



JANUARY 15, 2020

# CDIAC-CMTA

## Advanced Public Funds Investing

### Utilizing Callables, Bullets, Step-Ups, and Floaters

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# Introduction

## Rick Phillips

- City of Las Vegas Investment Officer 1989-1998
- Clark County Chief Investment Officer 1998-2005
- FHN Main Street President & Chief Investment Officer 2005-Present
- Manage/Consult on \$50+ Billion AUM for States and Local Agencies
- CMTA Investment Policy Review Committee
- CDIAC LAIG Committee
- GIOA Founder



# Putting Fundamentals in Your Favor

## 7 Habits of Highly Successful Investment Programs

1. You Have a Detailed Asset/Liability Matching Model (aka: Cash Flow Model)
2. You Have a Responsible Amount of Interest Rate Risk and Credit Risk
3. You Don't Try to Time the Market
4. You Love Losses and Hate Gains (the unrealized kind)
5. You Follow GAAP (Generally Accepted Accounting Principles)
6. You Benchmark Your Investment Program and Portfolio in Multiple Ways
7. You Provide Quality, Timely, Transparent Reporting



# GIOA Model Investment Policy--Primary Objectives

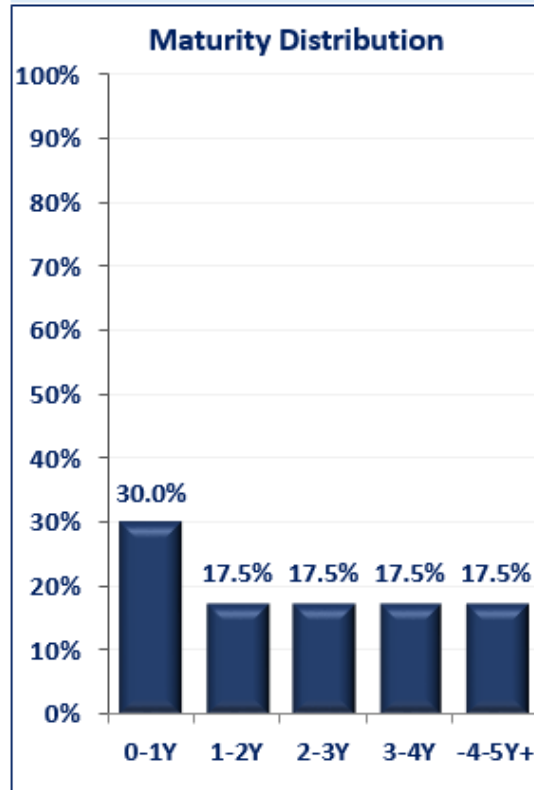
- 1. Safety of Principal:** Safety of principal is the foremost objective of the [entity's] investment program. Investments by the [designated official] shall be undertaken in a manner that seeks to ensure the preservation of capital in the overall portfolio. To attain this objective, diversification 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.
- 2. 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.
- 3. 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.

# Portfolio Structures and Strategies

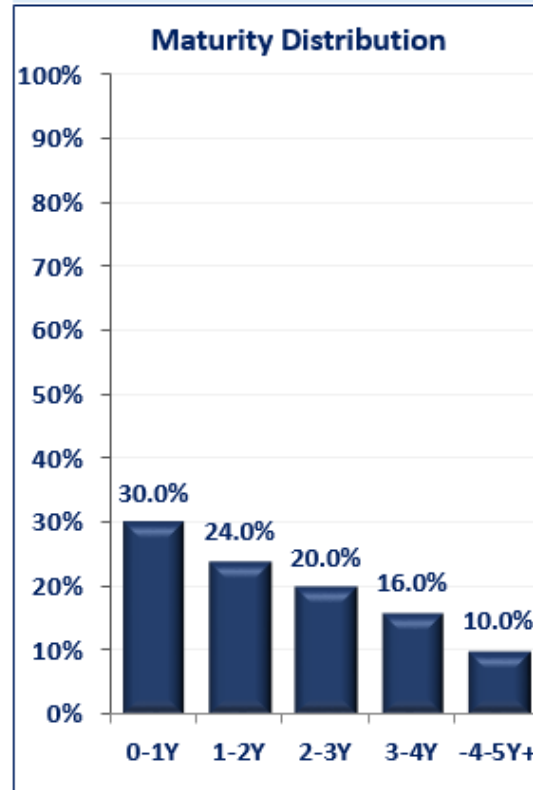
## Using Bullets, Callables, Floaters, and Step-Ups

### Proactive Management or Buy & Hold

#### Cash Flow Matching

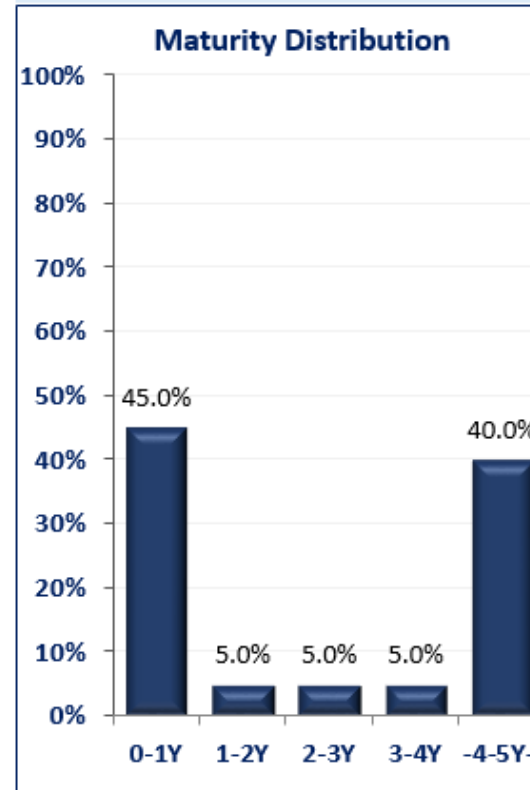


#### Index Matching

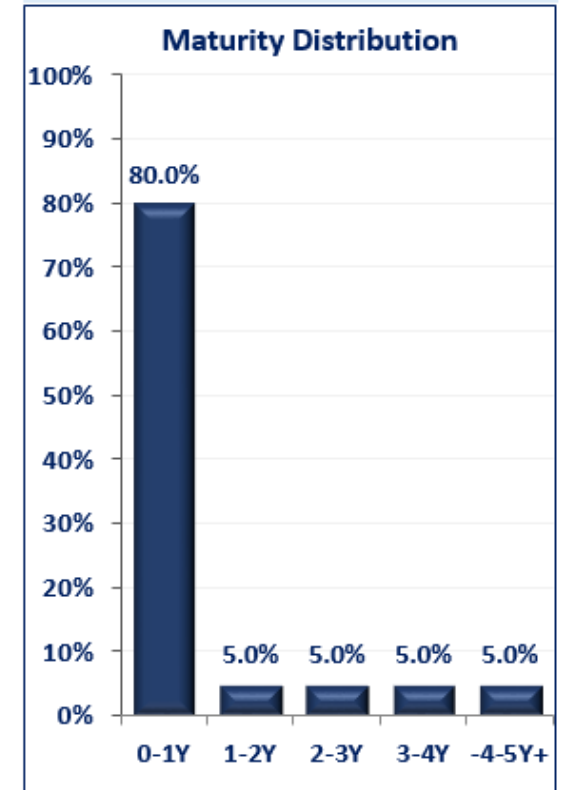


### Active Management

#### Barbell/Marketing Timing



#### Market Timing/Relative Value



Creating a Stable'r Investment Income

# Security Type Selection for Different Strategies

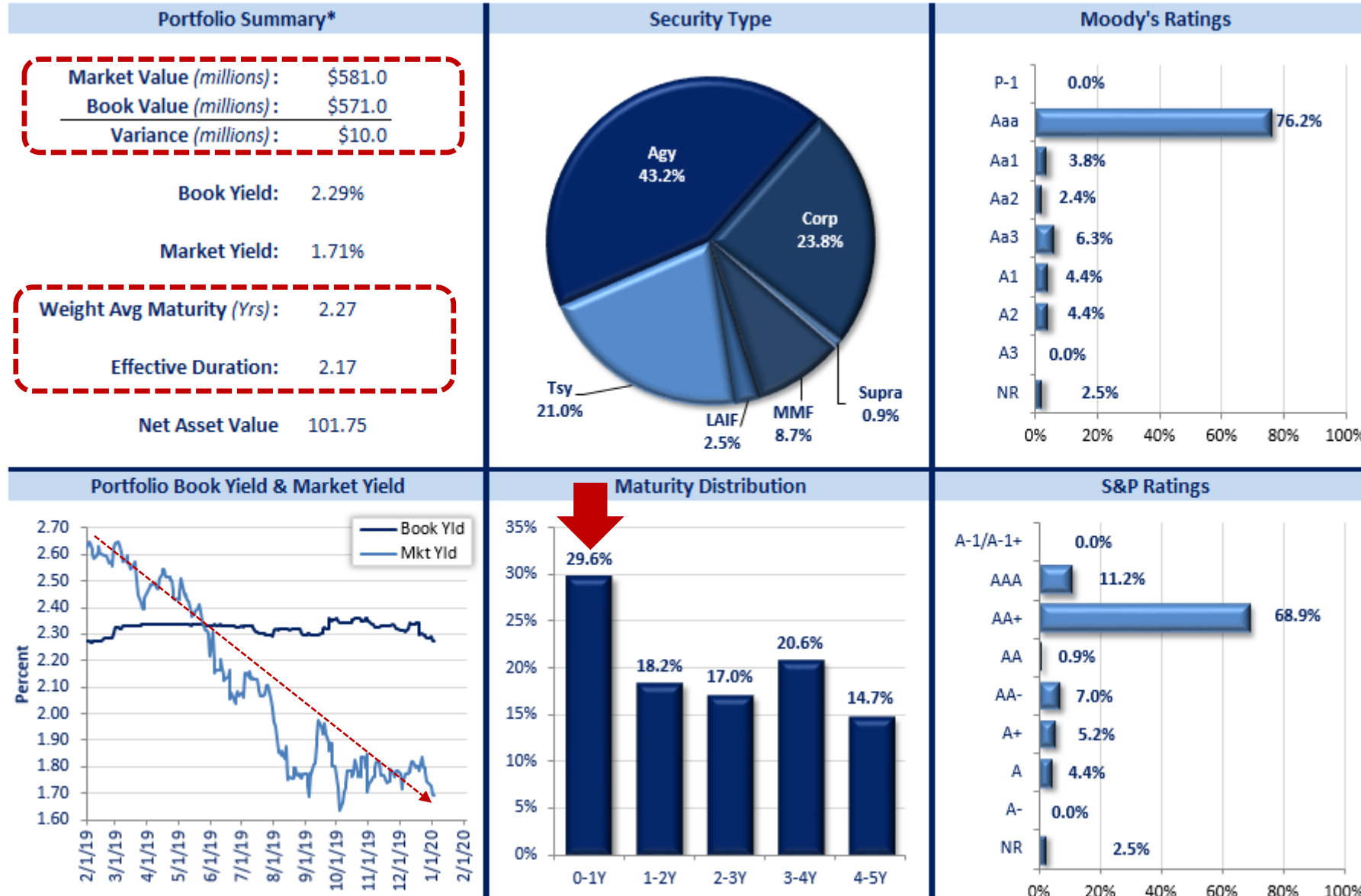
## Securities to Match Cash Outflows:

- Bullets
- Floating Rate Notes
- ABS Credit Card (soft bullets)

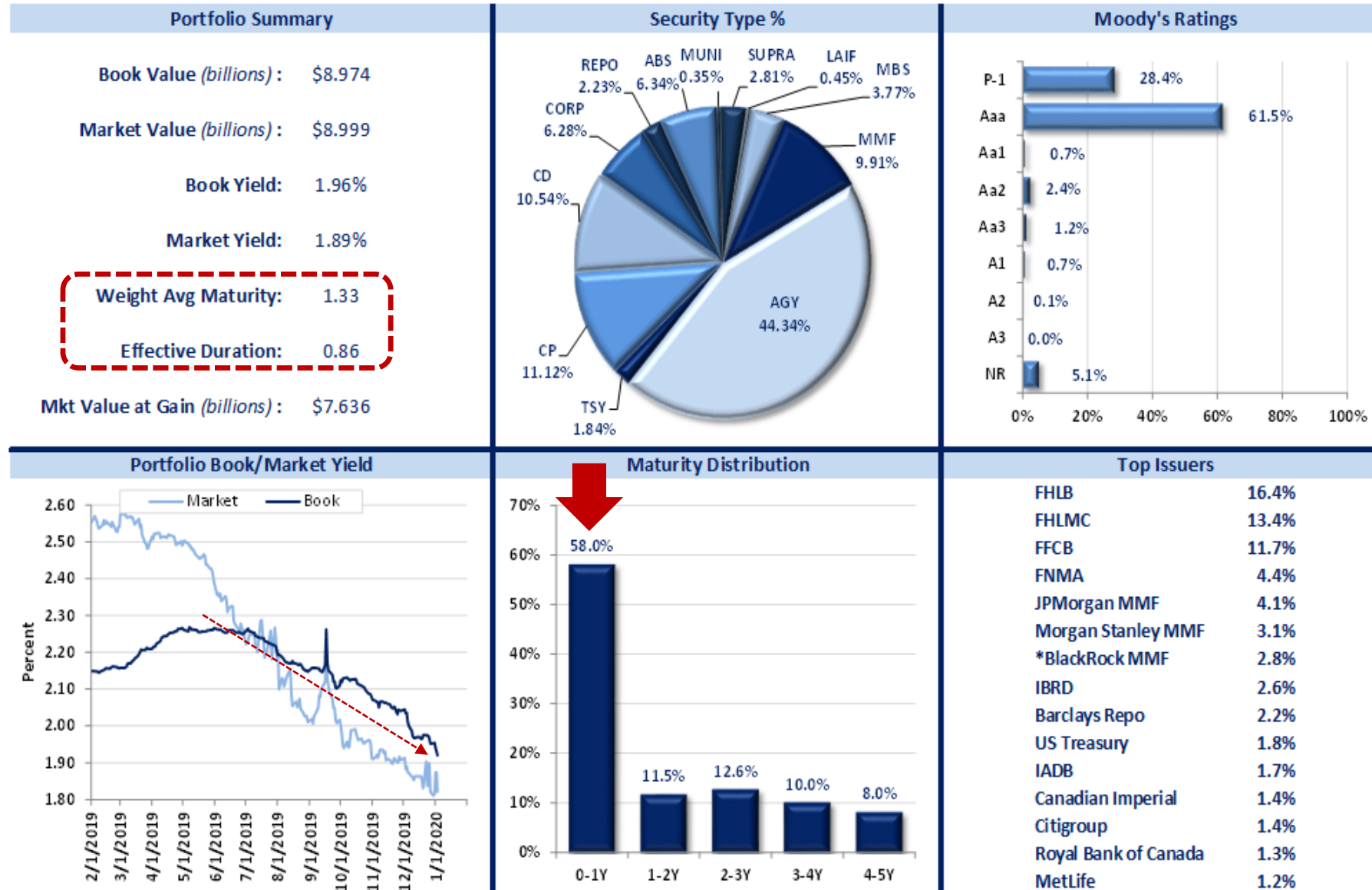
## Securities to Market Time:

- Bullets
- Callables
- Floating Rate Notes
- Step-Ups/Step-Downs
- Paydowns  
(ABS/MBS/SBA)
- Bond Mutual Funds
- Floating NAV Funds
- TIPS

# Real World Example #1



# Real World Example #2

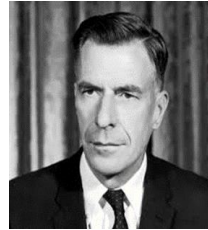
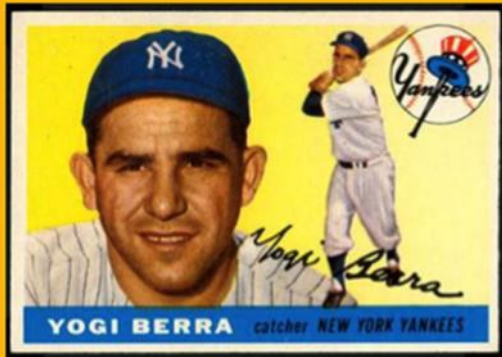




# Timing The Market



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



**"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

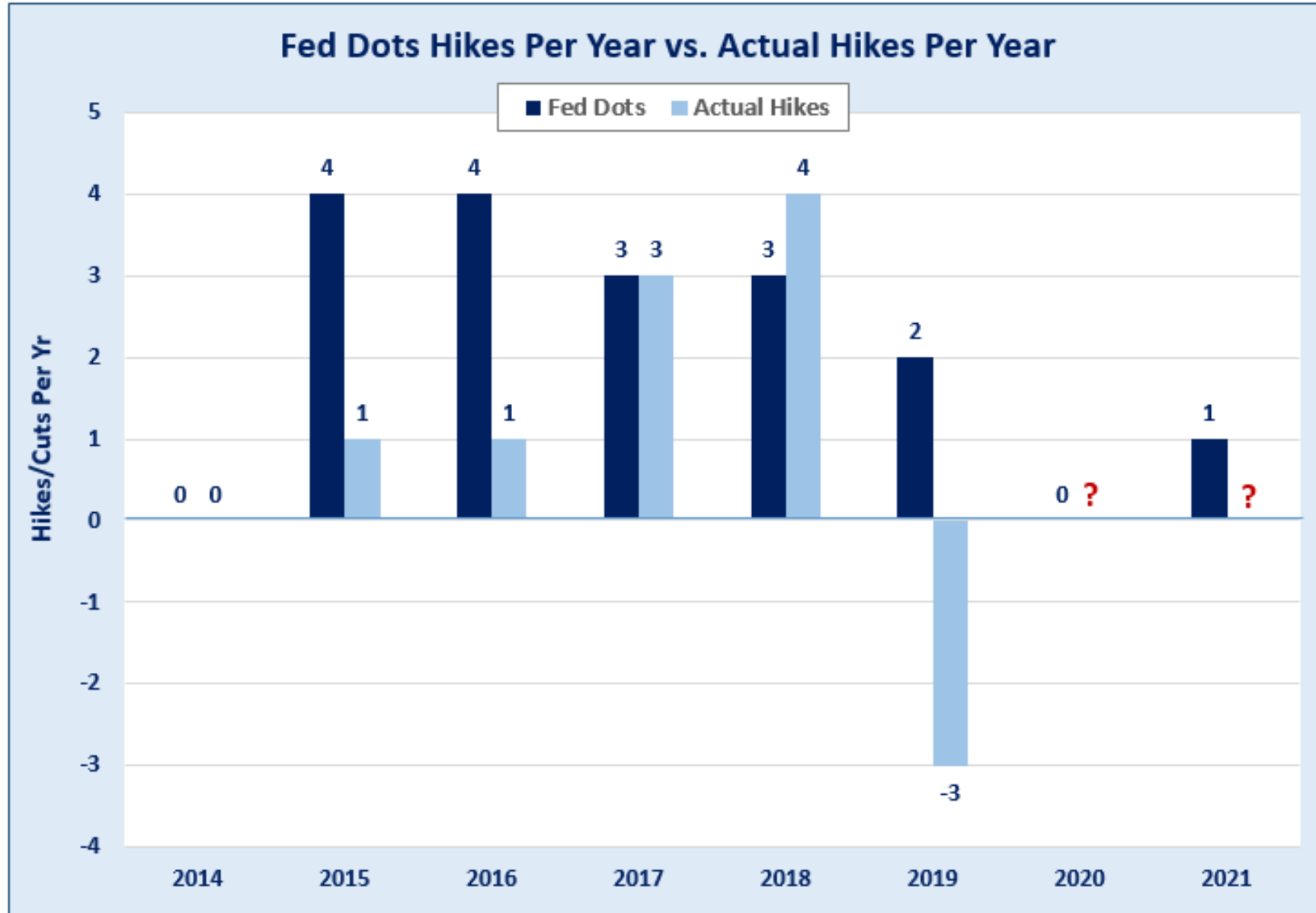


**"Our ability to forecast is limited".**

CNBC November 2019



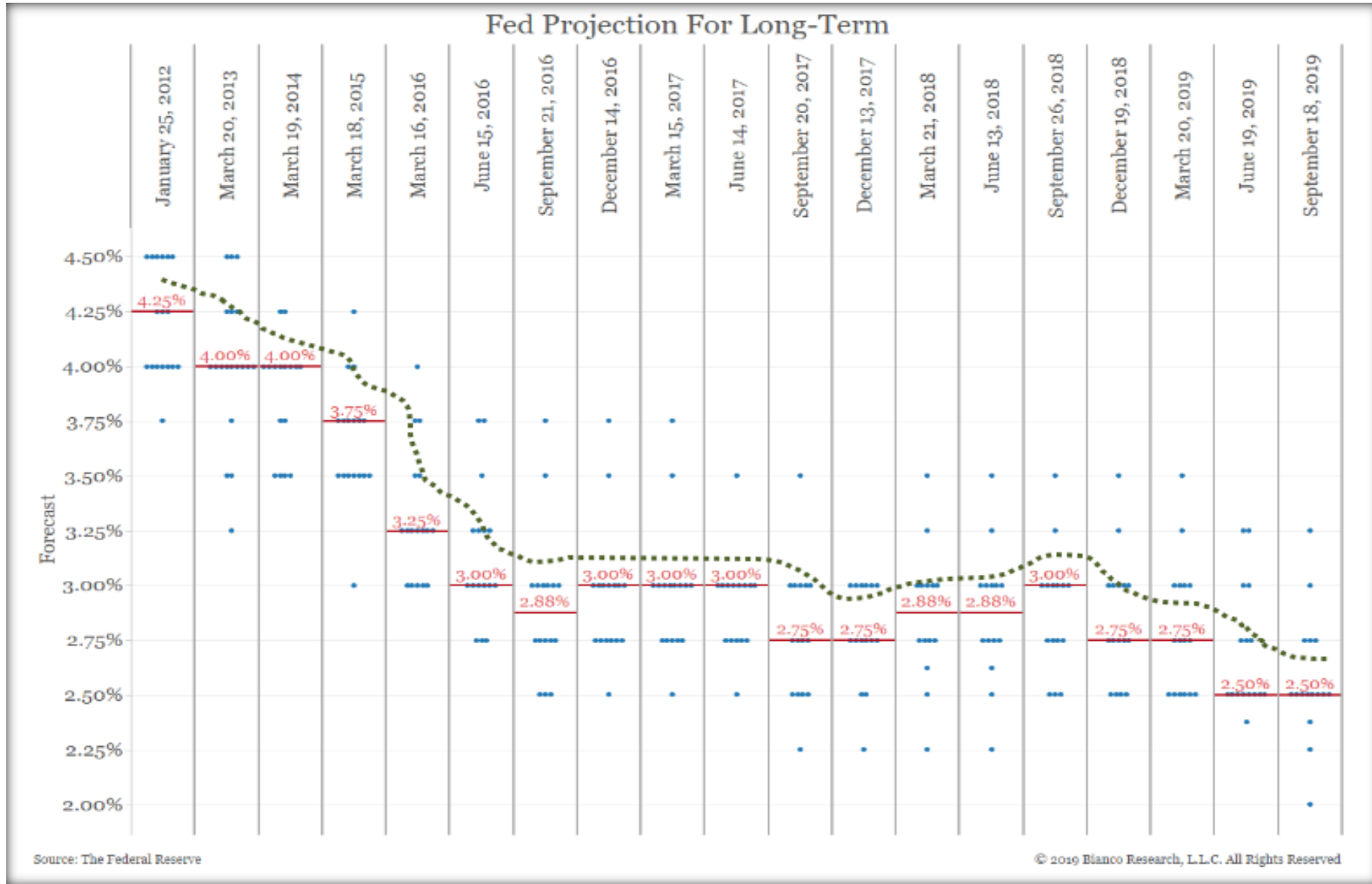
# How Good is The Fed At Timing the Market?



