Eurodollar Futures 2.0

Practical Applications

Agenda

1 Measuring risk

2 Hedging Short-term (S-T) rate exposure

3 Creating synthetic investments

4 Pricing and hedging IRS

5 ‘Alpha’ opportunities with EDs & FFs

Measuring Risk

Money market BPVs

Calculated as:

BPV = Face Value x (Days/360) x 0.01%

$10 million 180-day loan

$500 = $10MM x (180/360) x 0.01%

$100 million 60-day loan

$1,666.67 = $100MM x (60/360) x 0.01%

$1 million 90-day Eurodollar futures

$25 = $1MM x (90/360) x 0.01%

	Face Value			
Days	**$500,000**	**$1 MM**	**$10 MM**	**$100 MM**
1	$0.14	$0.28	$2.78	$27.78
7	$0.97	$1.94	$19.44	$194.44
30	$4.17	$8.33	$83.33	$833.33
60	$8.33	$16.67	$166.67	**$1,666.67**
90	$12.50	**$25.00**	$250.00	$2,500.00
180	$25.00	$50.00	**$500.00**	$5,000.00
270	$37.50	$75.00	$750.00	$7,500.00
360	$50.00	$100.00	$1,000.00	$10,000.00

CME Group

Hedging Rate Exposure

$$\Delta\ \text{Value}_{risk} \approx \Delta\ \text{Value}_{futures}$$

$$\begin{aligned} HR &= \Delta\ \text{Value}_{risk} \div \Delta\ \text{Value}_{futures} \\ &\approx BPV_{risk} \div BPV_{futures} \\ &\approx BPV_{risk} \div \$25 \end{aligned}$$

Sell Eurodollar futures ➔ Hedge risk of rising rates

Buy Eurodollar futures ➔ Hedge risk of declining rates

Hedging Rate Exposure

Anticipated borrowing …

Example: a corporation anticipates borrowing $100 million for 90 days at 3-month LIBOR + fixed premium

- **BPV of loan = $2,500**

BPV = $100,000,000 x (90/360) x 0.01% = $2,500

- **Sell 100 Eurodollars to "lock-in" prevailing forward rates reflected in futures**

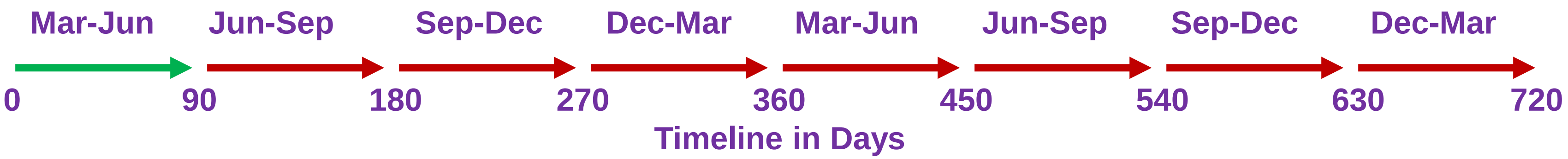
HR = $2,500 ÷ $25 = 100 contracts

Hedging Rate Exposure

Floating rate loan …

Example: it is March and corporation anticipates borrowing $100 million for 2 years at 3-month LIBOR + fixed premium reset quarterly

Loan "decomposed" into 8 quarterly strips … rate with 1st 90-days locked in … risk that rates rise by 7 quarterly loan reset dates



- **BPV of loan = $17,500**

BPV = $100,000,000 x (630/360) x 0.01% = $17,500

- **Sell 700 Eurodollars to hedge risk of rising rates**

HR = $17,500 ÷ $25 = 700 contracts

Hedging Rate Exposure

Floating rate loan …

HR recommends sale of 700 futures … but in which contract month?

If hedge "stacked" in nearby "white" Jun contract

- **Implies that hedger anticipates a yield curve flattening or inverts, i.e., short-term yields rise relative to long-term yields**

If hedge "stacked" in deferred "red" Dec contract

- **Implies that hedger hopes yield curve steepens, i.e., short-term yields decline relative to long-term yields**

If yield curve expected to flatten or invert	➔	**"Stack" short hedge in nearby futures**
If yield curve expected to steepen	➔	**"Stack" short hedge in deferred futures**

Hedging Rate Exposure

Floating rate loan …

Think of floating rate loan as 7 successive 90-day loans

BPV of each 90-day loan = $2,500

$2,500 = $100,000,000 x (90/360) x 0.01%

HR for each loan period = 100

HR = $2,500 ÷ $25 = 100 contracts

Hedge each loan period separately, that is, sell "strip" of Eurodollar futures

Reset Date	Action
White June	Sell 100 White Jun futures
White September	Sell 100 White Sep futures
White December	Sell 100 White Dec futures
White March	Sell 100 White Mar futures
Red June	Sell 100 Red Jun futures
Red September	Sell 100 Red Sep futures
Red December	Sell 100 Red Dec futures

Creating Synthetic Investments

Strips …

Buy (sell) strip by buying (selling) series of successively deferred quarterly futures

- **Example: buy 3-month investment, and also buy March, June & September futures (a strip), to create a synthetic investment**

Buy 3-Month Term Investment	Buy March Eurodollars	Buy June Eurodollars	Buy September Eurodollars

0 → 90 → 180 → 270 → 360

Days

Yield on strip calculated as follows

$$\text{Strip} = \Pi\ [1 + R_i\ (\text{days}_i/360)]\ -1\ )\ \div\ (\text{term}/360)$$

Creating Synthetic Investments

Buy strip: buying series of successively deferred quarterly futures contracts, anchored by ST cash rate ("stub rate")

Contract	Term Days	Cumulative Term	Futures Price	Implied Rate	Compound Factor	Strip Rate
stub	91	91	LIBOR	1.613%	1.0041	1.613%
Mar-18	91	182	98.2200	1.780%	1.0086	1.700%
Jun-18	91	273	98.0700	1.930%	1.0135	1.782%
Sep-18	91	364	97.9750	2.025%	1.0187	1.850%
Dec-18	91	455	97.8900	2.110%	1.0241	1.910%
Mar-19	91	546	97.8300	2.170%	1.0298	1.962%
Jun-19	91	637	97.7800	2.220%	1.0355	2.008%
Sep-19	91	728	97.7500	2.250%	1.0414	2.047%

December 18, 2017 data

2-yr Strip = 2.047%
minus
2-yr UST = 1.840%
equals
2-yr TED = 20.8 bps

2-yr IRS = 2.040%

$$\text{Strip} = \left(\Pi\,[1 + R_i\,(\text{days}_i/360)] - 1\right) \div (\text{term}/360)$$

Plug in Eurodollar futures curve levels with front "stub" rate to calculate CF

- **CF1 = 1+ (.0163*91/360) = 1.0041**
- **CF2 = 1.0041* (1+.0178* 91/360) = 1.0086…**
- **Strip Rate = (1.0414 – 1) ÷ (728/360) = 2.047%**

