Session 3: Part 4
Public Investment Planning: Understanding Callables
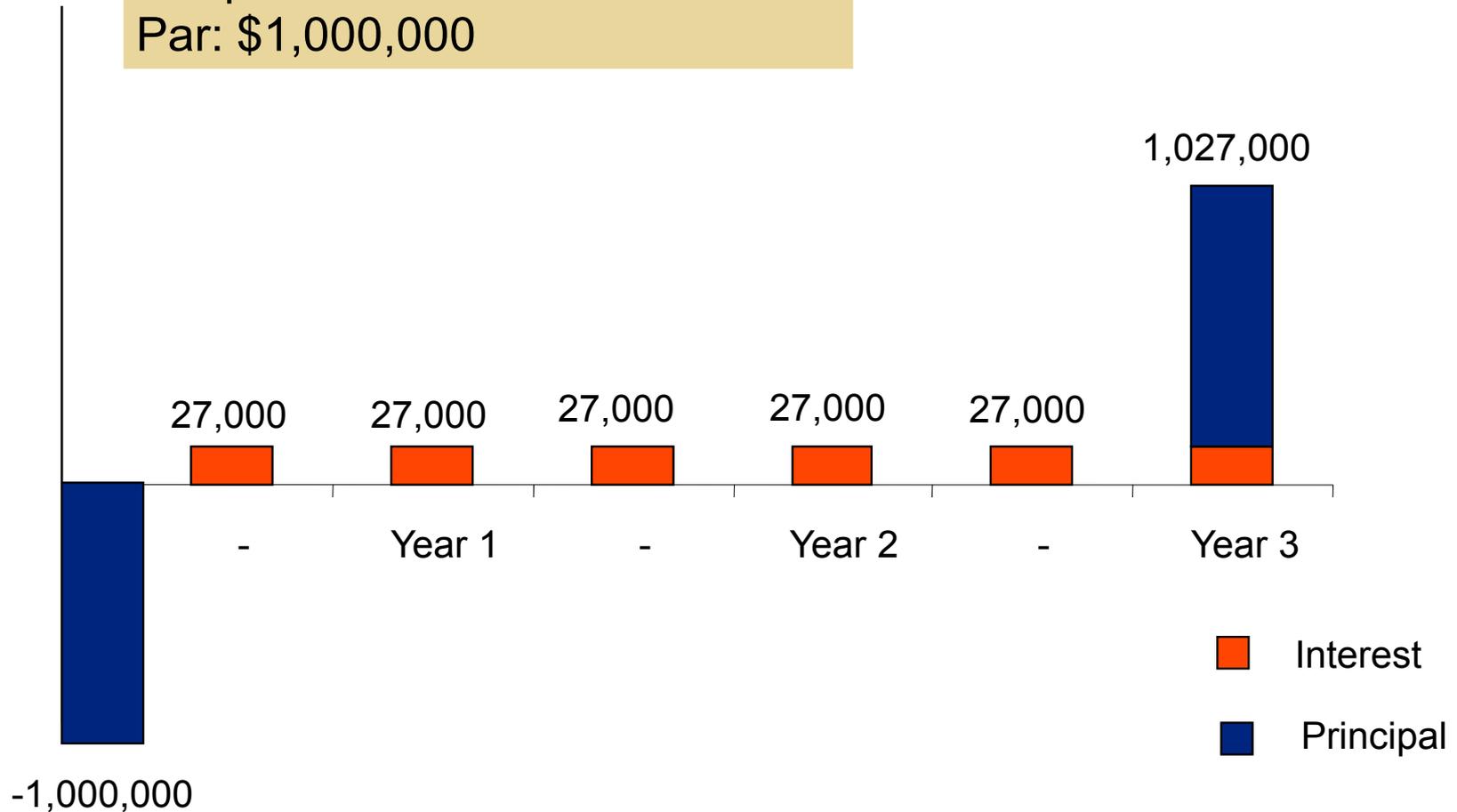# March 12, 2014

Presented by:

