

Bullets, Floaters, Callables, & Step-Ups

CDIAC-CMTA
Advanced Public Funds Investing
January 17, 2018

Rick Phillips
President and Chief Investment Officer

Fundamentals

- **You Can't Predict Future Interest Rates**
- **But Neither Can Anyone Else**
- **Brokers Usually Make More on Callables**

- **Portfolio Strategies:**
- **Cash Flow Matching vs. Indexing vs. Relative Value**

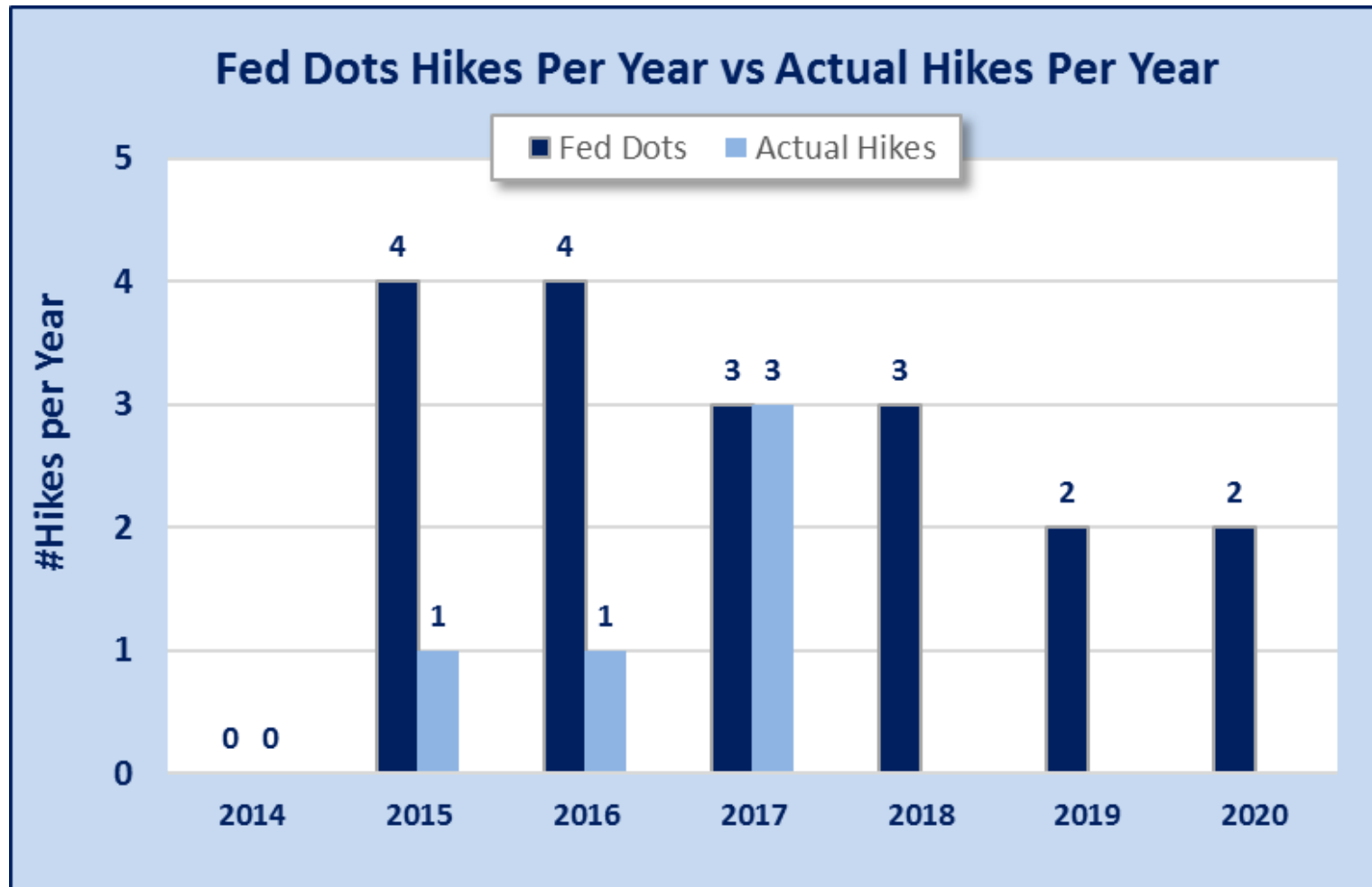
Forecasting—Market Timing



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

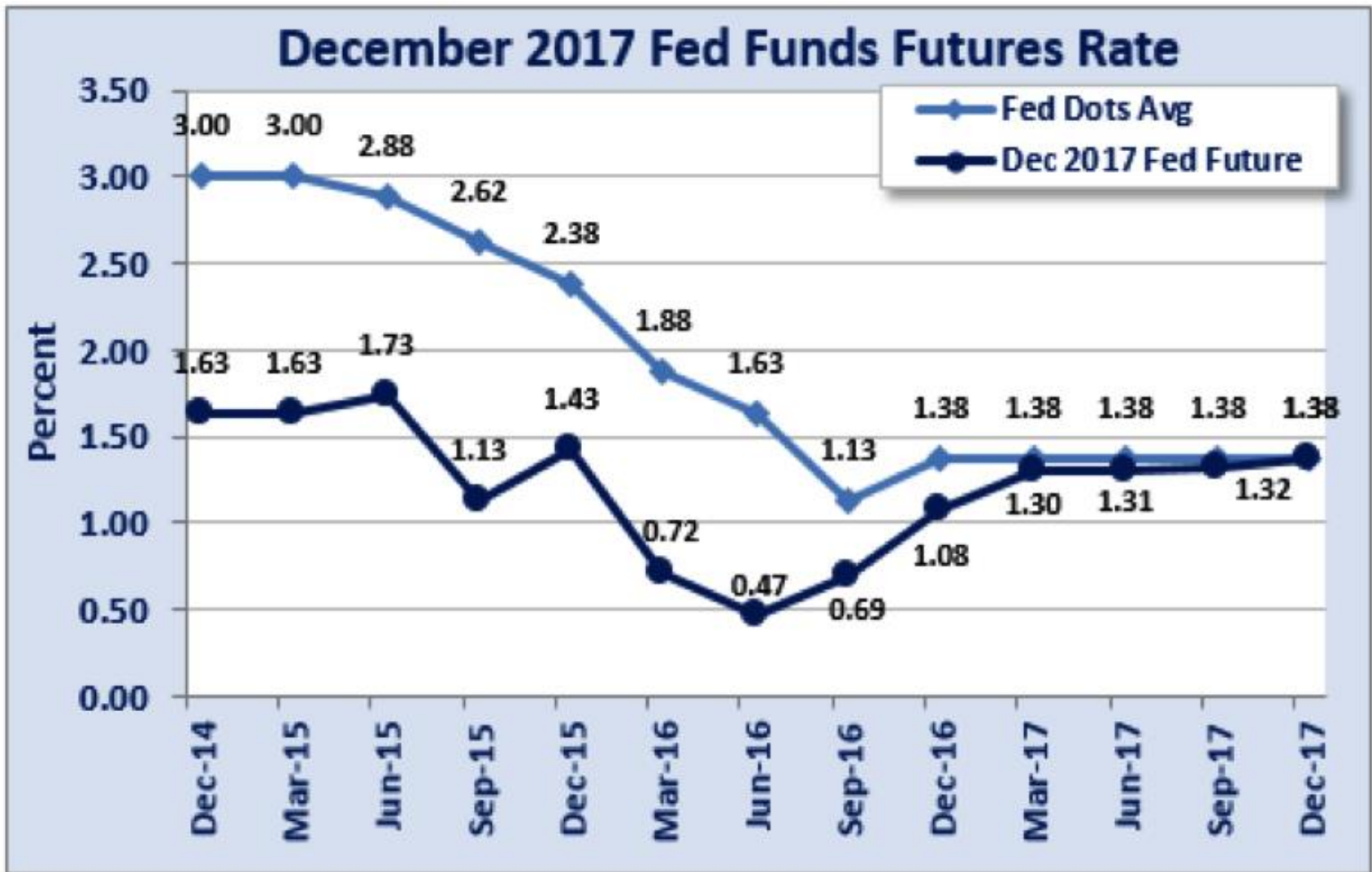
John Kenneth Galbraith, Economist

