From Policy to Construction: Portfolio Structure and Diversification

Rick Phillips Chief Investment Strategist Meeder Public Funds February 28, 2024 -- 1:30PM to 2:30PM

MEEDER

PUBLIC FUNDS



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

Structuring An Investment Program To Ensure The 3 Objectives Are Accomplished



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

California Code/Investment Policy = Legal



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Investment Plan = Practical and Day-To-Day



Structuring An Investment Plan To Ensure The 3 Objectives Are Accomplished



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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"



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Wisdom Of The Past: Context Is Very Helpful



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The more you know about the <u>past</u>, the better prepared you are for the <u>future</u>. Theodore Roosevelt

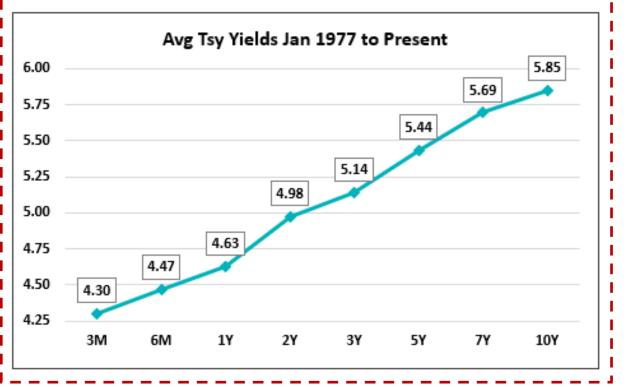
1. Longer Duration Has Generated More Investment Income Over the Long Run



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benchmark measury woulled sharp ratio (work) Analysis										
Jan 1977 to Present										
	Modified									
		Avg	Sharp	% Return of 10Yr /						
Maturity	Avg Yield	Duration	Ratio	% 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%						

Benchmark Treasury Modified Sharp Ratio (MSR) Analysis

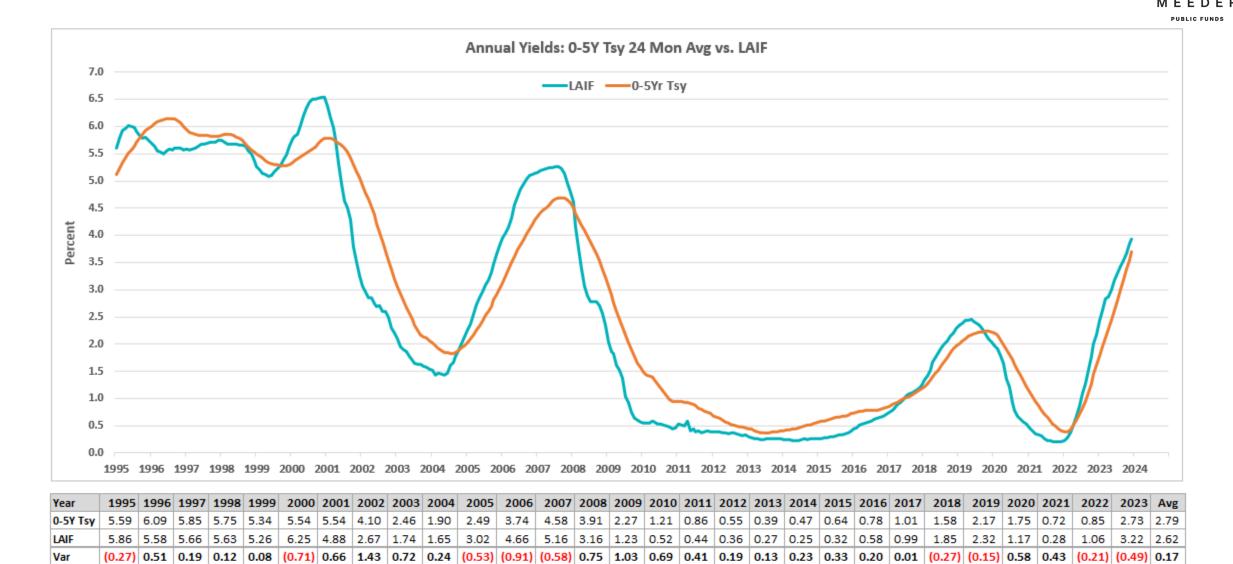


4.98% (2Y) - 4.30% (3M) / 1.91 (2Yr Dur) = 0.35

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

.

Longer Duration vs. Shorter Duration



GASB 31: Balance Sheet vs. Income Statement



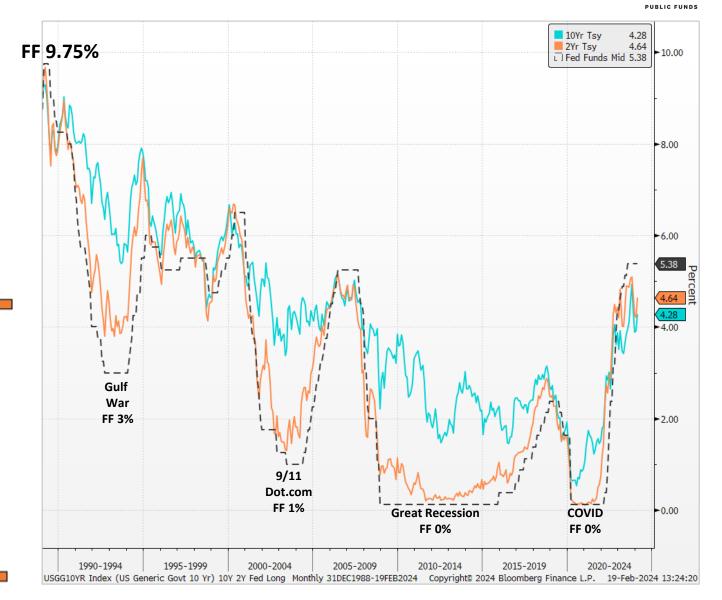
GASB 31 essentially says you "sell" your portfolio every fiscal year end, then "rebuy" it on the first day of the next fiscal year, and adjust investment income by that amount.