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PFM Asset Management LLC

Getting Value in Today's (or any) Market

- Develop a long-term plan

- Be sure each investment decision fits into this plan

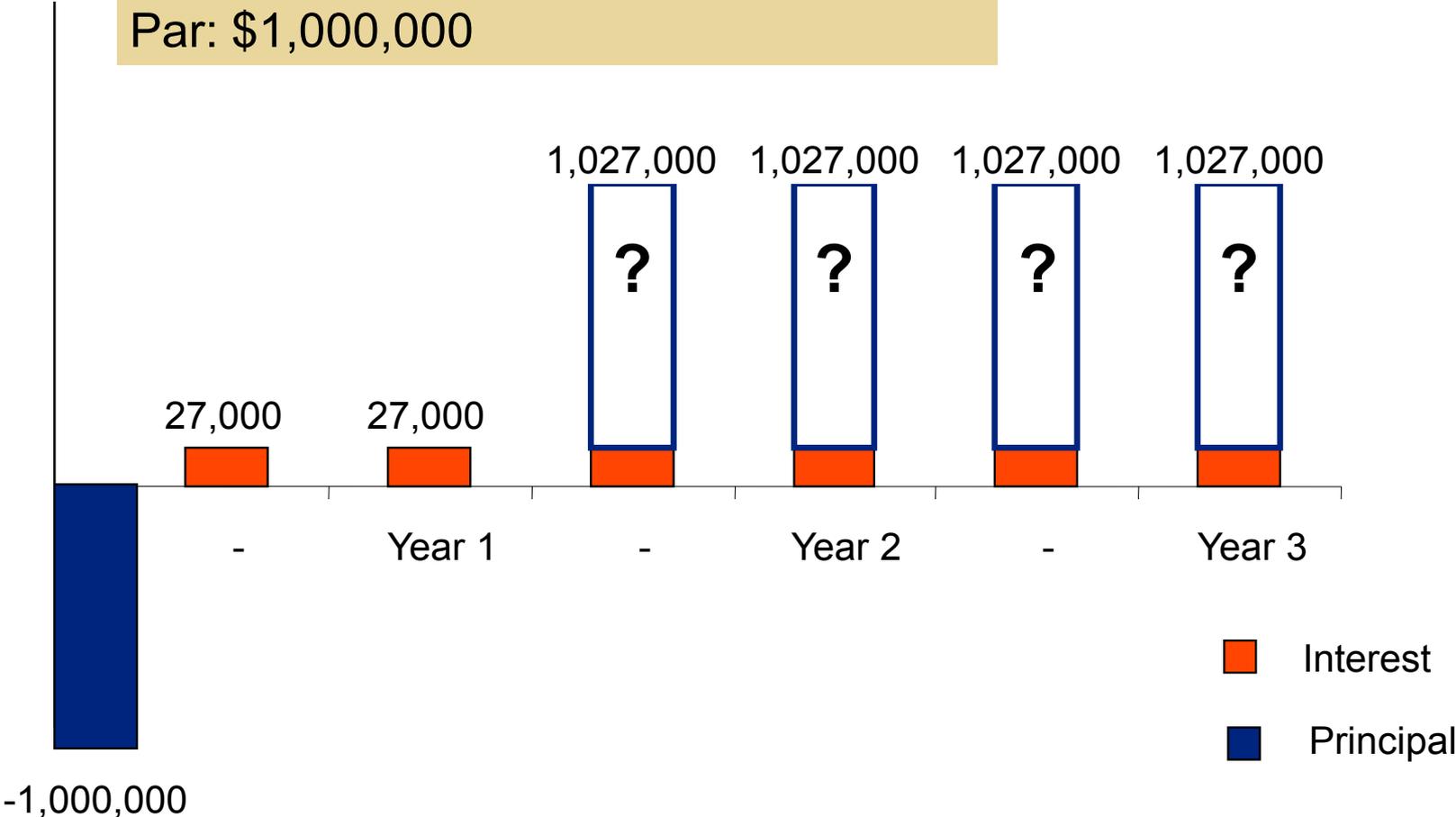- Evaluate how well the portfolio fits the long-term plan

Non-Callable Security – "Bullet"

Maturity: 3-year
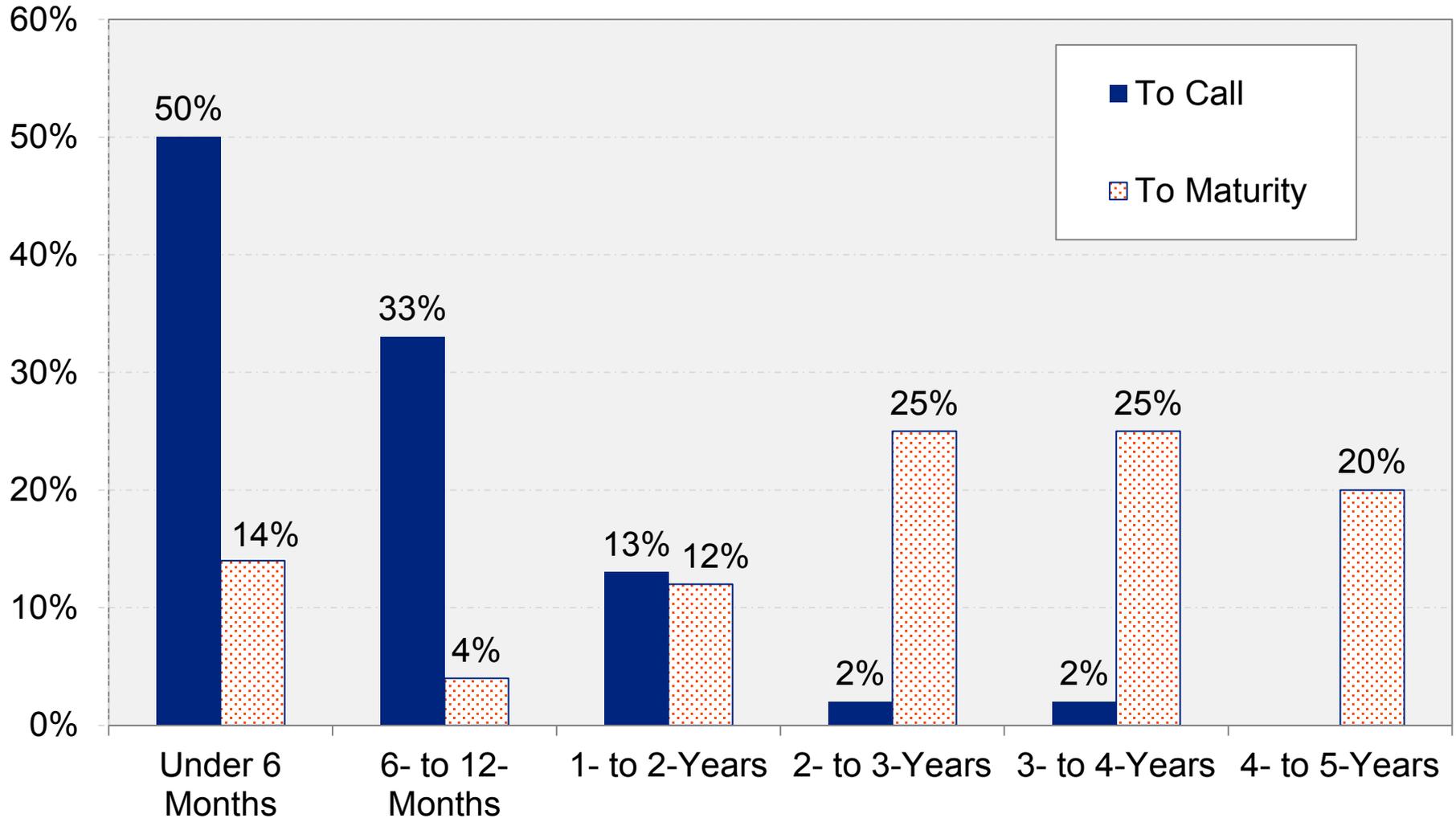Coupon: 5.40%
Par: $1,000,000

