

# Interest Rate Futures and Options as Risk Management Tools

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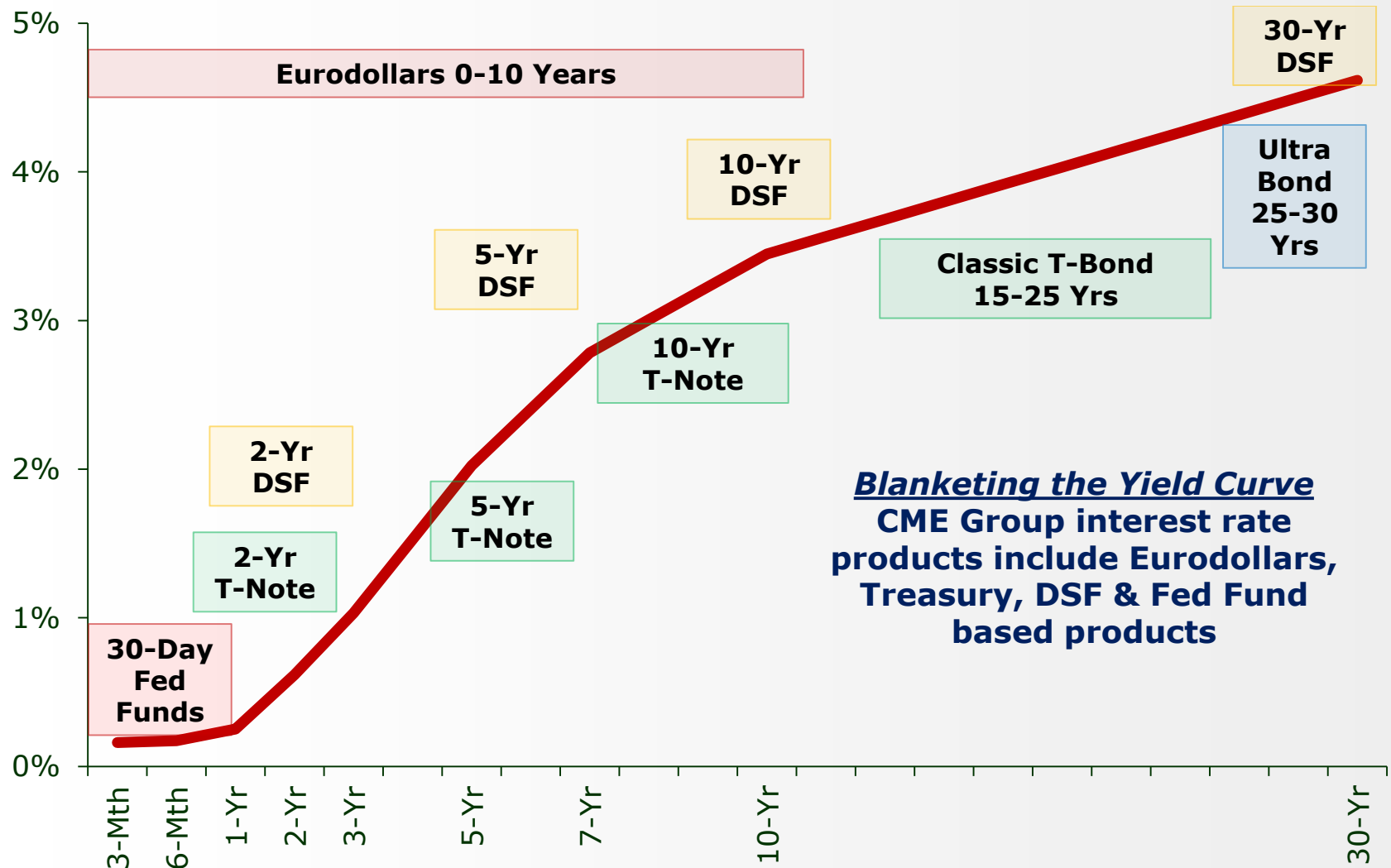
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# Outline

- **Understanding Treasury Futures**
- **Cheapest-to-Deliver (CTD) Security**
- **Risk Management Process**
- **Strategy Examples**
  - **Duration Adjustment**
  - **Managing Yield Curve Exposure**
  - **Adjusting Sector Weighting**
  - **Portfolio Hedging with Options**

# Interest Rate Risk Management Products



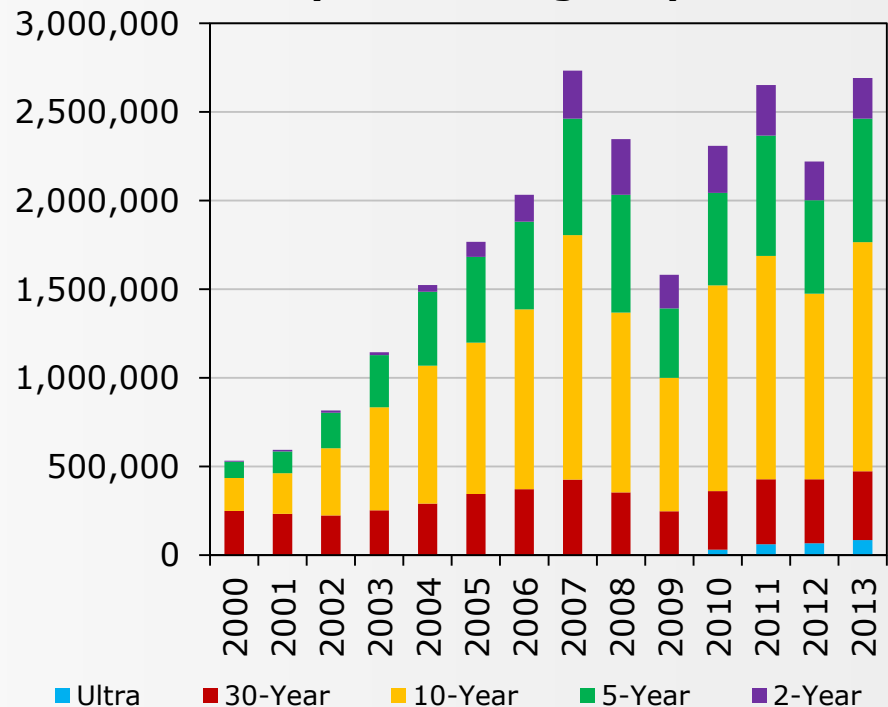
# Understanding Treasury Futures

## Treasury futures ...

- Generally calls for delivery of \$100,000 face value in “maturity window”
- I.e., 10-year futures call for delivery of T-notes with 6-1/2 to 10 years until maturity
- Quoted in % of par to 1/32<sup>nd</sup> or better, e.g., 99-08 means 99+8/32nds
- Invoice paid from long to short on delivery, where CF = price to yield 6%

$$\text{Invoice} \sim \frac{\text{Futures Price}}{\text{Conversion Factor (CF)}}$$

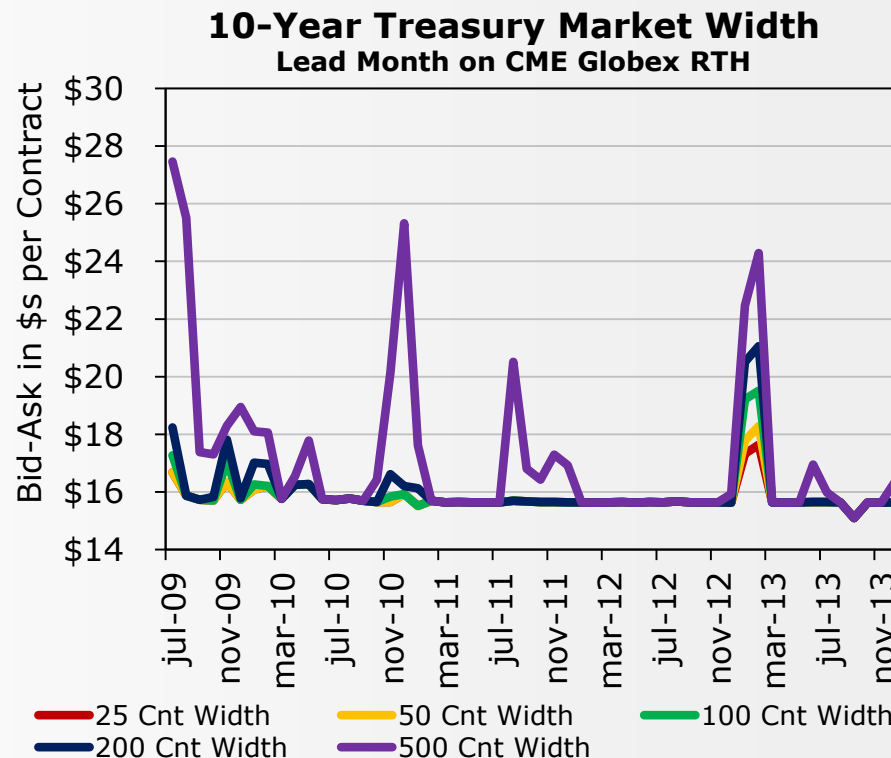
Treasury Futures Avg Daily Volume



# Understanding Treasury Futures

## *Market width...*

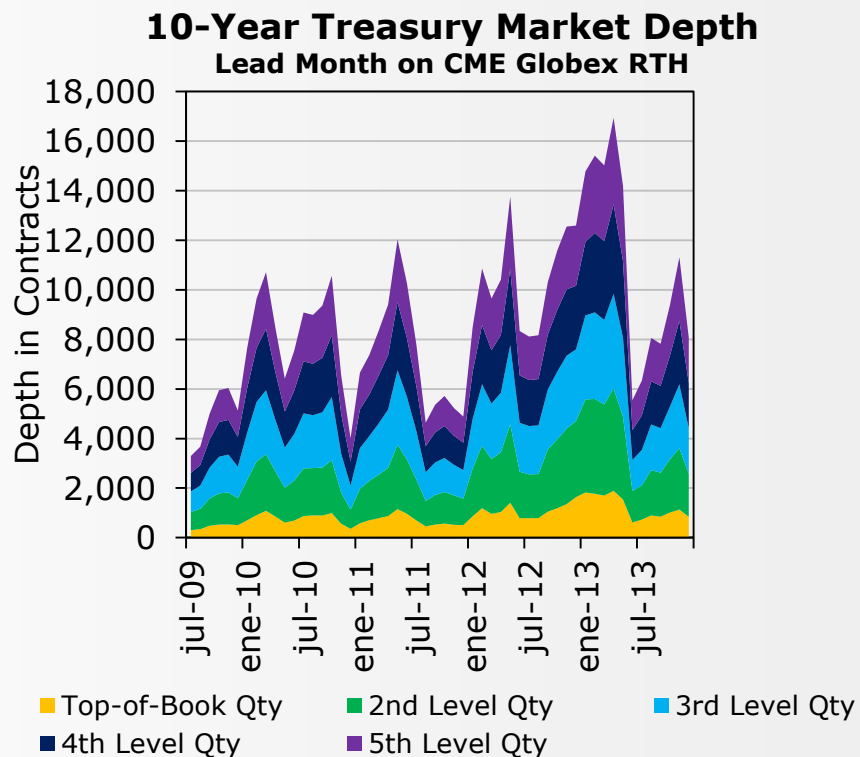
- Bid-ask spread for 500-lot order averaged \$16.33 in Dec-13
- Minimum tick = \$15.625



