

SESSION 5

From Policy to Construction: Portfolio
Structure and Diversification



Rick Philips

*Chief Investment Strategist
Meeder Public Funds*

From Policy to Construction: Portfolio Structure and Diversification

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February 28, 2024 -- 1:30PM to 2:30PM



CALIFORNIA DEBT AND INVESTMENT ADVISORY COMMISSION

Rick Phillips

- Meeder Public Funds: Chief Investment Strategist - 2023 to Present
- FHN Main Street Advisors: President - 2005 to 2023
- Clark County Nevada: Chief Investment Officer - 1998 to 2005
- City of Las Vegas: Investment Officer - 1989 to 1998
- Government Investment Officers Association (GIOA) Founder

- Identify the different elements of consideration in building a portfolio
- Recognize key challenges in linking policy to portfolio development and operation
- Recognize the differences between book yield, book return, and total return and the implications of using one versus the others

SLI:

1. Safety of Principal
2. Sufficient Liquidity
3. Market Rate of Investment Income



The “Other Objectives”



Budget Stability of Investment Income



Sleep Adjusted Returns

Investment Plan = Practical and Day-To-Day

Creating an Investment Plan



8. Primary Investment Objectives

- **Safety of Principal:** Safety of principal is the foremost objective of the [entity's] investment program. Investments by the [designated official] shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification of security types, sectors, issuers, and maturities is necessary in order that potential losses on individual securities do not exceed the income generated from the remainder of the portfolio.
- **Liquidity:** The investment portfolio shall be structured to timely meet expected cash outflow needs and associated obligations which might be reasonably anticipated. This objective shall be achieved by matching investment maturities with forecasted cash outflows and maintaining an additional liquidity buffer for unexpected liabilities.
- **Investment Income:** The investment portfolio shall be designed to earn a market rate of investment income in relation to prevailing budgetary and economic cycles, while taking into account investment risk constraints and liquidity needs of the portfolio.

12 Paramount Principles Of Public Fund Investment Programs

1. Longer Duration Will Generate More Investment Income Over the Long Run
2. A Detailed Asset/Liability Matching Model (aka: Cash Flow Model) is a Must
3. Interest Rate Risk (WAM/Duration) Should Match Cash Flow Metrics (LGIPs vs Operating)
4. Credit Can Enhance Income, But Duration is the Bigger Determinant of Income
5. Prudent Diversification Among Asset Classes and Investment Types and Maturities
6. You, I...Nor Anyone Else Can Time the Market Accurately Over the Long Run
7. Limit Optionality (Callables) in the Portfolio
8. The “Goofiness” of GASB 31—Gains are Bad and Losses are Good! (The Unrealized Kind)
9. Understand the Risks of Funds in LGIPs and Other Pools (JPAs, Bond Funds)
10. Follow GAAP (Generally Accepted Accounting Principles)
11. Benchmark Your Investment Program and Portfolio in Multiple Ways
12. Tell the Story: Provide Quality, Timely, Transparent Reporting

**Employing Probable Expectations:
Increase the Likelihood of Long-Term Success
For the Investment Program (SLI-Safety, Liquidity, Income)**

Principal Preservation > Investment Income
***“The Investment Portfolio is the Only Place in Local Government Where
Revenue Can Be Generated Without Assessing Taxes or Fees”***

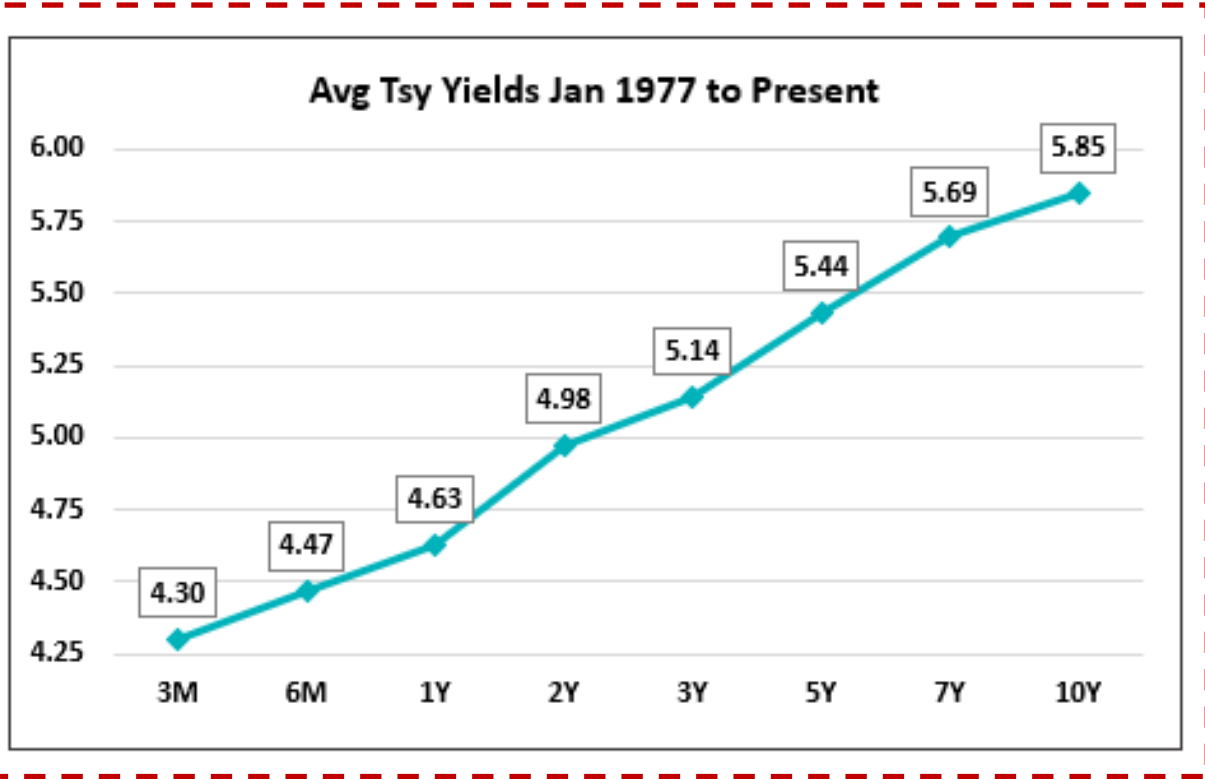


**The more you know about the past,
the better prepared you are for the future.**
Theodore Roosevelt

1. Longer Duration Has Generated More Investment Income Over the Long Run

Benchmark Treasury Modified Sharp Ratio (MSR) Analysis
Jan 1977 to Present

Maturity	Avg Yield	Avg Duration	Modified Sharp Ratio	% Return of 10Yr / % 10Yr Risk
3 Mon T-Bill	4.30	0.25		74% / 3%
6 Mon T-Bill	4.47	0.50	0.33	76% / 6%
1 Yr T-Bill	4.63	1.00	0.33	79% / 12%
2 Yr T-Note	4.98	1.91	0.35	85% / 24%
3 Yr T-Note	5.14	2.78	0.30	88% / 34%
5 Yr T-Note	5.44	4.55	0.25	93% / 56%
7 Yr T-Note	5.69	6.24	0.22	97% / 77%
10 Yr T-Note	5.85	8.10	0.19	100% / 100%

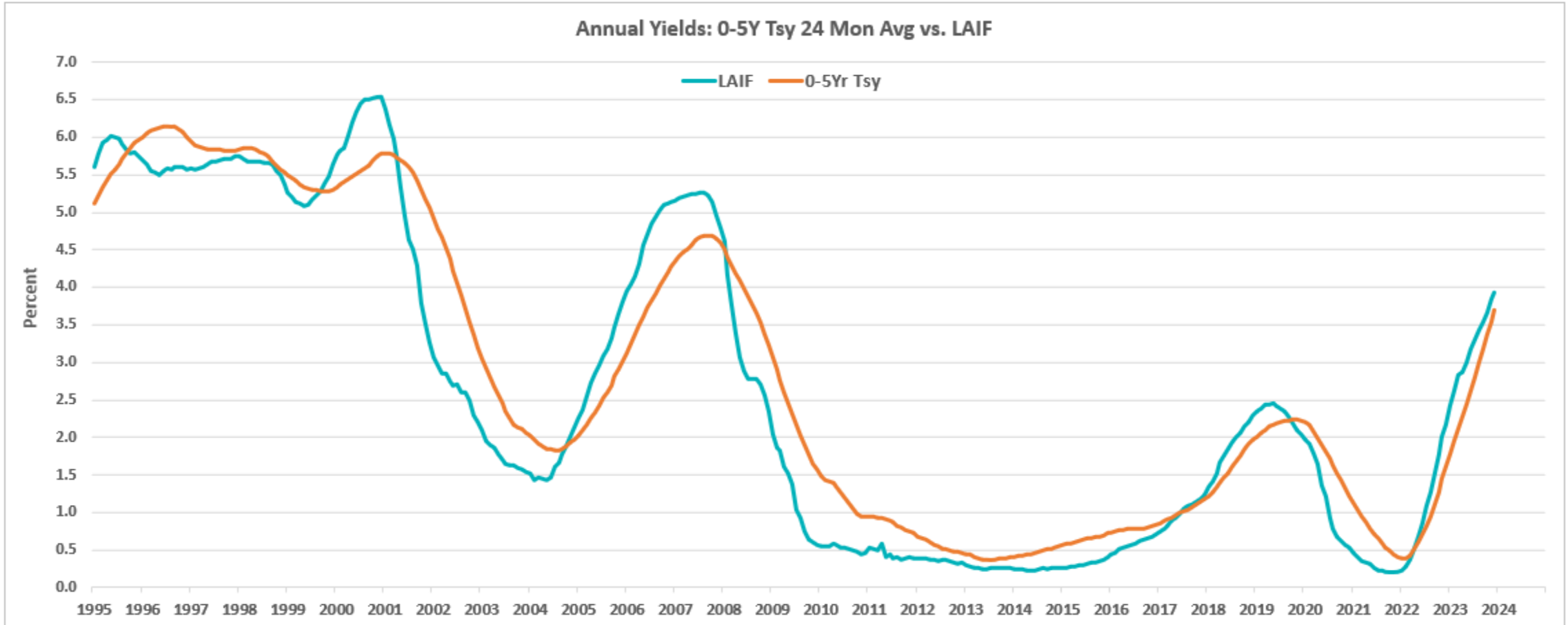


4.98% (2Y) - 4.30% (3M) / 1.91 (2Yr Dur) = 0.35

4.98% (2Y) / 5.85% (10Y) = 85%	1.91 (2Y) / 8.10 (10Y) = 24%
Yield Comparison	Duration Comparison

Source: Bloomberg

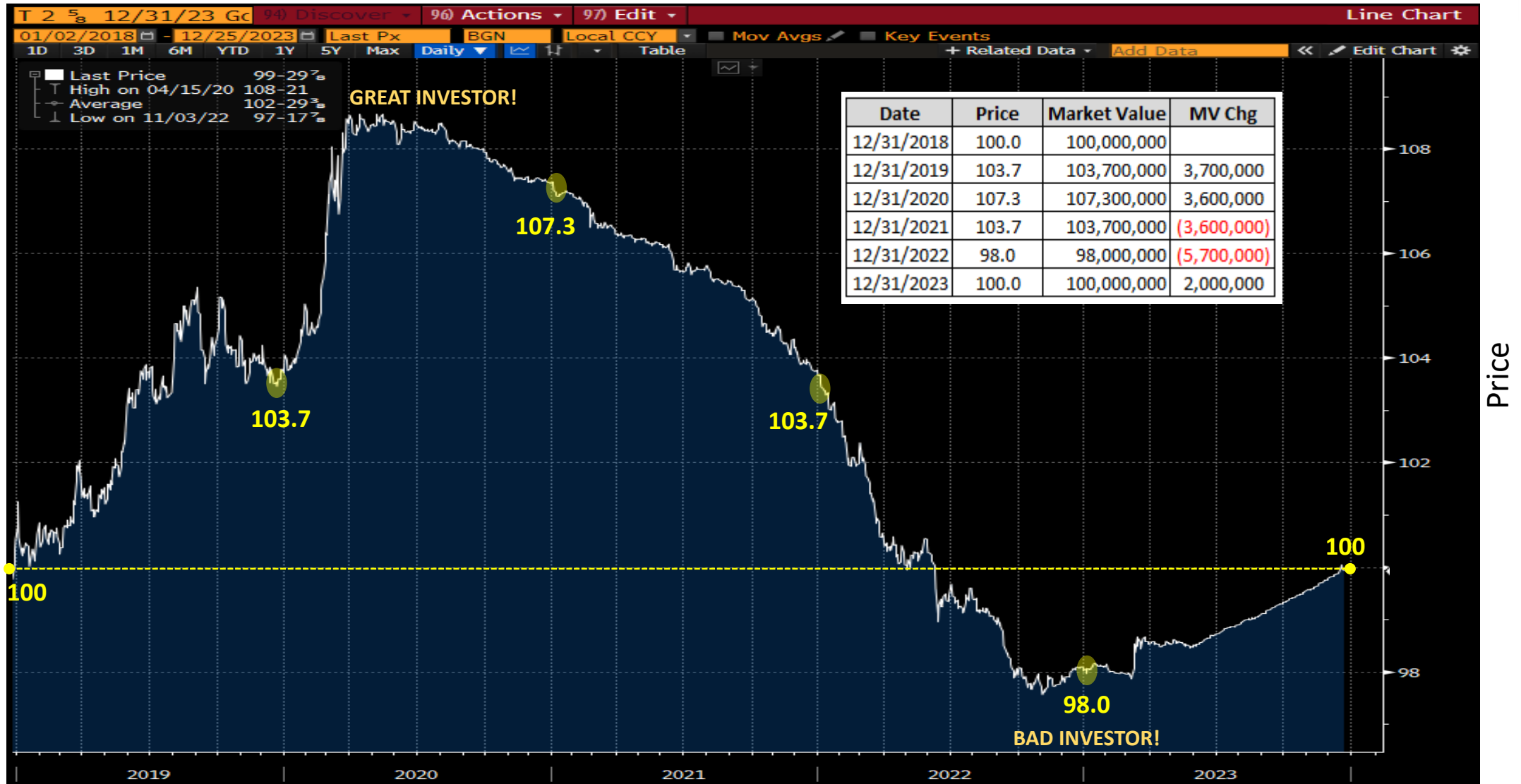
Longer Duration vs. Shorter Duration



Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
0-5Y Tsy	5.59	6.09	5.85	5.75	5.34	5.54	5.54	4.10	2.46	1.90	2.49	3.74	4.58	3.91	2.27	1.21	0.86	0.55	0.39	0.47	0.64	0.78	1.01	1.58	2.17	1.75	0.72	0.85	2.73	2.79
LAIF	5.86	5.58	5.66	5.63	5.26	6.25	4.88	2.67	1.74	1.65	3.02	4.66	5.16	3.16	1.23	0.52	0.44	0.36	0.27	0.25	0.32	0.58	0.99	1.85	2.32	1.17	0.28	1.06	3.22	2.62
Var	(0.27)	0.51	0.19	0.12	0.08	(0.71)	0.66	1.43	0.72	0.24	(0.53)	(0.91)	(0.58)	0.75	1.03	0.69	0.41	0.19	0.13	0.23	0.33	0.20	0.01	(0.27)	(0.15)	0.58	0.43	(0.21)	(0.49)	0.17

Source: Bloomberg, State of California, Using Month End Yields 0-5 Year 24 Mov. Avg.; LAIF 12 Month Avg Monthly Eff. Yld.

