off if a key structural change is not yet fully incorporated into prices. All expectations can be wrong for embarrassingly long periods; such is the nature of uncertainty in relatively efficient financial markets. At best, return expectations work as views that are directionally correct for somewhat more than half the time.

Combining the Estimates

Thoughtful investors may use all four sources as ingredients when forming their expectations. But which source should receive the largest weight? If expected returns were constant over time, then the historical average return over a long neutral sample would be our best estimate of a future return. Because it seems evident from fluctuating market yields and return predictability, however, that expected returns do vary over time, we prefer forward-looking market-based estimates. Such estimates have a contrarian tendency because higher valuations imply lower starting yields and thus lower expected returns. Survey-based estimates may best describe what investors are actually expecting, but these estimates may not coincide with objectively feasible prospective returns (because surveys often reveal overly extrapolative subjective expectations). If forward-looking estimates are not available or relevant (e.g., for commodities, hedge funds, or long–short premia with high turnover), then it seems best to use some combination of historical evidence and theory.

It is worth stressing that in addition to studying both historical and prospective returns, it can be useful to decompose total returns and to focus on their most persistent and predictive components.[136] If we can split the realized return into the expected part of the return and the unexpected part (e.g., the impact of growth surprises and unexpected valuation changes), it makes sense to exclude the latter from return predictions.

A special case is a return split into income (yield) and capital gain or loss; carry strategies focus on the first part and hope that the second part does not offset the carry advantage. Another well-known return decomposition for equities is the dividend discount model, which portrays the total return as the sum of the dividend yield, the growth rate of dividends (or earnings or total payout), and the change in the valuation multiple.

---

[136]Total returns can be decomposed into income and capital gain, real return and inflation, riskless rate and risk premium, and expected return plus or minus surprise. They can also be represented as expected or realized, nominal or real, currency-hedged or unhedged, and over various time horizons (but are often expressed as annualized returns). Finally, an average of any return or component thereof can be expressed in arithmetic-mean or geometric-mean form.

Empirical Evidence of Return Predictability: Spotlight on Carry

In a risk-neutral world with no return predictability, all assets always have the same expected return (as the riskless asset), although realized returns can vary because of period-specific surprises. In a rational world with risk-averse investors and constant risk premia, however, riskier assets will offer higher long-run average returns than riskless or low-risk assets that have less-volatile realized returns. Under such tightly constrained conditions, risk tends to be rewarded (the average returns of asset classes are predictable), but there are no time-varying risk premia. In the real world, we also observe some return predictability over time, although it is seldom easy to exploit. We will later stress that such predictability may reflect either rationally time-varying risk premia, investor irrationality, or both.

Empirical research has found within-year momentum and multiyear reversal tendencies in most asset classes (e.g., see Asness et al. 2013; Ilmanen 2011, 2022). We focus on yield- or carry-based predictability, which also has been prevalent in most asset classes. Naïve carry thinking has "worked" historically in the sense that higher yields tend to imply higher average returns, but some explanation could always systematically hurt carry strategies. Logically, if we find no return predictability when ex ante yields/valuations vary so visibly over time, it must mean that something else offsets the initial carry/income advantage. Let us look at examples in different asset classes:

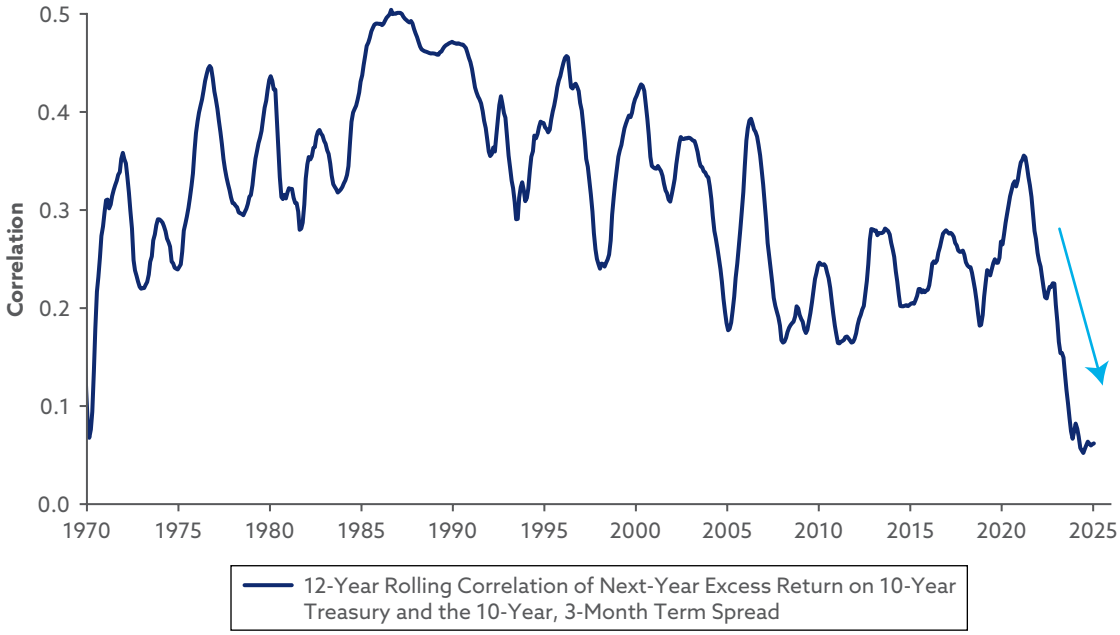
- For equities, higher dividend yields must imply some mix of higher expected returns and lower expected (dividend/earnings/payout) growth. This accounting identity is true both over time (the decline in dividend yields over the past 50 years might be consistent with a constant expected return if the average growth rate has risen over time) and across countries, sectors, or single stocks (assets with faster expected growth will have lower dividend yields or higher valuations, to deliver comparable expected returns). Over the long run, subsequent growth differences have not tended to fully offset initial yield advantages, although the past 15 years have seen a different story.
- For government bonds, a steep yield curve may imply a higher term premium (excess return on long-term bonds over cash) or, alternatively, the market's expectation of rising interest rates. The pure expectations hypothesis states that all government bonds of different maturities have the same expected return, so the initial yield advantage from a steeper yield curve would be offset by capital losses resulting from rising rates. Over the long run, such an offset has not tended to happen. Thus, carry strategies have been profitable in single government bond markets (and across them).
- For currencies, higher interest rates may imply positive excess returns or market expectations of a falling exchange rate. The uncovered interest parity hypothesis states that all currencies have the same expected return, so any initial interest rate advantage would be offset by expected exchange rate depreciation. Over the long run, such offset has tended to be only partial. Thus, carry strategies have tended to be profitable in currency markets (with some notorious exceptions).
- The list goes on. Commodities with a steeper roll (greater backwardation) have either higher future returns or lower future spot prices. Corporate bonds with wider credit spreads offer either higher future returns or larger default losses. Real estate assets with higher rental yields offer either higher future returns or lower future rental growth (and lower asset prices).