Market Timing...Not a Good Strategy



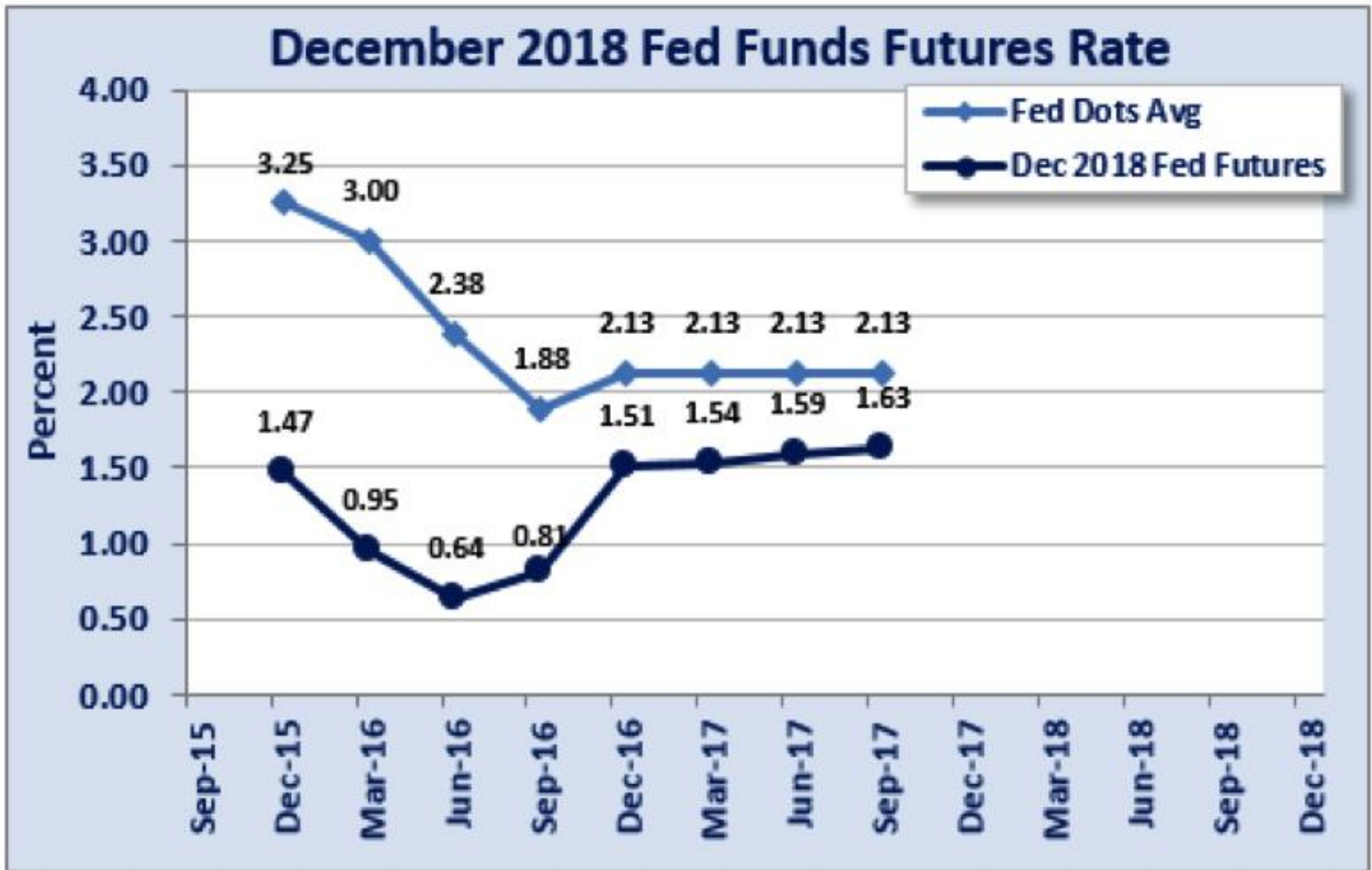
Source: Bloomberg

Market Timing...Not a Good Strategy



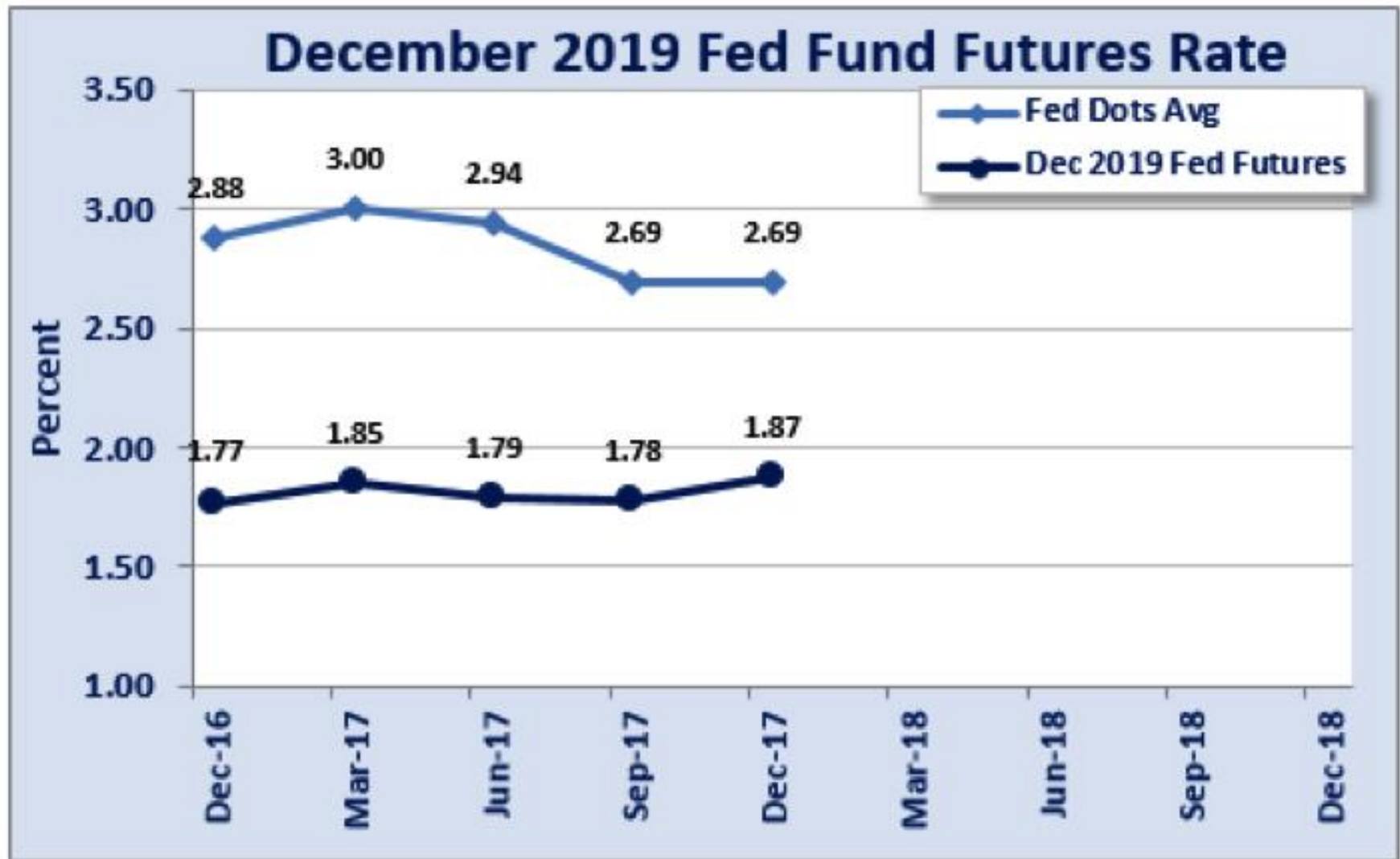
Source: Bloomberg

Market Timing...Not a Good Strategy



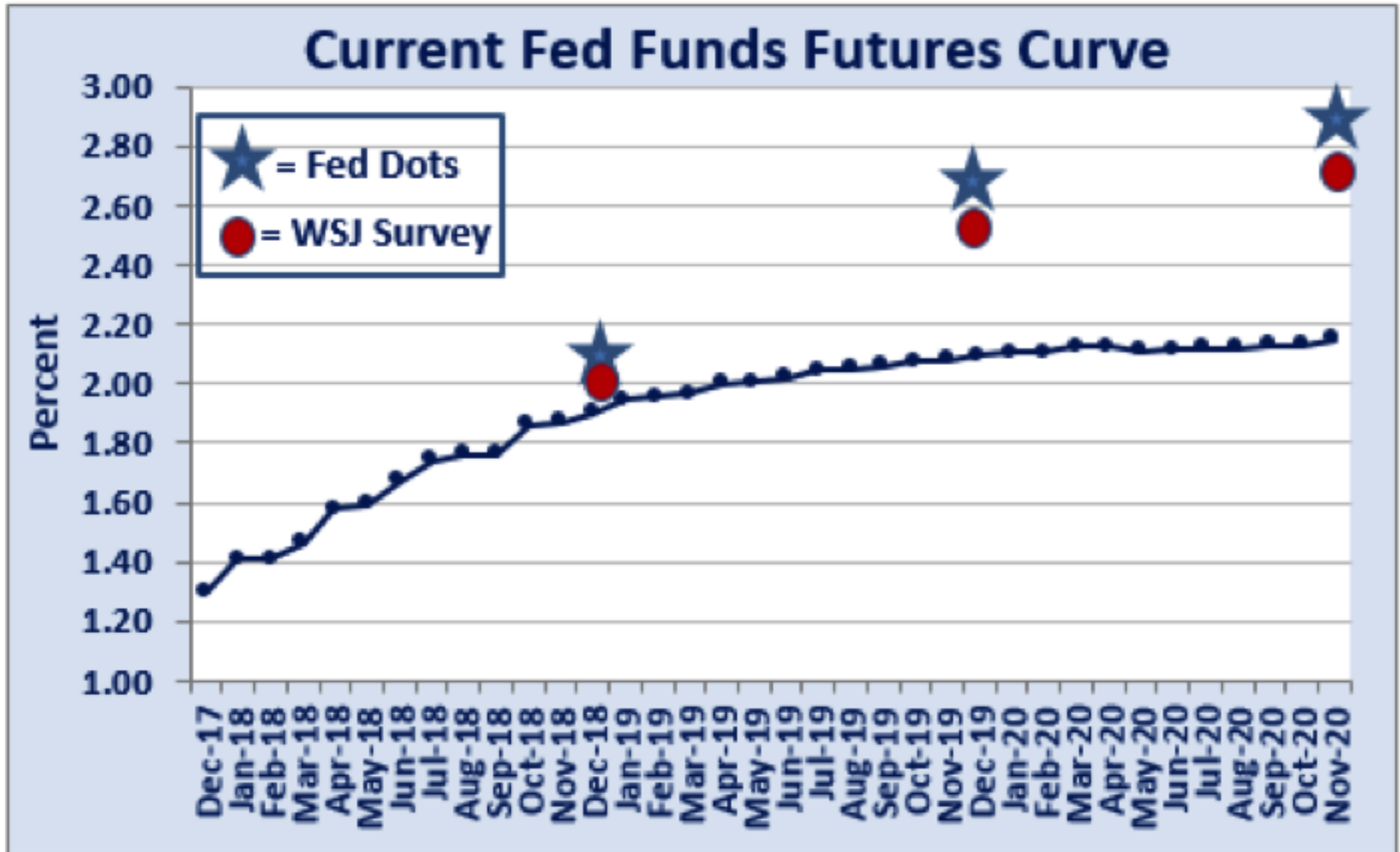
Source: Bloomberg

Market Timing...Not a Good Strategy



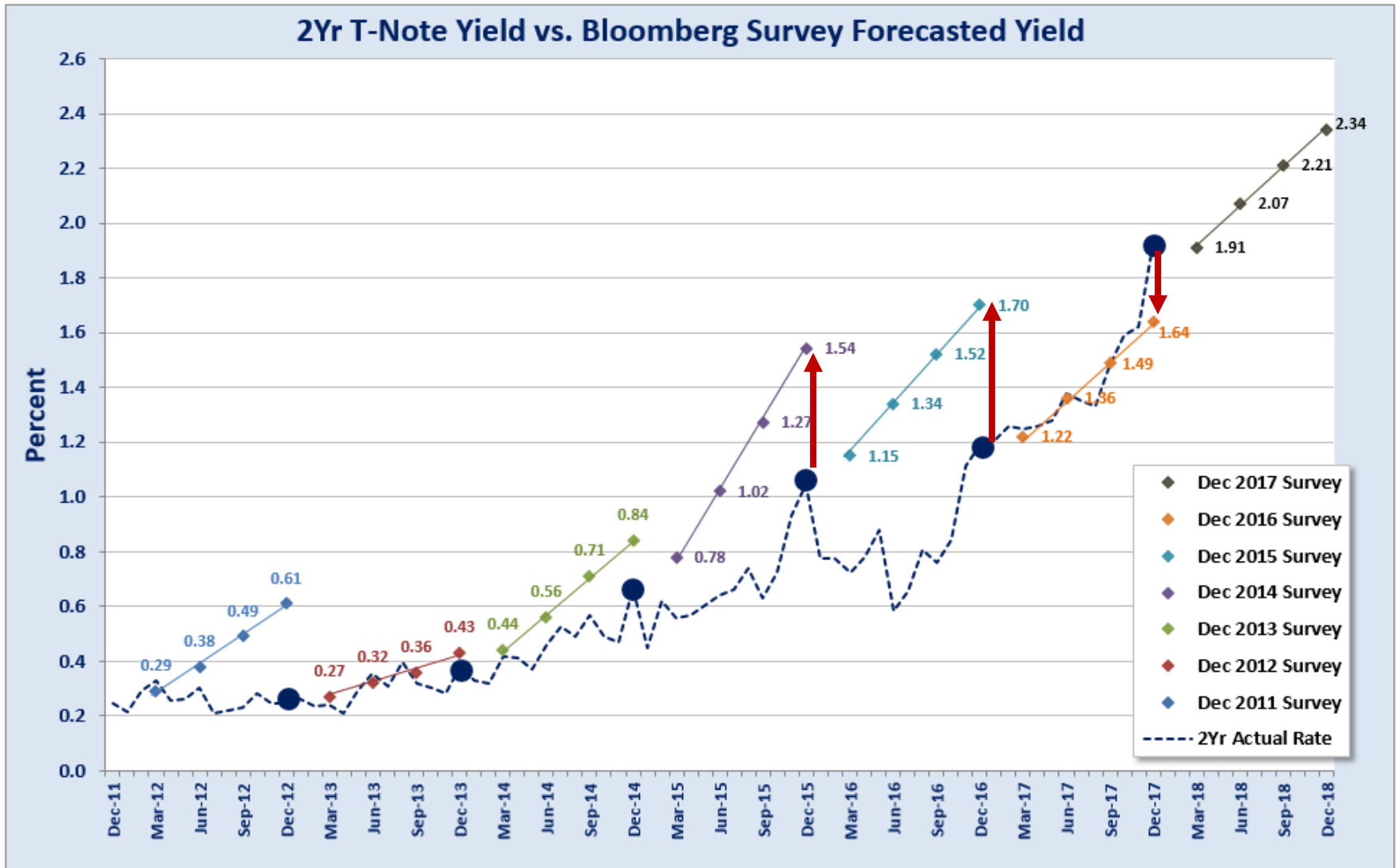
Source: Bloomberg

Market Timing...Not a Good Strategy



Source: Bloomberg

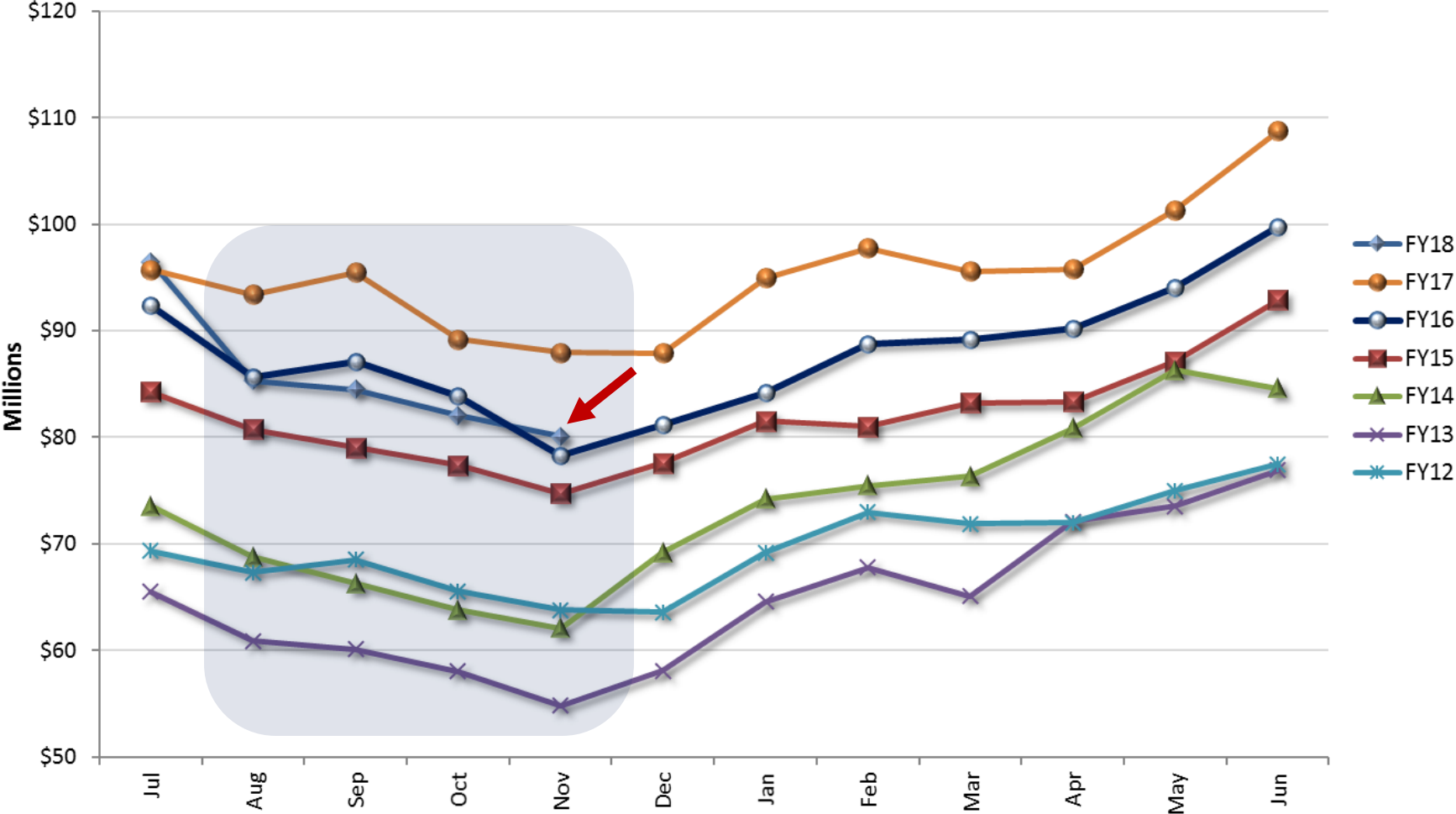
Market Timing...Not a Good Strategy



Source: Bloomberg

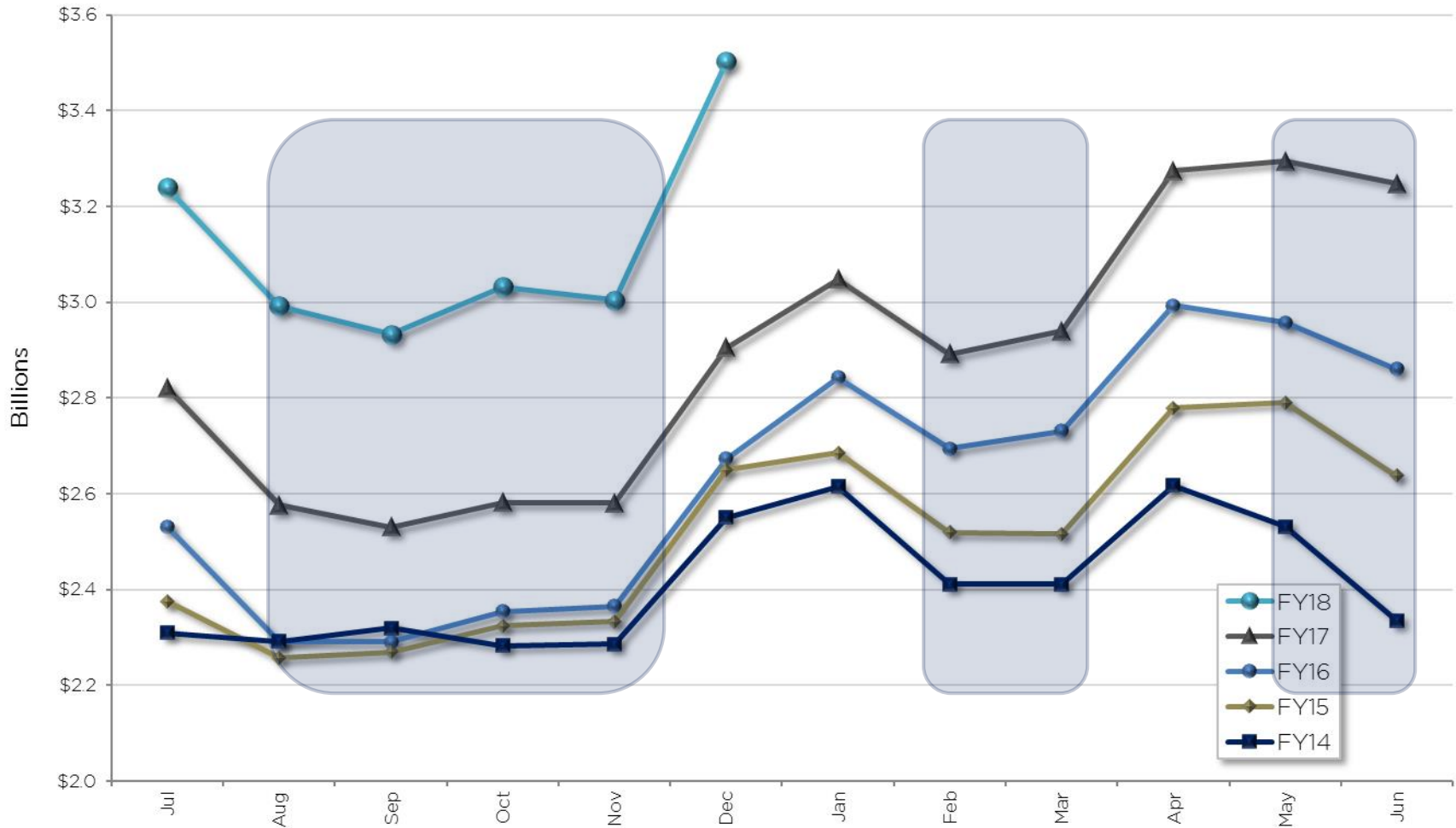
Portfolio Strategy: Cash Flow Matching