GASB 31: Balance Sheet vs. Income Statement

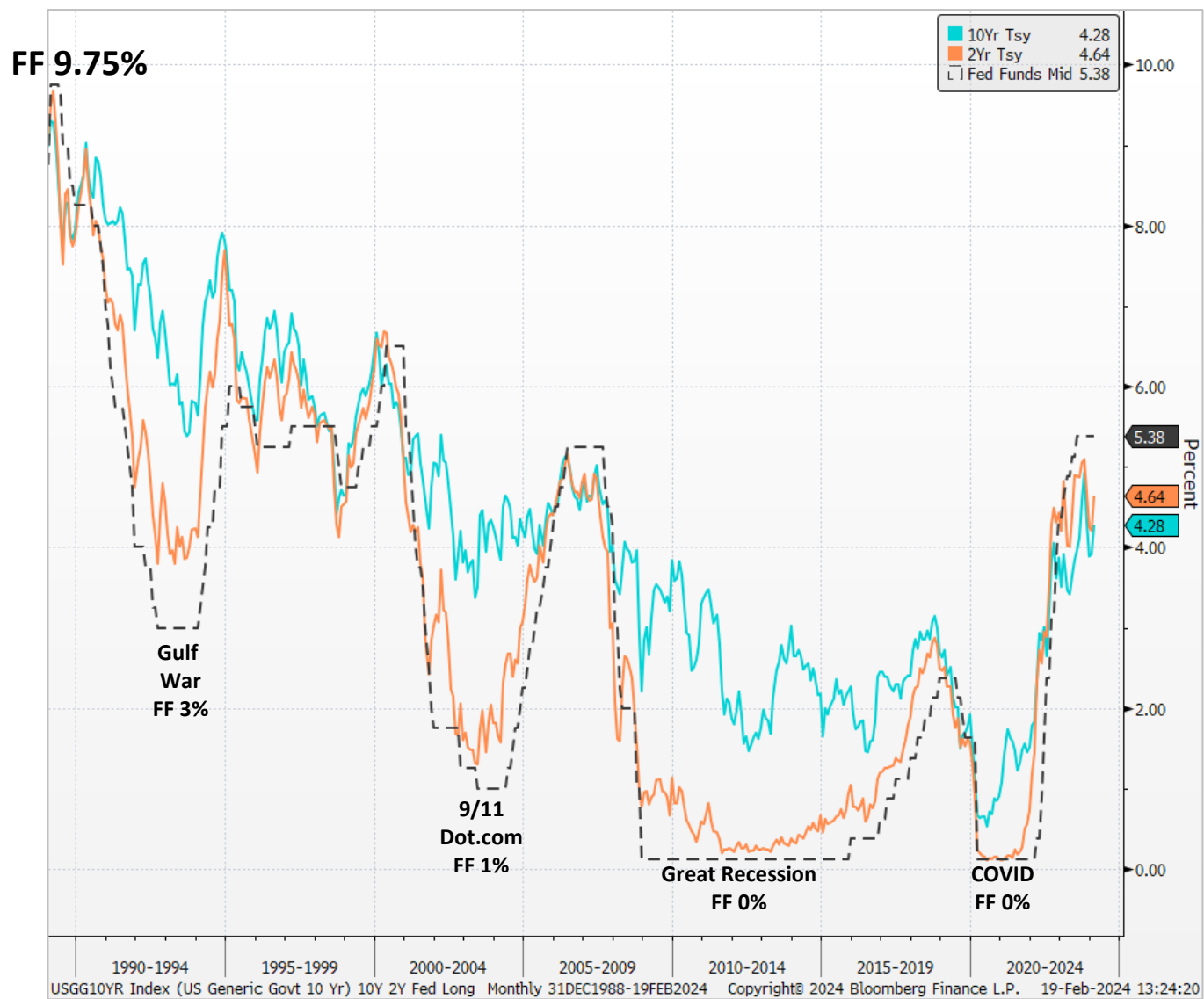


GASB 31 essentially says you “sell” your portfolio every fiscal year end, then “rebuy” it on the first day of the next fiscal year, and adjust investment income by that amount.

Highest Year Ending Yields Since 2006...17 Years Ago

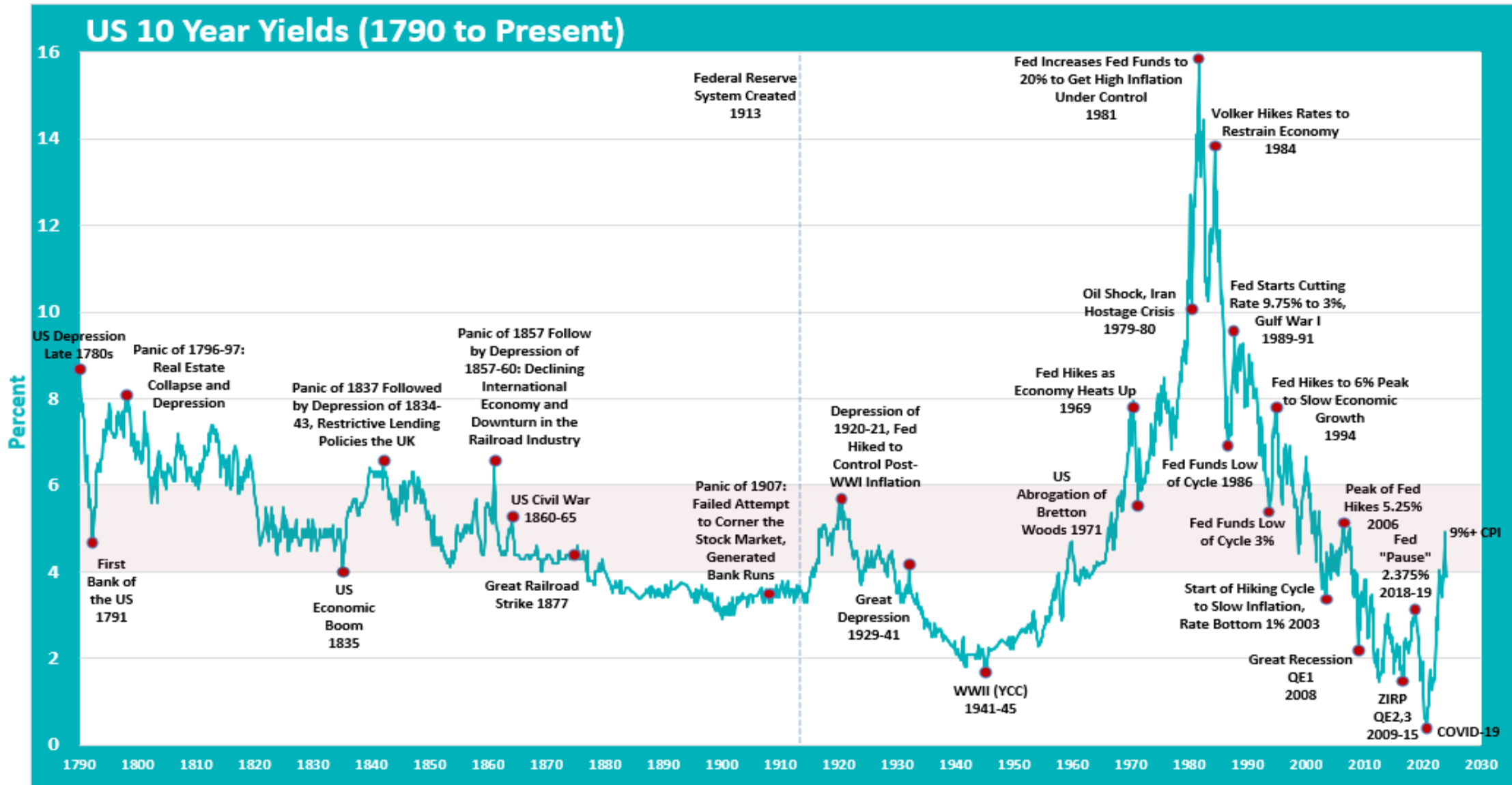
U.S. Treasury Yields 1989-2023

Date	3M	6M	1Y	2Y	3Y	5Y	10Y	30Y	Avg Yld
Dec-89	7.78	7.86	7.82	7.84	7.86	7.83	7.94	7.98	7.86
Dec-90	6.64	6.74	6.86	7.23	7.35	7.68	8.07	8.25	7.35
Dec-91	3.96	4.01	4.09	4.75	5.04	5.93	6.70	7.40	5.23
Dec-92	3.14	3.38	3.58	4.56	5.05	5.99	6.69	7.40	4.97
Dec-93	3.06	3.29	3.58	4.23	4.51	5.21	5.79	6.35	4.50
Dec-94	5.69	6.49	7.18	7.70	7.78	7.83	7.82	7.88	7.30
Dec-95	5.08	5.15	5.14	5.15	5.21	5.38	5.57	5.95	5.33
Dec-96	5.17	5.30	5.48	5.87	6.01	6.21	6.42	6.64	5.89
Dec-97	5.35	5.44	5.48	5.65	5.66	5.71	5.74	5.92	5.62
Dec-98	4.45	4.53	4.52	4.53	4.53	4.54	4.65	5.10	4.61
Dec-99	5.33	5.73	5.96	6.21	6.28	6.34	6.44	6.48	6.10
Dec-00	5.90	5.71	5.37	5.10	5.13	4.98	5.11	5.46	5.34
Dec-01	1.73	1.80	3.30	3.03	3.79	4.30	5.05	5.47	3.56
Dec-02	1.19	1.20	3.30	1.60	1.96	2.73	3.82	4.78	2.57
Dec-03	0.92	1.01	3.30	1.82	2.30	3.25	4.25	5.07	2.74
Dec-04	2.21	2.58	3.30	3.07	3.22	3.61	4.22	4.83	3.38
Dec-05	4.07	4.37	3.30	4.40	4.36	4.35	4.39	4.53	4.22
Dec-06	5.01	5.08	3.30	4.81	4.73	4.69	4.70	4.81	4.64
Dec-07	3.24	3.39	3.30	3.05	3.01	3.44	4.02	4.45	3.49
Dec-08	0.08	0.26	0.34	0.76	0.97	1.55	2.21	2.68	1.11
Dec-09	0.05	0.19	0.44	1.14	1.68	2.68	3.84	4.64	1.83
Dec-10	0.12	0.18	0.26	0.59	0.99	2.01	3.29	4.33	1.47
Dec-11	0.01	0.06	0.10	0.24	0.35	0.83	1.88	2.89	0.80
Dec-12	0.04	0.11	0.14	0.25	0.35	0.72	1.76	2.95	0.79
Dec-13	0.07	0.09	0.11	0.38	0.76	1.74	3.03	3.97	1.27
Dec-14	0.04	0.12	0.21	0.66	1.07	1.65	2.17	2.75	1.08
Dec-15	0.16	0.47	0.60	1.05	1.31	1.76	2.27	3.02	1.33
Dec-16	0.50	0.61	0.81	1.19	1.45	1.93	2.44	3.07	1.50
Dec-17	1.38	1.53	1.73	1.88	1.97	2.21	2.41	2.74	1.98
Dec-18	2.35	2.48	2.60	2.49	2.46	2.51	2.68	3.01	2.57
Dec-19	1.54	1.58	1.57	1.57	1.61	1.69	1.92	2.39	1.73
Dec-20	0.06	0.08	0.10	0.12	0.16	0.36	0.91	1.64	0.43
Dec-21	0.03	0.18	0.38	0.73	0.96	1.26	1.51	1.90	0.87
Dec-22	4.34	4.75	4.69	4.43	4.22	4.00	3.87	3.96	4.28
Dec-23	5.33	5.25	4.76	4.25	4.01	3.85	3.88	4.03	4.42



Source: Bloomberg, end of day

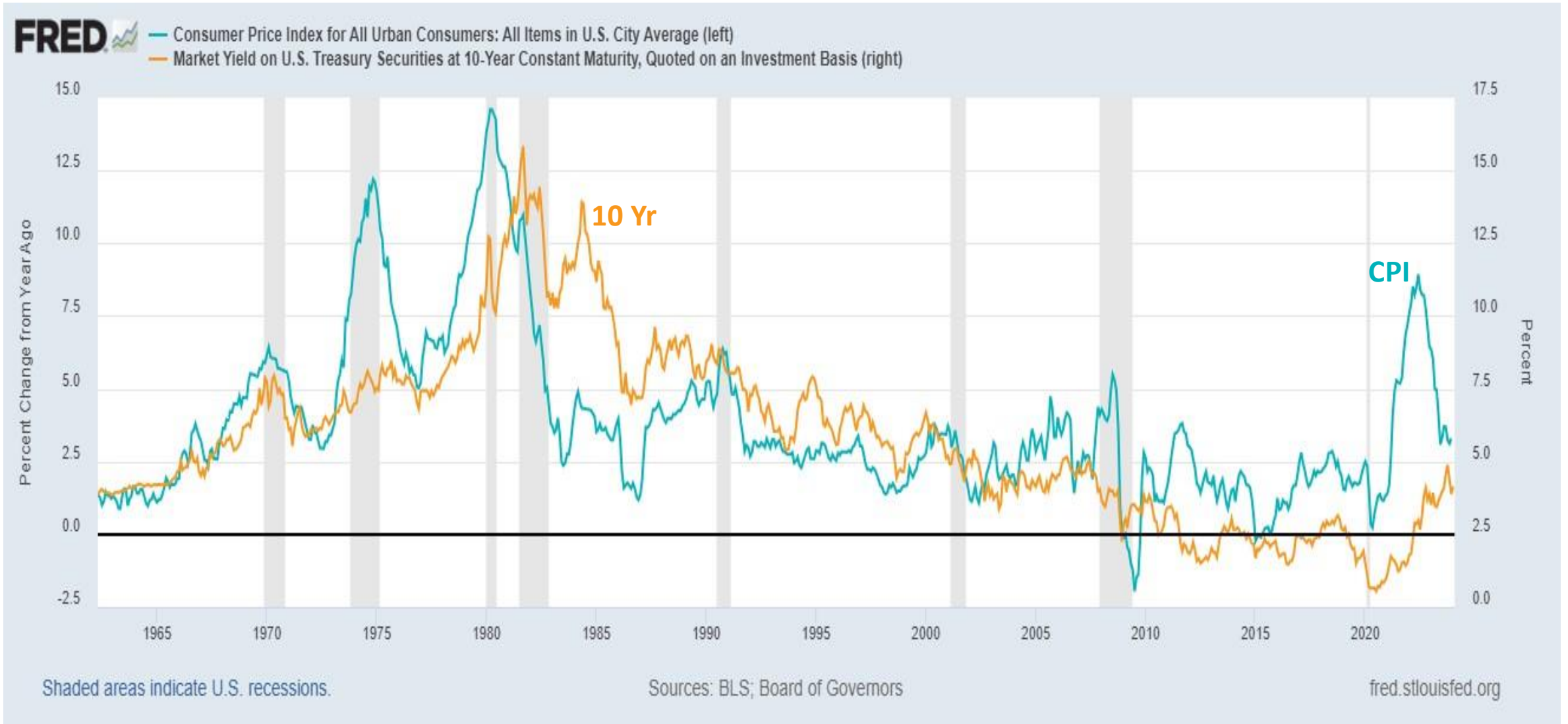
Rate History...A Very Long Rate History



Sources: Goldman Sachs, Global Financial Database, Arbor Research, Bloomberg 1790 to 1831 British Consols, 1831 to 1919 High-Grade Long Term Railroad, 1919 to Date 10Yr Treasuries

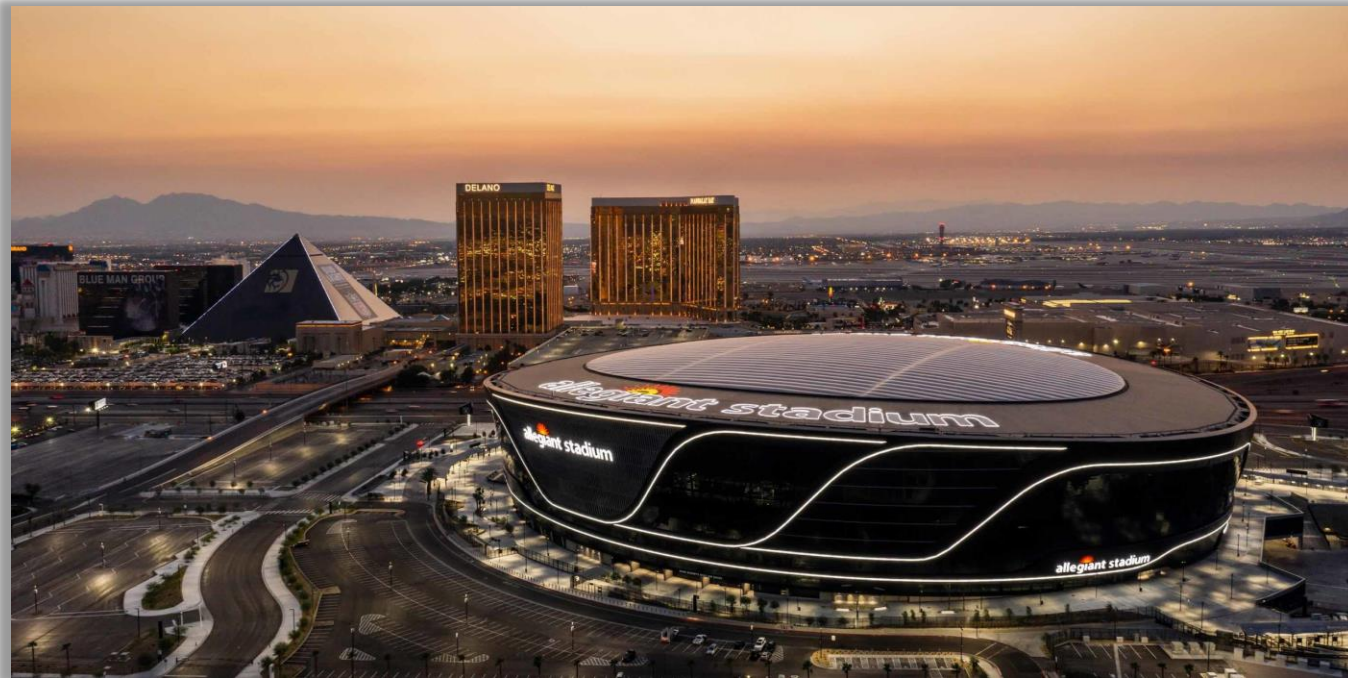
Longer Duration vs. Shorter Duration

- Shorter-Term Bonds Are Generally More Correlated With Fed Funds
- Longer-Term Bonds Are Generally More Correlate With Expected Growth and Expected Inflation

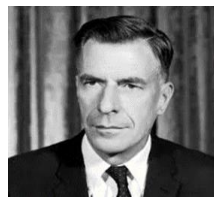


3. Interest Rate Risk (WAM/Duration) Should Match Cash Flow Metrics

- **Bond Proceed Funds and LGIPs Should Have Shorter Average Maturities**
- **Operating Funds Should Have Longer Average Maturities**



6. You, I...Nor Anyone Else Can Time the Market Accurately Over The Long Run



"The only function of economic (and interest rate) forecasting is to make astrology look respectable."

