

Eurodollars on CME Globex: Implied Price Functionality

August 2007

Presentation Outline

Current Implied Eurodollar Spreads

Calendar Spread Examples

- Implied IN Calendar spreads
- Implied OUT prices from Calendar spreads
- 2nd Generation Implied prices

Implied Pricing for Butterfly Spreads

- Introduction
- Implied IN examples
- Implied OUT examples
- Middle Leg dissemination
- Tick Size implications

Eurodollars on CME Globex: Current Implied Spread Functionality

Current Implied Spread Functionality

CME Group offers implied price functionality on listed Calendar, Butterfly and Pack spreads on CME Globex

- Calendar spreads the entire length of the Eurodollar futures curve
- Butterfly spreads the entire length of the Eurodollar futures curve
- Pack spreads listed through the purples

Calendar Spreads

3-Month	6-Month	9-Month	12-Month	15-Month	18-Month
Q1-Q40	Q1-Q40	Q1-Q40	Q1-Q40	Q1-Q40	Q1-Q40

Butterfly Spreads

3-Month	6-Month	12-Month
Q1-Q40	Q1-Q40	Q1-Q40

Pack Spreads

Q1-Q24

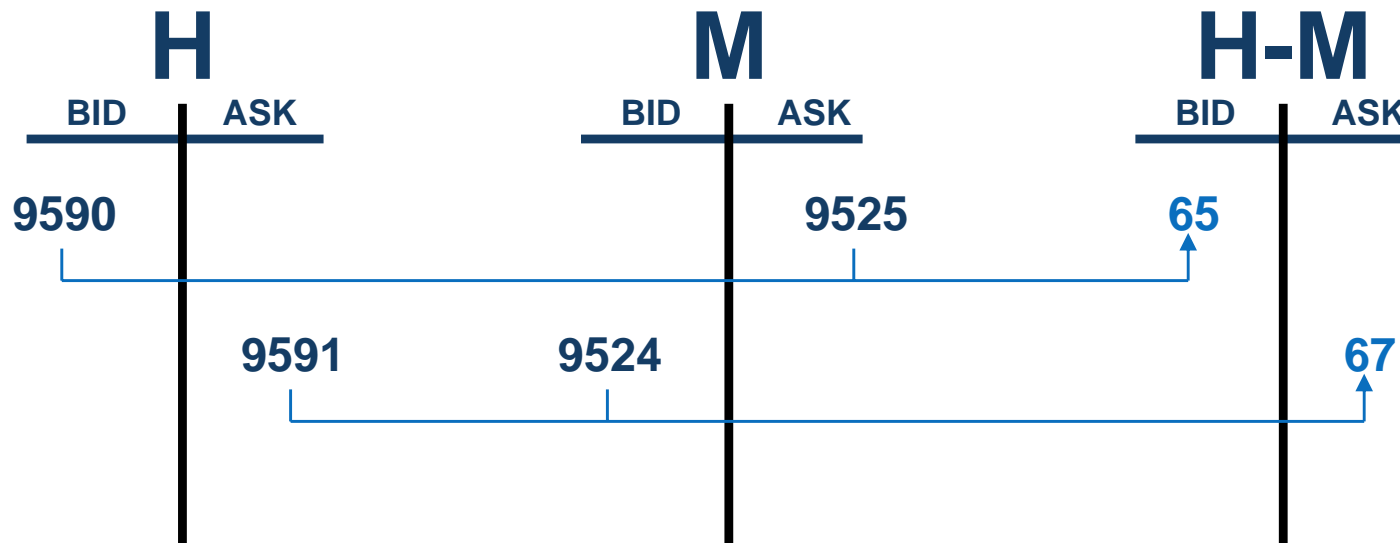
Eurodollars on CME Globex: Calendar Spread Examples

Calendar Spreads

Implied “IN”:

Two outright leg orders that combine to create an implied spread order

Calendar Spreads



Buy March for 9590

Sell June at 9525

Implied IN bid in March–June for 65

Sell March at 9591

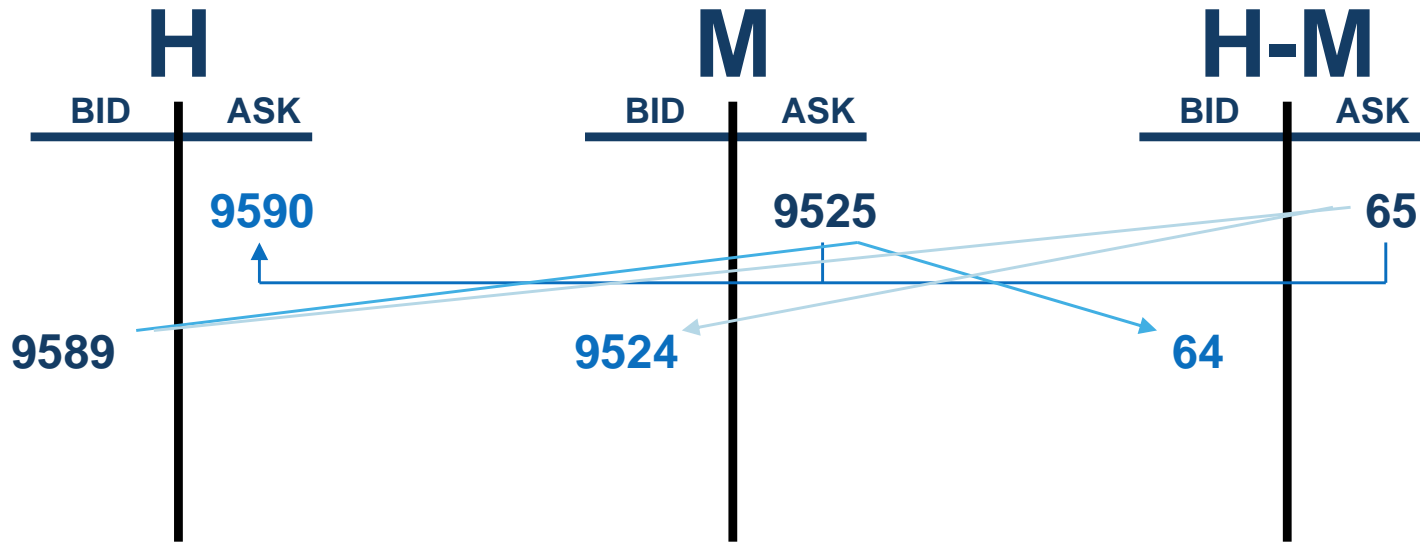
Buy June for 9524

Calendar Spreads

Implied “OUT”:

