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RETHINKING THE ROLE OF FIXED INCOME: DIVERSIFICATION AND THE PURSUIT OF A FREE LUNCH

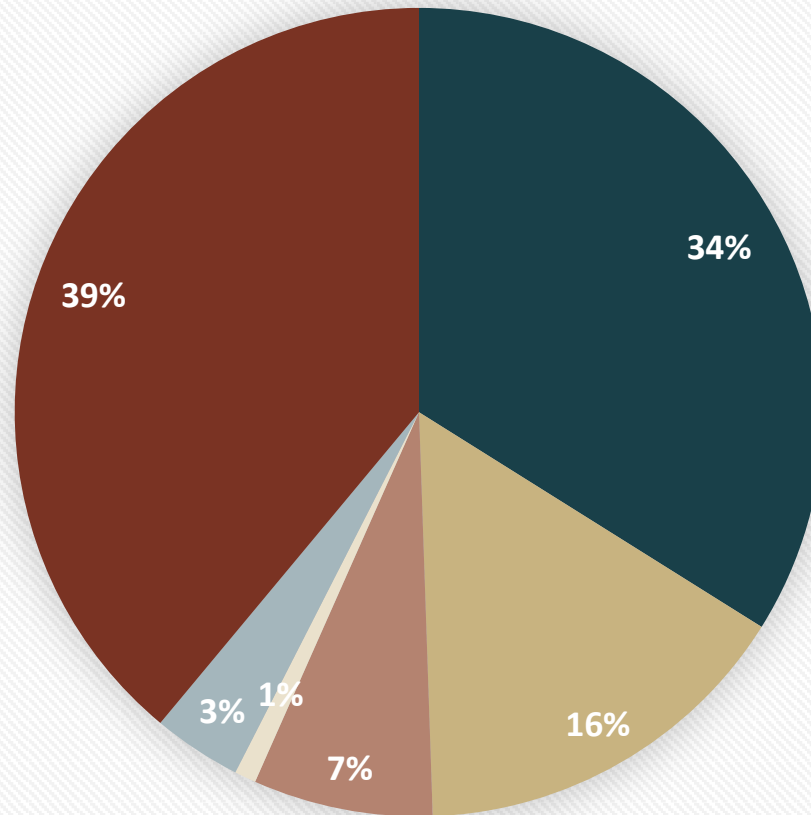
PAPERS 2018 SPRING FORUM

Erasing the word “boring” from the fixed income conversation.

***Summary:** An important building block of an efficient portfolio, uncorrelated and highly liquid fixed income can enhance an institutional investor’s ability to make tactical allocation decisions, improve portfolio risk metrics, and maximize total returns. The advent of big data and advanced analytics in asset management, including scenario testing and portfolio-specific correlation analysis, provides a powerful tool for investors seeking to optimize their portfolios and maximize the diversification benefit of not just fixed income, but all of assets classes.*

Snapshot of the eVestment Database

Total Products in eVestment Database: 57,898



■ Equity ■ Fixed Income ■ Balanced/ Multi Asset ■ Real Estate ■ Alternatives ■ Hedge Funds

eVestment Asset Class Breakdown

How many choices do we have?

Asset Class	Products	Firms
Equity	19,633	3,138
Fixed Income	9,003	1,298
Balanced/ Multi Asset	4,160	991
Real Estate	498	221
Alternatives	2,052	847
Hedge Funds	22,552	7,066
Total	57,898	13,561



57,898 Products = 540 Asset Classes

**540 Asset Classes that average 107
product offerings!**

eVestment “Fixed Income” Universe

How many Fixed Income “asset class” choices do we have?

- eVestment All US Fixed Income
- eVestment US Multi-Sector Fixed Income
- eVestment US High Yield Quality Bias Fixed Income
- eVestment US Long Duration Fixed Income
- eVestment US Passive Fixed Income
- eVestment US Passive Short Duration Fixed Income
- eVestment US Passive TIPS / Inflation Fixed Income
- eVestment US Passive Corporate Fixed Income
- eVestment US Government Fixed Income
- eVestment US Securitized Fixed Income - Non-Traditional
- eVestment US Municipal Fixed Income - Short Duration
- eVestment US Municipal Fixed Income - All Duration
- eVestment US Stable Value Fixed Income
- eVestment US Floating-Rate Bank Loan Fixed Income
- eVestment Canadian Short Duration Fixed Income
- eVestment Canadian Core Plus Fixed Income
- eVestment Canadian Mortgage Fixed Income
- eVestment All UK Fixed Income
- eVestment UK Corporate Fixed Income
- eVestment UK Short Duration Fixed Income
- eVestment UK All Duration Fixed Income
- eVestment Europe (Non-Euroland) Fixed Income
- eVestment Europe Fixed Income - Intermediate Duration
- eVestment Europe Fixed Income - Aggregate
- eVestment Europe Fixed Income - Government
- eVestment Europe Fixed Income - Convertibles
- eVestment Europe Fixed Income - Passive
- eVestment Swiss Fixed Income
- eVestment Japan Core Fixed Income
- eVestment Asia Fixed Income - Investment Grade
- eVestment Asia Fixed Income - Local Currency
- eVestment RMB/CNH Fixed Income
- eVestment Singapore Fixed Income
- eVestment All Global Fixed Income
- eVestment Global Fixed Income - Short Duration
- eVestment Global Fixed Income - All Duration
- eVestment Global High Yield Fixed Income - Unhedged
- eVestment Global Multi-Sector Fixed Income
- eVestment Global Unconstrained Fixed Income
- eVestment Global Floating-Rate Bank Loan Fixed Income
- eVestment Global Emerging Mkts Fixed Income - Unhedged
- eVestment Global Emerging Mkts Fixed Income - Blended Currency
- eVestment Global Emerging Mkts Passive Fixed Income
- eVestment Liability Driven Fixed Income
- eVestment SMA/Wrap - US Core Fixed Income
- eVestment All Fixed Income (ETF Strategist)
- eVestment US Core Fixed Income
- eVestment US High Yield Fixed Income
- eVestment US Short Duration Fixed Income
- eVestment US Long Duration - Credit Fixed Income
- eVestment US Passive Core Fixed Income
- eVestment US Passive Interm Duration Fixed Income
- eVestment US Passive Government Fixed Income
- eVestment US Enhanced Fixed Income
- eVestment US Securitized Fixed Income
- eVestment US Corporate Fixed Income
- eVestment US Municipal Fixed Income - Interm Duration
- eVestment US High Yield Municipal Fixed Income
- eVestment US Stable Value (Book Value) Fixed Income
- eVestment All Canadian Fixed Income
- eVestment Canadian Long Duration Fixed Income
- eVestment Canadian Corporate Fixed Income
- eVestment Canadian Passive Fixed Income
- eVestment UK Aggregate Fixed Income
- eVestment UK Government Fixed Income
- eVestment UK Interm Duration Fixed Income
- eVestment UK Passive Fixed Income
- eVestment Europe Fixed Income
- eVestment Europe Fixed Income - Long Duration
- eVestment Europe Fixed Income - Core Plus
- eVestment Europe Fixed Income - High Yield
- eVestment Europe Fixed Income - Covered Bond
- eVestment Europe Fixed Income - Asset-Backed Securities (ABS)
- eVestment Nordic Fixed Income
- eVestment Japan Passive Fixed Income
- eVestment Asia Fixed Income - High Yield
- eVestment Asia Fixed Income - Blended Currency
- eVestment Malaysia Fixed Income
- eVestment All New Zealand Fixed Income
- eVestment Global Fixed Income - Hedged
- eVestment Global Fixed Income - Intermediate Duration
- eVestment Global High Yield Fixed Income
- eVestment Global Agg Fixed Income
- eVestment Global Government Fixed Income
- eVestment Global Inflation Indexed Fixed Income
- eVestment All Emerging Mkts Fixed Income
- eVestment Global Emerging Mkts Fixed Income - Hard Currency
- eVestment Global Emerging Mkts Fixed Income - Corporate Debt
- eVestment All Africa Fixed Income
- eVestment US Fixed Income ESG-Focused
- eVestment SMA/Wrap - US High Yield Fixed Income
- eVestment US Core Plus Fixed Income
- eVestment US High Yield Fixed Income - Short Duration
- eVestment US Interm Duration Fixed Income
- eVestment US Long Duration - Gov/Cred Fixed Income
- eVestment US Passive High Yield Fixed Income
- eVestment US Passive Long Duration Fixed Income
- eVestment US Passive Securitized Fixed Income
- eVestment US TIPS / Inflation Fixed Income
- eVestment US Securitized Fixed Income - Mortgage
- eVestment US Municipal Fixed Income
- eVestment US Municipal Fixed Income - Long Duration
- eVestment US Unconstrained Fixed Income
- eVestment US Stable Value (Market Value) Fixed Income
- eVestment Canadian Cash Management Fixed Income
- eVestment Canadian Core Fixed Income
- eVestment Canadian High Yield Fixed Income
- eVestment North American Fixed Income
- eVestment UK Core Plus Fixed Income
- eVestment UK Inflation Indexed Fixed Income
- eVestment UK Long Duration Fixed Income
- eVestment All Europe Fixed Income
- eVestment Europe Fixed Income - Short Duration
- eVestment Europe Fixed Income - All Duration
- eVestment Europe Fixed Income - Corporate
- eVestment Europe Fixed Income - Cash Management
- eVestment Europe Fixed Income - Inflation Indexed
- eVestment Europe Fixed Income - Secured Loans
- eVestment All Japan Fixed Income
- eVestment All Asia Pacific Fixed Income
- eVestment Asia Fixed Income - Hard Currency
- eVestment All Hong Kong Fixed Income
- eVestment India Fixed Income
- eVestment All EAFE Fixed Income
- eVestment Global Fixed Income - Unhedged
- eVestment Global Fixed Income - Long Duration
- eVestment Global High Yield Fixed Income - Hedged
- eVestment Global Core Plus Fixed Income
- eVestment Global Credit Fixed Income
- eVestment Global Passive Fixed Income
- eVestment Global Emerging Mkts Fixed Income - Hedged
- eVestment Global Emerging Mkts Fixed Income - Local Currency
- eVestment Global Emerging Mkts High Yield Fixed Income
- eVestment South Africa Fixed Income
- eVestment Global Fixed Income ESG-Focused
- eVestment ETF - US Fixed Income

Putting “Fixed Income” Under The Microscope

How many Fixed Income “asset class” choices do we have?