John Kenneth Galbraith, Economist



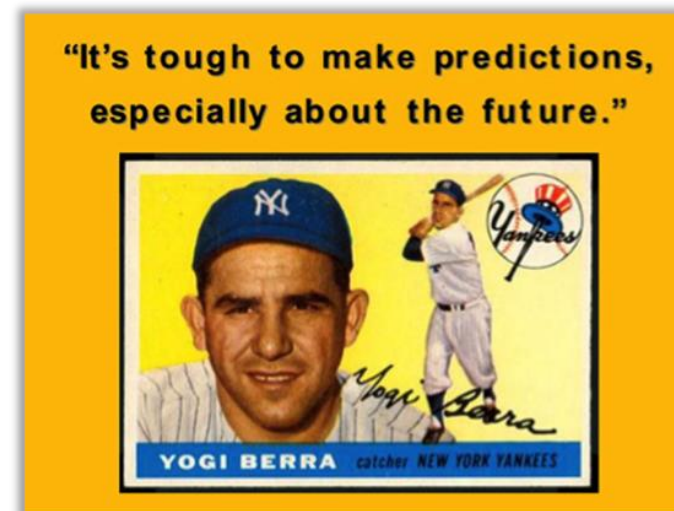
"The Federal Reserve is currently not forecasting a recession."

Ben Bernanke (former Fed Chair), January 10, 2008



"Our ability to forecast is limited".

Alan Greenspan (former Fed Chair) November 2019

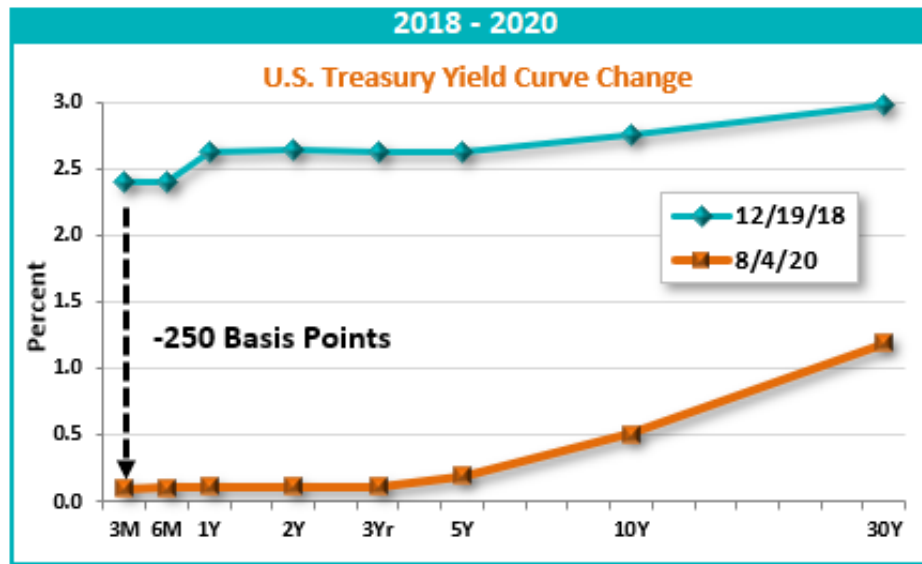
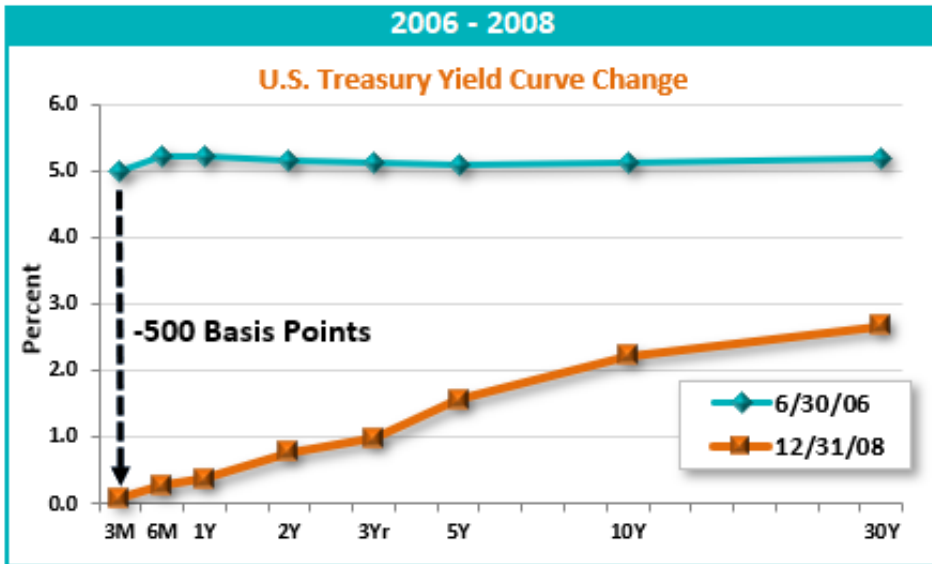
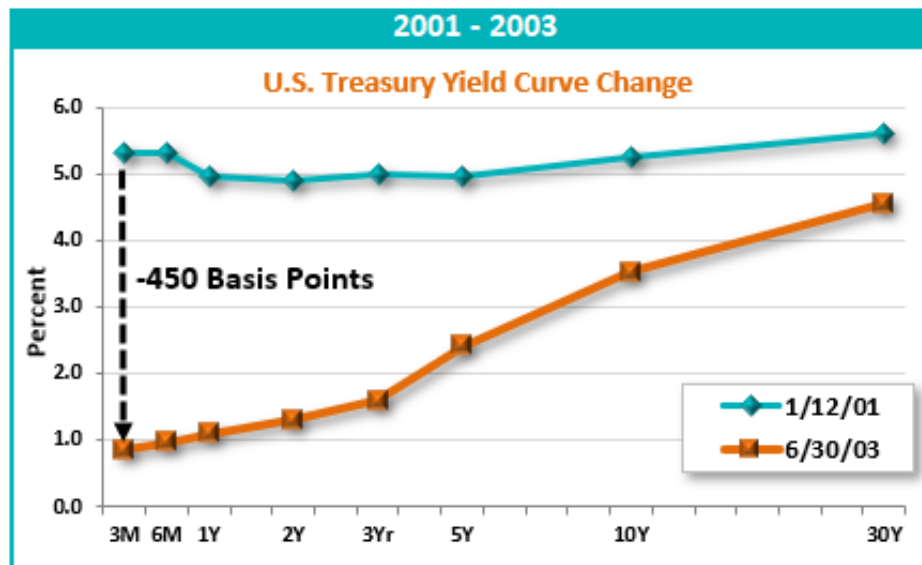
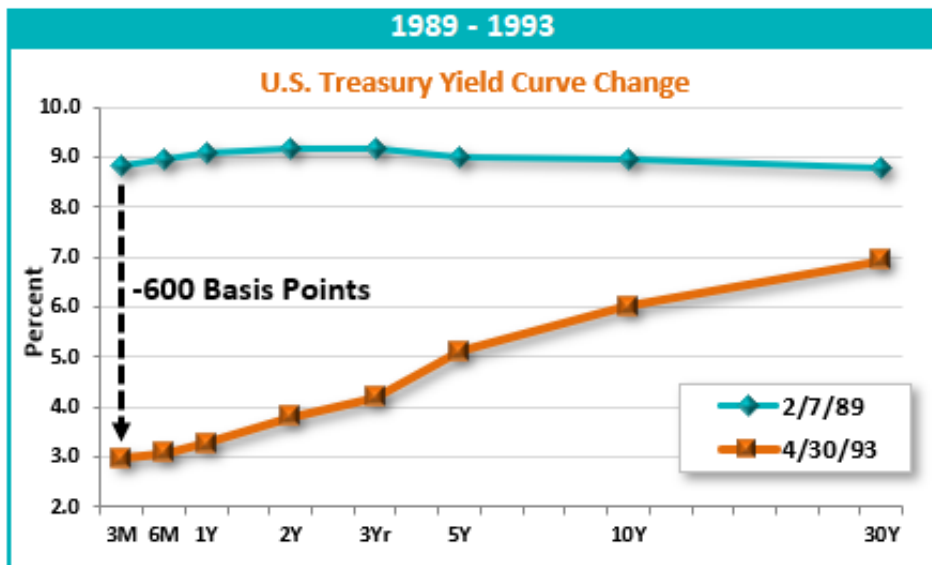


6. You, I...Nor Anyone Else Can Time the Market Accurately Over The Long Run

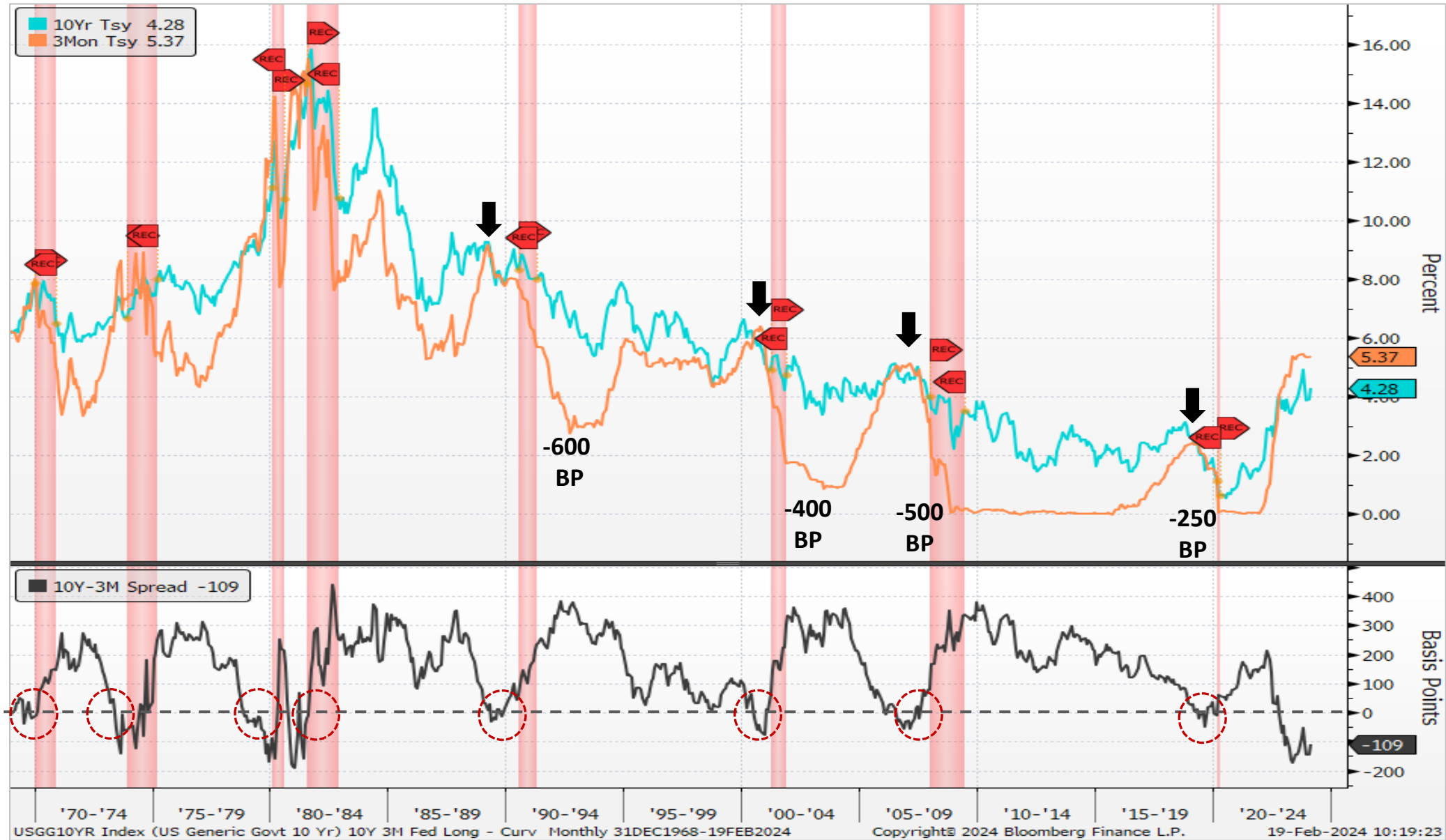


**Both the Fed and the markets expected 3 interest rate hikes (25 BPs)
in 2022...the Fed hiked 17 times! (The 25 Basis Point Kind)**

The "Yield Curve Trap"



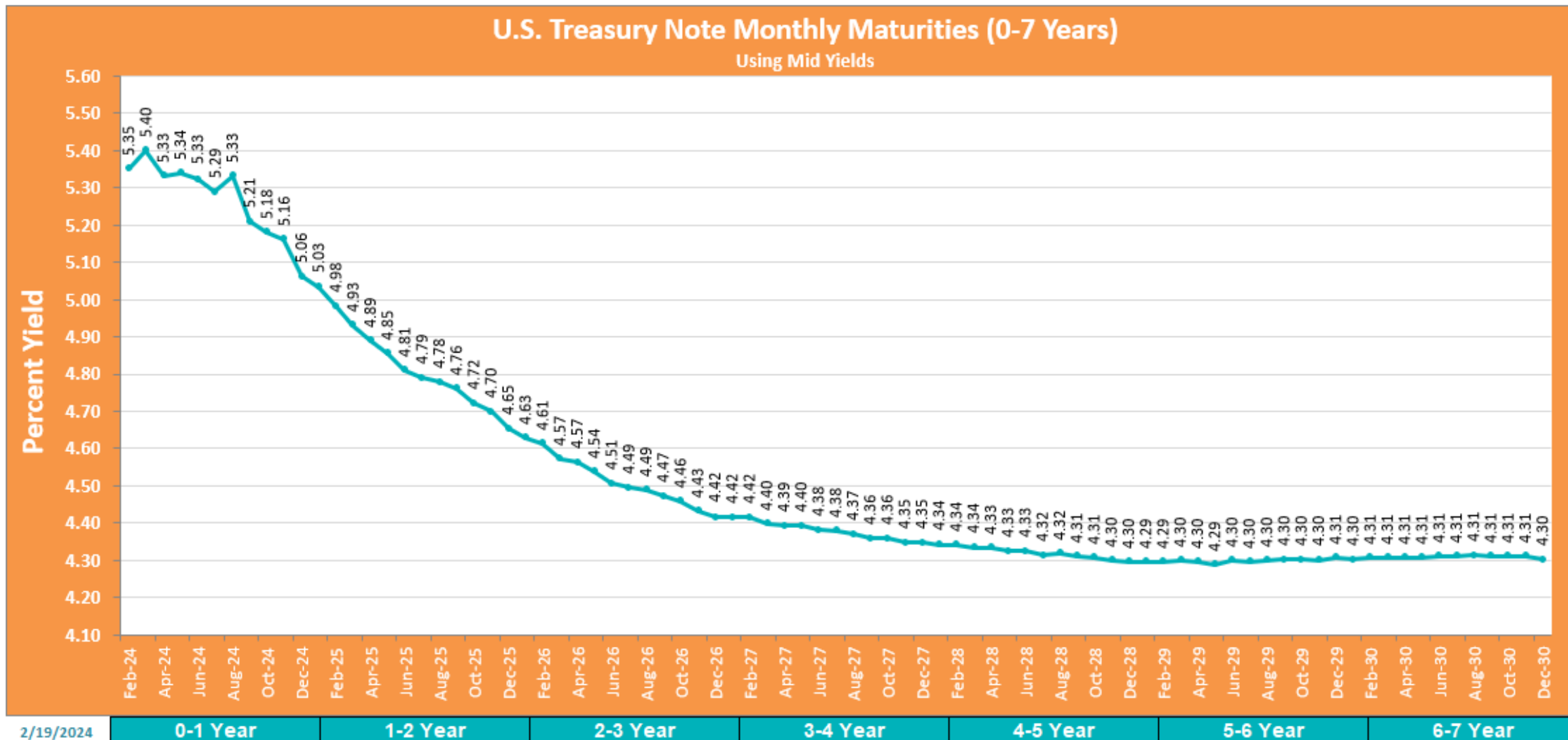
The Inverted Yield Curve Has Been An Accurate Predictor of Fed Cuts (and Recessions)



Source: Bloomberg

FOR INFORMATIONAL PURPOSES ONLY. SEE IMPORTANT DISCLOSURES AT THE END OF THE PRESENTATION.