Combining an outright leg and an outright spread to produce an implied leg

Calendar Spreads



Sell March–June at 65

Sell June at 9525

Implied OUT offer in March at 9590

Buy March for 9589

Implied IN bid in March-June for 64

Implied OUT bid in June for 9524

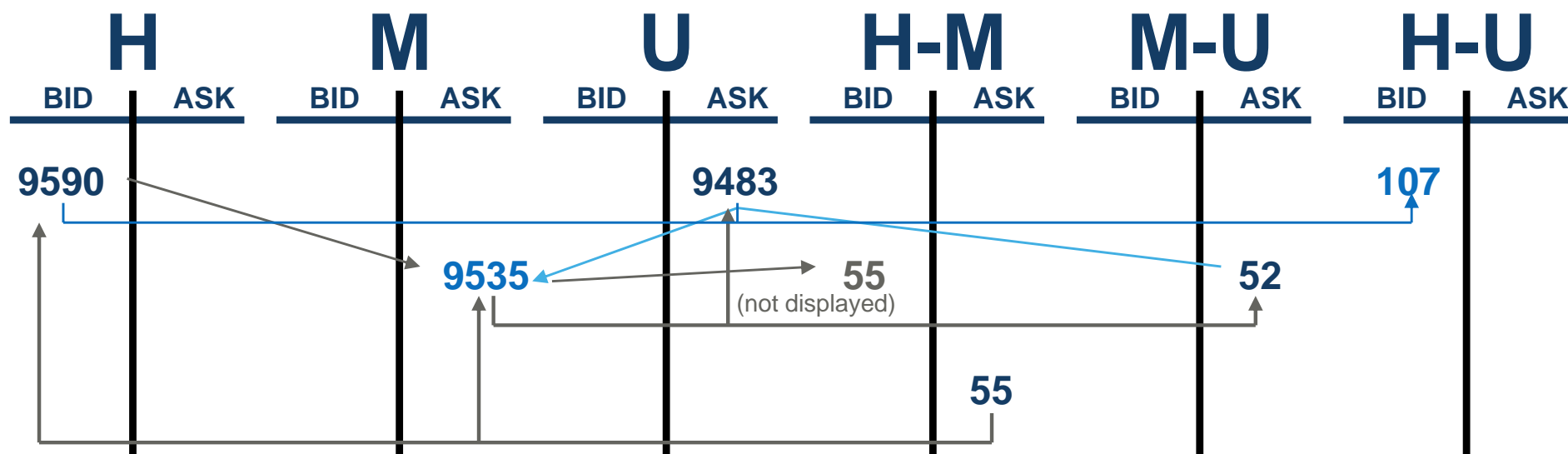
Calendar Spreads

A Second Generation order is:

An outright order and an implied “OUT” order combined to create a “second generation” implied order.

Are only generated if an incoming order cannot be satisfied by the existing marketplace, and unlike implied “IN” and “OUT” orders, they are never displayed.

Calendar Spreads



Buy March for 9590, sell September at 9483

2nd Gen Implied bid in Mar-Jun at 55

Implied IN bid in March–September for 107

Sell Mar-Jun at 55

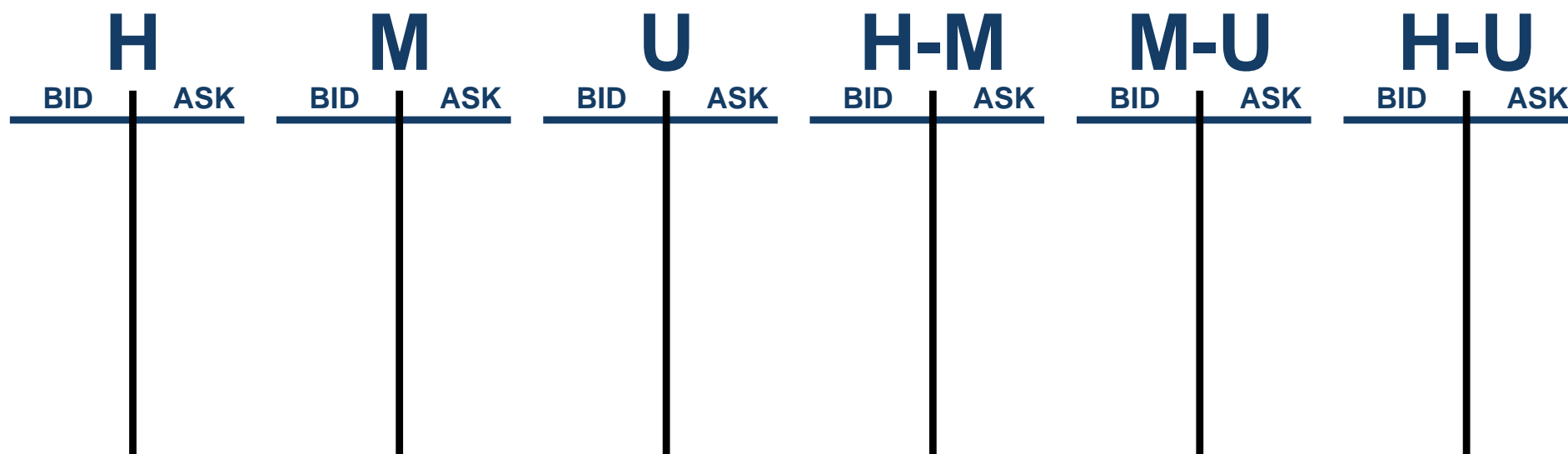
Sell June–September at 52

... takes out implied M 9535 vs H 9590

Implied OUT offer in June at 9535

... M 9535 takes out U 9483 vs M-U 52

Calendar Spreads



Buy March for 9590, sell September at 9483

Implied IN bid in March–September for 107

Sell June–September at 52

Implied OUT offer in June at 9535

2nd Gen Implied bid in Mar-Jun at 55

Sell Mar-Jun at 55

... takes out implied M 9535 vs H 9590

... M 9535 takes out U 9483 vs M-U 52

Eurodollars on CME Globex: Implied Pricing for Butterfly Spreads

Implied Prices for Butterfly Spreads

CME Group has expanded implied pricing to Butterfly spreads in order to leverage CME Globex Eurodollar order flow which will improve prices and deepen overall liquidity in associated contracts