- Number of firms that report fixed income products to eVestment: **1,298 Firms**
- Number of fixed income products: **9,003 Products**
- Number of fixed income universes in eVestment: **136 Universes**
- Number of firms and products in U.S. Core Fixed Income Universe: **201 Firms, 263 Products**

- *Number of products in the U.S. Core Fixed Income Universe with any high yield, bank loan or non-core exposure: **122 Products or 46% of the US Core Fixed Income Universe***



Conclusion: 46% of self-identified “Core Fixed Income” products, are Non-Core

Return Correlations

Data Sourced from eVestment as of December 31, 2017

eVestment Universe	Number of Strategies in eVestment Universe	Number of Firms with 10 Year Data	10 Year Average Correlation to S&P 500	10 Year Average Correlation to BB U.S. Aggregate Index
US Government Fixed Income	17	16	-0.51	0.82
US Stable Value Fixed Income	42	35	-0.32	0.29
US Municipal Fixed Income	210	152	-0.10	0.69
US Securitized Fixed Income - Mortgage	66	47	-0.05	0.62
US Core Fixed Income	264	225	-0.04	0.86
US TIPS/Inflation Fixed Income	51	40	0.00	0.55
US Securitized Fixed Income	115	67	0.07	0.51
US Core Plus Fixed Income	147	114	0.30	0.65
All Global Fixed Income	750	290	0.32	0.34
US Securitized Fixed Income - Non Traditional	49	20	0.35	0.26
US Corporate Fixed Income	96	60	0.35	0.65
All Emerging Market Fixed Income	361	112	0.62	0.21
US Floating-Rate Bank Loan Fixed Income	116	52	0.65	-0.23
Global High Yield Fixed Income	99	40	0.70	-0.05
US High Yield Fixed Income	253	145	0.76	-0.07
Average Correlation:			0.21	0.41

- Remember: Number of products in the U.S. Core Fixed Income Universe with any high yield, bank loan or non-core exposure: 133 (of these 264) Products or 50.3% of the US Core Fixed Income Universe. What happens to Correlation in this case?

Putting “Fixed Income” Under The Microscope

How many Fixed Income “asset class” choices do we have?

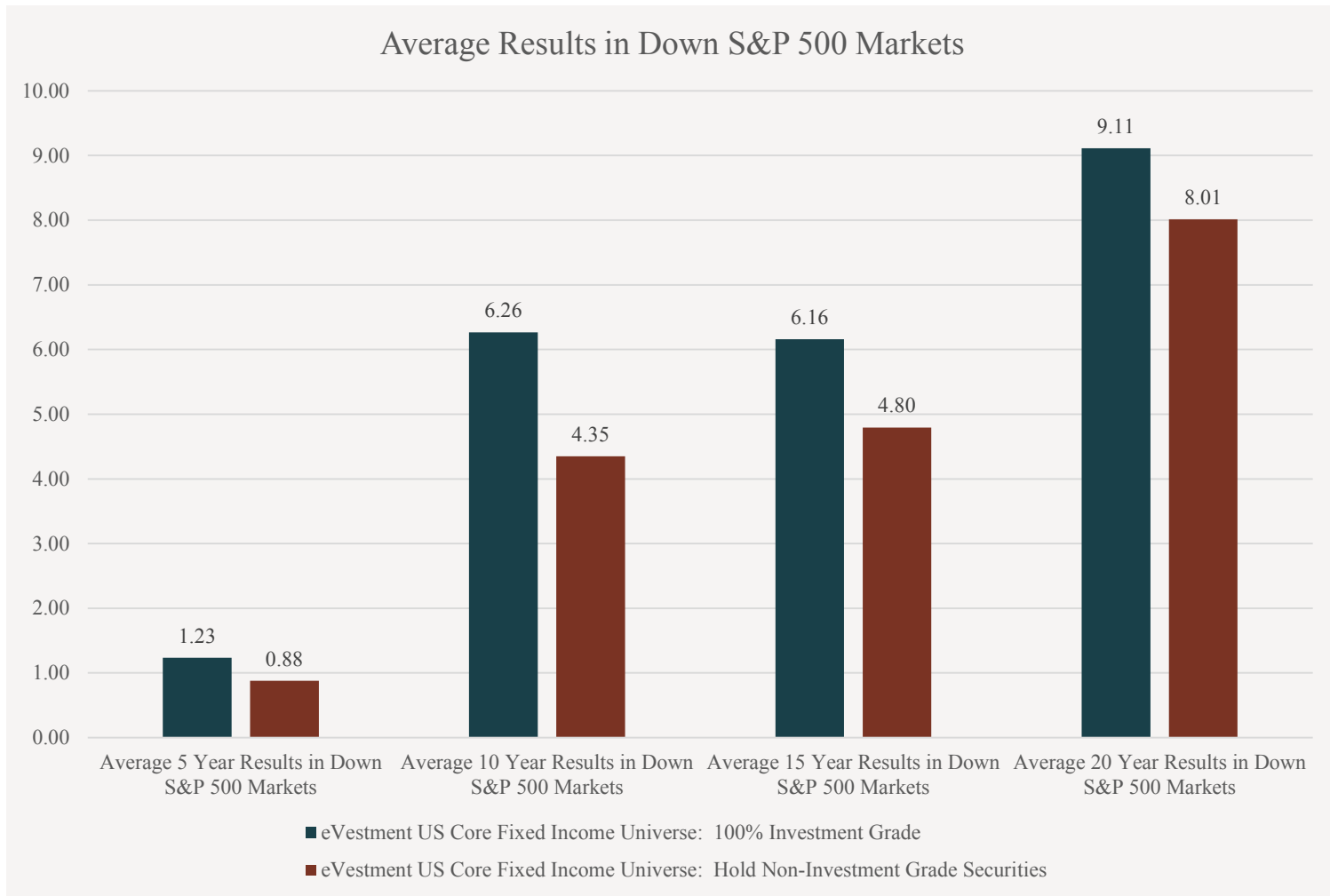
- Number of products in the U.S. Core Fixed Income Universe with any high yield, bank loan or non-core exposure: **133 Products or 50.3% of the US Core Fixed Income Universe.** What happens to Correlation in this case?*

10-year Average Correlation to S&P 500 of the 131 “true” Core: -0.14

10-year Average Correlation to S&P 500 of the 133 “other” Core: 0.06

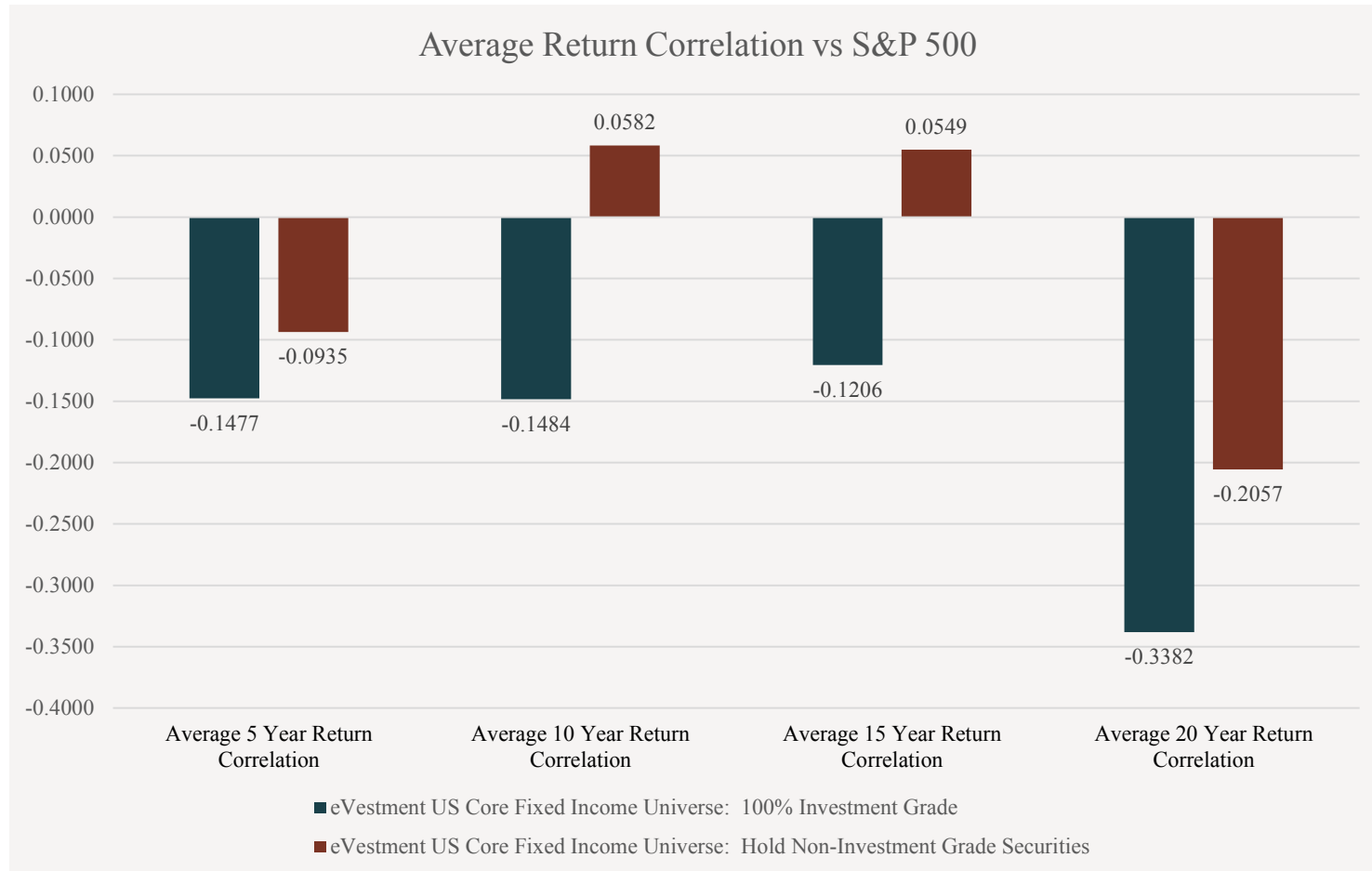
Putting “Fixed Income” Under The Microscope

Average Results in Down S&P 500 Markets



Putting “Fixed Income” Under The Microscope

Average Return Correlation vs S&P 500



Putting “Fixed Income” Under The Microscope

The Scenario:


- A) We all live in Alaska
- B) Two identical trucks are for sale

Full Disclosure: And except for one very minor difference in the engine components of one of them, which you'll only notice the difference in very dangerous snowstorms, they are the same.

- C) Price is the same, \$37,000
- D) There is a 30% chance of very poor driving conditions in any given year



Putting “Fixed Income” Under The Microscope



“Full Disclosure: Except for one very minor difference in the engine components of one of them, which you’ll only notice the difference in very dangerous snowstorms, they are the same.”