# Understanding Treasury Futures

## *Market depth ...*

- Top of the book market depth averaged 845 contracts in Dec-13



# Understanding Treasury Futures

	2-Year T-Note Futures	5-Year T-Note Futures	10-Year T-Note Futures	Classic T-Bond Futures	Ultra T-Bond Futures
<b>Contract Size</b>	\$200,000 value	\$100,000 face-value			
<b>Delivery Grade</b>	Notes with original maturity no greater than 5-1/4 years and remaining maturity of 1 3/4 to 2.0 years	Notes with original maturity no greater than 5-1/4 years and remaining maturity of at least 4 years, 2 months	Notes with original maturity no greater than 10 yrs and remaining maturity of at least 6-1/2 years	Bonds with remaining maturity of at least 15 years, but no more than 25 yrs	Bonds with remaining maturity of at least 25 yrs but no more than 30 yrs
<b>Invoice Price</b>	Invoice price = settlement price x conversion factor (CF) + accrued interest Where CF = hypothetical price to yield 6%				
<b>Price Quote</b>	1/4 <sup>th</sup> of 1/32 <sup>nd</sup> (\$15.625)	1/4 <sup>th</sup> of 1/32 <sup>nd</sup> (\$7.8125)	1/2 of 1/32 <sup>nd</sup> (\$15.625)	1/32 <sup>nd</sup> (\$31.25)	
<b>Symbols GLOBEX Bloomberg</b>	ZT TU	ZF FV	ZN TY	ZB US	UL WN



# Understanding Treasury Futures

## *Deliverable baskets vs. Dec-12 contracts ...*

Contract	# of Eligible Issues	Face Value of Deliverable Supply
2-Year Note	8	\$293 Billion
3-Year Note	4	\$140 Billion
5-Year Note	7	\$245 Billion
10-Year Note	16	\$902 Billion
Classic Bond	9	\$122 Billion
Ultra Bond	17	\$613 Billion

# Understanding Treasury Futures

## *Conversion factor invoicing system ...*

- **Conversion Factors (CF) = value of security to yield 6% (futures contract standard) as of 1<sup>st</sup> day of contract month**
- **Principle Invoice Amount paid from long to short upon delivery**
- **Accrued interest added to Principle Invoice Amount to calculate Total Invoice Amount**

$$\text{Principle Invoice} = \text{Futures Settlement} \times \text{CF} \times \$1,000$$

$$\text{Total Invoice} = \text{Principle Invoice} + \text{Accrued Interest}$$

- **Intent of CF invoicing system is to create basket of deliverable securities that is large, robust, insusceptible to manipulation**

# Understanding Treasury Futures

## Defining the “basis”

- Compare cash & adjusted futures prices ( $\approx$  principle invoice amount)
- Quoted in 32nds
- Low basis usually CTD

$$\text{Basis} = \text{Cash Price} - \text{Adjusted Futures}$$

$$\text{Adjusted Futures} = \text{Futures Price} \times \text{Conversion Factor (CF)}$$

	3-3/8%-19	1-3/4%-22
Cash Price	114-00 $\frac{3}{4}$	99-18 $\frac{3}{4}$
Futures Price	131-23+	131-23+
x CF	0.8604	0.7077
Adjusted Futures	~113-11	~93-072
Basis	21.7/32nds	203.4/32nds

# Understanding Treasury Futures

## *Cheapest to Deliver (CTD)*

- March 2013 10-year T-note futures @ 131-23+ on 1/10/13
- CTD generally is security with lowest basis or highest IRR

Coupon	Maturity	Price	Yield	CF	Basis	IRR
1-5/8%	11/15/22	97-18 <sup>3</sup> / <sub>4</sub>	1.895%	0.6867	227.966	-32.838%
1-5/8%	8/15/22	98-01 <sup>3</sup> / <sub>4</sub>	1.847%	0.6928	217.252	-31.092%
<b>1-3/4%</b>	<b>5/15/22</b>	<b>99-18<sup>3</sup>/<sub>4</sub></b>	<b>1.798%</b>	<b>0.7077</b>	<b>203.441</b>	<b>-28.414%</b>
2%	2/15/22	102-04 <sup>3</sup> / <sub>4</sub>	1.743%	0.7307	118.484	-25.314%
2%	11/15/21	102-17 <sup>3</sup> / <sub>4</sub>	1.688%	0.7367	176.191	-23.420%
2-1/8%	8/15/21	103-28 <sup>3</sup> / <sub>4</sub>	1.637%	0.7507	160.174	-20.744%
3-1/8%	5/15/21	112-05 <sup>3</sup> / <sub>4</sub>	1.562%	0.8194	135.569	-15.053%
3-5/8%	2/15/21	116-04 <sup>1</sup> / <sub>4</sub>	1.501%	0.8544	114.527	-11.469%
2-5/8%	11/15/20	108-18	1.465%	0.7985	107.923	-12.264%
2-5/8%	8/15/20	108-22	1.414%	0.8039	89.160	-9.727%
3-1/2%	5/15/20	115-01+	1.341%	0.8588	61.229	-4.829%
3-5/8%	2/15/20	115-25+	1.288%	0.8697	39.280	-1.923%
1-1/8%	12/31/19	98-27 <sup>3</sup> / <sub>4</sub>	1.295%	0.7326	75.475	-10.165%
1%	11/30/19	98-05 <sup>3</sup> / <sub>4</sub>	1.277%	0.7341	47.151	-6.095%
<b>3-3/8%</b>	<b>11/15/19</b>	<b>114-00<sup>3</sup>/<sub>4</sub></b>	<b>1.232%</b>	<b>0.8604</b>	<b>21.734</b>	<b>0.121%</b>
1-1/4%	10/31/19	99-31 <sup>3</sup> / <sub>4</sub>	1.251%	0.7477	49.085	-6.008%
1%	3/30/19	98-16 <sup>1</sup> / <sub>4</sub>	1.232%	0.7341	57.651	-7.637%

**Cheapest to Deliver (CTD)**

# Understanding Treasury Futures

## *Why is 1 security CTD?*

- **Cash Market Biases**

1. Reinvestment risks
2. Tax considerations
3. Shape of yield curve

**If yields > 6% →**

**Bias to long duration securities (i.e., low-coupon, long-maturity)**

**If yields < 6% →**

**Bias to short duration securities (i.e., high-coupon, short-maturity)**

- **Conversion Factor Biases**

1. Dominates when yields depart from 6%

# Risk Management Process

## *Risk management process in 4 steps ...*

- 1. Assess market risks and opportunities**
- 2. Assess portfolio risks relative to benchmark**
- 3. Pursue return (or “alpha”) by managing ...**
  - **Duration risk**
  - **Yield curve exposure**
  - **Sector weighting strategy**
  - **Security selection**
- 4. Implement strategy**

# Assess Portfolio Risk Relative to Benchmark

## *Breakeven analysis...*

- Breakeven (B/E) rate analysis asks ... how far must rates rise before price decline offsets 1 year of coupon income and investor breaks even?
- May be estimated as yield divided by duration
- *E.g.*, Treasury return = 0 if rates rise 26 basis points

## Breakeven (B/E) Rate Analysis (12/31/13)

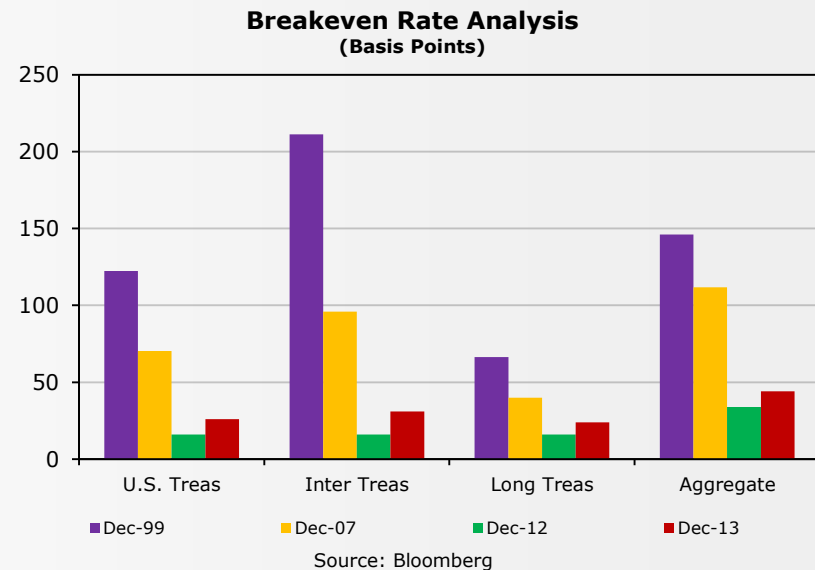
Barcap Index	2013 Return	Duration (Years)	Yield	B/E Rate Advance
U.S. Treasury	-2.8%	5.6	1.44%	26 bps
Intermediate Treasury	-1.3%	3.7	1.15%	31 bps
Long Treasury	-12.7%	16.1	3.79%	24 bps
Aggregate	-2.0%	5.6	2.48%	44 bps

Source: Barclays Capital, Bloomberg

# Assess Portfolio Risk Relative to Benchmark

## *Breakeven analysis...*

- **B/E Rate Advances** backing off all-time historical lows
- This point, coupled with the tapering and magnitude of outstanding Treasury issuance suggests potential risk borne by Treasury investors





# Duration Management Case Study

## *Fixed income portfolio impacted by rising/falling rates ...*

- Duration is most efficient way of measuring portfolio risk
- *E.g.*, portfolio with duration = 4 years may lose 4% if rates increase 100 basis points (1.00%)
- Asset managers may target portfolio duration to a performance benchmark or “bogey” to keep pace
- OR, may extend (shorten) duration in anticipation of falling (rising) rates ... enhancing returns or “alpha”

**If interest rates  
expected to decline**



**Extend portfolio duration  
in anticipation of price advance**

**If interest rates  
expected to advance**



**Reduce portfolio duration  
in anticipation of price decline**

# Duration Management Case Study

## What is *BPV of Treasury Futures*?

*Since the Invoice Price = Futures Price (FP) x Conversion Factor(CF)*

*And at delivery time the Invoice Price will be approx = CTD Price*

*Then prior to delivery.....*

$$BPV_{\text{ctd}} = \Delta FP \times CF_{\text{ctd}}$$

*And re-arranging.....*

$$BPV_{\text{futures}} = BPV_{\text{CTD}} / CF_{\text{ctd}}$$

# Duration Management Case Study

## *Adjust duration with futures.....*

- “Hedge ratio” (HR) = no. of futures needed to adjust duration of security or portfolio

$$HR = [(D_{\text{target}} - D_{\text{current}}) \div D_{\text{current}}] \times [BPV_{\text{portfolio}} \div (BPV_{\text{ctd}} / CF_{\text{ctd}})]$$

*Where*

$D_{\text{target}}$  = Target duration

$D_{\text{current}}$  = Current duration of portfolio

$BPV_{\text{portfolio}}$  = Basis point value of portfolio

$BPV_{\text{ctd}}$  = Basis point value of cheapest-to-deliver security vs. futures