Month-End Portfolio Balance of a California City's Pool



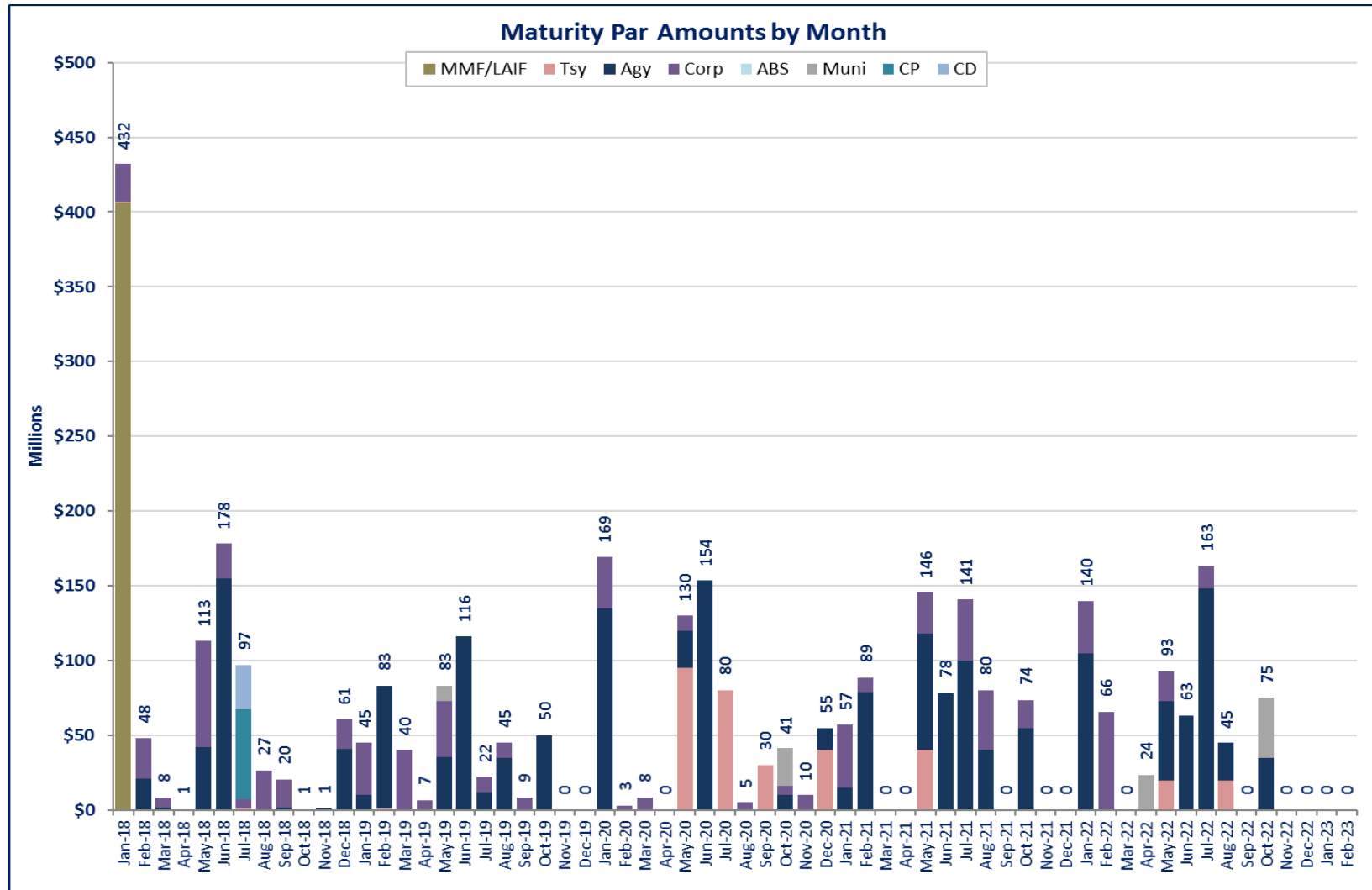
Cash Flow Patterns

Month-End Portfolio Balance of a California County's Pool



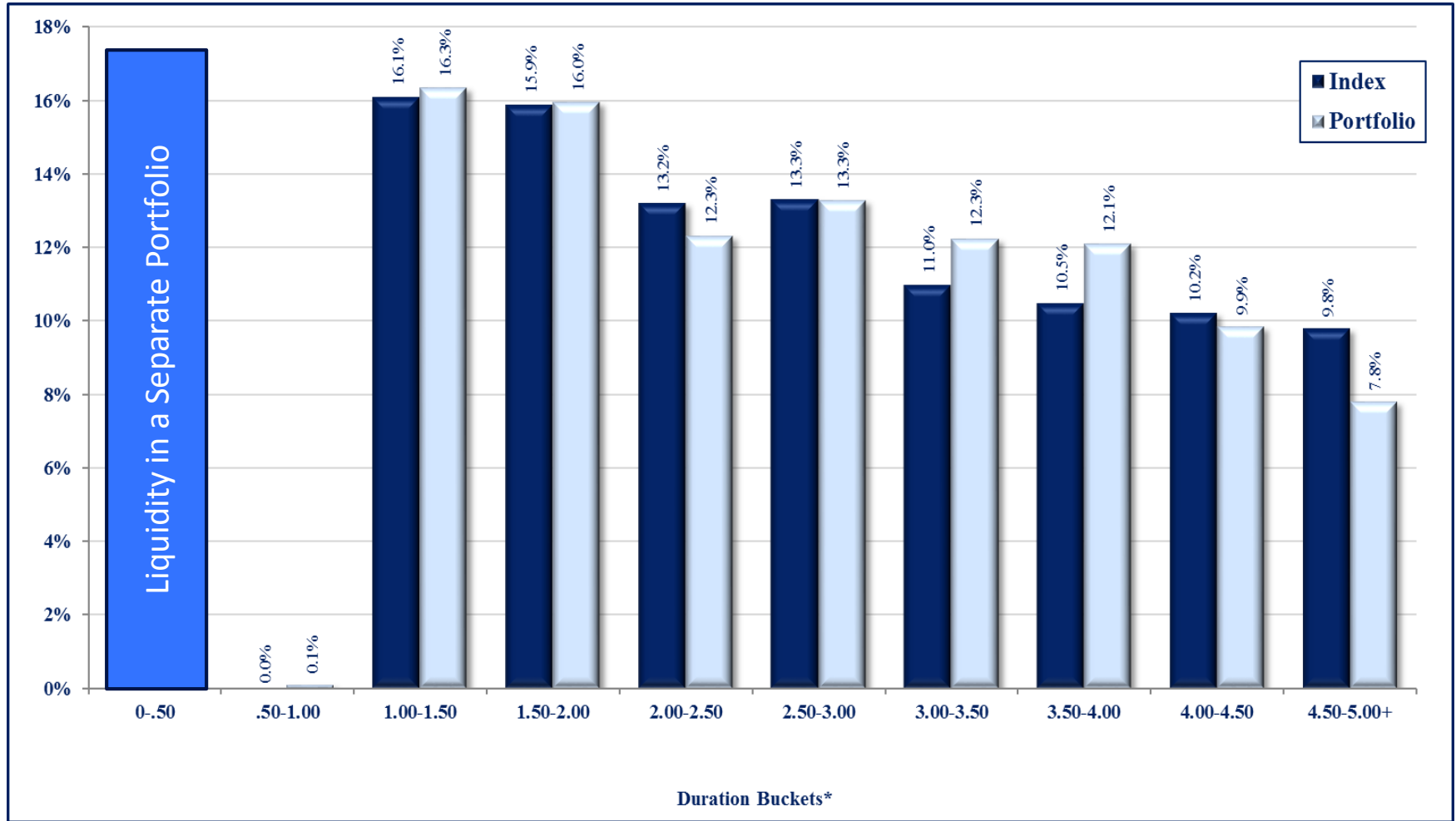
Cash Flow Matching

Maturity Schedule a California County's Pool

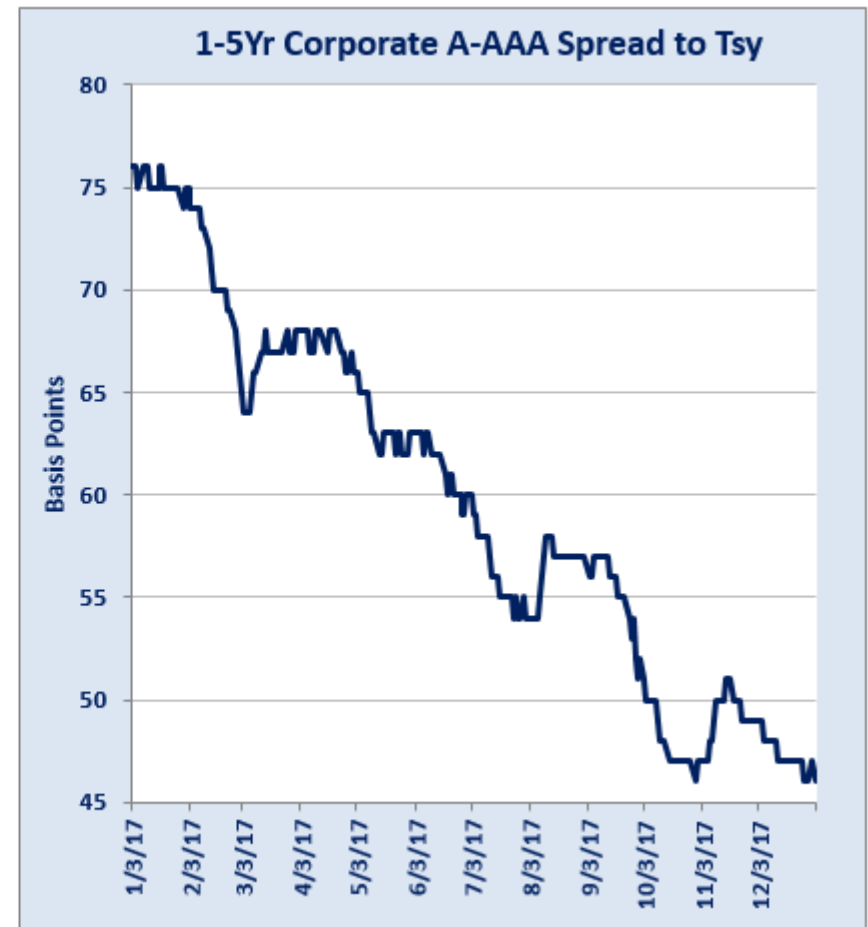
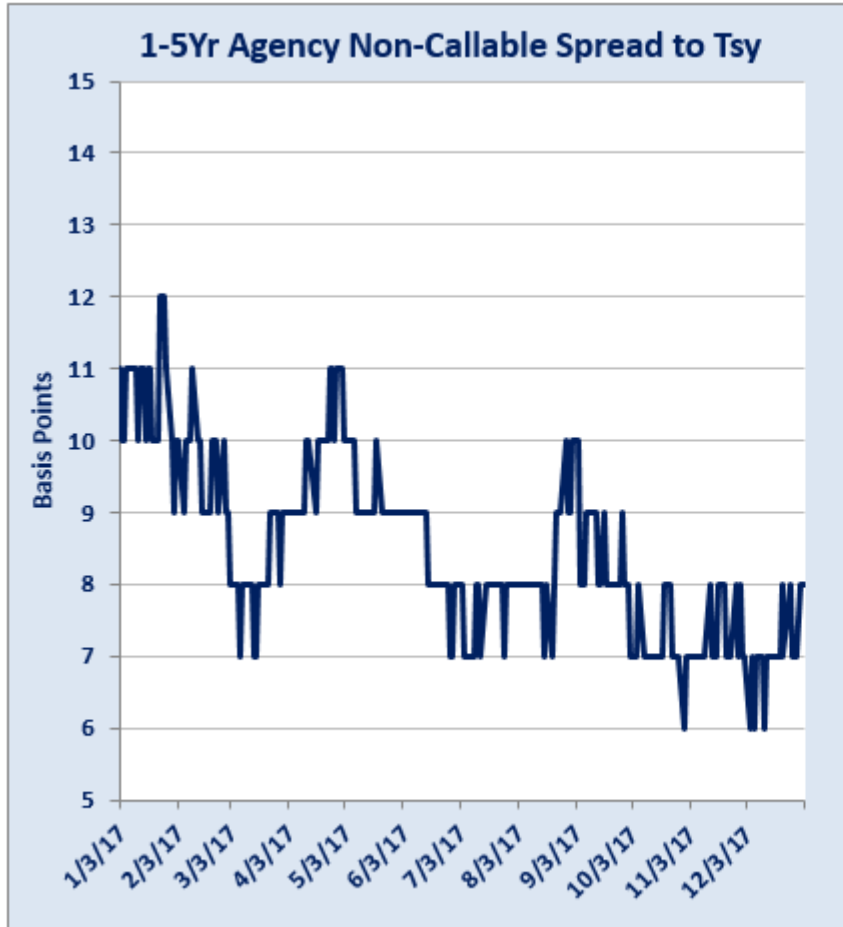


Portfolio Strategy: Index Matching (1-5Yr)

Maturity Schedule a California City's Pool



Portfolio Strategy: Relative Value or Timing “Bets”

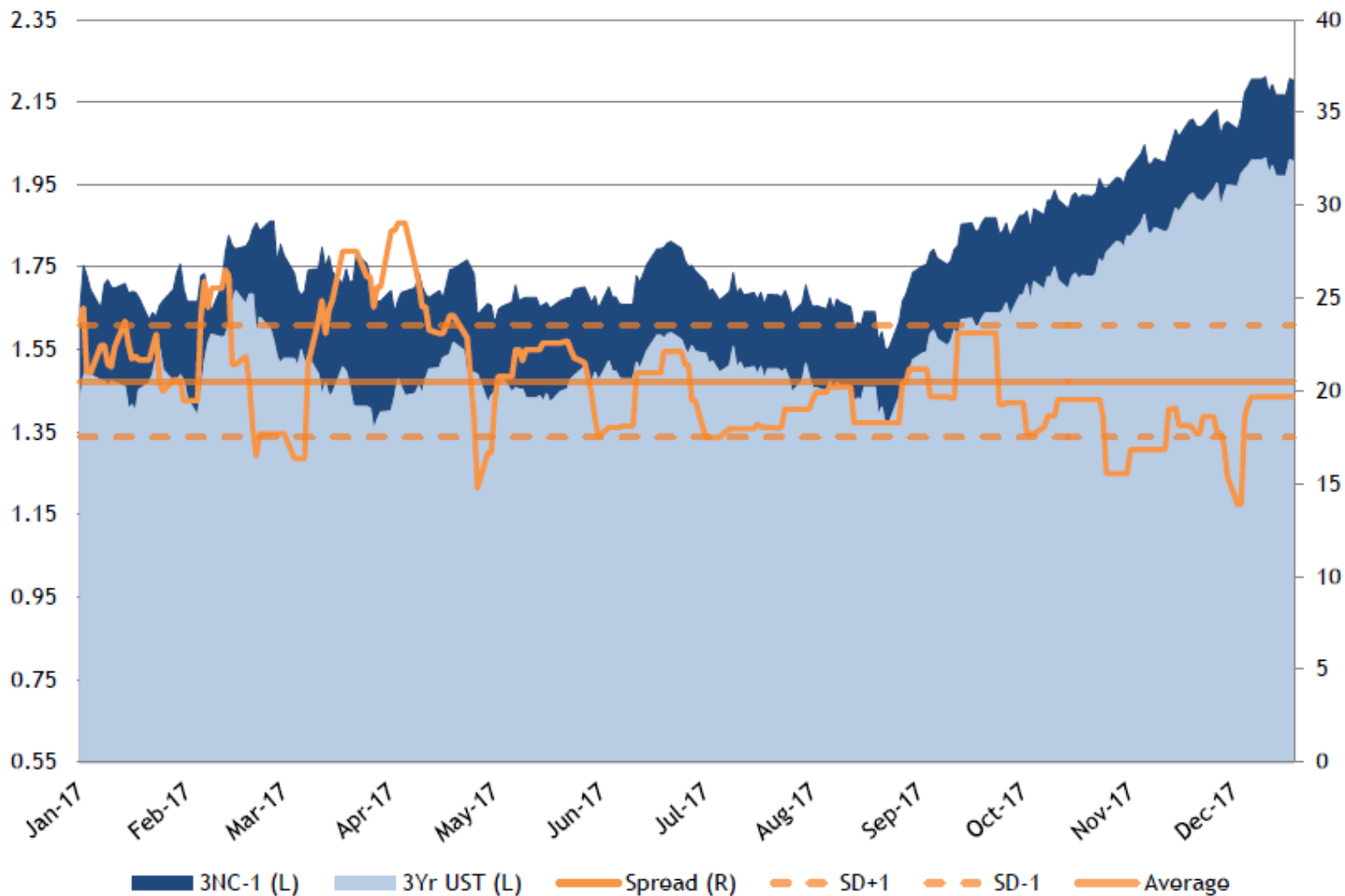


Would you sell corporates now?