Putting "Fixed Income" Under The Microscope

FIXED INCOME IS NOT BORING!



And there are consequences to our mistakes

Putting “Fixed Income” Under The Microscope

But what if TWO Trucks went on sale both for 37% off?



Diversification:



- 1) This is why we diversify
- 2) And a reminder to not get greedy – Markets have a mind of their own

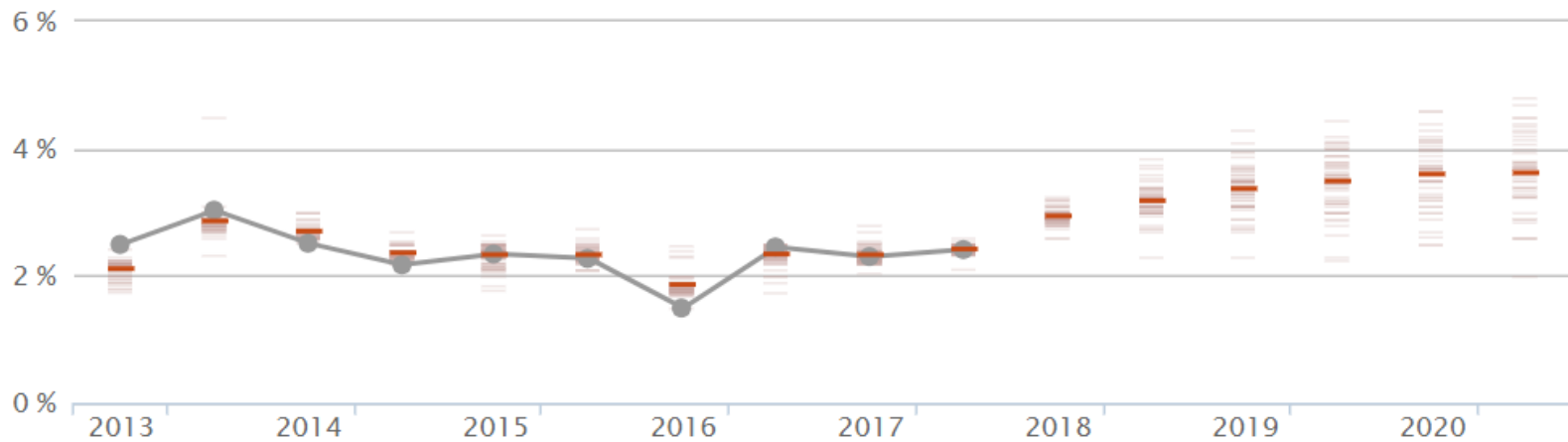
Easy to do, right?

Economic Forecasting Survey

The Wall Street Journal surveys a group of more than 60 economists on more than 10 major economic indicators on a monthly basis.

10 Year Note

Actual
 Estimates
 12 yr.
8 yr.
4 yr.



Share view:

Embed

10 Year Note

Actual (Dec. 2017)

2.41%

Projected: Jun. 2018

2.94% ▲

Projected: Dec. 2018

3.18%

Projected: Jun. 2019

3.37%



Market Forecasting: WSJ Survey

Bond Yields:

Average forecast for closing yield on 10-year Treasury notes in December 2017: 2.89%

Actual yield as of Dec. 22: 2.486%

Swing and a miss. Economists had predicted rising government bond yields in 2017, but the yield on the benchmark 10-year Treasury note has moved sideways even as the Fed has pushed up short-term rates. One result: The so-called yield curve has flattened, which could be a warning sign for the economy.

Fed Rate Increases:

Average forecast for 2017: Three rate increases

Actual: Three rate increases

4/25/2018 What Economic Forecasters Got Right, and Wrong, in 2017 - Real Time Economics - WSJ

<https://blogs.wsj.com/economics/2017/12/26/what-economic-forecasters-got-right-and-wrong-in-2017/> 3/4

Back in 2016, economists expected three federal-funds-rate rate increases but got only one.

This year, they got the three increases they expected as the expansion remained on track and the unemployment rate moved below Fed officials' estimates for its sustainable long-term level.

Notes:

- 1) *The group did fairly well on forecasts for inflation, GDP, Crude Oil, Housing and recession risk.*
- 2) *Bond Yields have historically proven difficult to predict.*

Remember January 2016?

“Historic week: Dow plunge 1,079 points”

- Jan, 8, 2016 money.cnn.com

“Dow plunges 391 points as fear grips markets”

- Jan, 15, 2016 money.cnn.com

“U.S. stocks post worst 10-day start to a year in history.”

- Jan, 15, 2016 marketwatch.com

“Oil prices plumbed new lows, dropping below \$28 per barrel.”

- Jan 15, 2016 oilprice.com

“Bad January a bad omen for stocks in 2016?”

- Jan, 31, 2016 chicagotribune.com

“Ouch. 93% of investors lost money in January”

- Feb 1, 2016 money.cnn.com

Remember what happened next?

“United Kingdom votes for ‘Brexit’, toppling government”

- June 24, 2016 usatoday.com

“Headlines sound the alarm about rock-bottom interest rates around the world.”

- July 7, 2016 forbes.com

“10-year U.S. Treasury bonds has hit all-time lows.”

- July 7, 2016 money.cnn.com

“Presidential election 2016: In a stunner, Donald Trump wins.”

- November 9, 2016 cbsnews.com

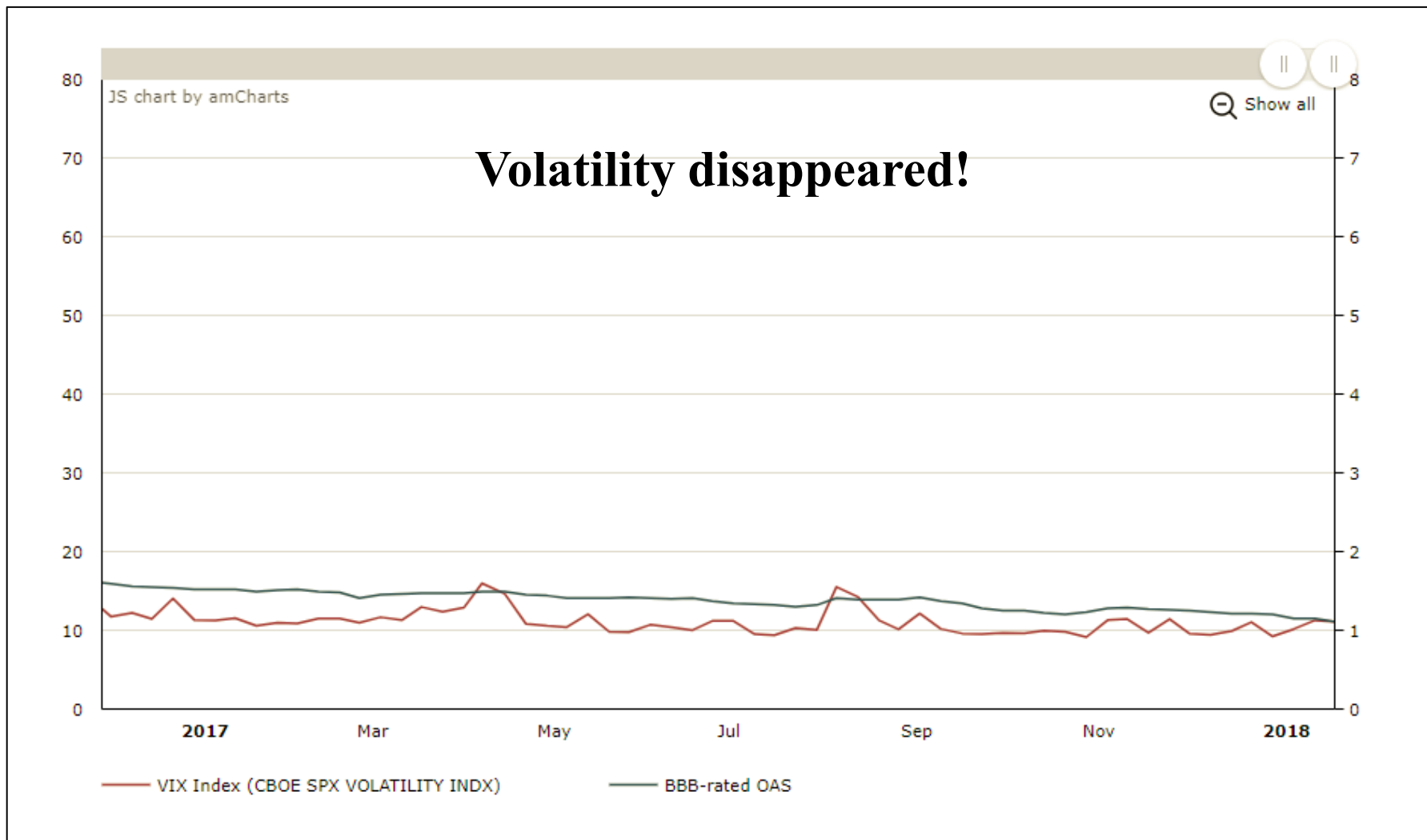
“Stocks close out 2016 with double-digit gains.”

- December 30, 2016 cnbc.com

“Dow hits record, topping 21,000 for the first time.”

- March 1, 2017 cbsnews.com

And then, this (calendar year 2017)?



