MOSCOW EXCHANGE

Moscow 2020
Derivatives Market

# The Synthetic Matching of Calendar Spreads

The Synthetic Matching of Calendar Spreads

- **Calendar spread (CS) –** the Derivatives Market technology allowing for simultaneous trading in two futures contracts on the same underlying asset but with different delivery months and opposite (short or long) positions. *For example: RTS-6.20 and RTS-9.20.*

  ➢ First leg of a CS – a nearby futures contract
  ➢ Second leg of a CS – a futures contract with the most distant expiration

	First leg position	Second leg position
Calendar spread buy	↓	↑
Calendar spread sell	↑	↓

AS IS

Calendar spreads are traded in a **separate** order book. Calendar spread orders (first leg order and second leg order) are matched with the offset orders within that separate order book
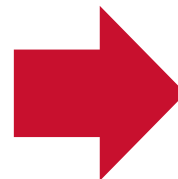
TO BE

The Synthetic Matching will give an opportunity to match the order not only within the separate CS order book, but also in the order books of the related instruments: for example in the order book of one of the legs (futures)

Price Discovery: Through order books mergence the synthetic matching allows to find prices that are the same or even **better** than in every single order book

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Example of active order matching with the passive one:

Active order	Passive order: Real order *or* Synthetic order	Synthetic passive order pricing
↑ a nearby futures	↓ a nearby futures *or* ↓ a distant futures + ↑ Calendar Spread	A distant futures price - Calendar Spread price
↓ a nearby futures	↑ a nearby futures *or* ↑ a distant futures + ↓ Calendar Spread	A distant futures price - Calendar Spread price
↑ a distant futures	↓ a distant futures *or* ↓ a nearby futures + ↓ Calendar Spread	A nearby futures price + Calendar Spread price
↓ a distant futures	↑ a distant futures *or* ↑ a nearby futures + ↑ Calendar Spread	A nearby futures price + Calendar Spread price
↑ Calendar Spread	↓ Calendar Spread *or* ↑ a nearby futures + ↓ a distant futures	A distant futures price - A nearby futures price
↓ Calendar Spread	↑ Calendar Spread *or* ↓ a nearby futures + ↑ a distant futures	A distant futures price - A nearby futures price

↑ **buy**
↓ **sell**
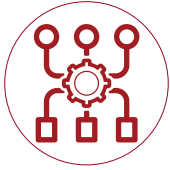
First column:
Active order type and direction (buy or sell)

Second column:
Two types of offset orders: real and synthetic ones

Third column:
Pricing of the synthetic order from the second column

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The Synthetic Matching of Calendar Spreads: algorithm

1. The entering active order defines one of *6* synthetic matching options (see the previous slide).
2. Each option contains two more cases – 1) matching within the order book and 2) synthetic matching (there may be several options also for the synthetic matching if the incoming futures is one of the legs of several calendar spreads - see the example below).
3. Then, the best quote among synthetic orders and real counter-orders is determined and matches with the active order.
4. The algorithm repeats until the active order is executed.

Case study: a futures is a leg for a few calendar spreads

1. For example, we have two calendar spreads *RTS-6.20-9.20, RTS-9.20-12.20.*
2. Then comes Order №1 for buying *RTS-9.20.*
3. The offsetting orders for Order №1 may be created the following ways:
    1. ↓ ***RTS-9.20*** *– real order*
    2. ↓ ***RTS-6.20*** *+* ↓ ***RTS-6.20-9.20*** *– synthetic order*
    3. ↓ ***RTS-12.20*** *+* ↑ ***RTS-9.20-12.20*** *– synthetic order*
4. The best price order matches with Order №1.
5. If two or more of four options give the same price – the second priority is the time of the incoming order (See Slide 6).
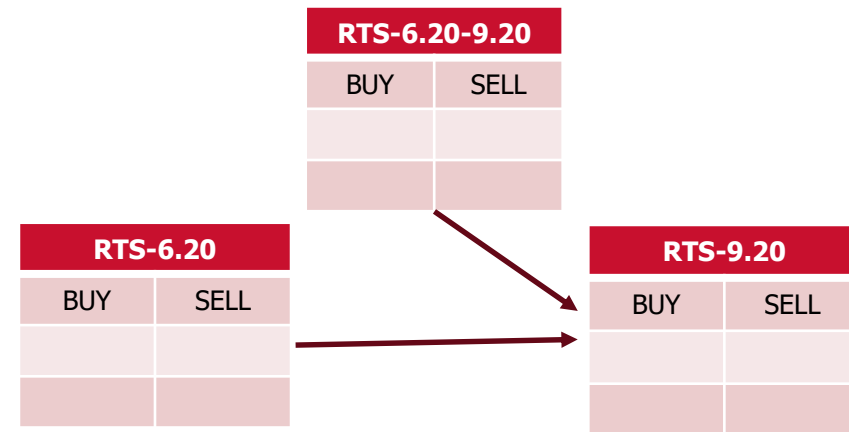
The Synthetic Matching: peculiarities (1/2)