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

U.S. Treasury Yields 1989-2023

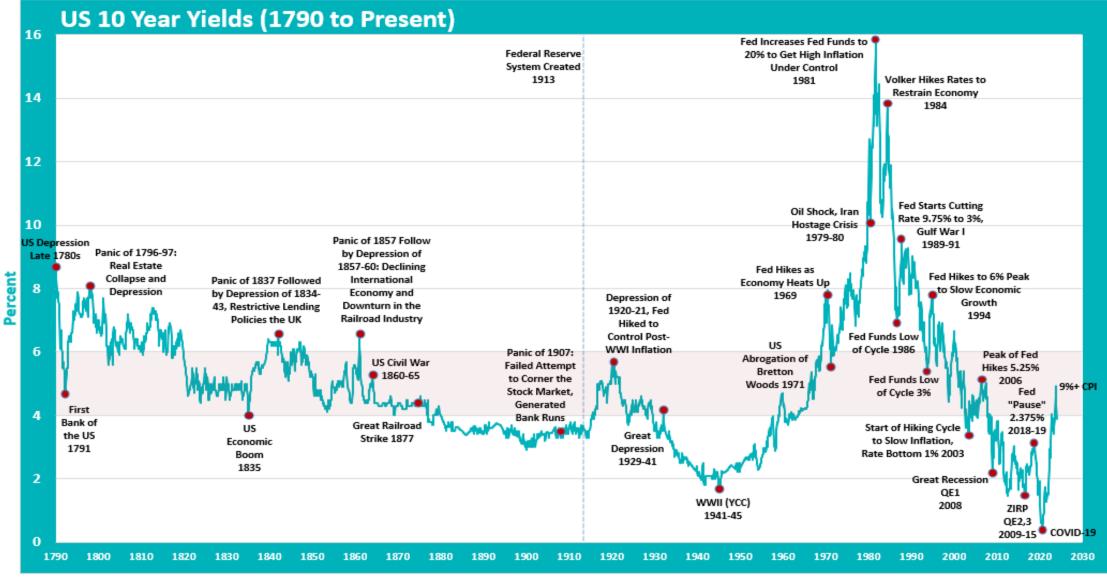
	Date	ЗM	6M	1Y	2Y	3Y	5Y	10Y	30Y	Avg Yld
	Dec-89	7.78	7.86	7.82	7.84	7.86	7.83	7.94	7.98	7.86
	Dec-90	6.64	6.74	6.86	7.23	7.35	7.68	8.07	8.25	7.35
	Dec-91	3.96	4.01	4.09	4.75	5.04	5.93	6.70	7.40	5.23
	Dec-92	3.14	3.38	3.58	4.56	5.05	5.99	6.69	7.40	4.97
	Dec-93	3.06	3.29	3.58	4.23	4.51	5.21	5.79	6.35	4.50
	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 🤇
1	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
, I	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 🤙



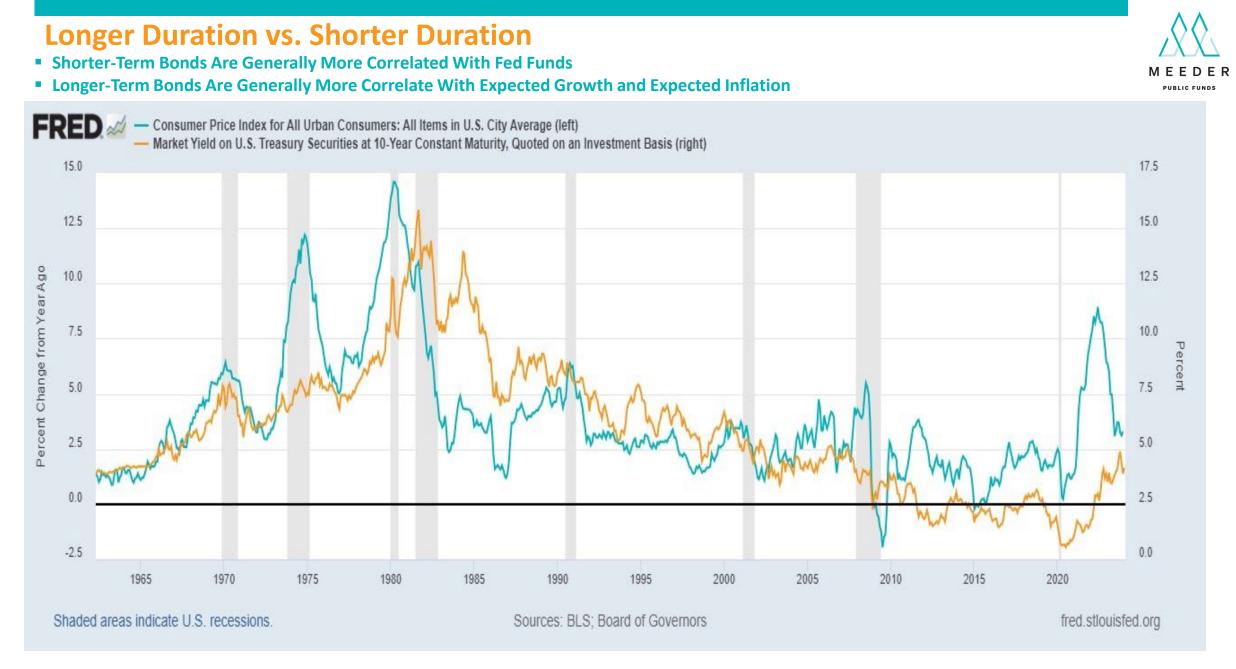


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Rate History...A Very Long Rate History



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



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

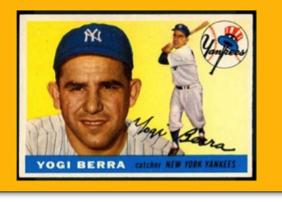


"The Federal Reserve is currently not forecasting a recession." Ben Bernanke (former Fed Chair), January 10, 2008



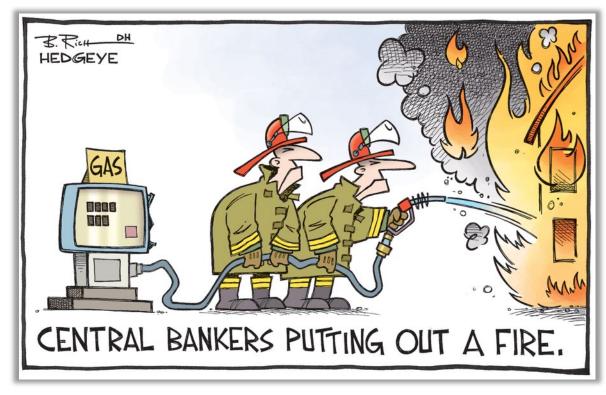
"Our ability to forecast is limited". Alan Greenspan (former Fed Chair) November 2019

> "It's tough to make predictions, especially about the future."