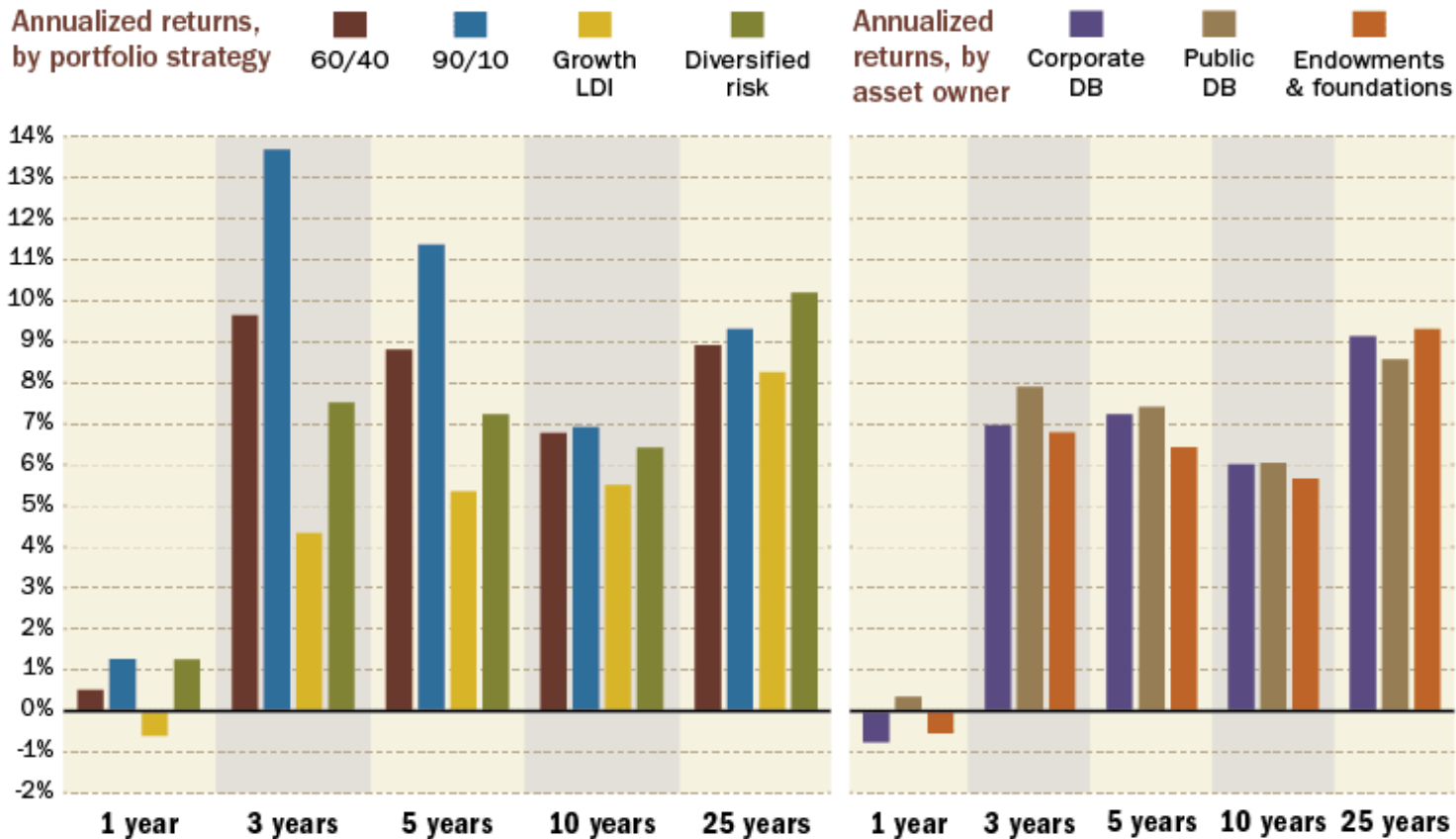
One Conclusion:

Markets - to an extent - have a mind of their own. Crystal balls in our industry are cloudy at best in the short-term.

Diversification at the Plan level

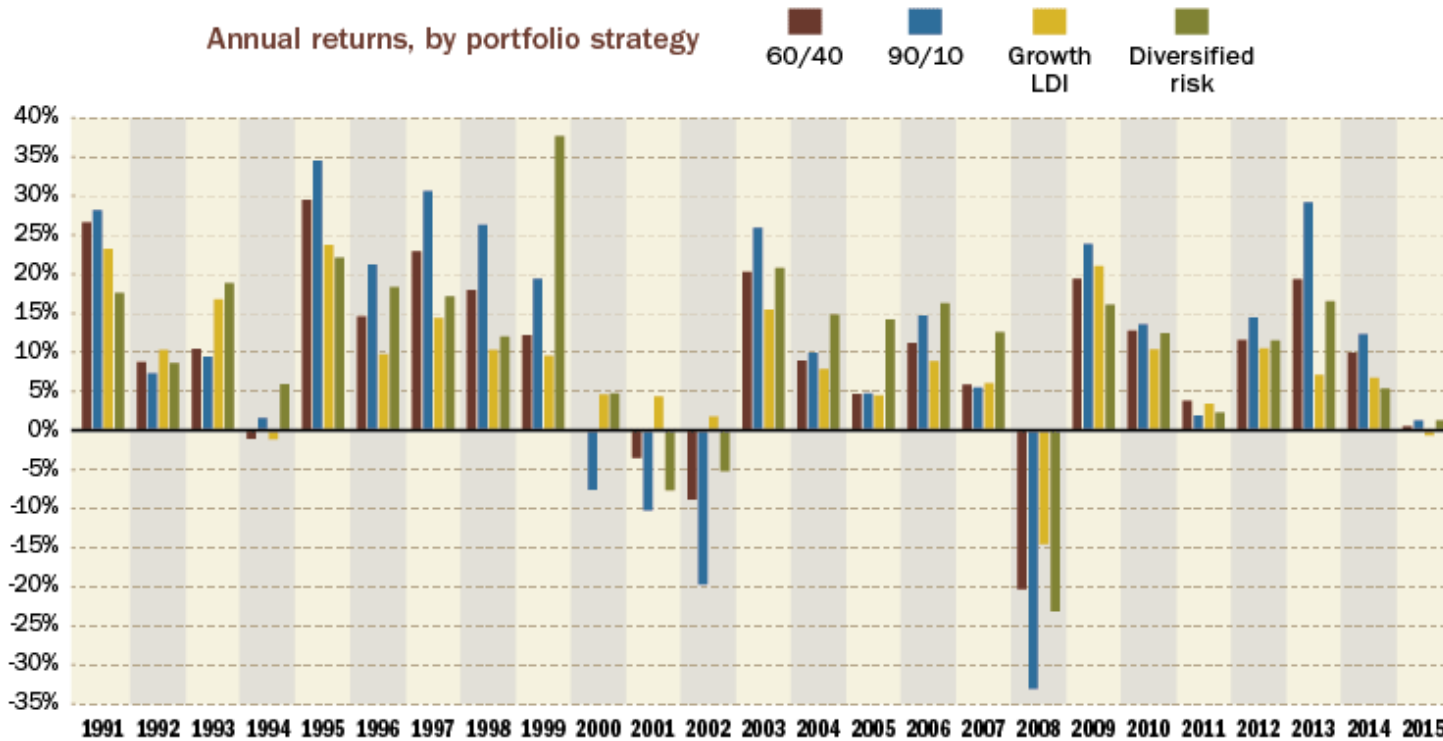
Active vs. Passive – A P&I analysis:

According to a *P&I* analysis, diversified portfolios constructed with active, passive and alternative investments produced the highest risk-adjusted return over the 25 years ended Dec. 31.



“The Big differences” that can occur in any given year tend to smooth out over time. *Risk Profiles Matter!*

Active vs. Passive – A P&I analysis:



➔ Big differences can occur in a given year.

Pensions & Investments used the following indexes to calculate the annualized returns of its model portfolios:

60/40: Russell 3000, 60%; Barclays Capital U.S. Aggregate Bond (total return), 40%;

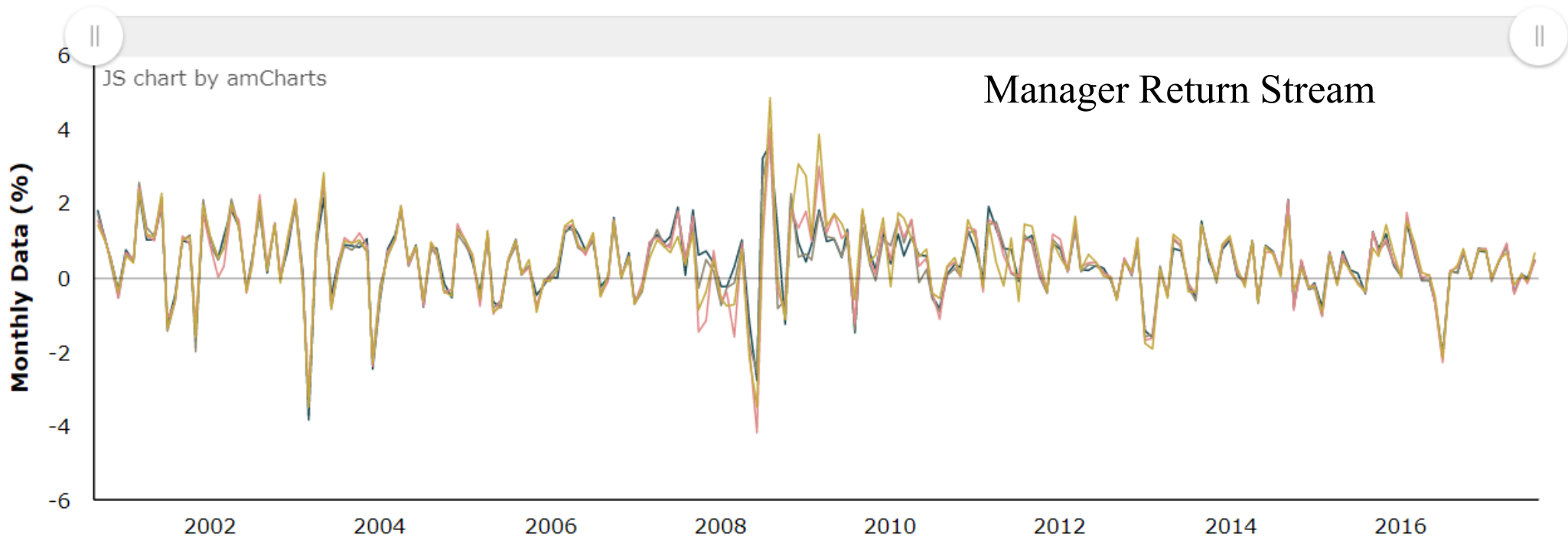
90/10: Standard & Poor's 500, 90%; Barclays Capital U.S. Short Treasury (total return), 10%;

Growth LDI: Barclays U.S. Aggregate Corporate Bond (total return), 60%; Hedge Fund Research HFRI Fund Weighted Composite, 20%; Russell 3000, 15%; MSCI Europe Australasia Far East, 5%;

Diversified risk: listed equities, 30% (Russell 3000 and MSCI EAFE, 15% each); HFRI Fund Weighted Composite, 20%; private equity, 20% (Cambridge Associates U.S. Private Equity, 15%, and Cambridge Associates U.S. Venture Capital, 5%); real assets, 20% (NCREIF Property, 10%, Standard & Poor's GSCI Total Return, 5%, NCREIF Farmland, 2.5%, and NCREIF Timberland, 2.5%); Barclays U.S. Aggregate Corporate Bond (total return), 10%.