- We hope the parallels are obvious: In all of these cases, long-run empirical evidence suggests that carry strategies have tended to be profitable. In some cases, the initial yield advantage has even been augmented by capital gains, although in most cases a partial offset has resulted from capital losses. As long as changing market conditions (faster growth, rising interest rates, depreciating currency) do not fully offset the initial yield advantage of positive-carry strategies, these approaches will be profitable.[137]

Some evidence suggests that both directional and relative (cross-market) carry strategies are no longer performing as well as they used to. To review evolution over time, we need to focus on short-term return predictability rather than multiyear return predictability. We examine two carry-related propositions: We first track the yield curve's ability to predict next-year Treasury returns. Then, we study the Sharpe ratios of cross-country carry strategies (both over rolling 12-year windows).

Exhibit 11.1 examines the first proposition. Yield curve steepness shows a correlation range of +0.2 to +0.5 with the subsequent year's Treasury returns over the half-century from

Exhibit 11.1. The Yield Curve's Ability to Predict Next-Year Treasury Return Fell During the 2020s: 1 January 1970 to 31 December 2025



Sources: AQR and St. Louis Fed (FRED database).

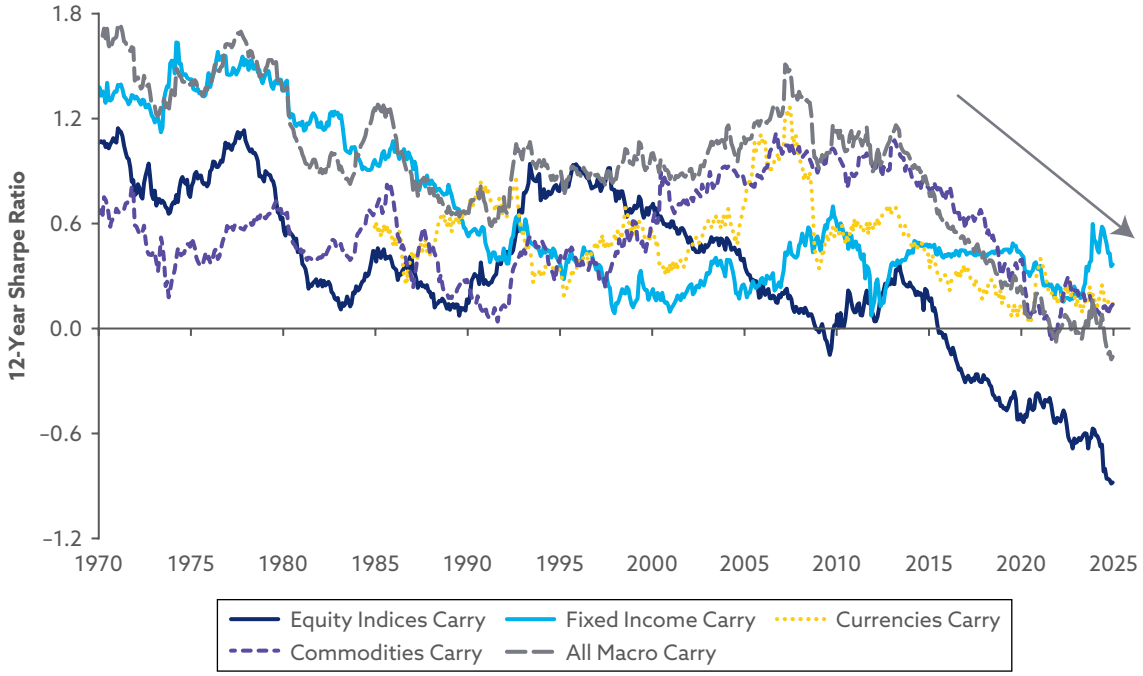
[137]See Koijen et al. (2018) and Ilmanen (2011, chaps. 11 and 22), which describe empirical evidence and early academic studies dating to the 1980s, such as Fama and Bliss (1987). A useful research strategy involves running complementary regressions that assign a carry indicator's predictive ability to either future excess returns or to relevant changes in capital market conditions. In most long-term studies, carry predicts future excess returns and thus was interpreted to reflect required risk premia rather than market expectations of relevant capital market conditions.

1970 to 2020. The correlation then fell in 2021–2023, when yield curve steepness no longer positively predicted bond returns. This result is consistent with the expectations hypothesis finally working and the yield curve predicting future yield changes rather than future excess bond returns, at least for a while.

Looking beyond directional Treasury yield moves, **Exhibit 11.2** shows that simple cross-market carry strategies began to disappoint as early as the 2008 Global Financial Crisis (GFC) and the 2010s. The worst decay was in equity country allocation strategies, where the carry signal underweighted US equities amid their stellar post-GFC run-up.

Currency allocation and commodity allocation based on carry signals have also become less profitable after the GFC. (Only bond allocation across 10-year government bond markets based on curve steepness kept performing, although not as well as in the 1970s and 1980s.) Perhaps the near-zero interest rate monetary policies and quantitative easing pushed too much money into reaching-for-yield strategies and weakened the carry opportunities. If so, initial yield spreads predicted subsequent growth edges and exchange rate moves across countries, as well as relative commodity price moves, better than they had done in the past. As a result, these capital market moves offset the initial yield advantages of high-carry assets over

Exhibit 11.2. 12-Year Rolling Sharpe Ratio of Cross-Market Carry Strategies, 1 January 1970 to 31 December 2024



Sources: AQR Data Library and Ilmanen et al. (2022).

Notes: Carry is defined as the expected return of a long–short carry portfolio in unchanged market conditions. Carry strategies involve favoring equity markets with a high dividend yield relative to the short-term interest rate in that country, bond markets with a steep yield curve, currencies with a high short rate, and commodities with a steep backwardation (roll) between the first two contracts.

low-carry assets. Time will tell if naïve carry strategies will again perform better in a different type of macro environment.

Why Are Returns Predictable at All?

Return predictability over time may reflect rationally time-varying risk premia or investor irrationality.[138] Cross-sectional predictability in average returns across assets may similarly reflect rational risk premia or investor irrationality.

It is hard to disentangle whether predictability reflects rational risk premia or irrational forces, such as different varieties of over- and underreaction. The classic academic explanation was that abnormally cheap asset valuations reflect high required risk premia. Survey evidence, however, increasingly points to irrational explanations, in which case expectational errors rather than time-varying risk premia are behind the observed return predictability:

- Overextrapolative growth optimism by equity analysts and investors causes equities to be overvalued (e.g., the 2000 tech bubble), resulting in low subsequent equity returns. Analysts and investors presume earnings growth to be highly persistent and tend to be disappointed when abnormal growth weakens after a couple of years.
- Overly anchored interest rate expectations keep bond yields too high amid abnormally low rates (e.g., in the 2010s), giving rise to steep yield curves. Economists and bond investors who confidently expect large yield rises (or falls) tend to be disappointed and would have been better off assuming unchanged yields.
- Likewise, survey expectations of large exchange rate changes tend not to materialize, an outcome that explains carry strategies' average profitability. For example, since the 1990s, the high-yielding Australian dollar has not depreciated against the low-yielding Japanese yen nearly as much as survey expectations (or the large interest rate differential) implied. A random-walk (unchanged) exchange rate forecast would have been better.[139]

How Patterns Vary over Time and Across Asset Classes or Investor Groups

The most prevalent regularities, or factor premia, evident in many asset classes, are positive rewards for high starting yield (carry), cheap valuation (value), benign within-year trend (momentum), and multiyear weakness (mean reversion).[140] All have historically worked in both market directional (timing) and cross-sectional (market and asset selection) contexts. Among these four regularities, all but momentum share a contrarian flavor in different forms.