Unlike most other futures exchanges, CME Group generates both implied “IN” and implied “OUT” bids and offers on Butterfly spreads

CME Group uses both outright and implied Calendar spread and leg orders to derive implied bids and offers on Butterfly spreads

CME Group will generate both first and second generation implied bids and offers for Butterfly spreads

- Although CME Group generates second generation implied bids and offers as well as implies out individual legs, it will not disseminate the 2nd generation implieds nor the implied out middle legs

Implied Prices for Butterfly Spreads

Implied “Butterfly” Spreads

Butterfly Definition

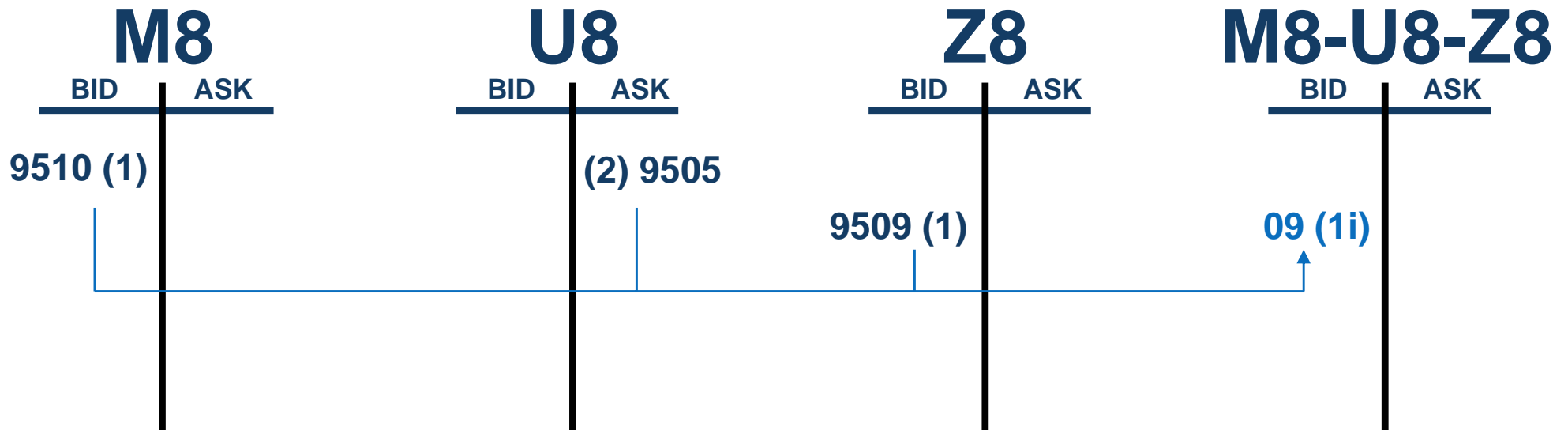
- The Butterfly spread is a combination of two Calendar spreads such that the makeup is:
 - Buy 1 - Leg # 1
 - Sell 2 - Leg # 2
 - Buy 1 - Leg # 3
- Contracts quoted in .50 tick increments
- CME Globex Naming Convention - BF: H8-M8-U8

Implied Prices for Butterfly Spreads – Implied “IN”

Implied <<IN>> orders in Butterfly Spreads are derived from any of the following:

- Existing outright orders in 3 individual contracts (legs)
- Existing outright orders in 2 individual contract legs and a Calendar spread
- Existing outright orders in 2 outright Calendar spreads

Implied Prices for Butterfly Spreads: Implied “IN”



9510 Bid for 1 Lot – M8

2 Lot Offer at 9505 – U8

9509 Bid for 1 Lot – Z8

09 Implied Bid for 1 Lot M8-U8-Z8

$$M8+Z8-(2*U8)=M8-U8-Z8$$

$$9510+9509-(2*9505)=M8-U8-Z8$$

$$09 = M8-U8-Z8$$

Implied Prices for Butterfly Spreads: Implied “IN”

M8-U8	
BID	ASK
05 (1)	

U8-Z8	
BID	ASK
	(1) 02

M8-U8-Z8	
BID	ASK
03 (1i)	