Source: Pensions & Investments; Wilshire TUCS

Risk Matters: Capturing the “Free Lunch”



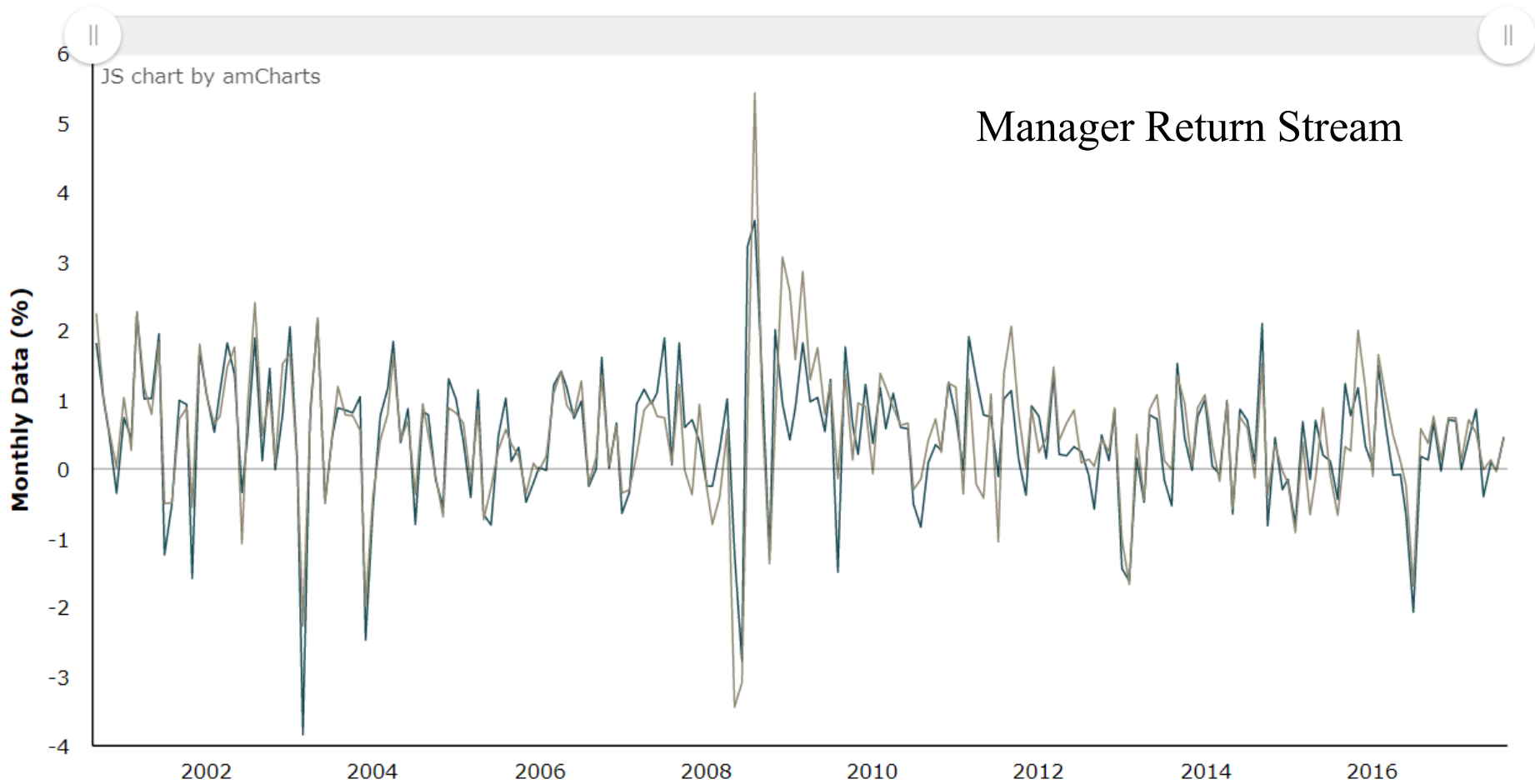
Source: C.S. McKee EIP (Education and Information Portal)

Risk Matters: Capturing the “Free Lunch”



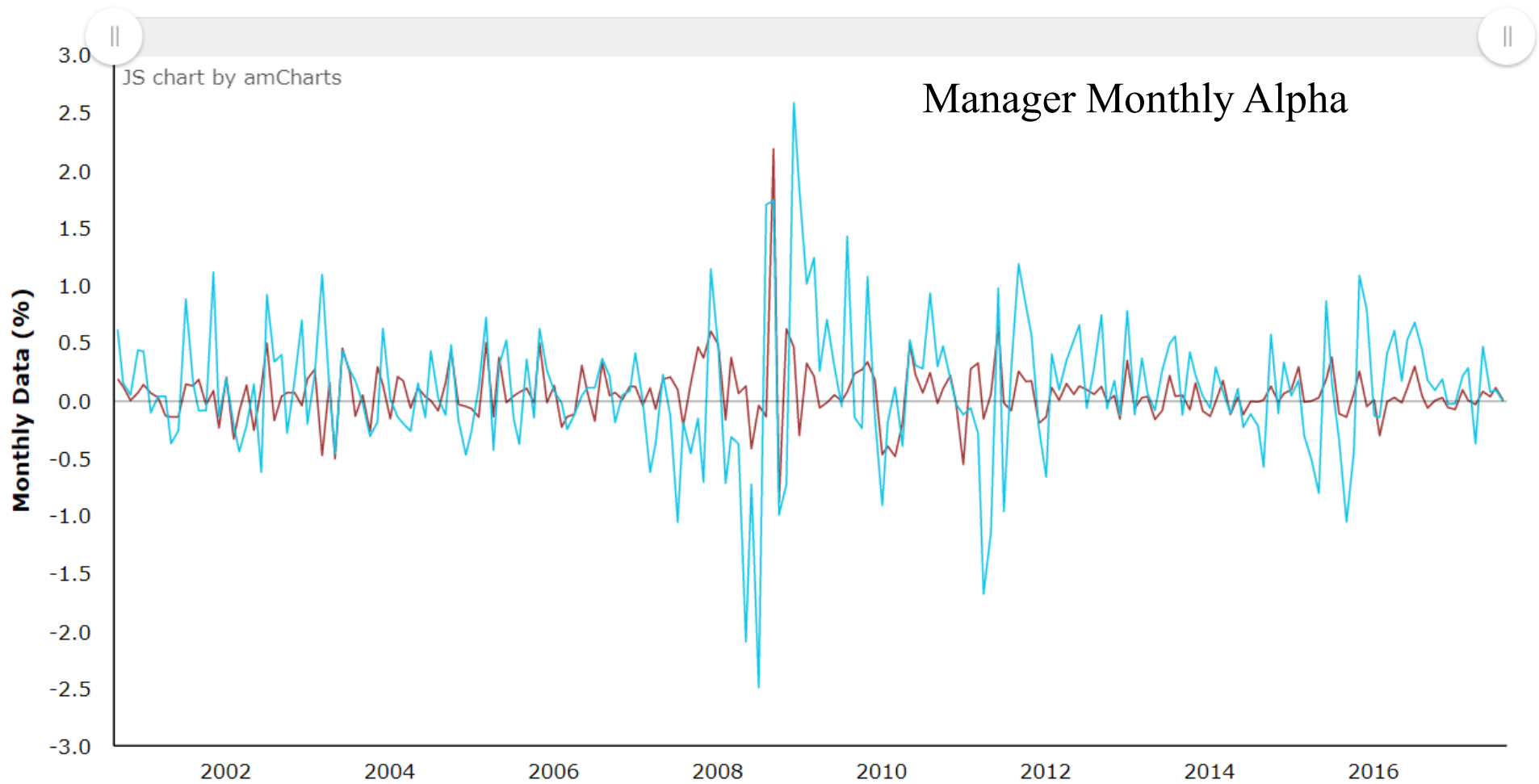
Source: C.S. McKee EIP (Education and Information Portal)

Risk Matters: Capturing the “Free Lunch”



Source: C.S. McKee EIP (Education and Information Portal)

Risk Matters: Capturing the “Free Lunch”



Source: C.S. McKee EIP (Education and Information Portal)

Rising Interest Rates: What it means

Step 1: Ignore CNBC

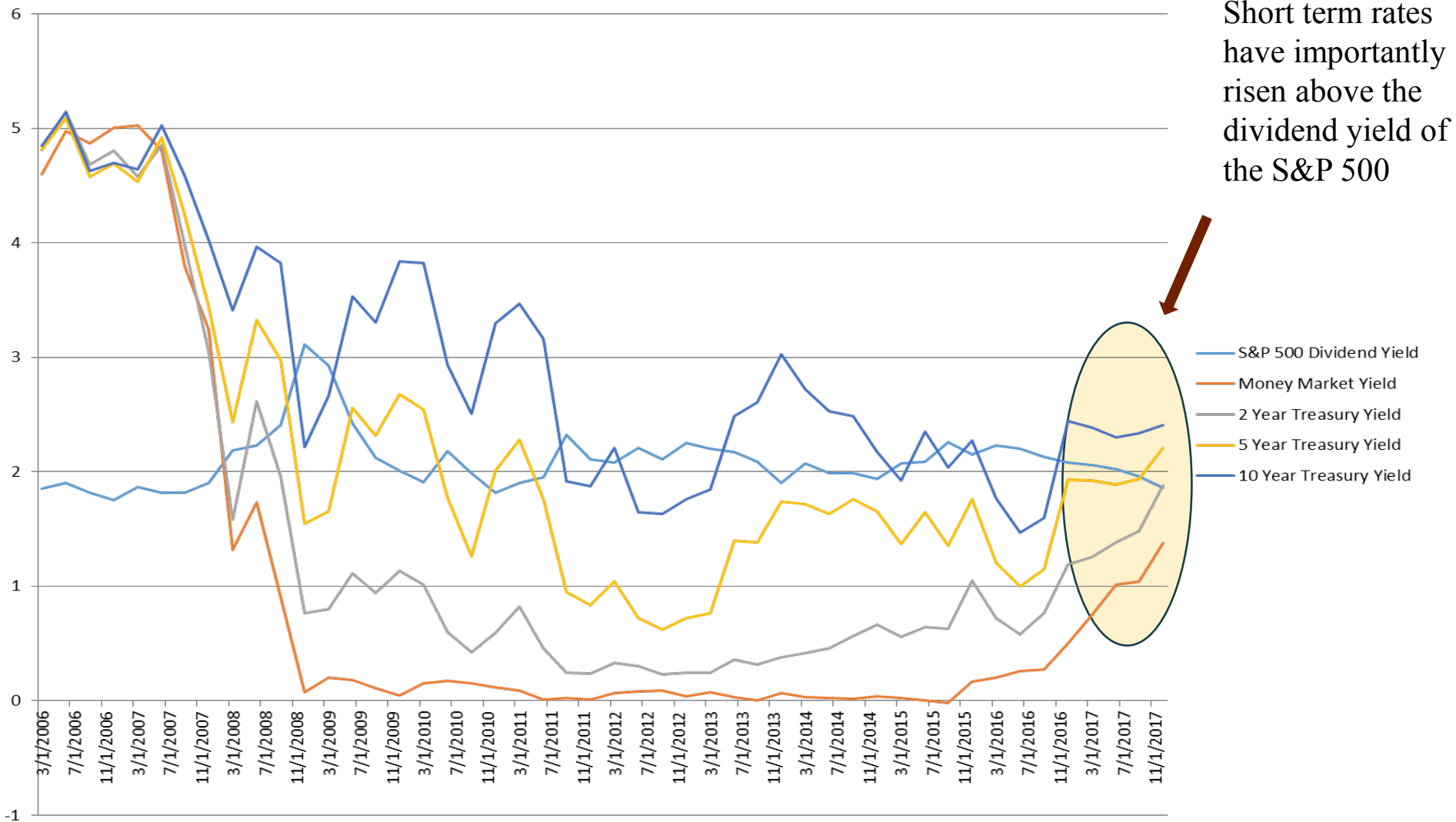
Step 2: Remember your Investment Policy Statement