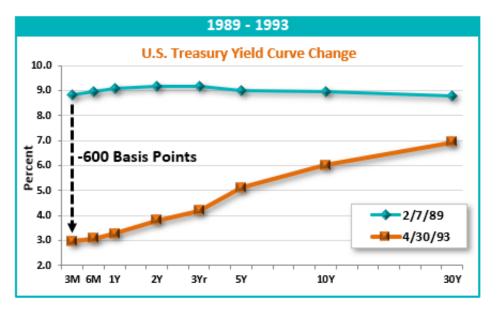
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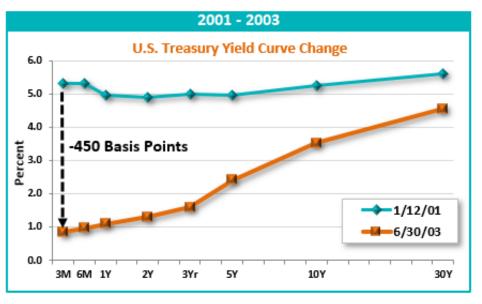




Both the Fed and the markets expected 3 interest rate hikes (25 BPs) in 2022...the Fed hiked 17 times! (The 25 Basis Point Kind)

The "Yield Curve Trap"

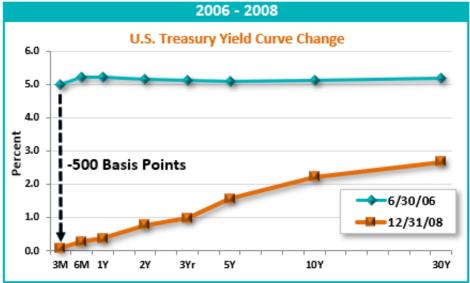


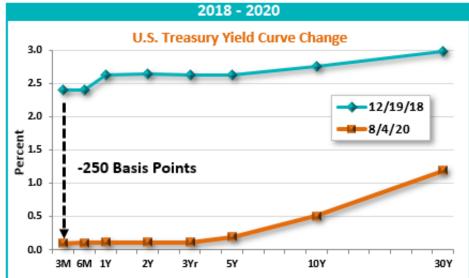




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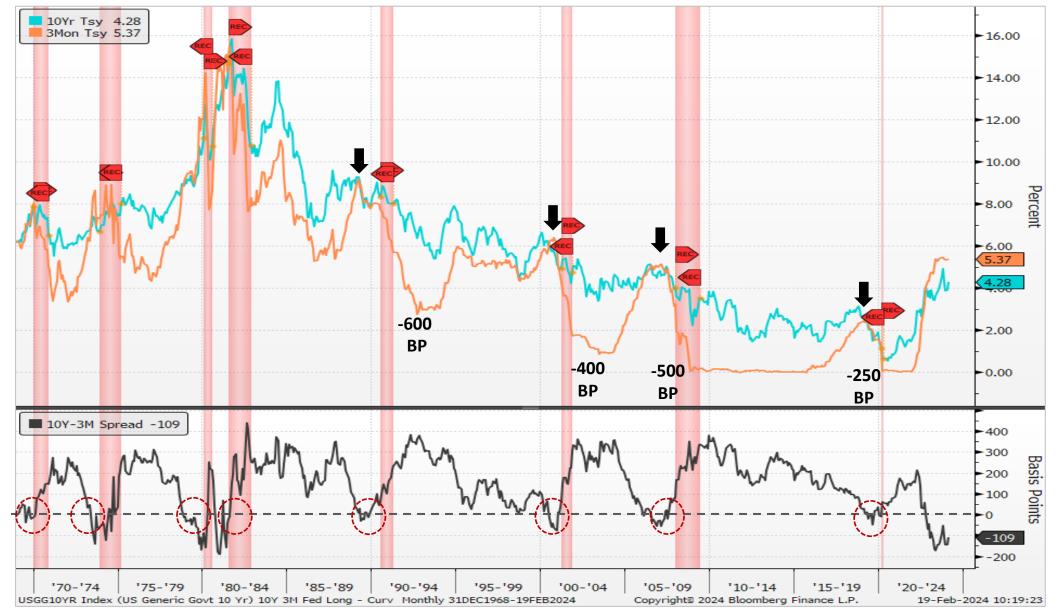




The Inverted Yield Curve Has Been An Accurate Predictor of Fed Cuts (and Recessions)