Source: Bloomberg



# Long-Term Fed Funds...Lower and Lower and Lower



Source: Bianco

# Experts kNOw Better?



**Variety  
magazine,  
1955.**

<http://www.buzzfeed.com/lukelewis/26-shockingly-bad-predictions#.fanwK6eXE>

# Experts kNOw Better?



**Microsoft CEO  
Steve Ballmer,  
2007.**

<http://www.buzzfeed.com/lukelewis/26-shockingly-bad-predictions#.fanwK6eXE>

# The “Bond King’s” Predictions



The image shows a CNBC news segment. At the top is the CNBC logo and a menu icon. The headline reads: "Bond King Gundlach predicts yields are headed much higher before this move ends". Below the headline is a video frame showing Jeffrey Gundlach speaking. To his right is a financial data box for a 10-year Treasury note, showing a price of 97.5156 (up 0.4531) and a yield of 3.171%. Below this is an "INTRA DAY" line chart showing price fluctuations from 8A to 2P. A lower-third graphic says "GUNDLACH: 30-YEAR COULD GO TO FOUR PERCENT". The CNBC logo is in the bottom right of the video frame. Below the video frame, it says "Published 12:44 PM ET Thu, 11 Oct 2018".

**CNBC**

## Bond King Gundlach predicts yields are headed much higher before this move ends

**10-YR T-NOTE**  
97.5156 +0.4531  
YIELD: 3.171%

INTRA DAY  
3.250+  
97.0625 (CLOSE)  
3.150+  
8A 11A 2P

**GUNDLACH: 30-YEAR COULD GO TO FOUR PERCENT**

**CNBC**

Published 12:44 PM ET Thu, 11 Oct 2018

Source: CNBC, Twitter



**Jeffrey Gundlach** ✓  
@TruthGundlach

Long maturity US Treasury price action today was consistent with a blowoff momentum top. I suspect buyer's remorse will set in fairly soon.

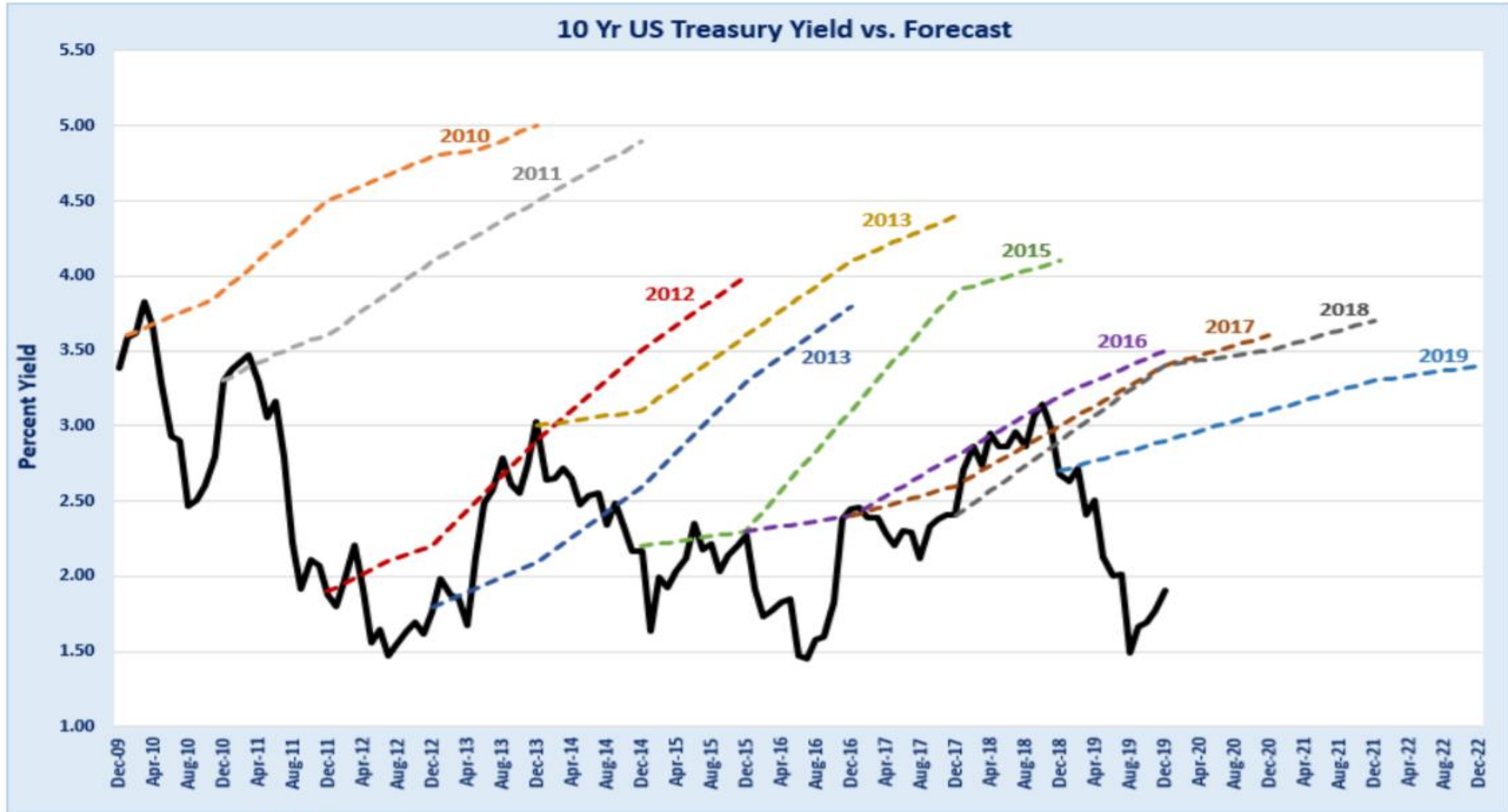
4:59 PM · 5/29/19

# How Did He Do? “Just a Bit Outside”



Source: Bloomberg

# Interest Rate Forecasting Makes Astrology...

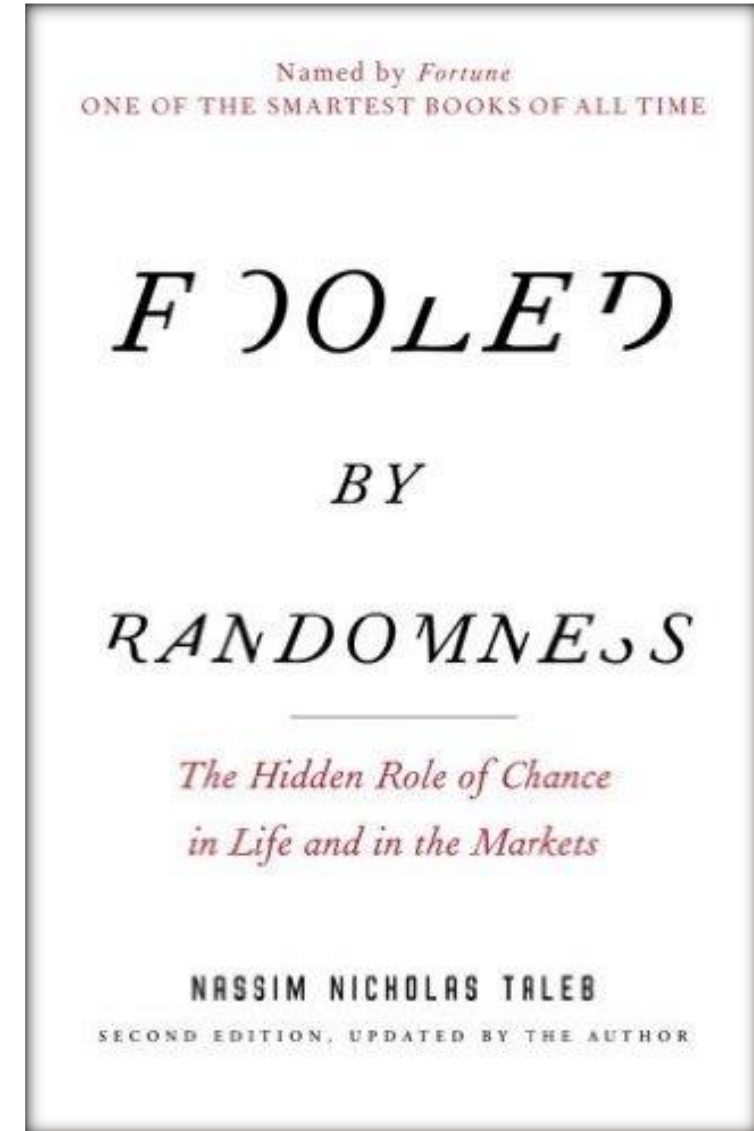


Sources: Bloomberg and Philadelphia Fed Survey of Professional Forecasters



# Fooled By Randomness

“Generate a long series of coin flips, producing heads and tails with 50% odds each and fill up sheets of paper. If the series is long enough you may get eight heads or eight tails in a row, perhaps even ten of each. Yet you know that in spite of these wins the conditional odds of getting a head or a tail is still 50%.”



# It's Tough to Time the Bond Market

## S&P Dow Jones Indices

A Division of **S&P Global**

Research

## SPIVA<sup>®</sup> U.S. Scorecard

### Report 11: Percentage of Fixed Income Funds Outperformed by Benchmarks

FUND CATEGORY	COMPARISON INDEX	1-YEAR (%)	3-YEAR (%)	5-YEAR (%)	10-YEAR (%)	15-YEAR (%)
Government Long Funds	Bloomberg Barclays US Government Long	100.00	76.79	98.31	98.73	98.00
Government Intermediate Funds	Bloomberg Barclays US Government Intermediate	94.12	89.47	85.71	85.29	91.07
Government Short Funds	Bloomberg Barclays US Government (1-3 Year)	91.67	84.00	82.14	69.70	82.86
Investment-Grade Long Funds	Bloomberg Barclays US Government/Credit Long	97.65	72.04	98.91	95.97	97.50
Investment-Grade Intermediate Funds	Bloomberg Barclays US Government/Credit Intermediate	50.50	39.90	55.50	51.65	72.68
Investment-Grade Short Funds	Bloomberg Barclays US Government/Credit (1-3 Year)	83.87	37.50	62.12	41.27	68.00

Source: S&P

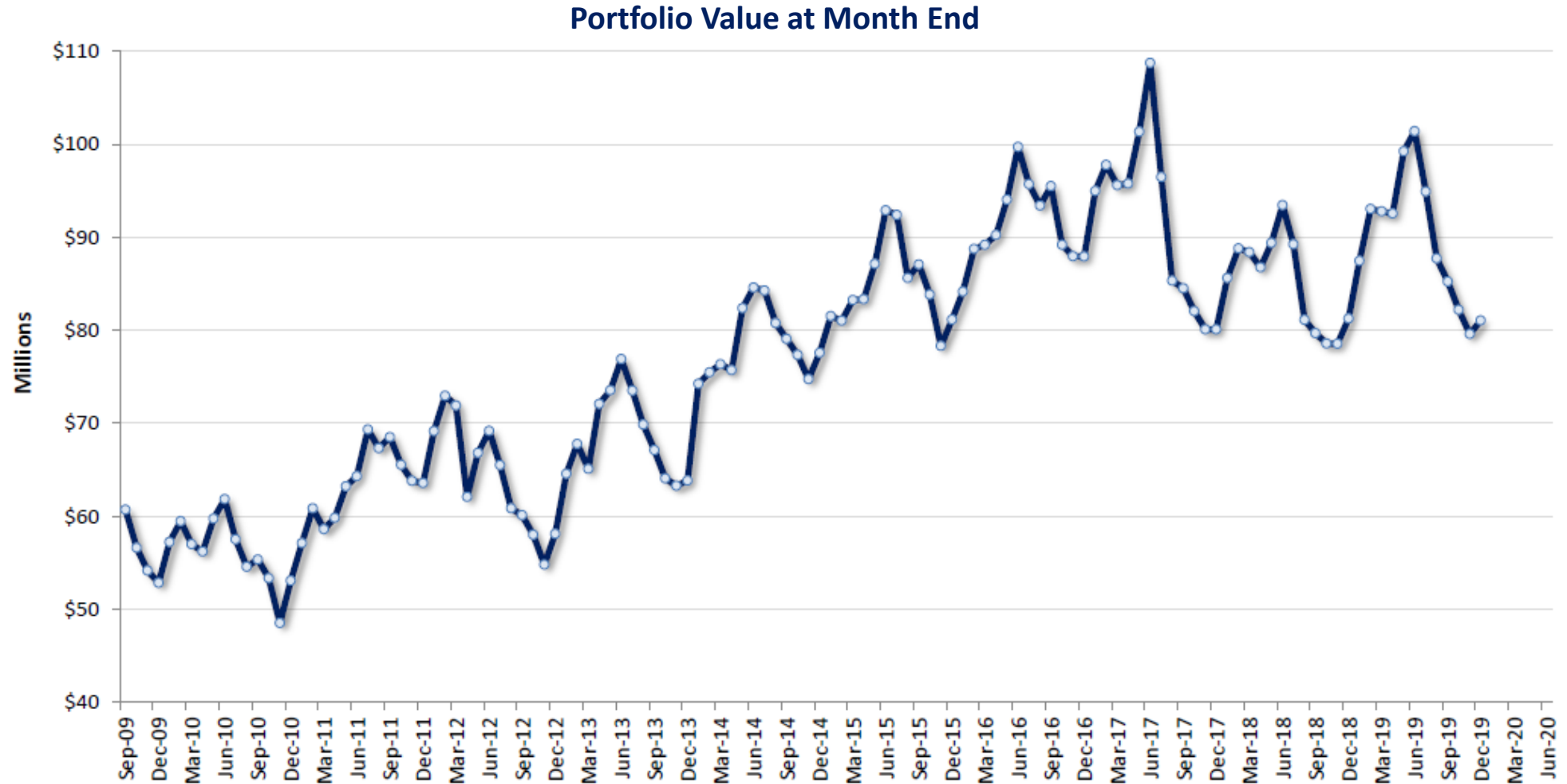


So, When is the Best Time to Buy a Bond?

**WHEN YOU HAVE  
MONEY!**

# Portfolio Strategy: Cash Flow Matching

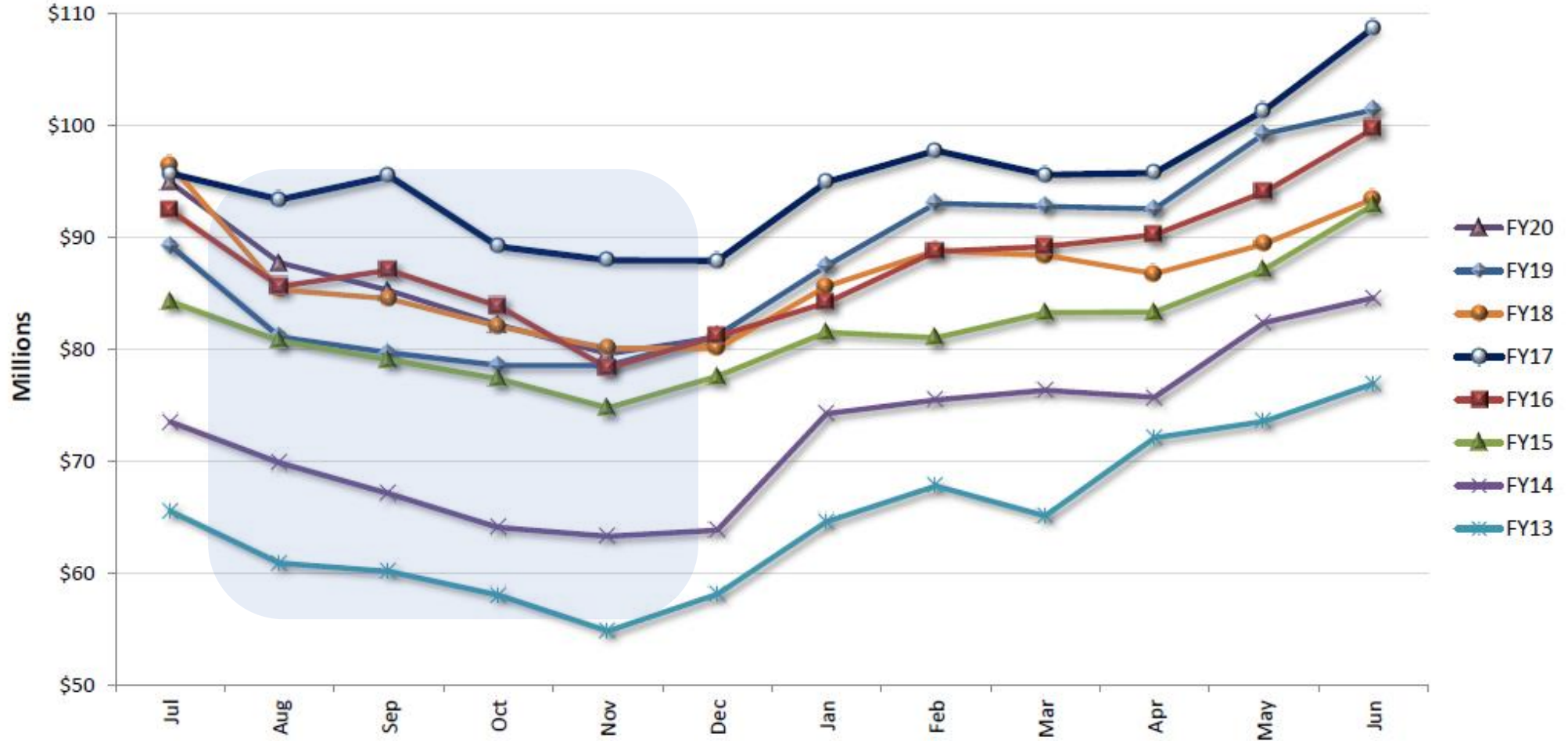
Can You Use Bullets, Callables, Floaters, and Step-Ups?