$CF_{\text{ctd}}$  = Conversion factor of CTD security

# Duration Management Case Study

## *Decrease duration in anticipation of rising rates .....*

- Asset manager has portfolio with duration of 4 yrs and wants to reduce duration to 3 yrs
- \$1 billion portfolio
- BPV of \$400,000
- Which Contract? 2-, 5-, 10-, 30-year or Ultra Treasury futures
  1. Segment portfolio and Benchmark into defined maturity buckets or...
  2. 5-year futures most closely matched to 4-year duration
- As of Dec 2013, CTD was 1%-18 vs. Mar-14 5-year T-note futures
  - $BPV_{ctd} = \$43.70$  per \$100,000 face value;  $CF_{ctd} = 0.8180$

$$HR = [(3 - 4) \div 4] \times [\$400,000 \div (\$43.70 / 0.8180)]$$

$$= -1872 \text{ or } \text{Sell } 1,872 \text{ futures}$$

# Duration Management Case Study

## *Decrease duration in anticipation of rising rates ...*

- If yields rise by 100 basis points, portfolio value may decline by 3% or \$30 million
- But this is preferable to 4% or \$40 million decline if duration unadjusted
- \$1 million or 100 basis points (1.00%) represents “alpha” or enhanced return

**Sell 1872 Five-year  
T-note futures**



**Reduces portfolio duration  
from 4 to 3 years**

# Duration Management Case Study

*What are the key factors to monitor when hedging?*

- Change in CTD and Basis
- Change in BPV of portfolio relative to BPV of Future (ie convexity)
- Change in performance benchmark characteristics
- Change in Investment team's expectations/objectives

**Hedge  
Management**



**A dynamic process**

# Yield Curve Exposure Case Study

## *Changing yield curve shape as source of alpha ...*

- “Bullet,” “barbell” or “ladder” portfolio
  - Bullet uses portfolio of securities with durations centered near single point
  - Barbell uses combination of long and short duration securities
  - Ladder uses securities evenly distributed across yield curve
- Anticipated change in shape of curve may drive strategy

Yield curve expected  
to steepen

→ Bullet portfolio

Yield curve expected  
to flatten or invert

→ Barbell portfolio

- Or use futures “overlay” strategy w/o altering portfolio structure

Yield curve expected to  
steepen

→

“Buy the curve,” i.e.,  
buy S-T and sell L-T futures

Yield curve expected to  
flatten or invert

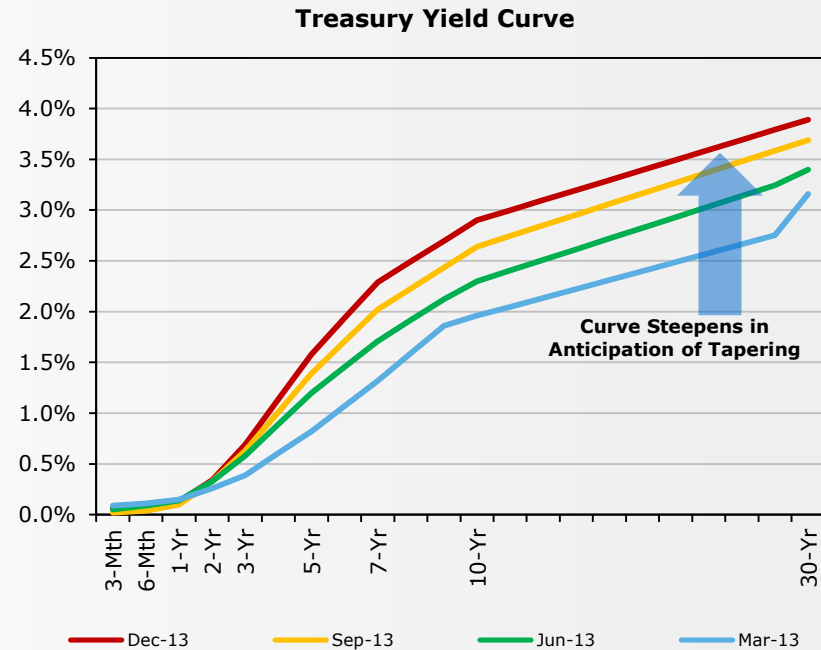
→

“Sell the curve,” i.e.,  
sell S-T and buy L-T futures

# Yield Curve Exposure Case Study

## *Will curve steepen?*

- Spread between 10- and 2-year notes was 250 basis points as of Dec 2013
- Expectation of steepening yield curve
  - (1) Tapering
  - (2) Low Fed Funds rate
  - (3) Recovery with growing inflationary expectations





# Yield Curve Exposure Case Study

*Enhance returns on changing shape of yield curve ...*

- Use 10-year/2-year Treasury spread to trade curve
- “Spread ratio” (SR), or no. of S-T and L-T Treasury futures to trade curve calculated as

$$SR = BPV_{10\text{-yr futures}} \div BPV_{2\text{-yr futures}}$$

*Where*

$BPV_{10\text{-yr futures}}$  = Basis point value of 10-year T-note futures

$BPV_{2\text{-yr futures}}$  = Basis point value of 2-year T-note futures

# Yield Curve Exposure Case Study

*Buy the curve in anticipation of curve steepening .....*

- **CTD was 2-5/8%-20 vs. Mar-14 10-yr T-note futures**

- **$BPV_{\text{ctd}} = \$65.20$  per \$100,000 FV ...  $CF_{\text{ctd}} = 0.8205$**

$$BPV_{10\text{-yr futures}} = \$65.20 \div 0.8205 = \$79.46$$

- **CTD was 2-1/8%-15 vs. Mar-14 2-yr T-note futures**

- **$BPV_{\text{ctd}} = \$42.20$  per \$200,000 FV;  $CF_{\text{ctd}} = 0.9365$**

$$BPV_{2\text{-yr futures}} = \$42.20 \div 0.9365 = \$45.06$$

- **Buy 1.76 2-year contracts for every 10-year contract purchased**

$$SR = \$79.46 \div \$45.06 = 1.76$$

Dec 2013 Data

# Yield Curve Exposure Case Study

*Buy the curve in anticipation of curve steepening ...*

- Asset manager wants to limit risk to \$1MM if 10-year/2-year spread flattens by 30 basis points
- THUS ... buy 737 Two-year futures vs. sell of 419 Ten-year futures
  - 419 ten year futures =  $(\$1,000,000 \div 30 \text{ bps}) \div \$79.46 \text{ BPV}$
  - 738 two year futures =  $1.76 \times 419 \text{ contracts}$
  - If 2-year rates rise 10 bps and 10-year rates rise 50 bps
    - 738 long 2-year futures **lose \$332,543** ( $= 738 \times 10 \text{ bps} \times \$45.06$ )
    - 419 short 10-year futures **gain \$1,664,687** ( $= 419 \times 50 \text{ bps} \times \$79.46$ )
- Net Gain of \$1,332,595 or ~13 bps of alpha on \$1 Billion portfolio

**Buy 738 Two-year T-note futures &  
sell 419 Ten-year T-note futures**



**“Buying the curve” enhances  
return if curve steepens**

Note:

CTD of 10yr is a 7yr note yielding ~2.2%

CTD of 2 yr is 1 ¾ yr note yielding ~.30%

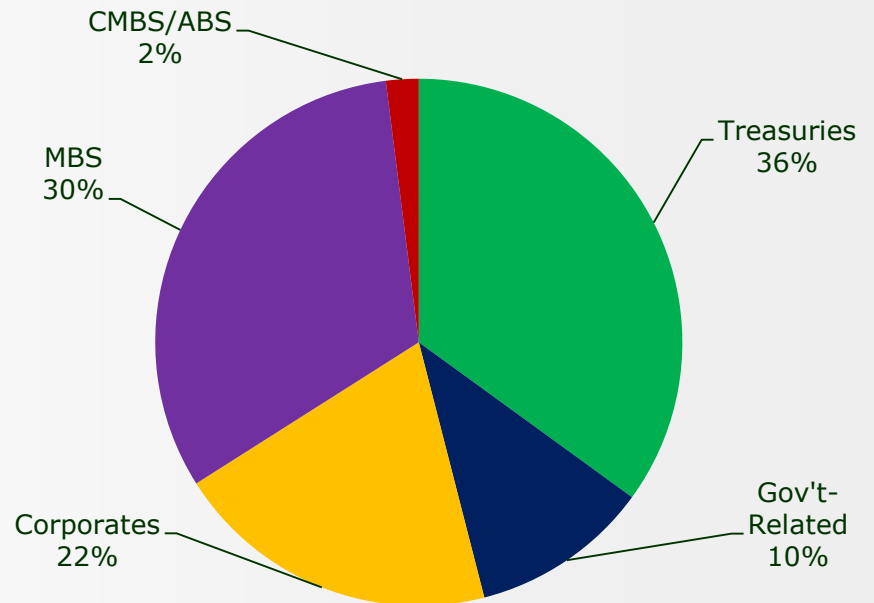
Thus.... the yield curve spread is between the 7.0 and 1.7 yr maturities

# Sector Weighting Case Study

## Benchmark ...

- Barclays Capital U.S. Aggregate Bond Index is popular benchmark or “bogey” for fixed income performance
- Asset managers may conform portfolio to composition of benchmark to prevent under-performance
- This strategy precludes enhancing yields above benchmark

**Barclays U.S. Aggregate Bond Index  
(2014)**



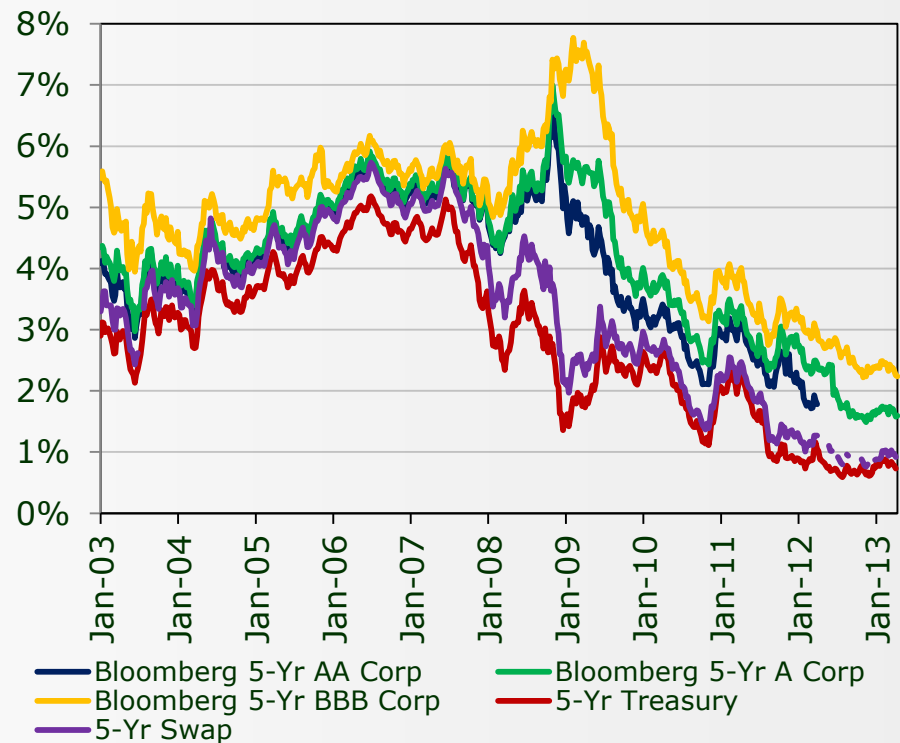
Source: Barclays Capital

# Sector Weighting Case Study

## *Five-year yields ...*

- Interest rate swap (IRS) rates generally parallel corporate yields
- Divergence occurred at height of subprime crisis but tracking has since improved

**Corporates, Treasuries & Swaps**



# Sector Weighting Case Study

## *Swaps & corporates ...*

- Swap rates correlated with corporate yields
- Highest correlation with high quality corporate issues
- **THUS ... deliverable swap futures (DSFs) may be reasonable proxy for corporate bond exposure**