---

[138]Other possible causes of predictability include gradual investor learning about structural changes or memory effects of lifetime experiences, as well as so-called *peso problems* and data mining. (A peso problem occurs when an event that the market is discounting—in the original 1970s example, a fall in the Mexican peso—does not appear in the historical data, so it is perceived as impossible or unlikely.) In reality, the observed return predictability may reflect a mix of all these forces. We focus on the two most prominent explanations in the academic literature.

[139]See, for example, Bacchetta et al. (2009), Greenwood and Shleifer (2014), and Bordalo et al. (2024). Stated differently, the observed return predictability means that the constant expected return hypothesis on equities, the pure expectations hypothesis on interest rates, and the uncovered interest parity hypothesis of exchange rate are rejected empirically.

[140]For further discussion, see Asness et al. (2013), Koijen et al. (2018), Ilmanen (2011, 2022), and Ilmanen et al. (2021).

Survey evidence suggests that such predictability patterns result less from time-varying risk premia and more from investor irrationality, but both may matter. It has historically made sense to bet against abnormally strong market or survey expectations of changing capital market conditions in all asset classes. Such strong expectations give rise to negative carry or high asset valuation, which tend to set a (too) high bar for consensus expectations to be profitable.

We should not be surprised, then, by variation in regularities across asset classes and over time. Indeed, we should perhaps be surprised by seeing as much commonality as noted earlier. Some lack of robustness is inherent when investors try to exploit any predictability patterns, which may endogenously change market behavior. Regularities may also be broken by ordinary random variation or exogenous structural changes. Let's not forget Nassim Taleb's idea that all important market action happens in the unpredictable tails.[141]

Understanding Return Expectations has highlighted some differences in the patterns by which investors form return expectations: more extrapolative in equities and more contrarian in bonds; more extrapolative among retail investors and more contrarian among institutional investors. When it comes to asset market regularities, we can point to two well-known exceptions: First, the stock selection momentum strategy has not worked historically in Japan.[142] Second, one-month momentum works in most macro assets but not in stock selection (in which case short-term reversals dominate likely because of price pressure and liquidity provisions).

All these regularities are weak enough to sometimes disappoint. Patterns may change over time. Indeed, many of these regularities are weaker in this century than they were in the last quarter of the previous century. This difference may reflect investor learning and arbitraging-away forces, but it may just be evidence of a painfully long bad patch. A topical example is that many value and carry strategies have had a more than decade-long dry spell since the GFC (perhaps related to easy monetary and fiscal policies or an absence of severe bear markets or recessions). If there is a silver lining, it is the fact that being hard to exploit can sustain a low-positive-Sharpe-ratio opportunity even if it is caused by market inefficiency.

On occasion, "this time *really* is different." Famous examples include the 40-year downtrend in inflation and real bond yields from 1981 to 2021; equity market richening in the 1980s and 1990s (and again after the GFC); and the shift from a physical to a digital world, which has especially favored the United States, its tech sector, and certain mega-cap firms. Such long-lasting structural shifts can be poison to contrarian investors, except when the macro trend finally reverses—and by that time, contrarian investors may have become extinct. Indeed, one way to view the warnings of this series against rearview-mirror expectations is as an attempt to keep alive even humble contrarian spirits after the exceptional post-GFC environment.

---

[141]See Taleb (2007). We also remind readers of the beautiful Chesterton quote in chapter 1, which highlights the limits of predictability.

[142]Standalone, that is. Momentum has worked decently when combined with value; see Asness (2011).

When it comes to investment horizons, the message from empirical regularities may sound confusing. As noted, multimonth momentum and multiyear reversal tendencies are common in many asset classes. One simple story is a cycle of greed and fear, which can push asset valuations too high (low) amid irrational exuberance (gloom) until the rubber band of sell (buy) incentives pulls them back toward fair value. Besides this overreaction story, multimonth momentum may also be explained by investor underreaction to fundamental news. Markets certainly react quickly to any news, but some reaction is delayed not by minutes but by months.[143]

How long of a history of past returns proves useful for assessing prospective returns? Apart from the first-year momentum, investors can learn from multiple-decades-long histories, unless a clear structural shift has occurred or if current valuations differ meaningfully from past averages. We have emphasized the dangers of rearview-mirror expectations that focus excessively on past 3- to 10-year experiences, over which empirical data show mean-reversion tendencies (perhaps precisely because of such typical rearview-mirror perspective length in performance evaluation). We have called multiyear return chasing "the premier bad habit" for investors; Cliff Asness has described it as "acting like momentum investors at reversal horizons."[144]

Exhibit 11.3 summarizes these ideas in a stylized chart of (empirically) objectively optimal and subjectively typical weights of past return observations in forming return expectations.[145] The exhibit highlights investors' tendency to underappreciate first-year momentum (thus allowing it to persist) and also to underweight distant observations at the same time as they overweight observations from the 3- to 10-year rearview-mirror perspective.

We conclude by reiterating our most topical market view. Although we warn against multiyear extrapolation of past returns or growth, sometimes those overextrapolative investors get it right for a few years, become overconfident, and expect even more return or growth persistence—and the outcome may be a bubble. Such times are especially challenging for contrarian-leaning investors, making it hard to be patient. This principle can apply to directional positions in equity markets or interest rates, as well as to positions across countries, sectors, styles, or single stocks.

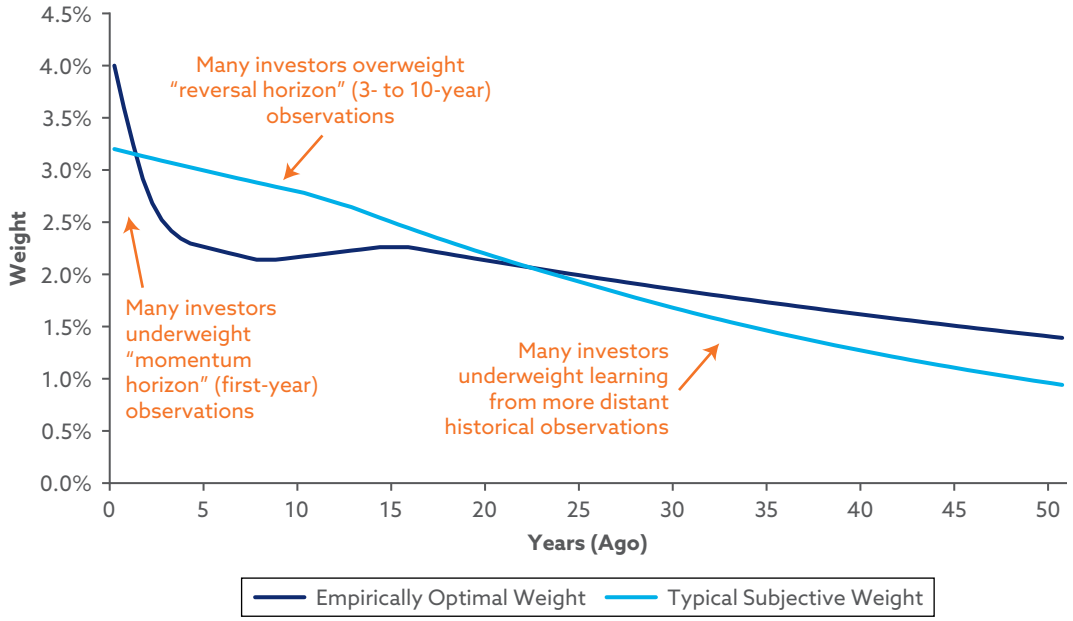
---

[143]Such a delay seems surprising in the fast 21st-century communication world. Perhaps investors react to the instant news but do not fully recognize that news events can be positively autocorrelated (a positive surprise now may imply likelihood of another positive surprise next month). It is also revealing that underreactions are more typical for bad news, for nonsalient bread-and-butter news (the so-called frog-in-the-pan phenomenon), and for news in a low-volatility environment.