# Portfolio Strategy: Cash Flow Matching

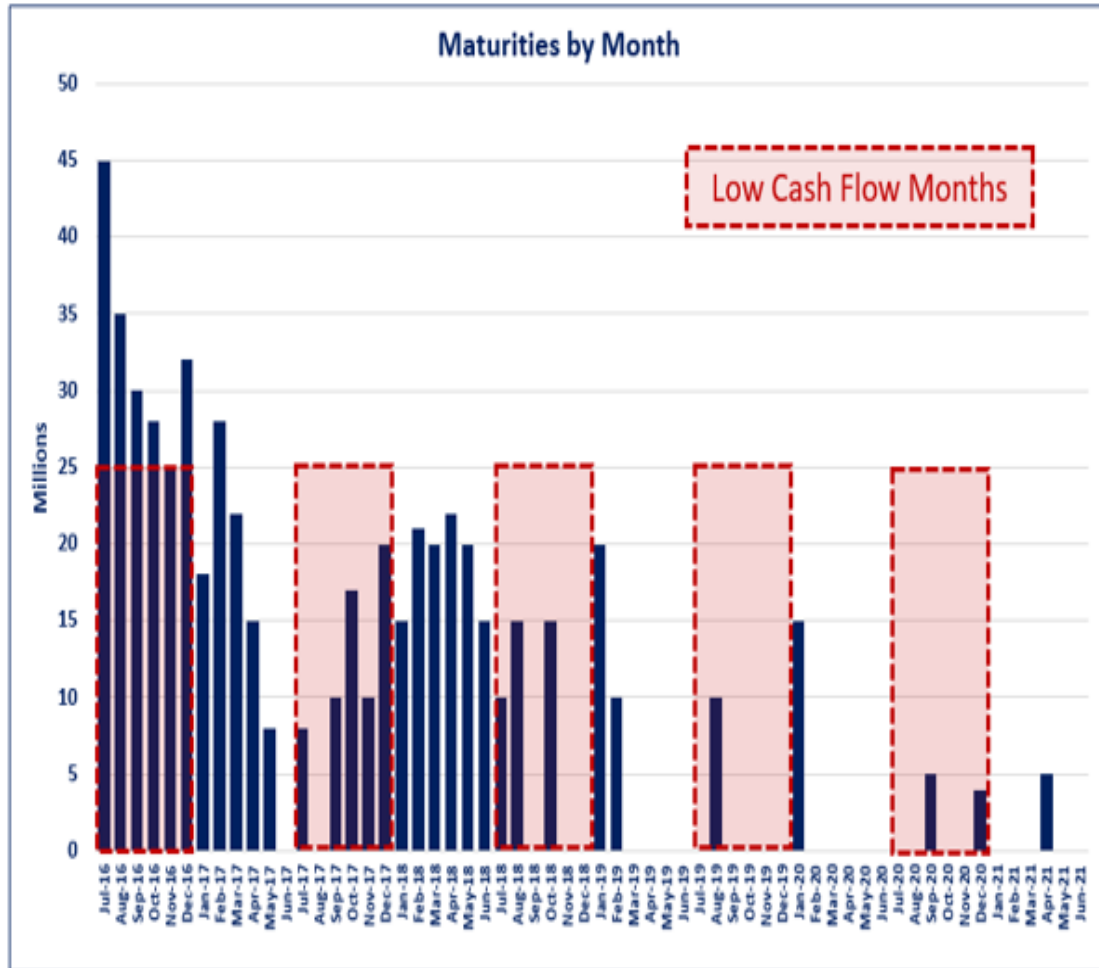
Can You Use Bullets, Callables, Floaters, and Step-Ups?

### City Portfolio Value at Month End by Fiscal Years

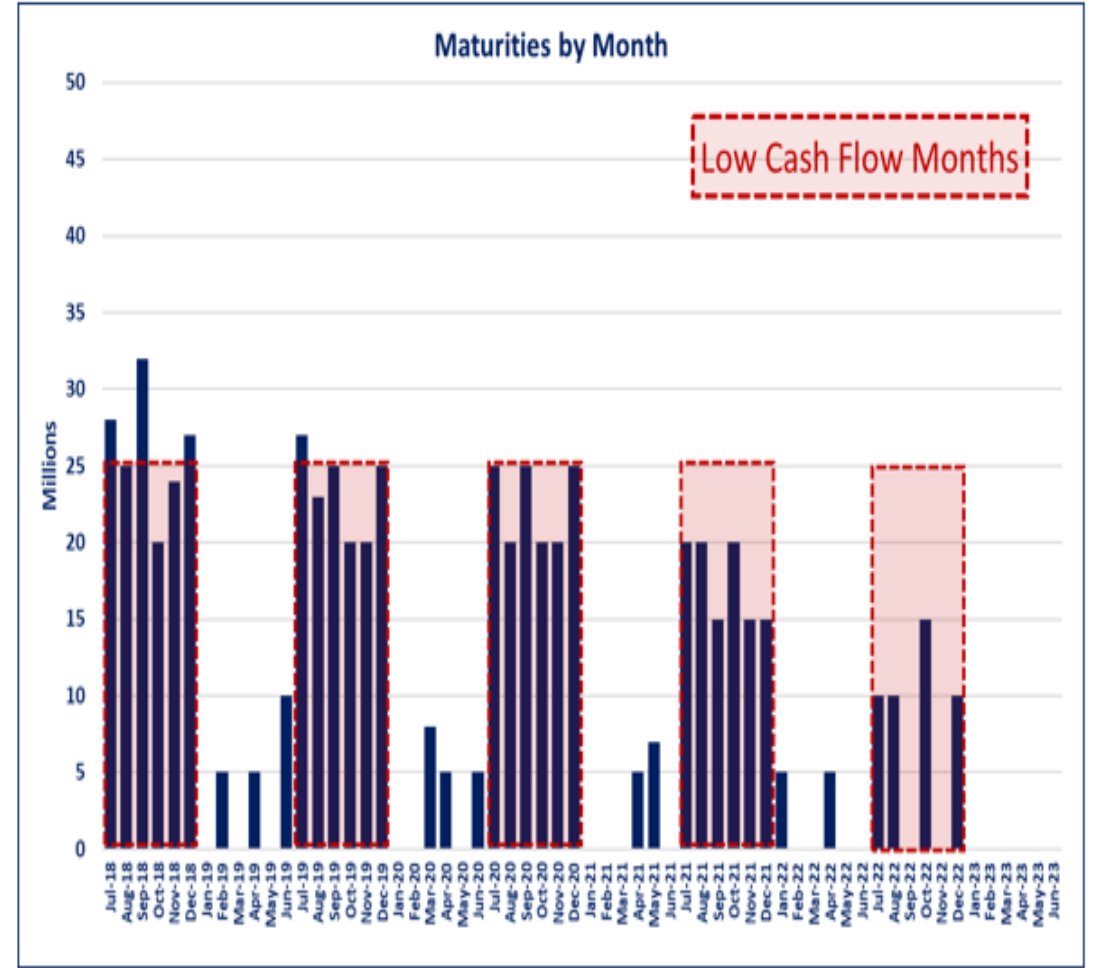


# Structuring to Match Cash Outflows

Before: .9 Duration



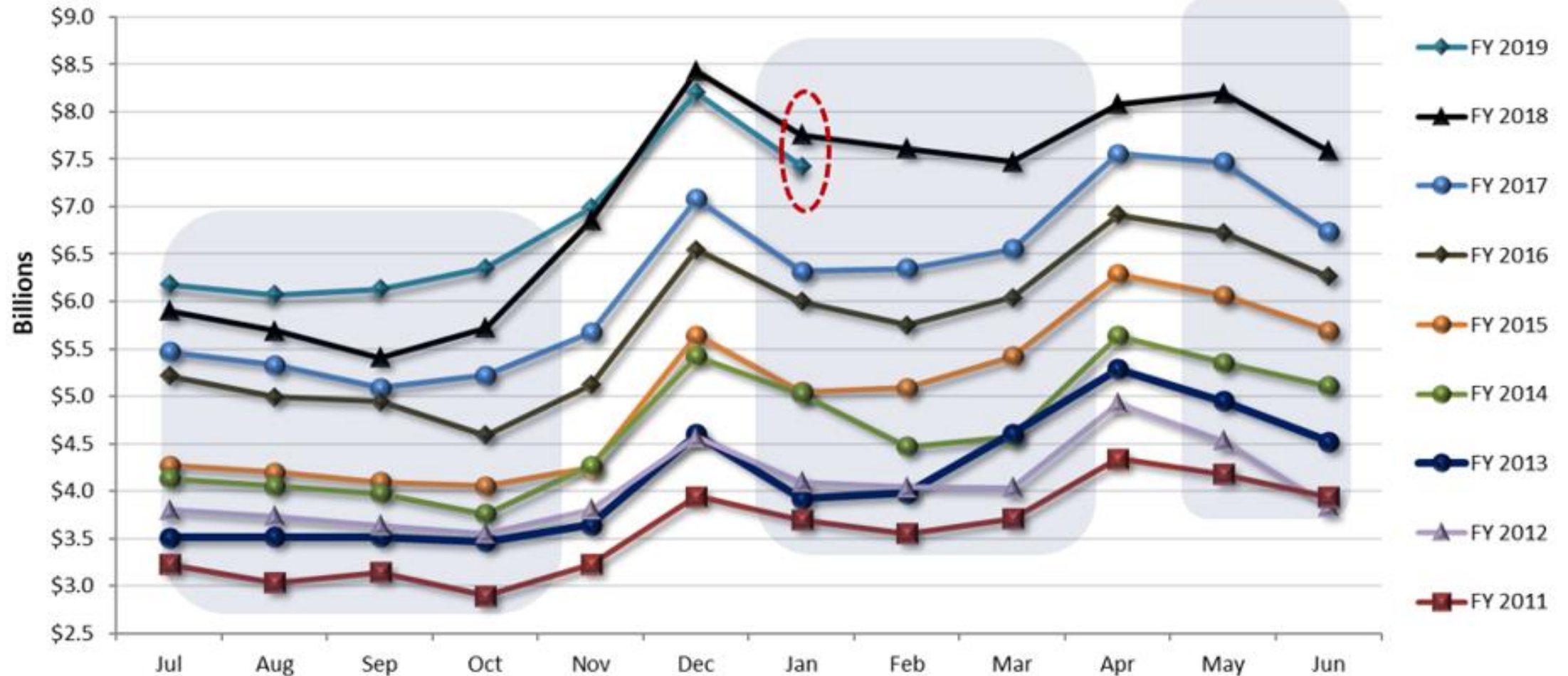
After: 2.1 Duration



# Portfolio Strategy: Cash Flow Matching

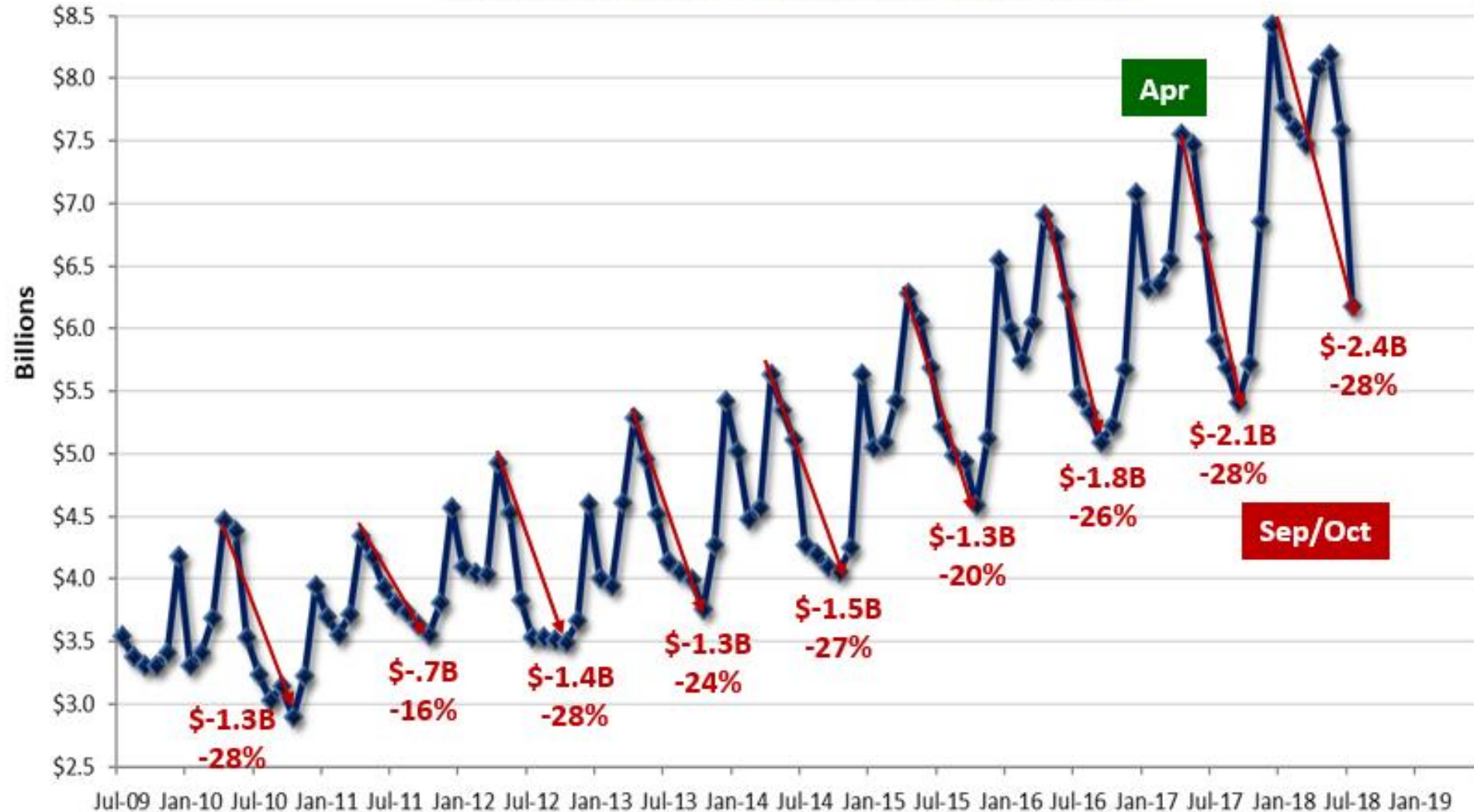
Can You Use Bullets, Callables, Floaters, and Step-Ups?

County Portfolio Value at Month End by Fiscal Years



# It Doesn't Exactly Repeat...But it Really Rhymes

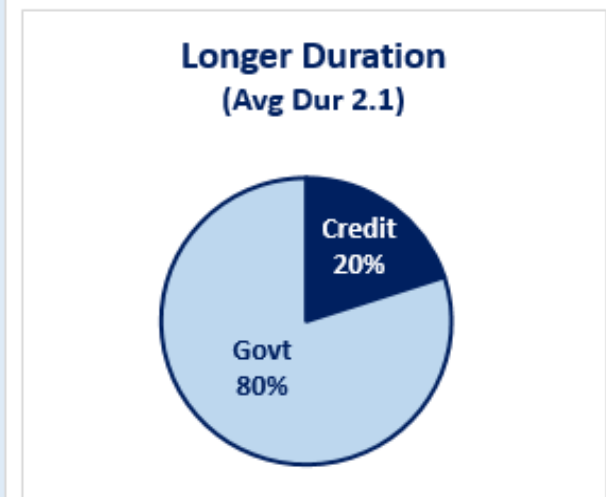
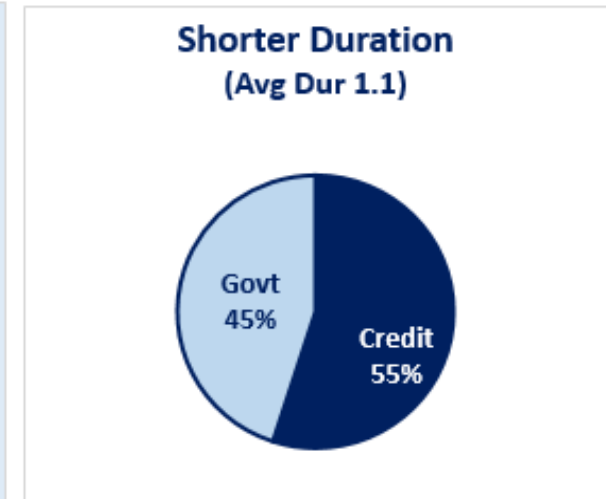
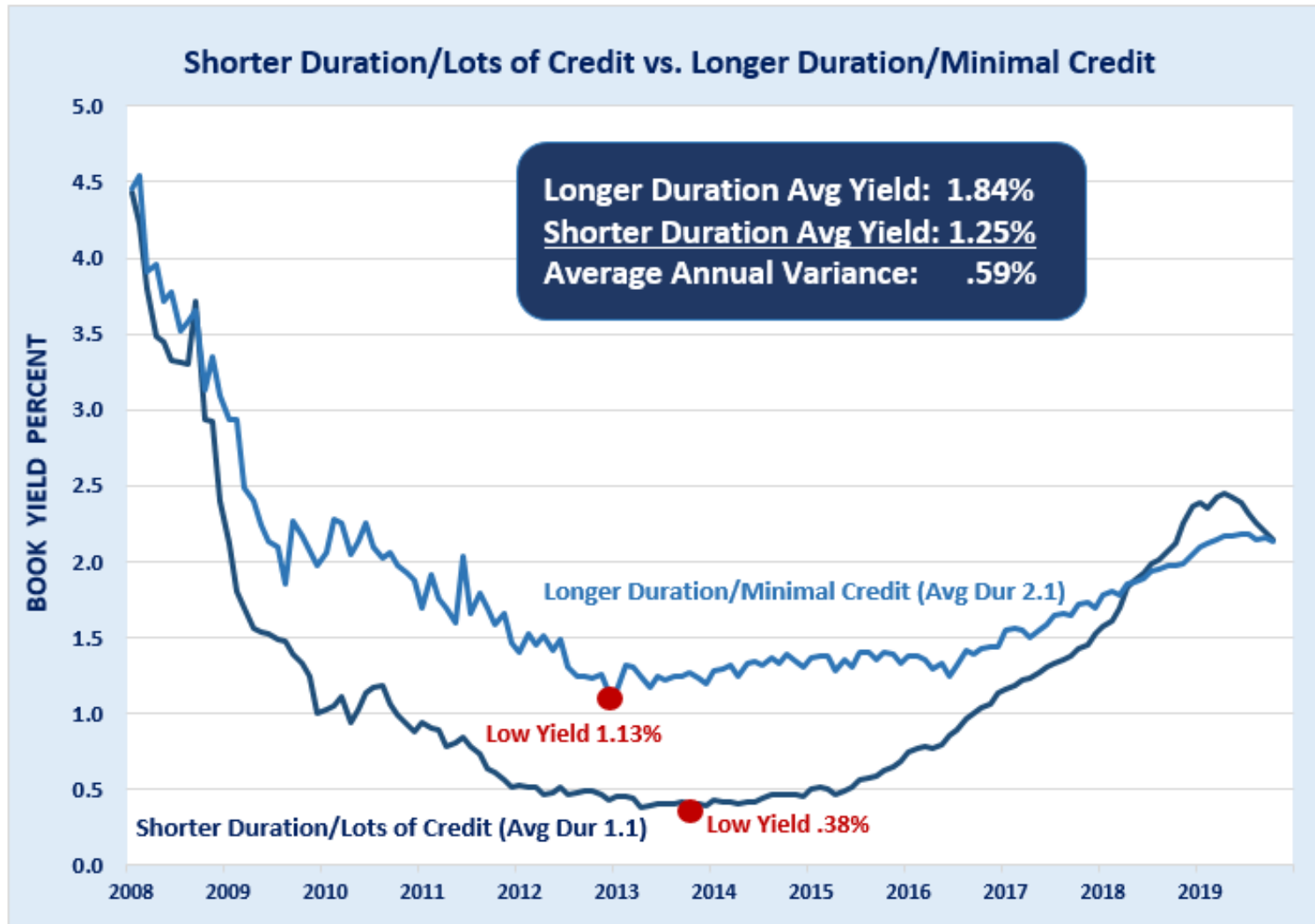
## Month End Portfolio Balance



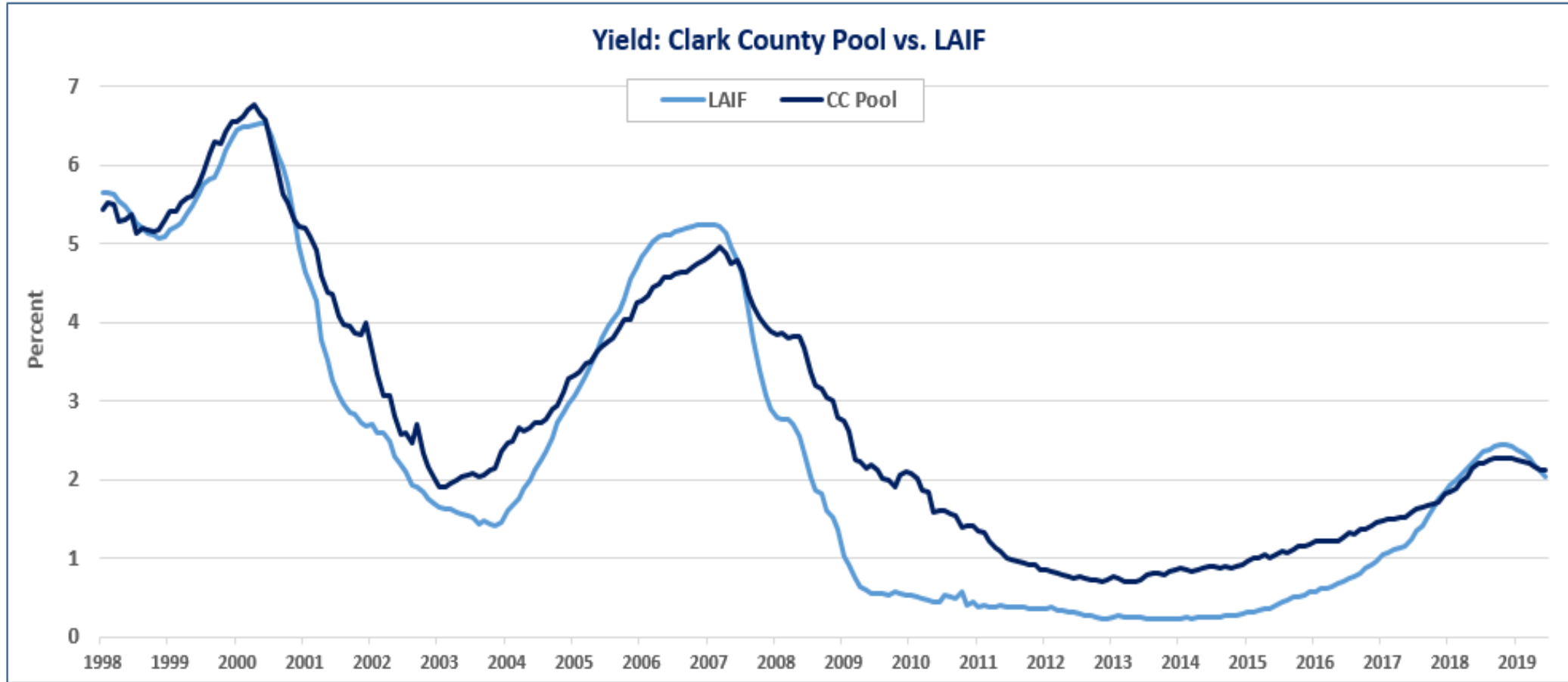


# Real World Example: Shorter Duration vs. Longer Duration

Using Bullets, Callables, Floaters, and Step-Ups to Manage Duration



# Real World Example: Shorter Duration vs. Longer Duration #2



Average Fiscal Year Yields

Fiscal Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*	Avg
CC Pool	5.30	5.92	6.15	4.36	2.74	2.06	2.79	3.74	4.57	4.53	3.45	2.21	1.66	1.06	0.77	0.78	0.89	1.08	1.30	1.61	2.14	2.19	2.79
NV LGIP	5.36	5.68	6.13	3.43	2.18	1.53	2.23	3.85	5.12	4.38	2.19	0.66	0.49	0.38	0.31	0.25	0.27	0.43	0.75	1.36	2.26	2.22	2.34
Variance	(0.05)	0.24	0.02	0.93	0.56	0.53	0.56	(0.11)	(0.55)	0.15	1.27	1.55	1.17	0.68	0.47	0.53	0.62	0.64	0.55	0.25	(0.12)	(0.03)	0.45