05 Bid for 1 Lot – M8-U8

1 Lot offered at 02 – U8-Z8

03 Implied Bid for 1 Lot – M8-U8-Z8

Since $(M8-U8)-(U8-Z8) = M8-(2*U8)+Z8 = \text{Butterfly}$

Then $(05-02) = 03 \text{ Bid for the Butterfly}$

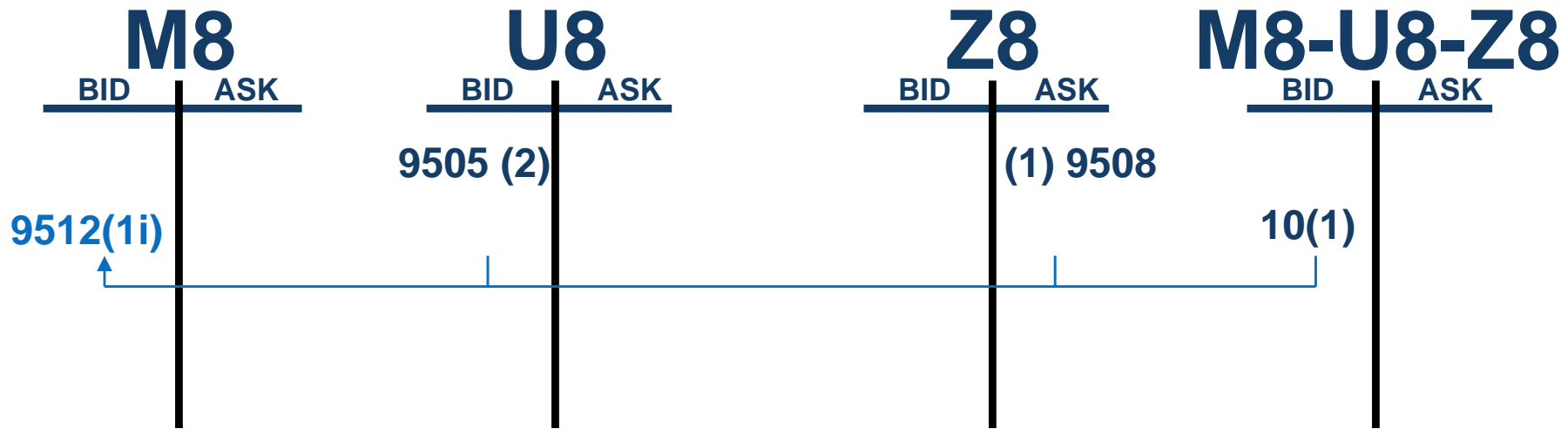
Implied Prices for Butterfly Spreads – Implied “OUT”

An implied bid or offer in one of the legs is derived from a Butterfly spread and either an order in two of the legs or a Calendar spread

Implied <<OUT>> orders from Butterfly Spreads are derived from any of the following:

- An existing outright order in the Butterfly spread and existing outright orders in two of the individual contracts (legs)
- An existing outright order in the Butterfly spread and existing outright orders in a Calendar spread and in one of the individual contracts (legs)

Implied “OUT” (Butterfly Spread + 2 Legs)



9505 Bid for 2 Lot – U8

1 Lot Offer at 9508 – Z8

10 Bid for 1 Lot – M8-U8-Z8

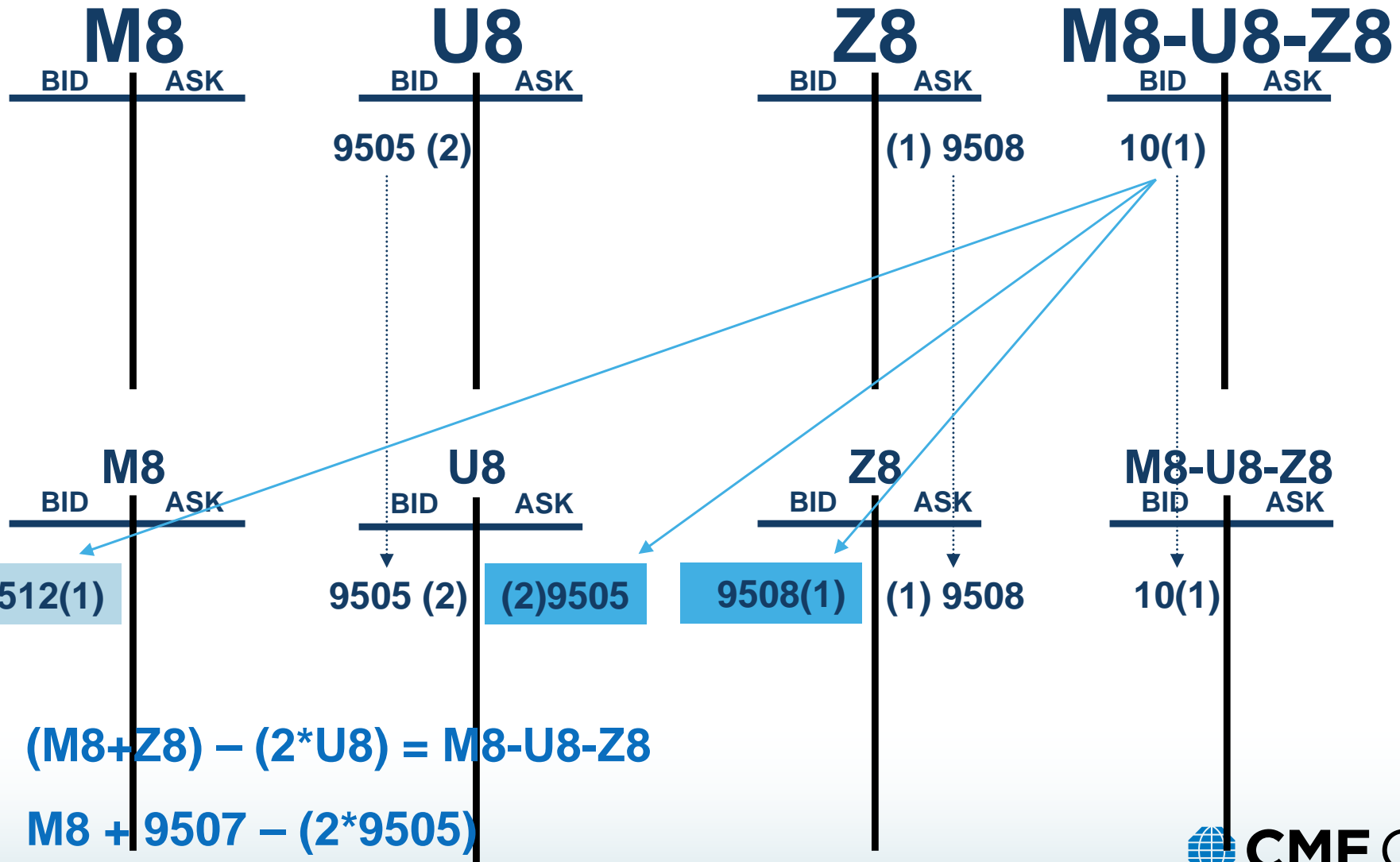
9512 Implied Bid for 1 Lot – M8

$$(M8+Z8) - (2*U8) = M8-U8-Z8$$

$$M8 + 9507 - (2*9505)$$

$$M8 = 9512$$

Implied "OUT" (Butterfly Spread + 2 Legs)