## **Correlation of Weekly Yield Fluctuations of 10-Year Swap Rates w/ Corp Bond Yields (Dec-10 thru Dec-13)**

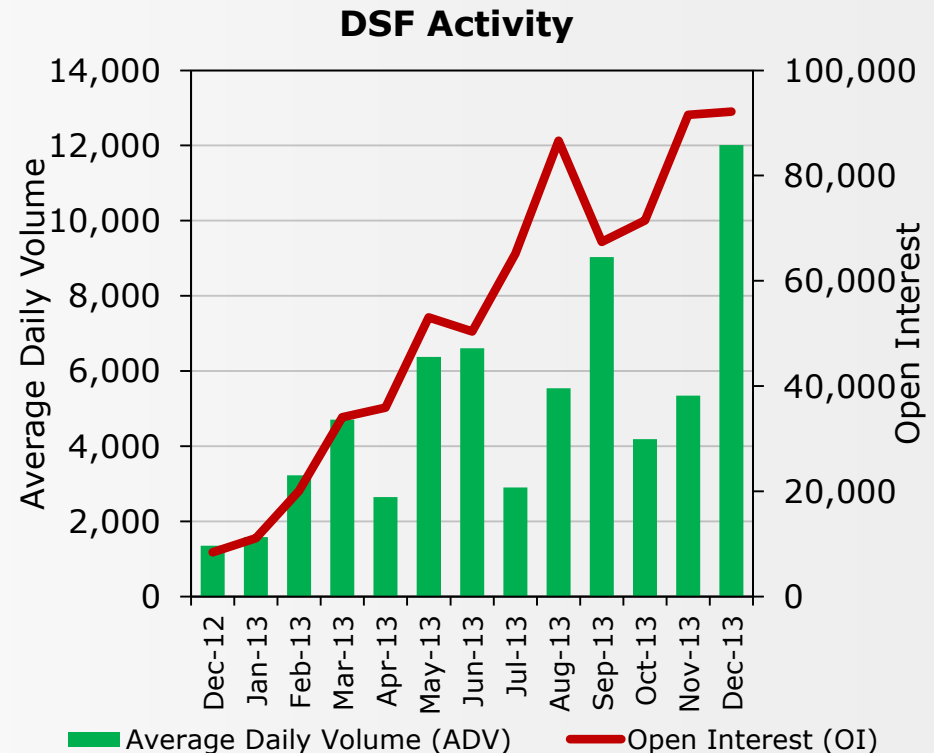
<b>AA Industrials</b>	0.88
<b>A Industrials</b>	0.84
<b>BBB Industrials</b>	0.79
<b>BB Industrials</b>	0.63

Source: Bloomberg

# Understanding Deliverable Swap Futures (DSF)

## Key benefits ...

- **DSF launched 12/3/12 with strong initial results**
- **Featuring flexible execution thru Globex, blocks, EFPs, open outcry**
- **Risk offsets vs. Eurodollar & Treasury futures**
- **Simple futures documentation, reporting and infrastructure**
- **Generally ½ bps wide markets**
- **Used by banks, hedge funds, asset mgrs, prop shops**



# Understanding Deliverable Swap Futures (DSF)

## DSF Basics ...

- DSFs call for delivery of 2-, 5-, 10- or 30-year \$100,000 face value IRS cleared by CME Clearing House
- Coupons fixed by Exchange near market rates, e.g., 0.5%, 1.0%, 1.5%
- Delivery on Monday prior to 3<sup>rd</sup> Wednesday in March, June, Sep, Dec
- Quoted as 100% of par + Non-Par Value (NPV) of delivered swap ... NPV paid upon delivery as IRS established by book entry at Clearing House

Rates > DSF Coupon → NPV is negative (-) & DSF Quote < Par

Rates < DSF Coupon → NPV is positive (+) & DSF Quote > Par

## Reference Conventions

DSF Contracts	Delivered or Actual IRS	Delivery
Buyer (Long)	Fixed Rate Receiver (Floating Rate Payer)	“Takes” Delivery
Seller (Short)	Fixed Rate Payer (Floating Rate Receiver)	“Makes” Delivery



# Understanding Deliverable Swap Futures (DSF)

## *DSF fixed coupon rate...*

- Fixed by Exchange near market rates, e.g., 0.50%, 1.00%, 1.50%, etc.
- ISDA announced Market Agreed Coupon (MAC) system after DSFs debuted, *i.e.*, OTC swaps with specified coupons
- DSFs now synched with MAC
- More evidence of “futurization” or convergence of OTC and futures market practices

**DSF Coupon Rates**

Tenor	Sep-13	Dec-13	Mar-14	Jun-14
2-Yr	0.50%	0.50%	0.75%	0.75%
5-Yr	1.25%	1.50%	2.00%	2.00%
10-Yr	2.25%	2.50%	3.25%	3.00%
30-Yr	3.00%	3.25%	3.75%	3.75%

# Deliverable Swap Futures- Price to Yield Analytics

[cmegroup.com/trading/interest-rates/dsf-analytics](http://cmegroup.com/trading/interest-rates/dsf-analytics)

CME Ticker	Bloomberg Ticker	DSF Pricing					Timestamp
		Price	Coupon	PV01	NPV	Implied Rate	
T1UH4 2Y	CTPH4	100'170	0.750%	\$20.01	\$531.25	0.4845%	1:15:02 PM CT 3/5/2014
F1UH4 5Y	CFPH4	101'220	2.000%	\$48.86	\$1,687.50	1.6546%	1:15:02 PM CT 3/5/2014
N1UH4 10Y	CNPH4	103'310	3.250%	\$91.11	\$3,968.75	2.8144%	1:15:02 PM CT 3/5/2014
B1UH4 30Y	CBPH4	102'180	3.750%	\$195.94	\$2,562.50	3.6192%	1:15:02 PM CT 3/5/2014
T1UM4 2Y	CTPM4	100'092	0.750%	\$19.98	\$289.06	0.6054%	1:15:02 PM CT 3/5/2014
F1UM4 5Y	CFPM4	100'285	2.000%	\$48.66	\$890.62	1.8170%	1:15:02 PM CT 3/5/2014
N1UM4 10Y	CNPM4	100'230	3.000%	\$90.52	\$718.75	2.9206%	1:15:02 PM CT 3/5/2014
B1UM4 30Y	CBPM4	101'210	3.750%	\$194.32	\$1,656.25	3.6648%	1:15:02 PM CT 3/5/2014

# Sector Weighting Case Study

## *Rotating between sectors to generate alpha.....*

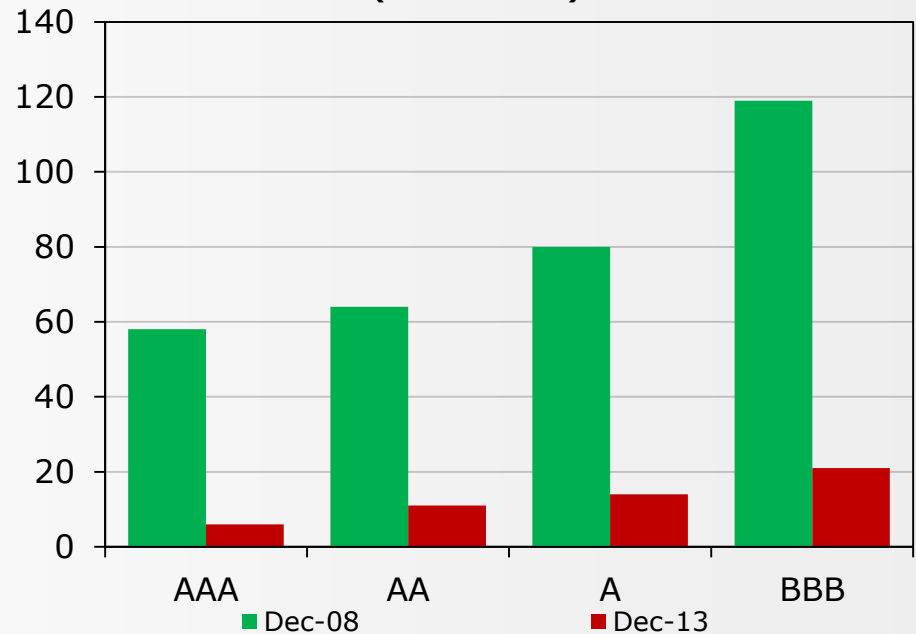
- Liquidate securities in one sector and buy securities in other sector
- OR ... use futures “overlay” strategy to reallocate investment between sectors w/o disturbing portfolio
- *E.g.*, sell Treasury futures & buy Deliverable Swap Futures (DSFs) to reallocate from Treasuries to corporates
- DSFs might be used as proxy for investment grade corporate exposure noting unavailability of corporate bond futures

# Sector Weighting Case Study

## *Breakeven analysis...*

- **B/E Rate Advances** are backing off all-time historical lows
- **Corporate investors** are more vulnerable to widening credit spreads than ever before

**Corporate Spread B/E Analysis**  
(Basis Points)



Source: Bloomberg

# Sector Weighting Case Study

1. How much risk or BPV do you want to shift?
2. Which part of the yield curve?
3. What is BPV of the Treasury Future?
4. How many Treasury Contracts to Transfer Risk Equivalent?
5. How many DSFs to be duration neutral?

**Set Up Hedge → Answer Key Questions**

# Sector Weighting Case Study

## *Buy 10-year Treasury and sell 10-year DSFs ...*

- (1) Asset mgr wants to shift 10% of \$1 billion portfolio to Treasuries from corporates as of Nov '13
  - $BPV_{\text{portfolio}} = \$400,000$  so 10% is \$40,000
- (2) Asset mgr believes 10 yr maturity is most vulnerable to widening
- (3)  $BPV_{\text{treas future}} = \text{CTD for Dec-13 10-yr note futures was } 2\text{-}1/8\%\text{-}20$  with a BPV of \$63.20 divided by CF of 0.7939 = \$79.60
- (4) 502 Treas futures = \$40,000 in risk exposure (ie  $\$40,000 / \$79.60$ )
- (5)  $BPV_{\text{swap future}} = 10\text{-yr DSF BPV for Dec-13} = \$76.88$ 
  - Spread Ratio (SR) =  $(BPV_{\text{Treas fut}} / BPV_{\text{DSF}} = 79.69 / \$76.88 = 1.04$
  - 522 10 yr DSFs =  $1.04 \times 502$  10 yr Treas

**Buy 502 Ten-year Treasury futures & sell 522 Ten-year DSFs → Effectively rotates 10% of portfolio duration from corporates to Treasuries**