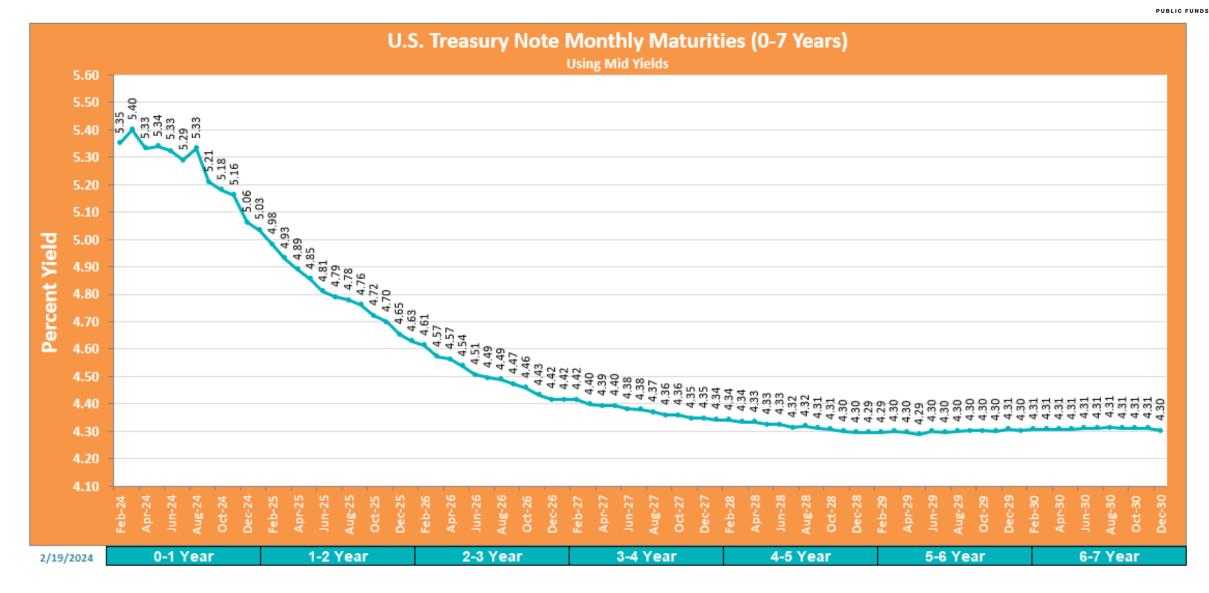


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Source: Bloomberg

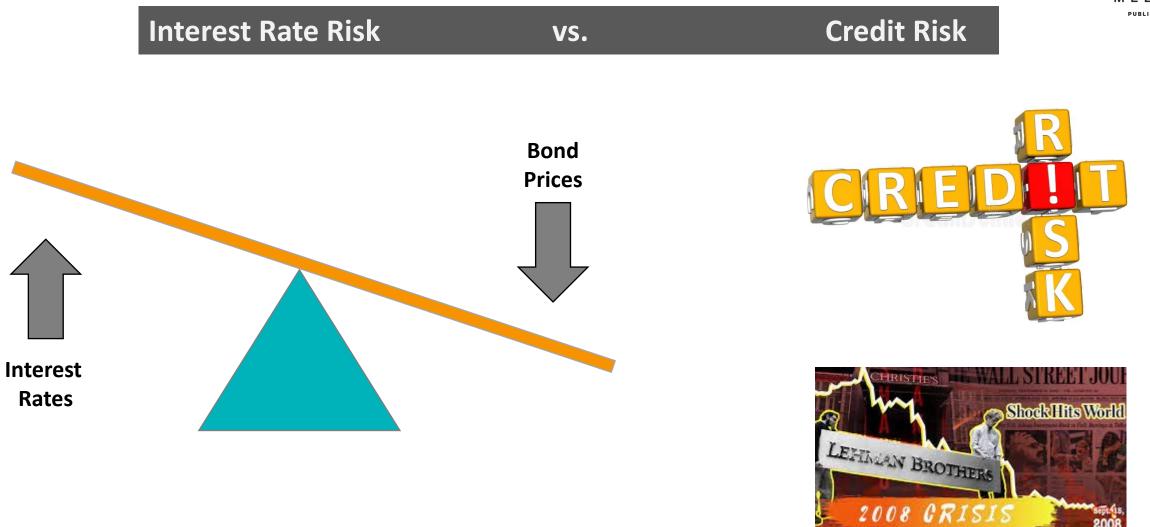
The Yield Curve Is Still...Just A Bit Inverted



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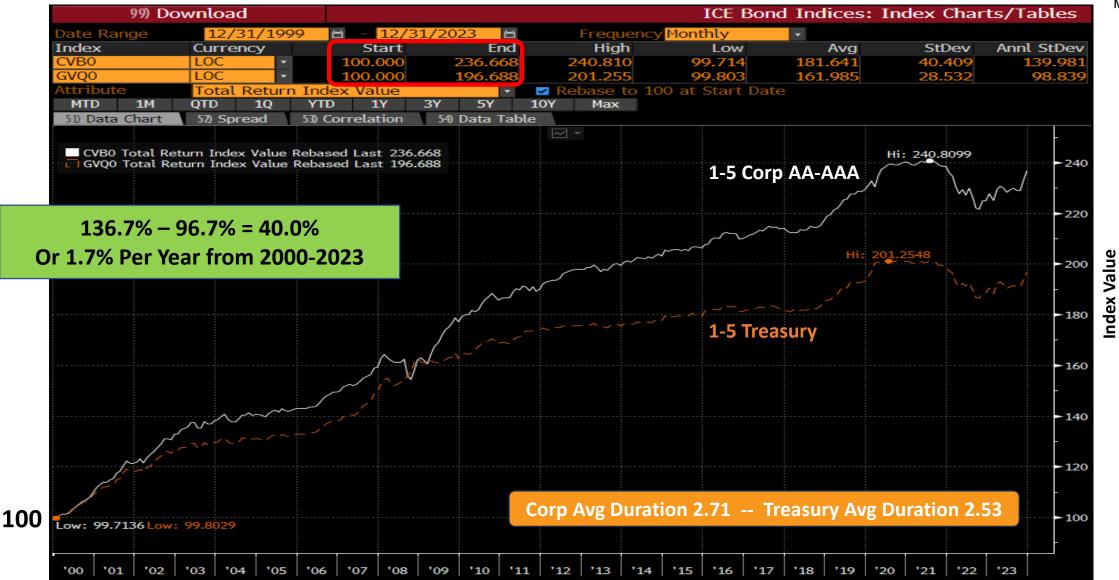
4. Credit Can Enhance Income, But Duration Is The Bigger Determinant of Income



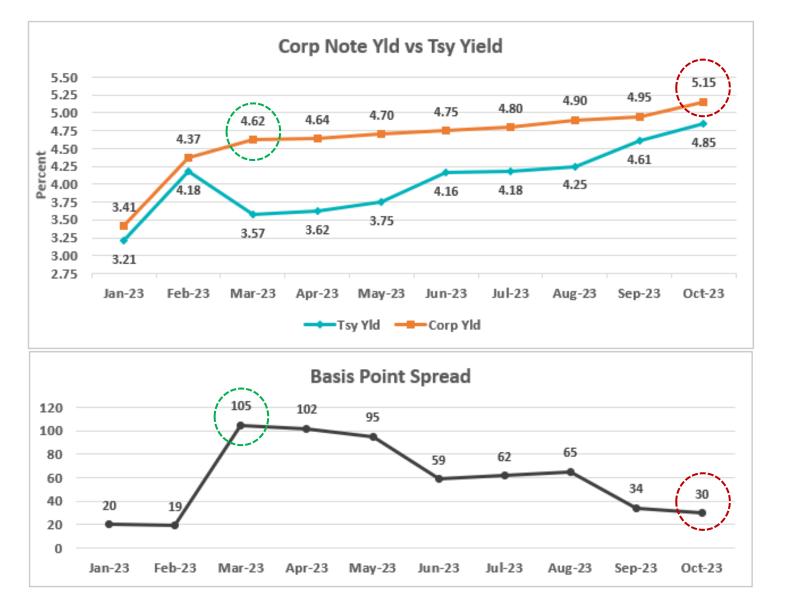


Corporate vs. Treasury





Relative Value: Would You Sell?