Source: Bloomberg, ICE

Portfolio Strategy: Relative Value

3Yr/1Yr Callable Agency



Source: Suntrust



Bullets

FHDN 0 01/04/19 Govt		Settings ▾	Page 1/11 Security Description: Bond
		95) Buy	96) Sell
25) Bond Description		26) Issuer Description	
Pages	Issuer Information	Identifiers	
1) Bond Info	Name FHLB DISC CORP	ID Number 313384AD1	
2) Addtl Info	Industry US GOVT AGENCY	CUSIP 313384AD1	
3) Covenants	Security Information	FIGI BBG00J7STP39	
4) Guarantors	Issue Date 01/04/2018	Common 009317325	
5) Bond Ratings	Interest Accrues		
6) Identifiers	1st Coupon Date	Issuance & Trading	
7) Exchanges	Maturity Date 01/04/2019	Disc @ Issue	
8) Inv Parties	Floater Formula N.A.	Risk Factor .941	
9) Fees, Restrict	Workout Date	Amount Issued 100 (MM)	
10) Schedules	Coupon Security Type AGD	Amount Outstanding 100 (MM)	
11) Coupons	Cpn Frequency Type ZERO	Minimum Piece 100000	
Quick Links	Mty/Refund Type NORMAL Series	Minimum Increment 1000	
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			
36) HDS Holders			

Source: Bloomberg

Bullets

Buy/Sell	Sell	Cusip	313384AD1	Status	Accepted
Issue	FHDN 0 01/04/19	Broker	FTNF	Benchmark	
Audit Trail				Broker Name	FTN FINANCIAL
DlrFutBrkr	--				
Quantity	1,000,000	Disc Rate	0.9863	Principal	\$ 990,000.00
Price	99.0000	Yield	1.0076	Acc Int	0.00
Settle Date	01/04/2018	Spread		Net	990,000.00
B/Price	0.000000 (0-00)	B/Yield		B/Discount	



Source: Bloomberg

Bullets

FNMA 2 01/05/22 Corp		Settings ▾	Page 1/11	Security Description: Bond
		94) Notes	95) Buy	96) Sell
25) Bond Description		26) Issuer Description		
Pages	Issuer Information		Identifiers	
11) Bond Info	Name	FANNIE MAE	ID Number	AM0330390
12) Addtl Info	Industry	Government Agencies	CUSIP	3135G0S38
13) Covenants	Security Information		ISIN	US3135G0S387
14) Guarantors	Mkt Iss	US Domestic	Bond Ratings	
15) Bond Ratings	Country	US	Currency	USD
16) Identifiers	Rank	Unsecured	Series	
17) Exchanges	Coupon	2.000000	Type	Fixed
18) Inv Parties	Cpn Freq	S/A	Iss Price	99.82100
19) Fees, Restrict	Day Cnt	30/360	Maturity	01/05/2022
20) Schedules	BULLET			
21) Coupons	Iss Sprd	+14.00bp vs T 2 12/31/21		
Quick Links	Calc Type	(1)STREET CONVENTION	Issuance & Trading	
32) ALLQ Pricing	Pricing Date	01/05/2017	Amt Issued/Outstanding	
33) QRD Quote Recap	Interest Accrual Date	01/09/2017	USD	3,000,000.00 (M) /
34) TDH Trade Hist	1st Settle Date	01/09/2017	USD	3,000,000.00 (M)
35) CACS Corp Action	1st Coupon Date	07/05/2017	Min Piece/Increment	
36) CF Prospectus			2,000.00 / 1,000.00	
37) CN Sec News			Par Amount	1,000.00
38) HDS Holders			Book Runner	CITI,GS,NOM
39) VPRD Underly Info			Reporting	TRACE

Source: Bloomberg

Bullets

FNMA 2 01/05/22 Corp		1) Export	97) Settings	Cash Flow Analysis	
BBID	AM0330390			95) Buy	96) Sell
2) Cash Flows		3) Present Values		4) Distressed Analysis	
Price	99.305000	Settlement	01/09/17	Issue	01/09/2017 Maturity 01/05/2022
Yield	2.147676 to Worst		01/05/22	@ 100.000000	Face Amt 1000 M

Payment Date	Interest	Principal	Total
07/05/2017	9,777.78	0.00	9,777.78
01/05/2018	10,000.00	0.00	10,000.00
07/05/2018	10,000.00	0.00	10,000.00
01/05/2019	10,000.00	0.00	10,000.00
07/05/2019	10,000.00	0.00	10,000.00
01/05/2020	10,000.00	0.00	10,000.00
07/05/2020	10,000.00	0.00	10,000.00
01/05/2021	10,000.00	0.00	10,000.00
07/05/2021	10,000.00	0.00	10,000.00
01/05/2022	10,000.00	1,000,000.00	1,010,000.00

Source: Bloomberg

Bullets

FNMA 2 01/05/22 Corp		Settings	Yield and Spread Analysis	
			95) Buy	96) Sell
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing
5) Description		6) Custom		
FNMA 2 01/05/22 (3135G0S38)		Risk		
Price	99.8210	Duration	4.773	
Settle	01/09/17	Modified Duration	4.724	
Workout	01/05/2022 @ 100.00	Risk	4.716	
	Wst	Convexity	0.253	
Street Convention	2.0379	DV	01 on 1MM	472
US Government Equivalent	2.0379	YV	0.01	0.00212
True Yield	2.0379	Invoice		
Equiv 1 /Yr Compound	2.0483	Face	1,000 M	
Japanese Yield (Simple)	2.0390	Principal	998,210.00	
Mmkt (Act/ 360)		Accrued (0 Days)	0.00	
Current Yield	2.004	Total (USD)	998,210.00	

Source: Bloomberg

Bullets

95) Actions		96) Alerts		97) Export		98) Summary		99) Set Homepage		New Issue Monitor	
Selection		*NIM2-Agency (NIM2)				1) *Show Filters		2) Clear Filters		Issues	
● Real Time Monitoring		● Issue History		Date Range		12/03/17		-		01/03/18	
Date	Issuer	Coupon	Maturity	Spread	Curr	Outst	Book Mgr	Note			
		Fixed	All	All	US	All					
101) 12:47	FED HOME LN BANK	2.125	06/11/21		USD	47.1	MS-sole	INCREASE			
102) 11:53	FED HOME LN BANK	2.000	12/11/20		USD	136.05	DB,MS	3-NC INC			
103) 11:04	FED FARM CREDIT	1.950	01/10/20		USD	200	NOM-sole	2-NC			
104) 1/2	FARMER MAC	2.120	01/08/21		USD	12	INCAP-sole	3-NC			
105) 12/29	FED HOME LN BANK	2.750	12/13/24		USD	615.13	MS-sole	INCREASE			
106) 12/29	FED HOME LN BANK	2.500	12/09/22		USD	648.4	MS-sole	INCREASE			
107) 12/28	FED HOME LN BANK	2.750	12/10/27		USD	35.5	MS-sole	INCREASE			
108) 12/28	FED HOME LN BANK	1.750	01/02/19		USD	16.75	MS,WFS	1-NC			
109) 12/27	FED FARM CREDIT	2.370	02/05/24		USD	20	MS-sole	6-NC			
110) 12/27	FED FARM CREDIT	2.880	01/03/29		USD	10	MS-sole	11-NC			
111) 12/27	FED FARM CREDIT	2.980	01/03/30		USD	20	ML-sole	12-NC			
112) 12/27	FED HOME LN BANK	4.375	06/14/19		USD	75	BofAML-sole	INCREASE			
113) 12/27	FED FARM CREDIT	2.330	04/03/23		USD	30	JOINT LEADS	5.25-NC			
114) 12/27	FED FARM CREDIT	2.600	01/05/26		USD	30	FCS,WFS	8-NC			
115) 12/27	FED FARM CREDIT	2.240	07/05/22		USD	40	JOINT LEADS	4.5-NC			

Source: Bloomberg



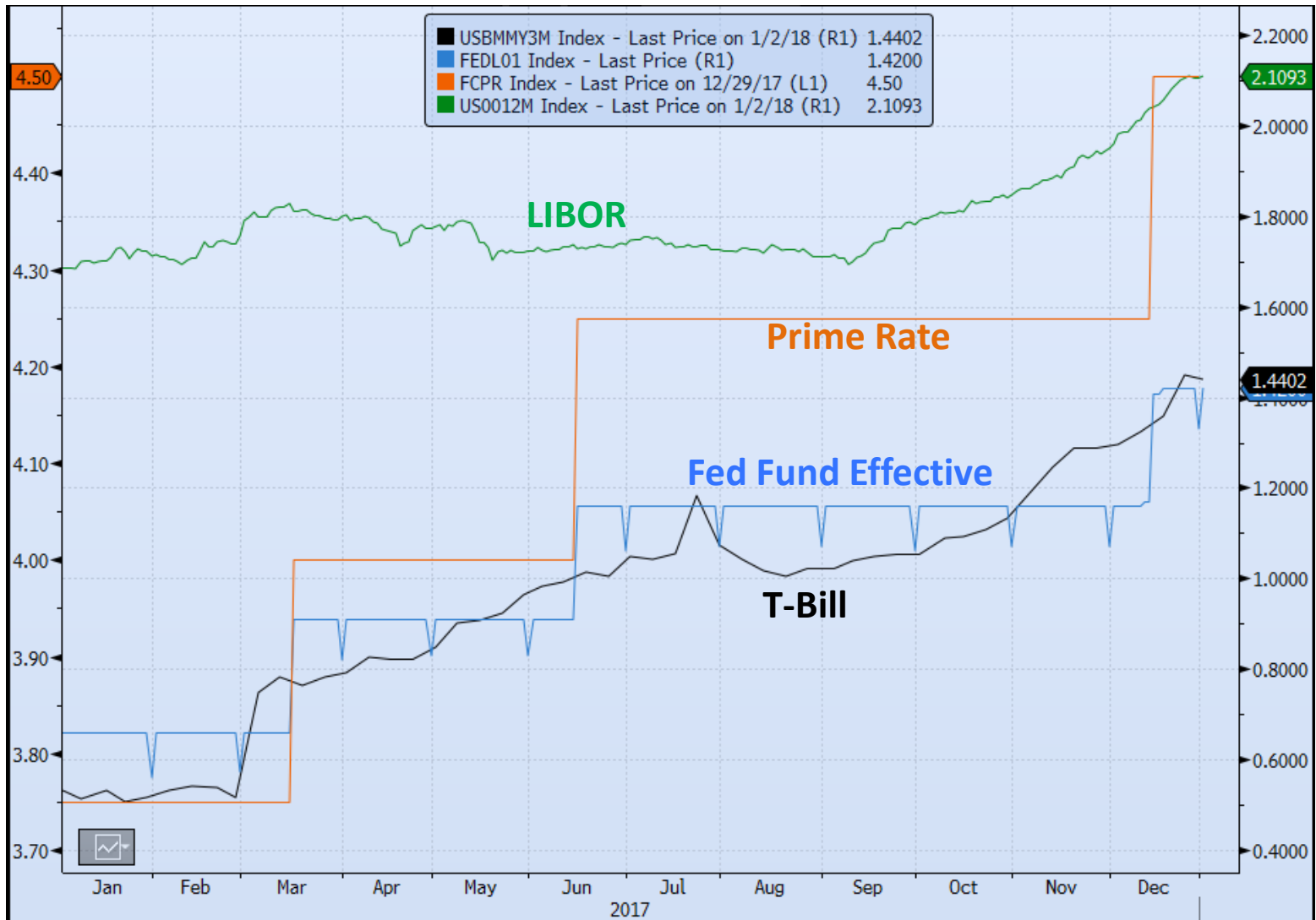
Floating Rate Notes

95) Actions		96) Alerts		97) Export		98) Summary		99) Set Homepage		New Issue Monitor	
Selection		*NIM2-Agency (NIM2)		1) *Show Filters		2) Clear Filters		Issues			
<input checked="" type="radio"/> Real Time Monitoring		<input type="radio"/> Issue History		Date Range		12/03/17		-		01/03/18	
Date	Issuer	Coupon	Maturity	Spread	Curr	Outst	Book Mgr	Note			
		Floati	All	All	US	All					
101) 11:55	FED FARM CREDIT	FRN	10/09/18		USD	200	DAIWA-sole	01/09/18			
102) 11:37	FED FARM CREDIT	FRN	01/09/19		USD	250	ML-sole	00 01/09/18			
103) 12/27	FED FARM CREDIT	FRN	11/04/19		USD	100	FCS,TDSEC	0 01/04/18			
104) 12/27	FED FARM CREDIT	FRN	01/03/20		USD	400	JOINT LEADS	01/03/18			
105) 12/27	FED FARM CREDIT	FRN	11/04/19		USD	100	FCS,TDSEC	01/04/18			
106) 12/26	FED FARM CREDIT	FRN	01/02/20		USD	400	DAIWA-sole	01/02/18			
107) 12/21	FED HOME LN BANK	FRN	04/26/18		USD	500	BNYM	12/26/17			
108) 12/20	FED FARM CREDIT	FRN	10/28/19		USD	125	JEFF	12/28/17			
109) 12/19	FED FARM CREDIT	FRN	12/26/19		USD	200	FCS	12/26/17			
110) 12/4	FED FARM CREDIT	FRN	11/12/20		USD	125	DAIWA-sole	12/12/17			

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

Source: Bloomberg

Floating Rate Notes



Source: Bloomberg

Floating Rate Notes

FHLB Float 01/05/18 Corp		Settings ▾	Page 1/11 Security Description: Bond	
		94) Notes	95) Buy	96) Sell
25) Bond Description		26) Issuer Description		
Pages	Issuer Information	Identifiers		
11) Bond Info	Name FEDERAL HOME LOAN BANK	ID Number	LW7077800	
12) Addtl Info	Industry Government Agencies	CUSIP	3130A8NP4	
13) Covenants	Security Information	ISIN	US3130A8NP47	
14) Guarantors	Mkt Iss US Domestic	Bond Ratings		
15) Bond Ratings	Country US	Currency	Moody's Aaa	
16) Identifiers	Rank Unsecured	Series	S&P AA+	
17) Exchanges	Coupon 1.313000	Type Floating	Composite AA+	
18) Inv Parties	Formula QUARTLY US LIBOR -3.0000			
19) Fees, Restrict	Day Cnt ACT/360	Iss Price	100.00000	
20) Schedules	Maturity 01/05/2018	Issuance & Trading		
21) Coupons	BULLET	18 Month Security		
Quick Links	Iss Sprd	Amt Issued/Outstanding		
32) ALLQ Pricing	Calc Type (21)FLOAT RATE NOTE	USD 250,000.00 (M) /		
33) QRD Quote Recap	Pricing Date 07/01/2016	USD 250,000.00 (M)		
34) TDH Trade Hist	Interest Accrual Date 07/05/2016	Min Piece/Increment		
35) CACS Corp Action	1st Settle Date 07/05/2016	10,000.00 / 5,000.00		
36) CF Prospectus	1st Coupon Date 10/05/2016	Par Amount 5,000.00		
37) CN Sec News		Book Runner JPM-sole		
38) HDS Holders		Reporting TRACE		
39) VPRD Underly Info				

Source: Bloomberg

Floating Rate Notes

Coupons

Coupon Information

Benchmark	US0003M	Benchmark Freq	Quarterly
Fix Frequency	Quarterly	Next Coupon Date	01/05/2018
Paying Agent		Prev Coupon Date	10/05/2017
Pay Calendars	US	Cap	Floor 0
Refix Calendars	EN US	Margin	-3
First Irreg Cpn	Normal	Current Coupon	1.313
Last Irreg Cpn	Normal	Cpn Conv	Mod-Unadj Cpn Freq
			Quarterly

Reset Days Prior 2 

Table View
 Chart View

Past Coupon Resets		Margin History	
Accrual Start	Rate	Date	Margin
01/05/2018			
10/05/2017	1.31300		
07/05/2017	1.26900		
04/05/2017	1.12000		
01/05/2017	0.96900		
10/05/2016	0.82800		
07/05/2016	0.62400		