Callable Security

Maturity: 3-year non-callable for 1 year
Coupon: 5.40%
Par: $1,000,000

1,027,000   1,027,000   1,027,000   1,027,000

?   ?   ?   ?

27,000   27,000

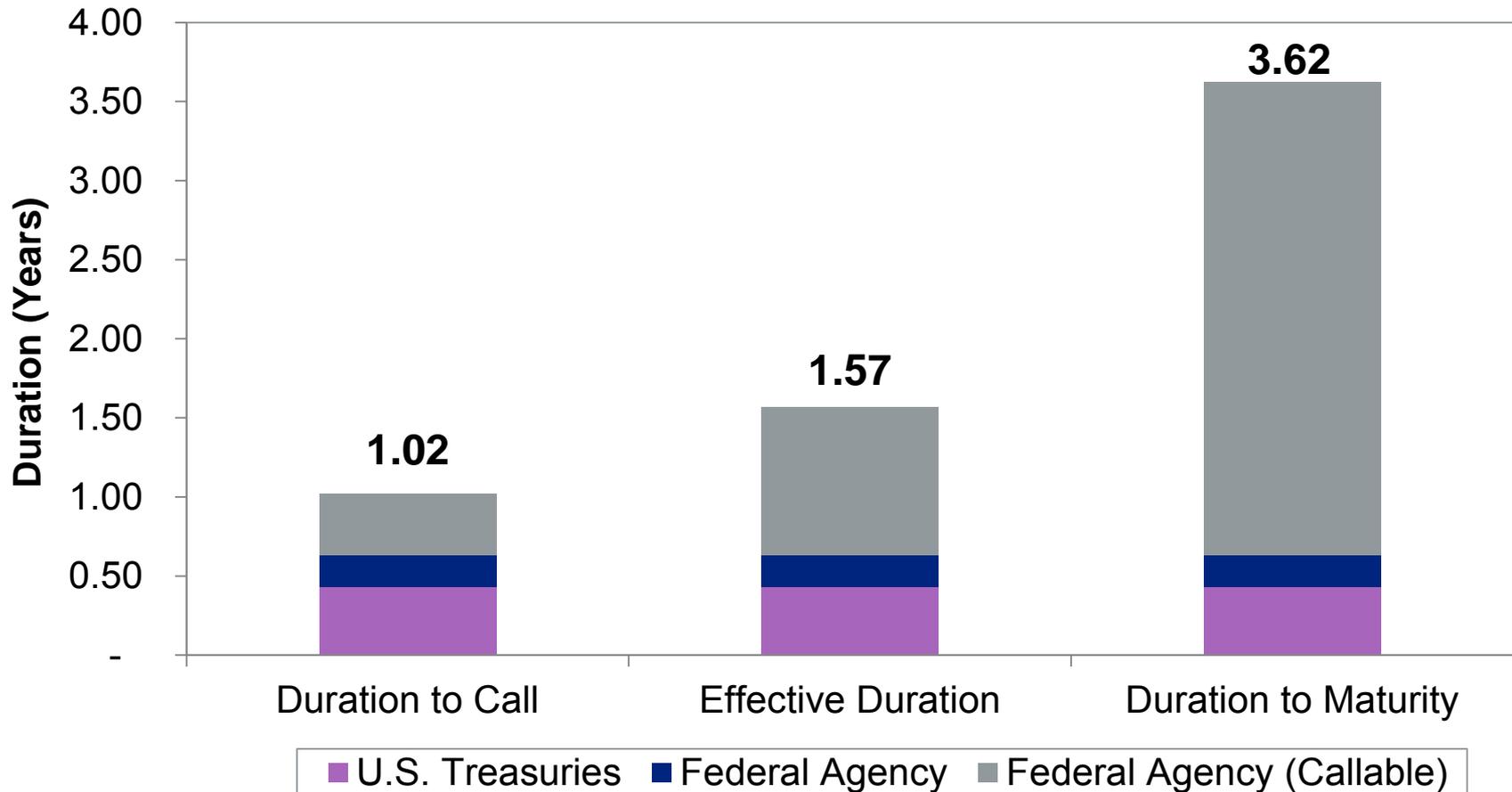-   Year 1   -   Year 2   -   Year 3

■ Interest

■ Principal

-1,000,000

Callables Impact Maturity Distribution . . .

. . . And Duration

Sample Portfolio
70% Callable Bonds

Callable yield > Bullet yield

Gold   or

Fool's Gold ???

The Catch

- Actual yield advantage depends on:

  – Call structure

  – Offering price

  – Current interest rate levels
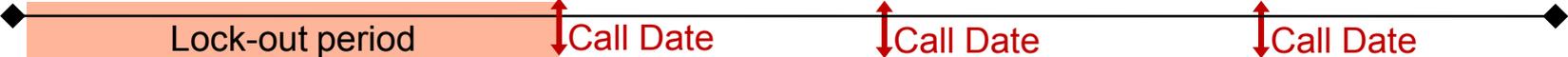
  – Anticipated interest rate levels

Call Structure

Non-callable

Purchase ———————————————————————— *Final Maturity*

American: Callable Anytime

Lock-out period	Call period

Bermudian: Specified Dates

| Lock-out period | ↓Call Date | ↓Call Date | ↓Call Date |

European: One-time Call Date

| Lock-out period | ↓Call Date |
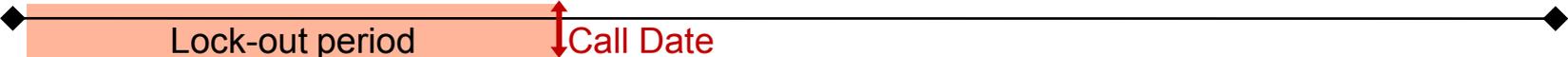
Step-Up: Specified Dates or Coupon "Steps Up"

Call/Step-Up
Call/Step-Up
Call/Step-Up

| Lock-out period |
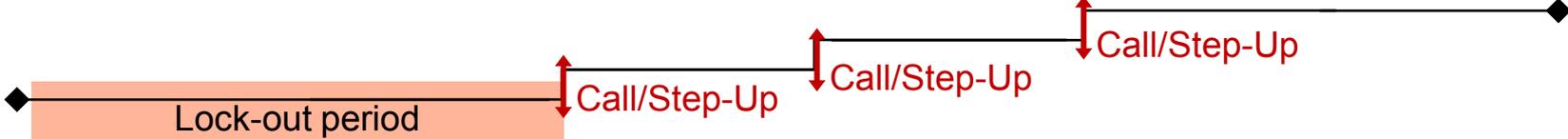
Offering Price

- Investors must be able to determine the appropriate price for both the security and the call option

- "Option Adjusted Spread Analysis"

  – Premium/Discount

  – Yield to Call

  – Yield to Maturity

  – Yield on non-callable security

Option Adjusted Analysis

Source: Bloomberg

Market Conditions Affect Performance

- The agency (the issuer) will always act in their <u>own</u> best interest – which will be to the <u>investor's detriment</u>.

Possible Outcome	Why?	Impact on Investor
Bond gets called	**Rates are lower**	**Investor is forced to reinvest, but now at lower yields.**
Bond does not get called	**Rates are higher**	**Investor retains ownership, locked in until maturity, but in a market environment where rates are now higher (and investor wishes they did not own it).**