[144]See Asness-Ilmanen (2012, p. 48).

[145]We stress the term "stylized." The shape of the empirically optimal weights is loosely based on evidence in many asset classes, as described in Ilmanen (2011, 2022). The shape of the typical weights is loosely based on the multiyear extrapolation tendencies for risky assets highlighted in this series and in Goyal et al. (2015). The chart conveniently stops at 50 years, as if cut off by historical sample size or a perceived sharp structural change. Even longer histories may be relevant but undoubtedly less relevant than recent observations.

Exhibit 11.3. Stylized Chart of Weights of Past Observations on Expected Returns



Source: AQR.

We have used US equity outperformance over the rest of the world as the poster child for this monograph. Five dangerous forces coincide to boost the rearview-mirror mindset on the US/non-US equity tilt, which makes us more comfortable highlighting a US underweight as a multiyear opportunity.[146] Although we made a good case for long-run US exceptionalism worth about a 1% annual growth edge (see chapter 2), the abnormally strong US growth edge after the GFC (near 3%) has made many investors extrapolate this pattern and has pushed US market valuations to nearly double those of the rest of the world. It's a high bar to clear and a recipe for disappointment.

[146]We concluded in chapter 1 that the rearview-mirror mindset is (1) more pronounced if overextrapolators recently got it right and became more confident; (2) more typical for stocks than bonds; (3) more vulnerable when looking back 3 to 10 years; (4) more misleading when past outperformance mainly reflects richening valuations that have reached extreme levels; and (5) more dangerous when "the times they are a-changing" (i.e., when there is a catalyst for structural change).

REFERENCES

Adam, Klaus, and Stefan Nagel. 2022. "Expectations Data in Asset Pricing." In *Handbook of Economic Expectations*, edited by Rüdiger Bachmann, Giorgio Topa, and Wilbert van der Klaauw, 477–506. Amsterdam: Elsevier.

Adrian, Tobias, Richard K. Crump, and Emanuel Moench. 2013. "Pricing the Term Structure with Linear Regressions." *Journal of Financial Economics* 110 (1): 110–38. doi:10.1016/j.jfineco.2013.04.009.

Amromin, Gene, and Steven A. Sharpe. 2014. "From the Horse's Mouth: Economic Conditions and Investor Expectations of Risk and Return." *Management Science* 60 (4): 845–66. doi:10.1287/mnsc.2013.1806.

Andre, Peter, Philipp Schirmer, and Johannes Wohlfahrt. 2024. "Mental Models of the Stock Market." https://ssrn.com/abstract=4589777.

Ang, Andrew, Amit Goyal, and Antti Ilmanen. 2014. "Asset Allocation and Bad Habits." *Rotman Journal of International Pension Management* 7 (2): 16–27.

AQR Portfolio Solutions Group. 2017. "2017 Capital Market Assumptions for Major Asset Classes." AQR Alternative Thinking. www.aqr.com/Insights/Research/Alternative-Thinking/2017-Capital-Market-Assumptions-For-Major-Asset-Classes.

———. 2019. "Inversion Anxiety: Yield Curves, Economic Growth, and Asset Prices." AQR Alternative Thinking, 12 September. www.aqr.com/Insights/Research/Alternative-Thinking/Inversion-Anxiety-Yield-Curves-Economic-Growth-and-Asset-Prices.

———. 2024. "Can Machines Time Markets? The Virtue of Complexity in Return Prediction." AQR Alternative Thinking (6 May). www.aqr.com/Insights/Research/Alternative-Thinking/Can-Machines-Time-Markets-The-Virtue-of-Complexity-in-Return-Prediction.

———. 2026. "2026 Capital Market Assumptions for Major Asset Classes." AQR Alternative Thinking. www.aqr.com/Insights/Research/Alternative-Thinking/2026-Capital-Market-Assumptions-for-Major-Asset-Classes.

Arnott, Robert D., and Peter L. Bernstein. 2002. "What Risk Premium Is Normal?" *Financial Analysts Journal* 58 (2): 64–85. doi:10.2469/faj.v58.n2.2524.

Asness, Clifford S. 2000. "Bubble Logic: Or, How to Learn to Stop Worrying and Love the Bull." Working paper, 31 October. doi:10.2139/ssrn.240371.

———. 2011. "Momentum in Japan: The Exception That Proves the Rule." *Journal of Portfolio Management* 37 (4): 67–75. doi:10.3905/jpm.2011.37.4.067.

———. 2012. "An Old Friend: The Stock Market's Shiller P/E." White paper, AQR, 1 November. www.aqr.com/Insights/Research/White-Papers/An-Old-Friend-The-Stock-Markets-Shiller-PE.

———. 2014. "My Top 10 Peeves." *Financial Analysts Journal* 70 (1): 22–30. doi:10.2469/faj.v70.n1.2.

© 2026 CFA Institute Research Foundation. All rights reserved.

———. 2021. "The Long Run Is Lying to You." AQR, Cliff's Perspectives (4 March). www.aqr.com/Insights/Perspectives/The-Long-Run-Is-Lying-to-You.

———. 2024. "The Less-Efficient-Market Hypothesis." *Journal of Portfolio Management* 51 (1): 68–89. doi:10.3905/jpm.2024.51.1.068.

———. 2025. "2035: An Allocator Looks Back over the Last 10 Years." AQR, Cliff's Perspectives (2 January). www.aqr.com/Insights/Perspectives/2035-An-Allocator-Looks-Back-Over-the-Last-10-Years.

Asness, Clifford S., Andrea Frazzini, and Lasse H. Pedersen. 2019. "Quality Minus Junk." *Review of Accounting Studies* 24 (4): 34–112. doi:10.1007/s11142-018-9470-2.

Asness, Clifford S., and Antti Ilmanen. 2012. "The 5 Percent Solution." *Institutional Investor* (May): 46–49, 75–78.

Asness, Clifford S., Antti Ilmanen, and Thomas Maloney. 2017. "Market Timing: Sin a Little." *Journal of Investment Management* 15 (3): 23–40.

Asness, Clifford S., Antti Ilmanen, and Dan Villalon. 2023. "International Diversification: Still Not Crazy After All These Years." *Journal of Portfolio Management* 49 (6): 9–18. doi:10.3905/jpm.2023.1.489.

Asness, Clifford S., Roni Israelov, and John M. Liew. 2011. "International Diversification Works (Eventually)." *Financial Analysts Journal* 67 (3): 24–38. doi:10.2469/faj.v67.n3.1.