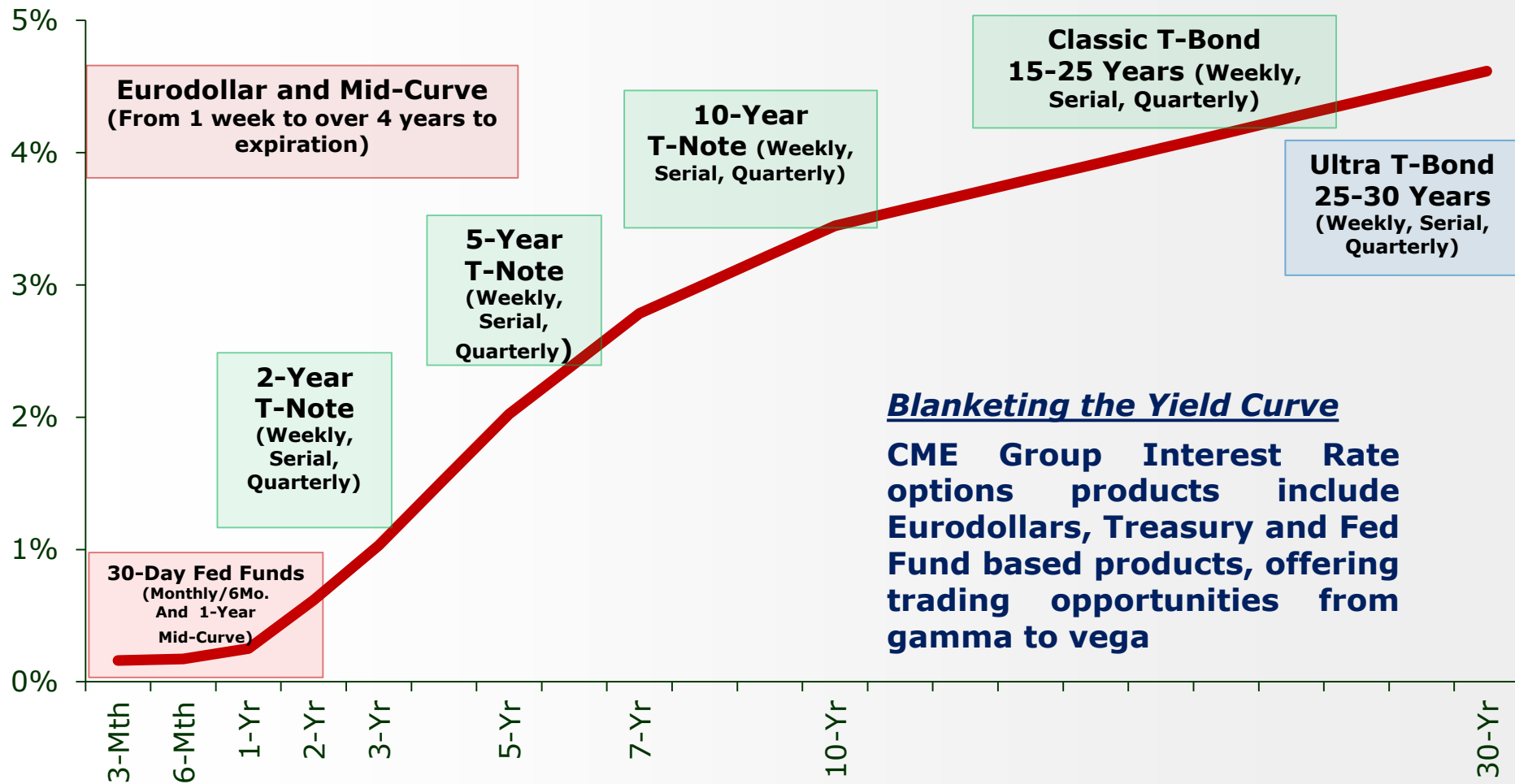
**Result: If swap yield spreads widen by 10 bps relative to Treasuries, this adds \$401,313 or 4 bps of “alpha” ...  $[(\$76.88 \times 10 \text{ bps} \times 522 \text{ contracts}) / \$1 \text{ billion}]$**

# Sector Weighting Case Study

## *Summary...*

- Spread 10-year DSF vs 10-year Treasury futures in appropriate ratio
  - Swap Spreads Widening → SELL 10-year DSFs & BUY 10-year Treasury futures
  - Swap Spreads Narrowing → BUY 10-year DSFs & SELL 10-year Treasury futures
- Primarily a credit spread ... but with yield curve element driven by maturity of CTD Treasury security

# Portfolio Hedging with Options



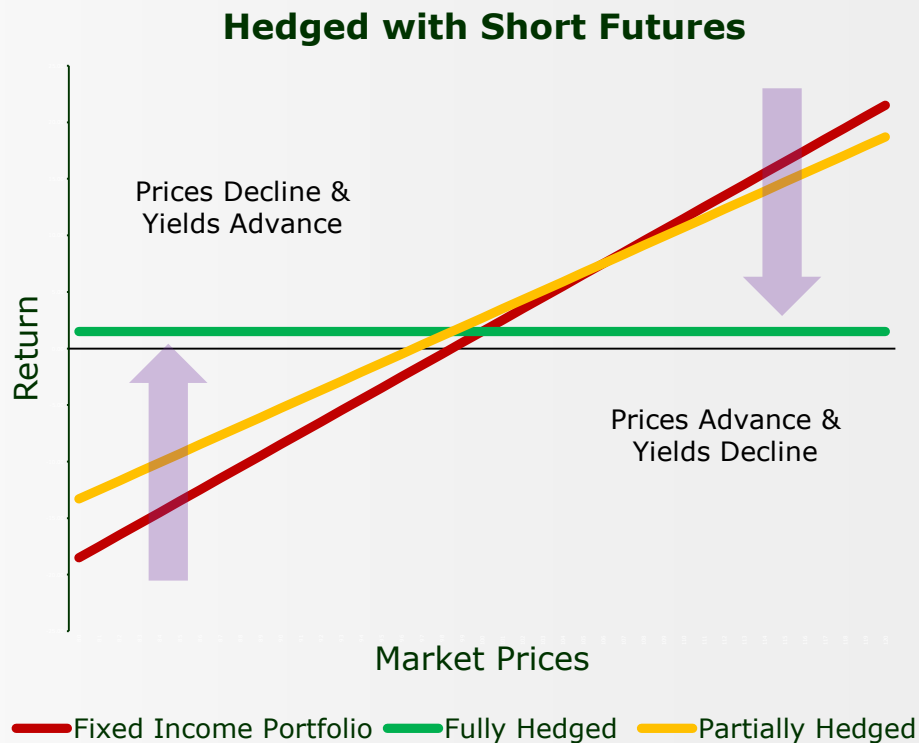


# Portfolio Hedging with Options

## Short futures hedge ...

- “Partially hedge” by reducing duration
- “Fully hedge” by reducing duration to near zero
- **THUS ... turn long-term into short-term investment and earn short-term rate of return**

**Sell futures → Reduce portfolio risk measured by duration**



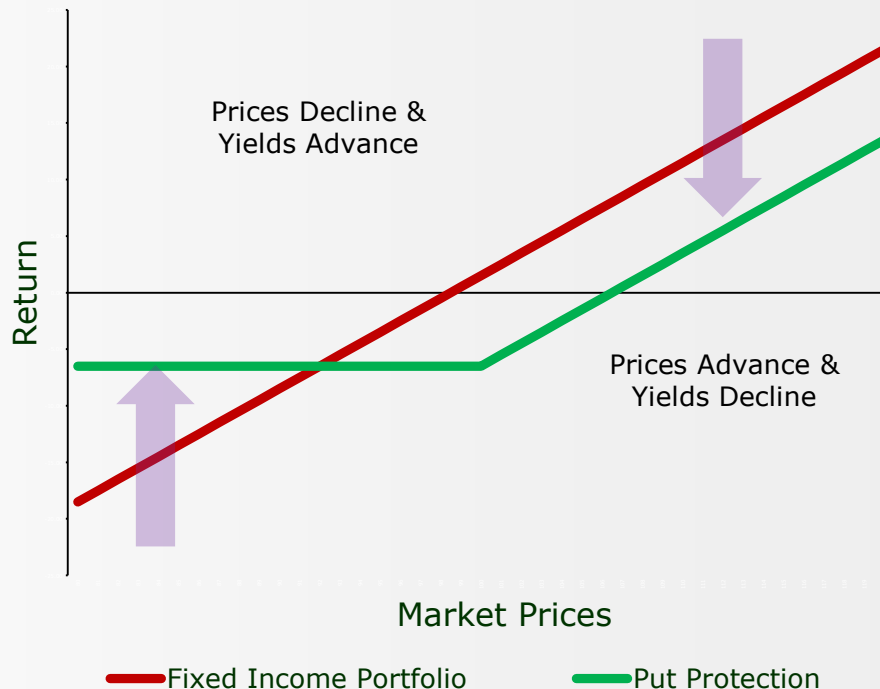
# Portfolio Hedging with Options

## *Long put hedge ...*

- Long fixed income portfolio + long put options = “synthetic” long call

**Buy puts → Lock-in floor return & retain upside potential**

### Buying Put Protection

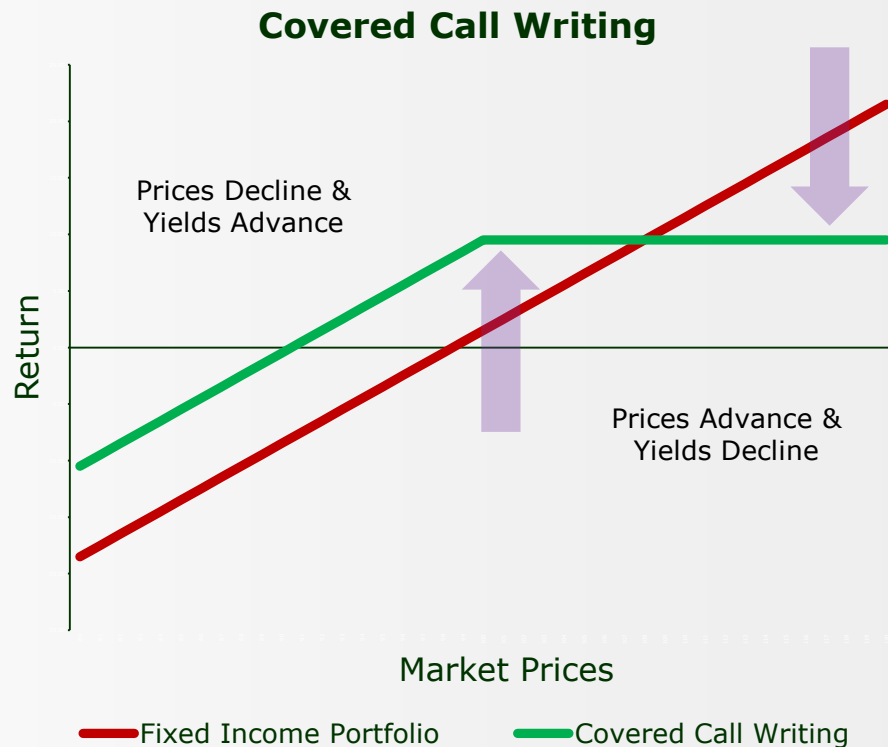


# Portfolio Hedging with Options

## Short call hedge ...

- Long fixed income portfolio + short calls = “synthetic” short put
- OR ... “covered call writing” because contingent obligation to deliver underlying on exercise of calls covered by long portfolio

**Sell calls → Enhances income in neutral market & lock-in ceiling return**



# Portfolio Hedging with Options

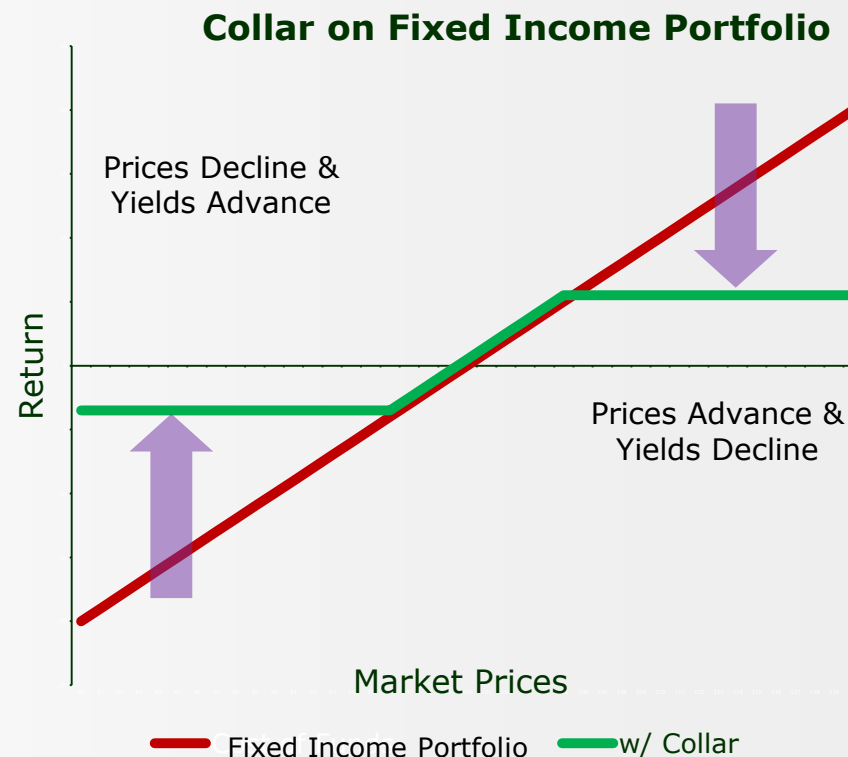
## Collar ...