\*FYTD 2020

Avg WAMs: LAIF ~.5 Years, Clark County ~1.8 Years

# Optimal Duration: Risk Adjusted Return

**Benchmark Treasury Modified Sharp Ratio Analysis**  
1/31/1990 to 12/31/2019

Maturity	Avg Yield	Avg Duration	Modified Sharp Ratio	% Return of 30Yr / % 30Yr Risk
3 Mon T-Bill	2.78	0.24		62% / 3%
6 Mon T-Bill	2.91	0.48	0.277	65% / 6%
1 Yr T-Bill	3.04	0.97	0.271	67% / 12%
<b>Sweet Spot</b> 2 Yr T-Note	3.35	1.90	0.299	74% / 24%
3 Yr T-Note	3.57	2.85	0.277	79% / 36%
5 Yr T-Note	3.97	4.45	0.267	88% / 56%
10 Yr T-Note	4.52	7.96	0.218	100% / 100%

(Avg Yield – Risk Free Yield) / Avg Duration = MSR

$$(3.35\% \text{ 2y} - 2.78\% \text{ 3m}) / 1.90 \text{ 2y} = .299$$

**3.35% 2yr / 4.52% 10yr = 74%**  
**Yield Comparison**

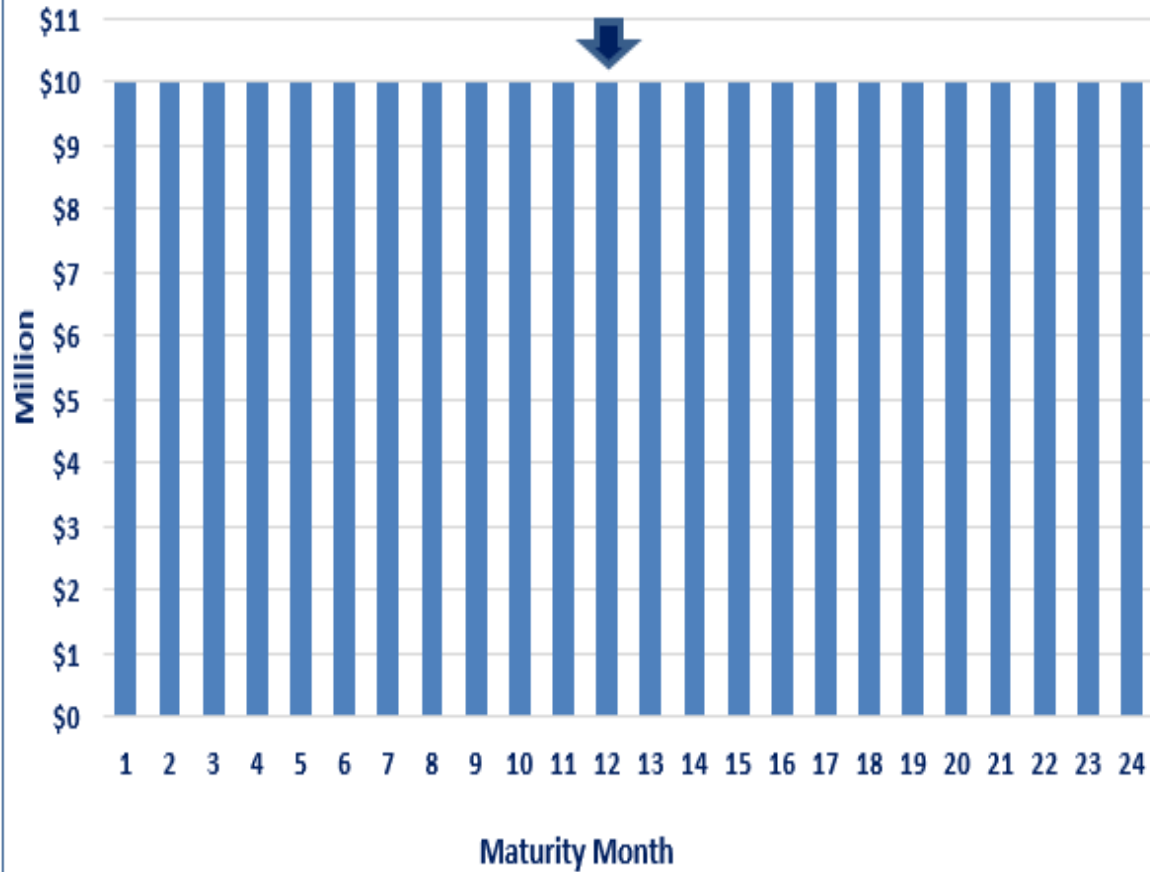
**1.90 2Yr / 7.96 10Yr = 24%**  
**Duration Comparison**

Source: Bloomberg

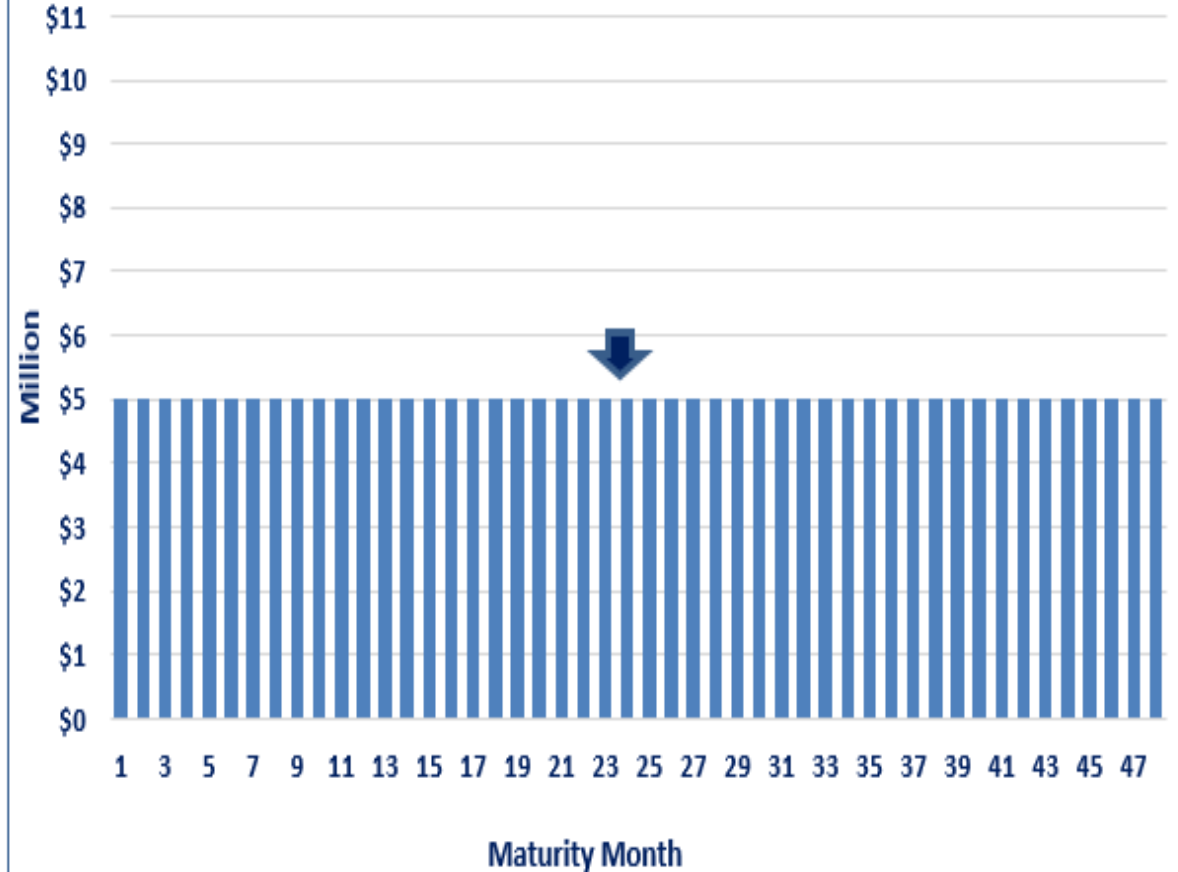


# 1 Year WAM vs. 2 Year WAM

1 Year WAM Portfolio  
(24 2Yr Treasuries)



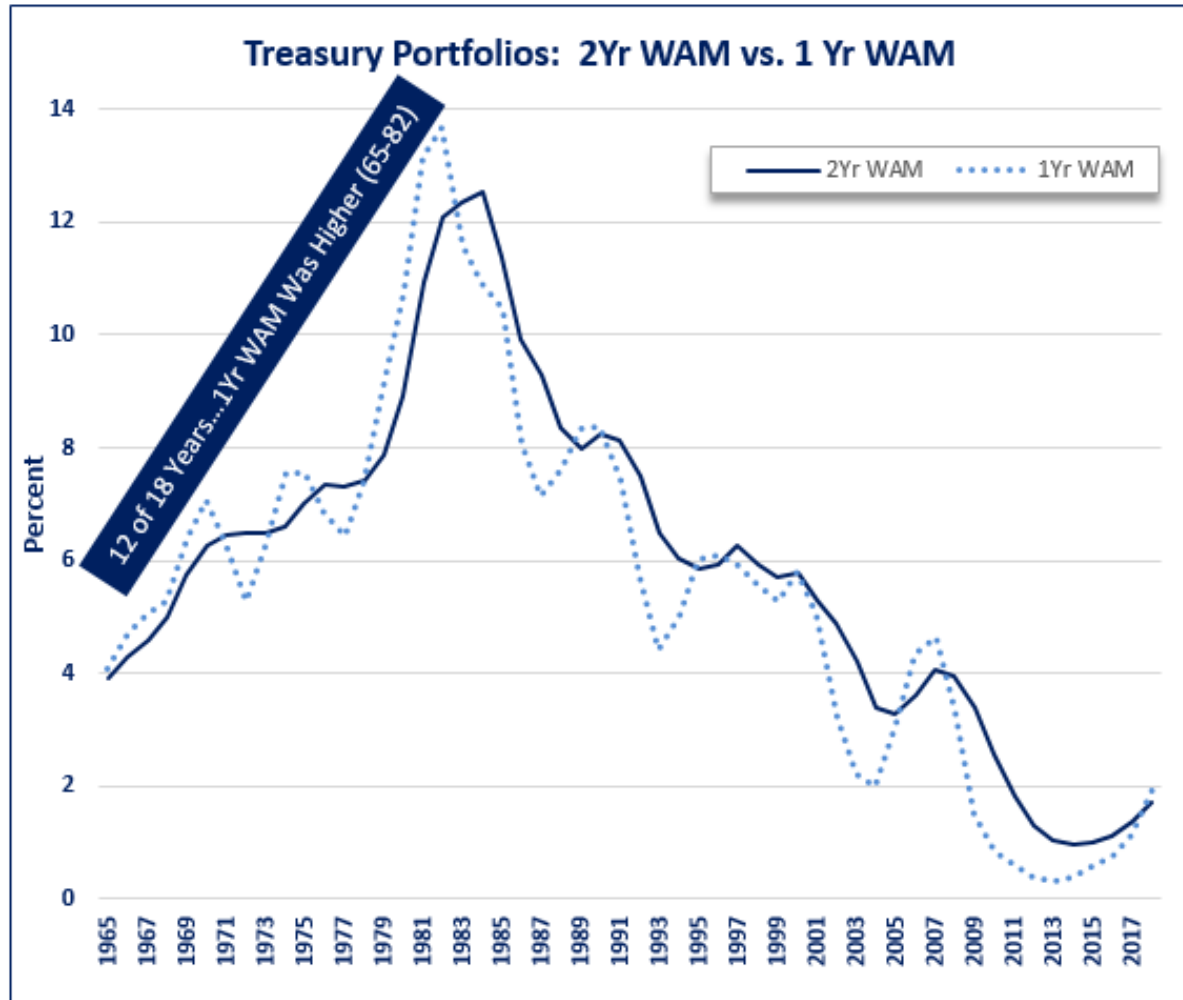
2 Year WAM Portfolio  
(48 4Yr Treasuries)



# 1 Yr WAM vs. 2 Yr WAM: A Long View of Returns

Year	1Y WAM	2Y WAM	Var
1965	4.06	3.90	(0.16)
1966	4.70	4.30	(0.40)
1967	5.05	4.60	(0.45)
1968	5.28	5.00	(0.29)
1969	6.38	5.73	(0.65)
1970	7.08	6.27	(0.81)
1971	6.31	6.46	0.15
1972	5.29	6.50	1.21
1973	6.24	6.48	0.24
1974	7.57	6.60	(0.97)
1975	7.56	7.01	(0.56)
1976	6.85	7.34	0.49
1977	6.43	7.31	0.88
1978	7.40	7.44	0.04
1979	9.06	7.87	(1.18)
1980	10.77	8.91	(1.86)
1981	13.17	10.94	(2.22)
1982	13.68	12.11	(1.57)
1983	11.61	12.34	0.74
1984	10.91	12.55	1.65
1985	10.46	11.38	0.93
1986	8.07	9.94	1.87
1987	7.15	9.30	2.15
1988	7.64	8.35	0.71
1989	8.34	7.97	(0.37)
1990	8.37	8.25	(0.11)
1991	7.44	8.13	0.69

Year	1Y WAM	2Y WAM	Var
1992	5.74	7.49	1.75
1993	4.41	6.49	2.08
1994	4.99	6.03	1.03
1995	6.00	5.84	(0.16)
1996	6.08	5.91	(0.16)
1997	5.91	6.26	0.35
1998	5.56	5.93	0.37
1999	5.26	5.71	0.45
2000	5.81	5.77	(0.04)
2001	5.04	5.29	0.25
2002	3.23	4.87	1.64
2003	2.20	4.19	2.00
2004	1.97	3.39	1.42
2005	3.12	3.27	0.16
2006	4.33	3.60	(0.74)
2007	4.64	4.05	(0.59)
2008	3.34	3.95	0.61
2009	1.48	3.37	1.89
2010	0.83	2.56	1.73
2011	0.60	1.80	1.20
2012	0.38	1.27	0.89
2013	0.29	1.02	0.73
2014	0.39	0.96	0.57
2015	0.55	0.98	0.43
2016	0.74	1.12	0.38
2017	1.12	1.37	0.25
2018	1.96	1.72	(0.24)



1Yr WAM Avg Yield= 5.53

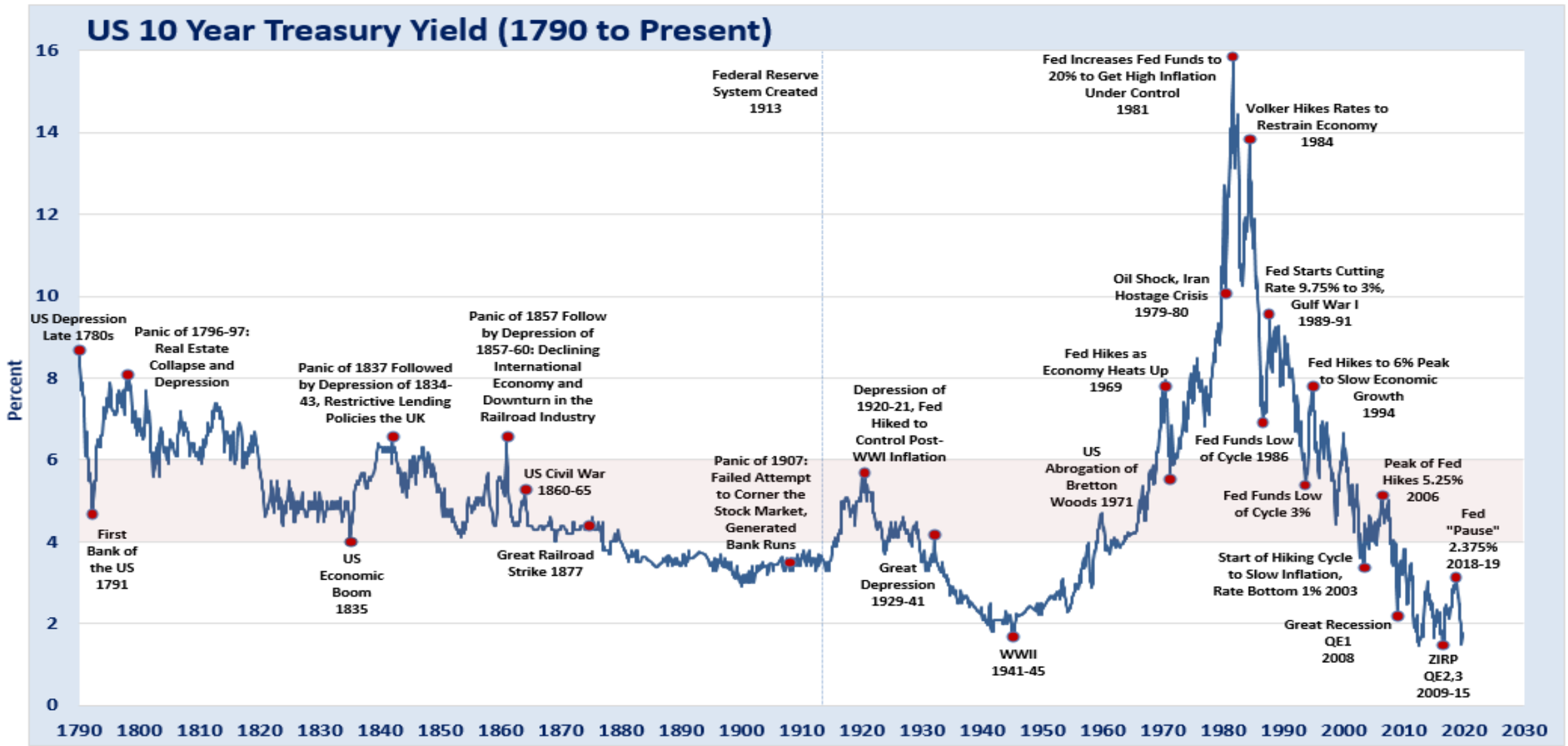
2Yr WAM Avg Yield= 5.87

2Yr WAM vs. 1Yr WAM Yield = 0.34 Per Year

Notes: 2Yr WAM is the 48 month moving average of the 4yr treasury, the 1Yr WAM is the 24 month moving average of the 2 year treasury  
The 4yr treasury is the average of the 3yr and 5yr treasury, since the US Treasury does not issue a 4 yr treasury