Asness, Clifford S., Tobias J. Moskowitz, and Lasse Heje Pedersen. 2013. "Value and Momentum Everywhere." *Journal of Finance* 68 (3): 929–85. doi:10.1111/jofi.12021.

Authers, John. 2024. "In the Long Run, We're All Revised Projections." Points of Return (November 22). Bloomberg Opinion.

Babu, Abhilash, Brendan Hoffman, Ari Levine, Yao Hua Ooi, Sarah Schroeder, and Erik Stamelos. 2020. "You Can't Always Trend When You Want." *Journal of Portfolio Management* 46 (4): 52–68. doi:10.3905/jpm.2020.1.133.

Bacchetta, Philippe, Elmar Mertens, and Eric van Wincoop. 2009. "Predictability in Financial Markets: What Do Survey Expectations Tell Us?" *Journal of International Money and Finance* 28 (3): 406–26. doi:10.1016/j.jimonfin.2008.09.001.

Bachelier, Louis. (1900) 2006. *Théorie de la Spéculation. Translated into English and reprinted as Louis Bachelier's Theory of Speculation: The Origins of Modern Finance*. Princeton, NJ: Princeton University Press.

Bachmann, Rüdiger, Giorgio Topa, and Wilbert van der Klaauw, eds. 2022. *Handbook of Economic Expectations*. Cambridge, MA: Academic Press.

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer. 2018. "Extrapolation and Bubbles." *Journal of Financial Economics* 129 (2): 203–27. doi:10.1016/j.jfineco.2018.04.007.

Bauer, Michael D., and Glenn D. Rudebusch. 2019. "Expectations About the Federal Funds Rate in the Long Run." FEDS Notes, October 9. Board of Governors of the Federal Reserve System. doi:10.17016/2380-7172.2463.

Begenau, Juliane, Pauline Liang, and Emil Siriwardane. 2025. "The Rise of Alternatives." Working paper, Stanford Graduate School of Business. doi:10.2139/ssrn.4940886.

Benartzi, Shlomo, and Richard H. Thaler. 1995. "Myopic Loss Aversion and the Equity Premium Puzzle." *Quarterly Journal of Economics* 110 (1): 73–92. doi:10.2307/2118511.

Bernstein, Peter L. 1998. *Against the Gods: The Remarkable Story of Risk*. Hoboken, NJ: Wiley.

Bernstein, William J., and Robert D. Arnott. 2003. "Earnings Growth: The Two Percent Dilution." *Financial Analysts Journal* 59 (5): 47–55. doi:10.2469/faj.v59.n5.2563.

Best, Peter, Alistair Byrne, and Antti Ilmanen. 1998. "What Really Happened to U.S. Bond Yields." *Financial Analysts Journal* 54 (3): 41–49. doi:10.2469/faj.v54.n3.2179.

Blitz, David. 2020. "Factor Performance 2010–2019: A Lost Decade?" *Journal of Index Investing* 11 (2): 57–65. doi:10.3905/jii.2020.1.090.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer. 2022a. "Overreaction and Diagnostic Expectations in Macroeconomics." *Journal of Economic Perspectives* 36 (3): 223–44. doi:10.1257/jep.36.3.223.

———. 2022b. "Salience." *Annual Review of Economics* 14: 521–44. doi:10.1146/annurev-economics-051520-011616.

Bordalo, Pedro, Nicola Gennaioli, Rafael La Porta, and Andrei Shleifer. 2019. "Diagnostic Expectations and Stock Returns." *Journal of Finance* 74 (6): 2839–74. doi:10.1111/jofi.12833.

———. 2024. "Belief Overreaction and Stock Market Puzzles." *Journal of Political Economy* 132 (5): 1450–84. doi:10.1086/727713.

Boudoukh, Jacob, Ronen Israel, and Matthew Richardson. 2019. "Long-Horizon Predictability: A Cautionary Tale." *Financial Analysts Journal* 75 (1): 17–30. doi:10.1080/0015198X.2018.1547056.

Boutros, Michael, Itzhak Ben-David, John R. Graham, Campbell R. Harvey, and John W. Payne. 2025. "The Persistence of Miscalibration." *Review of Financial Studies* 39 (11): 3413–49. doi:10.1093/rfs/hhaf070.

Braggion, Fabio, Felix von Meyerinck, Nic Schaub, and Michael Weber. 2025. "The Long-Term Effects of Inflation on Inflation Expectations." CESifo Working Paper No. 11679. doi:10.2139/ssrn.5153479.

Brixton, Alfie, Jordan Brooks, Pete Hecht, Antti Ilmanen, Thomas Maloney, and Nicholas McQuinn. 2023. "A Changing Stock–Bond Correlation: Drivers and Implications." *Journal of Portfolio Management* 49 (4): 64–80. doi:10.3905/jpm.2023.1.459.

Brixton, Alfie, Charles Fattouche, and Thomas Maloney. 2025. "A New Paradigm in Active Equity: Navigating Concentrated Markets and Harnessing New Technologies." White paper, AQR, 5 February. www.aqr.com/Insights/Research/White-Papers/A-New-Paradigm-in-Active-Equity.

Bro, Jeppe, and Jonas N. Eriksen. 2025. "Subjective Expectations and House Prices." *Journal of Banking and Finance* 172: 107377. doi:10.1016/j.jbankfin.2024.107377.

Brooks, Jordan. 2023. "Driving with the Rear-View Mirror." White paper, AQR. www.aqr.com/-/media/AQR/Documents/Insights/White-Papers/Driving-with-the-Rear-View-Mirror.pdf.

Campbell, John Y., and John H. Cochrane. 1999. "By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior." *Journal of Political Economy* 107 (2): 205–51. doi:10.1086/250059.

Campbell, John Y., and Robert J. Shiller. 1988. "Stock Prices, Earnings and Expected Dividends." *Journal of Finance* 43 (3): 661–76. doi:10.1111/j.1540-6261.1988.tb04598.x.

———. 1991. "Yield Spreads and Interest Rate Movements: A Bird's Eye View." *Review of Economic Studies* 58 (3): 495–514. doi:10.2307/2298008.

———. 1998. "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management* 24 (2): 11–26. doi:10.3905/jpm.24.2.11.

Chambers, David, Elroy Dimson, Antti Ilmanen, and Paul Rintamäki. 2024. "Long-Run Asset Returns." *Annual Review of Financial Economics* 16: 435–58. doi:10.1146/annurev-financial-082123-105515.

Chan, Louis K. C., Jason Karceski, and Josef Lakonishok. 2003. "The Level and Persistence of Growth Rates." *Journal of Finance* 58 (2): 643–84. doi:10.1111/1540-6261.00540.

Cochrane, John H. 2008. "The Dog That Did Not Bark: A Defense of Return Predictability." *Review of Financial Studies* 21 (4): 1533–75. doi:10.1093/rfs/hhm046.

———. 2011. "Presidential Address: Discount Rates." *Journal of Finance* 66 (4): 1047–108. doi:10.1111/j.1540-6261.2011.01671.x.

Coibion, Olivier, and Yuriy Gorodnichenko. 2015. "Information Rigidity and the Expectations Formation Process: A Simple Framework and New Facts." *American Economic Review* 105 (8): 2644–78. doi:10.1257/aer.20110306.