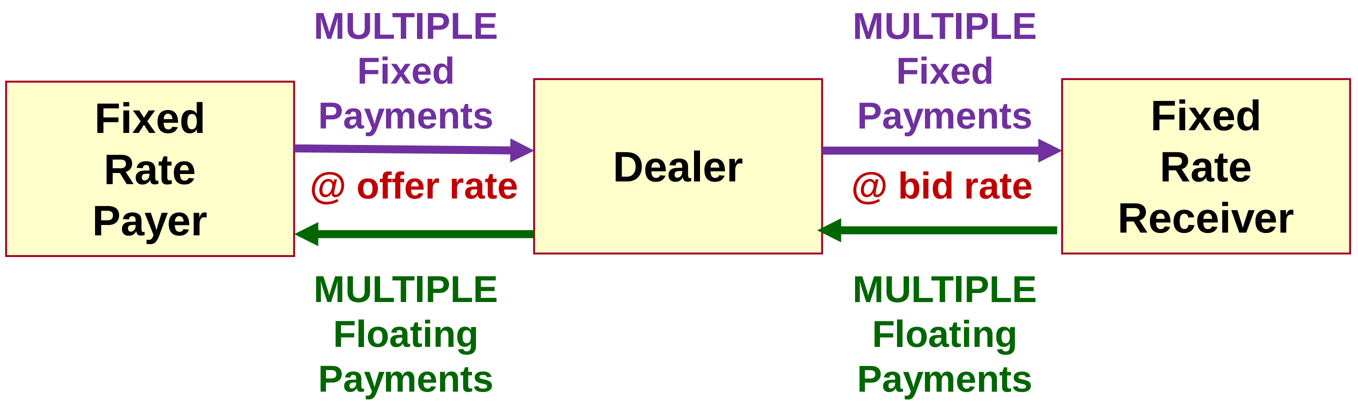
Data Source: Bloomberg

Interest Rate Swaps (IRS)

Interest rate swap (IRS) structure:

Exchange a series of periodic fixed rate for floating rate payments based on specified principle.

Multiple valuation points, single valuation point, distinguishing IRS from FRA or futures.



Think of IRS as a bundle of FRAs at quarterly or semi-annual intervals.

Fixed rate payer (or floating rate receiver) is known as “payer” … fixed rate receiver (or floating rate payer) is known as “receiver” … typically intermediated through a dealer

Pricing and Hedging IRS

In an Interest Rate Swap (IRS), counterparties agree to exchange periodic interest payments.

The amount of the payments is based on the notional principal amount.

At the inception of a swap the terms are such that the present value (PV) of the floating payments is equal to the PV of the fixed-rate payments.

Step 1: Establish the terms and notional amount

Step 2: Calculate the floating payments based on a forward curve

Step 3: Calculate the PV of floating payment based on a discount factor

Step 4: Calculate the swap rate by calculating payments that net PVs

Step 5: Calculate projected cash flows and hedge ratios based on BPV

Pricing and Hedging IRS

Value a 2-Year, $100 million IRS for settlement December 20, 2017

$100 million notional	**Settles**	**Maturity**
2-Year IRS	**12/20/2017**	**12/20/2019**

Contract	Term Days	Cumulative Term	Futures Price	Implied Yield	Compound Factor	Discount Factor
stub	91	91	LIBOR	1.613%	1.0041	0.9959
Mar-18	91	182	98.22	1.780%	1.0086	0.9915
Jun-18	91	273	98.070	1.930%	1.0135	0.9867
Sep-18	91	364	97.975	2.025%	1.0187	0.9816
Dec-18	91	455	97.890	2.110%	1.0241	0.9764
Mar-19	91	546	97.830	2.170%	1.0298	0.9711
Jun-19	91	637	97.780	2.220%	1.0355	0.9657
Sep-19	91	728	97.750	2.250%	1.0414	0.9602

The discount factor (DF) is equal to 1 ÷ compound factor
Example: Stub period DF = 1/1.0041 = 0.9959

Data: Bloomberg, CME Group

Pricing and Hedging IRS

Calculate the PV_{float} by using the actual days/360 and the DF.

Contract	Term Days	Rate	Float pymt	Disc factor	PV float
stub	91	0.016133	407,806	0.9959	406,150
Mar-18	91	0.017800	449,944	0.9915	446,110
Jun-18	91	0.019300	487,861	0.9867	481,355
Sep-18	91	0.020250	511,875	0.9816	502,477
Dec-18	91	0.021100	533,361	0.9764	520,790
Mar-19	91	0.021700	548,528	0.9711	532,678
Jun-19	91	0.022200	561,167	0.9657	541,910
Sep-19	91	0.022500	568,750	0.9602	546,127

Floating payment = days/360 x rate x notional amount

$$PV_{float} = Payment_{float} \times DF$$

Pricing and Hedging IRS

Calculation of the fixed swap rate (SR):

PV_{float} payments = PV_{fixed} payments requires a fixed rate that will produce the same net present value as the floating rate payments.

$$SR = \frac{\text{PV of floating-rate payments}}{\sum_{t=1}^{N} \text{notional amount} \times \text{days}/360 \times DF}$$

Pricing and Hedging IRS

Calculation of the fixed swap rate (SR):

Period	Days	Rate	Float pymt	Disc factor	PV float	fixed notional
1	91	0.016133	407,806	0.9959	406,150	25,175,112
2	91	0.017800	449,944	0.9915	446,110	25,062,345
3	91	0.019300	487,861	0.9867	481,355	24,940,670
4	91	0.020250	511,875	0.9816	502,477	24,813,655
5	91	0.021100	533,361	0.9764	520,790	24,682,010
6	91	0.021700	548,528	0.9711	532,678	24,547,361
7	91	0.022200	561,167	0.9657	541,910	24,410,378
8	91	0.022500	568,750	0.9602	546,127	24,272,330
					3,977,597	197,903,862

Fixed notional$_{period}$ = days/360 x DF x notional value
Example period 1 = (91/360) x 0.9959 x 100,000,000 = 25,175,112…

SR = 3,977,597 ÷ 197,903,862 = 0.02009, or 2.010%

Pricing and Hedging IRS

Calculate the PV_{fixed} and fixed payments

						Swap Rate	2.010%
Period	Days	Rate	Float pymt	Disc factor	PV float	Fixed	PV fixed
1	91	0.01613	407,806	0.9959	406,150	508,049	505,985
2	91	0.01780	449,944	0.9915	446,110	508,049	503,719
3	91	0.01930	487,861	0.9867	481,355	508,049	501,273
4	91	0.02025	511,875	0.9816	502,477	508,049	498,721
5	91	0.02110	533,361	0.9764	520,790	508,049	496,075
6	91	0.02170	548,528	0.9711	532,678	508,049	493,368
7	91	0.02220	561,167	0.9657	541,910	508,049	490,615
8	91	0.02250	568,750	0.9602	546,127	508,049	487,841
					3,977,597	4,064,390	3,977,597

SR = 3,977,597 ÷ 197,903,862 = 0.02009, or 2.010%

PV_{float} = PV_{fixed} at a rate of 2.010%

CME Group

Pricing and Hedging IRS

Calculate the BPV of this 2-Year, $100mm IRS.