- Collar constructed by buying out-of-the-money puts and selling out-of-the-money calls
- Short option helps fund long option

Buy out-of-the-money puts & sell out-of-the-money calls



Limits upside return & downside risk



# Portfolio Hedging with Options

## Matching Strategy with Forecast

- ***Optimal strategy ...***

- **No Single Strategy that is always superior**
- **Some judgement is required**
- **Should be put in context of market risks and relative benchmark risks**

	Bearish (Rising Rates)	Neutral (Stable Rates)	Bullish (Declining Rates)
1	Sell Futures	Sell Calls	Buy Puts
2	Buy Puts	Sell Futures	Sell Calls
3	Sell Calls	Buy Puts	Sell Futures

# Summary

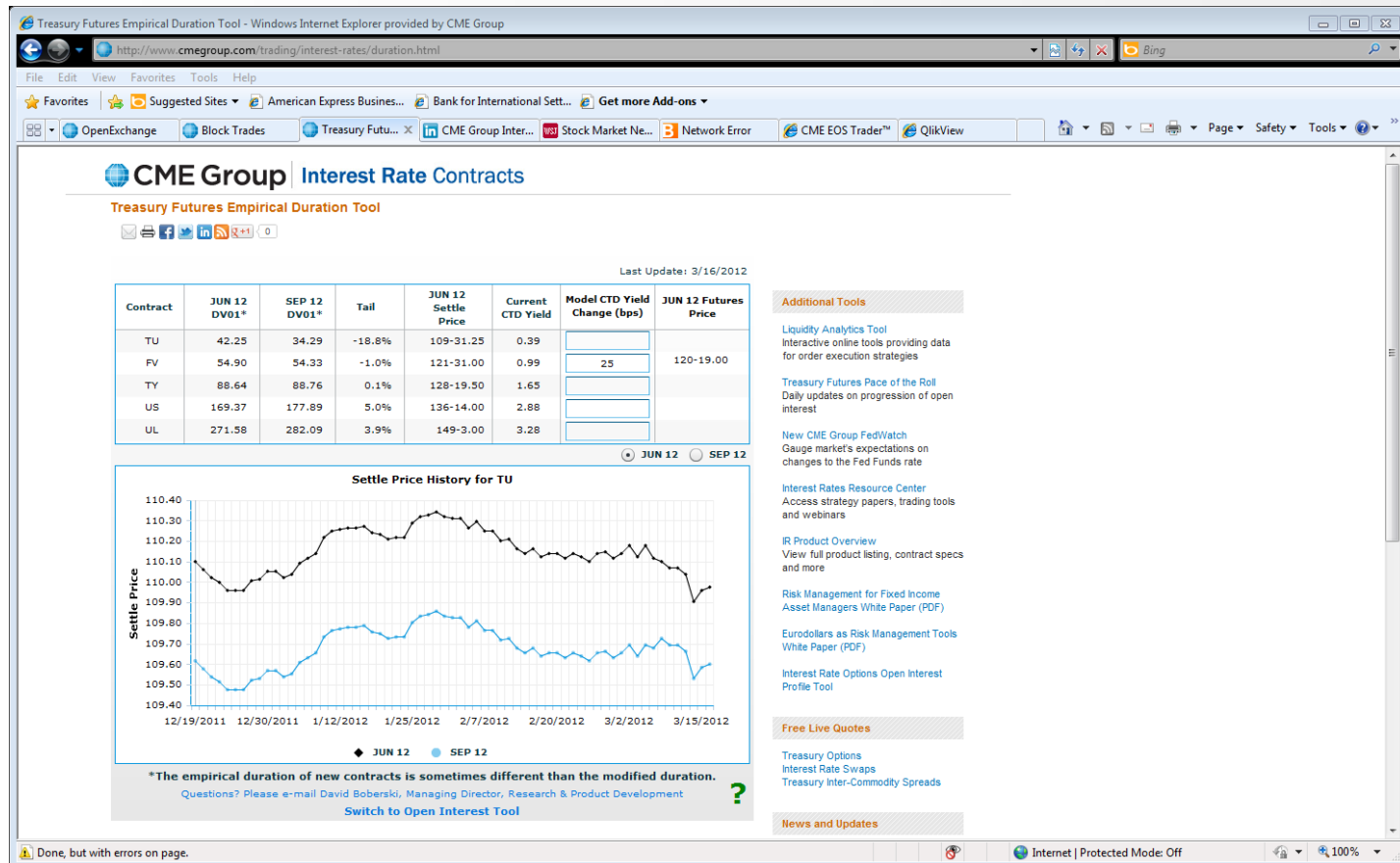
## *Strategies we have considered .....*

Objective	Strategy	Instrument(s)
Manage duration exposure	Reduce duration in face of rising rates by selling futures	5-year T-note futures
Yield curve management	“Buy the curve” in anticipation of steepening yield curve	2-year T-note & 10-year T-note futures
Shift risk exposure between market sectors	Reduce corporate exposure in favor of Treasury exposure	10-year T-note & 10-year DSFs
Augment Income	Sell call options	Options on Treasury futures
Create “floor” return	Buy put options	Options on Treasury futures

# Supplementary Slides-CME Analytical Tools

# Empirical Duration of Treasury Futures

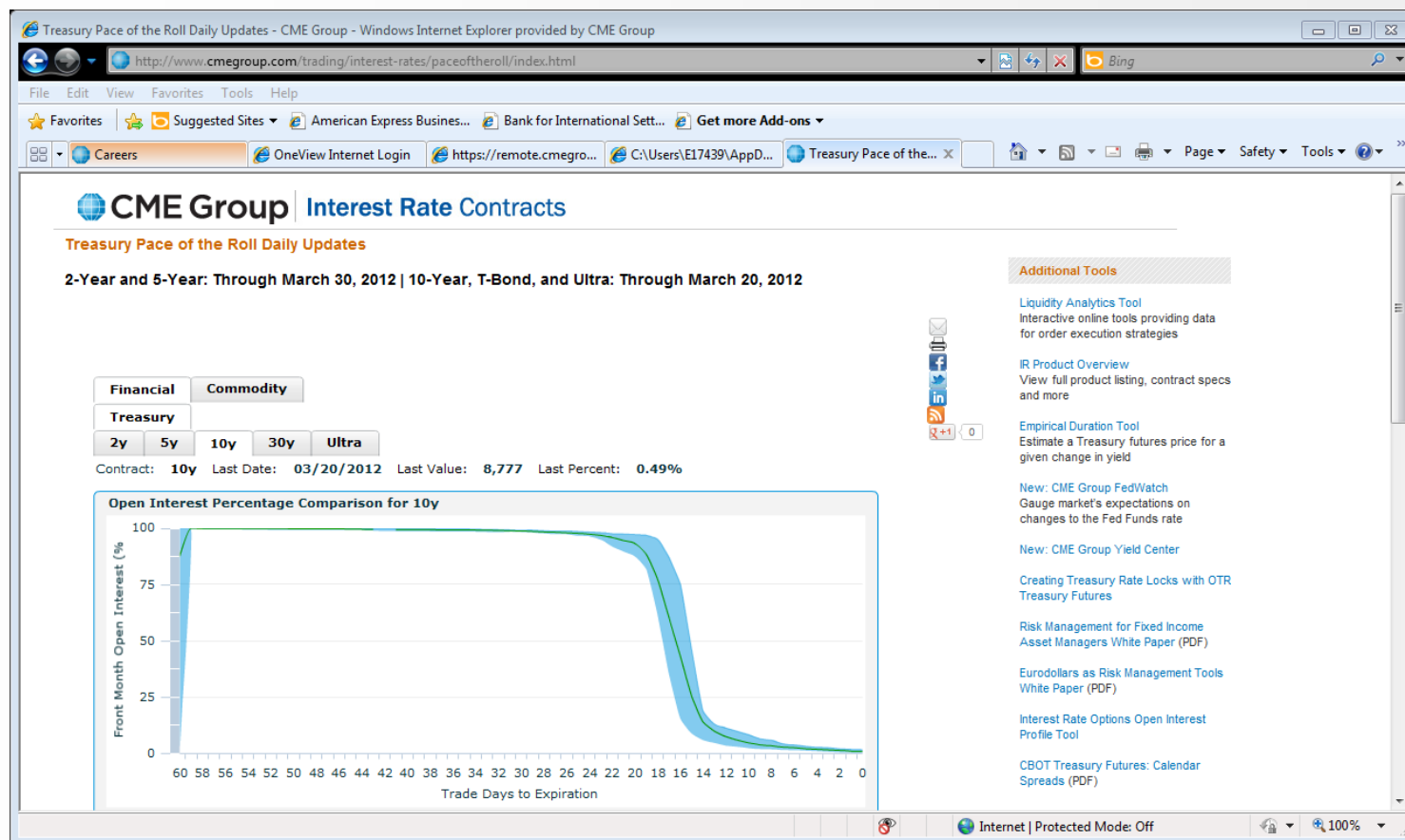
cmegroup.com/trading/interest-rates/duration