Investor losses either way

Why Callables Can Perform Poorly

3-Year Federal Agency Yield
January 1, 2002 – December 31, 2013

Source: Bloomberg
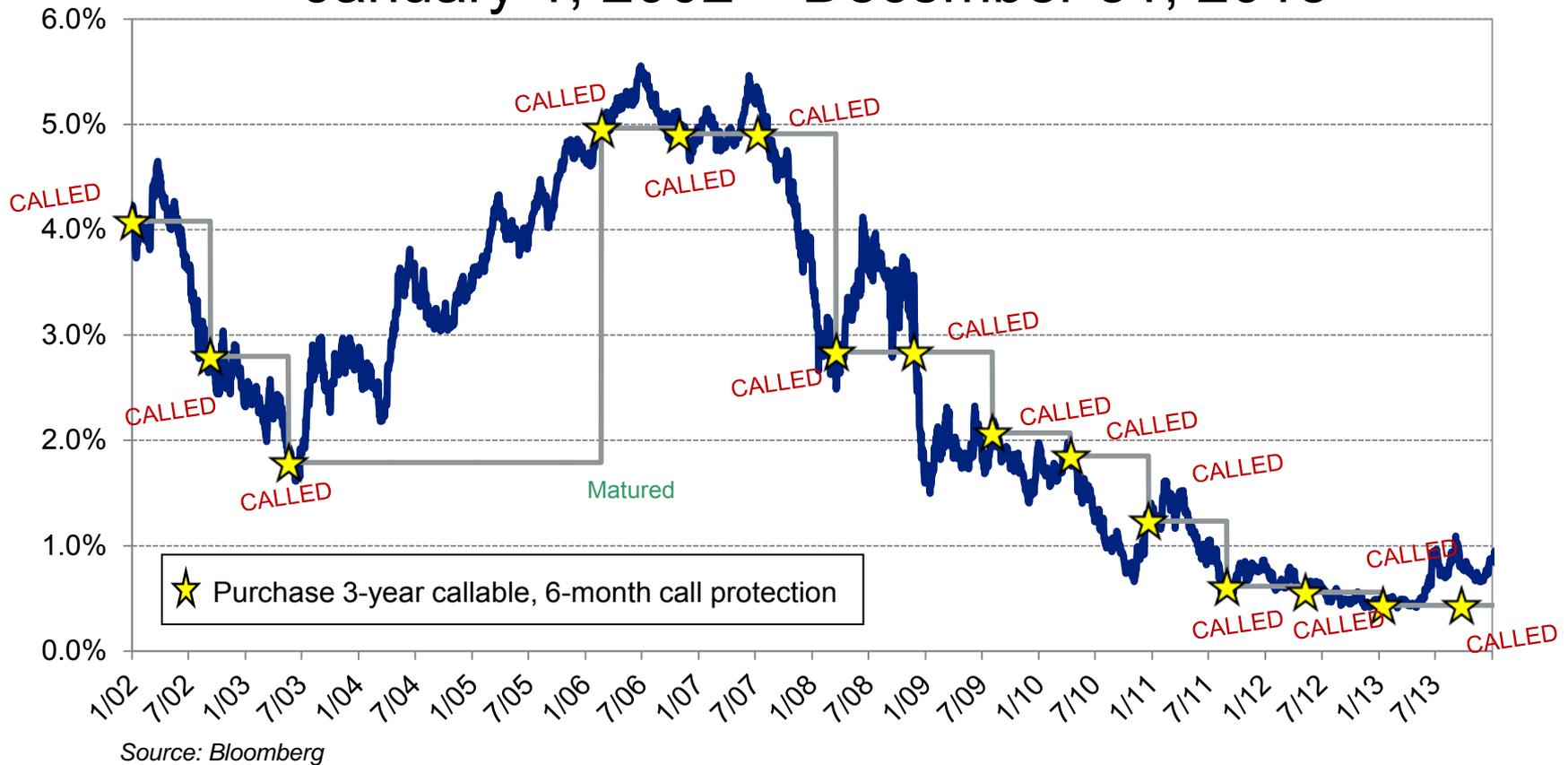
Mathematics Provide the Proof

- Example: 3-year non-call 6-month

    – If rates fall, the investment gets called, performs like a short 6-month maturity investment, and forces reinvestment at lower yields.

    – If rate rise, the investment does not get called, performs like a long 3-year maturity investment, loses market value (from higher rates) and forces the investor to hold an underperforming asset for the remaining full maturity.

    – This concept is called "negative convexity."