Contract	PV float	PV fixed	Float-Fixed(1)	PV float +.01%	PV fixed	Float-Fixed(2)	(1)-(2)
stub	406,150	505,985	-99,835	406,150	505,985	-99,835	
Mar-18	446,110	503,719	-57,609	448,616	503,719	-55,103	
Jun-18	481,355	501,273	-19,918	483,849	501,273	-17,424	
Sep-18	502,477	498,721	3,756	504,958	498,721	6,237	
Dec-18	520,790	496,075	24,716	523,259	496,075	27,184	
Mar-19	532,678	493,368	39,309	535,132	493,368	41,764	
Jun-19	541,910	490,615	51,295	544,351	490,615	53,736	
Sep-19	546,127	487,841	58,287	548,555	487,841	60,714	?
	3,977,597	3,977,597	0	3,994,870	3,977,597		

Original value

+01 BPV adjustment

Net change

Compare the original value, NPV = 0, to value with floating rates +01 bps.

Pricing and Hedging IRS

Calculate the BPV of this 2-Year, $100mm IRS.

Contract	PV float	PV fixed	Float-Fixed(1)	PV float +.01%	PV fixed	Float-Fixed(2)	(1)-(2)
stub	406,150	505,985	-99,835	406,150	505,985	-99,835	0
Mar-18	446,110	503,719	-57,609	448,616	503,719	-55,103	-2,506
Jun-18	481,355	501,273	-19,918	483,849	501,273	-17,424	-2,494
Sep-18	502,477	498,721	3,756	504,958	498,721	6,237	-2,481
Dec-18	520,790	496,075	24,716	523,259	496,075	27,184	-2,468
Mar-19	532,678	493,368	39,309	535,132	493,368	41,764	-2,455
Jun-19	541,910	490,615	51,295	544,351	490,615	53,736	-2,441
Sep-19	546,127	487,841	58,287	548,555	487,841	60,714	-2,427
	3,977,597	3,977,597	0	3,994,870	3,977,597		-17,273

Original value

+01 BPV adjustment

Net change

Compare the original value, NPV = 0, to value with floating rates +01 bps.

Pricing and Hedging IRS

Hedging cash flows of a swap

Position	Risk	Hedge
Fixed Rate Payer	Rates fall and prices rise	Buy Eurodollar futures
Fixed Rate Receiver	Rates rise and prices fall	Sell Eurodollar futures

Pricing and Hedging IRS

Hedge ratio = $\text{Value}_{\text{risk}}$ ÷ $25 = 17,273 / 25 = 691 contracts

Contract	PV float	PV fixed	Float-Fixed(1)	PV float +.01%	PV fixed	Float-Fixed(2)	(1)-(2)	Hedge
stub	406,150	505,985	-99,835	406,150	505,985	-99,835	0	0
Mar-18	446,110	503,719	-57,609	448,616	503,719	-55,103	-2,506	-100
Jun-18	481,355	501,273	-19,918	483,849	501,273	-17,424	-2,494	-100
Sep-18	502,477	498,721	3,756	504,958	498,721	6,237	-2,481	-99
Dec-18	520,790	496,075	24,716	523,259	496,075	27,184	-2,468	-99
Mar-19	532,678	493,368	39,309	535,132	493,368	41,764	-2,455	-98
Jun-19	541,910	490,615	51,295	544,351	490,615	53,736	-2,441	-98
Sep-19	546,127	487,841	58,287	548,555	487,841	60,714	-2,427	-97
	3,977,597	3,977,597	0	3,994,870	3,977,597		-17,273	-691

Original value

+01 BPV adjustment

Net change

Fixed rate receiver (long) floating rate payer will sell Eurodollars to hedge.

Pricing and Hedging IRS

Dodd-Frank legislation requires that cleared OTC IRS be subject to 5-day margin … futures subject to 1-day margin

THUS … one may create weighted Eurodollar futures strip that mimics OTC IRS instrument with reduced margin requirements

Basle III risk capital charges similarly favor futures over OTC IRS instruments

Estimated Margin Requirements
(as of 3/27/2017)

Eurodollar Futures Strip	
Initial Margin	$32,945
Maintenance Margin	$29,950
Cleared-Only IRS	
Fixed Payer Margin	$45,851
Fixed Receiver Margin	$61,936

Notes
For a $10 million notional, 2-year Eurodollar futures strip vs. comparable $10 million notional, spot starting 2-year cleared-only interest rate swap (IRS) instrument.

‘Alpha’ Opportunities with Eurodollar Futures

Spread trading constitutes a large portion of the total volume traded in Eurodollar futures.

Spread trades involving just Eurodollar futures are known as “intra-market” spreads.

Examples of intra-market spreads include:

- Calendar (or time) spreads
- Butterfly spreads
- Condor spreads

Eurodollar Futures

Intra-Market Calendar spreads

An opening trade involving the simultaneous purchase and sale of the same futures contract but at different expiry dates.

The spread is identified by the action taken on the shortest maturity contract.

For example: Buying the EDH7 / EDH8 spread involves buying EDH7 contracts and selling the same amount of EDH8 contracts.

Executing calendar spreads in STIR products generally constitutes expressing an opinion on or hedging yield curve risk.