Step 3: Remember the purpose of a Defined Benefit Plan

- To meet your respective plan obligations, not to try and beat Yale/Harvard endowment returns.
- *Reminder: The liability side of a Defined Benefit is a natural hedge to rising rates because as rates increase, liabilities decrease.*

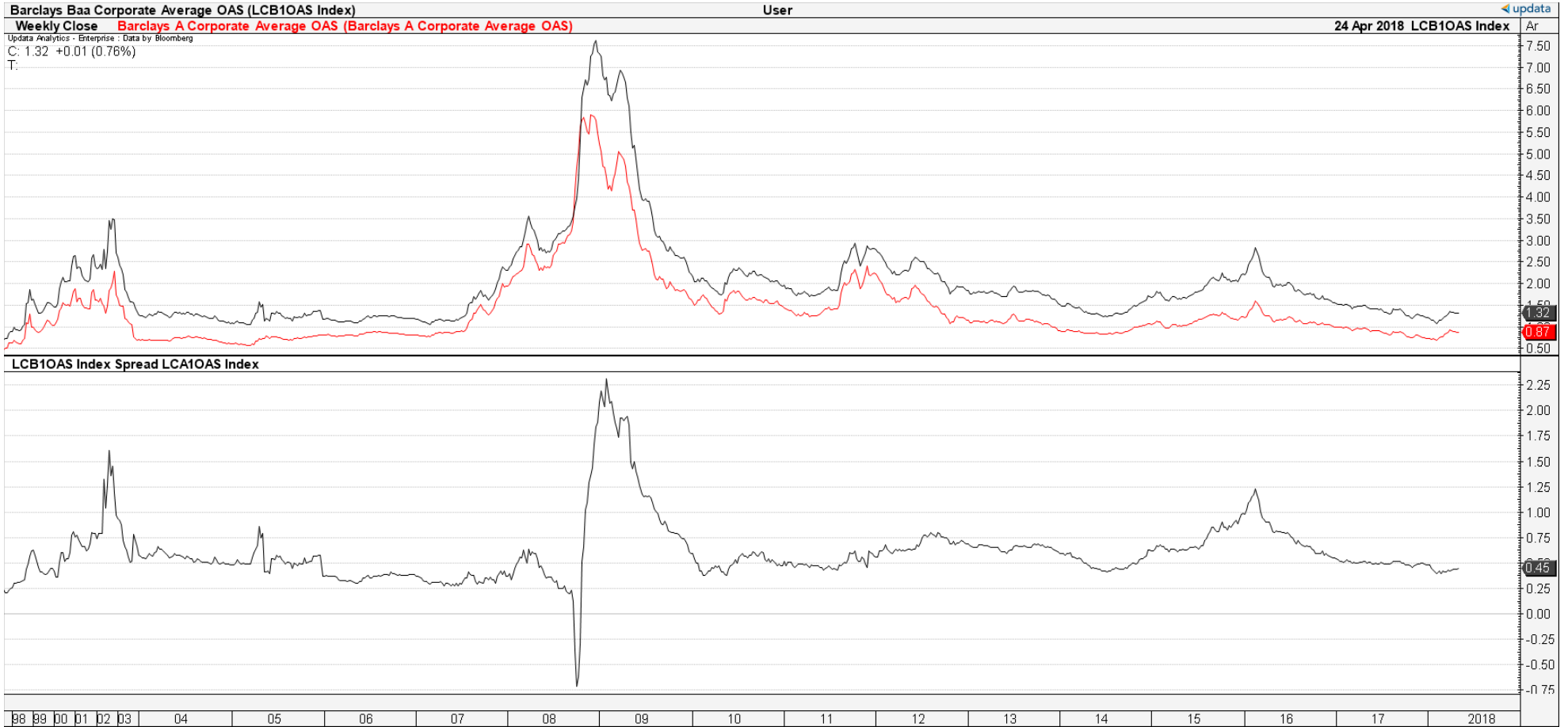
At the total portfolio level: Rising interest rates are also a natural hedge to the possibility of a recession, and to risk assets that tend to outperform when we are not in recession. (The Problem: We don't know when the recession is coming – see Step 2 above)

Short Term Yields – Trending Up



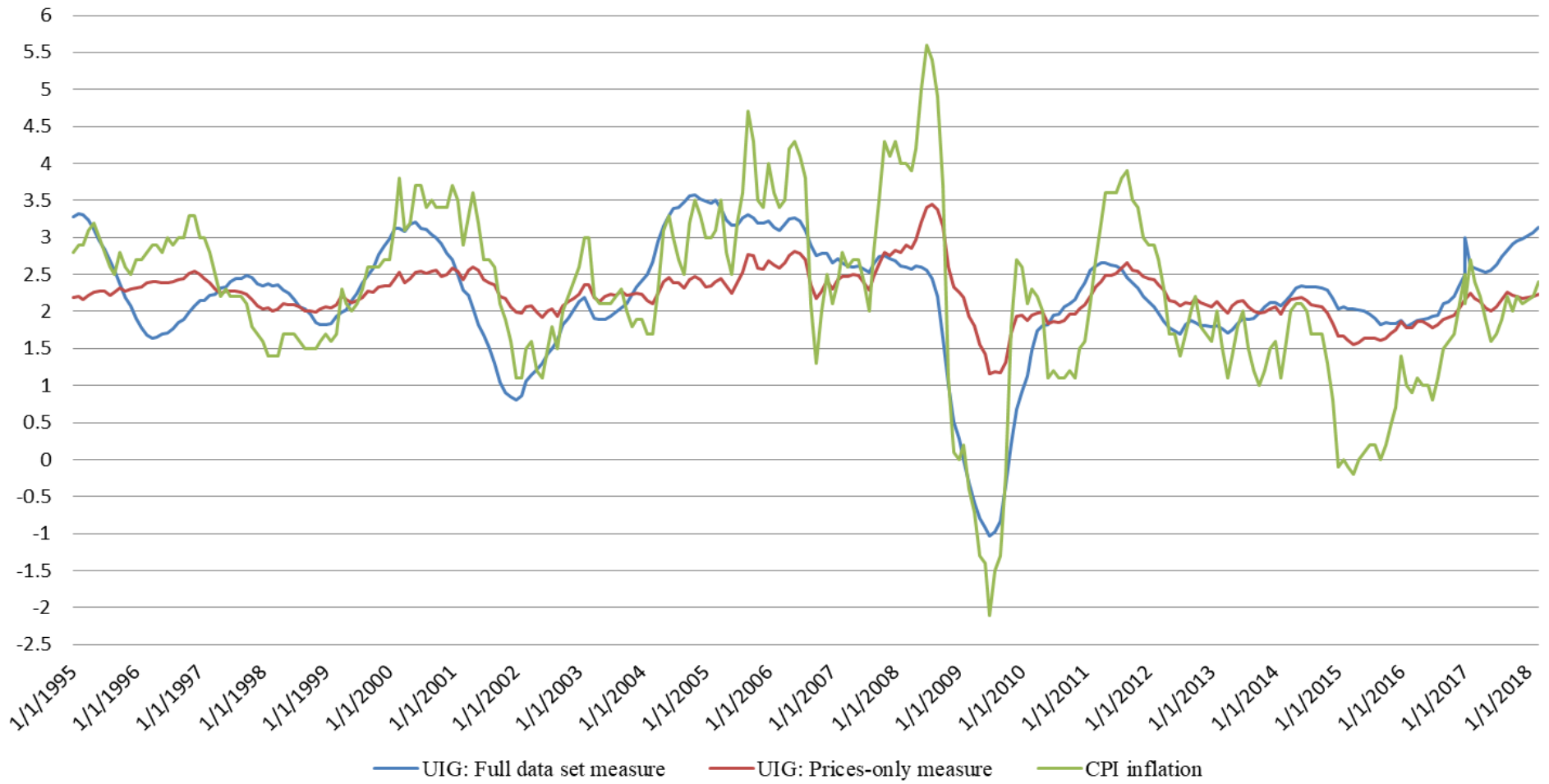
Short term rates have importantly risen above the dividend yield of the S&P 500