Negative Convexity
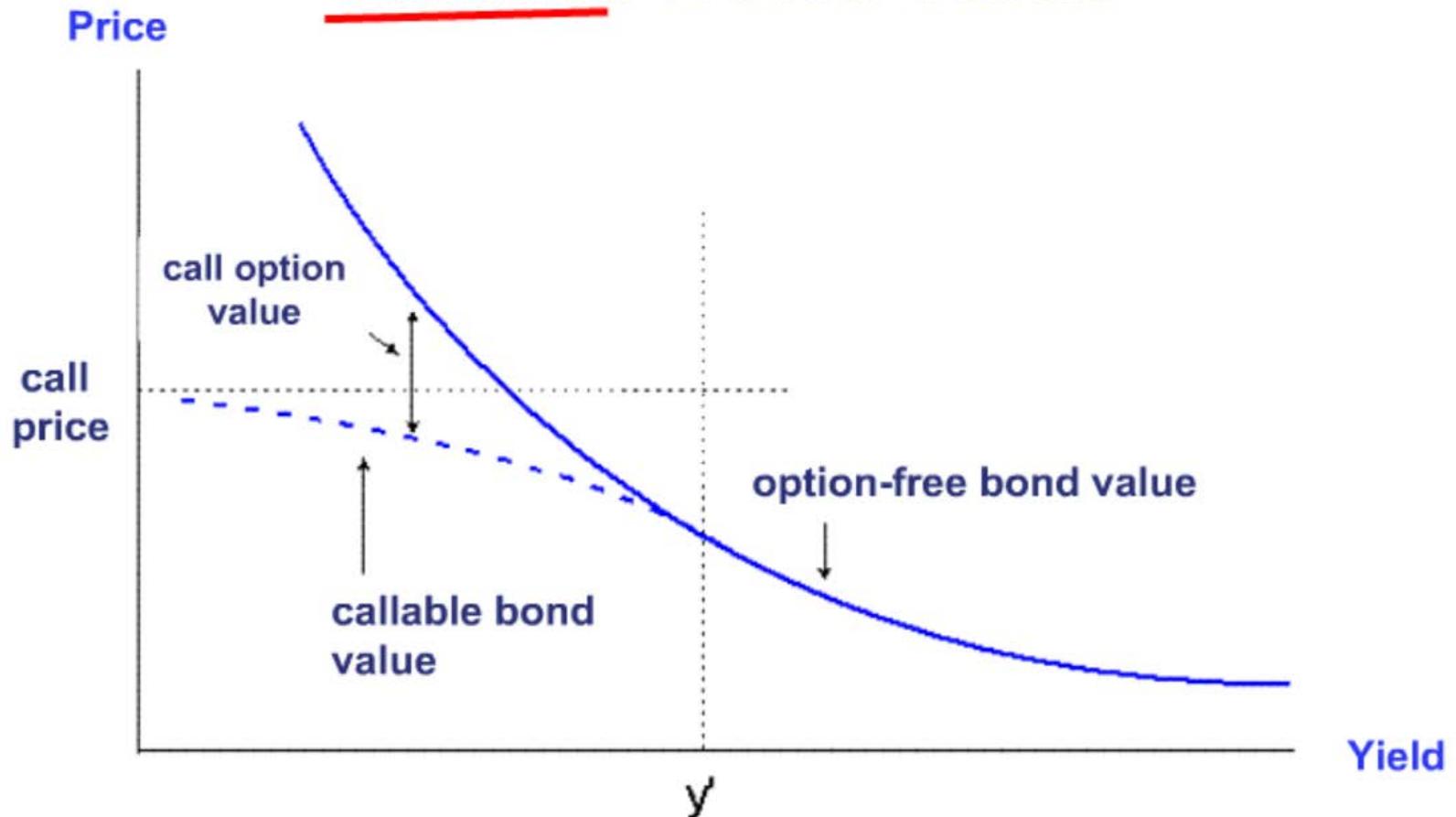
Image Source: Studyblue

When Will Callables Win?

- Callables may perform well:

    1. When the yield curve is flat, and

    2. When rates are stable, or

    3. When rates rise gradually (and then, only versus some alternatives)

Even then, the <u>maximum benefit the investor can gain in callables is the amount of the original extra yield spread.</u>

But, callables can underperform by much more . . .

Callables Have Historically Under-Performed

Small gains

Big losses

Source: Merrill Lynch Index data, 1-5 year maturity agencies
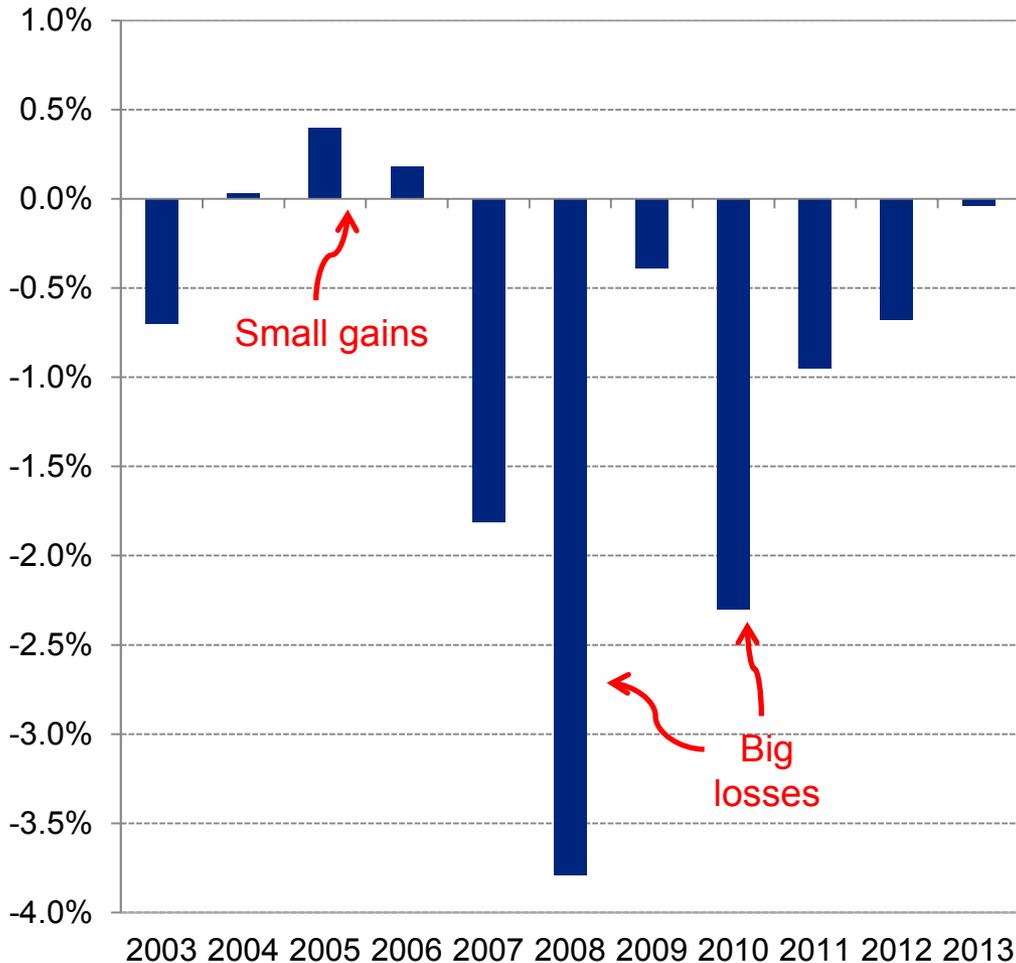
Annual Returns of Callable vs. Non-Callable Agencies