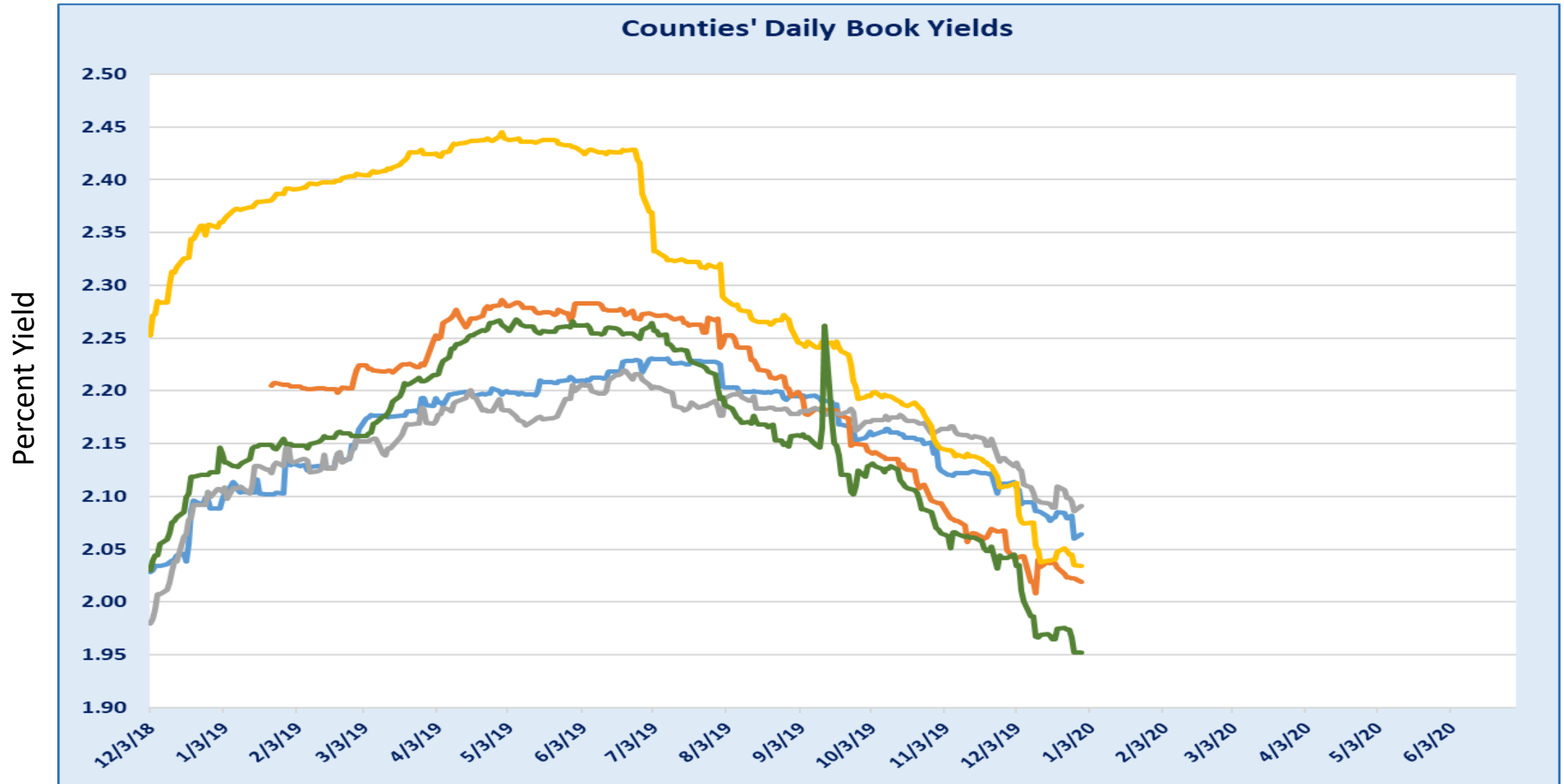
Source: Bloomberg

# A Long View of Rates



Sources: Goldman Sachs, Global Financial Database, Arbor Research

# Which Portfolios Own Callables? Shorter Duration?



# Bond Risk Metrics

**Convexity:** A measure of how much a fixed-income instrument's duration changes when interest rates change. A high convexity indicates greater sensitivity of a bond's price to interest rate changes.

**Duration:** A measure of the timing of the cash flows, such as the interest payments and the principal repayment, to be received from a given fixed-income security. This calculation is based on three variables: term to maturity, coupon rate, and yield to maturity. The duration of a security is a useful indicator of its price volatility for given changes in interest rates. There are three primary types of duration: Macaulay Duration, Modified Duration, and Effective Duration.

**Macaulay Duration** was developed in 1938 by Frederic Macaulay, this form of duration measures the number of years required to recover the true cost of a bond, considering the present value of all coupon and principal payments received in the future. **Thus, it is the only type of duration quoted in "years."** Interest rates are assumed to be continuously compounded.

**Modified Duration** expands or modifies Macaulay duration to measure the responsiveness of a bond's price to interest rate changes. It is defined as the percentage change in price for a 100 basis point change in interest rates. The formula assumes that the cash flows of the bond do not change as interest rates change (which is not the case for most callable bonds).

**Effective Duration** (sometimes called option-adjusted duration) 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.



# Bullet Basics: T-Bill

B 0 12/31/20 Govt		Settings ▾	Actions ▾	Page 1/11	Security Description: Bond
				95) Buy	96) Sell
25) Bond Description		26) Issuer Description			
Pages		Issuer Information		Identifiers	
11) Bond Info	Name		TREASURY BILL	ID Number	912796TY5
12) Addtl Info	Industry		Treasury (BCLASS)	CUSIP	912796TY5
13) Covenants	Security Information			ISIN	US912796TY52
14) Guarantors	Issue Date	01/02/2020		SEDOL 1	BK7K295
15) Bond Ratings	Interest Accrues			FIGI	BBG00R7TT3K9
16) Identifiers	1st Coupon Date			Issuance & Trading	
17) Exchanges	Maturity Date	12/31/2020		Disc @ Issue	1.550000
18) Inv Parties	Floater Formula	N.A.		Risk Factor	.961
19) Fees, Restrict	Workout Date			Amount Issued	26000 (MM)
20) Schedules		Security Type	USD	Amount Outstanding	26000 (MM)
21) Coupons		Type	ZERO	Minimum Piece	100
Quick Links	Cpn Frequency	Mty/Refund Type	NORMAL	Minimum Increment	100
32) ALLQ Pricing	Calc Type	DISCOUNT		SOMA Holdings	N.A.
33) QRD Quote Recap	Day Count	ACT/360			
34) CACS Corp Action	Market Sector	US GOVT			
35) CN Sec News	Country	US	Currency	USD	
36) HDS Holders					

Source: Bloomberg

# Are T-Bills and Discount Notes Legal Investments?

## 53601.6. Prohibited Securities

(a) A local agency shall not invest any funds pursuant to this article or pursuant to Article 2 (commencing with Section 53630) in inverse floaters, range notes, or mortgage-derived, interest-only strips.

(b) **A local agency shall not invest any funds pursuant to this article or pursuant to Article 2 (commencing with Section 53630) in any security that could result in zero interest accrual if held to maturity.** However, a local agency may hold prohibited instruments until their maturity dates. The limitation in this subdivision shall not apply to local agency investments in shares of beneficial interest issued by diversified management companies registered under the Investment Company Act of 1940 (15 U.S.C. Sec. 80a-1 et seq.) that are authorized for investment pursuant to subdivision (l) of Section 53601.

# LAIG Info



Some investments, such as straight floaters or floating rate notes that are not otherwise prohibited have the **potential to result in zero interest accrual**. Before purchasing these types of investments, the local agency should evaluate all possible outcomes, and, as a safeguard, should consider including in its investment policy a statement establishing an acceptable positive spread or floor for all securities, which pay interest based on a spread to an index.

Source: CDIAC

# Bullet Basics: T-Note

T 1 <sup>3</sup> / <sub>4</sub> 12/31/24 Govt		Settings ▾	Actions ▾	Page 1/11	Security Description: Bond	
				95) Buy	96) Sell	
25) Bond Description		26) Issuer Description				
Pages	Issuer Information			Identifiers		
11) Bond Info	Name US TREASURY N/B			ID Number 912828YY0		
12) Addtl Info	Industry Treasury (BCLASS)			CUSIP 912828YY0		
13) Covenants	Security Information			ISIN US912828YY08		
14) Guarantors	Issue Date	12/31/2019		SEDOL 1	BKRM495	
15) Bond Ratings	Interest Accrues	12/31/2019		FIGI	BBG00R4RS6F6	
16) Identifiers	1st Coupon Date	06/30/2020		Issuance & Trading		
17) Exchanges	Maturity Date	12/31/2024		Issue Price	99.971399	
18) Inv Parties	Floater Formula	N.A.		Risk Factor	4.793	
19) Fees, Restrict	Workout Date	12/31/2024		Amount Issued	41000 (MM)	
20) Schedules	Coupon 1.750	Security Type	USN	Amount Outstanding	41000 (MM)	
21) Coupons	Cpn Frequency	S/A	Type	FIXED	Minimum Piece	100
Quick Links	Mty/Refund Type	NORMAL	Series		Minimum Increment	100
32) ALLQ Pricing	Calc Type	STREET CONVENTION			SOMA Holdings	N.A.
33) QRD Quote Recap	Day Count	ACT/ACT				
34) CACS Corp Action	Market Sector	US GOVT				
35) CN Sec News	Country	US		Currency	USD	
36) HDS Holders						

Source: Bloomberg

# Bullet Basics: T-Note Cash Flow

T 1 <sup>3</sup> / <sub>4</sub> 12/31/24 Govt		1) Export	97) Settings	Cash Flow Analysis	
100-24 <sup>1</sup> / <sub>4</sub> / 100-24+	1.591/1.590	CBBT @ 01/03		95) Buy	96) Sell
				BBID	912828YY0
2) Cash Flows		3) Present Values		4) Distressed Analysis	
Price	100-00	Settlement	01/06/20	Issue	12/31/2019 Maturity 12/31/2024
Yield	1.749975 to Worst		12/31/24	@ 100.000000	Face Amt 1000 M
Payment Date	Interest	Principal	Total		
06/30/2020	8,750.00	0.00	8,750.00		
12/31/2020	8,750.00	0.00	8,750.00		
06/30/2021	8,750.00	0.00	8,750.00		
12/31/2021	8,750.00	0.00	8,750.00		
06/30/2022	8,750.00	0.00	8,750.00		
12/31/2022	8,750.00	0.00	8,750.00		
06/30/2023	8,750.00	0.00	8,750.00		
12/31/2023	8,750.00	0.00	8,750.00		
06/30/2024	8,750.00	0.00	8,750.00		
12/31/2024	8,750.00	1,000,000.00	1,008,750.00		

Source: Bloomberg

# Does Coupon Reinvestment Affect YTM?

*JOURNAL OF ECONOMICS AND FINANCE EDUCATION* • Volume 7 • Number 1 • Summer 2008 48

## *Yield-to-Maturity and the Reinvestment of Coupon Payments*

*Shawn M. Forbes, John J. Hatem, and Chris Paul<sup>1</sup>*

### ABSTRACT

This note addresses a common misconception, found in investment texts and popular investment education literature, that in order to earn the yield to maturity on a coupon bond an investor must reinvest the coupon payments. We identify a sample of text and professional sources making this claim, demonstrate that yield to maturity entails no assumption of coupon reinvestment, discuss a cause for this confusion and offer a possible remedy.

<https://www.economics-finance.org/jefe/econ/ForbesHatemPaulpaper.pdf>

# Bullet Basics: 5 Yr T-Note

T 1 <sup>3</sup> / <sub>4</sub> 12/31/24 Govt		Settings ▾	Yield and Spread Analysis	
			95 Buy	96 Sell
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing
5) Description		6) Custom		
T 1 <sup>3</sup> / <sub>4</sub> 12/31/24 ( 912828YY0 )		Risk		
Price	100-00 (100.00)	Duration	4.809	
Settle	12/31/19	Modified Duration	4.768	
Maturity	12/31/2024	Risk	4.768	
Street Convention	1.7500	Convexity	0.257	
Treasury Convention	1.7500	DV ▾	01 on IMM	477
True Yield	1.7500	YV ▾	0.031	0.00655
Equiv 1 ▾ /Yr Compound	1.7577	Invoice		
Japanese Yield (Simple)	1.7500	Face	1,000 M	
Mmkt (Act/360 ▾ )		Principal	1,000,000.00	
Current Yield	1.750	Accrued (0 Days)	0.00	
After Tax (Inc 40.800 % CG 23.800 %)	1.0360	Total (USD)	1,000,000.00	
Issue Price = 99.971. Bond Purchased at Par.				

Source: Bloomberg

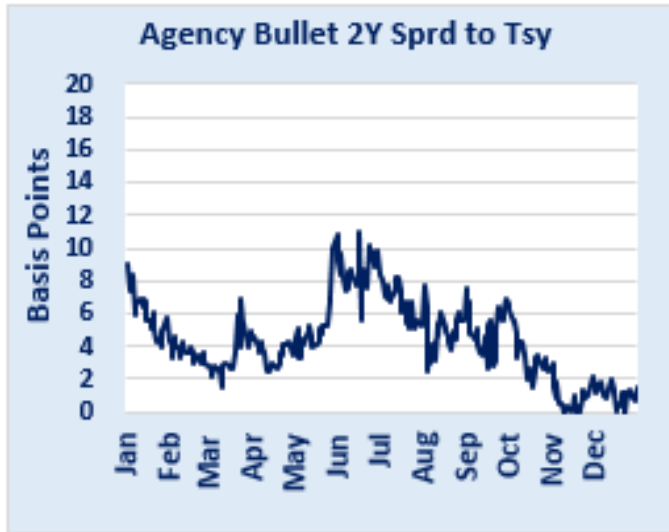
# Bullet Basics: 2 Yr T-Note

T 1 <sup>5</sup> / <sub>8</sub> 12/31/21 Govt		Settings ▾	Yield and Spread Analysis	
			95 Buy	96 Sell
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing
		5) Description	6) Custom	
T 1 <sup>5</sup> / <sub>8</sub> 12/31/21 ( 912828YZ7 )		Risk		
Price	100-00 (100.00)	Duration	1.976	
Settle	12/31/19	Modified Duration	1.960	
Maturity	12/31/2021	Risk	1.960	
Street Convention	1.6250	Convexity	0.048	
Treasury Convention	1.6250	DV ▾ 01 on 1MM	196	
True Yield	1.6250	YV ▾ 0.031	0.01594	
Equiv 1 ▾ /Yr Compound	1.6316	Invoice		
Japanese Yield (Simple)	1.6250	Face	1,000 M	
Mmkt (Act/ 360 ▾ )		Principal	1,000,000.00	
Current Yield	1.625	Accrued (0 Days)	0.00	
		Total (USD)	1,000,000.00	
After Tax (Inc 40.800 % CG 23.800 %)	0.9620			
Issue Price = 99.945. Bond Purchased at Par.				

Source: Bloomberg



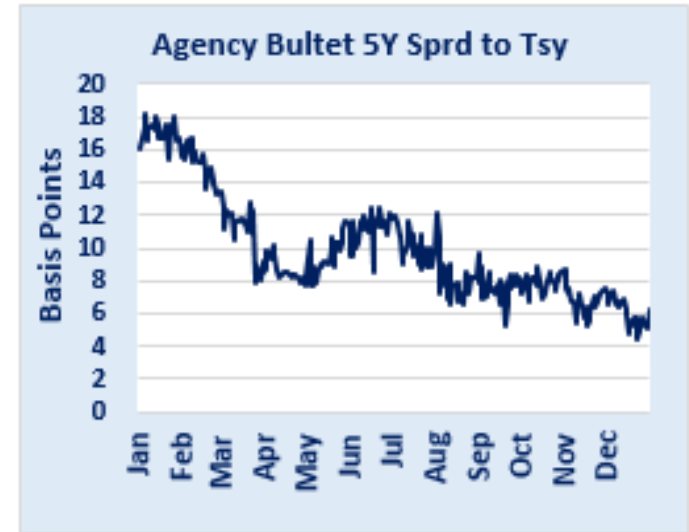
# Bullet Basics: Spreads to Treasuries



1



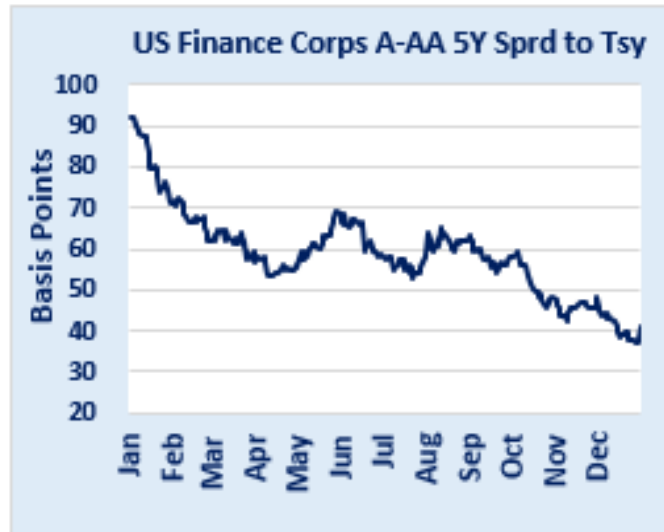
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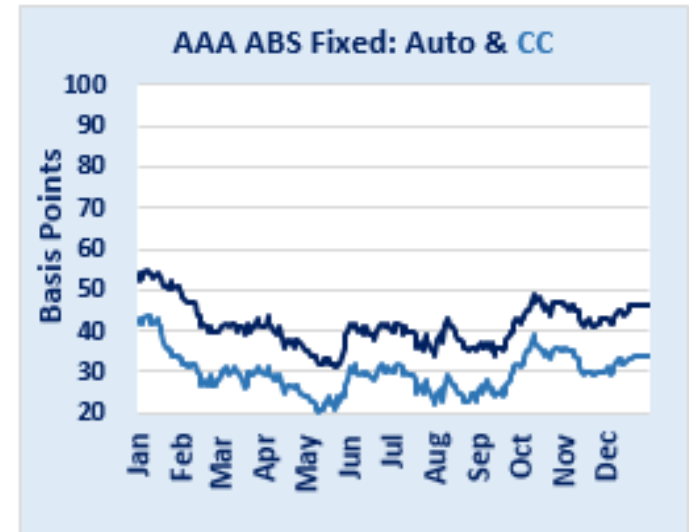
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41



41



46

33

Source: Bloomberg

# Bullet Basics: 3Yr Spreads to Treasuries

<u>SIZE</u>	<u>CUSIP</u>	<u>ISSUE</u>	<u>SPRD</u>	<u>BENCH</u>	<u>YTM</u>	<u>ISPD</u>	<u>GSPD</u>	<u>NOTE</u>
10MM+	3135G0W33	FNMA 1 3/8 09/06/22	2	3YR	1.611%	-1.2	2.5	BMARK
2MM+	313380GJ0	FHLB 2 09/09/22	1.5	3YR	1.606%	-1.7	1.9	TAP
25MM+	3133ELGN8	FFCB 1.6 10/13/22	2	3YR	1.611%	-1.0	2.3	MTN
20MM+	3133EA7E2	FFCB 1.96 11/07/22	1.5	3YR	1.606%	-1.4	1.7	MTN
25MM+	313381BR5	FHLB 1 7/8 12/09/22	2	3YR	1.611%	-0.7	2.0	TAP
SOLD	3133ELGU2	FFCB 1.55 01/10/23	1.5	3YR	1.606%	-1.0	1.4	MTN
25MM+	3133ELHZ0	FFCB 1.6 07/17/23	1.5	3YR	1.606%	-1.2	-0.5	MTN
10MM+	3130A3VC5	FHLB 2 1/4 12/08/23	2.5	3YR	1.616%	-0.4	-1.0	MTN
2MM	3133EH2U6	FFCB 2.35 12/12/23	3	3YR	1.621%	0.1	-0.5	MTN
5MM+	3133ELFW9	FFCB 1.71 01/02/24	3.5	3YR	1.626%	0.5	-0.2	MTN
20MM+	3133ELGV0	FFCB 1.55 01/10/24	2.5	3YR	1.616%	-0.5	-1.3	MTN

## Bullet Basics: 5Yr Spreads to Treasuries

<u>SIZE</u>	<u>CUSIP</u>	<u>ISSUE</u>	<u>SPRD</u>	<u>BENCH</u>	<u>YTM</u>	<u>ISPD</u>	<u>GSPD</u>	<u>NOTE</u>
10MM+	3135G0V34	FNMA 2 1/2 02/05/24	-0.5	5YR	1.641%	1.9	1.1	BMARK
10MM+	3135G0V75	FNMA 1 3/4 07/02/24	0	5YR	1.646%	1.6	0.9	BMARK
10MM+	3135G0ZR7	FNMA 2 5/8 09/06/24	-1	5YR	1.636%	0.3	-0.5	BMARK
5MM+	3130A2UW4	FHLB 2 7/8 09/13/24	2	5YR	1.666%	3.2	2.5	TAP
10MM+	3135G0W66	FNMA 1 5/8 10/15/24	1.5	5YR	1.661%	2.5	1.8	BMARK
10MM+	3130A3GE8	FHLB 2 3/4 12/13/24	2	5YR	1.666%	2.7	2.0	TAP
10MM+	3135G0X24	FNMA 1 5/8 01/07/25	4	5YR	1.686%	4.6	3.8	BMARK
3MM+	3133EEWP1	FFCB 2.37 04/01/25	7	5YR	1.716%	7.0	5.4	MTN
15MM+	3130A5R35	FHLB 2 7/8 06/13/25	9	5YR	1.736%	8.4	6.1	TAP
2MM+	3133EHXQ1	FFCB 2 1/4 09/08/25	12	5YR	1.766%	10.9	7.7	MTN
2MM+	3133EKSU1	FFCB 2.08 10/01/25	13	5YR	1.776%	11.7	8.3	MTN
20MM+	3130AEB74	FHLB 3 1/8 12/12/25	13.5	5YR	1.781%	11.7	7.5	TAP
5MM+	3130A6ZQ3	FHLB 2 5/8 12/12/25	13	5YR	1.776%	11.2	7.1	TAP