Coibion, Olivier, Yuriy Gorodnichenko, Saten Kumar, and Mathieu Pedemonte. 2020. "Inflation Expectations as a Policy Tool?" *Journal of International Economics* 124: 103297. doi:10.1016/j.jinteco.2020.103297.

Couts, Spencer J., Andrei S. Gonçalves, and Johnathan Loudis. 2026. "The Subjective Risk and Return Expectations of Institutional Investors." Fisher College of Business Working Paper No. 2023-03-014. doi:10.2139/ssrn.4458499.

Cowles, Alfred E. 1938. *Common Stock Indices, 1871–1937.* Cowles Commission for Research in Economics, Economic Monograph 3. Bloomington, IN: Principia Press.

Cox, John C., Jonathan E. Ingersoll, Jr., and Stephen A. Ross. 1985. "A Theory of the Term Structure of Interest Rates." *Econometrica* 53 (2): 385–407. doi:10.2307/1911242.

Crump, Richard K., Stefano Eusepi, Emanuel Moench, and Bruce Preston. 2022. "The Term Structure of Expectations." In *Handbook of Economic Expectations*, edited by Rüdiger Bachmann, Giorgio Topa, and Wilbert van der Klaauw, 507–40. Cambridge, MA: Academic Press. doi:10.1016/B978-0-12-822927-9.00025-2.

D'Acunto, Francesco, Ulrike Malmendier, and Michael Weber. 2022. "What Do the Data Tell Us About Inflation Expectations?" In *Handbook of Economic Expectations*, edited by Rüdiger Bachmann, Giorgio Topa, and Wilbert van der Klaauw, 133–61. Cambridge, MA: Academic Press. doi:10.1016/B978-0-12-822927-9.00012-4.

Dahlquist, Magnus, and Markus Ibert. 2024. "Equity Return Expectations and Portfolios: Evidence from Large Asset Managers." *Review of Financial Studies* 37 (6): 1887–928. doi:10.1093/rfs/hhae008.

———. 2026. "Institutions' Return Expectations Across Assets and Time." *Journal of Financial Economics* 175: 104188. doi:10.1016/j.jfineco.2025.104188.

DeBondt, Werner F. M., and Richard Thaler. 1985. "Does the Stock Market Overreact?" *Journal of Finance* 40 (3): 793–805. doi:10.1111/j.1540-6261.1985.tb05004.x.

Dimson, Elroy, Paul Marsh, and Mike Staunton. 2002. *Triumph of the Optimists: 101 Years of Global Investment Returns*. Princeton, NJ: Princeton University Press. doi:10.1515/9781400829477.

———. 2021. "American Exceptionalism: The Long-Term Evidence." *Journal of Portfolio Management* 47 (7): 14–26. doi:10.3905/jpm.2021.1.257.

———. 2026. *Global Investment Returns Yearbook 2026*. UBS. www.ubs.com/global/en/investment-bank/insights-and-data/articles/global-investment-returns-yearbook-2026.html.

Fama, Eugene F. 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work." *Journal of Finance* 25 (2): 383–417. doi:10.2307/2325486.

Fama, Eugene F., and Robert R. Bliss. 1987. "The Information in Long-Maturity Forward Rates." *American Economic Review* 77 (4): 680–92. www.jstor.org/stable/1814539.

Fama, Eugene F., and Kenneth R. French. 1988. "Dividend Yields and Expected Stock Returns." *Journal of Financial Economics* 22 (1): 3–25. doi:10.1016/0304-405X(88)90020-7.

———. 1993. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33 (1): 3–56. doi:10.1016/0304-405X(93)90023-5.

Farmer, Leland E., Emi Nakamura, and Jón Steinsson. 2024. "Learning About the Long Run." *Journal of Political Economy* 132 (10): 3334–77. doi:10.1086/730207.

Fisher, Lawrence, and James H. Lorie. 1964. "Rates of Return on Investments in Common Stocks." *Journal of Business* 37 (1): 1–21. doi:10.1086/294647.

Frankel, Jeffrey A., and Kenneth A. Froot. 1990. "Chartists, Fundamentalists, and Trading in the Foreign Exchange Market." *American Economic Review* 80 (2): 181–85. www.jstor.org/stable/2006566.

Frazzini, Andrea, and Lasse Heje Pedersen. 2014. "Betting Against Beta." *Journal of Financial Economics* 111 (1): 1–25. doi:10.1016/j.jfineco.2013.10.005.

Gennaioli, Nicola, and Andrei Shleifer. 2018. *A Crisis of Beliefs: Investor Psychology and Financial Fragility*. Princeton, NJ: Princeton University Press. doi:10.2307/j.ctvc77dv1.

Goyal, Amit, Antti Ilmanen, and David Kabiller. 2015. "Bad Habits and Good Practices." *Journal of Portfolio Management* 41 (4): 97–107. doi:10.3905/jpm.2015.41.4.097.

Graham, Benjamin F., and David L. Dodd. 1934. *Security Analysis*. New York: McGraw-Hill.

Graham, John R., and Campbell R. Harvey. 2018. "The Equity Risk Premium in 2018." Working paper, Duke University. doi:10.2139/ssrn.3151162.

Greenwood, Robin, and Andrei Shleifer. 2014. "Expectations of Returns and Expected Returns." *Review of Financial Studies* 27 (3): 714–46. doi:10.1093/rfs/hht082.

Gürkaynak, Refet S., Brian Sack, and Jonathan H. Wright. 2007. "The US Treasury Yield Curve: 1961 to the Present." *Journal of Monetary Economics* 54 (8): 2291–304. doi:10.1016/j.jmoneco.2007.06.029.

Haghani, Victor, and James White. 2024. "Introducing P-CAPE: Incorporating the Dividend Payout Ratio Improves Our Favorite Estimator of Stock Market Returns." Elm Wealth, 19 June. https://elmwealth.com/p-cape/.

Harris, Robert, Tim Jenkinson, and Rüdiger Stucke. 2012. "Are Too Many Private Equity Funds Top Quartile?" *Journal of Applied Corporate Finance* 24 (4): 77–89. doi:10.1111/j.1745-6622.2012.00402.x.

Hartzmark, Samuel M., and David H. Solomon. 2022. "Reconsidering Returns." *Review of Financial Studies* 35 (1): 343–93. doi:10.1093/rfs/hhab015.

Hecht, Peter, and Jeffrey Cao. 2025. "Portable Alpha: Why Now?" White paper, AQR, 20 February. www.aqr.com/Insights/Research/White-Papers/Portable-Alpha-Why-Now.

Hillenbrand, Sebastian, and Odhrain McCarthy. 2024. "Street Earnings: Implications for Asset Pricing." Working paper, 8 August.

Homer, Sidney. 1963. *A History of Interest Rates*. New Brunswick, NJ: Rutgers University Press.

Horizon Actuarial. 2025. *Survey of Capital Market Assumptions: 2025 Edition*. www.horizonactuarial.com/_files/ugd/f76a4b_a39fff36468c4cf9bf837c85a9b56d76.pdf.

Hyytinen, Ari, and Mika Pajarinen. 2008. "Why Are All New Entrepreneurs Better than Average? Evidence from Subjective Failure Rate Expectations." *Journal of Business Venturing* 23 (6): 705–21.