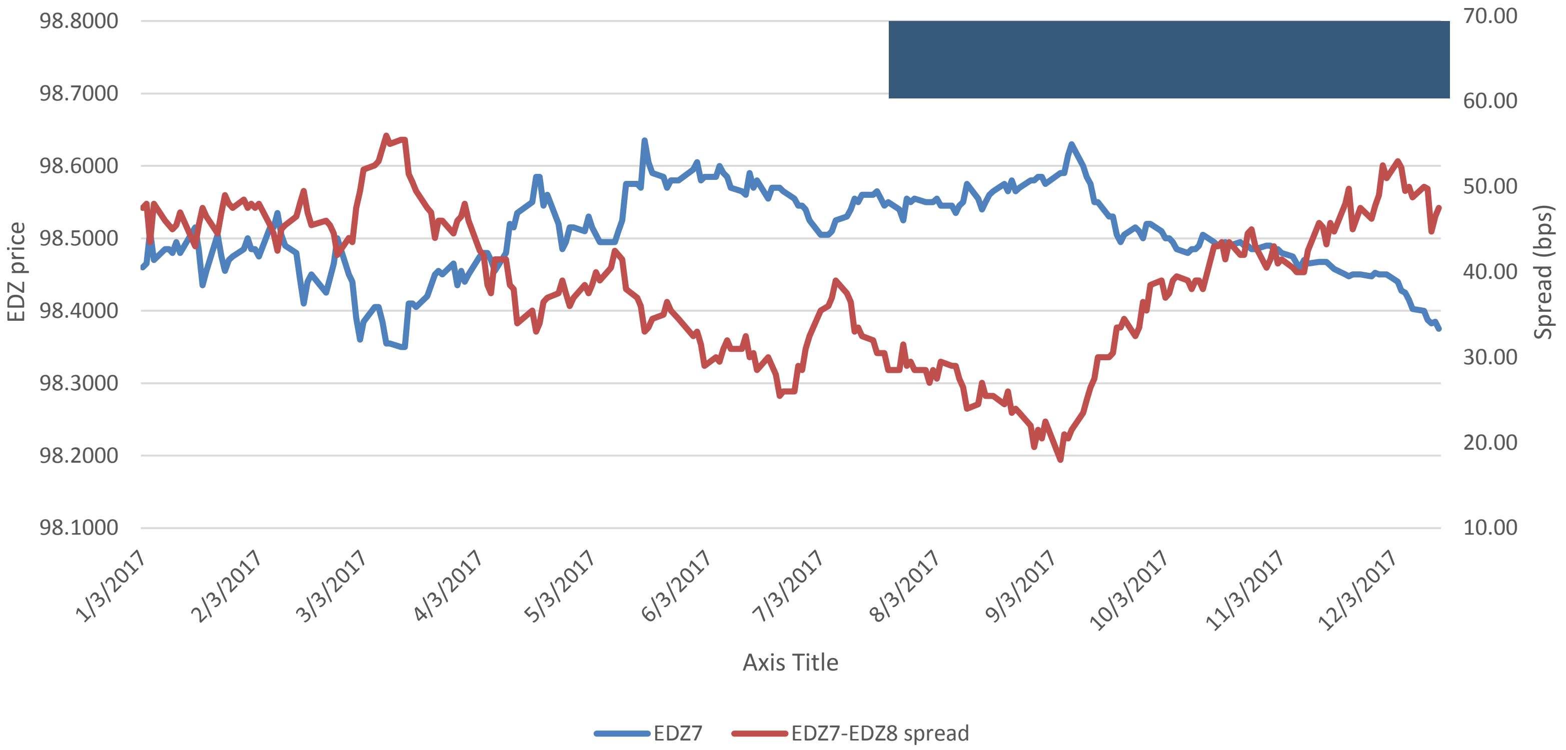
Eurodollar Futures

Intra-Market Calendar spreads

Eurodollar Futures

Intra-Market Calendar spreads

EDZ7-EDZ8 spread versus EDZ7 prices



Eurodollar Futures

Intra-Market Calendar spreads

Example: Post September FOMC meeting selling the EDZ7 / EDZ8 calendar spread on 09/20/2017 anticipating a curve flattening into year-end.

1st Step: Determine hedge, or spread, ratio.

Spread Ratio (SR) = $BPV_1 \div BPV_2$

All Eurodollar futures contracts have the same BPV = $25.00, therefore…

SR = $25 / $25 = 1.0 or buy/sell equal amount of futures

2nd Step: Execute the trade via broker as a spread to reduce execution risk.

For this example on September 20, 2017 trader decides to sell 1000 EDZ7 / EDZ8 spreads at 33.50 bps.

Eurodollar Futures

Intra-Market Calendar spreads

LIBOR rates trend higher into year-end, EDZ7 trades to lower prices.

What about the yield curve?

On September 20 trader sold 1000 EDZ7/EDZ8 spreads at 33.50 bps:
Selling 1000 EDZ7 = 98.505
Buying 1000 EDZ8 = 98.170
98.505 – 98.170 = .335, or 33.5 bps

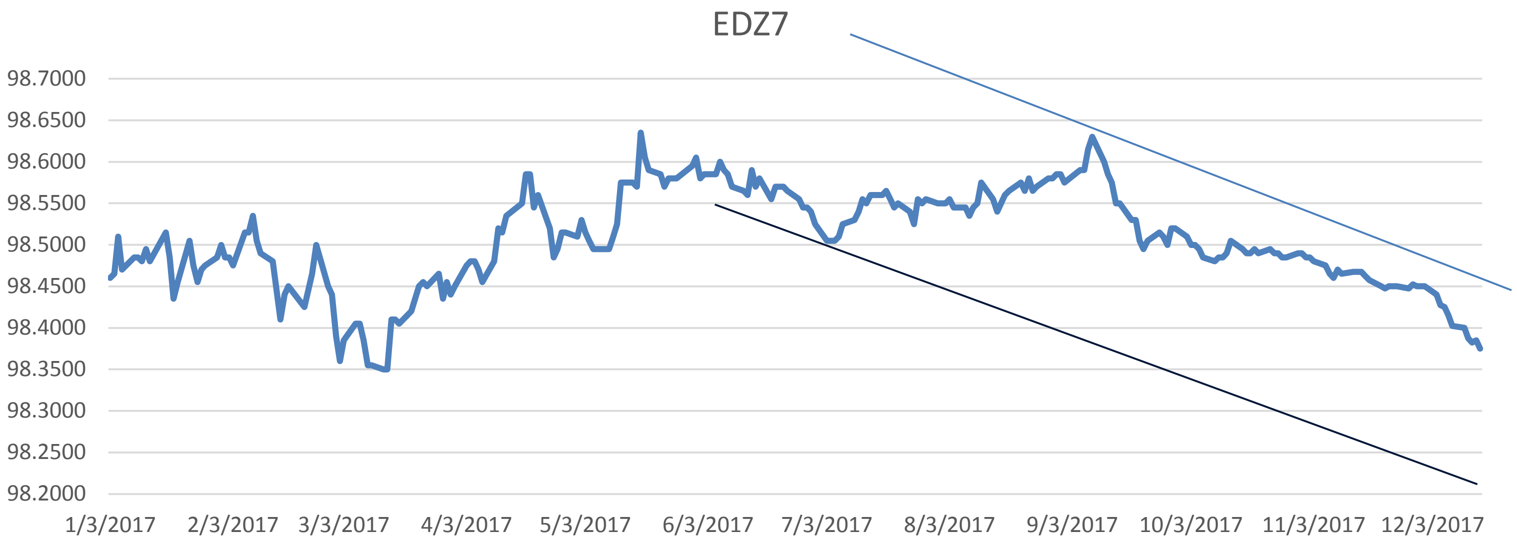
This spread implies the trader has a yield curve flattening bias.

Exiting the trade on December 15, 2017.

Eurodollar Futures

Intra-Market Calendar spreads

LIBOR rates trend higher into year-end, EDZ7 trades to lower prices.



But what happens to the yield curve?

This trade implies the trader has a yield curve flattening bias.