Book Return Vs. Total Return

Swap Book Analysis (Bloomberg Function "SWB")

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

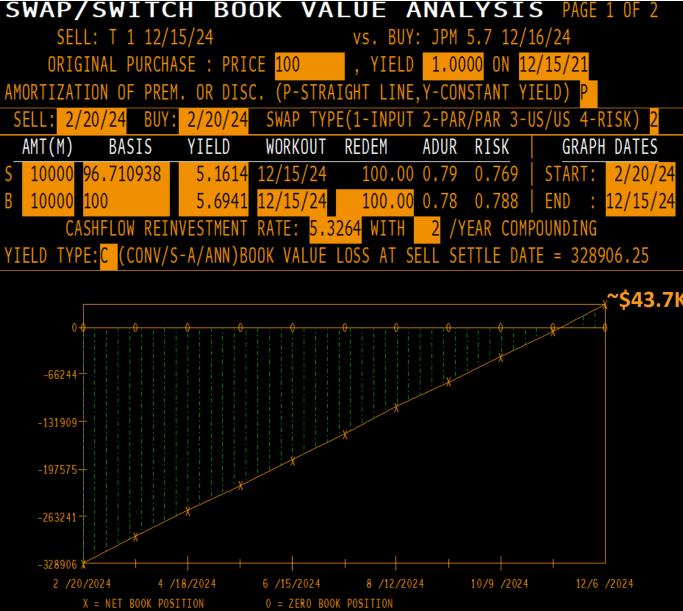
Sell at a 5.16% yield and realize an ~\$328K loss

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

Income Gain: ~43.7K

~\$329K Realized L

Source: Bloomberg



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

Sample

Clark County Investment Pool	investment Foncy compliance	:	12/31/2023
Item / Sector	Parameters	In Con	npliance
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%

Investment Policy Compliance



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

Sample

Portfolio Summary

MATURITY DISTRIBUTION

12/31/2023

Clark County Investment Pool
SECTOR ALLOCATION
45%
Agy 37.1%
45%
40%

Corp 14.3%

11/30/23

\$6,981,054,948

\$7,224,119,740

\$7,299,615,238

\$96.635

3.14%

-\$243,064,792

CDs 2.8%

MMF 11.7%

Tsy 26.0%

Per Book Value

Market Value

Net Asset Value

Book Value

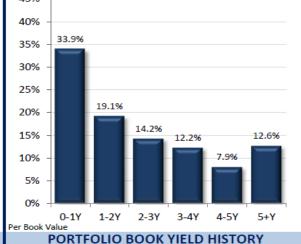
Variance

Par Value

Book Yield

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P-1 9.1% 68.0% Aaa 0.0% Aa1 1.9% Aa2 Aa3 0.2% 5.4% A1 A2 4.5% A3 0.0% NR 10.9% 25% 75% 0% 50% NR: Not Rated

CREDIT QUALITY (MOODY'S)

TOP ISSUERS

lssuer	% 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%

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

CP 2.4% __

ACCOUNT SUMMARY

12/31/23

\$7,025,903,047

\$7,208,848,809

-\$182,945,763

\$7,279,915,613

\$97.462

3.14%

Per Book Value

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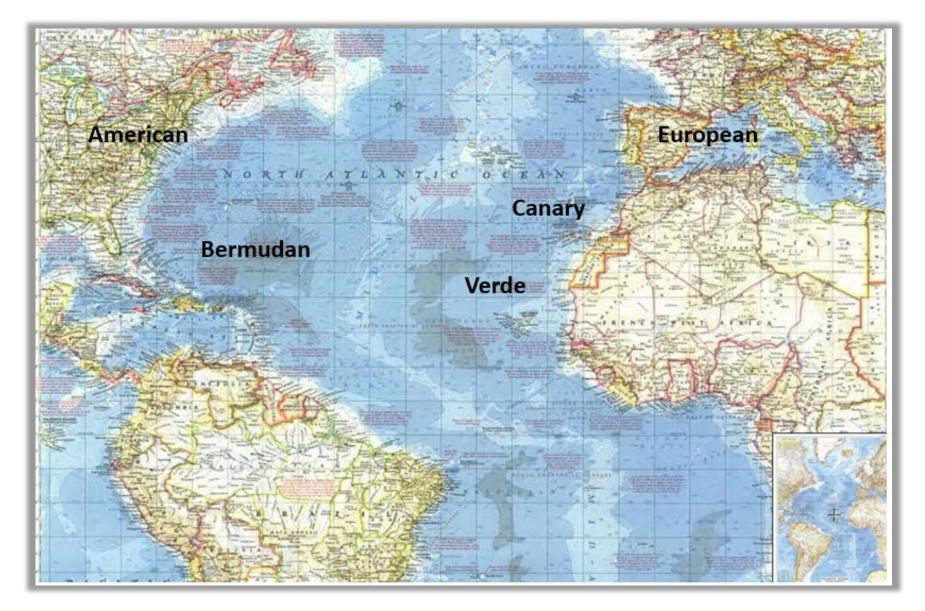
When someone purchases a callable bond, they are selling a call option to the issuer. This gives the issuer the right to call the bond <u>when it is advantageous for the issuer</u>, not the person buying the callable.

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) Su	mmary 9	8) Set Homepage	99) Export	•	L L	New Issue Monitor
Selection U.S. Agencies (NIM	2)	• 1) Sho	w Filters	2) Clear Filters	Issues & News 🔻	
• Real Time • Issue History	Date Ra	nge 01/19/24	i - 02/	/19/24 🖬 🛛 🙆 P	Prelim Issues PREL	
Date Issuer/Headline	Coupon	Maturity Sp	read 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		1000 BofA-sole	1-NC10MO 1X	
107) 2/16 FED HOME LN BANK	5.970	02/28/39	USD		S 15-NC1 CONT	
108) 2/16 FED HOME LN BANK	6.000	02/28/29	USD		le 5-NC1MO INC	
109) 2/16 FED HOME LN BANK	6.250	02/23/44	USD		X 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		S 3-NC9MO BERM	
113) 2/16 FED HOME LN BANK	4.500	03/12/27		150.06FHN-sole	INCREASE	
114) 2/16 FREDDIE MAC	5.250	02/28/28	USD		WE4-NC1 BERM	
115) 2/16 FED HOME LN BANK	5.150	02/21/25	USD		OS 1-NC9MO 1X	
116) 2/16 FREDDIE MAC	5.000	02/23/29	USD		S-NC6MO BERM	
117) 2/16 FED HOME LN BANK	5.000	02/21/29	USD		S-NC1.75 1X	
118) 2/16 FED HOME LN BANK	4.650	02/16/29	USD	15 JOINT LEAD		
119) 2/16 FREDDIE MAC	5.625	02/22/27	USD		S 3-NC3MO BERM	
120) 2/16 FED HOME LN BANK	5.000	02/20/29	USD		S 5-NC2 BERM	
121) 2/16 FED HOME LN BANK	5.050	08/18/25	USD	15 INSPRX,RW	B 1.5-NC1 1X	