The Yield Curve Is Still...Just A Bit Inverted



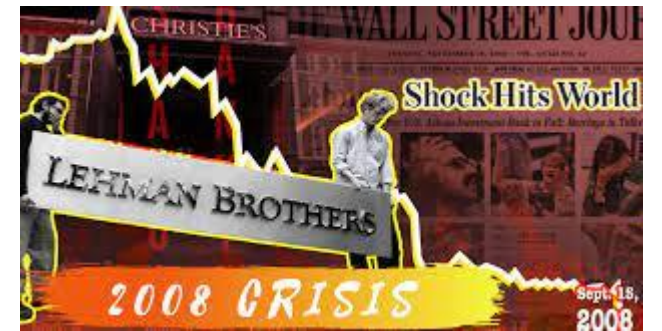
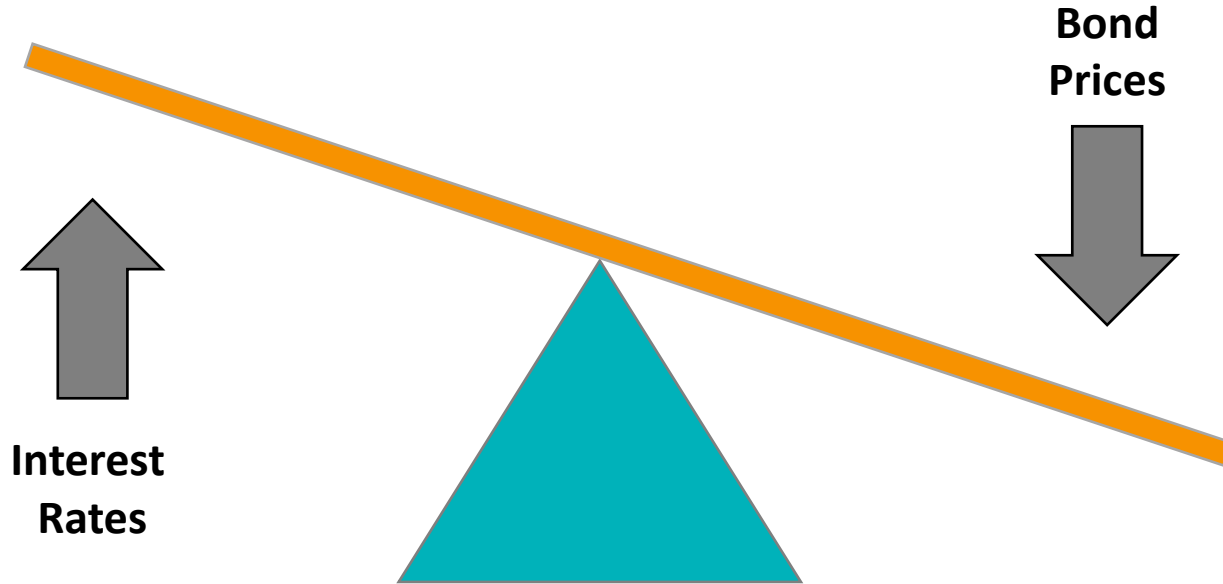
Source: Bloomberg

4. Credit Can Enhance Income, But Duration Is The Bigger Determinant of Income

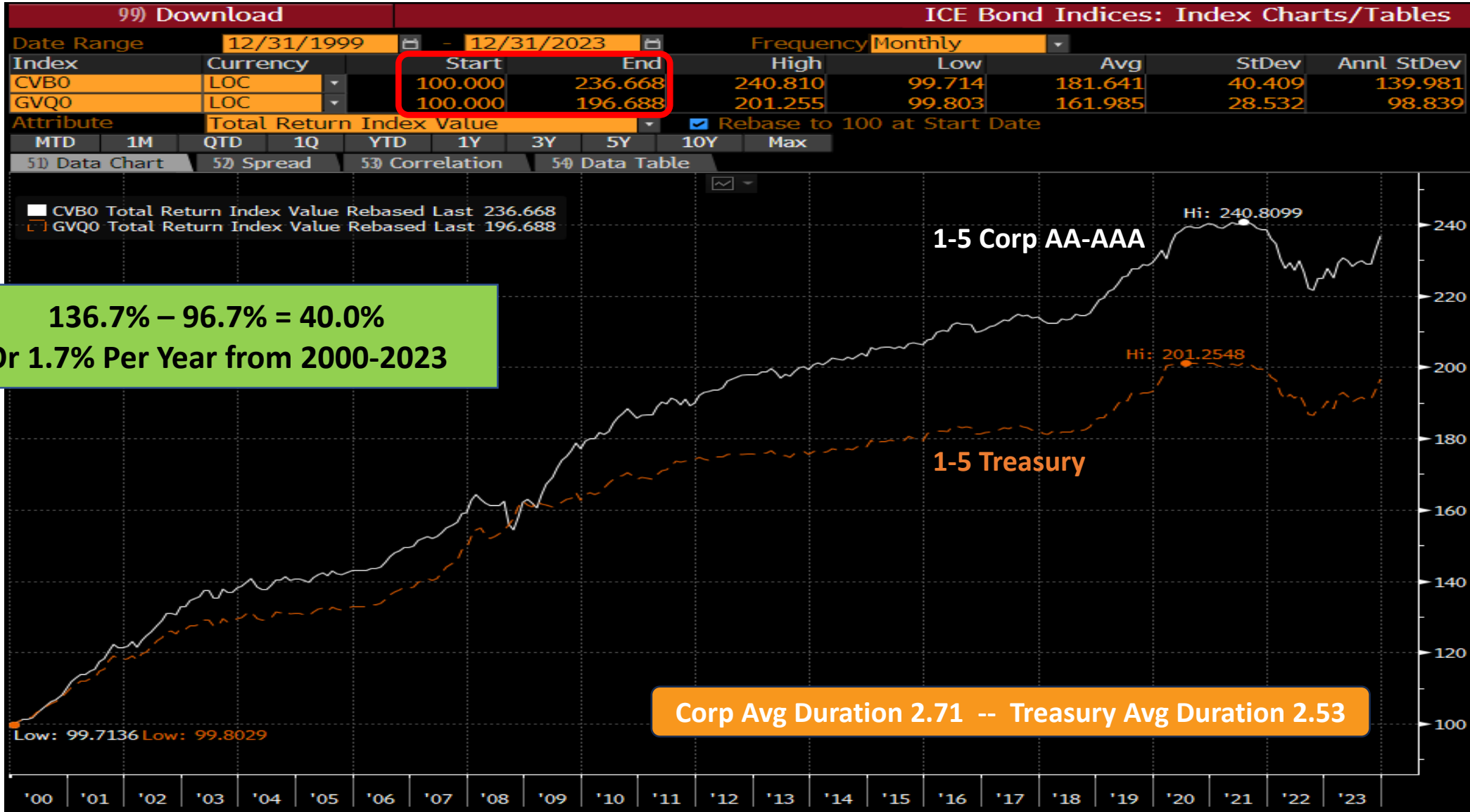
Interest Rate Risk

vs.

Credit Risk

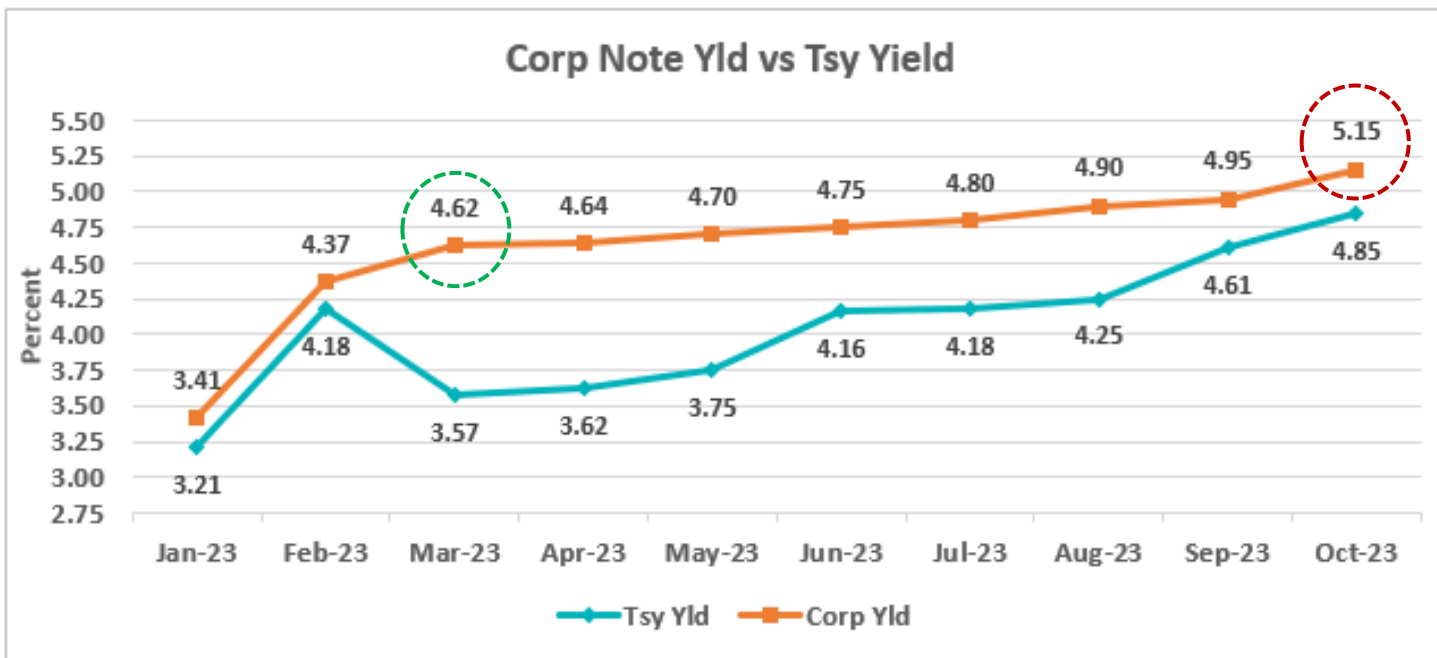


Corporate vs. Treasury

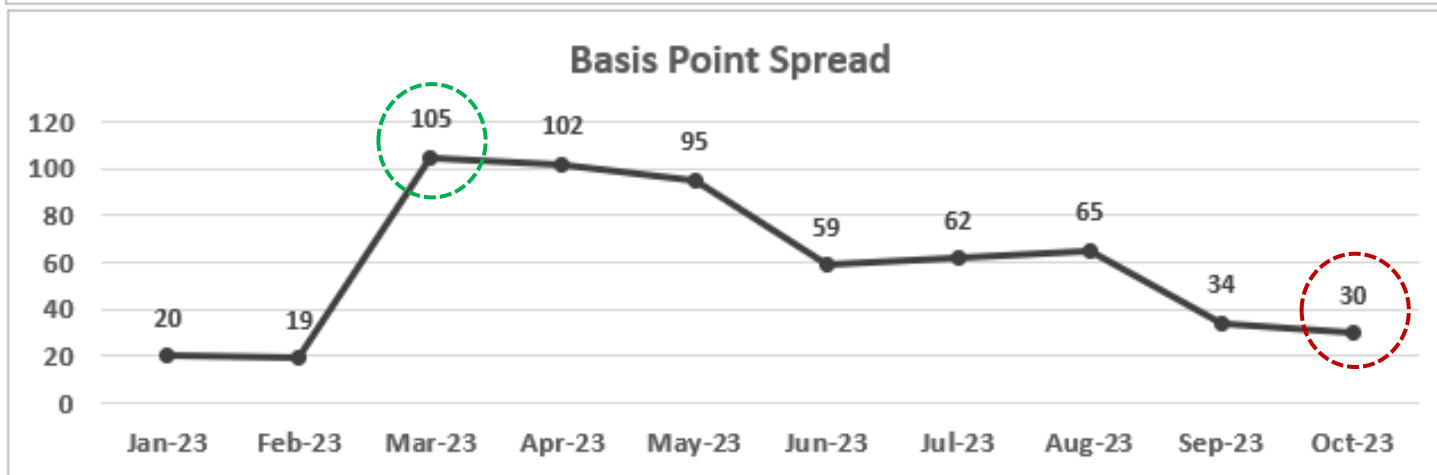


Source: Bloomberg

Relative Value: Would You Sell?



Book Return
Vs.
Total Return



Source: Meeder Public Funds, hypothetical yields

Swap Book Analysis (Bloomberg Function "SWB")

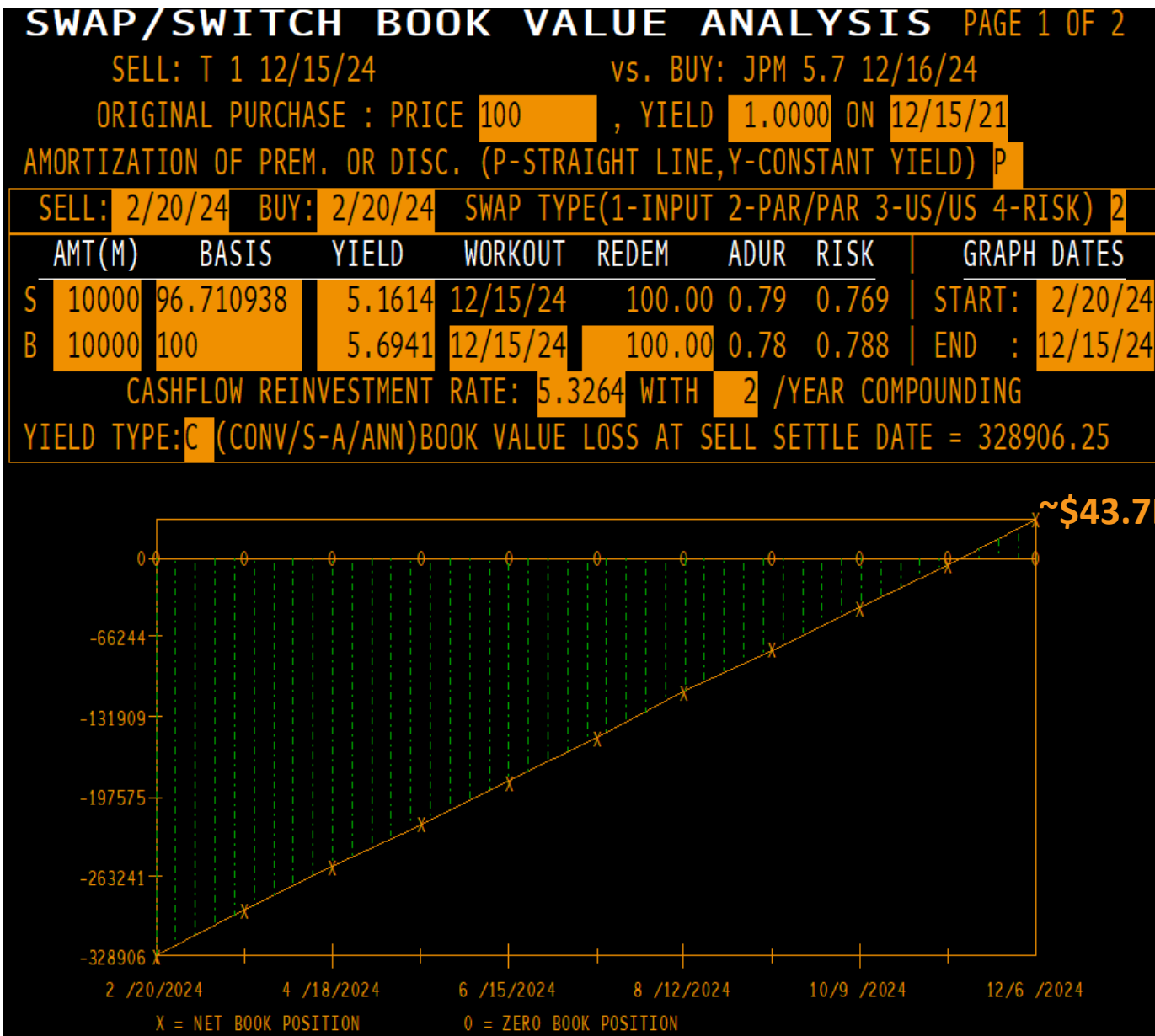
T-Note 1.0%
12/15/24 issued in
Dec 2021 (3Yr)