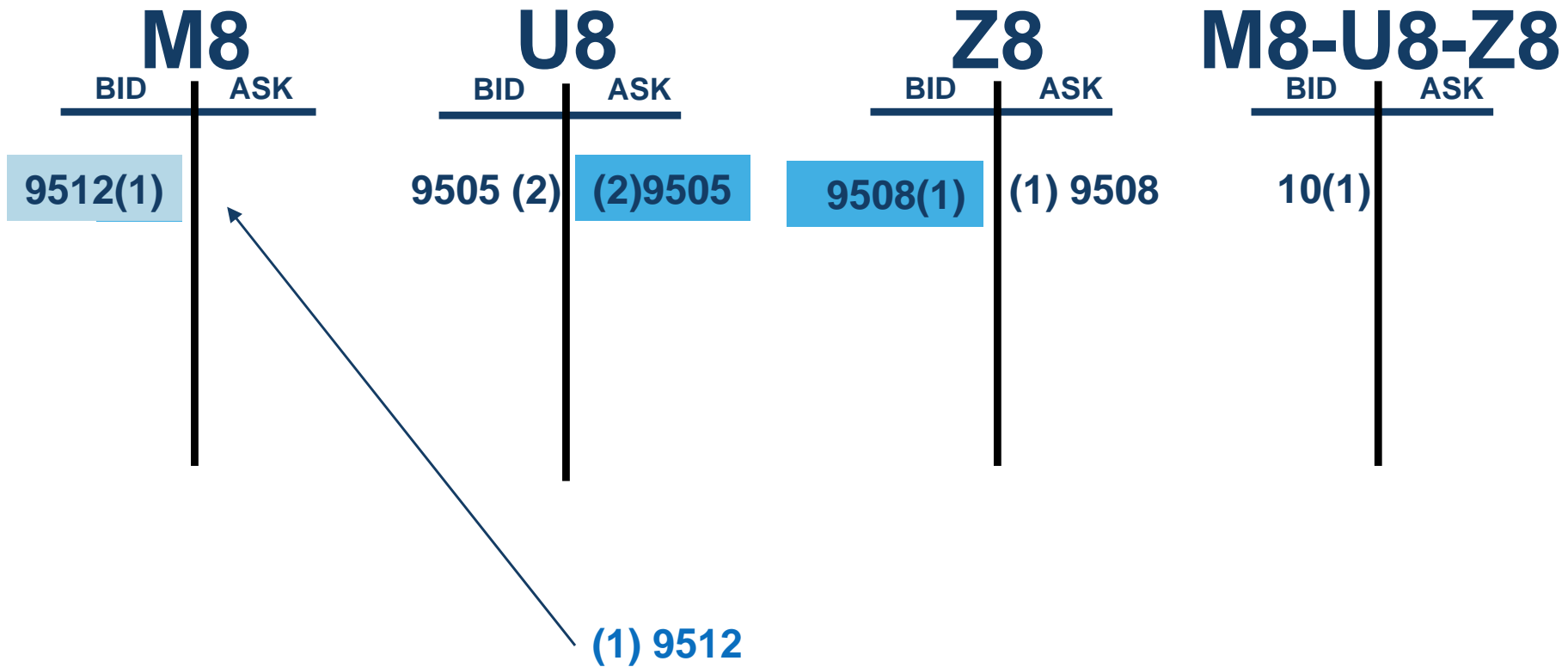


$$(M8 + Z8) - (2 * U8) = M8-U8-Z8$$

$$M8 + 9507 - (2 * 9505)$$

$$M8 = 9512$$

Implied “OUT” (Butterfly Spread + 2 Legs)



Consequently, a 1-Lot offered at 9512 or better would clear the book

Implied Pricing Calculations – Implied “OUT”

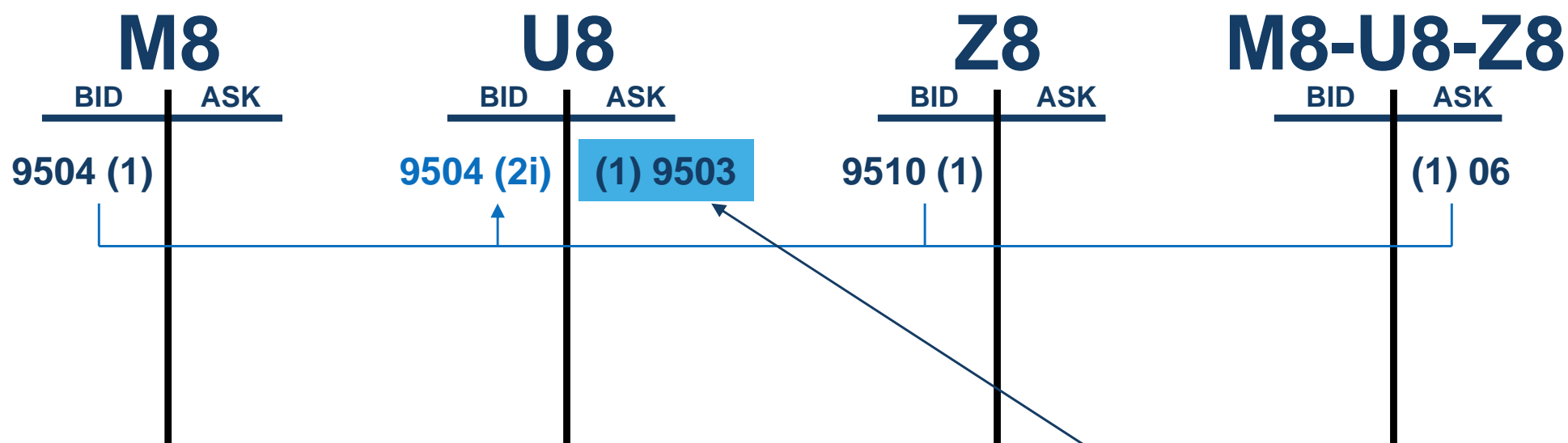
Middle Leg Dissemination

If an Implied OUT order on the Butterfly middle leg is disseminated, there is a possibility that the order book may display markets with crossed prices

Therefore, the trading engine will NOT disseminate Implied OUT prices on the Butterfly middle leg. Orders may still be matched based upon an implied middle leg, with any potential price improvement being granted to the incoming order.