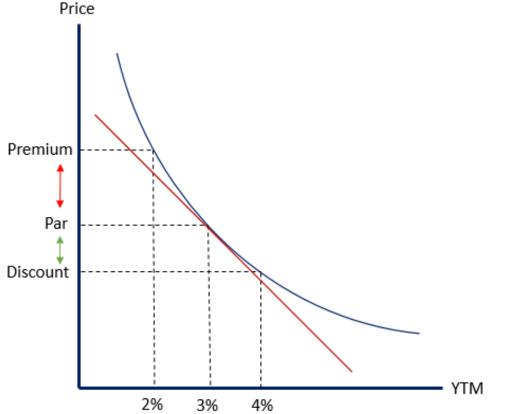


Bond Convexity: Bullets



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

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

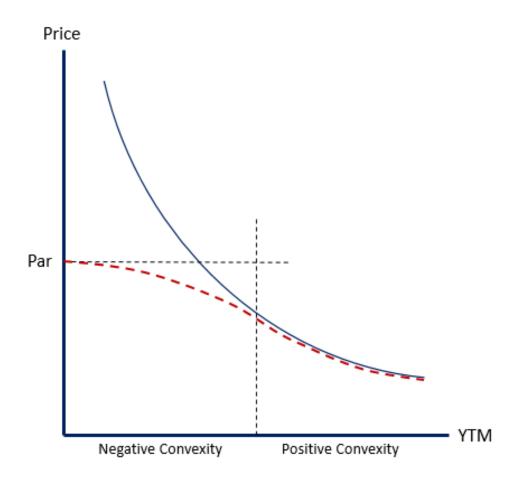


- Because duration is a linear assumption, it miscalculates the change in the price of a bond given a change in the yield to maturity
- Duration underestimates the bond price when yields fall and overestimates the bond price when yields rise
- Convexity measures the curvature of the price/yield relationship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

Bond Convexity: Callables



Negative Convexity



- As interest rates drop, callable bonds become negatively convex and duration decreases
- If the bonds 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

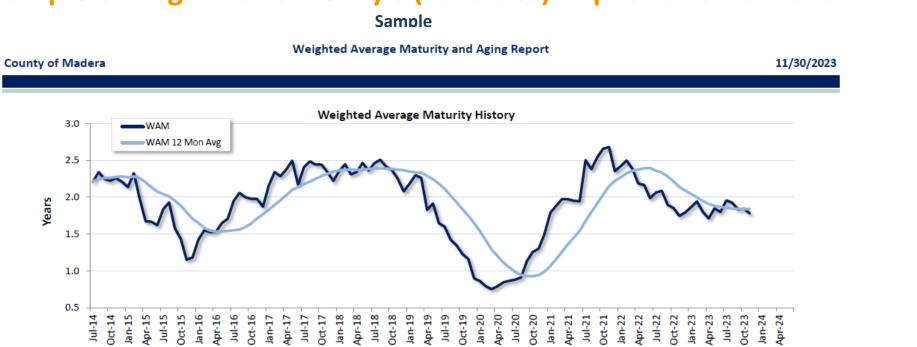


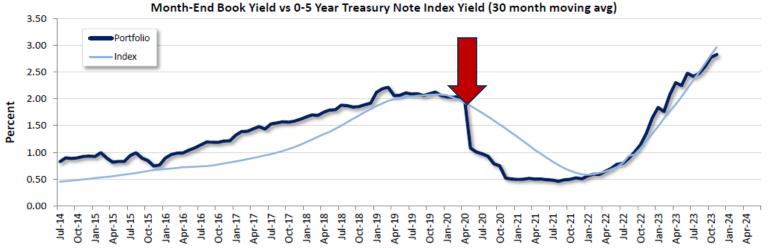
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Real World Example of Negative Convexity's (Callables) Impact on a Portfolio





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

Effective Duration (sometimes called option-

adjusted duration or OAS) further refines the

CDIAC No. 20-10



CDIAC

CALIFORNIA DEBT AND INVESTMENT ADVISORY COMMISSION

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 riskfree rate. Absolute yield spread for a bond is calculated by subtracting the yield of a "riskfree" 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 riskfree 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

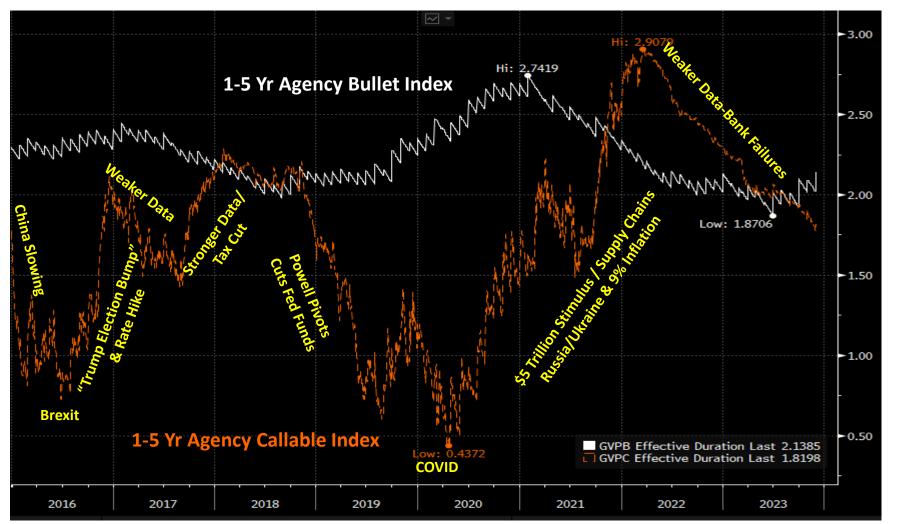
https://www.treasurer.ca.gov/cdiac/publications/issue-brief/2020/20-10.pdf

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.

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

- Interest Income Budget Stability
- Sleep Adjusted Returns





Effective Duration:

.