Ibbotson, Roger G., and Peng Chen. 2003. "Long-Run Stock Returns: Participating in the Real Economy." *Financial Analysts Journal* 59 (1): 88–98. doi:10.2469/faj.v59.n1.2505.

Ibbotson, Roger G., and Rex A. Sinquefield. 1976. "Stocks, Bonds, Bills and Inflation: Year-by-Year Historical Returns." *Journal of Business* 49 (1): 11–47. doi:10.1086/295803.

Ilmanen, Antti. 1996. "Market Rate Expectations and Forward Rates." *Journal of Fixed Income* 6 (2): 8–22. doi:10.3905/jfi.1996.408177.

———. 2011. *Expected Returns: An Investor's Guide to Harvesting Market Rewards*. Chichester, UK: Wiley. doi:10.1002/9781118467190.

———. 2022. *Investing amid Low Expected Returns: Making the Most When Markets Offer the Least*. Hoboken, NJ: Wiley.

Ilmanen, Antti, Ronen Israel, Rachel Lee, Tobias J. Moskowitz, and Ashwin K. Thapar. 2021. "How Do Factor Premia Vary over Time? A Century of Evidence." *Journal of Investment Management* 19 (4): 15–57.

Jivraj, Farouk, and Robert J. Shiller. 2017. "The Many Colors of CAPE." Yale ICF Working Paper No. 2018-22, 13 October. doi:10.2139/ssrn.3258404.

Jones, Bradley A. 2017. "Leaning with the Wind: Long-Term Asset Owners and Procyclical Investing." *Journal of Investment Management* 15 (2): 16–38.

Kahneman, Daniel. 2011. *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.

Kahneman, Daniel, and Amos Tversky. 1971. "Belief in the Law of Small Numbers." *Psychological Bulletin* 76 (2): 105–10. doi:10.1037/h0031322.

———. 1979. "Prospect Theory: An Analysis of Decision Under Risk." *Econometrica* 47 (2): 263–92. doi:10.2307/1914185.

Keynes, John Maynard. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.

Kim, Don H., and Jonathan H. Wright. 2005. "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates." FEDS Working Paper No. 2005-33, Board of Governors of the Federal Reserve System, August. www.federalreserve.gov/pubs/feds/2005/200533/200533pap.pdf.

Kim, Seanna, Trent Commins, and Ted Hsu. 2025. "Current Constituents CAPE." Research Affiliates, February. www.researchaffiliates.com/publications/articles/1070-current-constituents-cape.

Koijen, Ralph S. J., Tobias J. Moskowitz, Lasse Heje Pedersen, and Evert B. Vrugt. 2018. "Carry." *Journal of Financial Economics* 127 (2): 197–225. doi:10.1016/j.jfineco.2017.11.002.

Kothari, S. P., Eric So, and Rodrigo Verdi. 2016. "Analysts' Forecasts and Asset Pricing: A Survey." *Annual Review of Financial Economics* 8: 197–219. doi:10.1146/annurev-financial-121415-032930.

Kuchler, Theresa, Monika Piazzesi, and Johannes Stroebel. 2022. "Housing Market Expectations." In *Handbook of Economic Expectations*, edited by Rüdiger Bachmann, Giorgio Topa, and Wilbert van der Klaauw, 163–91. Cambridge, MA: Academic Press. doi:10.1016/B978-0-12-822927-9.00013-6.

Lakonishok, Josef, Andrei Shleifer, and Robert Vishny. 1994. "Contrarian Investment, Extrapolation, and Risk." *Journal of Finance* 49 (5): 1541–78. doi:10.1111/j.1540-6261.1994.tb04772.x.

Lefèvre, Edwin. (1923) 2009. *Reminiscences of a Stock Operator*. Reprinted and annotated. Hoboken, NJ: Wiley.

L'Her, Jean-François, Tarek Masmoudi, and Ram Karthik Krishnamoorthy. 2018. "Net Buybacks and the Seven Dwarfs." *Financial Analysts Journal* 74 (4): 57–85. doi:10.2469/faj.v74.n4.4.

Ma, Rui, Ben R. Marshall, Nhut H. Nguyen, and Nuttawat Visaltanachoti. 2024. "Estimating Long-Term Expected Returns." *Financial Analysts Journal* 80 (4): 134–54. doi:10.1080/0015198X.2024.2358737.

Macaulay, Frederick R. 1938. *The Movements of Interest Rates, Bond Yields and Stock Prices in the United States Since 1856*. Cambridge, MA: National Bureau of Economic Research.

Malmendier, Ulrike, and Stefan Nagel. 2011. "Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?" *Quarterly Journal of Economics* 126 (1): 373–416. doi:10.1093/qje/qjq004.

———. 2016. "Learning from Inflation Experiences." *Quarterly Journal of Economics* 131 (1): 53–87. doi:10.1093/qje/qjv037.

Maloney, Thomas. 2024. "Honey, the Fed Shrunk the Equity Premium: Asset Allocation in a Higher-Rate World." *Journal of Portfolio Management* 50 (6): 7–22. doi:10.3905/jpm.2024.1.601.

Markowitz, Harry M. 1952. "Portfolio Selection." *Journal of Finance* 7 (1): 77–91. doi:10.1111/j.1540-6261.1952.tb01525.x.

Mauboussin, Michael, and Dan Callahan. 2023. *Total Shareholder Return*. Consilient Observer, Counterpoint Global Insights, Morgan Stanley Investment Management.

McCarthy, Odhrain, and Sebastian Hillenbrand. 2025. "Heterogeneous Beliefs and Stock Market Fluctuations." Working paper, 1 April. doi:10.2139/ssrn.3944887.

McQuarrie, Edward F. 2021. "Where Siegel Went Awry: Outdated Sources and Incomplete Data." Working paper, 23 July. doi:10.2139/ssrn.3805927.

———. 2024a. "Stocks for the Long Run? Sometimes Yes, Sometimes No." *Financial Analysts Journal* 80 (1): 12–28. doi:10.1080/0015198X.2023.2268556.

———. 2024b. "Introducing a New Monthly Series of US Government Bond Returns 1793–2023." Working paper, 18 July.

McQuinn, Nicholas, Ashwin Thapar, and Dan Villalon. 2021. "Portfolio Protection? It's a Long (Term) Story." *Journal of Portfolio Management* 47 (3): 35–50. doi:10.3905/jpm.2020.1.203.

Mian, Atif, Amir Sufi, and Nasim Khoshkhou. 2023. "Partisan Bias, Economic Expectations, and Household Spending." *Review of Economics and Statistics* 105 (3): 493–510. doi:10.1162/rest_a_01045.

Milliman. 2025. "2024 Public Pension Funding Study." www.milliman.com/en/insight/2024-public-pension-funding-study.

Modigliani, Franco, and Richard A. Cohn. 1979. "Inflation, Rational Valuation and the Market." *Financial Analysts Journal* 35 (2): 24–44. doi:10.2469/faj.v35.n2.24.

Moskowitz, Tobias J., Yao Hua Ooi, and Lasse Heje Pedersen. 2012. "Time Series Momentum." *Journal of Financial Economics* 104 (2): 228–50. doi:10.1016/j.jfineco.2011.11.003.

Nagel, Stefan, and Zhengyang Xu. 2022. "Asset Pricing with Fading Memory." *Review of Financial Studies* 35 (5): 2190–245. doi:10.1093/rfs/hhab086.