Eurodollar Futures

Intra-Market Calendar spreads

On December 15, 2017 trader covers the position, buying 1000 EDZ7/EDZ8 spreads:

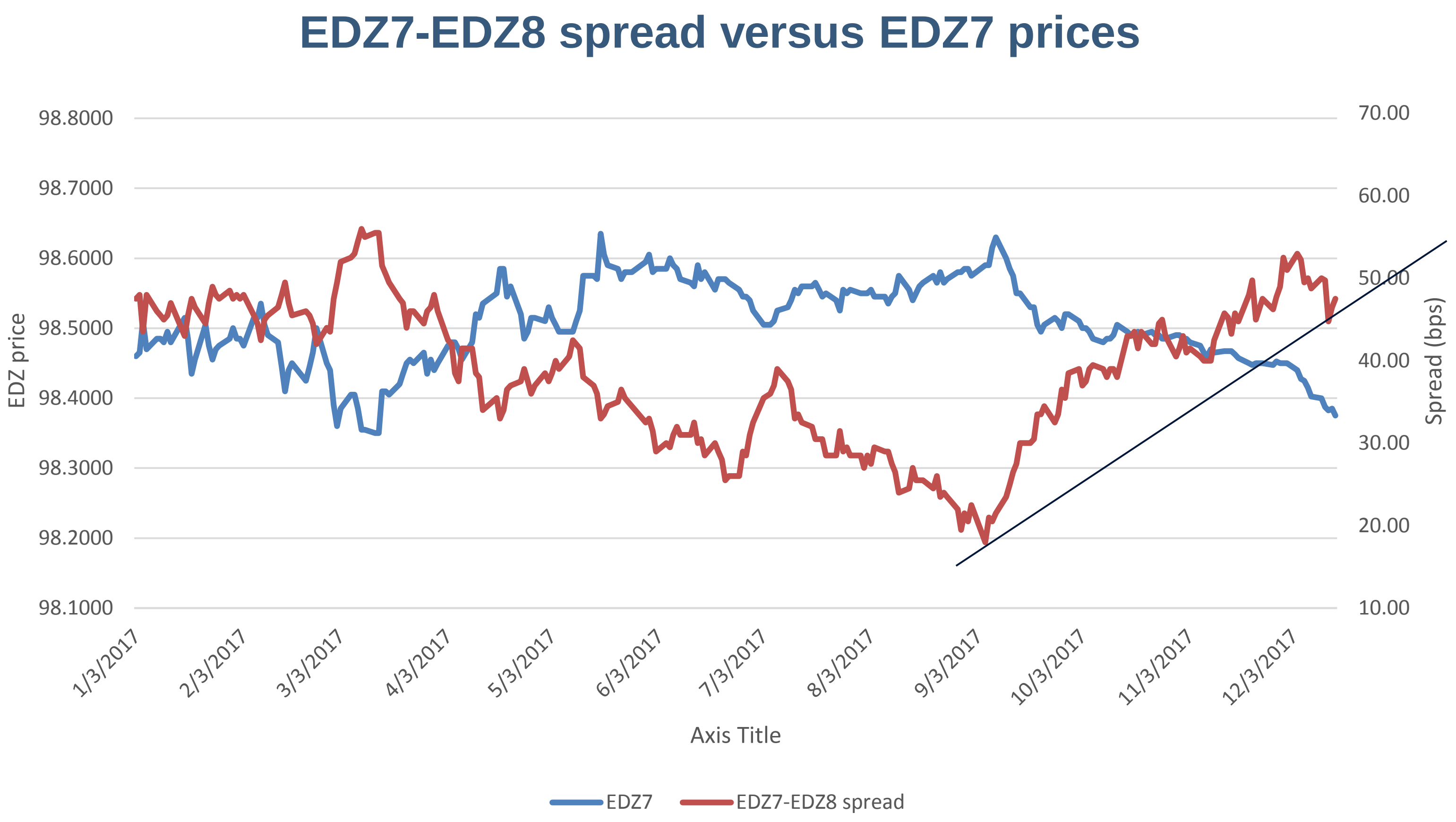
Buying 1000 EDZ7 = 98.375
Selling 1000 EDZ8 = 97.900
98.375 – 97.900 = 0.475, or 47.5 bps

From September 20 to December 15, 2017 the yield curve from EDZ7 to EDZ8 widened, or steepened from 33.5 bps to 47.5 bps.

47.5 – 33.5 = 14.0 bps of steepening.

Eurodollar Futures

Intra-Market Calendar spreads



Eurodollar Futures

Intra-Market Calendar spreads

How did our trader do?

9/20/2017 Sold 1000 EDZ7 = 98.505
12/15/2017 Bought = 98.170
98.505 – 98.170 = 0.335, or 33.5 bps gain
33.5 bps x $25 per bps x 1000 contracts = **$837,500 gain**

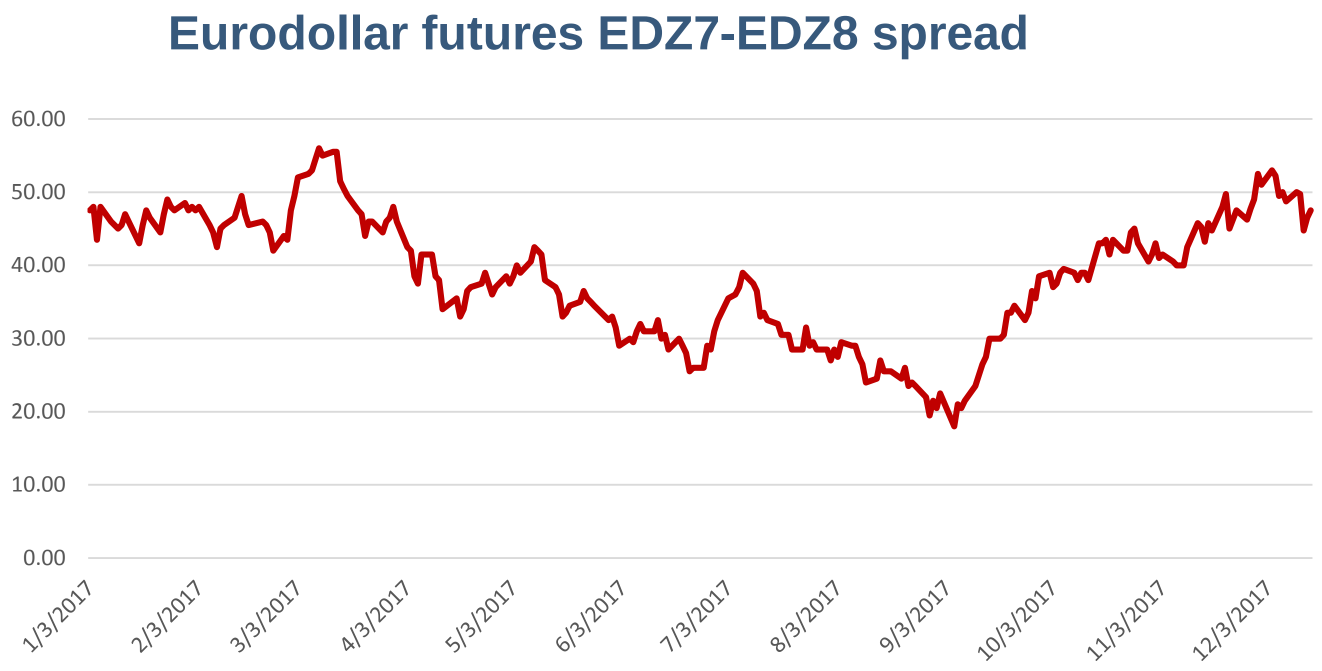
9/20/2017 Bought 1000 EDZ8 = 98.375
12/15/2017 Sold = 97.900
98.375 – 97.900 = 0.475, or 47.5 bps loss
47.5 bps x $25 per bps x 1000 contracts = **$1,187,500 loss**

1,187,500 – 837,500 = $350,000 net loss. Why?