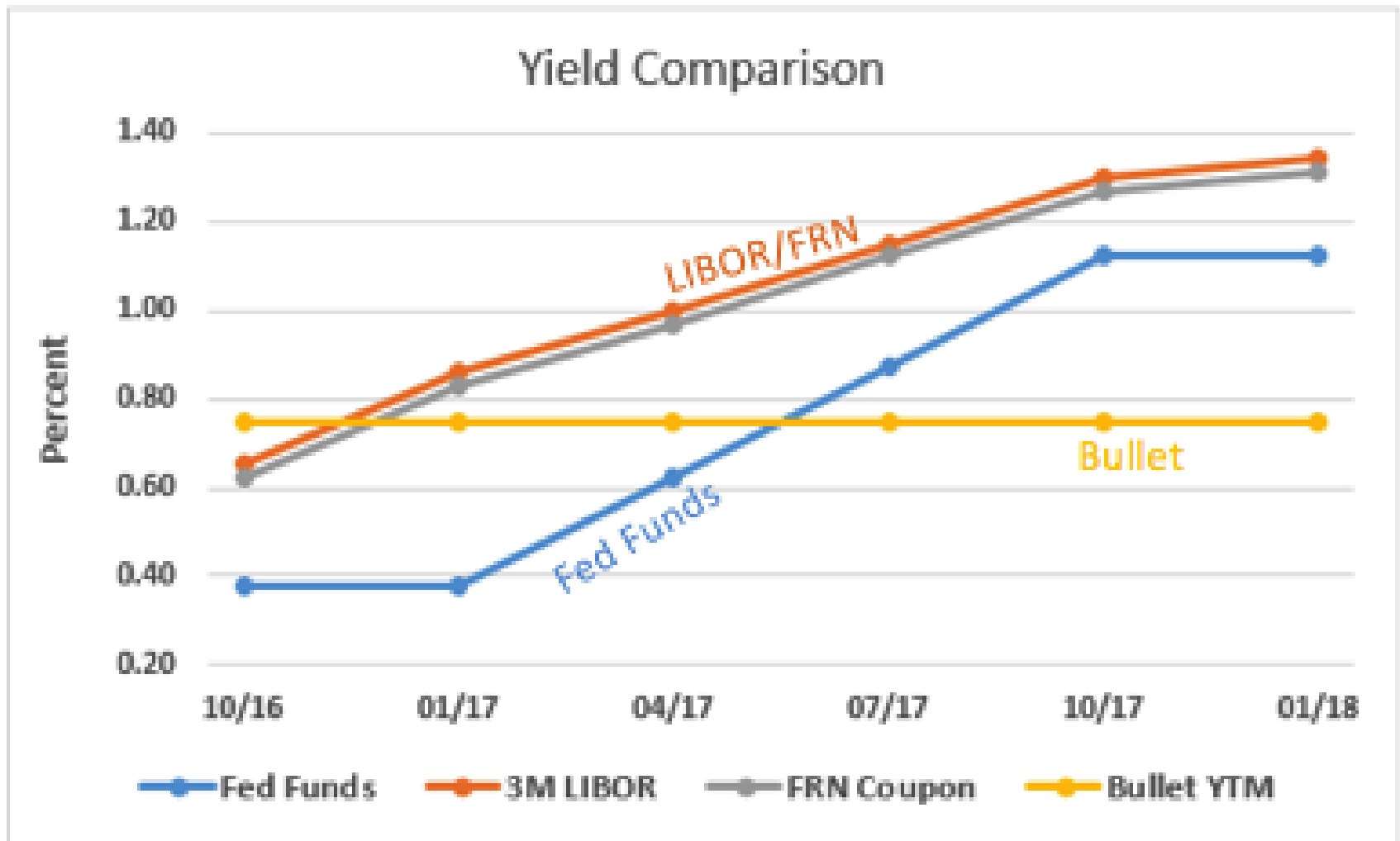
Source: Bloomberg

Floating Rate Notes

Coupon					
Start	End	Fed Funds	3M LIBOR	FRN Coupon	Bullet YTM
7/5/2016	to 10/5/2016	0.375	0.654	0.624	0.75
10/5/2016	to 1/5/2017	0.375	0.858	0.828	0.75
1/5/2017	to 4/5/2017	0.625	0.999	0.969	0.75
4/5/2017	to 7/5/2017	0.875	1.150	1.120	0.75
7/5/2017	to 10/5/2017	1.125	1.299	1.269	0.75
10/5/2017	to 1/5/2018	1.125	1.343	1.313	0.75
Average		0.750	1.051	1.021	0.75

Source: Bloomberg

Floating Rate Notes



Source: Bloomberg

Floating Rate Notes



Source: Bloomberg

Floating Rate Notes

25) Bond Description	26) Issuer Description		Identifiers	
Pages	Issuer Information			
11) Bond Info	Name	FEDERAL FARM CREDIT BANK	ID Number	AQ5551686
12) Addtl Info	Industry	Government Agencies	CUSIP	3133EH5H2
13) Covenants	Security Information		ISIN	US3133EH5H21
14) Guarantors	Mkt Iss	US Domestic	Bond Ratings	
15) Bond Ratings	Country	US	Moody's	Aaa
16) Identifiers	Currency	USD	S&P	AA+
17) Exchanges	Rank	Unsecured	Fitch	AAA
18) Inv Parties	Series		Composite	AA+
19) Fees, Restrict	Coupon	1.482750	Issuance & Trading	
20) Schedules	Type	Floating	Amt Issued/Outstanding	
21) Coupons	Formula	MONTHLY US LIBOR -8.5000 ←	USD	400,000.00 (M) /
Quick Links	Day Cnt	ACT/360	USD	400,000.00 (M)
32) ALLQ Pricing	Iss Price	100.00000	Min Piece/Increment	
33) QRD Quote Recap	Maturity	01/02/2020	1,000.00 / 1,000.00	
34) TDH Trade Hist	BULLET		Par Amount	1,000.00
35) CACS Corp Action	Iss Sprd	24 Month Security	Book Runner	DAIWA-sole
36) CF Prospectus	Calc Type	(21)FLOAT RATE NOTE	Reporting	TRACE
37) CN Sec News	Pricing Date	12/26/2017		
38) HDS Holders	Interest Accrual Date	01/02/2018		
39) VPRD Underly Info	1st Settle Date	01/02/2018		
	1st Coupon Date	02/02/2018		

Source: Bloomberg

Floating Rate Notes

3 Rate Hikes in 2018, None in 2019

Coupon		Fed	1M	FRN	Bullet
Start	End	Funds	LIBOR	Coupon	YTM
1/2/18	to 2/2/18	1.375	1.51	1.48	2.06
2/2/18	to 3/2/18	1.375	1.52	1.43	2.06
3/2/18	to 4/2/18	1.625	1.77	1.68	2.06
4/2/18	to 5/2/18	1.625	1.77	1.68	2.06
5/2/18	to 6/2/18	1.625	1.77	1.68	2.06
6/2/18	to 7/2/18	1.875	2.02	1.93	2.06
7/2/18	to 8/2/18	1.875	2.02	1.93	2.06
8/2/18	to 9/2/18	1.875	2.02	1.93	2.06
9/2/18	to 10/2/18	1.875	2.02	1.93	2.06
10/2/18	to 11/2/18	1.875	2.02	1.93	2.06
11/2/18	to 12/2/18	1.875	2.02	1.93	2.06
12/2/18	to 1/2/19	2.125	2.27	2.18	2.06
1/2/19	to 2/2/19	2.125	2.27	2.18	2.06
2/2/19	to 3/2/19	2.125	2.27	2.18	2.06
3/2/19	to 4/2/19	2.125	2.27	2.18	2.06
4/2/19	to 5/2/19	2.125	2.27	2.18	2.06
5/2/19	to 6/2/19	2.125	2.27	2.18	2.06
6/2/19	to 7/2/19	2.125	2.27	2.18	2.06
7/2/19	to 8/2/19	2.125	2.27	2.18	2.06
8/2/19	to 9/2/19	2.125	2.27	2.18	2.06
9/2/19	to 10/2/19	2.125	2.27	2.18	2.06
10/2/19	to 11/2/19	2.125	2.27	2.18	2.06
11/2/19	to 12/2/19	2.125	2.27	2.18	2.06
12/2/19	to 1/2/20	2.125	2.27	2.18	2.06
Average		1.94	2.08	1.99	2.06

3 Rate Hikes in 2018, 3 in 2019

Coupon		Fed	1M	FRN	Bullet
Start	End	Funds	LIBOR	Coupon	YTM
1/2/18	to 2/2/18	1.375	1.51	1.48	2.06
2/2/18	to 3/2/18	1.375	1.52	1.43	2.06
3/2/18	to 4/2/18	1.625	1.77	1.68	2.06
4/2/18	to 5/2/18	1.625	1.77	1.68	2.06
5/2/18	to 6/2/18	1.625	1.77	1.68	2.06
6/2/18	to 7/2/18	1.875	2.02	1.93	2.06
7/2/18	to 8/2/18	1.875	2.02	1.93	2.06
8/2/18	to 9/2/18	1.875	2.02	1.93	2.06
9/2/18	to 10/2/18	1.875	2.02	1.93	2.06
10/2/18	to 11/2/18	1.875	2.02	1.93	2.06
11/2/18	to 12/2/18	1.875	2.02	1.93	2.06
12/2/18	to 1/2/19	2.125	2.27	2.18	2.06
1/2/19	to 2/2/19	2.125	2.27	2.18	2.06
2/2/19	to 3/2/19	2.125	2.27	2.18	2.06
3/2/19	to 4/2/19	2.375	2.52	2.43	2.06
4/2/19	to 5/2/19	2.375	2.52	2.43	2.06
5/2/19	to 6/2/19	2.375	2.52	2.43	2.06
6/2/19	to 7/2/19	2.625	2.77	2.68	2.06
7/2/19	to 8/2/19	2.625	2.77	2.68	2.06
8/2/19	to 9/2/19	2.625	2.77	2.68	2.06
9/2/19	to 10/2/19	2.875	3.02	2.93	2.06
10/2/19	to 11/2/19	2.875	3.02	2.93	2.06
11/2/19	to 12/2/19	2.875	3.02	2.93	2.06
12/2/19	to 1/2/20	2.875	3.02	2.93	2.06
Average		2.16	2.30	2.21	2.06

Source: Bloomberg, FTN Main Street estimates

Floating Rate Notes

FFCB Float 01/02/20 (3133EH5H2)				M/M Equiv to Next Fix	Floater Cpn History	
Price	100.0001	Settle	01/02/18	<input checked="" type="radio"/> ACT/360 <input type="radio"/> ACT/365	Date	Rate
DM	-8.5	to Wst		Price at Refix	100.07517	01/02/18 1.48275
Yield	1.4793 (bp)			on 02/02/2018	31 Days	02/02/18 0.00000
Workout	01/02/20	@ 100.00		Mmkt	2.354144	
SFL	-8.507	Trade	12/29/2017			
Floater Information				Risk		
Benchmark	US0001M	Assumed Rate	1.56425		To 02/02/18	OAS
Quoted Margin	-8.50	Coupon	1.48275	Mod Duration	0.086	1.948
Next Pay	02/02/2018	Coupon Freq	Monthly	Risk	0.086	1.948
		Refix Freq	Monthly	Convexity	0.000148	0.048001
Index to	02/02/2018	1.566170		DV 01 on 1MM	9	195

“WAM Real Estate”

Source: Bloomberg



Callables: Option Basics

Two Types of Options Calls and Puts

What are some factors that determine option prices?

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?

Types of Callable Structures



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

5 Year Securities: Callables' Lockouts 1 Year

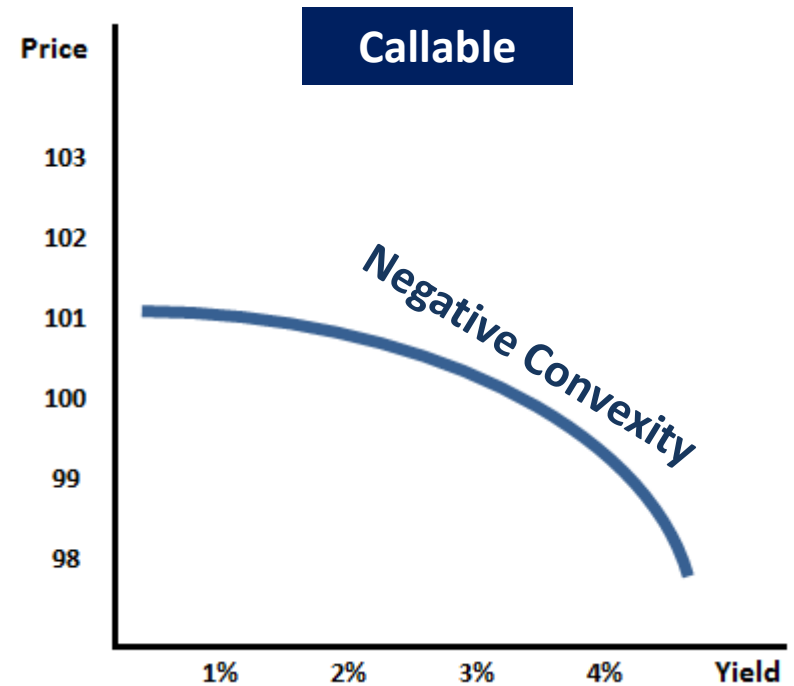
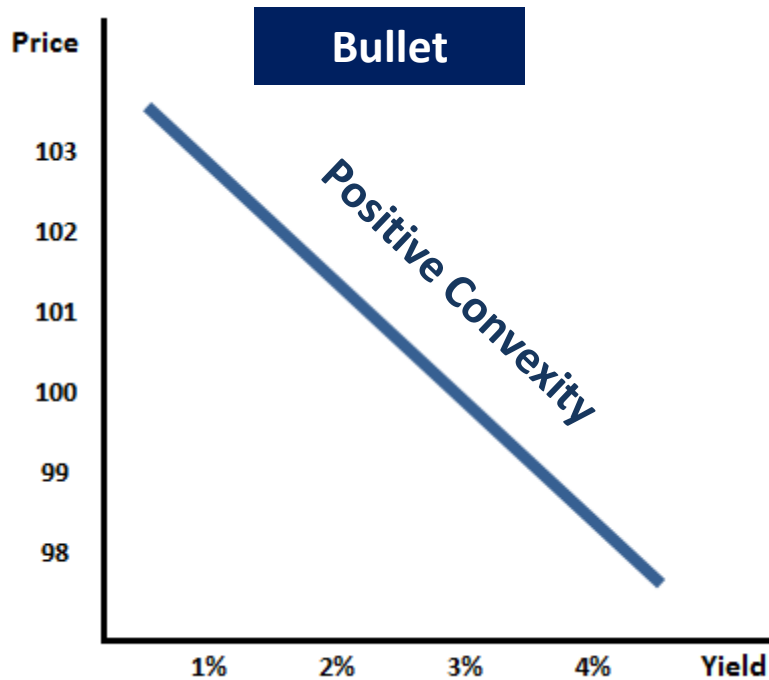
Instrument	Number of Calls	Yield
Treasury	0	2.30%
Bullet	0	2.36%
One-Time Call	1	2.44%
Discrete Call (quarterly)	15	2.54%
Continuous Call*	1,450	2.60%

*10 Day Call Notice

Source: Bloomberg, FTN Financial Capital Markets

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).



Convexity and Effective Duration

5Yr T-Note

T 1 ⁷ / ₈ 10/31/22 Govt		Settings	Yield and Spread Analysis		
99-16 ¹ / ₄ /99-17	1.978/1.973	CBBT @ 10/ 6	95) Buy	96) Sell	
1) Yield & Spread	2) Yields	3) Graphs	4) Pricing	5) Description	6) Custom
T 1 ⁷ / ₈ 10/31/22 (912828M49)		Risk			
Spread	1.670 bp vs 5y T 1 ⁷ / ₈ 09/30/22	Workout	OAS		
Price	99.5313	99-19 ³ / ₄ 08:02:32	<input checked="" type="radio"/> M.Dur	<input type="radio"/> Dur	4.761 4.789
Yield	1.9728 Wst	1.9561 S/A	Risk		4.778 4.807
Wkout	10/31/2022 @ 100.00	Duration	Convexity		0.258 0.261
Settle	10/10/17	10/10/17	DV	01 on 1MM	478 481

Source: Bloomberg

Convexity and Effective Duration

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	90) Sell			
1) Yield & Spread		2) Yields	3) Graphs	4) Pricing	5) Description	6) Custom	7) Calls
FHLB 2.35 10/19/22 (3130ACL6)				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	

5Yr Non-Call 2Yr 1X

FHLB 2.06 10/25/22 (3130ACLK8)		Risk				
Spread	10,390 bp vs 5y T 1 7/8 09/30/22	Workout	OAS			
Price	100.0000	↻ 99-19 ³ / ₄ 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	Risk		1.950	3.698
Wkout	10/25/2019 @ 100.00 Consensus	4.4	Convexity		0.048	-0.877
Settle	10/25/17	10/10/17	DV	01 on 1MM	195	370