BBB-rated corporate debt vs. A-rated corporate debt



CPI Inflation vs. Underlying Inflation Gauge

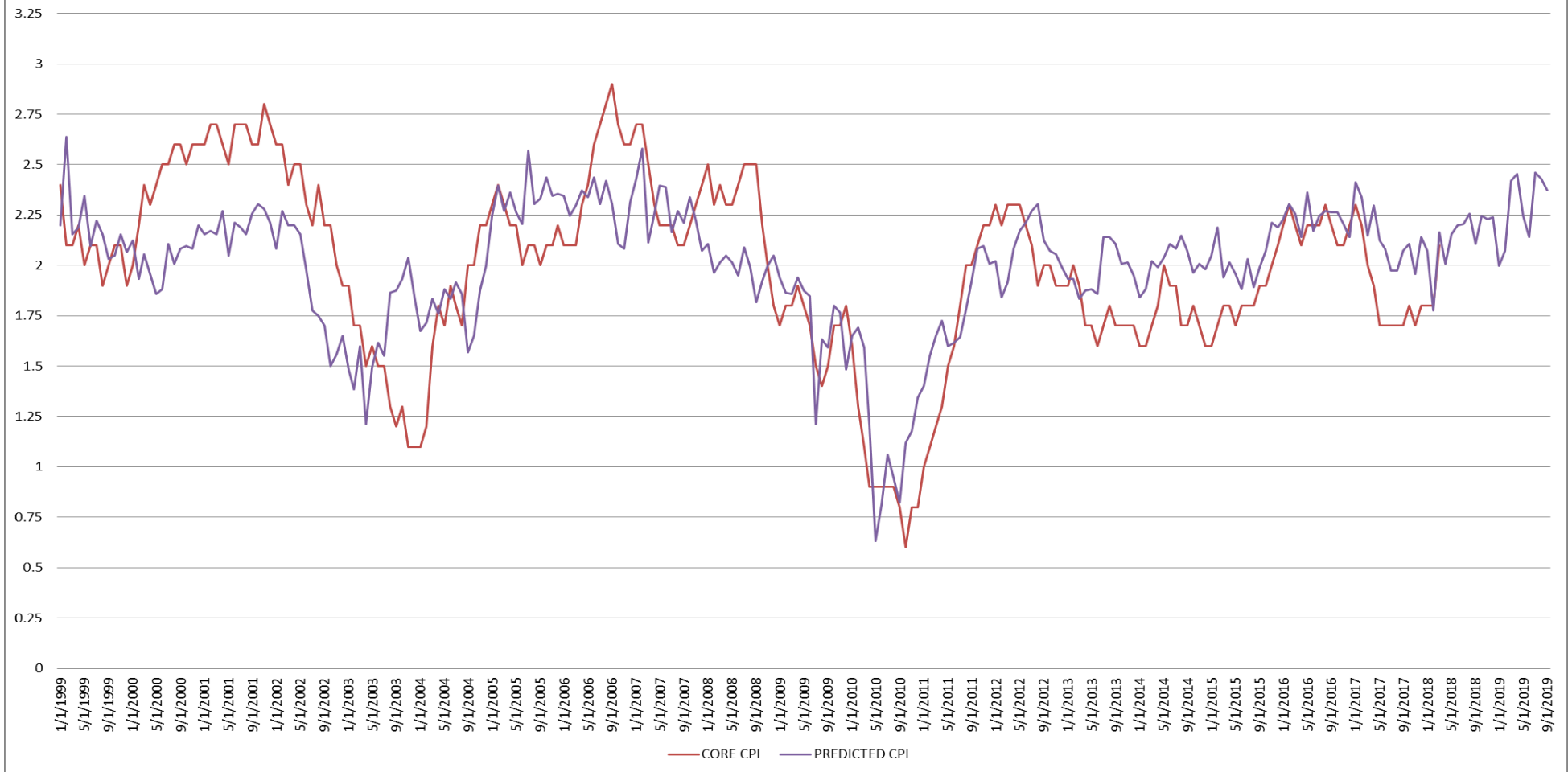
CPI Inflation vs. Underlying Inflation



The “prices-only” underlying inflation gauge (UIG) is derived from a large number of disaggregated price series in the consumer price index (CPI), while the “full data set” measure incorporates additional macroeconomic and financial variables.

Core CPI

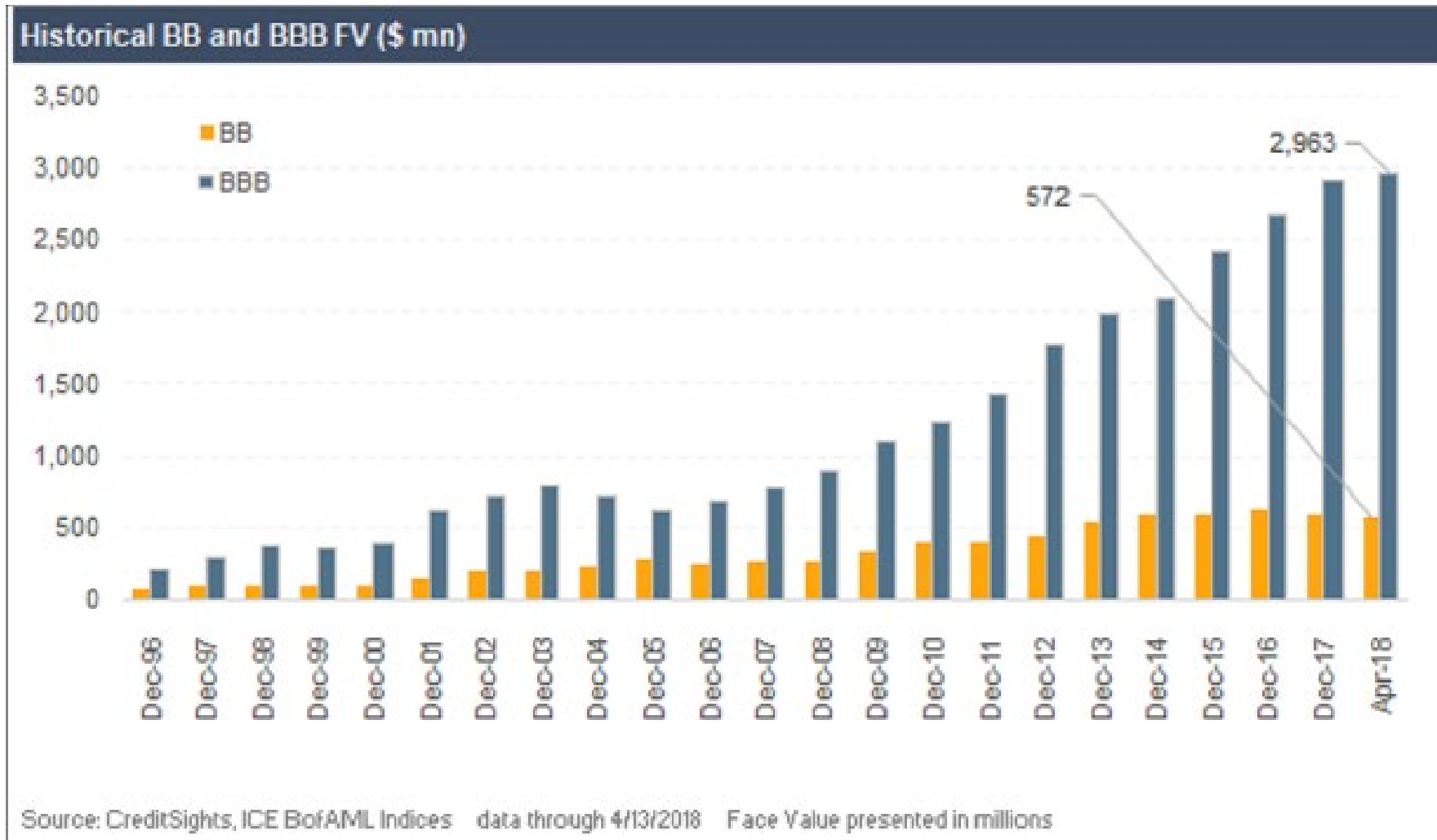
Core CPI vs. ISM Non-Manufacturing CPI Model



Regression model (OLS) using 18-month lagged ISM Non-Manufacturing Index to predict YoY Core CPI.

$$\text{Core CPI} = -2.500917 + 0.082854(\text{ISM Non-MFG}_{t-18}) \quad R^2 = 0.4966 \quad F\text{-Stat} = 221$$