Curve steepened by 14.0 bps.
14.0 bps x $25 x 1000 = $350,000

Eurodollar Futures

Intra-Market Calendar spreads



Curve steepeners: Buy near contract, Sell far contract

Curve flatteners: Sell near contract, Buy far contract

Eurodollar Futures

Intra-Market Calendar spreads

Spread positions generally reflect lower market risk and therefore require lower margin requirements.

Bought 1000 EDZ7 and sold 1000 EDZ8.
What is the margin required?

Margin	delta	side	percent	MM
EDH7	1	A		$315
EDH8	1	B		

EDH7 = 250 x 1000 = 250,000
EDH8 = 390 x 1000 = 390,000

315 x 1000 spreads = $315,000 margin required as spread

Versus outright legs = $640,000

Eurodollar Futures

Butterfly spreads

Similar to a calendar spread a "Butterfly" spread constitutes the difference between two sequential calendar spreads in the same futures contract.

If a calendar spread is = $P_1 - P_2$, a butterfly is = $(P_1 - P_2) - (P_2 - P_3)$

Or = $P_1 + P_3 - (2 \times P_2)$

Butterfly spreads are designed to take advantage of "humpedness", or price (yield) anomalies in a yield curve.

The action to the spread is designated by what is done to the front "wing" or contract of a three contract spread.

Eurodollar Futures

Butterfly spreads

Eurodollar Futures

Butterfly spreads

Example: Buying the EDZ7 / EDZ8 / EDZ9 butterfly.

Buy 1x front contract, Sell 2x middle contract, Buy 1x third contract

1st Step: Determine hedge, or spread, ratio.

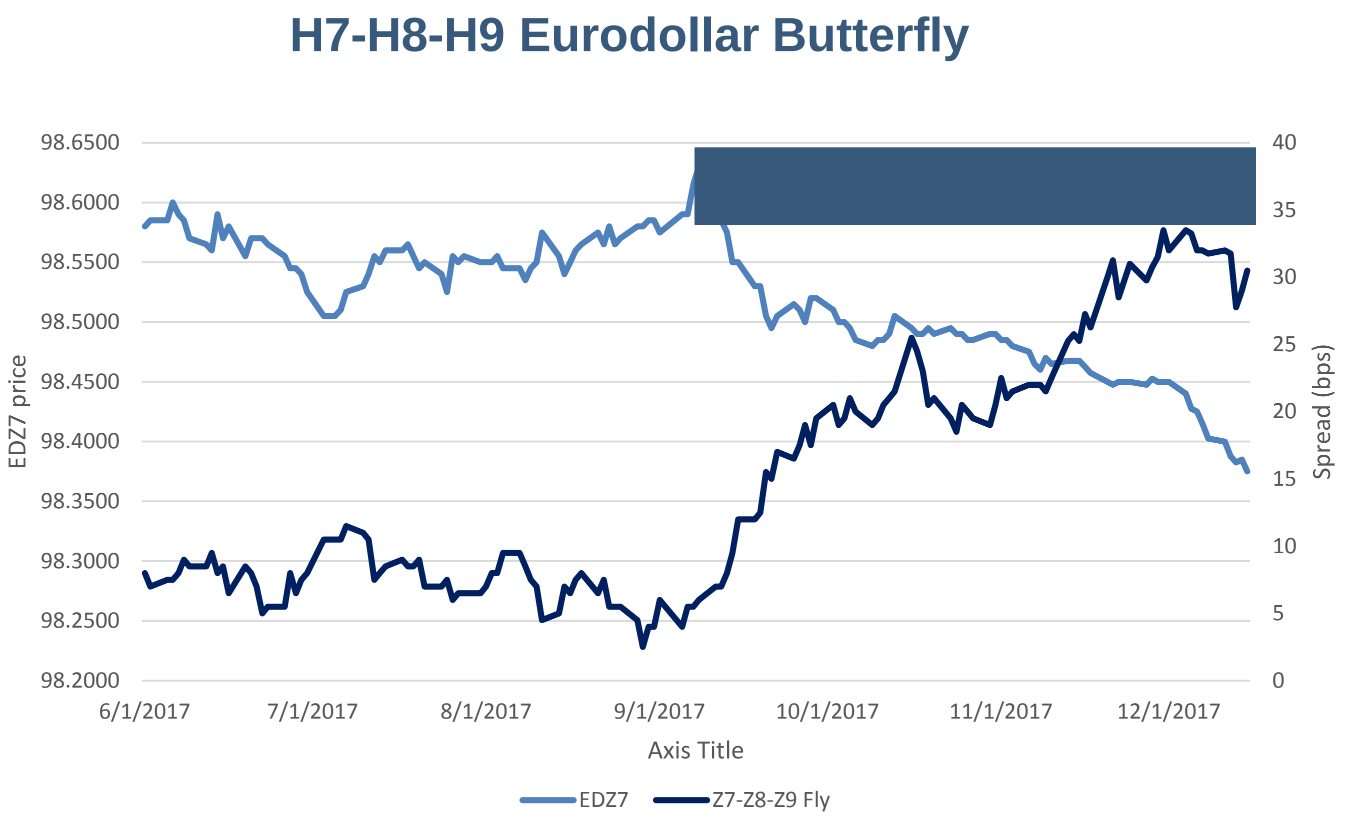
All Eurodollar futures contracts have the same BPV = $25.00, therefore…

Buy 1000 EDZ7, Sell 2000 EDZ8, and Buy 1000 EDZ9

2nd Step: Execute the trade

Eurodollar Futures

Butterfly spreads



Eurodollar Futures

Butterfly spreads

Example: Buying the EDZ7 / EDZ8 / EDZ\H9 butterfly.

September 20, 2017: trader buys this fly at 15.5 bps.
Bought 1000 EDZ7 = 98.505
Sold 2000 EDZ8 = 98.170
Bought 1000 EDZ9 = 97.990
(99.505 + 97.990) - (98.170 x 2) = 0.155, or 15.5 bps.

Assume trader exits the trade on December 15.