Source: Bloomberg

Convexity and Effective Duration

5Yr Non-Call 3 Month

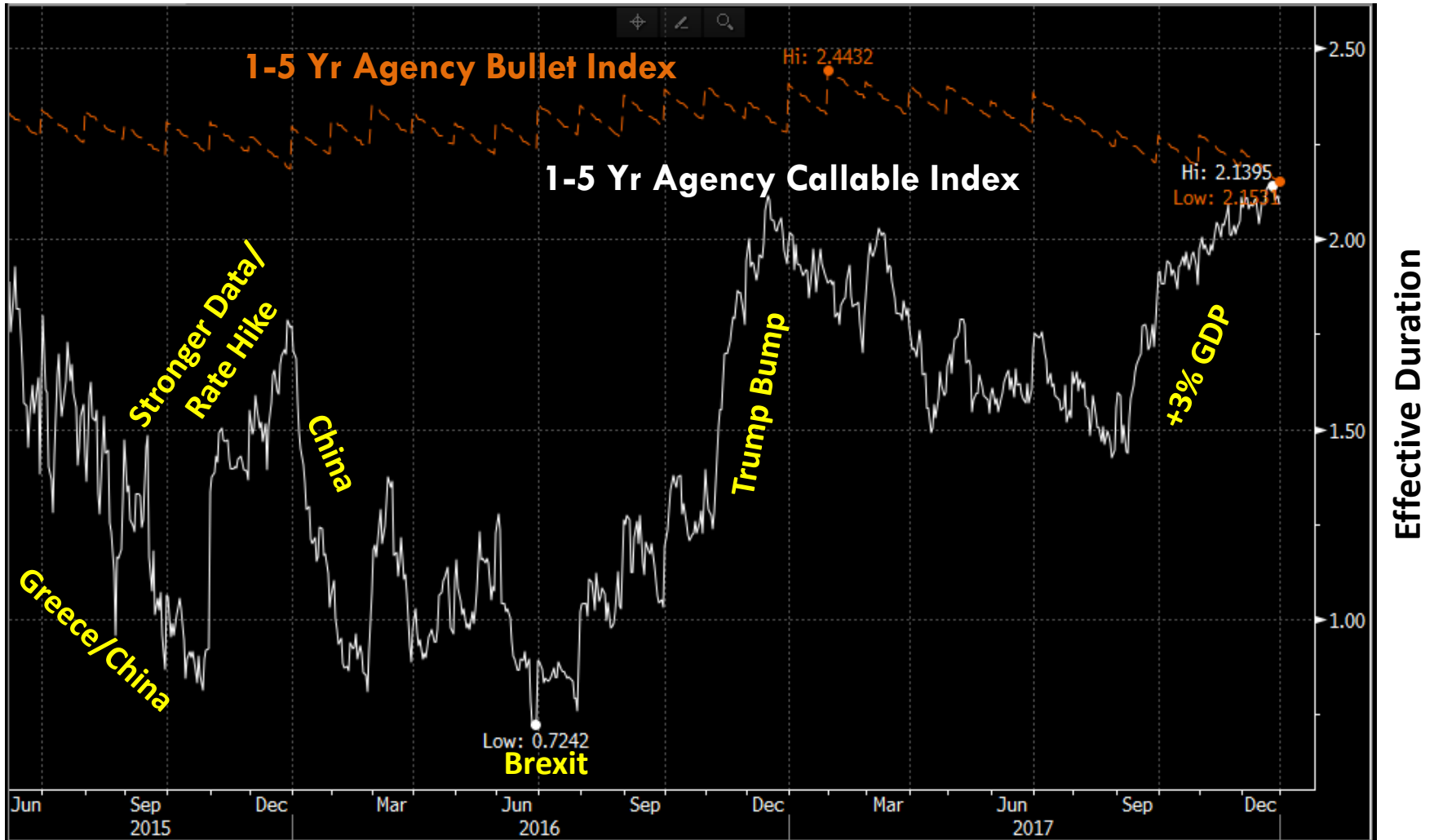
FHLB 2.35 10/19/22 Corp		Settings	Yield and Spread Analysis			
99.974/100.000	2.356/2.350	BVAL @ 10/ 6	95) Buy	90) Sell		
1) Yield & Spread	2) Yields	3) Graphs	4) Pricing	5) Description	6) Custom	7) Calls
FHLB 2.35 10/19/22 (3130ACLL6)			Risk			
Spread	128.780 bp vs 3mB 0 01/04/18		Workout	OAS		
Price	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	4.676	4.128
Yield	2.8500 Wst	1.0622 Conv	Risk		4.568	4.032
Wkout	10/19/2022 @ 100.00 Consensus	4.4	Convexity		0.249	-0.970
Settle	10/19/17	10/10/17	DV	01 on 1MM	457	403

Source: Bloomberg

Effective Duration: Bullets 1-5Yrs vs. Callables 1-5Yrs



What's the maximum % of callables you should have? What types of callables?

Source: Bloomberg

Callable Breakeven Analysis

5Y-1-1X Callable vs 5Yr Bullet

Bond	YTM	Year	Bullet	Callable
5-1-1X	2.44	Y1	2.35	2.44
5Y Bullet	2.35	Y2	2.35	2.33
		Y3	2.35	2.33
		Y4	2.35	2.33
		Y5	2.35	2.33
		Avg	2.35	2.35

If the callable gets called, this is what the 4yr bullet rate needs to be in one year to equal the return of the 5yr bullet.

4Y Bullet Breakeven Rate in 1 Year from Now: 2.33

4Y Bullet Today: 2.22

BE Basis Points the 4Y Bullet Needs Increase in 1 Year: 11

To Equal the YTM of the 5Y Bullet for the 5Y Horizon

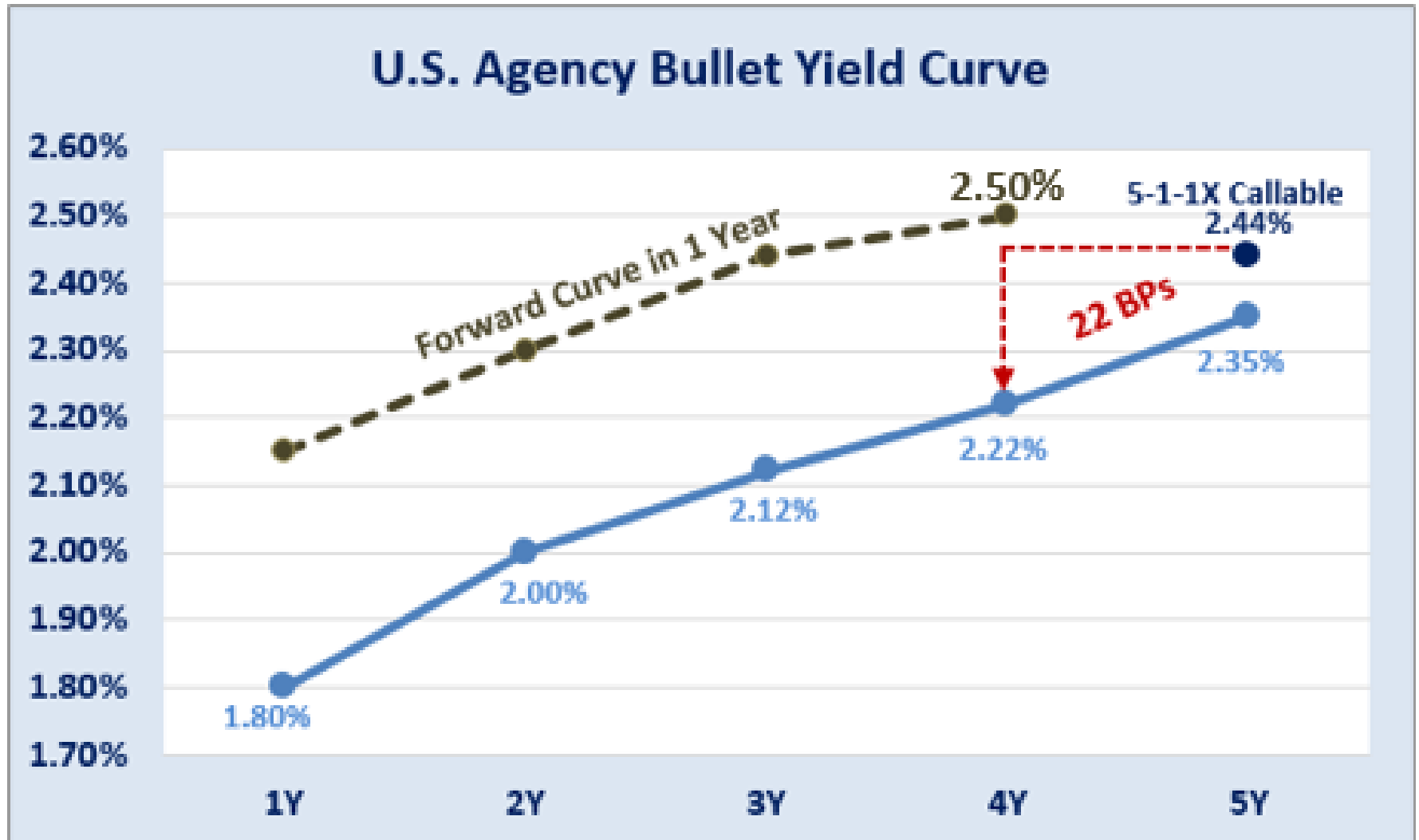
5-1-1X 2.44

4Y Bullet 2.22

Callable: BPs In-the-Money One Year Forward 22

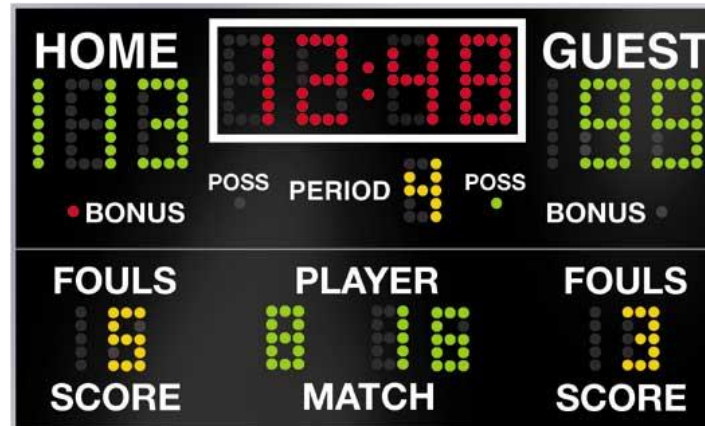
11 BPs x \$10mil x 5Yrs = \$55,000

Callable Breakeven Analysis



Three Types of Benchmarking

Keeping Score of Your Portfolio/Bonds



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

Calculation Methodology of Each Benchmark

Yield = Portfolio's Weighted Average Purchase Yield

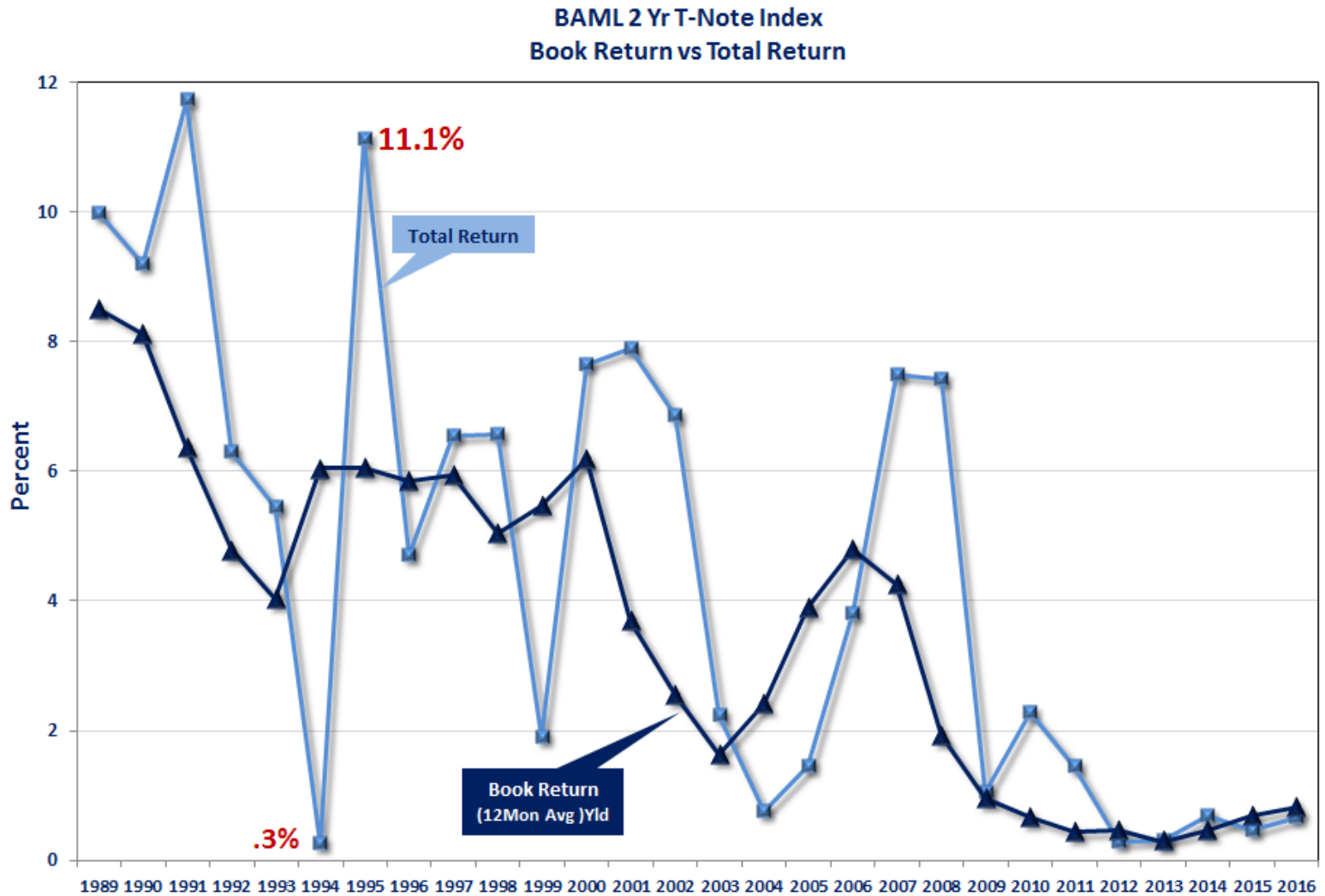
Book Return = + Accrued/Received Interest
+/- Amortization/Accretion of Premiums/Discounts
+/- Realized Gains/Losses

Average Daily Book Balance for the Period

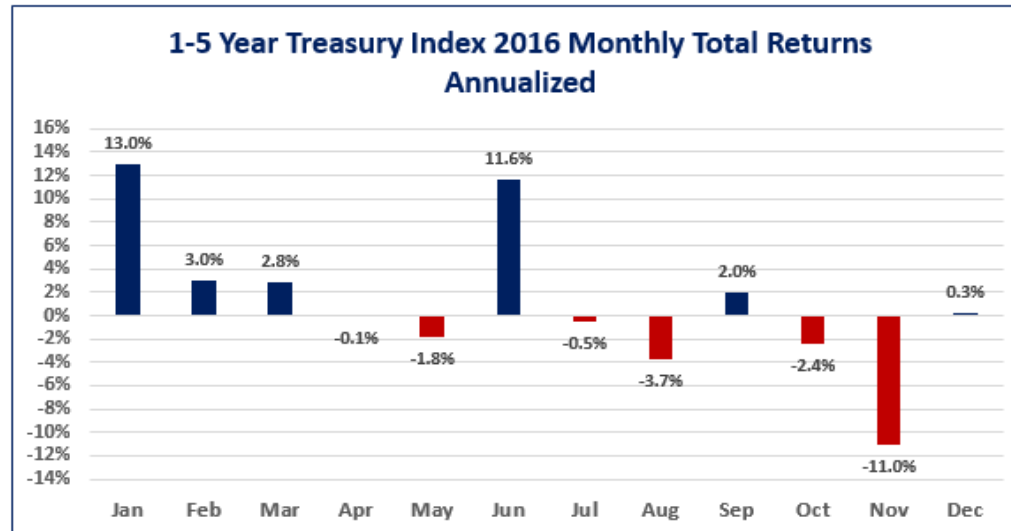
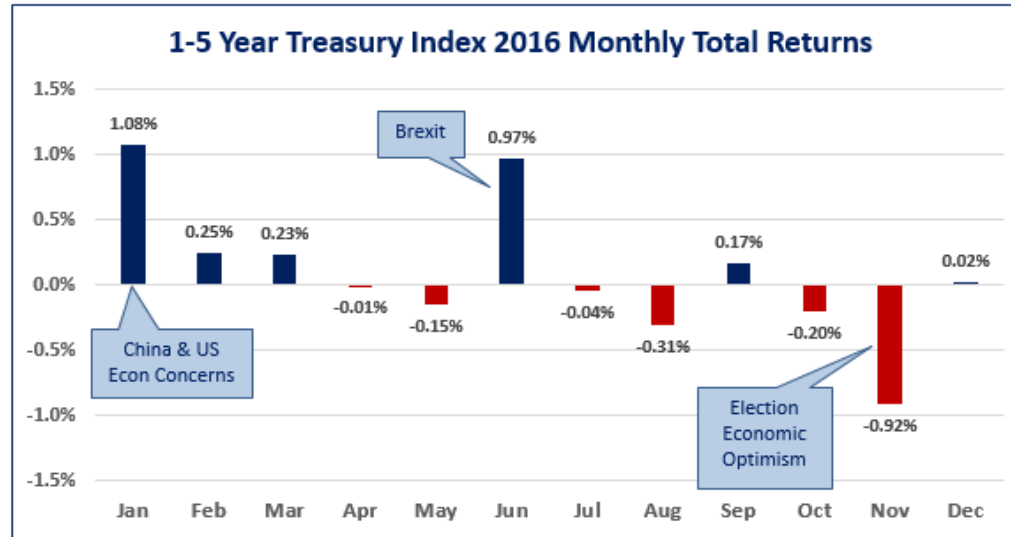
Total Return = + Accrued/Received Interest
+/- Realized Gains/Losses
+/- Unrealized Gains/Losses