Sell at a 5.16%
yield and realize
an ~\$328K loss

Buy JPM 5.7%
12/16/24 at a
5.69% yield

Income Gain:
~\$43.7K

~\$329K Realized Loss



Source: Bloomberg

5. Prudent Diversification Among Asset Classes and Investment Types and Maturities

Sample

Investment Policy Compliance

Clark County Investment Pool

12/31/2023

Item / Sector	Parameters	In Compliance
Weighted Average Maturity	Weighted Average Maturity (WAM) must be less than 2.5 years.	Yes: 2.37 Yrs
Liquidity	At least 5% of Pool must mature within 90 days or less (includes checking).	Yes: 17.0%
U.S. Treasuries	No limit, maximum maturity 10 years.	Yes: 26.0%
U.S. Federal Agencies	No limit, no issuer limit, maximum maturity 10 years.	Yes: 37.1%
Nevada Local Govt Investment Pool	No limit.	Yes: 0.0%
Commercial Paper	20% limit, 5% per issuer, maximum maturity 270 days, rated A-1 or P-1, issued by Domestic Corporation or depository institution licensed in the United States.	Yes: 2.4%
Corporate	20% limit, 5% per issuer, maximum maturity 5 years, A- or A3, issued by Domestic Corporations.	Yes: 14.3%
Negotiable Certificates of Deposit	No limit, 5% per issuer, maximum maturity 1 year, rated A-1 or P-1 by at least two, issued by banks, credit unions, or savings and loans.	Yes: 2.8%
Money Market Funds	No limit, no issuer limit, rated AAA-m or Aaa-mf, treasury and agency funds.	Yes: 11.7%
Agency Collateralized Mortgage Obligations	20% limit, no issuer limit, no maximum maturity, rated AAA or Aaa.	Yes: 0.0%
Agency MBS Pass-Through	No limit, no issuer limit, maximum maturity 10 years.	Yes: 0.0%
Asset-Backed Securities	20% limit, 5% per issuer, no maximum maturity, rated AAA or Aaa.	Yes: 5.8%
Repurchase Agreements	10% limit, 10% Issuer limit, maximum maturity 90 days, allowable treasury/agency collateral at 102% of investment, transacted with Federal Reserve Primary Dealers.	Yes: 0.0%



5. Prudent Diversification Among Asset Classes and Investment Types and Maturities

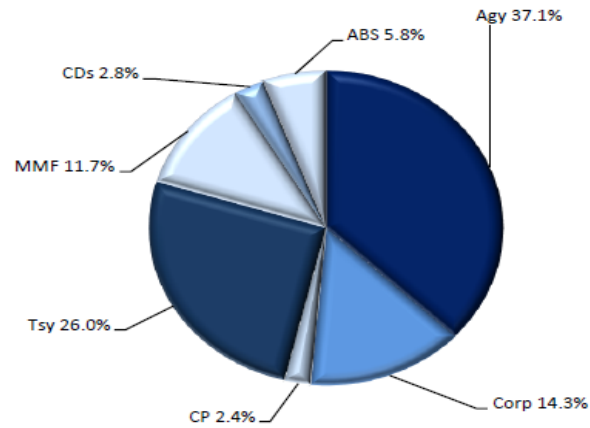
Sample

Portfolio Summary

Clark County Investment Pool

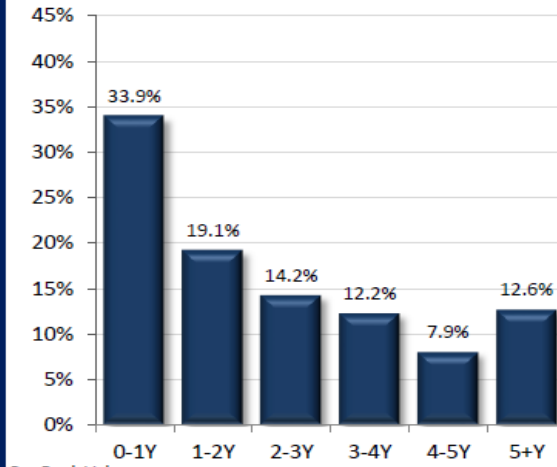
12/31/2023

SECTOR ALLOCATION



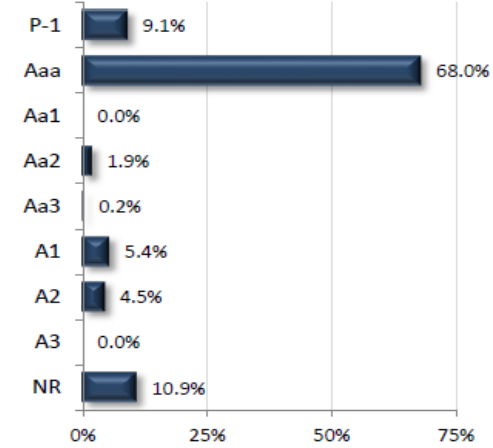
Per Book Value

MATURITY DISTRIBUTION



Per Book Value

CREDIT QUALITY (MOODY'S)



NR: Not Rated

ACCOUNT SUMMARY

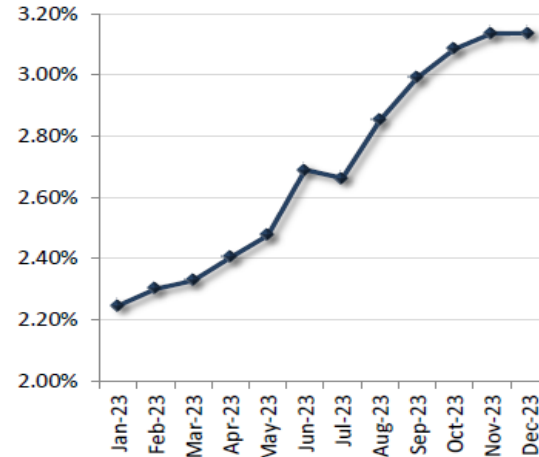
	12/31/23	11/30/23
Market Value	\$7,025,903,047	\$6,981,054,948
Book Value	\$7,208,848,809	\$7,224,119,740
Variance	-\$182,945,763	-\$243,064,792
Par Value	\$7,279,915,613	\$7,299,615,238
Net Asset Value	\$97.462	\$96.635
Book Yield	3.14%	3.14%

Y

E

*Book Value is at Original Cost, Not Amortized (Except for ABS)

PORTFOLIO BOOK YIELD HISTORY



TOP ISSUERS

Issuer	% Portfolio
U.S. Treasury	26.0%
FHLB	14.8%
AllSpring Govt-MMF	11.7%
FAMCA	8.1%
FFCB	6.2%
FHLMC	4.5%
FNMA	3.4%
Toyota	2.8%
JPM	2.2%
Wells Fargo Company	2.1%
Capital One - ABS	2.1%
American Express - ABS	1.7%
US Bancorp	1.4%
Microsoft	1.4%
Amazon	1.2%

Per Book Value

6. Limit Optionality (Callables) in the Portfolio

When someone purchases a callable bond, they are selling a call option to the issuer. This gives the issuer the right to call the bond when it is advantageous for the issuer, not the person buying the callable.

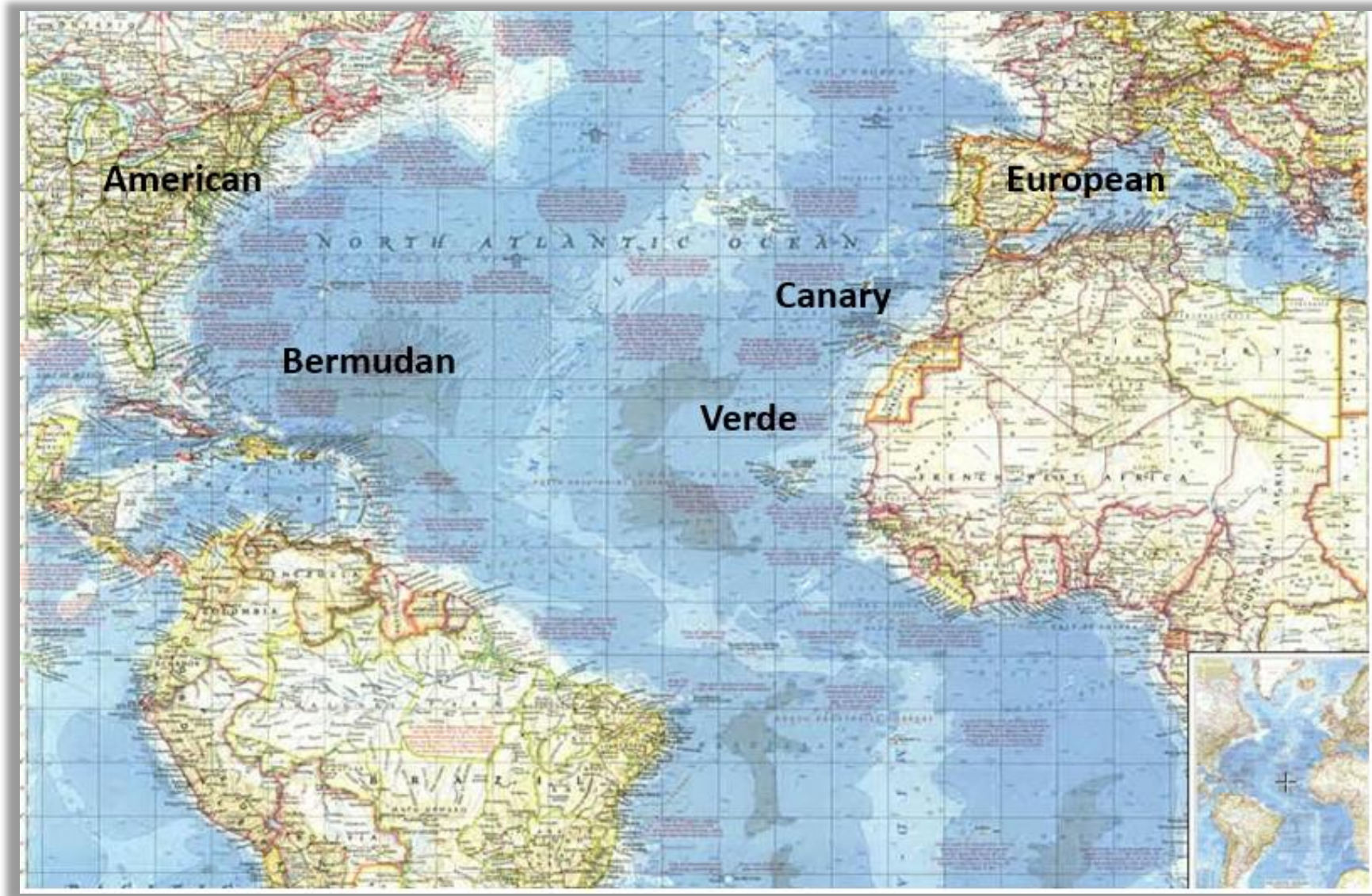
5 Year Securities: Callables' Lockouts 1 Year

Instrument	Number of Calls	Estimated Yield
Treasury	0	4.05%
Agency/GSE Bullet	0	4.10%
One-Time Call	1	5.00%
Discrete Call (quarterly)	15	5.15%
Continuous Call	1,450	5.20%

Items Impacting Callable Spreads/Yields:

Volatility, Number of Calls, Call Lockout Period, Yield Curve, Forward Rates

Primary Types of Callables



Bloomberg's New Issuer Monitor

95) Actions ▾ 96) Alerts ▾ 97) Summary 98) Set Homepage 99) Export ▾ [New Issue Monitor](#)

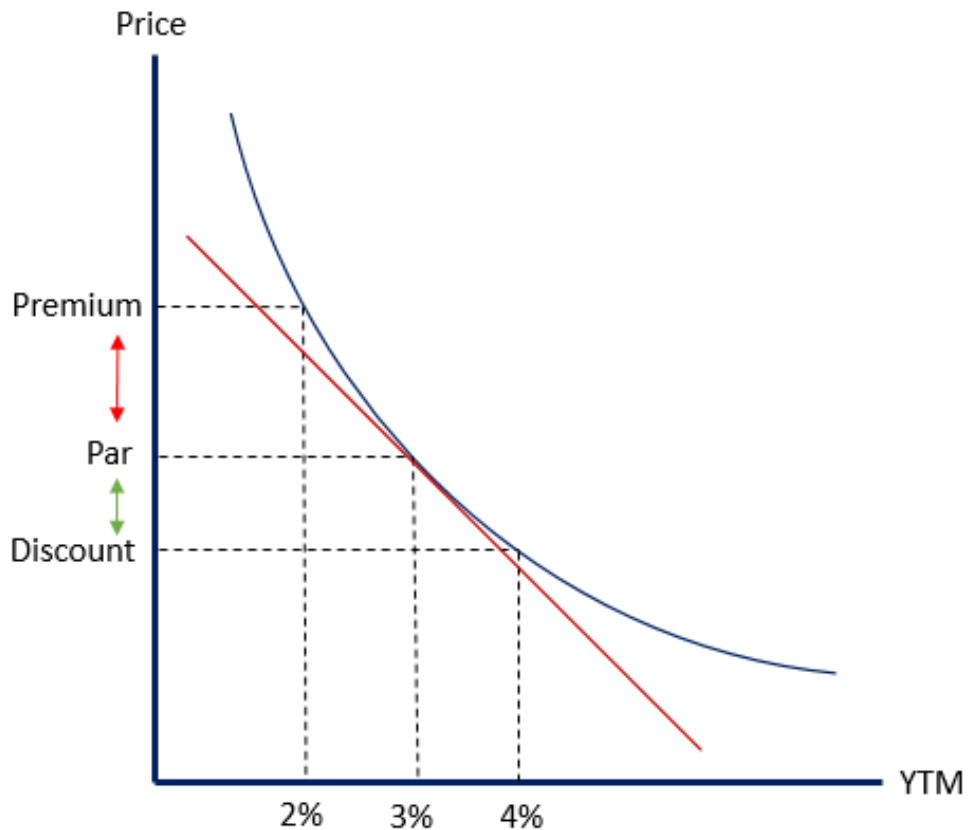
Selection **U.S. Agencies (NIM 2)** 1) Show Filters 2) Clear Filters Issues & News ▾

Real Time Issue History Date Range 01/19/24 - 02/19/24 6) Prelim Issues | PREL

	Date ↓	Issuer/Headline	Coupon	Maturity	Spread	Curr	Outst	Book Mgr	Note
			All ▾	All ▾	All ▾	All ▾	All ▾		
101)	2/16	FED HOME LN BANK	5.350	02/19/27		USD	15	STFL-sole	3-NC9MO BERM
102)	2/16	FREDDIE MAC	4.500	02/26/27		USD	10	MTBK-sole	3-NC9MO BERM
103)	2/16	FANNIE MAE	5.250	02/22/27		USD	50	WFS-sole	3-NC9MO 1INC
104)	2/16	FED HOME LN BANK	4.880	06/13/25		USD	15	OPP-sole	02/21/24
105)	2/16	FED HOME LN BANK	5.100	08/23/27		USD	15	WFS-sole	3.5-NC1.251X
106)	2/16	FED HOME LN BANK	5.170	03/19/25		USD	1000	BofA-sole	1-NC10MO 1X
107)	2/16	FED HOME LN BANK	5.970	02/28/39		USD	15	JOINT LEADS	15-NC1 CONT
108)	2/16	FED HOME LN BANK	6.000	02/28/29		USD	50	LOOPCM-sole	5-NC1MO INC
109)	2/16	FED HOME LN BANK	6.250	02/23/44		USD	65	BCLY,INSPRX	20-NC3MO INC
110)	2/16	FED HOME LN BANK	5.100	02/20/26		USD	15	HILTP-sole	2-NC1 1X
111)	2/16	FED HOME LN BANK	4.875	03/13/26		USD	80	FHN-sole	INCREASE
112)	2/16	FED HOME LN BANK	5.350	02/19/27		USD	15	JOINT LEADS	3-NC9MO BERM
113)	2/16	FED HOME LN BANK	4.500	03/12/27		USD	150.06	FHN-sole	INCREASE
114)	2/16	FREDDIE MAC	5.250	02/28/28		USD	15	BOSC,DW,RWE	4-NC1 BERM
115)	2/16	FED HOME LN BANK	5.150	02/21/25		USD	15	JOINT LEADS	1-NC9MO 1X
116)	2/16	FREDDIE MAC	5.000	02/23/29		USD	15	JOINT LEADS	5-NC6MO BERM
117)	2/16	FED HOME LN BANK	5.000	02/21/29		USD	15	JOINT LEADS	5-NC1.75 1X
118)	2/16	FED HOME LN BANK	4.650	02/16/29		USD	15	JOINT LEADS	5-NC3 1X
119)	2/16	FREDDIE MAC	5.625	02/22/27		USD	300	JOINT LEADS	3-NC3MO BERM
120)	2/16	FED HOME LN BANK	5.000	02/20/29		USD	50	JOINT LEADS	5-NC2 BERM
121)	2/16	FED HOME LN BANK	5.050	08/18/25		USD	15	INSPRX,RWB	1.5-NC1 1X