Source: FHN

# Bullet Basics: 5Yr+ Spreads to Treasuries

<u>SIZE</u>	<u>CUSIP</u>	<u>ISSUE</u>	<u>SPRD</u>	<u>BENCH</u>	<u>YTM</u>	<u>ISPD</u>	<u>GSPD</u>	<u>NOTE</u>
5MM+	3135G0K36	FNMA 2 1/8 04/24/26	1	7YR	1.767%	9.3	4.2	BMARK
???	3134A1Z60	FHLMC 6.93 06/01/26	8.5	7YR	1.842%	16.5	11.1	MTN
10MM+	3135G0Q22	FNMA 1 7/8 09/24/26	4.5	7YR	1.802%	11.6	5.6	BMARK
10MM+	3133ELCU6	FFCB 1.78 12/09/26	14	7YR	1.897%	20.4	14.1	MTN
5MM+	3130A9YY1	FHLB 2 1/8 12/11/26	14.5	7YR	1.902%	20.9	14.5	TAP
1MM+	3133EJDF3	FFCB 3.06 02/16/27	17	7YR	1.927%	22.9	16.4	MTN
4MM+	3133EHC84	FFCB 2.57 03/03/27	15	7YR	1.907%	20.8	14.3	MTN
5MM+	3130A3DU5	FHLB 3 03/12/27	15	7YR	1.907%	20.7	14.2	TAP
4MM+	3133EJW21	FFCB 3.4 11/23/27	14	7YR	1.897%	17.5	11.3	MTN
50MM+	3133ELHN7	FFCB 2.03 01/21/28	25	7YR	2.007%	28.1	21.8	MTN
<u>SIZE</u>	<u>CUSIP</u>	<u>ISSUE</u>	<u>SPRD</u>	<u>BENCH</u>	<u>YTM</u>	<u>ISPD</u>	<u>GSPD</u>	<u>NOTE</u>
2MM+	313382GT4	FHLB 3 03/10/28	13.5	10YR	1.976%	24.4	18.1	TAP
1MM+	3133EKEZ5	FFCB 2.72 03/28/28	15	10YR	1.991%	25.8	19.4	TAP
10MM+	3133EHWF6	FFCB 2.65 08/25/28	18	10YR	2.021%	27.5	21.0	MTN
5MM+	3133EK6Q4	FFCB 1.94 11/13/28	18	10YR	2.021%	26.8	20.3	MTN
10MM+	3130AFFX0	FHLB 3 1/4 11/16/28	14	10YR	1.981%	22.8	16.3	GLOBAL
5MM+	3133EHZ48	FFCB 2.77 12/04/28	18	10YR	2.021%	26.6	20.2	MTN
25MM+	3130AHVE0	FHLB 2 12/08/28	19	10YR	2.031%	27.5	21.1	MTN
25MM+	3133ELEH3	FFCB 2 12/18/28	19	10YR	2.031%	27.5	21.1	MTN
10MM+	3133EJCH0	FFCB 3.2 02/09/29	15	10YR	1.991%	23.1	16.7	MTN
5MM+	31359MEU3	FNMA 6 1/4 05/15/29	14	10YR	1.981%	21.3	15.1	BMARK
5MM+	3130AGDY8	FHLB 2 3/4 06/08/29	20.5	10YR	2.046%	27.6	21.5	TAP
3MM+	3133EHQU0	FFCB 2.83 07/06/29	22	10YR	2.061%	28.8	22.8	MTN
10MM+	3130AGUW3	FHLB 2 1/8 09/14/29	20.5	10YR	2.046%	26.7	20.8	TAP
10MM+	3133ELBN3	FFCB 1.95 11/27/29	21	10YR	2.051%	26.6	20.8	MTN
3MM+	3133EGL86	FFCB 2.86 11/28/29	22	10YR	2.061%	27.6	21.8	MTN
50MM+	3130AHKT9	FHLB 2 1/8 12/14/29	23.5	10YR	2.076%	29.0	23.2	TAP

Source: FHN

# Floater Features

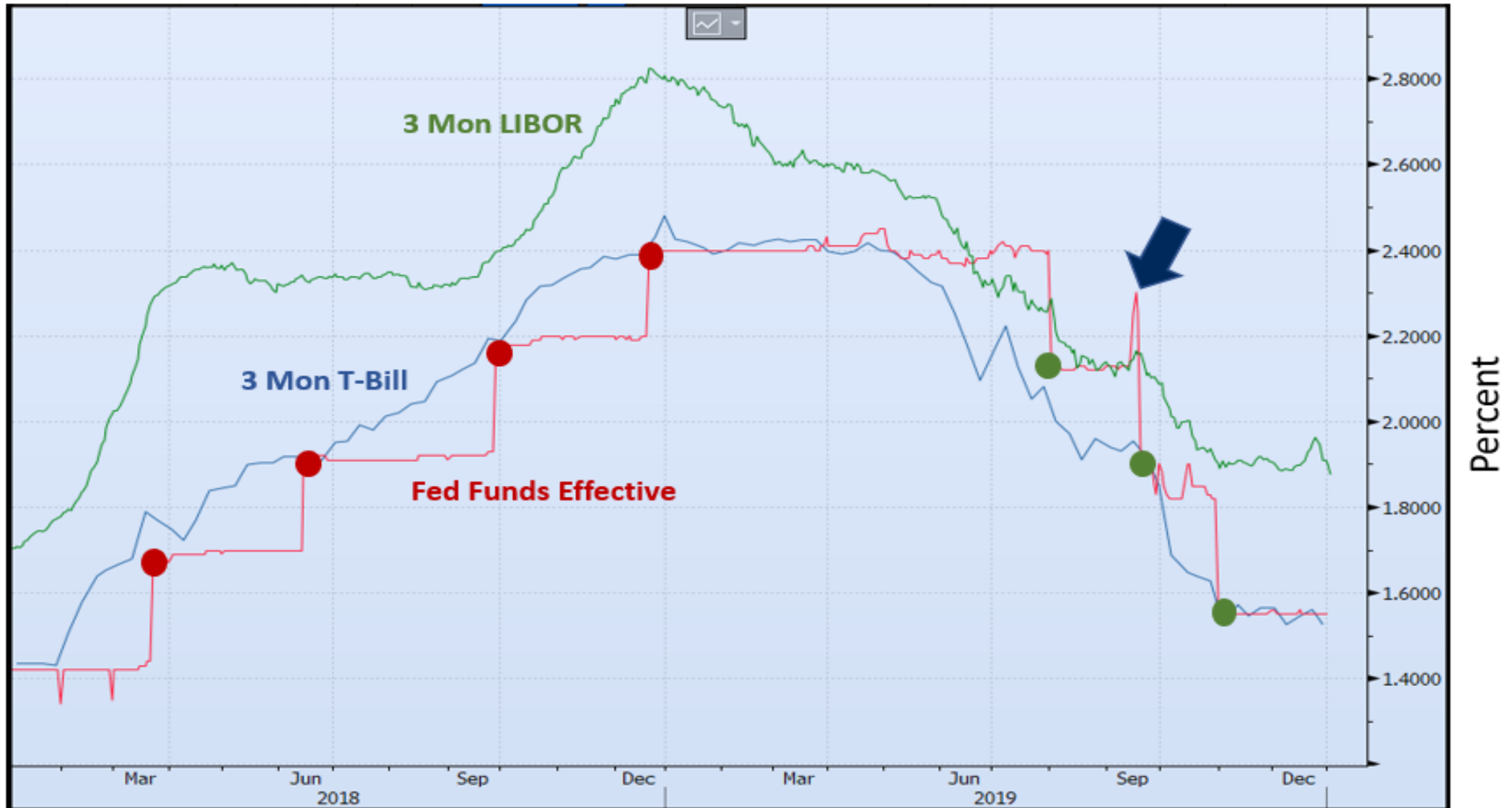
95) Actions ▾		96) Alerts ▾		97) Summary		98) Set Homepage		99) Export ▾		New Issue Monitor	
Selection		*NIM2-Agency (NIM2) ▾		1) Show Filters		2) Clear Filters		Issues ▾			
● Real Time		● Issue History		Date Range		11/05/19 ▾ - 01/04/20 ▾		6) My New Issues   NIMY »			
Date ↓	Issuer	Coupon	Maturity	Spread	Curr	Outst	Book	Mgr	Note		
		Float ▾	All ▾	All ▾	US ▾	All ▾					
101)	12/27	FED FARM CREDIT	FRN	07/02/21		USD	50	FCS-sole	0	01/02/20	
102)	12/23	FED FARM CREDIT	FRN	01/03/22		USD	100	TDSEC-sole	0	01/03/20	
103)	12/12	FED FARM CREDIT	FRN	05/20/21		USD	75	BNYM,MIZ		12/20/19	
104)	12/11	FARMER MAC	FRN	06/14/21		USD	25	CF-sole	0	01/02/20	
105)	12/10	FED FARM CREDIT	FRN	12/10/21		USD	540	JOINT LEADS	0	12/12/19	
106)	12/5	FED FARM CREDIT	FRN	12/16/20		USD	200	DAIWA,FCS	0	12/16/19	
107)	12/5	FED FARM CREDIT	FRN	09/16/20		USD	150	DAIWA-sole		12/16/19	
108)	12/3	FED FARM CREDIT	FRN	12/12/22		USD	466.75	JOINT LEADS	0000		
109)	12/3	FED FARM CREDIT	FRN	12/09/22		USD	500	JOINT LEADS		12/09/19	
110)	11/25	FED FARM CREDIT	FRN	11/02/21		USD	500	DAIWA,FCS	0	12/02/19	
111)	11/22	FED FARM CREDIT	FRN	05/03/21		USD	375	JOINT LEADS		12/03/19	
112)	11/19	FED HOME LN BANK	FRN	05/20/21		USD	50	FCS-sole		11/20/19	
113)	11/15	FED FARM CREDIT	FRN	06/14/21		USD	550	TDSEC-sole		INCREASE	
114)	11/14	FED FARM CREDIT	FRN	11/18/21		USD	355	JOINT LEADS		11/18/19	
115)	11/13	FED FARM CREDIT	FRN	03/17/21		USD	600	CITI-sole	0	11/19/19	
116)	11/13	FED FARM CREDIT	FRN	11/18/21		USD	650	BCLY,DAIWA	0000		
117)	11/8	FED FARM CREDIT	FRN	06/15/20		USD	50	CF,RBCCM	00	11/15/19	
118)	11/5	FED FARM CREDIT	FRN	11/07/22		USD	383	JOINT LEADS		11/07/19	

Floating Indexes: LIBOR, SOFR, Fed Funds Effective, T-Bill, Prime Rate

Source: Bloomberg

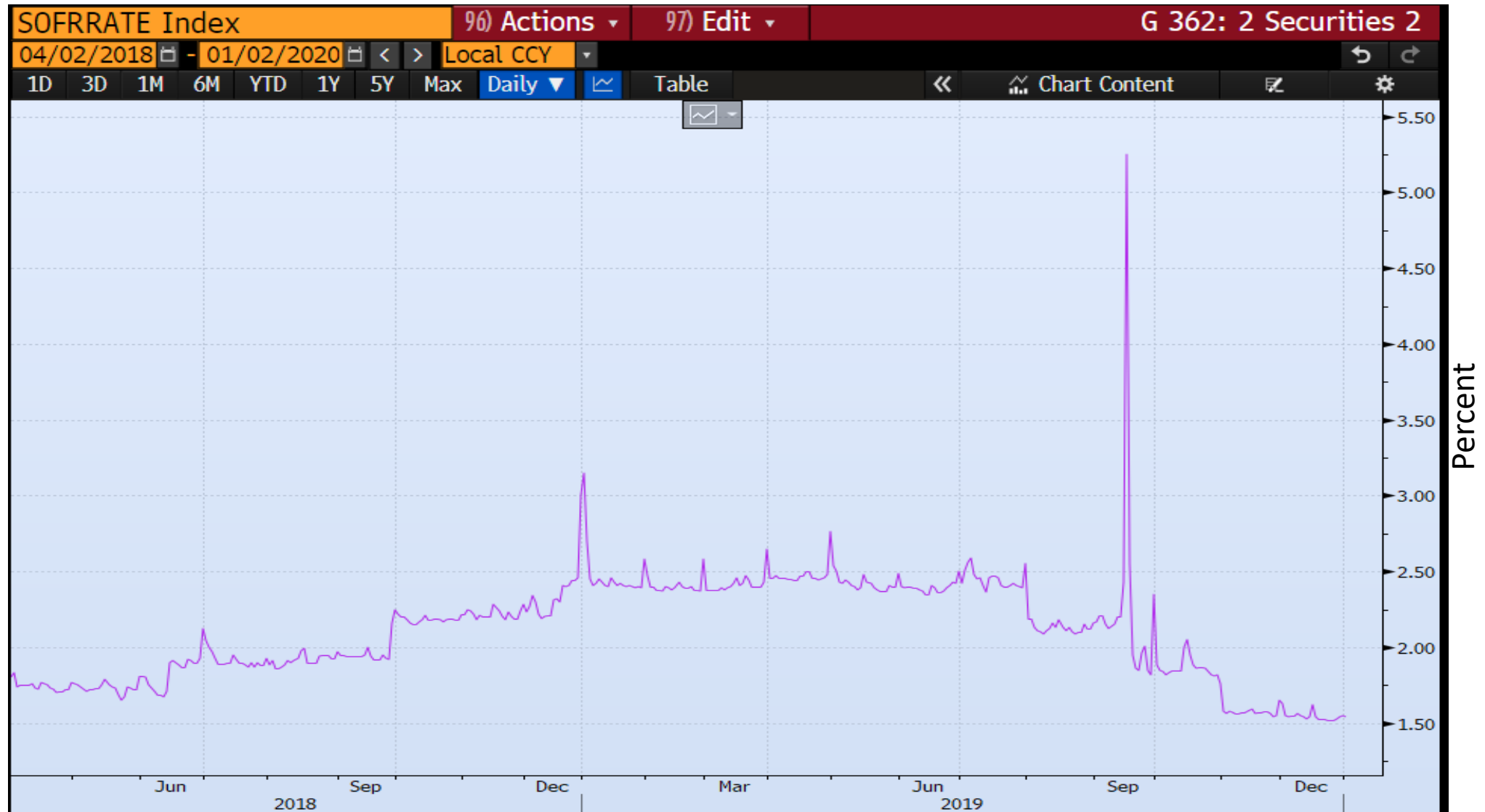


# Floating Rate Indexes



Source: Bloomberg

# SOFR Shenanigans: September Jump



Source: Bloomberg

# Floater Features: Spread

FFCB Float 06/10/20 Cor		Settings ▾	Actions ▾	Page 1/12	Security Description: Bond	
		94) Notes	95) Buy	96) Sell		
25) Bond Description		26) Issuer Description				
Pages	Issuer Information			Identifiers		
11) Bond Info	Name FEDERAL FARM CREDIT BANK			ID Number	AZ0159857	
12) Addtl Info	Industry Government Sponsored (BCLASS)			CUSIP	3133EKQB5	
13) Reg/Tax	Security Information			ISIN	US3133EKQB52	
14) Covenants	Mkt Iss US Domestic			Bond Ratings		
15) Guarantors	Country	US	Currency	USD	Moody's	Aaa
16) Bond Ratings	Rank	Unsecured	Series	0	S&P	NA
17) Identifiers	Coupon	1.700130	Type	Floating	Composite	NR
18) Exchanges	Formula MONTHLY US LIBOR -1.5000			Issuance & Trading		
19) Inv Parties	Day Cnt	ACT/360	Iss Price	100.00000	Amt Issued/Outstanding	
20) Fees, Restrict	Maturity	06/10/2020				
21) Schedules	BULLET			USD		350,000.00 (M) /
22) Coupons	Iss Sprd			USD		350,000.00 (M)
Quick Links	Calc Type (21)FLOAT RATE NOTE			Min Piece/Increment		
32) ALLQ Pricing	Pricing Date			1,000.00 / 1,000.00		
33) QRD Qt Recap	Interest Accrual Date			Par Amount		1,000.00
34) TDH Trade Hist	1st Settle Date			Book Runner		DAIWA-sole
35) CACS Corp Action	1st Coupon Date			Reporting		TRACE
36) CF Prospectus						
37) CN Sec News						
38) HDS Holders						

Source: Bloomberg



# Floater Features: Monthly Reset

FFCB Float 06/10/20 Cor Settings Actions Page 12/12 Security Description: Bond

94 Notes 95 Buy 96 Sell

25) Bond Description 26) Issuer Description

Coupons

Coupon Information

Benchmark	US0001M	Benchmark Freq	Monthly
Fix Frequency	Monthly	Next Coupon Date	01/10/2020
Paying Agent		Prev Coupon Date	12/10/2019
Pay Calendars	US	Cap	Floor 0
Refix Calendars	EN	Margin	-1.5 Reset Days Prior 2
First Irreg Cpn	Normal	Current Coupon	1.70013 Lockout 4
Last Irreg Cpn	Normal	Cpn Conv	Mod-Unadj Cpn Freq Monthly

Table View Chart View

Past Coupon Resets		Margin History	
Accrual Start	Rate	Date	Margin
01/10/2020			
12/10/2019	1.70013		
11/10/2019	1.74300		
10/10/2019	1.92375		
09/10/2019	2.03400		
08/10/2019	2.18588		
07/10/2019	2.36438		



Source: Bloomberg

# Floater Features: Trading Convention

FFCB 0 06/10/20 Corp		Settings ▾	Yield and Spread Analysis	
99.979/100.032	3.749/-8.520	BVAL @ 1/ 3/	95 Buy	96 Sell
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing
5) Description		6) Custom		
FFCB Float 06/10/20 ( 313BEKQB5 )		M/M Equiv to Next Fix		Floater Cpn History
Price	100.0320	Settle	01/06/20	Date
DM (bp)	-8.519877	to Wst		Rate
Workout	06/10/2020 @ 100.00	Trade	01/03/2020	
Neutral Price	100.029554			
Adjusted Price	100.030502			
Adjusted Simple Margin (bp)	-8.536			
Adjusted Total Margin (bp)	-8.589			
Spread For Life (bp)	-9.005			
Floater Information		Invoice		
Benchmark	US0001M Assumed Rt d	1.71425	Face	1,000 M
Quoted Margin	-1.50 Coupon	1.70013	Principal	1,000,320.00
Next Pay	01/10/2020 Coupon Freq	Monthly	Accrued (27 Days)	1,275.10
	Refix Freq	Monthly	Total (USD)	1,001,595.10
Index to	01/10/2020	1.562815 d		
Repo to	01/10/2020	1.56282		

“WAM Real Estate”

Source: Bloomberg

# Callable Characteristics

## Two Types of Options

### Calls and Puts

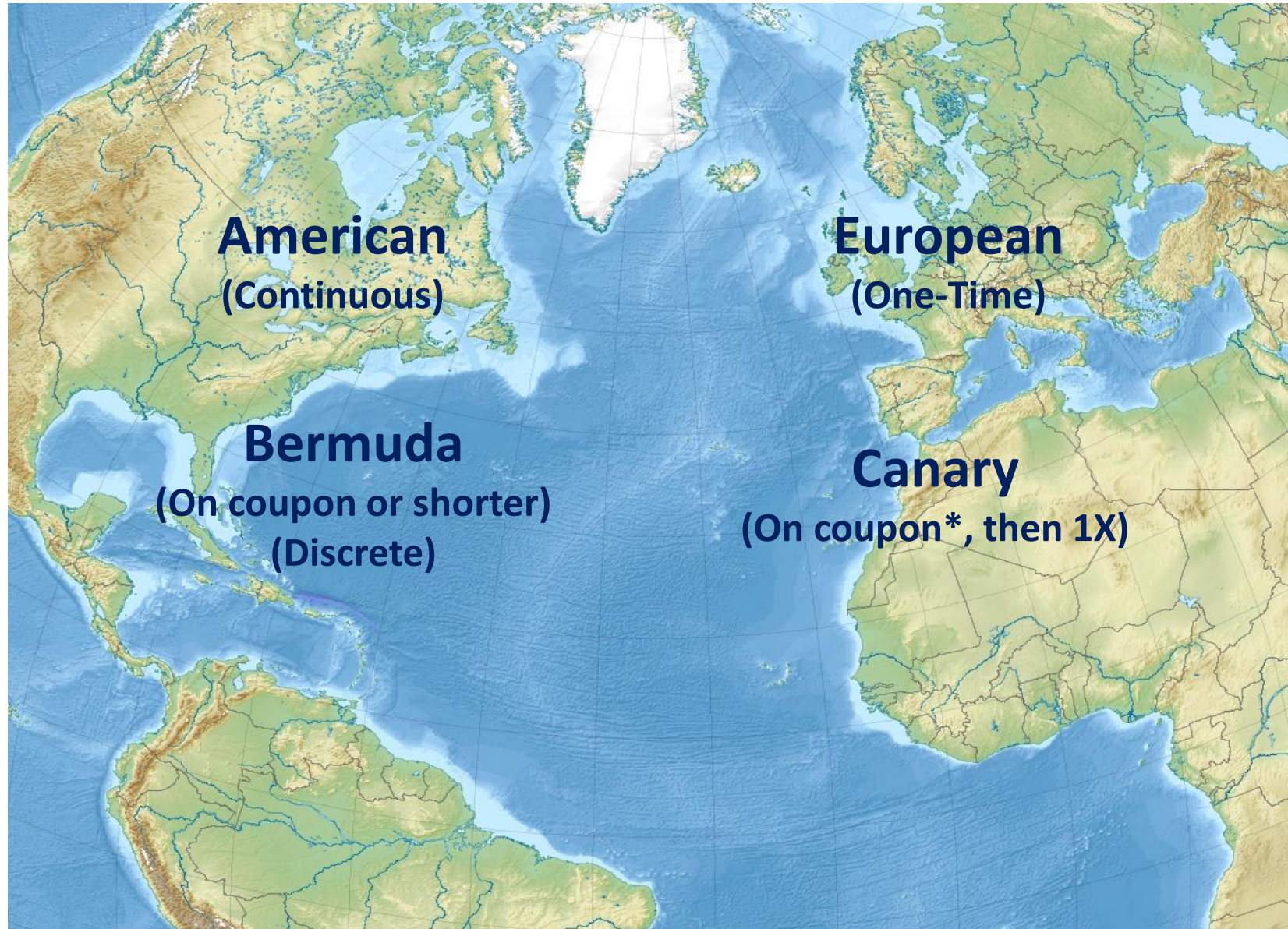
**When you purchase a callable bond, you are selling a call option to the issuer**