The following slides illustrate this scenario:

Implied “OUT” - Middle Leg Dissemination



9504 Bid for 1 Lot – M8

9510 Bid for 1 Lot – Z8

1 Lot Offer at 06 – M8-U8-Z8

9504 Implied Bid for 2 Lot – U8 (Not Disseminated)

The 4 implied bid for 2 lots would not trade with the 1 lot offered at 3, due to the all or none nature of implied spreading. Therefore, CME Group will not disseminate the implied bid to avoid the appearance of “crossed markets.” However, if there was sufficient quantity on the offer side, the trade would be immediately executed.

Incoming 1 lot offer at 9503

Implied Pricing Calculations

Eurodollar Price Tick Information

The following principles are applied with respect to the price ticks for Eurodollar spreads:

- An outright order entered in an instrument (leg or a spread) must respect the price tick of the instrument.
- All the contracts of the Eurodollar class, except the expiring contract month, have a price tick set to half a basis point.
- The expiring month of the Eurodollar class always has a price tick of .25. This means that when the M8 is the front month, it has a price tick of .25 and the U8 has a price tick of .50. However, as soon as the M8 expires and the U8 becomes the new front month, its tick size changes from .50 to .25 and is no longer eligible for implied spreading.

Implied Pricing Calculations

Price Tick Implications

There are market scenarios that can cause the price of the implied OUT orders in the contract middle leg to have .25 ticks. This issue is present in the following scenarios:

- First contract leg, third contract leg, and Butterfly spread all have prices that end in .50 ticks.
- Only one of the three components (first contract leg, third contract leg, or Butterfly spread) has a price that ends in a .50 tick.

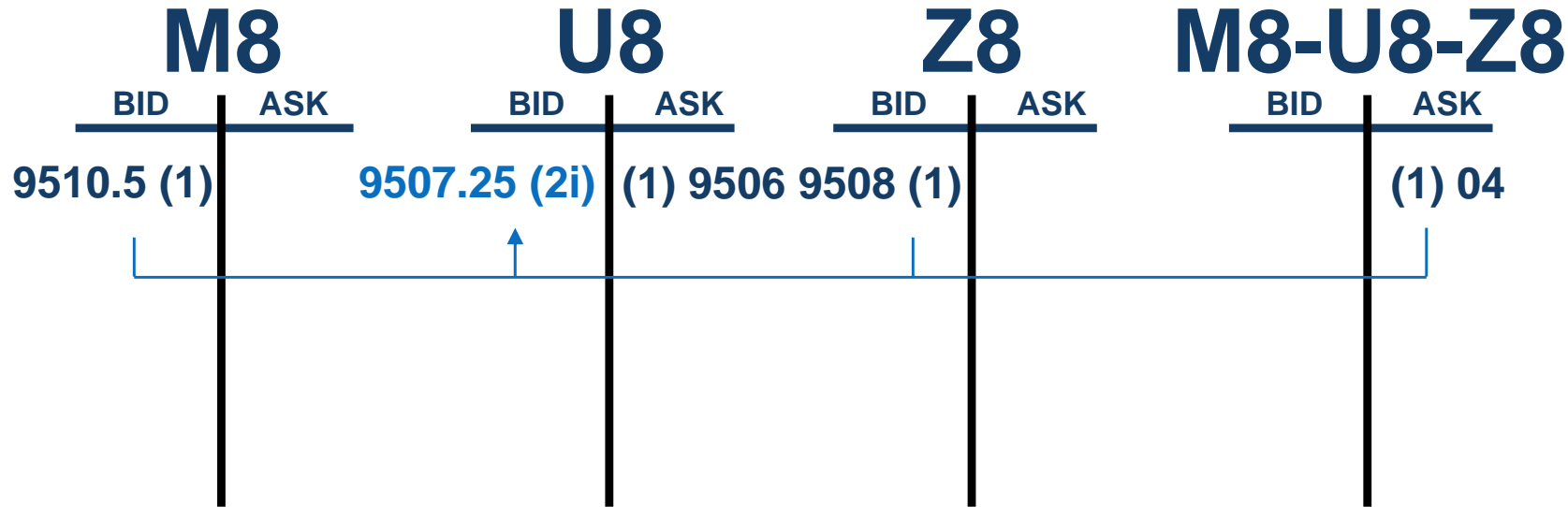
Implied Pricing Calculations

CME Group will impose the following pricing rule if there is a resting middle leg order:

If a resting middle leg outright order already exists, it would be combined with the incoming order, matched with the implied OUT middle leg, and would trade at its resting price. The incoming middle leg order would be assigned the price difference of the implied OUT contracts and the resting order.

Tick Size Implications: Implied “OUT”