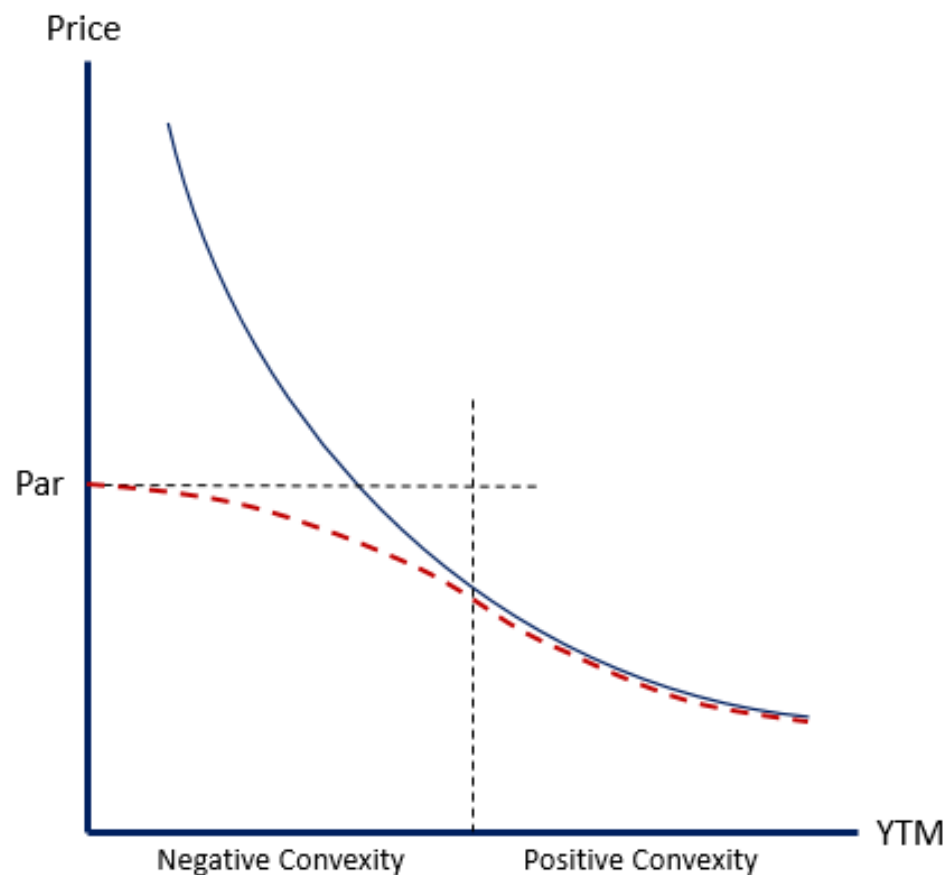
Convexity measures the curvature of the price/yield relationship of a bond

$$\Delta \text{Bond Price} \approx -\text{Modified Duration}(\Delta \text{YTM}) + \frac{1}{2} \text{Convexity}(\Delta \text{YTM})^2$$



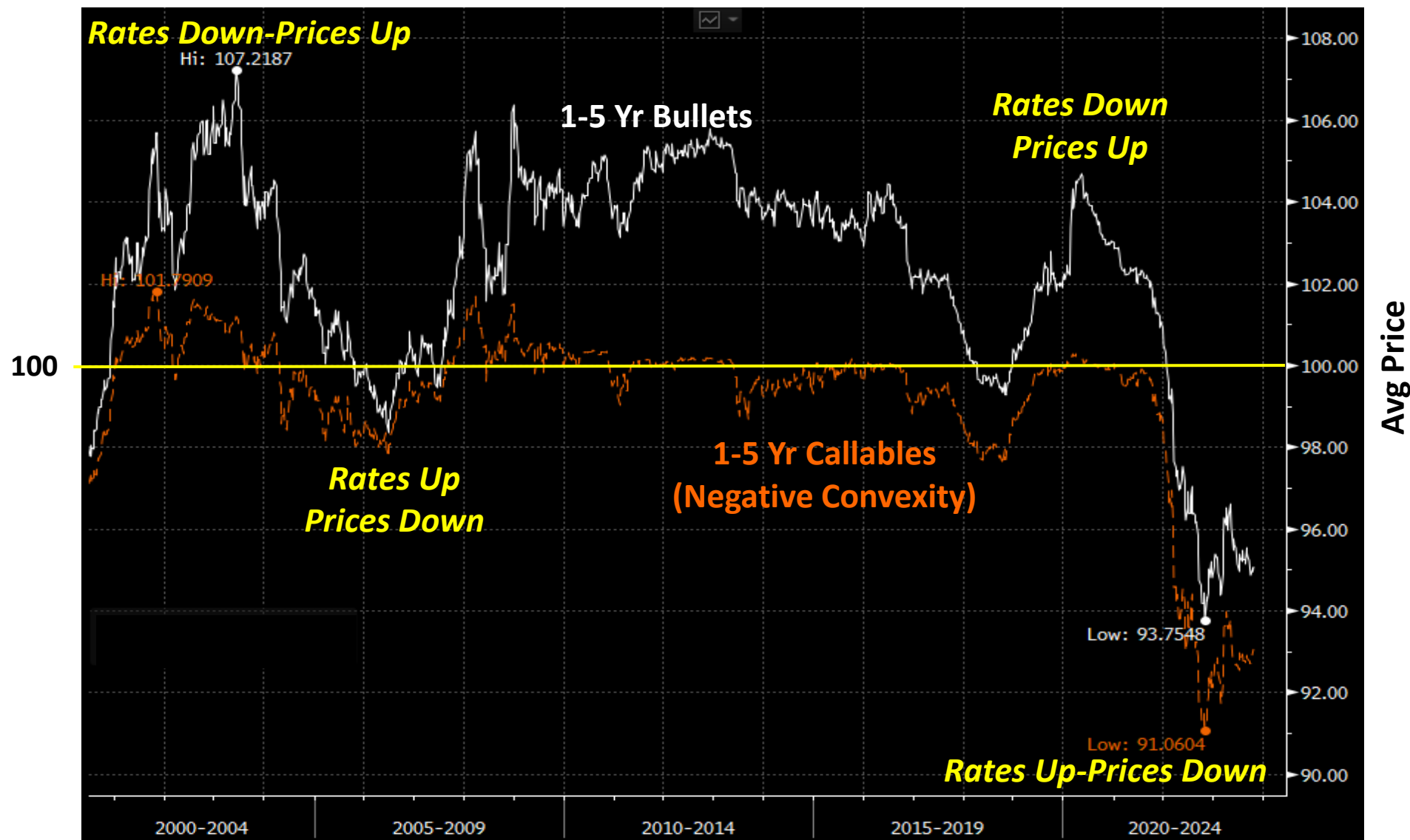
- Because duration is a linear assumption, it miscalculates the change in the price of a bond given a change in the yield to maturity
- Duration underestimates the bond price when yields fall and overestimates the bond price when yields rise
- **Convexity** measures the curvature of the price/yield relationship of a bond

Negative Convexity



- As interest rates drop, callable bonds become negatively convex and duration decreases
- If the bond's coupon is higher than a comparable bullet security, the issuer will call back the bond and you will have to reinvest at lower rates
- As interest rates rise, callable bonds act like normal bullet bonds and can become positively convex

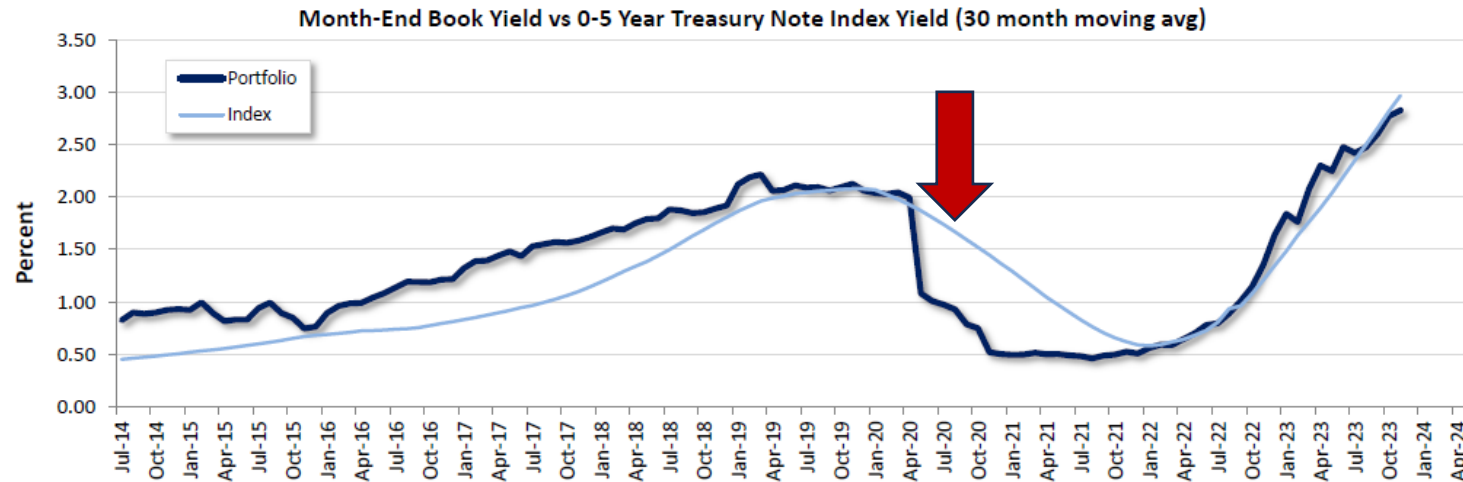
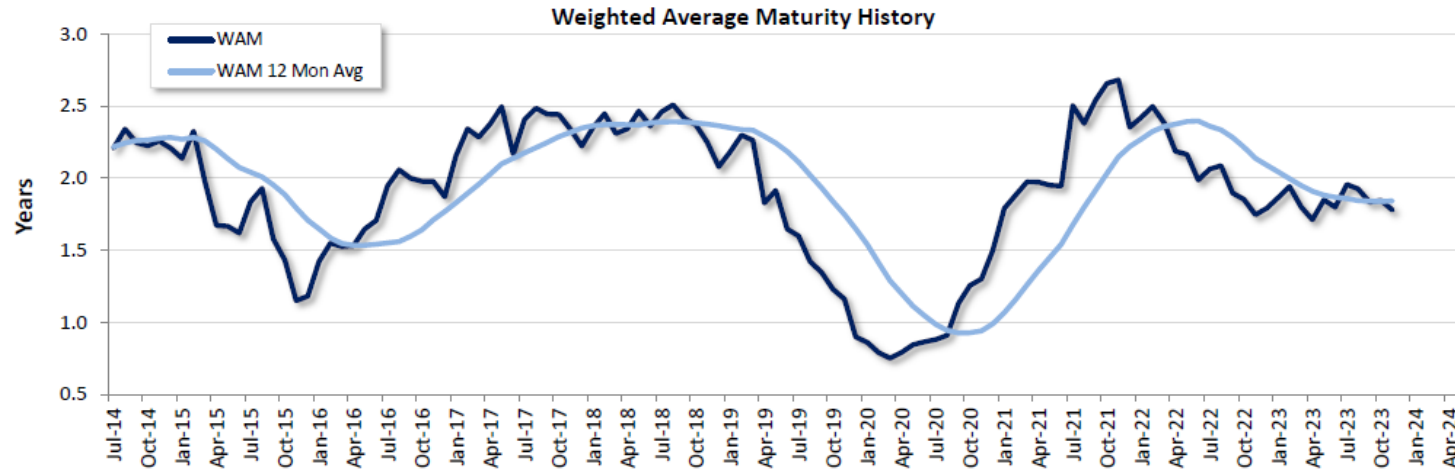
Average Prices: Agency 1-5Yr Callables vs. Agency 1-5Yr Bullets



Real World Example of Negative Convexity's (Callables) Impact on a Portfolio

Sample Weighted Average Maturity and Aging Report

11/30/2023



Interest Rate Risk...A.K.A. Duration

Effective Duration (sometimes called option-adjusted duration or OAS) further refines the modified duration calculation and is particularly useful when a portfolio contains callable securities.

Effective duration requires the use of a complex model for pricing bonds that adjusts the price of the bond to reflect changes in the value of the bond's "embedded options" (e.g., call options or a sinking fund schedule) based on the probability that the option will be exercised.

Effective duration incorporates a bond's yield, coupon, final maturity and call features into one number that indicates how price-sensitive a bond or portfolio is to changes in interest rates.



Issue Brief: Benefits and Limitations of Option-Adjusted Spread Analysis

INTRODUCTION

Public fund managers want to ensure that their investment practices are consistent with their investment policy, and accomplish the main objectives of optimizing safety, liquidity, and return on agency assets. These goals charge public agencies with thoughtfully choosing investments that mitigate risk, ensure sufficient liquidity to meet ongoing obligations, and also generate income for the portfolio over budgetary and economic cycles. These different objectives often come into contention with one another, as assets considered the safest usually produce the smallest returns and assets with higher returns also tend to have more risk.

Yield spread is an important indicator that investors consider when acquiring investments for their portfolios, as it measures additional return for an asset above a risk-free rate. Absolute yield spread for a bond is calculated by subtracting the yield of a "risk-free" bond¹ from the yield of that bond. Although the yield spread for a bond provides important information about the return on the investment, it does not account for embedded redemption structures, such as call options, which allow the issuer to redeem, or call, the bond prior to maturity.

Option-adjusted spread (OAS) is a measure of yield spread for a bond that accounts for embedded redemption structures. OAS is an improvement on the standard calculation of yield spread for a bond because it accounts for the possibility of a change in the bond's cash flows due to changes in interest rates. This issue brief discusses what OAS is, how to interpret OAS values, modeling assumptions, and the limitations of applications of OAS in public portfolio management.²

WHAT IS OAS?

OAS is a measure of yield spread that accounts for embedded call options in the valuation of bonds. The OAS for a bond is computed using price and projections of interest rate volatility to account for the possibility of early redemption. The OAS value is interpreted as the constant spread that can be earned on the asset compared to the risk-free option. Most commonly, the OAS is expressed as a spread over the Treasury curve.³

The main benefit and purpose of OAS is that it allows for comparability between bonds with different redemption structures. For the majority of public agencies, the most common application of OAS relates to agency investments in callable bonds. For example, an agency might want to compare the yield for a callable bond with the yield for a noncallable, or bullet, bond. Without OAS, an investor can only compare the nominal rate of return for each bond without being able to consider a potential lower return in cases where the callable bond is redeemed before maturity. When used correctly, OAS can help investors

EFFECTIVE DURATION

Additional benefits of OAS include applications to calculating duration for a bond in a way that accounts for an embedded option. Duration is a measure of estimating the price (market value) change in a bond given a change in interest rates. Effective duration is a byproduct of the option models that produce OAS and it accounts for ways that changes in interest rates have the potential to change a bond's cash flows. Similar to how OAS is an improved measure of yield spread, effective duration is an improvement over modified duration, as it is a more reliable indicator of a callable bond's price sensitivity to changes in interest rates.

make more informed decisions about which assets to include in their portfolios that balance their different investment objectives of safety, liquidity, and return.