	Agency Callables	Agency Bullets	Difference
2003	1.82%	2.51%	-0.70%
2004	1.75%	1.71%	0.03%
2005	1.86%	1.46%	0.40%
2006	4.67%	4.49%	0.18%
2007	6.00%	7.81%	-1.81%
2008	4.84%	8.63%	-3.79%
2009	2.14%	2.53%	-0.39%
2010	1.24%	3.54%	-2.30%
2011	1.67%	2.62%	-0.95%
2012	0.85%	1.52%	-0.68%
2013	-0.01%	0.03%	-0.04%
	2.44%	3.35%	-0.91%

Shifting from callables to non-callables would have added nearly 1% annually to return over the past 10 years

Don't Callables Always Get Called?

- Yes, in flat or declining rate environments. But no, not in rising rate environments.

Time Period	# of Callable Issues in the 1-5 Year Market index *	# Called	% Called
As of 12/31/2010	341	314	92%
As of 12/31/2011	321	319	99%
As of 12/31/2012	331	235	71%
As of 12/31/2013	329	61	18%

Merrill Lynch 1-5 year U.S. Agency Index.. Call results as of 2/28/2014. Excludes securities no longer callable at the beginning of each time period.

A Steep Yield Curve Favors Bullets

U.S. Treasury Yield Curve as of
December 31, 2013
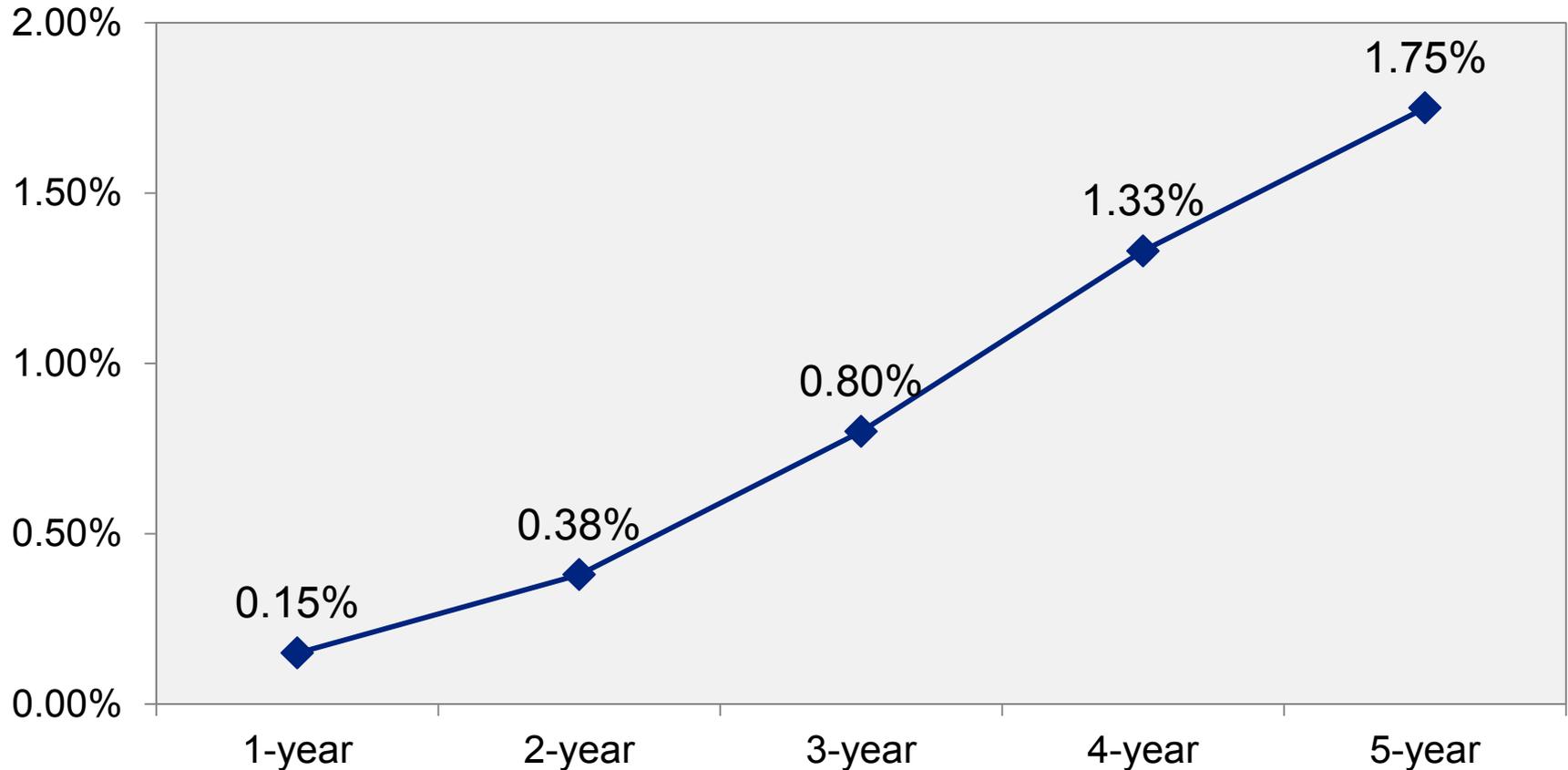
Source: Bloomberg Financial Markets