———. 2023. "Dynamics of Subjective Risk Premia." *Journal of Financial Economics* 150 (2). doi:10.1016/j.jfineco.2023.103713.

Natixis. 2025. "2025 Naxtis Global Survey of Individual Investors."

Park, Min, Matt Peterson, and Eric H. Weisbrod. 2025. "Top-Down vs. Bottom-Up Index Forecasts: The Information Content of Equity Strategists' Relative Pessimism." Working paper, 7 May. doi:10.2139/ssrn.4695279.

Philips, Thomas K. 2024. "Estimating Expected Returns: Then and Now." *Journal of Portfolio Management* 50 (10): 74–87. doi:10.3905/jpm.2024.1.629.

Philosophical Economics. 2013. "The Single Greatest Predictor of Future Stock Market Returns." *Philosophical Economics* (blog), 20 December. www.philosophicaleconomics.com/2013/12/the-single-greatest-predictor-of-future-stock-market-returns.

Piazzesi, Monika, Juliana Salomao, and Martin Schneider. 2015. "Trend and Cycle in Bond Premia." Working paper, March. https://web.stanford.edu/~piazzesi/trendcycle.pdf.

Poterba, James M., and Lawrence H. Summers. 1988. "Mean Reversion in Stock Prices: Evidence and Implications." *Journal of Financial Economics* 22 (1): 27–59. doi:10.1016/0304-405X(88)90021-9.

Rasmussen, Daniel. 2025. *The Humble Investor: How to Find a Winning Edge in a Surprising World*. Petersfield, UK: Harriman House.

Rintamäki, Paul. 2024. "Equity Wealth Cycles." Working paper, 20 July. doi:10.2139/ssrn.3924180.

Rogoff, Kenneth S., Barbara Rossi, and Paul Schmelzing. 2024. "Long-Run Trends in Long-Maturity Real Rates, 1311–2022." *American Economic Review* 114 (8): 2271–307. doi:10.1257/aer.20221352.

Schmelzing, Paul. 2020. "Eight Centuries of Global Real Interest Rates, R-G, and the 'Suprasecular' Decline, 1311–2018." Bank of England Working Paper No. 845, January. doi:10.2139/ssrn.3520654.

Sharpe, William F. 1964. "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk." *Journal of Finance* 19 (3): 425–42. doi:10.1111/j.1540-6261.1964.tb02865.x.

———. 1991. "The Arithmetic of Active Management." *Financial Analysts Journal* 47 (1): 7–9. doi:10.2469/faj.v47.n1.7.

Shiller, Robert J. n.d. Shiller Data (online database). www.shillerdata.com.

———. 1981. "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review* 71 (3): 421–36. www.jstor.org/stable/1802789.

———. 2016. *Irrational Exuberance*. 3rd ed. Princeton, NJ: Princeton University Press.

Siegel, Jeremy J. 1994. *Stocks for the Long Run*. New York: McGraw-Hill.

———. 2016. "The Shiller CAPE Ratio: A New Look." *Financial Analysts Journal* 72 (3): 41–50. doi:10.2469/faj.v72.n3.1.

Siegel, Laurence B. 2018. "She Caught the CATY, and Left Me a Mule to Ride: Improving on Dividend Yield as an Indicator of Stock Valuations and Expected Returns." 15 March. https://larrysiegel.org/she-caught-the-caty/.

Siegel, Laurence B., and Paul McCaffrey, eds. 2023. *Revisiting the Equity Risk Premium*. Charlottesville, VA: CFA Institute Research Foundation. doi:10.56227/23.1.16.

Smith, Edgar Lawrence. 1924. *Common Stocks as Long Term Investments*. New York: Macmillan.

Smolyansky, Michael. 2023. "End of an Era: The Coming Long-Run Slowdown in Corporate Profit Growth and Stock Returns." Finance and Economics Discussion Series 2023-041, Board of Governors of the Federal Reserve System, June. doi:10.17016/feds.2023.041.

Spiegelhalter, David. 2024. *The Art of Uncertainty: How to Navigate Chance, Ignorance, Risk and Luck*. New York: Pelican.

Straehl, Philip U., and Roger G. Ibbotson. 2017. "The Long-Run Drivers of Stock Returns: Total Payouts and the Real Economy." *Financial Analysts Journal* 73 (3): 32–52. doi:10.2469/faj.v73.n3.4.

Taleb, Nassim Nicholas. 2007. *The Black Swan*. New York: Random House.

Taylor, Bryan. 2023. "GFD Guide to Global Stock Markets, 2023 Edition." Working paper, 18 July. doi:10.2139/ssrn.4514486.

Thinking Ahead Institute. 2025. "Global Pension Assets Study—2025." www.thinkingaheadinstitute.org/research-papers/global-pension-assets-study-2025/.

Tobin, James L. 1958. "Liquidity Preference as Behavior Towards Risk." *Review of Economic Studies* 25 (2): 65–86. doi:10.2307/2296205.

Tversky, Amos, and Daniel Kahneman. 1974. "Judgment Under Uncertainty: Heuristics and Biases." *Science* 185 (4157): 1124–31. doi:10.1126/science.185.4157.1124.

University of Groningen. 2020. Maddison Project Database 2020. Groningen Growth Development Center. www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2020.

Vanguard. 2025. "Investor Pulse: Both Optimism and Uncertainty About 2025." https://corporate.vanguard.com/content/corporatesite/us/en/corp/articles/investor-pulse-mix-optimism-uncertainty-about-2025.html (inactive).

Vasicek, Oldrich. 1977. "An Equilibrium Characterization of the Term Structure." *Journal of Financial Economics* 5 (2): 177–88. doi:10.1016/0304-405X(77)90016-2.

Welch, Ivo, and Amit Goyal. 2008. "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction." *Review of Financial Studies* 21 (4): 1455–508. doi:10.1093/rfs/hhm014.

Williams, John Burr. 1938. *The Theory of Investment Value*. Cambridge, MA: Harvard University Press.

Yardeni, Edward. n.d. "Our Charts." Yardeni Research. www.yardeni.com/charts.

CFA Institute Research Foundation Board of Trustees 2026–2027

Chair
Susan Spinner, CFA

Vice Chair
Jeffery V. Bailey, CFA

Interim President and CEO, CFA Institute
Tricia Rothschild, CFA

*Emeritus

Giuseppe Ballocchi, PhD, CFA

Aaron Brown, CFA*

Cheng Sung, PhD

Peg DiOrio, CFA

Mei Gao, CFA

Will Goodhart

Attila Köksal, CFA

Aaron Low, CFA*

Lotta Moberg, PhD, CFA*

Kurt D. Winkelmann, PhD

Research Directors

Luis Garcia-Feijóo, CFA, CIPM

Lionel Martellini, PhD

Gary P. Brinson Director of Research Emeritus
Laurence B. Siegel

Staff

Treasurer
Alicia Martinez, CTP

Secretary
Lydia Ooghe

Strategic Operations Manager
Stacie Shure

For more information on members of the CFA Institute Research Foundation Board of Trustees, please visit https://rpc.cfainstitute.org/research-foundation/trustees.



ISBN 978-1-952927-86-7

Available online at
rpc.cfainstitute.org