Time Weighted Invested Market Value for the Period

Book Return vs. Total Return

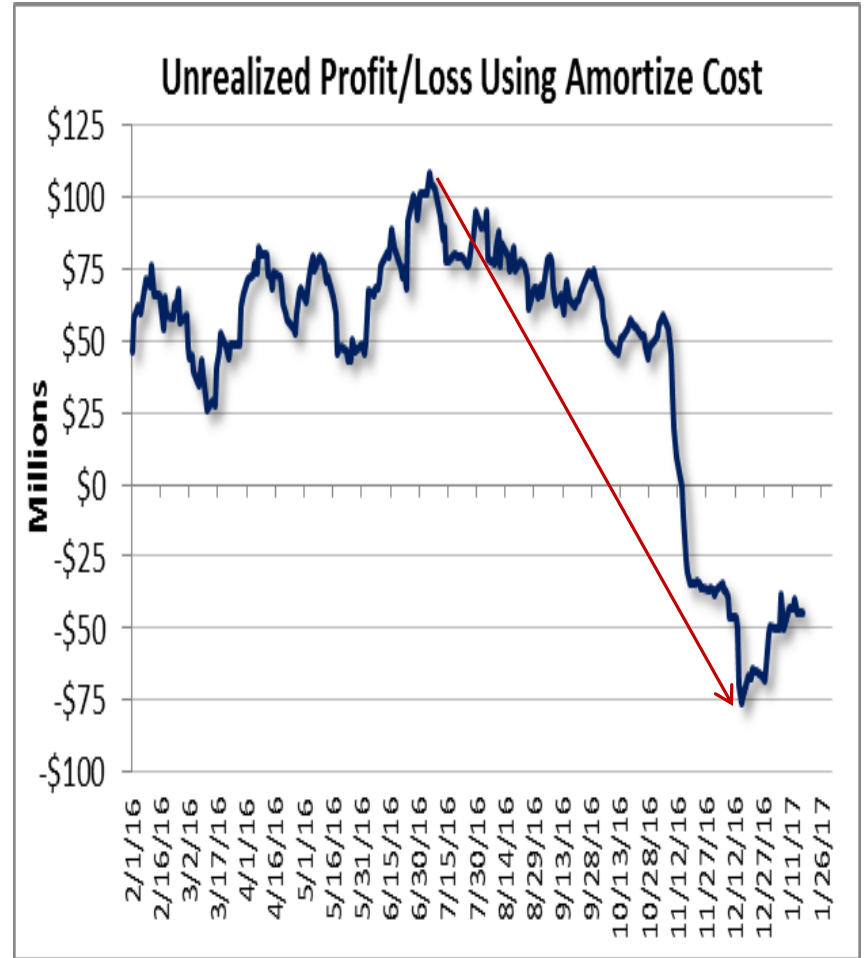
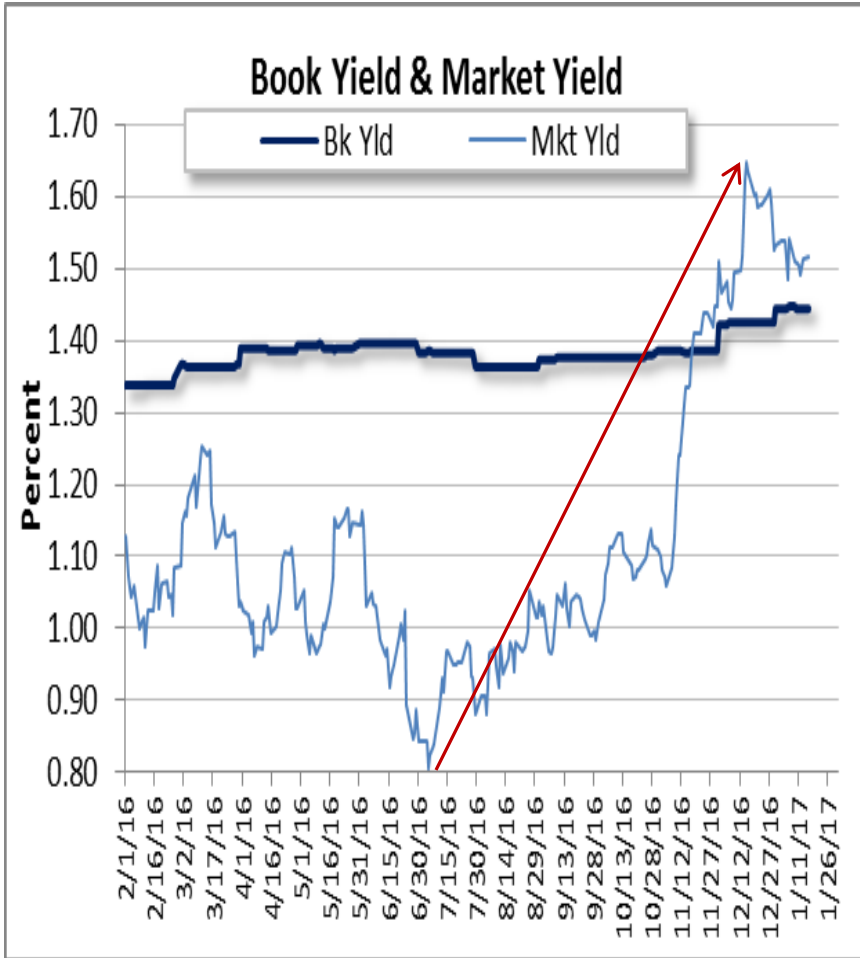