INVESTMENT RISKS OF CALLABLE BONDS

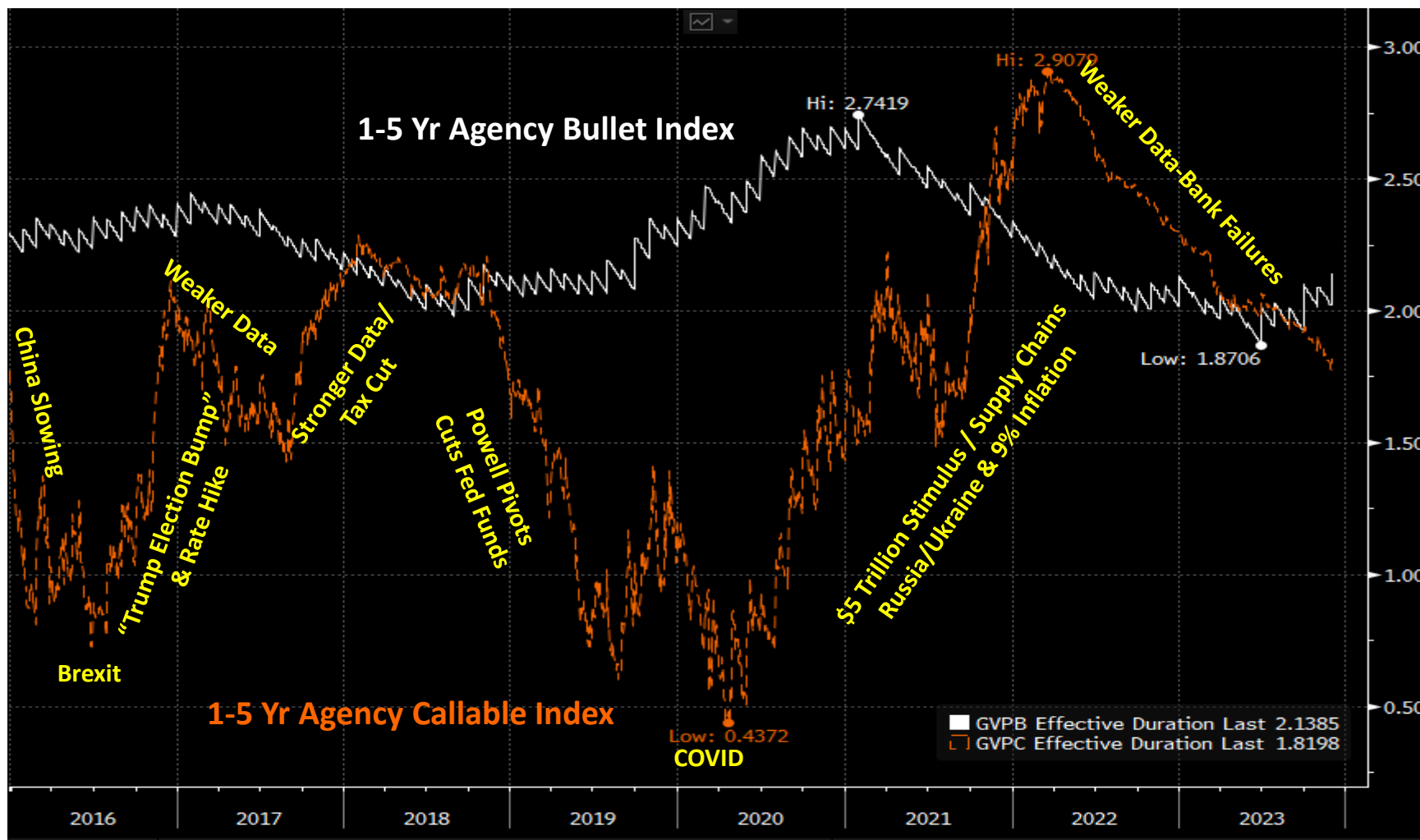
Callable bonds have an embedded option for early redemption, which is associated with additional investment risks. For example, one of the main risks of investing in callable bonds is the possibility that the bond could be redeemed, or "called," earlier than its

<https://www.treasurer.ca.gov/cdiac/publications/issue-brief/2020/20-10.pdf>

Effective Duration: Agency 1-5 Yr Bullets vs. 1-5 Yr Callables

- Interest Income Budget Stability
- Sleep Adjusted Returns

Effective Duration:



One-Time Call vs. Bullet

5Yr-NC 2Yr-1X Callable: YTM on 12/19/23 was 4.60%

FHLB 4.6 12/22/28 Corp Actions Settings Page 1/13 Security Description: Bond

Data not provided by Bloomberg

Pages	Issuer Information	Identifiers
1) Bond Info	Name FEDERAL HOME LOAN BANK	FIGI BBG01KPZ4ZQ9
12) Addtl Info	Industry Government Sponsored (BCLASS)	CUSIP 3130AYB54
13) Reg/Tax	Security Information	ISIN US3130AYB542
14) Covenants	Mkt Iss US DOMESTIC	Bond Ratings
15) Guarantors	Ctry/Reg US Currency USD	Moody's Aaa
16) Bond Ratings	Rank Unsecured Series 0000	S&P AA+
17) Identifiers	Coupon 4.600000 Type Fixed	Composite AA+
18) Exchanges	Cpn Freq S/A	Issuance & Trading
19) Inv Parties	Day Cnt 30/360 Iss Price 100.0000	Amt Issued/Outstanding
20) Fees, Restrict	Maturity 12/22/2028	USD 15,000.00 (M) /
21) Schedules	CALL 12/22/25@100.00	USD 15,000.00 (M)
22) Coupons	Iss Sprd	Min Piece/Increment
23) Impact	Calc Type (1)STREET CONVENTION	10,000.00/ 5,000.00
Quick Links	Pricing Date 12/19/2023	Par Amount 5,000.00
32) ALLQ Pricing	Interest Accrual Date 12/22/2023	Book Runner INSPRX,STONEX
33) QRD Qt Recap	1st Settle Date 12/22/2023	Reporting TRACE
34) TDH Trade Hist	1st Coupon Date 06/22/2024	
35) CACS Corp Action		
36) CF Filings		
37) CN Sec News		
38) HDS Holders		
60) Send Bond		
	Security created by firm INSPEREX LLC	

Bullet: YTM on 12/19/23 was 3.95%

Issuer Information		Identifiers	
Name	FEDERAL FARM CREDIT BANK	FIGI	BBG01KJFJ0N4
Industry	Government Sponsored (BCLASS)	CUSIP	3133EPN50
Security Information		ISIN	US3133EPN509
Mkt Iss	US DOMESTIC	Bond Ratings	
Ctry/Reg	US Currency USD	Moody's	Aaa
Rank	Unsecured Series	S&P	AA+
Coupon	4.250000 Type Fixed	Composite	AA+
Cpn Freq	S/A	Issuance & Trading	
Day Cnt	30/360 Iss Price 99.49280	Amt Issued/Outstanding	
Maturity	12/15/2028	USD	525,000.00 (M) /
	BULLET	USD	525,000.00 (M)
Iss Sprd		Min Piece/Increment	
Calc Type	(1)STREET CONVENTION	1,000.00/ 1,000.00	
Pricing Date	12/11/2023	Par Amount	1,000.00
Interest Accrual Date	12/15/2023	Book Runner	JOINT LEADS
1st Settle Date	12/15/2023	Reporting	TRACE
1st Coupon Date	06/15/2024		

4.60% - 3.95% = .65%



Where will 3 year bullet yields be 2 years from now?

Callable only on date(s) shown

Date	Price
12/22/2025	100.000

Deeply Discounted Callable...Bullet Alternative

3.3 Year Continuously Callable

FHLB 1.4 04/15/27 Corp		Settings ▾	Yield and Spread Analysis		
		Notes	95 Buy	96 Sell	
1) Yield & Spread	2) Graphs	3) Pricing	4) Description	5) Custom	
6) Calls	7) Yields				
FHLB 1.4 04/15/27 (3130AJGU7)		Risk			
Spread	21.04 bp vs 3yT 4 3/8 12/15/26	Workout	OAS		
Price	91.307	100-29 7/8 10:07:37	3.159	3.135	
Yield	4.248228 Wst	4.037825 S/A	Risk	2.893 2.871	
Wkout	04/15/2027 @ 100.00 Contribut.. Yld 6 6	Convexity	0.117	0.101	
Settle	12/26/23	DV 01 on 1MM	289	287	
		Benchmark Risk	2.788	2.777	
		Risk Hedge	1,038 M	1,034 M	
		Proceeds Hedge	906 M		
Spreads		Yield Calculations		Invoice	
1) G-Sprd	23.8	Street Convention	4.248228	Face	1,000 M
12) I-Sprd	53.4	Equiv 1 /Yr	4.293346	Principal	913,070.00
13) Basis	-5.9	Mmkt (Act/360)		Accrued (71 Days)	2,761.11
14) Z-Sprd	50.0	True Yield	4.248228	Total (USD)	915,831.11
15) ASW	48.0	Current Yield	1.533		
16) OAS	25.7				



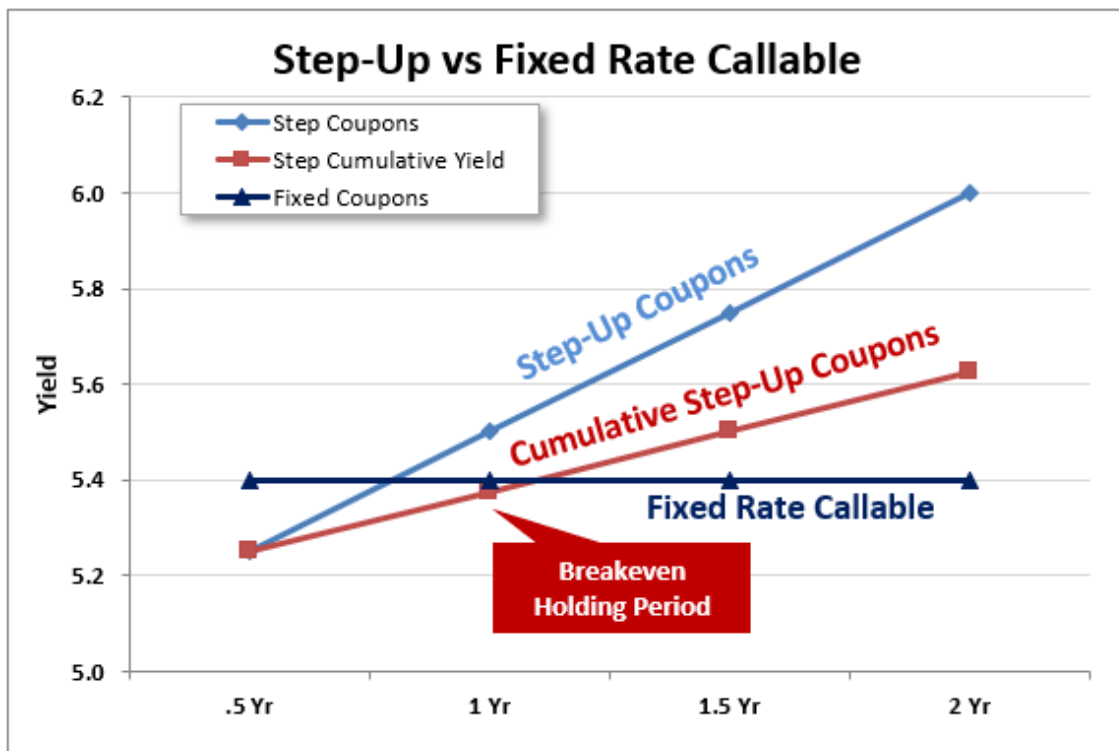
Picks up ~24 basis points to a similar maturity treasury and ~20 basis points to a similar maturity agency bullet

Step-Up Analysis

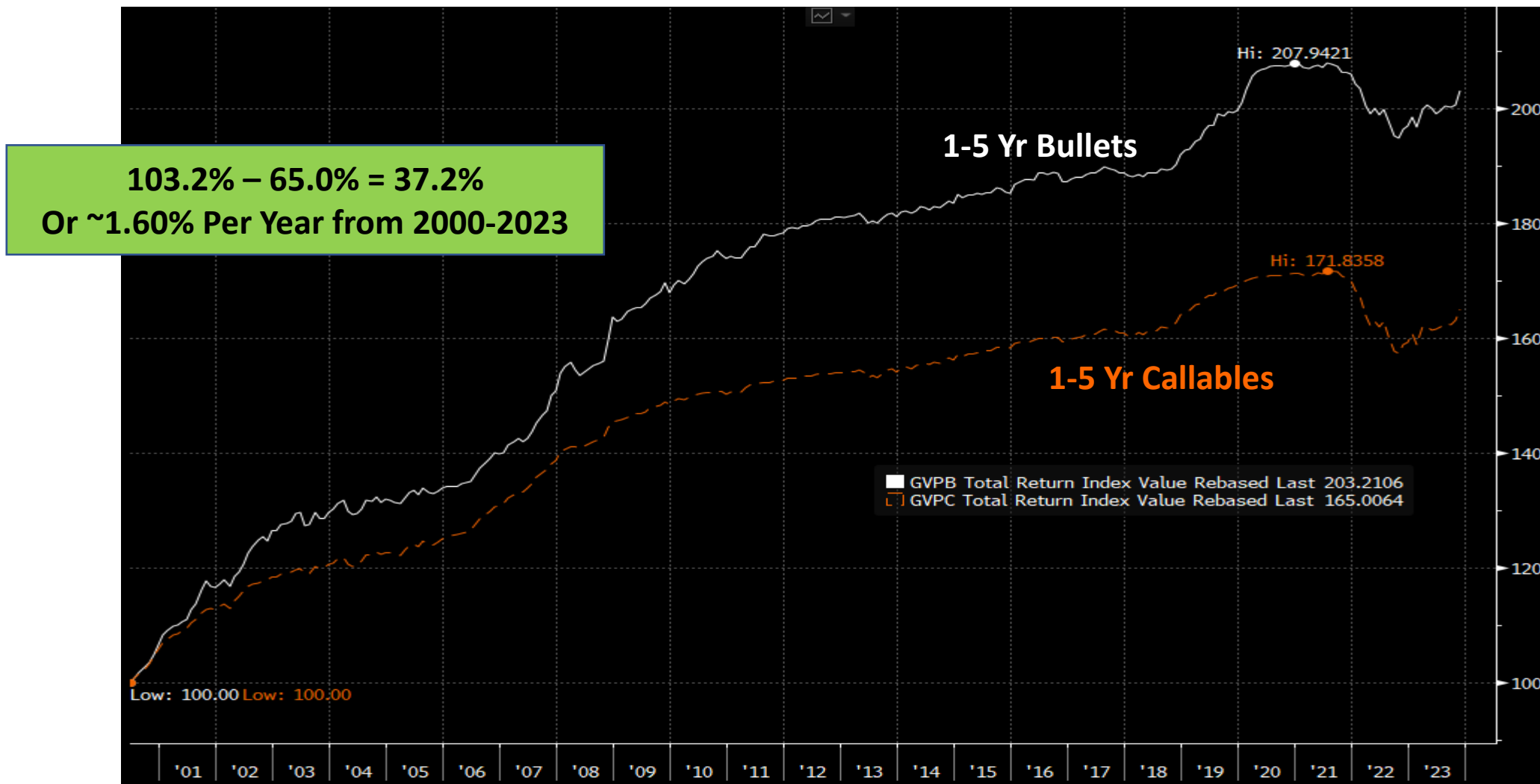
Step Up Analysis - 2yr Semi-Annual Steps				
Time	Step Cpns	Cumltv Cpn	Reg Cpns	Var
.5 Yr	5.250	5.250	5.400	(0.150)
1 Yr	5.500	5.375	5.400	(0.025)
1.5 Yr	5.750	5.500	5.400	0.100
2 Yr	6.000	5.625	5.400	0.225

Issuer	FEDERAL HOME LOAN BANK		
Industry	Government Sponsored (BCLASS)		
Security Information			
Mkt Iss	US DOMESTIC		
Ctry/Reg	US	Currency	USD
Rank	Unsecured	Series	
Coupon	5.250000	Type	Step-Up F
Cpn Freq	S/A		
Day Cnt	30/360	Iss Price	100.0000
Maturity	12/26/2025		
CALL 03/26/24@100.00			

Name	FEDERAL HOME LOAN BANK		
Industry	Government Sponsored (BCLASS)		
Security Information			
Mkt Iss	US DOMESTIC		
Ctry/Reg	US	Currency	USD
Rank	Unsecured	Series	
Coupon	5.400000	Type	Fixed
Cpn Freq	S/A		
Day Cnt	30/360	Iss Price	100.0000
Maturity	12/22/2025		
CALL 03/22/24@100.00			