Eurodollar Futures

Butterfly spreads

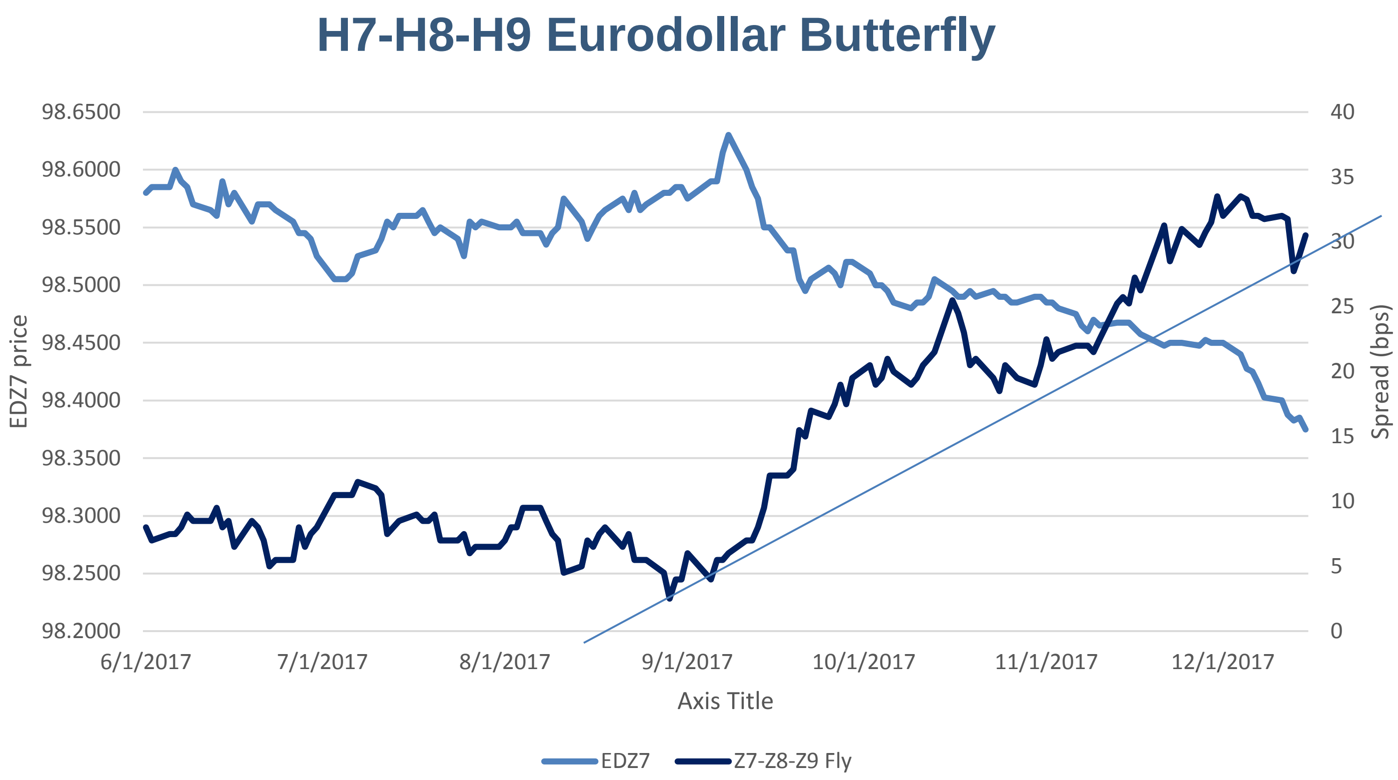
Example: Buying the EDH7 / EDH8 / EDH9 butterfly.

December 15, 2017: trader offsets position, selling the Fly.
Sold 1000 EDZ7 = 98.375, 13.0 lower in price
Bought 2000 EDZ8 = 97.900, 27.0 lower in price
Sold 1000 EDZ9 = 97.730, 26.0 lower in price
(98.375 + 97.730) - (97.900 x 2) = 0.305 or 30.5 bps.

The fly widened from 15.5 bps to 30.5 bps Sept 20 to Dec 15, 2017.

Eurodollar Futures

Butterfly spreads



Eurodollar Futures

Butterfly spreads

9/20/2017 Bought 1000 **EDZ7** = 98.505
12/15/2017 Sold = 98.375
98.505 - 98.375 = 0.130, or 13.0 tick loss
13.0 ticks x $25 per tick x 1000 contracts = $325,000

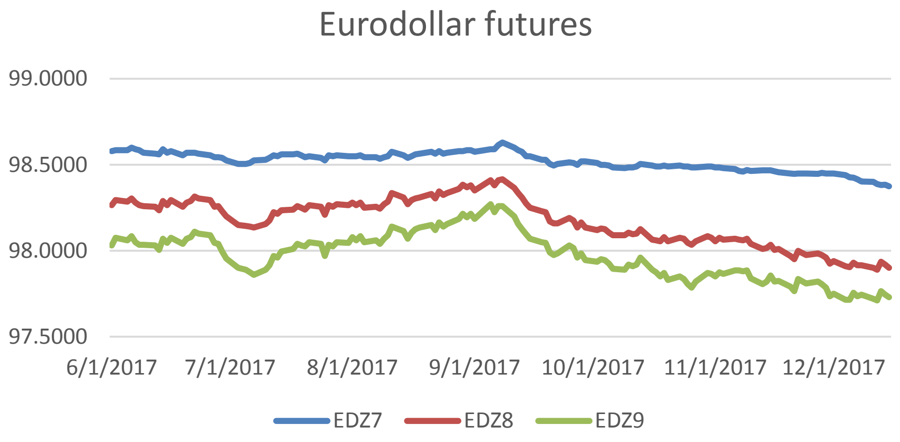
9/29/2017 Sold 2000 **EDZ8** = 98.170
12/15/2017 Bought = 97.900
98.170 – 97.900 = 0.270, or 27.0 tick gain
27.0 ticks x $25 per tick x 2000 contracts = $1,350,000 gain

9/20/2017 Bought 1000 **EDZ9** = 97.990
12/15/2017 Sold = 97.730
97.990 - 97.730 = 0.260, or 26.0 tick loss
26.0 ticks x $25 per tick x 1000 contracts = $650,000 loss

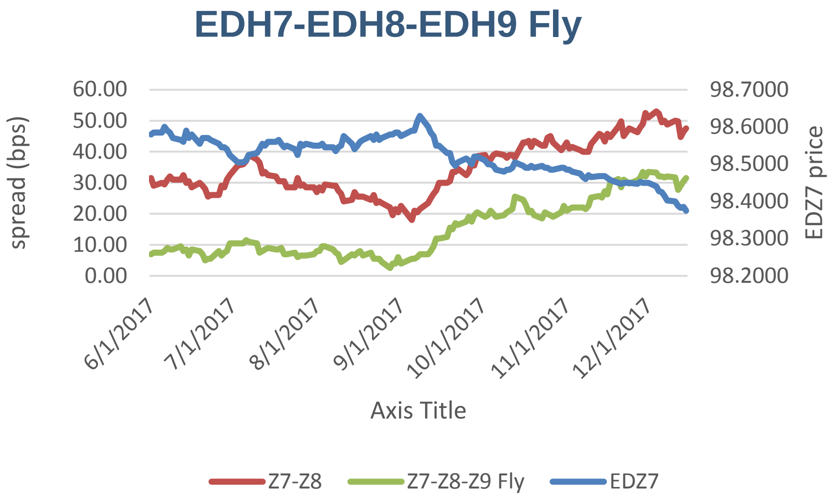
1,350,000 – (325,000 + 650,000) = $375,000 gain. Why?
30.5 – 15.5 bps = 15.0 bps. 15.0 x $25 x 1000 = $375,000

‘Alpha’ Opportunities with Eurodollar Futures

Butterfly spreads



All three futures contracts traded in similar price patterns as yields rose.