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

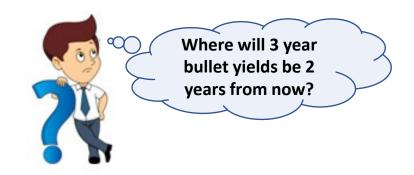
FHLB 4.6 12/22/2	8 Corp	Actions 🔹	Settings 🔹		Pag	e 1/13 S	ecurity	Descrip	tion: Bond
Data not provided				94) 🗔	Note	S	95) Bi	uy	96) Sell
25) Bond Description	n 26) Is	suer Descript	tion						
Pages	Issuer Ir	formation			1	Identifie	ers		
11) Bond Info	Name	Federal H	iome loan ba	NK	F	IGI		BBG01	KPZ4ZQ9
12) Addtl Info	Industry	Governme	nt Sponsored	(BCLASS)	(CUSIP		3130AY	/B54
13) Reg/Tax 14) Covenants	Security	Information	י. ו]	ISIN		US313()AYB542
15) Guarantors	Mkt Iss	US DOMEST	IC		E	Bond Ra	tings		
10 Bond Ratings	Ctry/Reg	US	Curren	cy USD	N	Moody's		Aaa	
17) Identifiers	Rank	Unsecured	Series	0000	5	5&P		AA+	
18) Exchanges	Coupon	4.600000	Туре	Fixed	(Composi	ite	AA+	
19) Inv Parties 20) Fees, Restrict	Cpn Freq	S/A	51						
20) Fees, Resulting 21) Schedules	Day Cnt		Iss Pri	ce 100.000	00 1	ssuance	e & Trac	ling	
22) Coupons	Maturity	12/22/2028	8		ŀ	Amt Issu	ued/Out	standin	g
23) Impact	CALL 12	/22/25@100	.00		ι ι	JSD		15,00	0.00 (M) /
Quick Links	Iss Sprd				ι	JSD		15,000	0.00 (M)
32) ALLQ Pricing	Calc Typ	e (1)STRE	ET CONVENTIO	N	1	Min Piec	e/Incre	ement	
33) QRD Qt Recap 34) TDH Trade Hist	Pricing D			12/19/202),000.00		0.00
35) CACS Corp Action	_	Accrual Dat	e	12/22/202		Par Amo		- /	5,000.00
30 CF Filings	1st Settle			12/22/202		Book Ru		INSPR	X,STONEX
37) CN Sec News	1st Coup			06/22/202		Reportir			TRACE
38) HDS Holders			firm INSPER				5		
60 Send Bond									

Callable only on date(s) shown	
Date	Price
12/22/2025	100.000

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

Issuer Information		Identifiers				
Name FEDERAL FARM	CREDIT BAN	FIGI	BBG01KJFJ0N4			
Industry Government S	ponsored (B	CLASS)	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	Туре	Fixed	Composite	AA+		
Cpn Freq S/A						
Day Cnt 30/360	Iss Price	99.492 80	Issuance & Tra	ading		
Maturity 12/15/2028			Amt Issued/Outstanding			
BULLET			USD	525,000.00 (M) /		
Iss Sprd			USD	525,000.00 (M)		
Calc Type (1)STREET C	ONVENTION		Min Piece/Increment			
Pricing Date	12	1,000.0	00/ 1,000.00			
Interest Accrual Date	12	Par Amount	1,000.00			
1st Settle Date		2/15/2023	Book Runner	JOINT LEADS		
1st Coupon Date	06	5/15/2024	Reporting	TRACE		

4.60% - 3.95% = .65%





				_	
FHLB 1.4 04/15/2	27 \$ ↑ 91.307 +.4	42	bp vs T 4.37	5 12/15/2026	
	As of 22 Dec Vol	10.0MM 5	Source TRMT		
FHLB 1.4 04/15/2	7 Corp Actions • S	ettings 🔹	Pa	age 1/13 Secur	ity Description: Bond
Data not provided	l by Bloomberg		94) 🕤 Not	es 🥬	5) Buy 96) Sell
25) Bond Descriptio		1 I			
Pages	Issuer Information			Identifiers	
11) Bond Info	Name FEDERAL HON	1e loan ban	K	FIGI	BBG00SZVG2C6
12) Addtl Info	Industry Government	Sponsored	(BCLASS)	CUSIP	3130AJGU7
13) Reg/Tax 14) Covenants	Security Information			ISIN	US3130AJGU77
15) Guarantors	Mkt Iss US DOMESTIC			Bond Ratings	
10 Bond Ratings	Ctry/Reg US	Currenc	y USD	Moody's	Aaa
17) Identifiers	Rank Unsecured	Series	-	S&P	AA+
18) Exchanges	Coupon 1.400000	Туре	Fixed	Composite	AA+
19 Inv Parties 20 Fees, Restrict	Cpn Freq S/A				
20) Fees, Restrict 21) Schedules	Day Cnt 30/360	Iss Price	e 100.0000	Issuance & 1	Trading
22) Coupons	Maturity 04/15/2027			Amt Issued/	Outstanding
23) Impact	CALL 01/02/24@100.0	0		USD	55,000.00 (M) /
Quick Links	Iss Sprd			USD	55,000.00 (M)
32) ALLQ Pricing	Calc Type (1)STREET	CONVENTION		Min Piece/In	
33) QRD Qt Recap 34) TDH Trade Hist	Pricing Date		04/02/2020		0.00/ 5,000.00
	Interest Accrual Date		04/15/2020	Par Amount	- /
36) CF Filings	1st Settle Date		04/15/2020	Book Runner	
37) CN Sec News	1st Coupon Date		10/15/2020	Reporting	TRACE