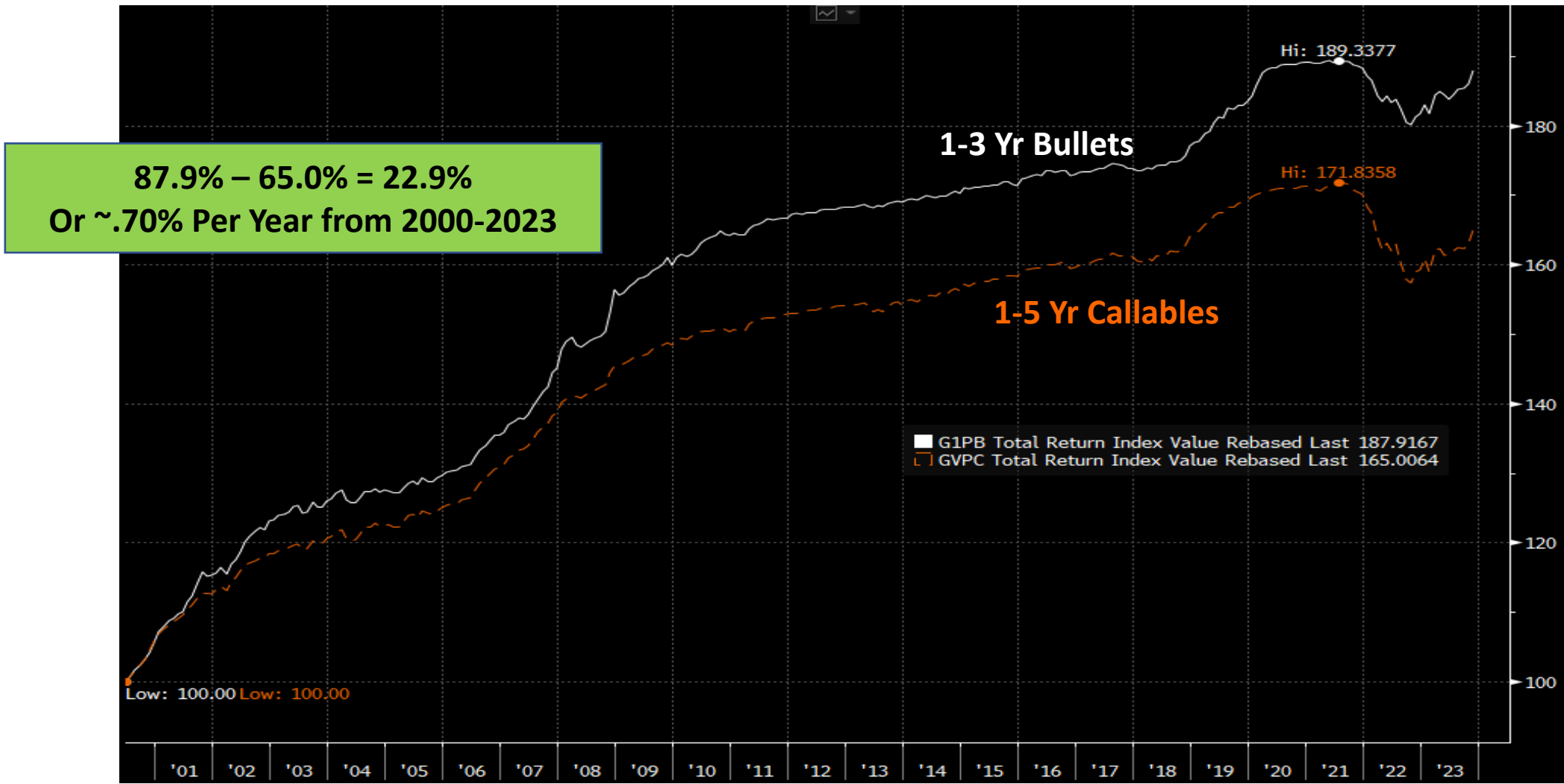


Total Return: 2000-2023 1-5 Yr Agency Callables vs. 1-5 Yr Agency Bullets



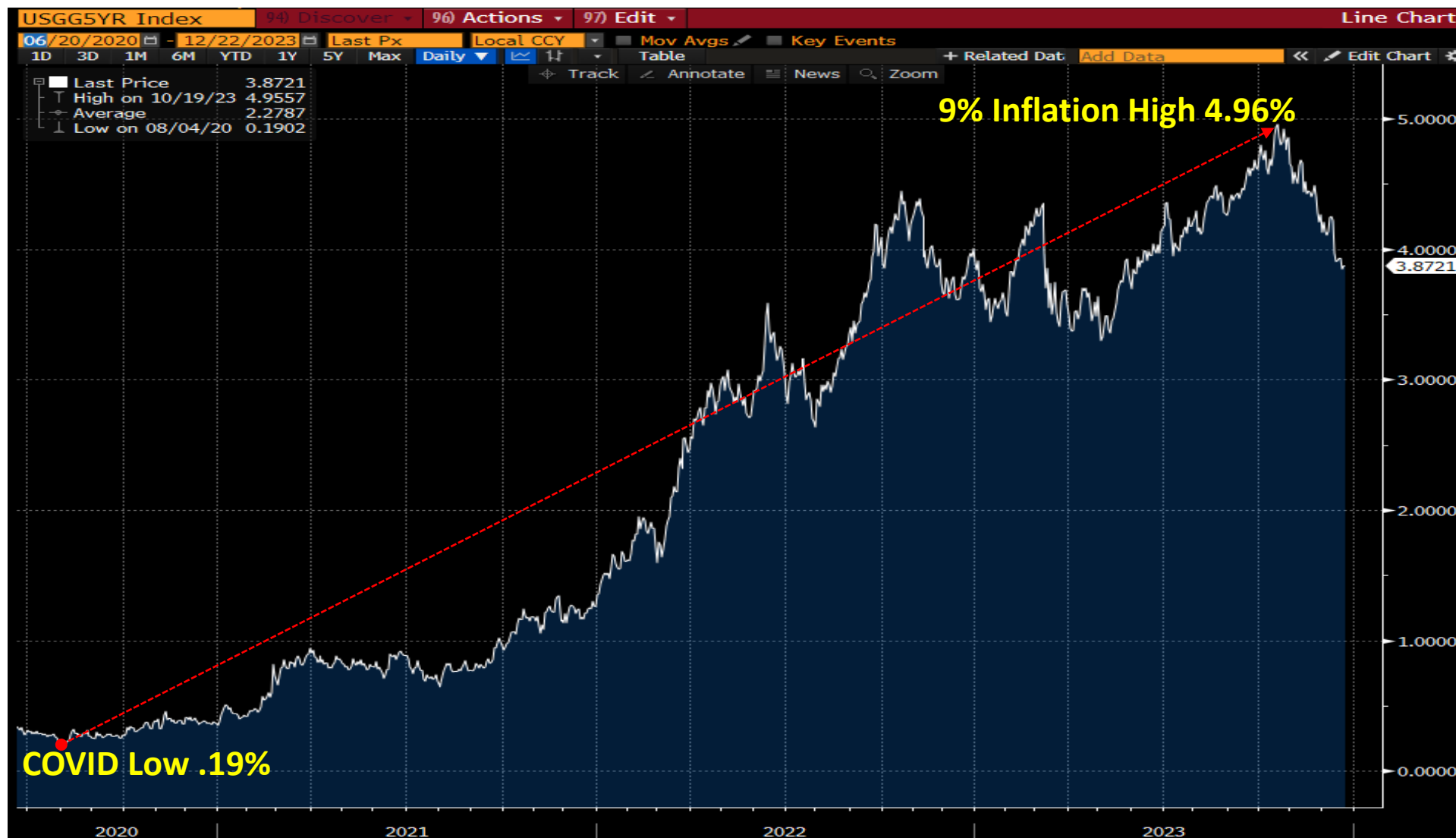
Avg Effective Duration: Bullets 2.37 Callables 1.57

Total Return: 2000-2023 1-5 Yr Agency Callables vs. 1-3 Yr Agency Bullets

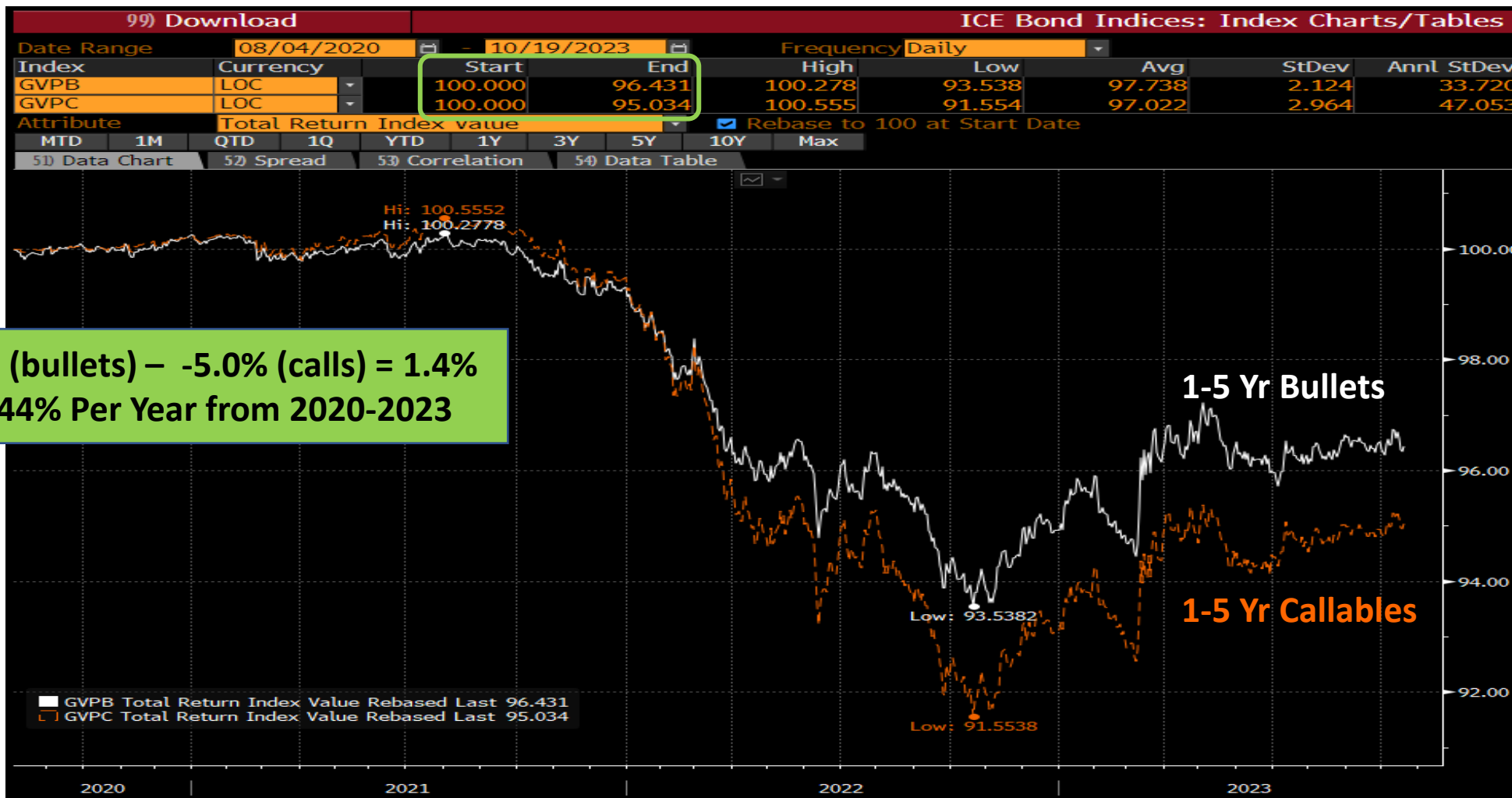


Avg Effective Duration: Bullets 1.82 Callables 1.57

But What If Your Timing Was Awesome!



Awesome Timing: 1-5 Yr Agency Callables vs. 1-5 Yr Agency Bullets



**-3.6% (bullets) – -5.0% (calls) = 1.4%
Or .44% Per Year from 2020-2023**

11. Benchmark Your Investment Program and Portfolio in Multiple Ways

"When performance is measured, performance improves. When performance is measured and reported, the rate of improvement accelerates." Thomas S. Monson



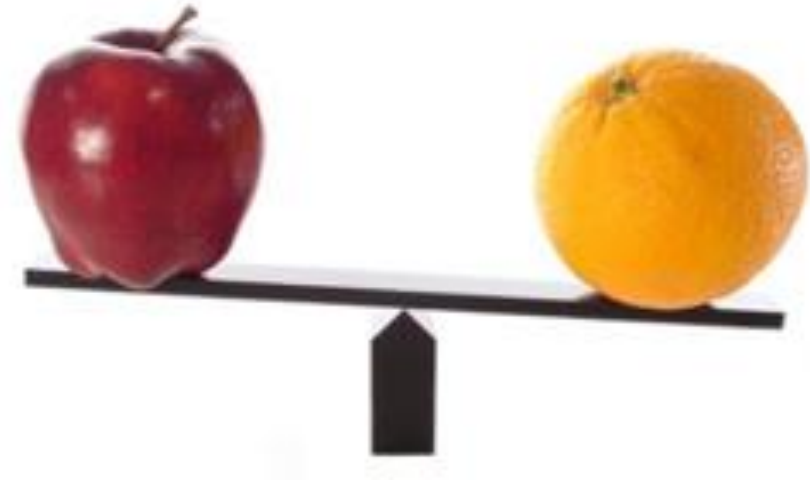
Your Investment Report Should Be on Your Website

To Be Relevant, Benchmarks Should Reflect the General Characteristics of a Portfolio's:

- Duration/Maturity
- Sector Allocations
- Turnover

Three Types of Benchmarking:

- Weighted Yield
- Book Rate of Return
- Total Rate of Return

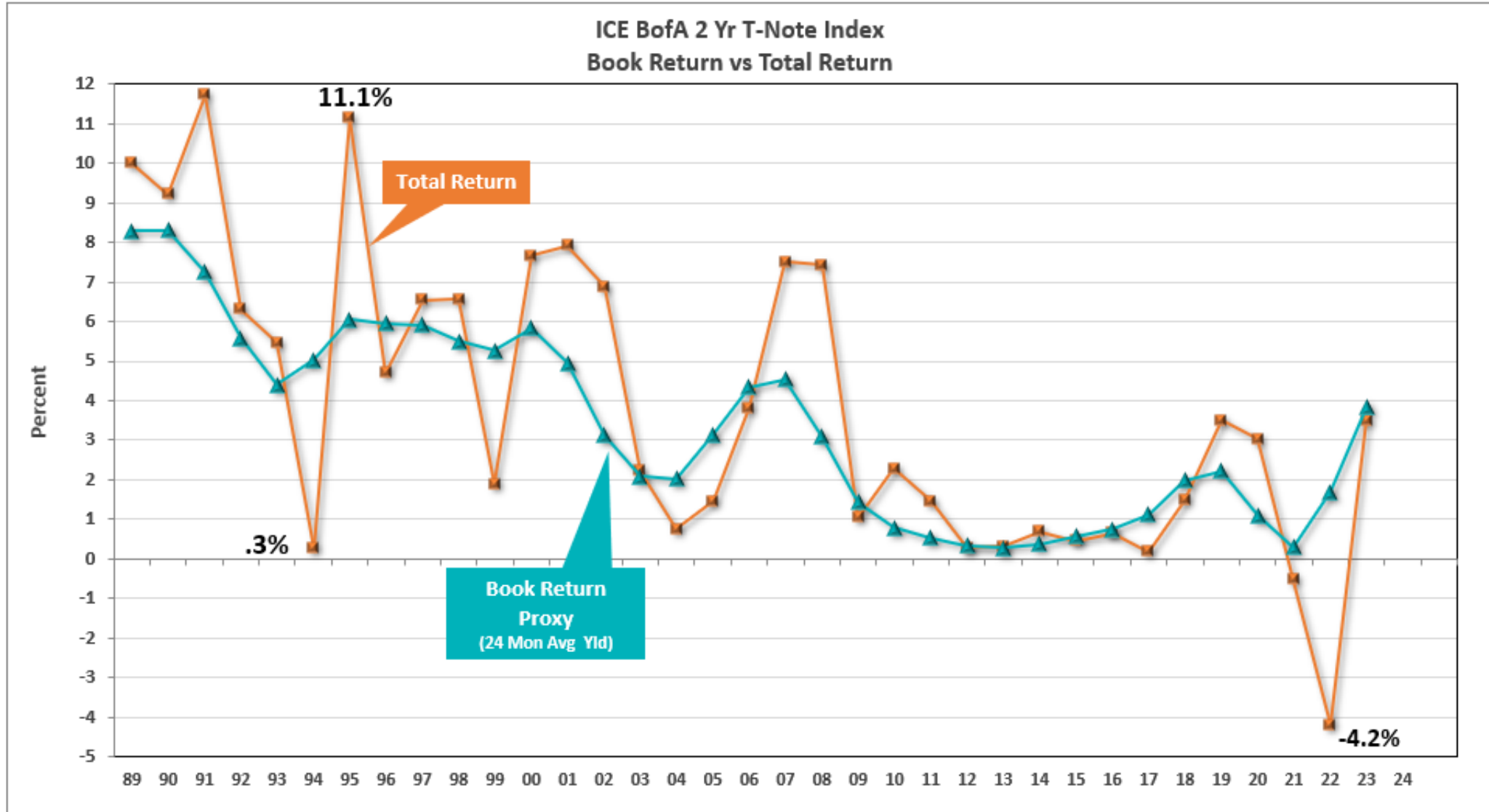


Book Return And Total Return Details

$$\text{Book Return} = \frac{\begin{aligned} &+ \text{ Accrued/Received Interest} \\ &+/- \text{ Amortization of Premiums/Discounts} \\ &+/- \text{ Realized Gains/Losses} \end{aligned}}{\text{Average Daily Book Balance for the Period}}$$

$$\text{Total Return} = \frac{\begin{aligned} &+ \text{ Accrued/Received Interest} \\ &+/- \text{ Realized/Gains Losses} \\ &+/- \text{ Unrealized Gains/Losses} \end{aligned}}{\text{Average Daily Book Balance for the Period}}$$

Book Return vs. Total Return



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