**What is the issuer's right?**

**What is your obligation?**

**How are you getting paid when you sell that option?**

# Callable Characteristics: Types



# Callable Characteristics: Number of Calls

## 5 Year Securities: Callables' Lockouts 1 Year

Instrument	Number of Calls	Yield
Treasury	0	1.60%
Bullet	0	1.66%
One-Time Call	1	1.76%
Discrete Call (quarterly)	15	1.95%
Continuous Call*	1,450	2.00%

\*10 Day Call Notice

## Are You Getting Paid Enough For the Options You're Selling?

Source: Bloomberg, FHN Capital Markets (callables: using avg spreads, 3 weeks settlement, standard fees)

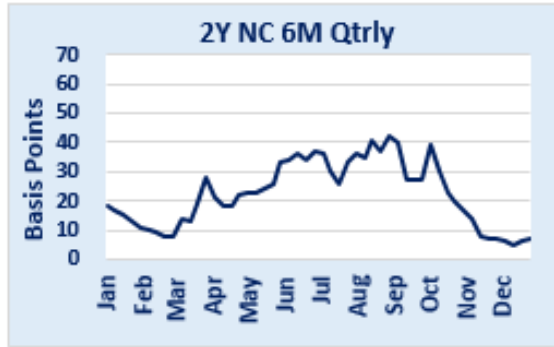
# Callable Characteristics: Yield/Coupon

## Primary Items Affecting Yield/Coupon

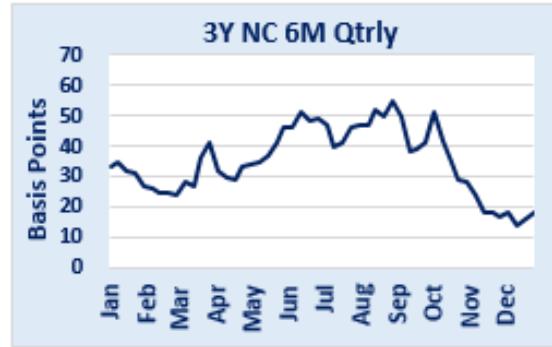
- Number of Calls
- Volatility
- Level of Rates
- Days to Settlement
- Auction/Reverse Inquiry
- Fees



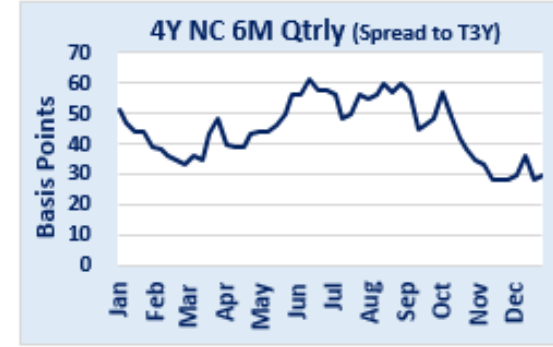
# Callable Characteristics: Spreads to Treasuries



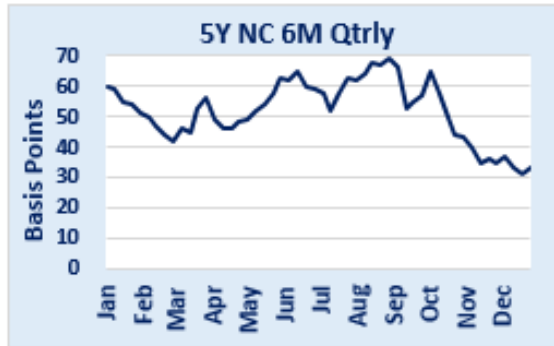
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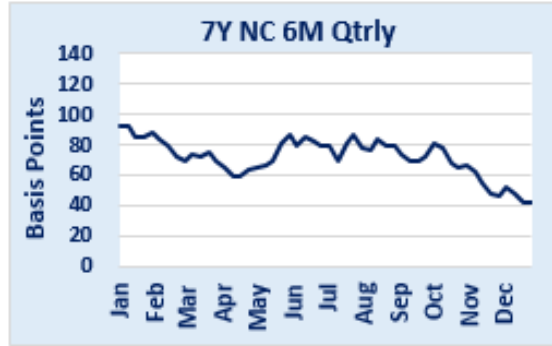
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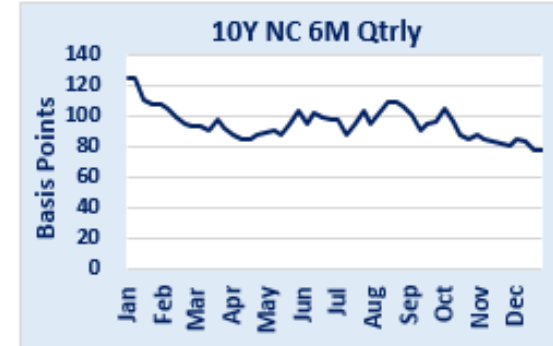
30



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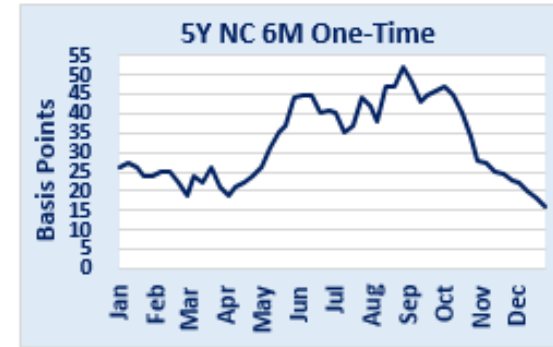
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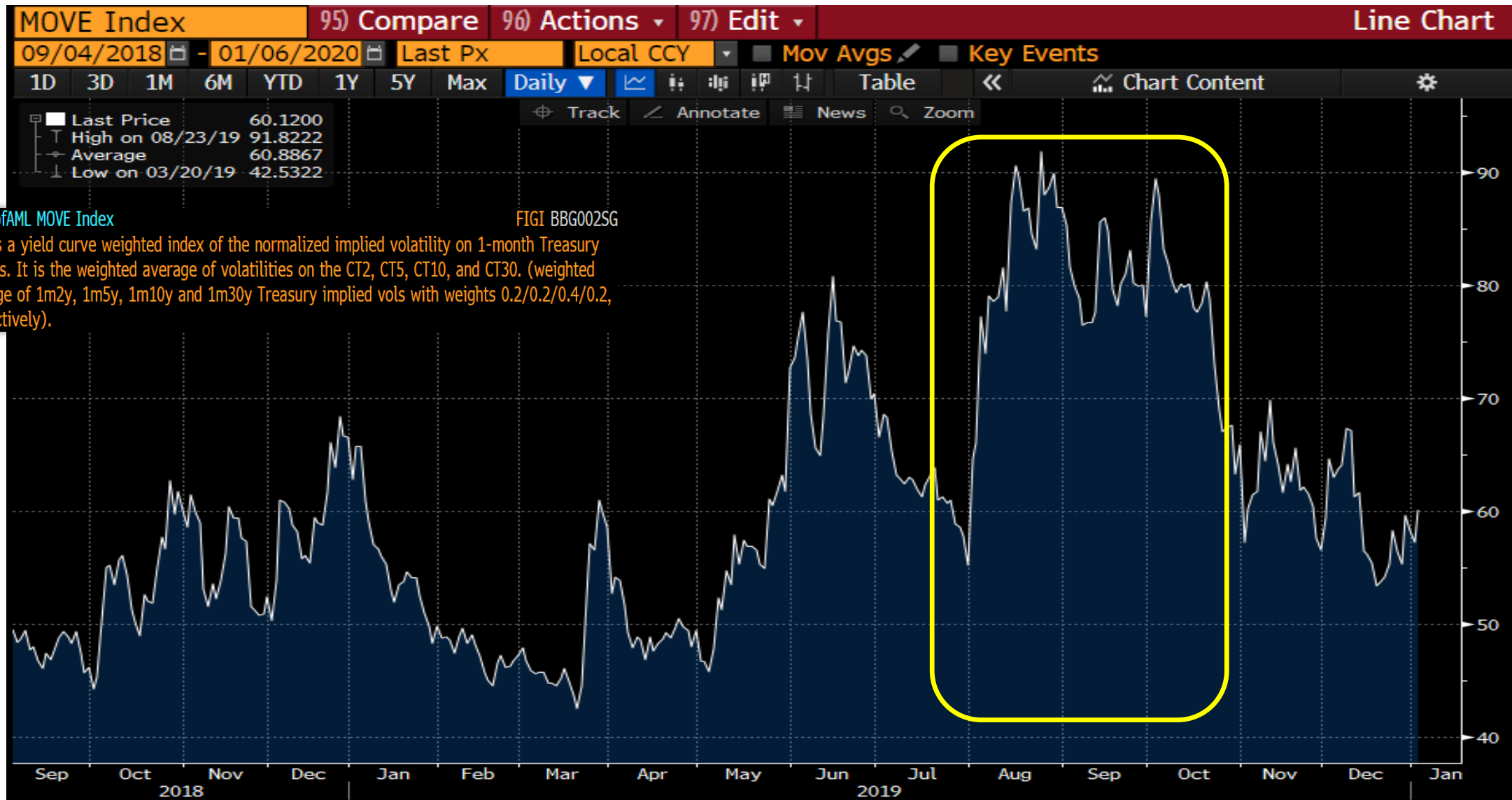
9



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Source: Bloomberg, FHN Capital Markets (callables: using avg spreads, 3 weeks settlement, standard fees)

# Callable Characteristics: Bond Volatility



## ICE BofAML MOVE Index

This is a yield curve weighted index of the normalized implied volatility on 1-month Treasury options. It is the weighted average of volatilities on the CT2, CT5, CT10, and CT30. (weighted average of 1m2y, 1m5y, 1m10y and 1m30y Treasury implied vols with weights 0.2/0.2/0.4/0.2, respectively).

FIGI BBG002SG

Source: Bloomberg



# Callable Characteristics: Option Adjusted Spread

**OPTION-ADJUSTED SPREAD ANALYSIS**  
 FREDDIE MAC FHLMC 1.9 01/24 99.946/100.002 (1.914/1.892) BVAL

Calculate **Price** **OAS (bp)** **Volatility**  
 (P,O,V)  P) 100 0) -26.91 V) 35.39

Cusip / ID# 3134GUS35 Option Px Value: -2.34  
 Settle 1/ 8/2020 Bench settle 1/ 6/2020 Vega: 0.00  
 Spread 37.6bp vs 1Y B 0 12/31/20 Govt @1.4825 ( 1.524)

2) Customize  
 Curve I111 Semi  
 US On/Off The Run  
 Dated 1/ 4/2020  
 Settle 1/ 8/2020  
 N None  
 Shift +0(bps)  
 Yield Spread

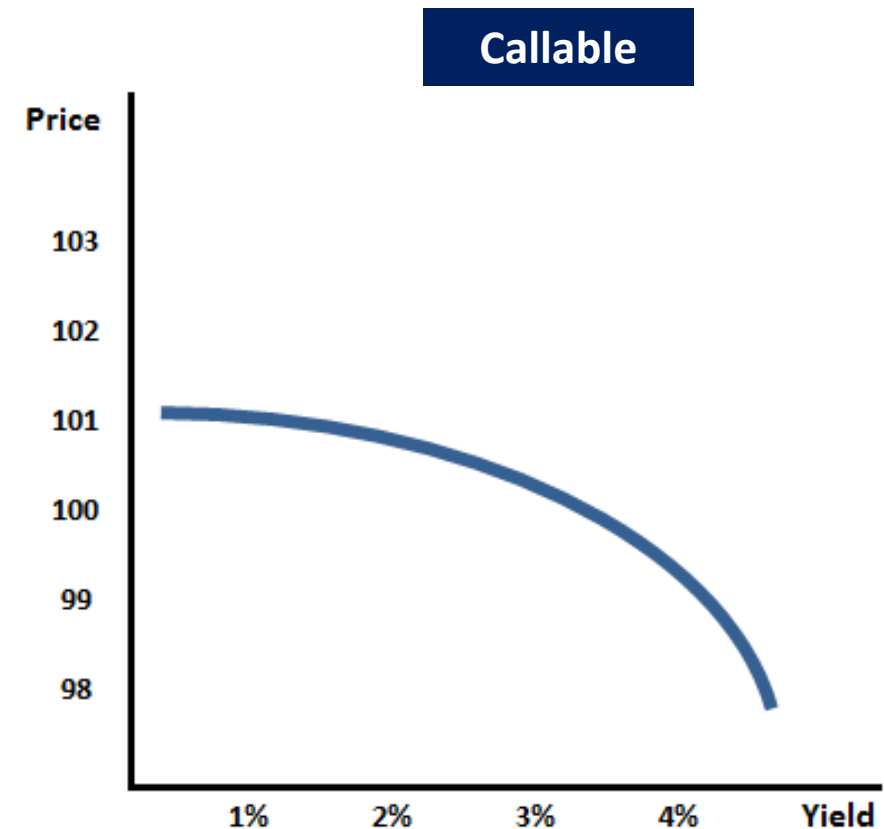
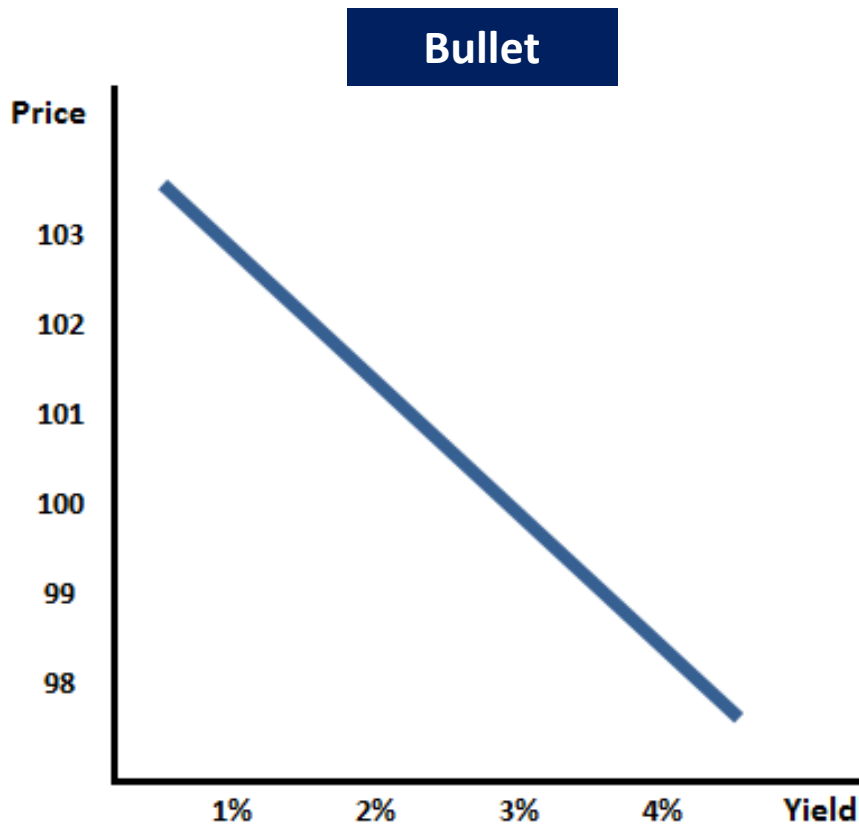
{NUM}<GO> for:	OAS Method	Option Free	To Call on 4/ 8/2020	To Mty
3) Call Schedule				
4/ 8/20 100.00	Yld	1.298	1.900	1.900
7/ 8/20 100.00	Sprd	-26.9	39.2	33.3
10/ 8/20 100.00	M Dur	1.20	0.49	3.83
1/ 8/21 100.00	Risk	1.20	0.49	3.83
4/ 8/21 100.00	Cnvx	-2.48	0.00	0.17
7/ 8/21 100.00				
10/ 8/21 100.00				
1/ 8/22 100.00	Model	<input type="checkbox"/> L=Lognormal		
4/ 8/22 100.00				
7/ 8/22 100.00	Exercise Premium	0.00		

3m	1.508
6m	1.529
1y	1.524
2y	1.525
3y	1.540
4y	1.567
5y	1.590
7y	1.705
10y	1.788
20y	2.103
30y	2.244

Source: Bloomberg

# Advanced Bond Math

**Bond Convexity** is a measure of the non-linear relationship of bond prices to changes in interest rates, the second derivative of the price of the bond with respect to interest rates (duration is the first derivative).



# Callable Characteristics: Rate Change Impact

5Yr Non-Call 3 Month

FHLB 2.35 10/19/22 Corp		Settings		Yield and Spread Analysis	
99.974/100.000	2.356/2.350	BVAL @ 10/ 6	95) Buy	96) Sell	
1) Yield & Spread		2) Yields		3) Graphs	
4) Pricing		5) Description		6) Custom	
7) Calls					
FHLB 2.35 10/19/22 ( 3130ACLL6 )				Risk	
Spread	128.780 bp vs 3mB 0 01/04/18	Workout	OAS		
Price	100.0000	1.0450 07:54:41	<input checked="" type="radio"/> M.Dur	<input type="radio"/> Dur	0.249 1.822
Yield	2.3500 Wst	1.0622 Conv	Risk 0.249 1.822		
Wkout	01/19/2018 @ 100.00 Consensus	4 4	Convexity 0.001 -3.706		
Settle	10/19/17	10/10/17	DV	01 on 1MM	24.85 182

## Same Bond...Interest Rates Up 50 Basis Points (Bullet'ish)

FHLB 2.35 10/19/22 ( 3130ACLL6 )		Risk	
Spread	178.780 bp vs 3mB 0 01/04/18	Workout	OAS
Price	97.6853	1.0450 10:04:25	<input checked="" type="radio"/> M.Dur <input type="radio"/> Dur
Yield	2.8500 Wst	1.0622 Conv	Risk 4.676 4.128
Wkout	10/19/2022 @ 100.00 Consensus	4 4	Convexity 4.568 4.032
Settle	10/19/17	10/10/17	DV 01 on 1MM 0.249 -0.970
			457 403

Source: Bloomberg



# Callable Characteristics: Convexity/Effective Dur.

5Yr Non-Call 3 Month

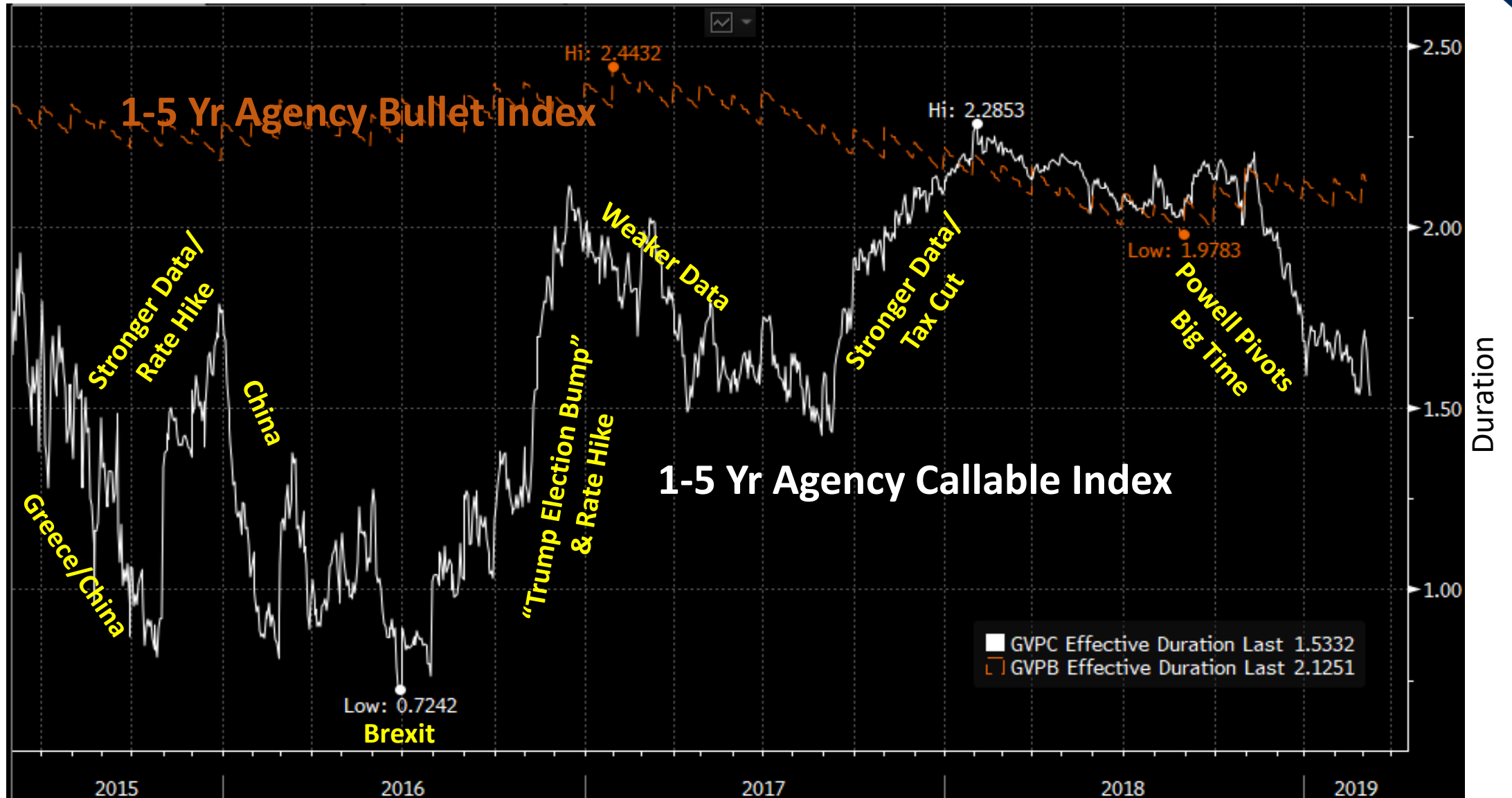
FHLB 2.35 10/19/22 Corp		Settings	Yield and Spread Analysis		
99.974/100.000	2.356/2.350	BVAL @ 10/ 6	95 Buy	96 Sell	
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing	5) Description
6) Custom		7) Calls			
FHLB 2.35 10/19/22 ( 3130ACLL6 )			Risk		
Spread	128.780 bp vs 3mB 0 01/04/18		Workout	OAS	
Price	100.0000	1.0450 07:54:41	<input checked="" type="radio"/> M.Dur	<input type="radio"/> Dur	0.249 1.822
Yield	2.3500 Wst	1.0622 Conv	<b>Risk</b>	0.249	1.822
Wkout	01/19/2018 @ 100.00 Consensus	4 4	<b>Convexity</b>	0.001	-3.706
Settle	10/19/17	10/10/17	DV	01 on 1MM	24.85 182