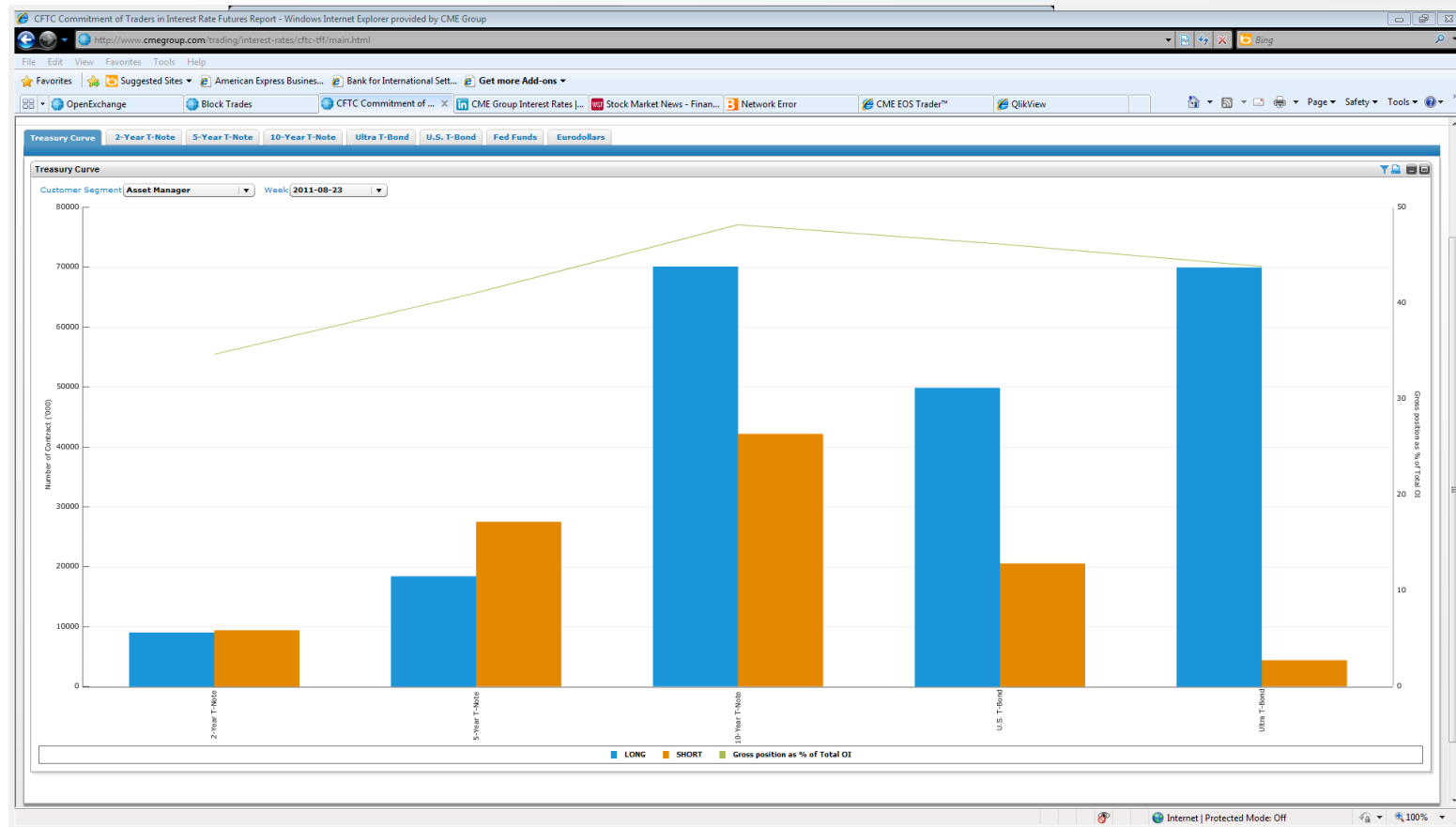
# Treasury Futures - Pace of the Roll

cmegroup.com/trading/interest-rates/paceoftheroll/index



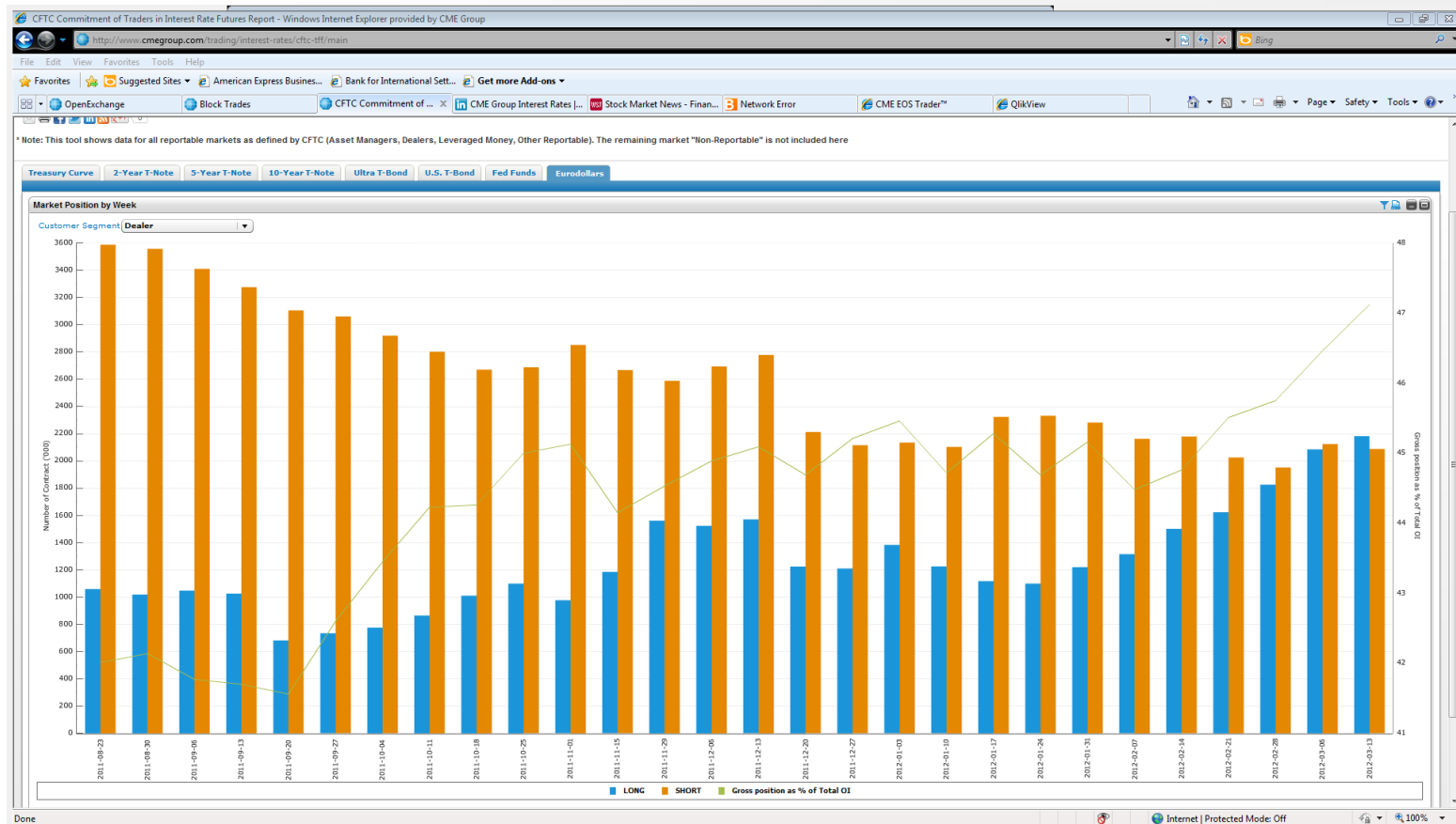
# CFTC Commitment of Traders-Treasuries

[cmegroup.com/trading/interest-rates/cftc-tff](http://cmegroup.com/trading/interest-rates/cftc-tff)



# CFTC Commitment of Traders-Eurodollars

[cmegroup.com/trading/interest-rates/cftc-tff](http://cmegroup.com/trading/interest-rates/cftc-tff)



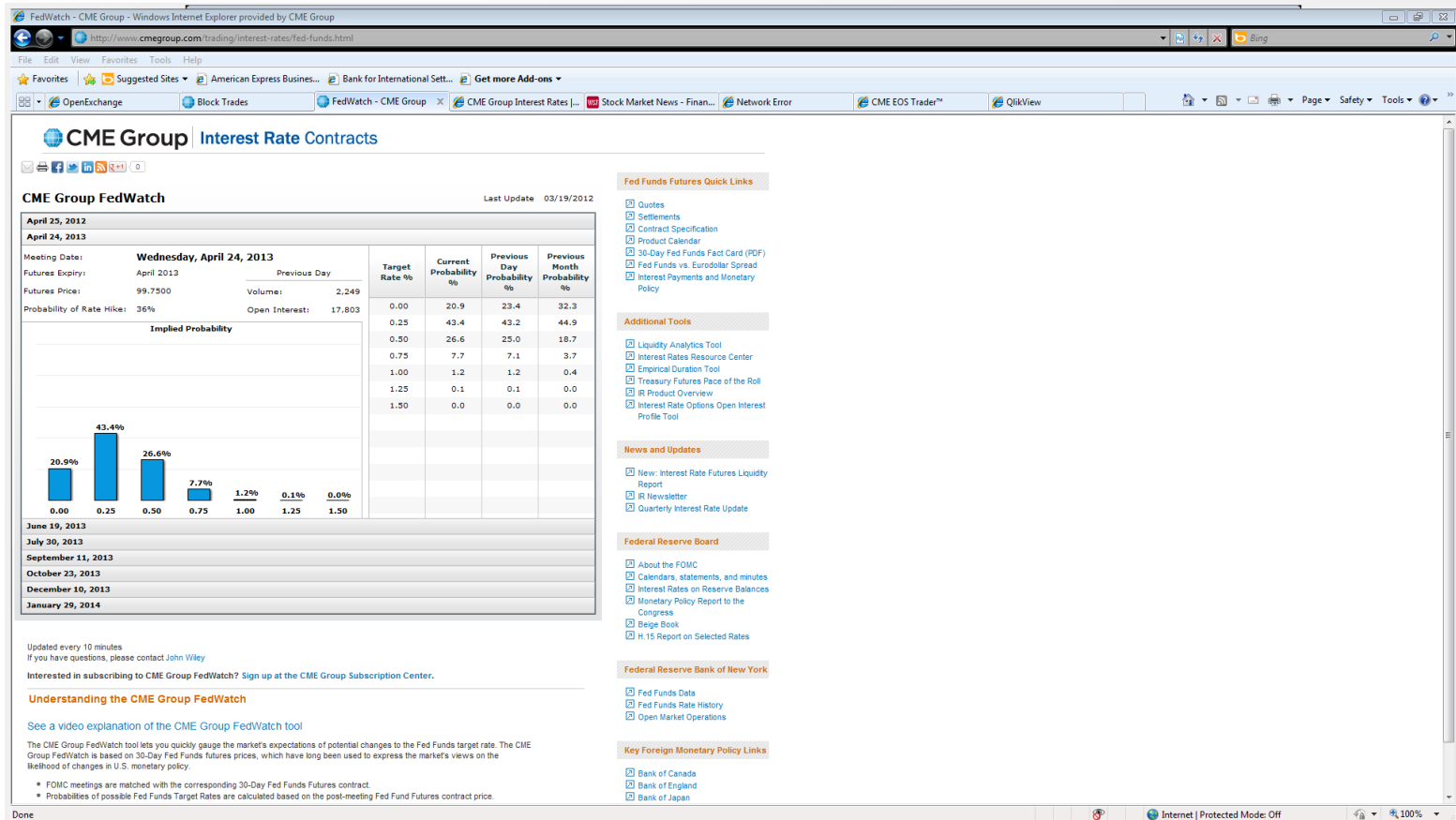
# Liquidity Analytics Tool

[cmegroup.com/trading/interest-rates/order-execution/main](http://cmegroup.com/trading/interest-rates/order-execution/main)



# CME Group FedWatch

cmegroup.com/trading/interest-rates/fed-funds



# CME Swap Equivalents Tool

[cmegroup.com/trading/interest-rates/edequivalents](http://cmegroup.com/trading/interest-rates/edequivalents)