Example 1: Resting Order



9510.5 Bid for 1 Lot – M8

1 Lot offered at 9506 – U8

9508 Bid for 1 Lot – Z8

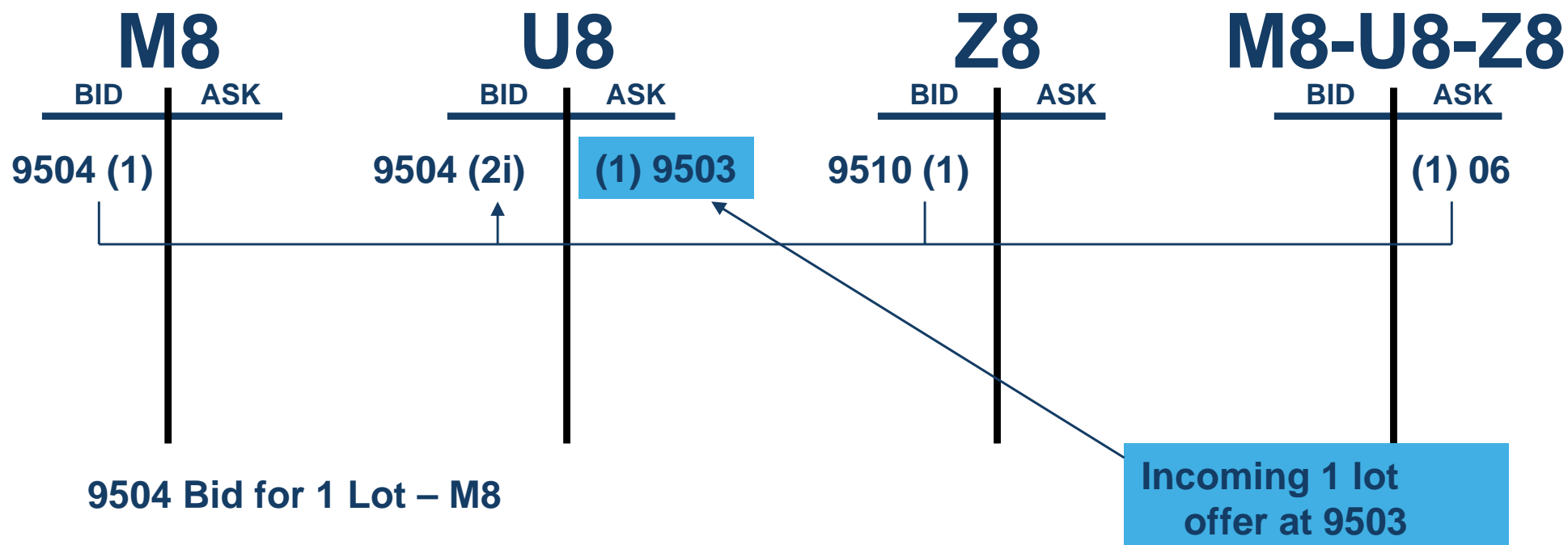
1 Lot offered at 04 – M8-U8-Z8

9507.25 Implied Bid for 2 lots – U8
(Not Displayed)

$$(9510.5 + 9508) - 2 * U8 = 04$$

$$U8 = 9507.25$$

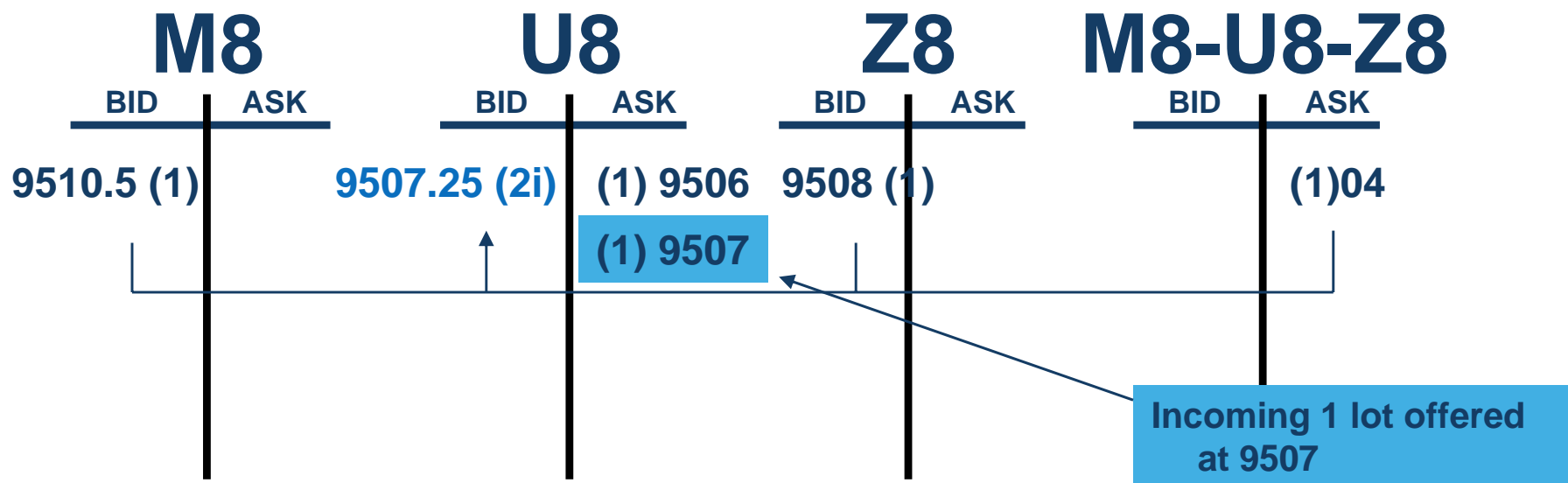
Implied “OUT” - Middle Leg Dissemination



The 4 implied bid for 2 lots would not trade with the 1 lot offered at 3, due to the all or none nature of implied spreading. Therefore, CME Group will not disseminate the implied bid to avoid the appearance of “crossed markets.” However, if there was sufficient quantity on the offer side, the trade would be immediately executed.

Tick Size Implications - Implied "OUT"

Example 1: Resting Order



9510.5 Bid for 1 Lot – M8

1 Lot offered at 9506 – U8

9508 Bid for 1 Lot – Z8

1 Lot offered at 04 – M8-U8-Z8

9507.25 Implied Bid for 2 lots – U8

$$(9510.5 + 9508) - 2 * U8 = 04$$

$$U8 = 9507.25$$

According to tick size rules, U8 cannot trade at 9507.25. Therefore, the 9507.25 bid would trade with the resting offer at 9506. The incoming order would trade at 9508.5 (the difference between the two implied lots and the resting order price)