5Yr Non-Call 2Yr 1X

FHLB 2.06 10/25/22 ( 3130ACLK8 )		Risk			
Spread	10.390 bp vs 5yT 1 7/8 09/30/22		Workout	OAS	
Price	100.0000	99-19 <sup>3</sup> / <sub>4</sub> 07:56:45	<input checked="" type="radio"/> M.Dur	<input type="radio"/> Dur	1.950 3.698
Yield	2.0600 Wst	1.9561 S/A	<b>Risk</b>	1.950	3.698
Wkout	10/25/2019 @ 100.00 Consensus	4 4	<b>Convexity</b>	0.048	-0.877
Settle	10/25/17	10/10/17	DV	01 on 1MM	195 370

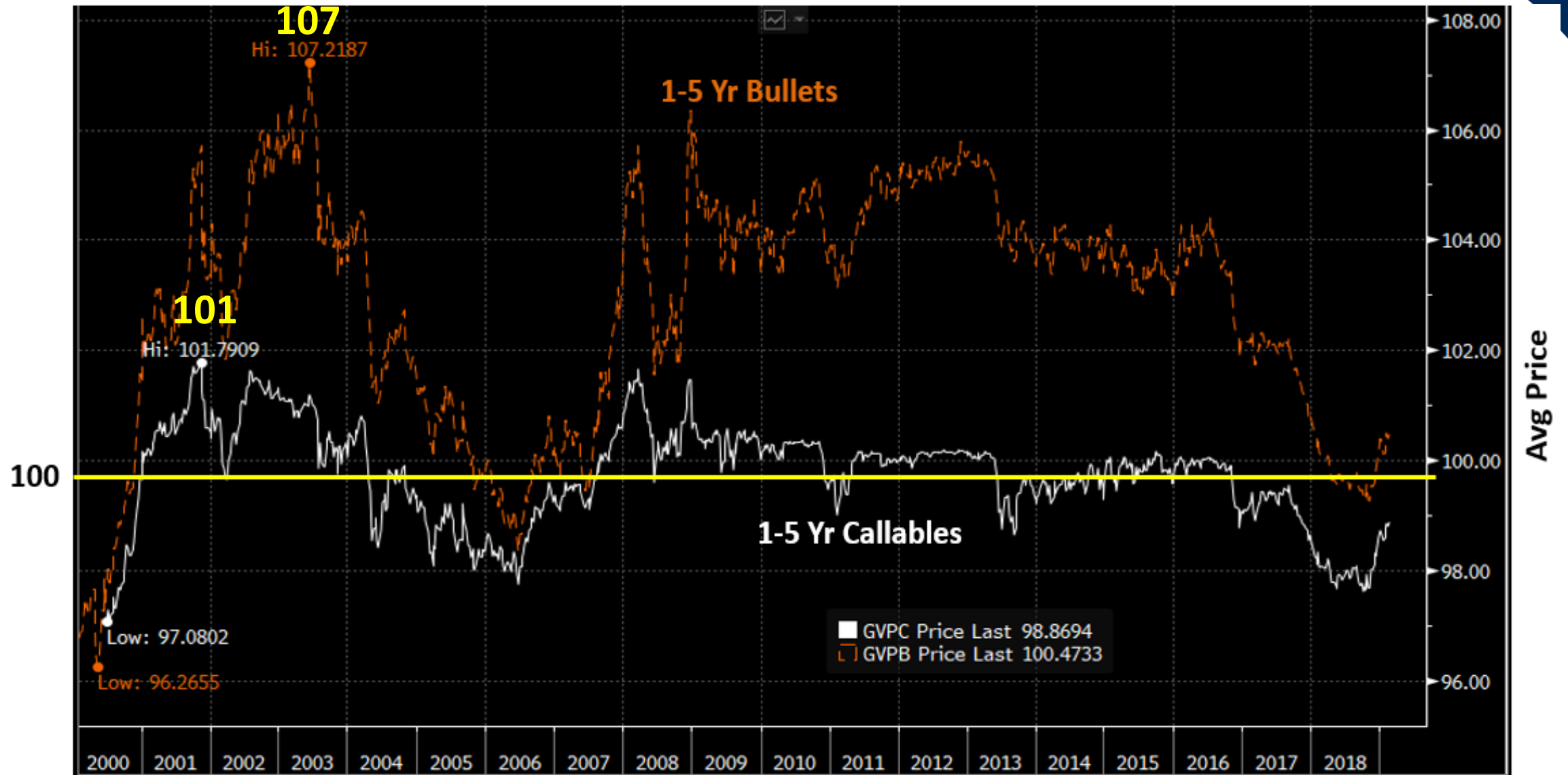
Source: Bloomberg

# The Callable Conundrum: Effective Duration



Source: Bloomberg

# The Callable Conundrum: Price Changes



Source: Bloomberg

# The Callable Conundrum: Total Return

## 1-5 Year Callables vs. 1-5 Year Bullets

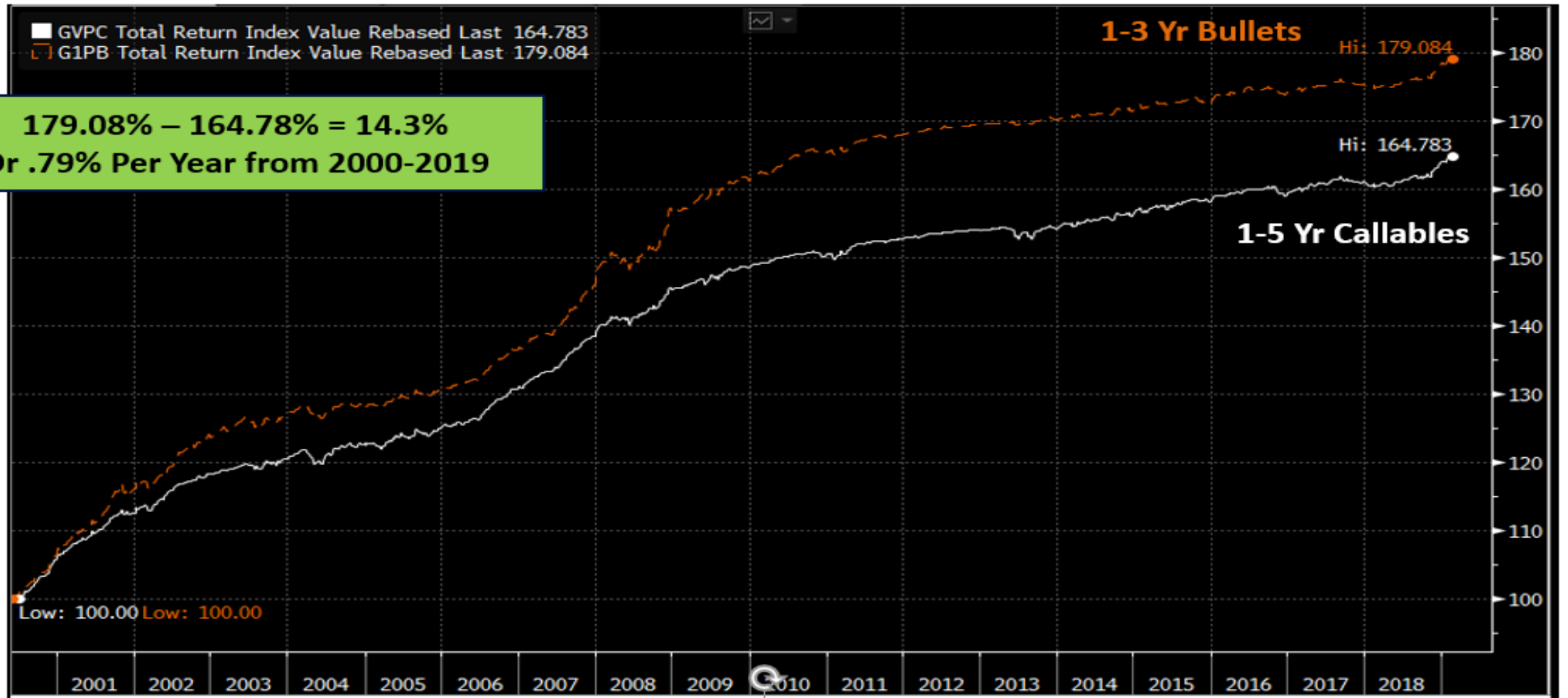


**Avg Effective Duration: Bullets 2.33 Callables 1.48**

Source: Bloomberg

# The Callable Conundrum: Total Return

## 1-5 Year Callables vs. 1-3 Year Bullets



179.08% – 164.78% = 14.3%  
Or .79% Per Year from 2000-2019

Avg Effective Duration: Bullets 1.78 Callables 1.48

Source: Bloomberg



# The Callable Conundrum: Awesome Timing!



Source: Bloomberg

# The Callable Conundrum: Awesome Timing!



Source: Bloomberg

# The Step-Up Standoff

FHLMC 1 3/4 12/30/24 Cor		Settings	Actions	Page 1/12	Security Description: Structured Note	
Data not provided by Bloomb...				94) Notes	95) Buy	96) Sell
25) Bond Description		26) Issuer Description				
Pages		Issuer Information			Identifiers	
11) Bond Info		Issuer FREDDIE MAC			ID Number ZP1476636	
12) Addtl Info		Industry Government Owned, No Guarantee (BC)			CUSIP 3134GUH37	
13) Reg/Tax		Security Information			ISIN US3134GUH371	
14) Covenants		Mkt Iss Domestic MTN			Bond Ratings	
15) Guarantors		Country US			Moody's Aaa	
16) Bond Ratings		Currency USD			Fitch AAA	
17) Identifiers		Rank Unsecured			Composite AAA	
18) Exchanges		Coupon 1.750000			Issuance & Trading	
19) Inv Parties		Type Step-Up...			Amt Issued/Outstanding	
20) Fees, Restrict		Cpn Freq S/A			USD 15,000.00 (M) /	
21) Schedules		Day Cnt 30/360 NON-...			USD 15,000.00 (M)	
22) Coupons		Maturity 12/30/2024			Min Piece/Increment	
Quick Links		CALL 03/30/20@100.00			1,000.00 / 1,000.00	
32) ALLQ Pricing		Iss Sprd			Par Amount 1,000.00	
33) QRD Qt Recap		Calc Type (1311) MULTI-STEP CPN BND			Book Runner MISCH-sole	
34) TDH Trade Hist		Pricing Date 12/18/2019			Reporting TRACE	
35) CACS Corp Action		Interest Accrual Date 12/30/2019				
36) CF Prospectus		1st Settle Date 12/30/2019				
37) CN Sec News		1st Coupon Date 06/30/2020				
38) HDS Holders						

Source: Bloomberg

# The Step-Up Standoff

FHLMC 1 <sup>3</sup>/<sub>4</sub> 12/30/24 Cor Settings Actions Page 12/12 Security Description: Structured Note

Data not provided by Bloomb... 94) Notes 95) Buy 96) Sell

25) Bond Description 26) Issuer Description

Pages

- 11) Bond Info
- 12) Addtl Info
- 13) Reg/Tax
- 14) Covenants
- 15) Guarantors
- 16) Bond Ratings
- 17) Identifiers
- 18) Exchanges
- 19) Inv Parties
- 20) Fees, Restrict
- 21) Schedules
- 22) Coupons**

Quick Links

- 32) ALLQ Pricing
- 33) QRD Qt Recap
- 34) TDH Trade Hist
- 35) CACS Corp Action
- 36) CF Prospectus

Coupons

Coupon Information

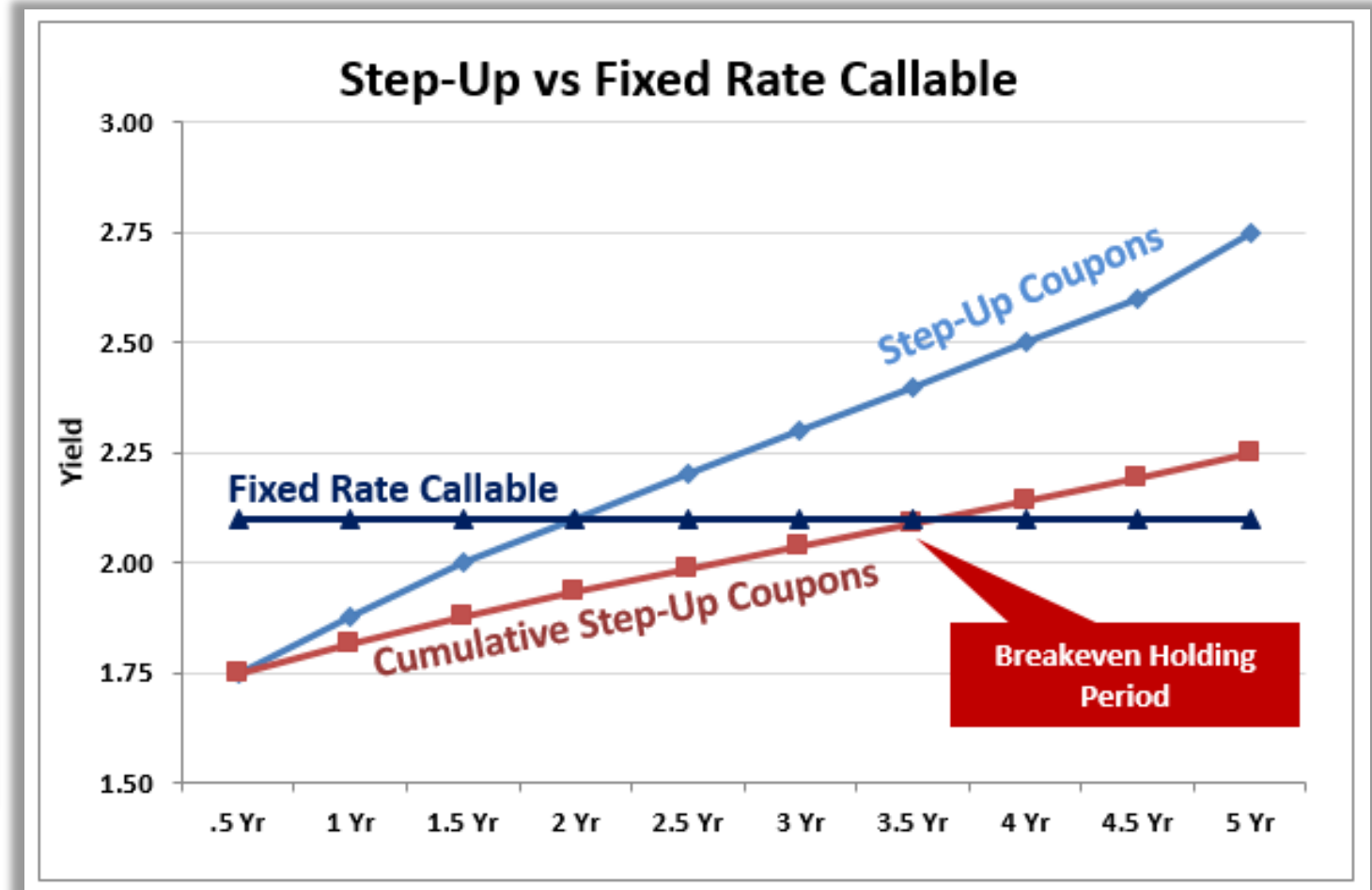
Issue Date	12/30/2019	First Coupon	Normal
1st Coupon Date	06/30/2020	Last Coupon	Normal
Observation Index	N/A	Paying Index	N/A

Coupon	End Date
1.750	06/30/2020
1.875	12/30/2020
2.000	06/30/2021
2.100	12/30/2021
2.200	06/30/2022
2.300	12/30/2022
2.400	06/30/2023
2.500	12/30/2023
2.600	06/30/2024
2.750	12/30/2024

Source: Bloomberg

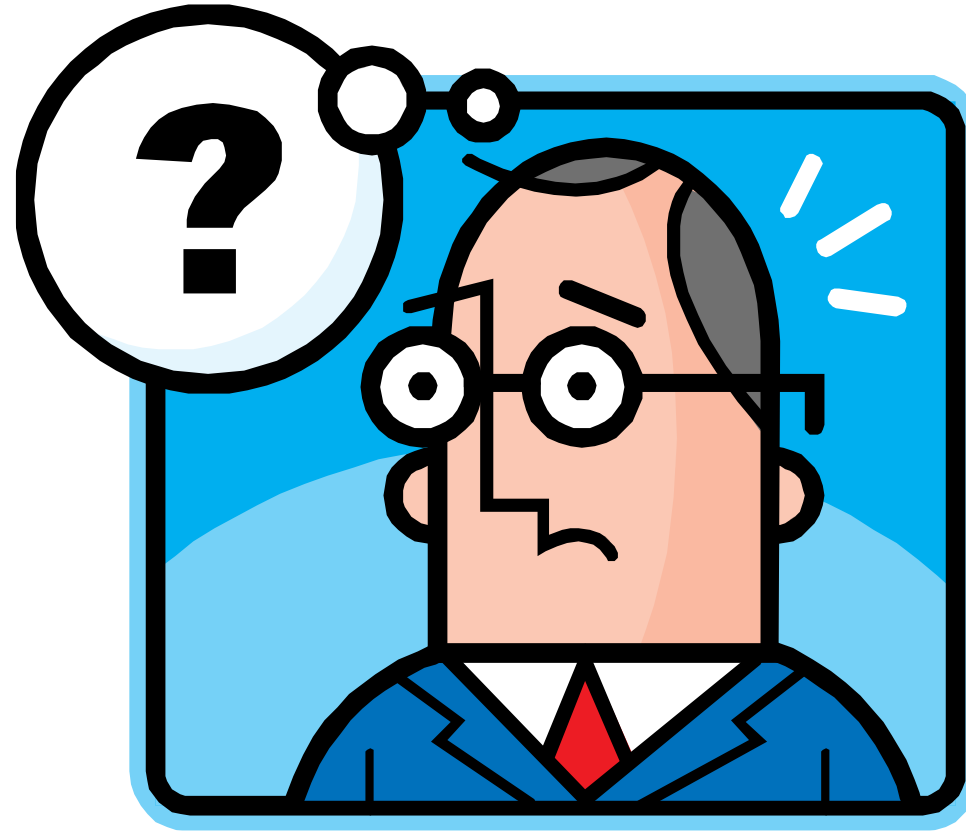
# The Step-Up Standoff

Step Up Analysis - 5yr Semi-Annual Steps				
Time	Step Cpns	Cumltv Cpn	Fixed Cpns	Var
.5 Yr	1.750	1.750	2.100	(0.350)
1 Yr	1.875	1.813	2.100	(0.288)
1.5 Yr	2.000	1.875	2.100	(0.225)
2 Yr	2.100	1.931	2.100	(0.169)
2.5 Yr	2.200	1.985	2.100	(0.115)
3 Yr	2.300	2.038	2.100	(0.063)
3.5 Yr	2.400	2.089	2.100	(0.011)
4 Yr	2.500	2.141	2.100	0.041
4.5 Yr	2.600	2.192	2.100	0.092
5 Yr	2.750	2.248	2.100	0.148



Source: Bloomberg

# Final Comments or Questions



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