Over the course of this trade the yield curve steepened.

Eurodollar Futures

Butterfly spreads

While the yield curve steepened, the EDZ7-EDZ9 it did not steepen uniformly.

EDZ7 From 1.495 bps to 1.625 bps = 13.0 bps higher in yield

33.5 bps to 47.5 bps = 14.0 bps steeper

EDZ8 From 1.830 bps to 2.100 bps = 27.0 bps higher in yield

18.0 bps to 1.0 bps = 1.0 flatter

EDZ9 From 2.010 bps to 2.270 bps = 26.0 bps higher in yield

The degree of steepening was greater Z7-Z8 than from Z8-Z9.

Eurodollar Futures

Butterfly spreads

Bought 1000 EDZ7
Sold 2000 EDZ8
Bought 1000 EDZ9, think of as two calendar spreads.

	Margin		delta	side	percent	MM
1.						
	EDZ7	1	A		$315	
	EDZ8	1	B			
2.	EDZ8		1	A		$265
	EDZ9	1	B			

EDZ7-EDZ8 = 315 x 1000 = 315,000
EDZ8-EDZ9 = 265 x 1000 = 265,000

(315 + 265) x 1000 spreads = $580,000 margin required as fly

Versus outright legs = $1,515,000

Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Since the resolution of the global financial crisis the OIS (overnight index swap) curve has become a reasonable indicator of interbank credit market floating rate risk.

Fed Funds are highly correlated to the OIS overnight rate.

Comparing Fed Funds futures to LIBOR based Eurodollar futures is a reasonable way to capture the spread between the OIS and LIBOR curves relationship.

Expecting the spread to widen = Buy FFs, Sell EDs

Expecting the spreads to narrow = Sell FFs, Buy EDs

Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Many consider the spread a “measure that tracks stress in U.S. money markets.”

Eurodollar futures, based on 3-month LIBOR, reflect the rate at which banks lend to each other.

Fed Fund futures are closely correlated to U.S. central bank rates.

A higher (widening) level in the spread signals increasing stress, while lower (narrower) levels indicate easy funding conditions.

Many financial market and economic factor may influence the trading and pricing of this spread.

Source: Min Zeng, “Benchmark Gives A Go Signal to Fed, Wall Street Journal, June 7, 2017

Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Example: Buying Fed Fund futures, selling Eurodollar futures

How to construct this trade?

Assume a short EDZ7 position of 1000 contracts

Hedge Ratio (HR) = $BPV_{risk} \div BPV_{contract}$

$EDZ7_{risk}$ = \$25 per bps x 1000 contracts = \$25,000 bps at risk

HR = 25,000 ÷ \$41.67 (BPV of FF futures) = sell 600 Fed Funds futures.

But which ones?

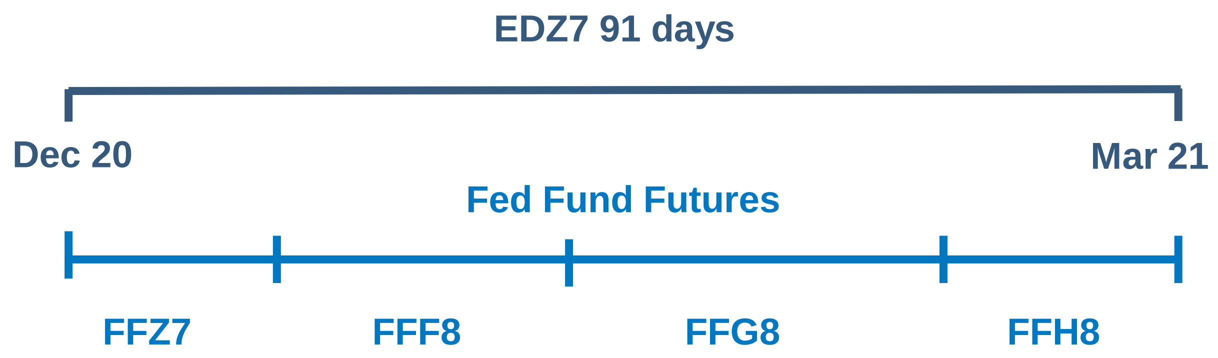
Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Quick review:

Eurodollar futures are based on a 3-month LIBOR rate starting on final settlement day (third Wednesday of quarterly contract month). In other words Eurodollar futures are *forward looking.*

Fed Fund futures are based on the average daily effective Fed Funds rate and calculated the last business day of the each contract month. In other words Fed Fund futures are *backward looking.*



Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Example: Buying Fed Fund futures, selling Eurodollar futures

How to construct this trade?

HR = 25,000 ÷ $41.67 = 600 Fed Funds futures. But which ones?

The only Fed Funds contracts that fall completely within the 91 days of the December 2017 Eurodollar futures forward rate are January (FFF8) 2017 and February (FFG8) 2017.

While not completely covering the same time period as the Eurodollar contract period the correlation is extremely high.

Using only two fed Fund contracts makes easier execution and trade tracking.

Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Example: Buying Eurodollar futures, Selling Fed Funds futures

23 October 2017 → **15 December 2017**

Bought FFs, sold EDZ7
EDZ7 = 98.495 = 1.505%
Bought FFF8 = 98.635
Bought FFG8 = 98.625
Ave FFs = 98.630 = 1.370%
Spread = 1.505 – 1.370
Spread = 0.1350 or 13.5 bps

Bought EDM7, sold FFs
EDZ7 = 98.375 = 1.625%
Sold FFF8 = 98.600
Sold FFG8 = 98.595
Ave FFs = 98.5975 = 1.4025%
Spread = 1.625 – 1.4025
Spread = 0.2225 or 22.25 bps

Spread = 22.25 – 13.50 = 8.75 bps wider

Other spread opportunities

Fed Fund futures versus Eurodollar futures:

How did the trade perform?

Sold 1000 **EDZ7** = 98.495
Bought = 98.375
12.0 bps x $25.00 per bps x 1000 contracts = $300,000 gain

Bought 300 **FFF8** = 98.635
Sold = 98.600
3.5 bps x $41.67 per bps x 300 contracts = $43,753.50 loss

Bought 300 **FFG8** = 98.625
Sold = 98.595
3.0 bps x $41.67 per bps x 300 contracts = $37,503 loss

$300,000 – ($43,753.50 + $37,503) = $218,743.50 net gain ÷ 8.75 bps = $24,999 BPV

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Other spread opportunities

Fed Fund futures versus Eurodollar futures:

Spread positions generally reflect lower market risk and therefore require lower margin requirements.

Bought 500 EDZ7 and sold 300 FFF8,
Bought 500 EDZ7 and sold 300 FFG8

What is the margin required?

Margin	delta	side	percent	MM
FFF8	3	A	80%	$240
EDZ7	5	B		

FFN7 = 240 x 300 = 72,000
EDM7 = 250 x 500 = 125,000
0.80 x 72,000 = 57,600   125,000 – 57,600 = 67,400 x 2 = 134,800

$134,800 margin required as spread

Versus outright legs = $394,000

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