The Synthetic matching does **NOT** have a specific direction:

A synthetic order on calendar spread may be compound of two separate futures orders
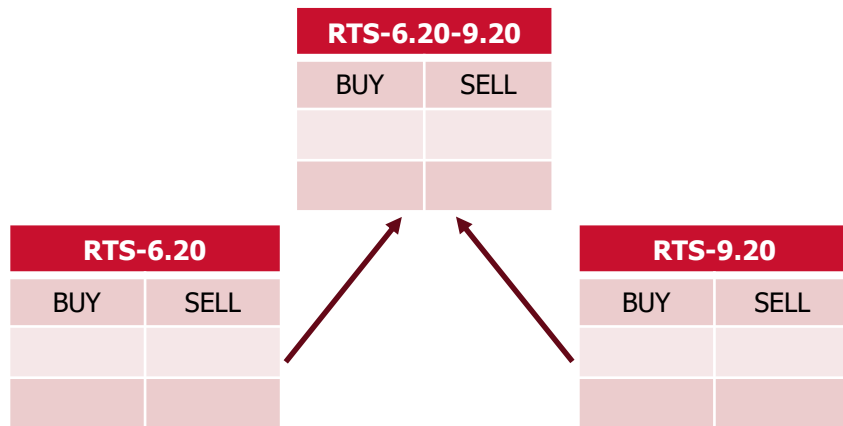
A synthetic order on a futures may be constructed of one futures and one calendar spread, for example:

The Synthetic Matching: peculiarities (2/2)

- **Matching priority**

1. The first matching priority is the price. Regardless of the order type (synthetic/real) the active order matches with that passive order, which offers the better price.

2. If a synthetic passive order and a real passive order offer equal prices, then the active order matches with the earlier order first.

3. As long as a synthetic spread has two legs coming at different time, the time of such spread is considered to be the time of the last leg received.

   - *Case study:*

   1. *For example, we have Order №2 for buying a calendar spread.*
   2. *We have also Order №1 and Order №3 for two futures in their order books, which can compile an identical buy-order if they meet an offset order.*
   3. *Order №1 appeared before Order №2 and Order №3 appeared after Order №2.*
   4. *Then comes an offset sell-order №4, which can potentially match with these both buy-orders (Order №2 and Order №1 + №3).*
   5. *Order №4 will match with Order №2 because it appeared earlier that the second leg of the spread (Order №1 + Order №3)*

- **Price advantage of the orders**

1. The order prices cross is checked within the order book of the spread as well as among the orders in the order books of this spread two legs.

2. An active order gets the price advantage if the offset price levels are different

3. Thus, transactions are executed at a passive order price (similar to the current implementation).

The Synthetic Matching: front ends (1/3)

The prices for each leg of the Calendar Spread are in the transaction table:

1. If a calendar spread matches with the same offset spread within its order book:

The price of the transaction on the nearby leg	The price of the transaction on the distant leg
The settlement price of the nearby leg after the latest clearing session.	The settlement price after the latest clearing session + swap-price.

2. If a calendar spread matches with two futures contracts from different order books:

Passive orders: two separate futures contracts	Passive orders: a futures and a calendar spread
The transaction prices for the first and second legs will be equal to the prices indicated in these two orders, which difference matches with the price of the calendar spread.	The transaction price for the second leg will be equal to the price of the passive order on the futures +/- the price of the passive order on the spread.

7

The Synthetic Matching: front ends (2/3)

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➢ In **Order Log** the calendar spread order splits up into two synthetic orders (similar to the current implementation).