Benefit of "Roll Down"

Expected Returns for Various U.S. Treasury Maturities

	Coupon	Maturity	As of 12/31/2013		1st Year Impact*					
			Yield	Duration	Roll-down	Yield	+	Market Value Appreciation	=	Total Return
1-year	0.125%	12/31/14	0.15%	1.00	-	0.15%	+	-	=	0.15%
2-year	0.250%	12/31/15	0.38%	1.99	-0.23%	0.38%	+	0.23%	=	0.61%
3-year	0.875%	12/31/16	0.80%	2.96	-0.42%	0.80%	+	0.84%	=	1.64%
4-year	0.750%	12/31/17	1.33%	3.92	-0.53%	1.33%	+	1.57%	=	2.90%
5-year	1.500%	12/31/18	1.75%	4.79	-0.42%	1.75%	+	1.65%	=	3.40%

Assumes no change in interest rates over the year.
Source: Bloomberg Financial Markets

Example

5 Year Maturity Security Comparison
(At Callable Issuance Date 2/28/2012)

Security	Issuer Action	Quoted Yield
3.00 UST 2/28/2017	110.547	**0.84%**
5.00 FHLMC 02/16/2017	118.944	**1.07%**
1.15 FNMA (CALLABLE) 02/28/2017 5NC2YR, One time	100.000	1.15%

Results 2 Years Later

5YR US Treasury rates increased 0.82% over the period

Security	Issuer Action	Ending Price	Annualized Total Return
3.00 UST 2/28/2017	-	106.688	**0.93%**
5.00 FHLMC 02/16/2017	-	112.518	**1.46%**
1.15 FNMA (CALLABLE) 02/28/2017	Called	100.000	1.15%

What Happened?

Security	Market Consequences
U.S. Treasury	5-year became a 3-year; Treasury "rolled down the curve" and appreciated in value, but underperformed as rates increased across the curve.
Agency Bullet	5-year became a 3-year; "rolled down the curve" and appreciated in value. Benefited from the additional yield spread and spread contraction.
Agency Callable	Issue called; Investor earned the coupon, no price appreciation, forced to reinvest at new market rates

What About "Step-Up" Callables?

- A "Step-Up" callable starts with a lower coupon that steps up over time, if the bond is not called away.

Performance Characteristics:

- The best a step-up can generally do is <u>equal</u> the return of a standard fixed-coupon callable

- But, the initial coupon is LOWER (*the only one the investor is guaranteed to get*)

- Step-up coupons also INCREASE the likelihood of a future call (*just when you wanted to get the higher coupon*)

- Step-ups <u>almost always perform even worse</u> than standard callables

Examples

3-year Maturity Securities

Security	Coupon	Beginning Price	Quoted Yield
U.S. Treasury	1.125%	100.36	1.00%
Agency Bullet	1.50%	101.04	1.15%
Agency Callable (non-call 1-year)	1.40%	100.00	1.40%
Agency Step-Up Callable (non-call 1-year, Semi-annual calls thereafter)	0.75% for 1st year 1.40% for 2nd year 2.05% for 3rd year (Avg. Coupon 1.40%)	100.00	1.40%

Representative rates as of 06/30/2010.

Results: 1 Year Later

3-year Maturity Securities

Security	Issuer Action	Ending Price	Return *
U.S. Treasury	-	101.23	2.03%
Agency Bullet	-	101.87	2.30%
Agency Callable	Called	100.00	1.40%
Agency Step-Up Callable	Called	100.00	0.75%

Based on actual rates as of 6/30/2011; 1-year total return for period ending 6/30/2011.

What Happened?

Security	Market Consequences
U.S. Treasury	3-year became a 2-year; rates fell 0.20%; Treasury "rolled down the curve" and appreciated in value.
Agency Bullet	3-year became a 2-year; rates fell; agency spread narrowed by 0.02%; "rolled down the curve" and appreciated in value.
Agency Callable	Issue called; Investor earned the coupon, but is now forced to reinvest at lower yields.
Agency Step-Up Callable	Issue called; Only earned the initial 1st coupon rate of 0.75%; Investor forced to reinvest.

Summary

- Callables offer higher initial yields, but much of the perceived benefit is "fool's gold."

- Using callables means uncertain cash flows – making it hard to match cash needs.

- Using callables results in variable durations – so risk management is made more difficult.

- Historical results show callables have underperformed over time, in some periods by a very wide margin.

- Step-up callables perform worse than standard ones.

- Mathematics favor "bullets" with a steep curve.

Disclosures

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