3.3 Year Continuously Callable

Deeply Discounted Callable...Bullet Alternative



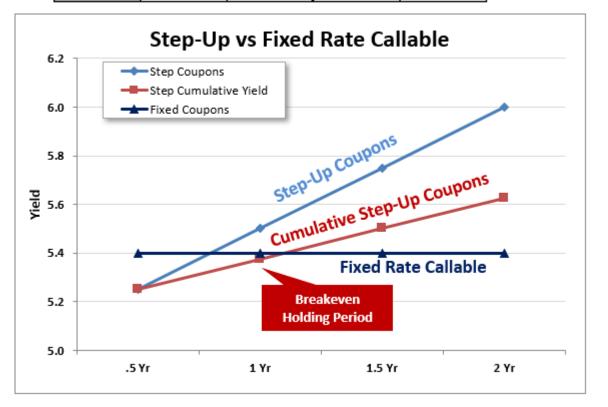
3.3 Year Continuously Callable

FHLB 1.4 0)4/15/27 (Corp	Settings	•			Yiel	ld and Spi	read Analysis
					Ę	Notes		95) Buy	96) Sell
1) Yield & S	Spread 2) Graphs	3) Pricing	4) Descr	iption	5) Custom	6) Calls	7) Yield	ds
FHLB 1.4 0)4/15/27 (3130AJG	U7)		Risk				
Spread	21.04 bp	vs 3y	[4 ³ 8 12/1	5/26 🔹			W	lorkout	OAS
Price	91.307	S	100-29 ⁷ 8	10 : 07 : 37	M.Dur	Dur		3.159	3.135
Yield	4.248228	vist 🔹	4.037825	S/A 🔻	Risk			2.893	2.871
	1/15/2027	<u> </u>	0 Contribu	t Yld <mark>6 6</mark>	Convexit	ty		0.117	0.101
Settle 1	2/26/23	ì	12/26/23	1	DV 🔹 0:	1 on 1MM		289	287
					Benchma	ark Risk		2.788	2.777
					Risk Hed	lge		1,038 M	1,034 M
					Proceeds	s Hedge		906 M	
Spreads		eld Calcu			Invoice				
 11) G-Sprd		reet Conv	ention	4.248228	Face				1,000 M
12) I-Sprd			/Yr	4.293346	· · ·				913,070.00
13) Basis		nkt (Act/	<mark>360 •)</mark>			(71 Days)			2,761.11
14) Z-Sprd		ue Yield	•	4.248228	Total (U	ISD)			915,831.11
15) ASW	48.0 Cu	irrent Yie	ld	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					
	Step	Cumltv	Reg		
Time	Cpns	Cpn	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	

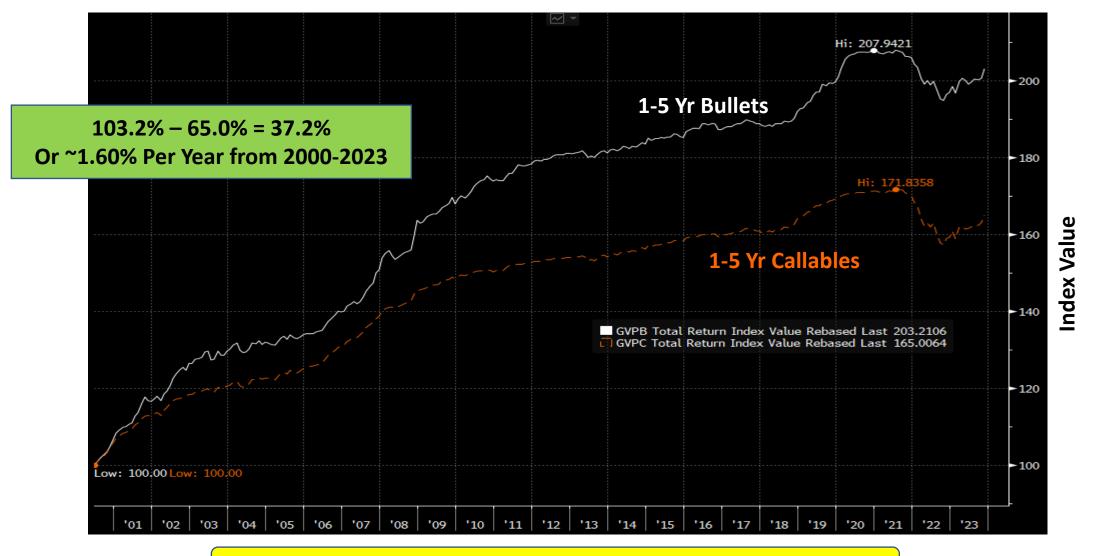


Issuer	FEDERAL HOME	loan bank				
Industry	Industry Government Sponsored (BCLASS)					
Security	Information					
Mkt Iss	US DOMESTIC					
Ctry/Reg	US	Currency	USD			
Rank	Unsecured	Series				
Coupon	5.250000	Туре	Step-Up F			
Cpn Freq	S/A					
Day Cnt	30/360	Iss Price	100.0000			
Maturity	12/26/2025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

Name	FEDERAL HOME	loan bank			
Industry	Industry Government Sponsored (BCLASS)				
Security	Information				
Mkt Iss	US DOMESTIC				
Ctry/Reg	US	Currency	USD		
Rank	Unsecured	Series			
Coupon	5.400000	Туре	Fixed		
Cpn Freq					
Day Cnt		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

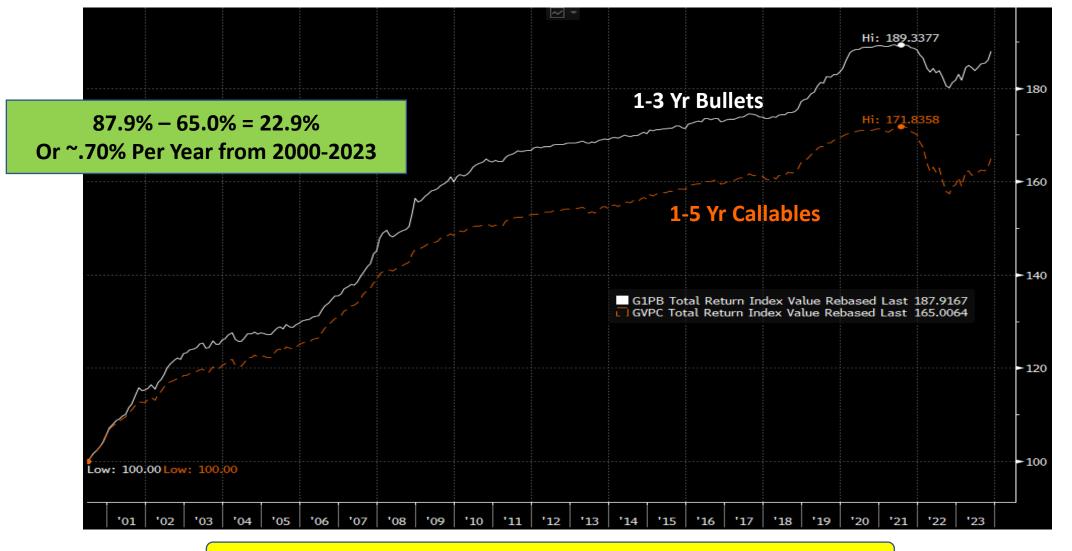




Avg Effective Duration: Bullets 2.37 Callables 1.57

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!



MEEDER PUBLIC FUNDS

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





11. Benchmark Your Investment Program and Portfolio in Multiple Ways



"When performance is measured, performance improves. When performance is measured and reported, the <u>rate</u> 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