➢ In **Multileg Order Log** two orders on separate futures contracts create a single synthetic order on calendar spread

Due to this, each order in Order Log and Multileg Order Log creates a pair.
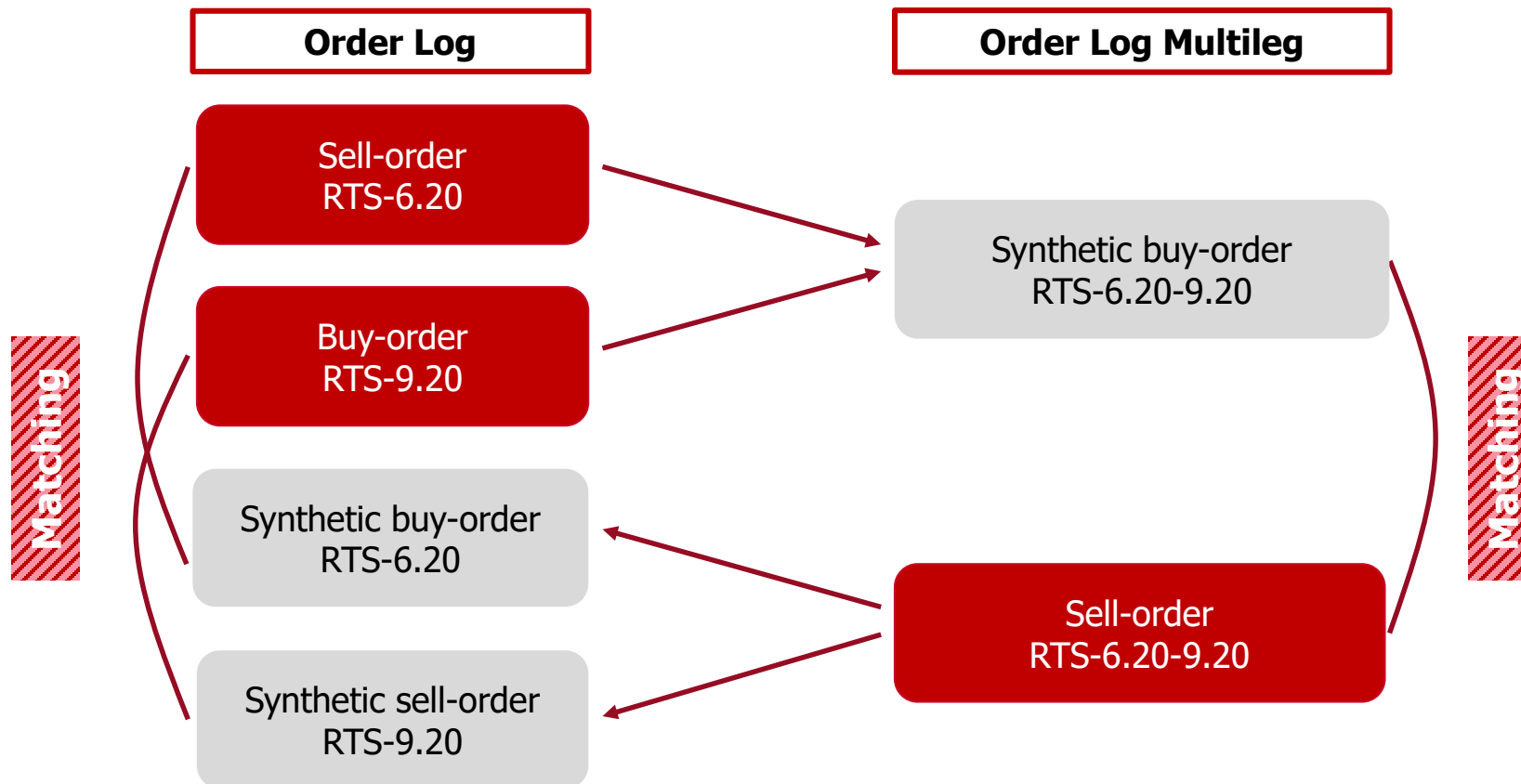
The Synthetic Matching: front ends (3/3)

- **Order Log**
  - **New records**
  - In Order Log there will be new records displaying synthetic orders. These records appear only at the time of matching with a new attribute. **The rest remains unchanged**

- **The depth of matching and the translation of synthetic orders in the order books**
  1. When matching, the synthetic orders of any depth, which necessary to put together active orders, are built.
  2. Only those synthetic orders which are engaged in matching are translated in the **orderlog** (that is, Action "1" in the Order Log can be inside of one transaction, which differs from the current implementation).
  3. In **aggregated order books** a limited depth is indicatively translated.

- **Turnover of the futures participating in the synthetic matching**

    The turnover comprises transactions on both legs.