Performance Benchmarking

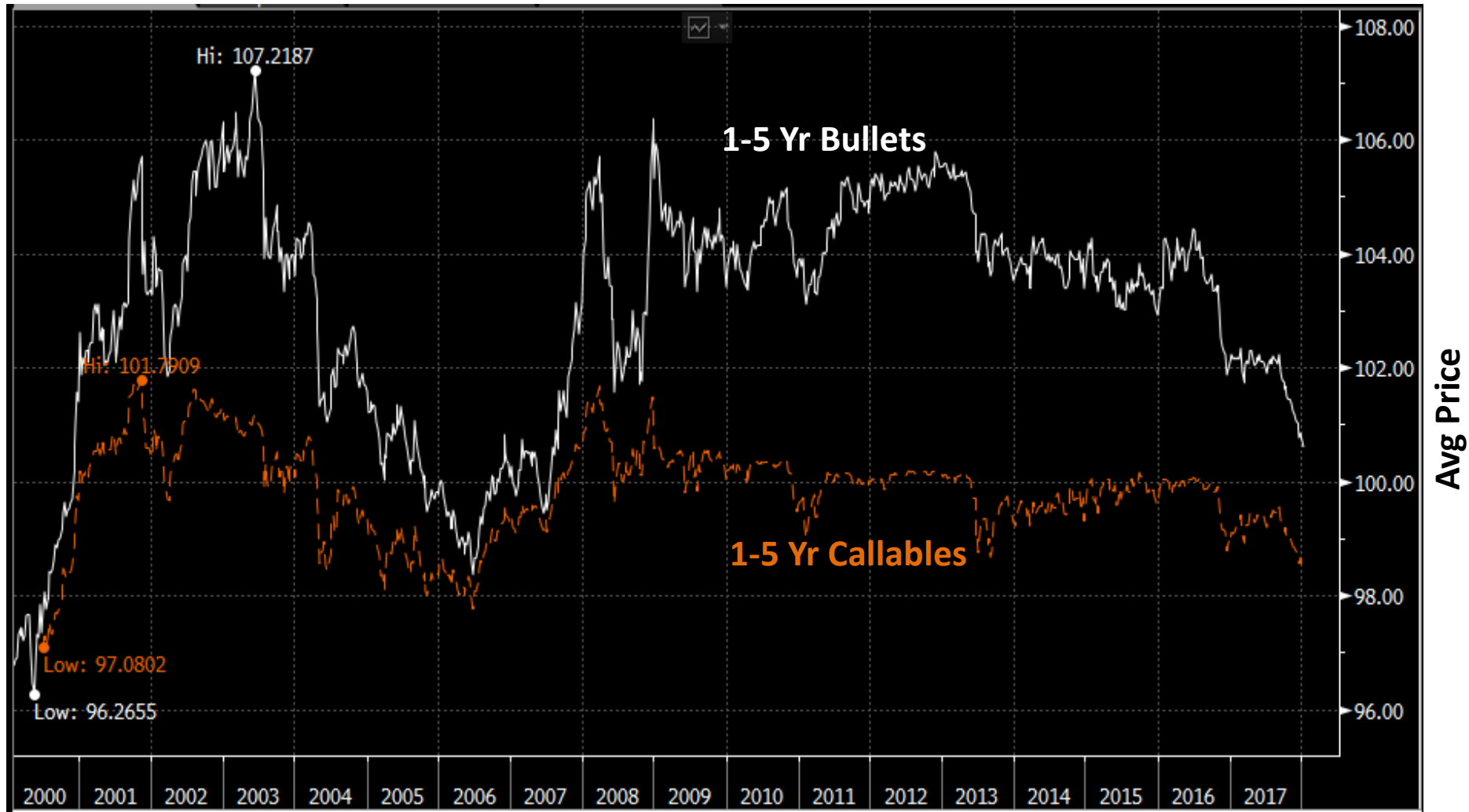


Source: Bloomberg, FTN Main Street

Real World Example



Avg Prices: 1-5Yr Callables vs. 1-5Yr Bullets



Source: Bloomberg

Total Return: Callables vs. Bullets



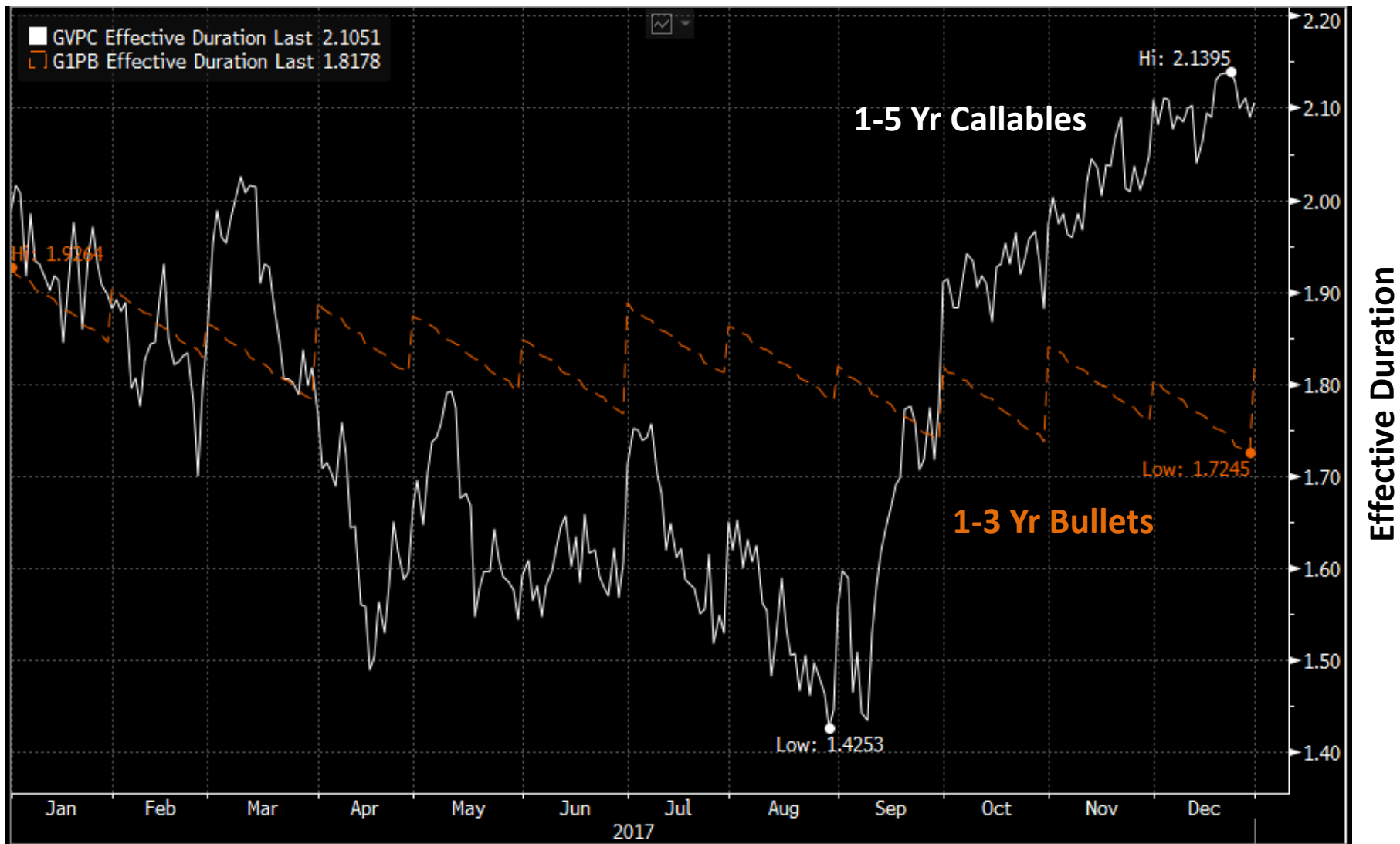
Source: Bloomberg

Effective Duration: Callables vs. Bullets



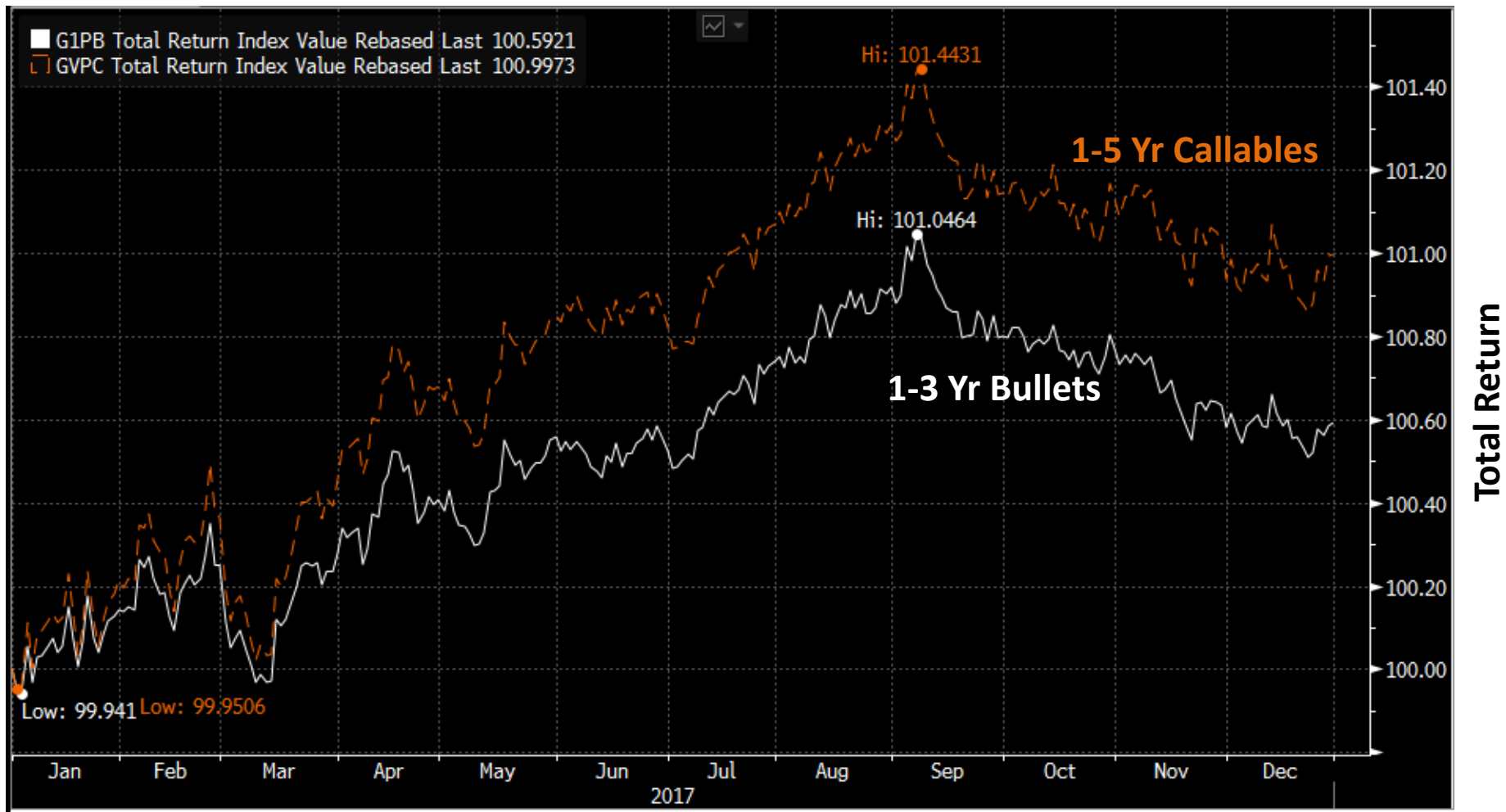
Source: Bloomberg

Effective Duration: Callables vs. Bullets



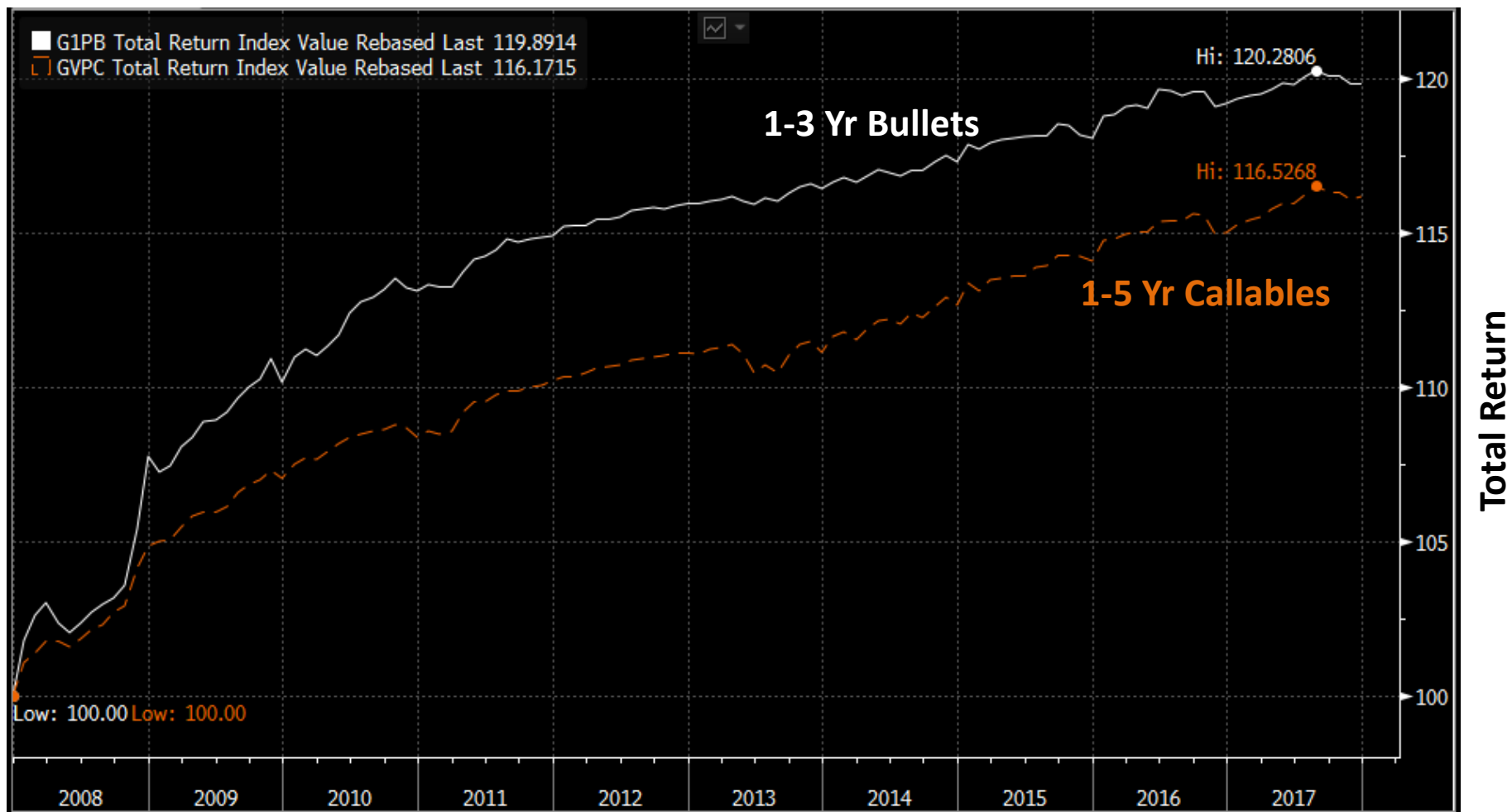
Source: Bloomberg

Total Return: Callables vs. Bullets



Source: Bloomberg

Total Return: Callables vs. Bullets



Source: Bloomberg

Callable Cost of Carry Analysis

COST OF CARRY MODEL

Par Amount	\$1,000,000
Announce Date	10/01/17
Issue/Setmnt Date	10/31/17
Maturity Date	10/31/22
Call Date	10/31/18
Coupon	2.100%
MMF Rate	1.13%
AOAS Eff Duration	0.98
Forward Settle Days	29
Daily Int for MMF	\$31.39
Daily Int for Bond	\$58.33

Inputs: Blue Fields

RESULTS	
Date	Cost of Carry-Basis Points
To Call Date	7.7
To Mat. Date	1.5
To Eff. Dur. Date	7.9

COST OF CARRY EFFECT TO CALL DATE	
Callable's YTC	2.100%
Less COC	-0.077%
Net YTC	2.023%
Matching Mat Bullet's YTM	2.010%
Variance	0.013%

COST OF CARRY TO CALL DATE				
	Days in MMF	Days in Bond	Totals	
Days	29	336	365	<Total Days
Daily Rate	1.130%	2.100%	2.023%	<Avg Rate
Daily Int Earnings	\$31.39	\$58.33	\$56.19	<Avg Daily Earnings
Total Int Earnings	\$910.28	\$19,600.00	\$20,510.28	<Total Int Earnings

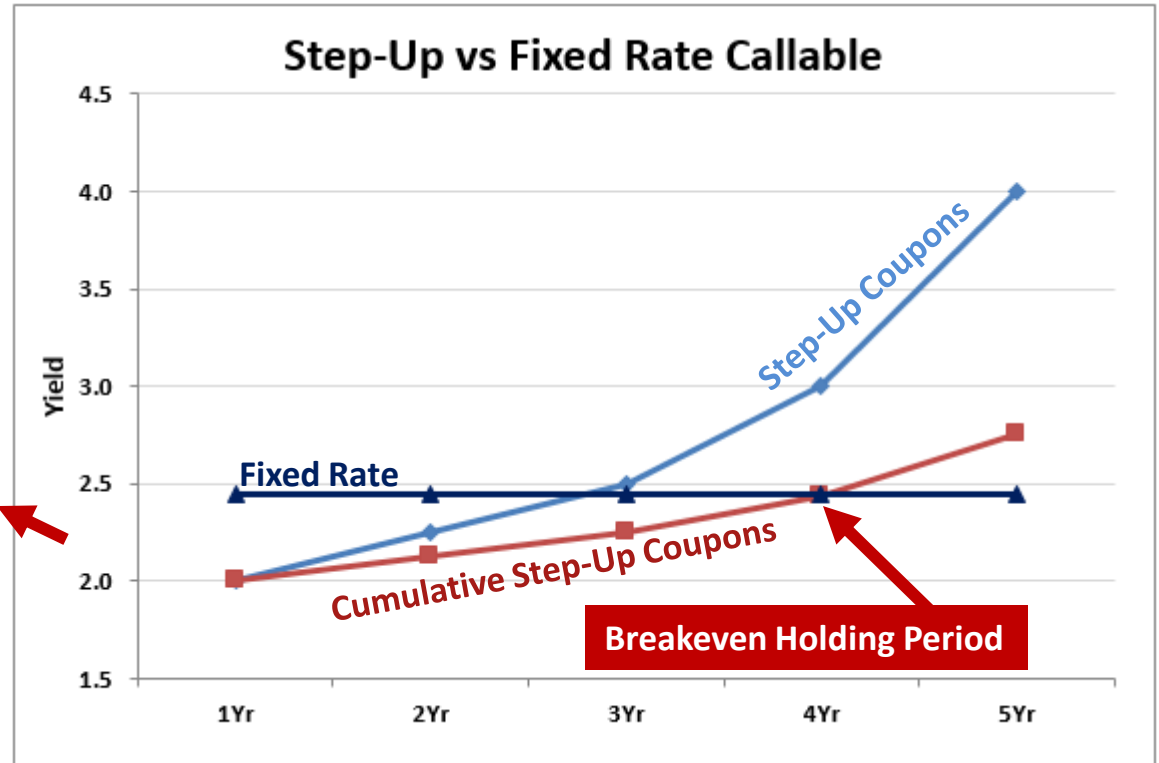
INTEREST EARNINGS TO THE:	MATCHED MATURITY BULLET	CALLABLE	VARIANCE
CALL DATE	\$20,379.17	\$20,510.28	\$131.11
EFFECTIVE DATE	\$19,971.58	\$20,084.44	\$112.86
MATURITY DATE	\$101,951.67	\$105,735.28	\$3,783.61

	No Forward Settlement	W/ Forward Settlement	Variance	
Days	365	365	-	
Stated Rate	2.100%	2.023%	0.077%	<Cost of Carry: Yield
Total Interest	\$21,291.67	\$20,510.28	\$781.39	<Cost of Carry: Dollars

Source: Bloomberg, FTN Main Street

5Yr Step-Up Callable vs. 5Yr Fixed Rate Callable

Step Up Analysis - 5yr Annual Steps				
Time	Step Cpns	SU Cumltv Cpn	Fixed Coupons	Var
1Yr	2.000	2.000	2.450	(0.450)
2Yr	2.250	2.125	2.450	(0.325)
3Yr	2.500	2.250	2.450	(0.200)
4Yr	3.000	2.438	2.450	(0.013)
5Yr	4.000	2.750	2.450	0.300



Source: Bloomberg

Step-Up: OAS, Effective Duration, Convexity

5Yr Step- Up, 1Yr Lockout, Callable Annually

OPTION-ADJUSTED SPREAD ANALYSIS

FREDDIE MAC FHLMC 2 12/21/22 99.718/99.995 (2.273/2.005) BVAL

Calculate **Price** **OAS (bp)** **Volatility**
 (P,O,V) P) 100 0) -21.6 V) 24.31
 Cusip / ID# 3134GB7G1 Option Px Value: -3.33
 Settle 12/21/2017 Bench settle 12/21/2017 Vega: -0.04
 Spread 79.3bp vs 2Y T 1 7/8 12/31/19 Govt @ 99-28+ (1.931)

2) Customize
 Curve I111 Semi
 US On/Off The Run
 Dated 12/21/2017
 Settle 12/21/2017
 N None
 Shift +0(bps)

Yield Spread

3m	1.340	
6m	1.527	
1y	1.706	
2y	1.878	
3y	1.994	
4y	2.155	
5y	2.245	

{NUM}<GO> for:	OAS Method	Option Free	To Call on 12/21/2018	To Mty
3) Call Schedule				
12/21/18 100.00	Yld	2.028	2.000	2.724
12/21/19 100.00	Sprd	-21.7	19.7	47.9
12/21/20 100.00	M Dur	2.14	0.99	4.69
12/21/21 100.00	Risk	2.14	0.99	4.69
	Cnvx	-1.78	0.01	0.25

Callable: OAS, Effective Duration, Convexity

5Yr Fixed Rate Callable, 1 Yr Lockout, Callable Continuously

OPTION-ADJUSTED SPREAD ANALYSIS
 FED FARM CREDIT FFCB 2.47 01/23 99.432/99.768 (2.593/2.520) BVAL

Calculate **Price** **OAS (bp)** **Volatility**
 (P,O,V) **O** P) 100 0) **-21.1** ← V) **23.95** ←

Cusip / ID# 3133EH5F6 Option Px Value: -1.58
 Settle 1/ 3/2018 Bench settle 1/ 3/2018 Vega: -0.05
 Spread 35.4bp vs 3Y T 2 01/15/21 Govt @99-21¼ (2.116)

2) Customize
 Curve I111 Semi
 US On/Off The Run
 Dated 1/ 3/2018
 Settle 1/ 3/2018
 N None
 Shift +0(bps)
 Yield Spread

3m	1.391	
6m	1.584	
1y	1.803	
2y	1.931	
3y	2.015	
4y	2.162	
5y	2.245	

{NUM}<GO> for:
 3) Call Schedule
 1/ 3/19 100.00

	OAS Method	Option Free	To Call on 1/ 3/2019	To Mty
Yld		2.135	2.470	2.470
Sprd		-21.2	69.9	12.3
M Dur	2.83		0.98	4.68
Risk	2.83		0.98	4.68
Cnvx	-1.85		0.01	0.25

Source: Bloomberg

Volatility Matters

OPTION-ADJUSTED SPREAD ANALYSIS

FED FARM CREDIT FFCB 2.47 01/23 99.432/99.768 (2.593/2.520) BVAL

Calculate **Price** **OAS (bp)** **Volatility**
 (P,0,V) **O** P) 100 0) + 8.44 V) 14.00

Cusip / ID# 3133EH5F6 Option Px Value: -0.67
 Settle 1/ 3/2018 Bench settle 1/16/2018 Vega: -0.05
 Spread 35.4bp vs 3Y T 2 01/15/21 Govt @99-21¼ (2.116)

2) Customize
 Curve I111 Semi
 US On/Off The Run
 Dated 1/ 3/2018
 Settle 1/ 3/2018
 N None
 Shift +0(bps)
 Yield Spread

3m	1.391
6m	1.584
1y	1.803
2y	1.931
3y	2.015
4y	2.162
5y	2.245

{NUM}<GO> for:

3) Call Schedule
 1/ 3/19 100.00

	OAS Method	Option Free	To Call on 1/ 3/2019	To Mty
Yld		2.328	2.470	2.470
Sprd		8.3	66.7	22.5
M Dur	2.88		0.98	4.68
Risk	2.88		0.98	4.68
Cnvx	-3.20		0.01	0.25

Source: Bloomberg

Volatility Matters

OPTION-ADJUSTED SPREAD ANALYSIS

FED FARM CREDIT FFCB 2.47 01/23 99.716/100.027 (2.531/2.442) BVAL

Calculate **Price** **OAS (bp)** **Volatility**
 (P,0,V) **O** P) 100 **0** -12.33 **V** 24.30

Cusip / ID# 3133EH5F6 Option Px Value: -1.65
 Settle 1/ 4/2018 Bench settle 1/ 4/2018 Vega: -0.05
 Spread 45.5bp vs 3Y T 1 7/8 12/15/20 Govt @ 99-19 1/4 (2.015)

2) Customize
 Curve I111 Semi
 US On/Off The Run
 Dated 1/ 3/2018
 Settle 1/ 4/2018
 N None
 Shift +0(bps)
 Yield Spread

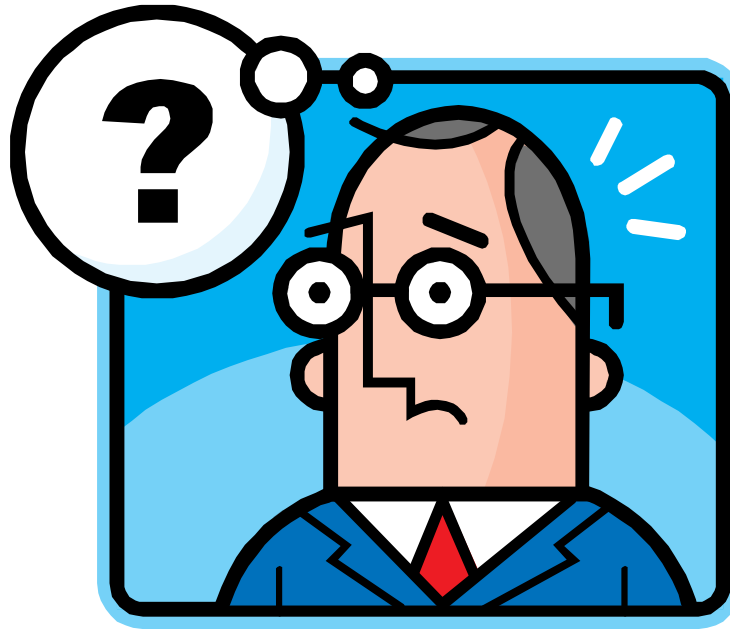
{NUM}<GO> for:
 3) Call Schedule
 1/ 3/19 100.00

	OAS Method	Option Free	To Call on 1/ 3/2019	To Mty
Yld		2.120	2.470	2.470
Sprd		-12.5	66.8	22.5
M Dur	2.72		0.98	4.67
Risk	2.72		0.98	4.67
Cnvx	-1.94		0.01	0.25

	Yield Spread
3m	1.391
6m	1.584
1y	1.803
2y	1.931
3y	2.015
4y	2.162
5y	2.245

Source: Bloomberg

Final Questions or Comments



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