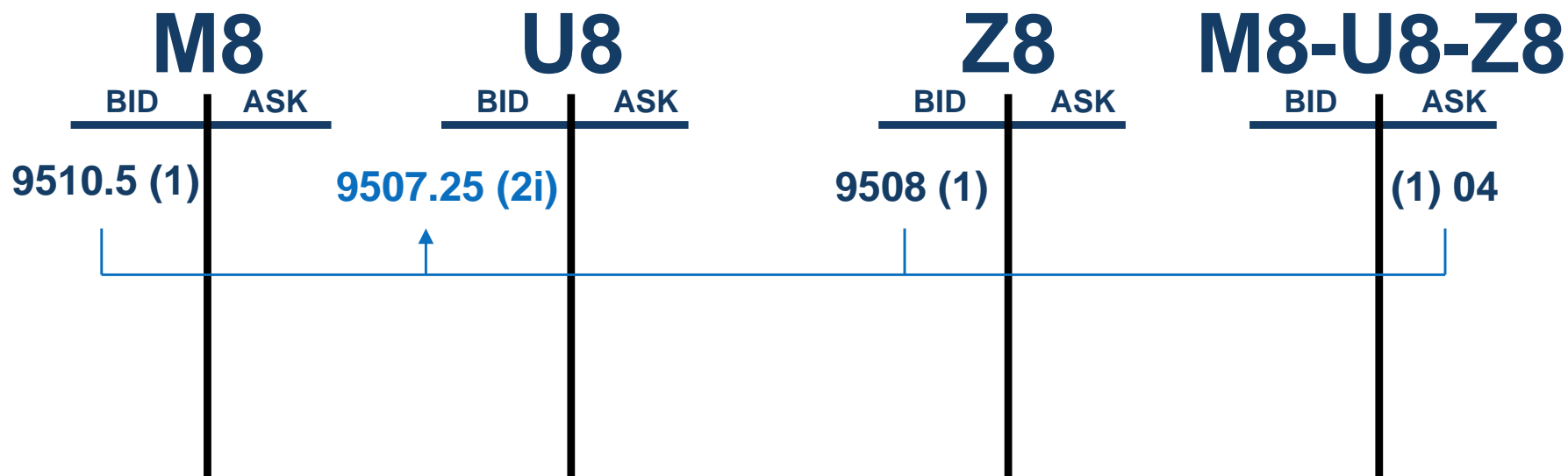
Implied Pricing Calculations

CME Group will impose the following pricing rule if there is no resting order:

- The incoming middle leg order would be assigned a price based on the following calculations:
 - $\text{Leg2} = (\text{Leg1} + \text{Leg3} - \text{Butterfly}) / 2$.
 - Ignore the decimals (i.e. the .25 ticks) in the calculated price to obtain the adjusted Leg2 price
 - Assign the decimals (i.e. the additional ticks) randomly to one of the legs in the middle leg 'body'

Tick Size Implications - Implied "OUT"

Example 2: No Resting Order



9510.5 Bid for 1 Lot – M8

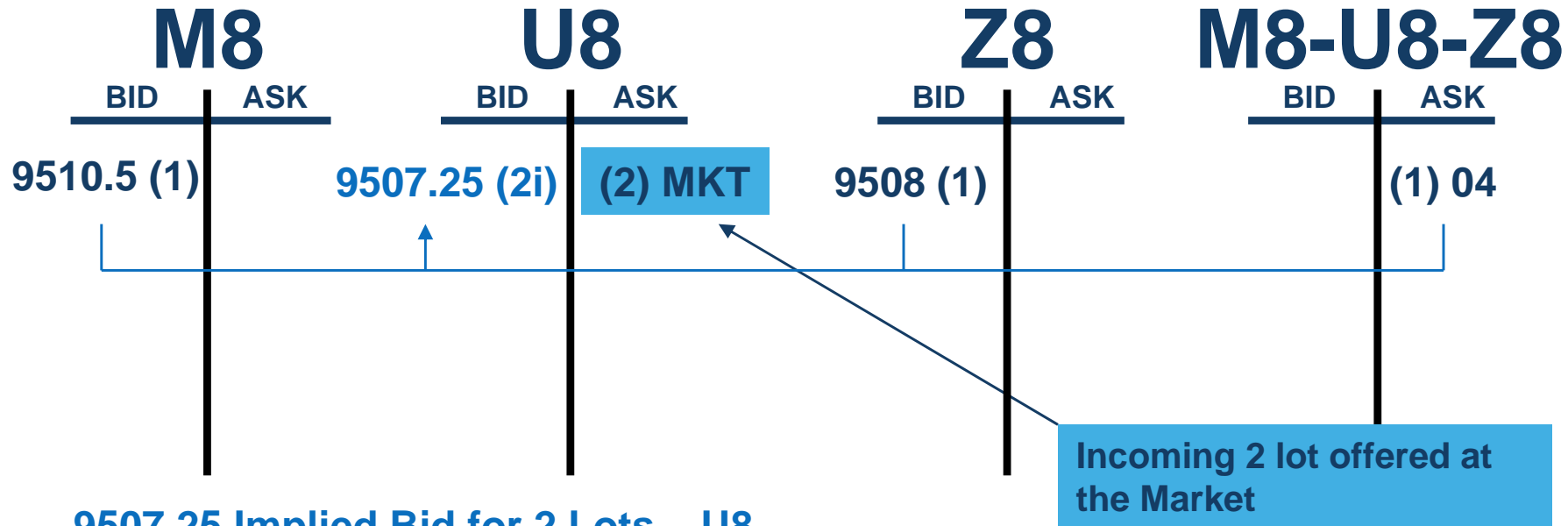
9508 Bid for 1 Lot – Z8

1 Lot offered at 04 – M8-U8-Z8

9507.25 Implied Bid for 2 Lots – U8

Tick Size Implications - Implied "OUT"

Example 2: No Resting Order



9507.25 Implied Bid for 2 Lots – U8

Since middle legs cannot trade in .25 ticks, the .25 would be dropped from the U8 Implied Bid resulting in an adjusted price of 9507.00

The two .25 ticks would be assigned to one of the lots of the incoming order.

As a result, two fill notices would be generated when the incoming order is matched:

The first at a price of 9507.50

The second at a price of 9507.00

Contact Us

CME Group Interest Rate Products and Services

interestrates@cmegroup.com

866-501-3646

Eurodollars on CME Globex: Implied Price Functionality

The Globe Logo, CME®, Chicago Mercantile Exchange®, and Globex® are trademarks of Chicago Mercantile Exchange Inc. CBOT® and the Chicago Board of Trade® are trademarks of the Board of Trade of the City of Chicago. CME Group is a trademark of CME Group Inc. All other trademarks are the property of their respective owners.

Copyright © 2007 CME Group. All rights reserved.