- **Settlement price calculation**

    Synthetic orders are factored into the estimation of the settlement price
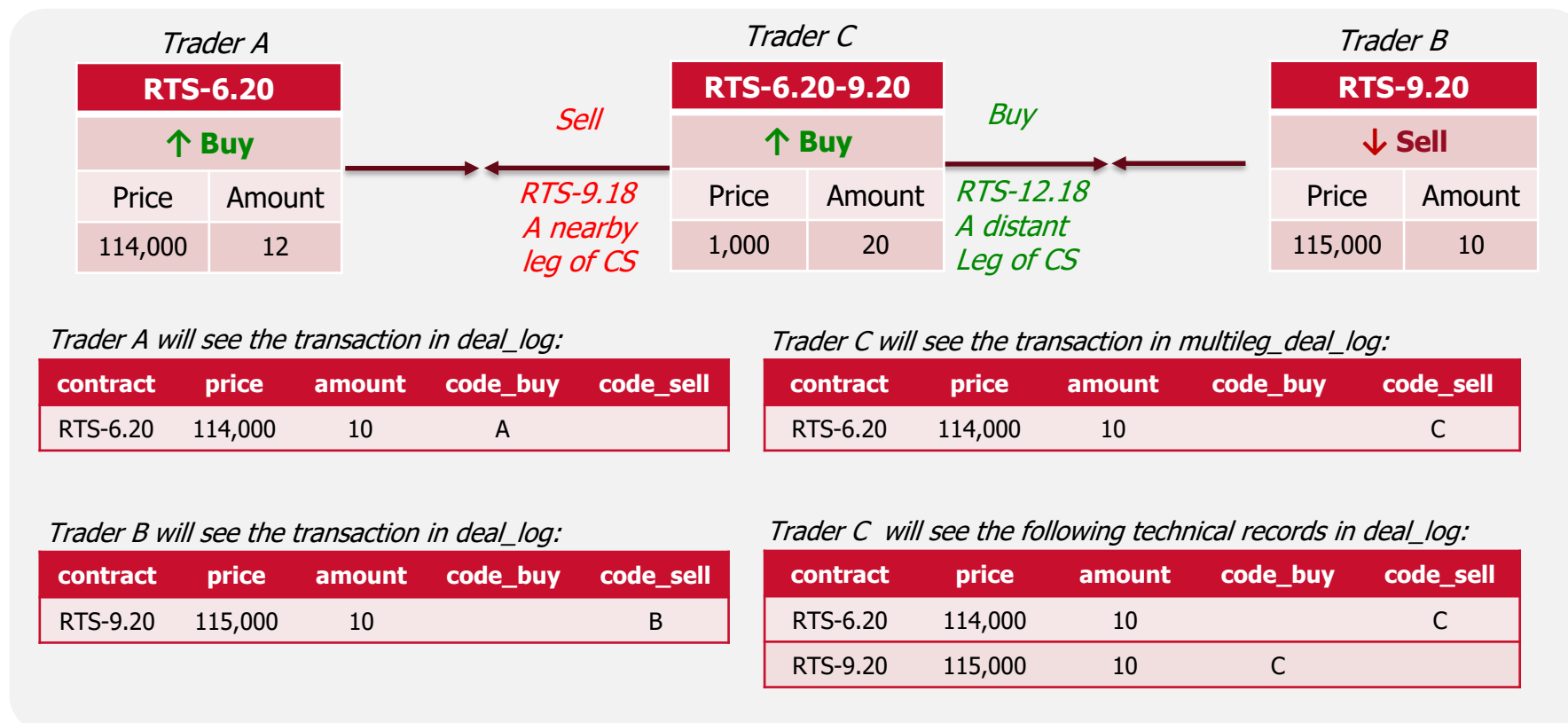
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Trader A

RTS-6.20	
↑ **Buy**	
Price	Amount
114,000	12

Sell

RTS-9.18 A nearby leg of CS

Trader C

RTS-6.20-9.20	
↑ **Buy**	
Price	Amount
1,000	20

Buy

RTS-12.18 A distant Leg of CS

Trader B

RTS-9.20	
↓ **Sell**	
Price	Amount
115,000	10

Only those synthetic orders which are engaged in matching are translated in the **orderlog** (i.e. the record "NEW" in Order Log may be within one transaction).

Trader A will see the transaction in deal_log:

contract	price	amount	code_buy	code_sell
RTS-6.20	114,000	10	A	

Trader C will see the transaction in multileg_deal_log:

contract	price	amount	code_buy	code_sell
RTS-6.20	114,000	10		C

Trader B will see the transaction in deal_log:

contract	price	amount	code_buy	code_sell
RTS-9.20	115,000	10		B

Trader C will see the following technical records in deal_log:

contract	price	amount	code_buy	code_sell
RTS-6.20	114,000	10		C
RTS-9.20	115,000	10	C	

Thank you for your attention!

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