**Define OTC Swap to sync with ED futures terms** →

**Define Swap Equivalent** →

**Compare Rates, DV01s, Convexity Bias**

**ED futures pricing, depth of book to create Swap "surrogate"**

**Export s results to EXCEL**

**CME Swap "E-Equivalents" Tool**

Define OTC Swap Details		OTC Swap		CME Swap "E-Quivalent"		
Notional (M)	100	Rate	1.25745%	vs.	Implied Rate	1.26343%
Currency	USD	DV01	\$ 17,461.23		DV01	\$ 17,450.00
Effective Date	8/24/2011				Conv. Bias	2.392
Maturity Date	8/24/2013					
Fixed (Pay/Rec)	Pay					
Coupon %	1.25745%					
DayCount	30/360					
Frequency	Semi					
Float (Pay/Rec)	Rec					
Index	3MLibor					
Day Count	ACT/360					
Frequency	Quarterly					

Calculate Swap "E-Quivalent"

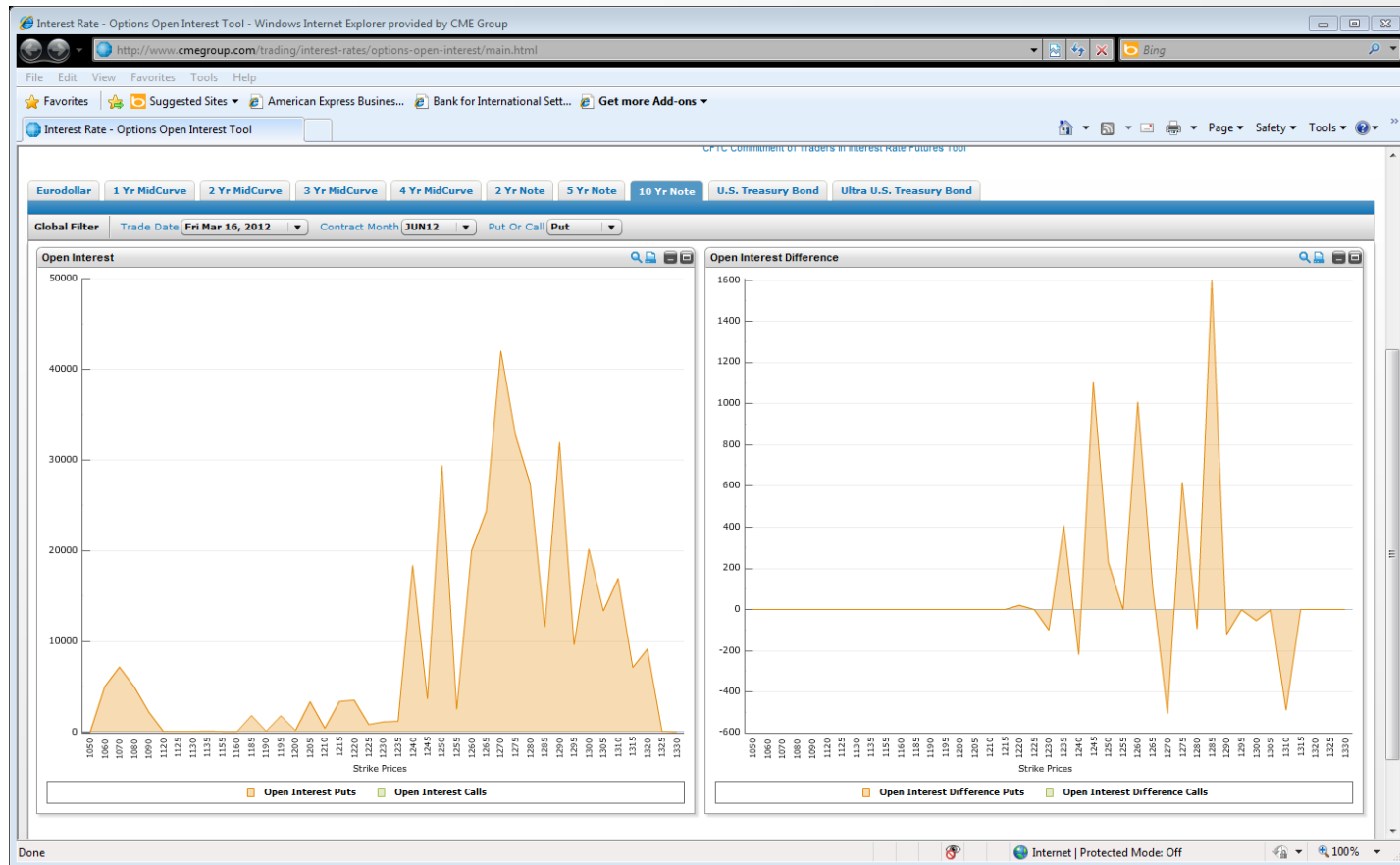
CME Implied Swap Construction				
Ticker	B/S	Qty.	Price	Top of Book
EDQ1	Sell	25	99.980	34
EDU1	Sell	100	99.975	135
EDZ1	Sell	98	99.950	132
EDH1	Sell	96	99.925	130
EDM1	Sell	89	99.900	120
EDU2	Sell	82	99.875	111
EDZ2	Sell	76	99.850	103
EDH2	Sell	70	99.825	95
EDM2	Sell	68	99.800	92

Define CME Implied Swap		Convexity Adjustment		Export Options	
Stub Adjustment (Serial or Quarterly)	Serial	Underlying	EDM1	EXPORT TO EXCEL	
Convexity Adjust (Y/N)	Y	Strategy	Buy STRDL		
		Delta	30		
		Quantity	40		


**NOTE: This is a theoretical example not reflective of actual market conditions**

# Interest Rate Options - Open Interest Tool

[cmegroup.com/trading/interest-rates/options-open-interest/main](http://cmegroup.com/trading/interest-rates/options-open-interest/main)




# QuikStrike Free Web Based Options Analytics Tool



**QuikStrike™**  
 Option Pricing and Analysis  
 Thursday, May 30, 2013

**Pricing Sheets**  
 CHICAGO 11:41 • NEW YORK 12:41 • LONDON 17:41 • TOKYO 01:41


**CME Group**

EURODOLLARS | ULTRA | 30 YR | 10 YR | 5 YR | 2 YR | FED FUNDS | Your Membership Type: Essentials

 SETTLEMENT REPORTS | OPEN INTEREST AND VOLUME | **PRICING SHEETS** | OPTION SPREADS | PRICING TOOLS | VOL TOOLS

FRONTS (WHITES) | 1 YEAR (REDS) | 2 YEAR (GREENS) | 1 YEAR MIDCURVE | 2 YEAR MIDCURVE | 3 YEAR MIDCURVE | 4 YEAR MIDCURVE | 5 YEAR MIDCURVE

 EDM3 Prices (18 DTE) vs 99.720 Settles as of 5/29/2013

Strikes: 15

- Visibility into Current and Historical Volatility by Strike
- Concise Volume and Open Interest Information
- Spread Analysis and Risk Graphs
- Options Pricing Analysis
- [cmegroup.com/quikstike](http://cmegroup.com/quikstike)



# Useful CME Group Links

## Strategy Papers

- **Treasury Futures:** [www.cmegroup.com/education/risk-management-for-fixed-income-asset-managers](http://www.cmegroup.com/education/risk-management-for-fixed-income-asset-managers)
- **Eurodollar:** [www.cmegroup.com/trading/interest-rates/files/IR-314\\_EurodollarRiskMgmtTools\\_SR.pdf](http://www.cmegroup.com/trading/interest-rates/files/IR-314_EurodollarRiskMgmtTools_SR.pdf)
- **Options Basics:** [www.cmegroup.com/education/option-fundamentals-for-fixed-income-asset-managers](http://www.cmegroup.com/education/option-fundamentals-for-fixed-income-asset-managers)
- **Treasury Options Strategies:** [www.cmegroup.com/education/files/Treasury-Option-Strategies.pdf](http://www.cmegroup.com/education/files/Treasury-Option-Strategies.pdf)
- **Invoice Swaps:** [www.cmegroup.com/education/featured-reports/cme-clearing-invoice-swaps-margin-efficiencies](http://www.cmegroup.com/education/featured-reports/cme-clearing-invoice-swaps-margin-efficiencies)

## Products

- **Treasury Futures:** [www.cmegroup.com/education/featured-reports/understanding-treasury-futures](http://www.cmegroup.com/education/featured-reports/understanding-treasury-futures)
- **Ultra Bond Futures:** [www.cmegroup.com/ultra](http://www.cmegroup.com/ultra)
- **Deliverable Swap Futures:** [www.cmegroup.com/dsf](http://www.cmegroup.com/dsf)
- **Mid-Curve Options:** [www.cmegroup.com/trading/interest-rates/stir/eurodollar-options.html](http://www.cmegroup.com/trading/interest-rates/stir/eurodollar-options.html)

## Other Useful Links

- **Treasury Futures Delivery Process:** [www.cmegroup.com/trading/interest-rates/files/CL-100\\_TFDPBrochureFINAL.pdf](http://www.cmegroup.com/trading/interest-rates/files/CL-100_TFDPBrochureFINAL.pdf)
- **Liquidity Tool:** [www.cmegroup.com/trading/interest-rates/order-execution/main](http://www.cmegroup.com/trading/interest-rates/order-execution/main)
- **Treasury Futures Empirical Duration Tool:** [www.cmegroup.com/trading/interest-rates/duration](http://www.cmegroup.com/trading/interest-rates/duration)
- **Inter-commodity Treasury Spreads:** [www.cmegroup.com/trading/interest-rates/intercommodity-spread](http://www.cmegroup.com/trading/interest-rates/intercommodity-spread)
- **Pace of the Roll:** [www.cmegroup.com/trading/interest-rates/paceoftheroll/index](http://www.cmegroup.com/trading/interest-rates/paceoftheroll/index)

# Interest Rate Options Resources

## Information and Tools

CME Group Interest Rate Products:

[www.cmegroup.com/interestrates](http://www.cmegroup.com/interestrates)

Block Trade Requirements and Vendor Codes:

[www.cmegroup.com/irvendorcodes](http://www.cmegroup.com/irvendorcodes)

Interest Rate Options Volume:

[www.cmegroup.com/iroptionsvolume](http://www.cmegroup.com/iroptionsvolume)

QuikStrike Options Analytics tool:

[www.cmegroup.com/quikstrike](http://www.cmegroup.com/quikstrike)

Request for Cross (RFC) Information:

[www.cmegroup.com/rfc](http://www.cmegroup.com/rfc)

Block Trade Rules and Procedures:

[www.cmegroup.com/block](http://www.cmegroup.com/block)

Interest Rate Options Open Interest Profile Tool:

[www.cmegroup.com/iroptionsoi](http://www.cmegroup.com/iroptionsoi)

Weekly Treasury Options:

[www.cmegroup.com/wto](http://www.cmegroup.com/wto)

Eurodollar Mid-Curve Options:

[www.cmegroup.com/midcurves](http://www.cmegroup.com/midcurves)

## Resource Papers

Eurodollar Mid-Curves

<http://www.cmegroup.com/education/featured-reports/conflicting-global-signals-complicate-fed-guessing-game.html>

Weekly Treasury Options

<http://www.cmegroup.com/education/featured-reports/itcm-treasury-2013-01-07.html>

Treasury Options and the U.S. Economy

<http://www.cmegroup.com/education/featured-reports/blu-putnam-us-unemployment-poised-to-dip-below-7-percent.html>

Options Fundamentals

<http://www.cmegroup.com/education/featured-reports/option-fundamentals-for-fixed-income-asset-managers.html>

<http://www.cmegroup.com/education/featured-reports/option-strategies-for-fixed-income-asset-managers.html>

# Reference

## *Check it out!*

- Information in this presentation is covered in The CME Risk Management Handbook
- Available through John Wiley & Sons