Growing presence of BBB rated debt



BBB-rated credit has more than tripled since 2008

Appendix

Public Pension Sources of Revenue 1985-2014

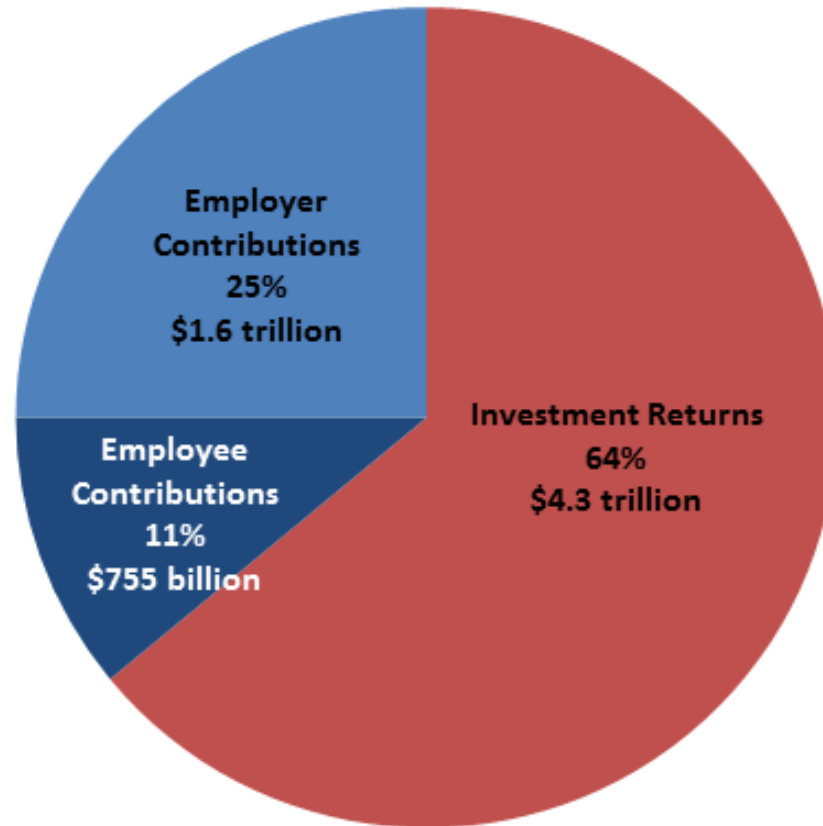
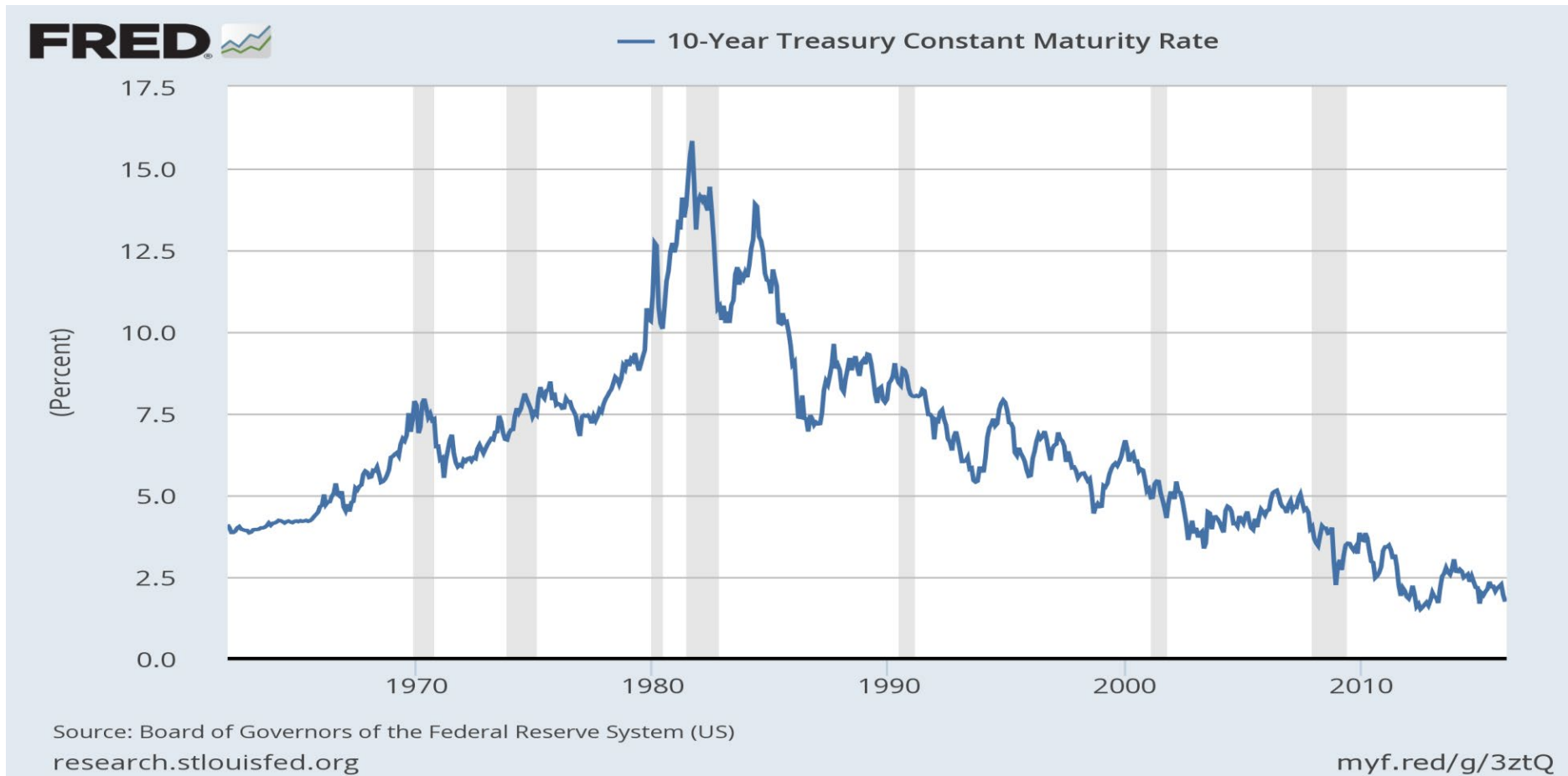
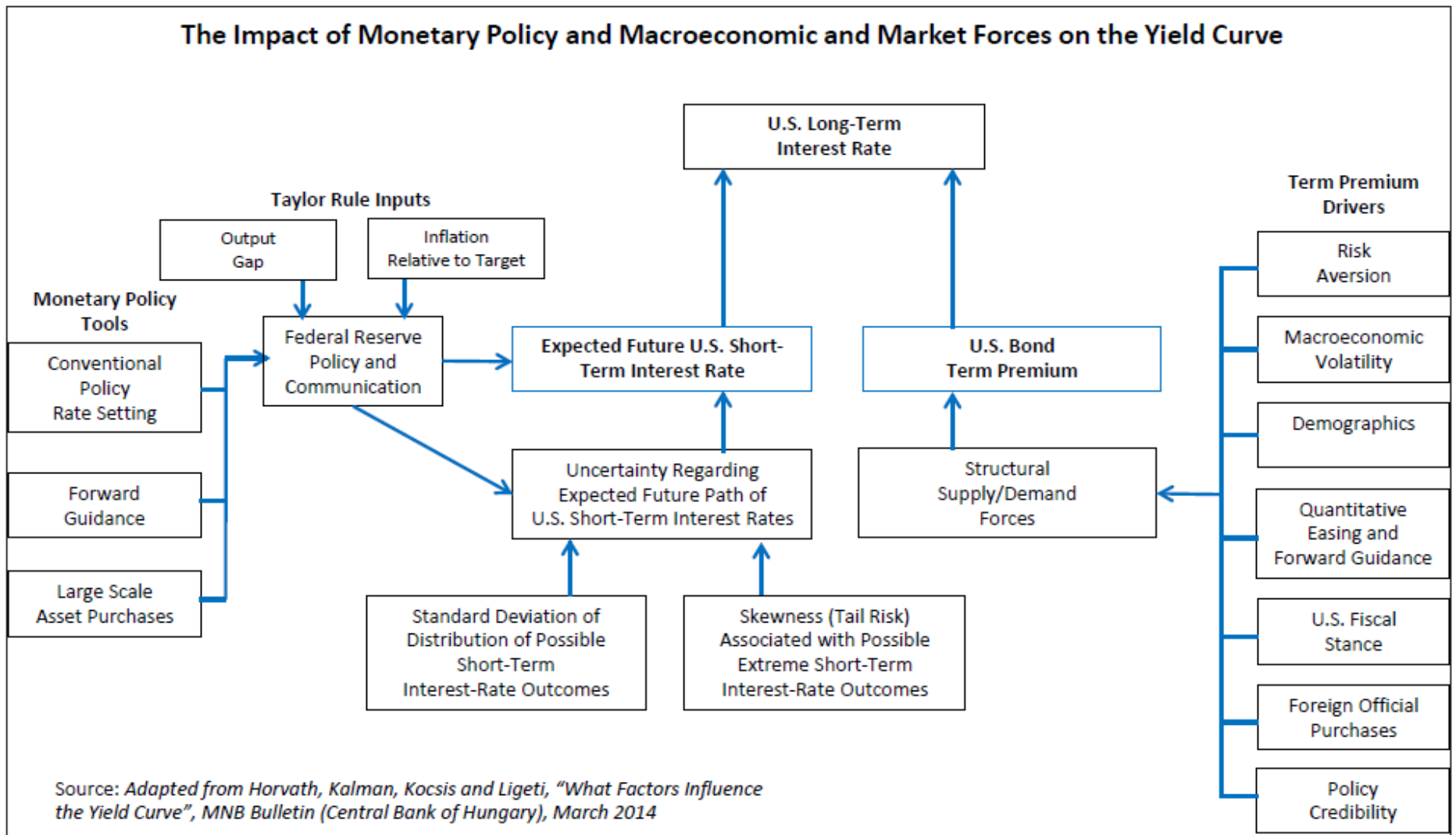


Chart: 10-Year U.S. Treasury Yield (1962-2016)

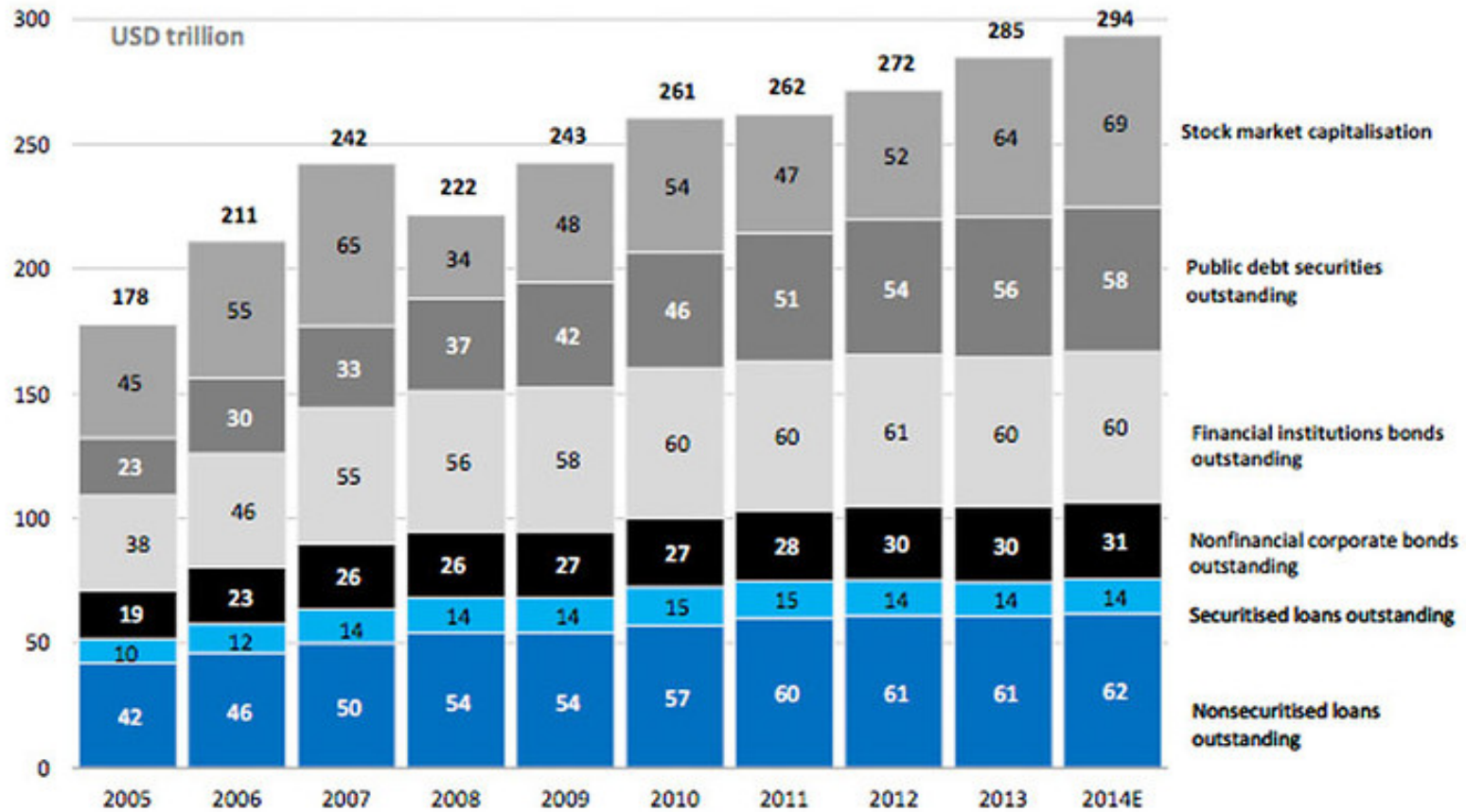


After peaking around 16% in the early 1980's, amid the Fed's efforts to squash inflation, 10-year Treasury yields have been trending downward for the past 35-years. Treasuries are an important asset class for pension investors.

Factors That Move Interest Rates



Global financial assets



\$294 trillion in assets linked to interest rates – including your municipal pension fund.