

Trading Safeguards at Eurex Exchange

Eurex Market Supervision



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1 Introduction



Introduction

- Various examples of highly volatile market situations caused by the activity of trading participants in recent years (e.g. US Flash Crash 2010, Knight Capital issue 2012,...)
- Development of safeguards in order to limit the consequences of potential trading errors
- Trading errors can result from e.g.
 - erroneously entered orders/quotes
 - abrupt market movements
 - system dependency due to program trading
 - high frequency trading

Various Safeguards during Process of Trading

There are a number of safeguards through the whole process from order entry until order execution:



2 Transaction Size Limits

Transaction Size Limits (TSL)

- Transaction size limits defining max. number of contracts tradable per order on business unit and trader level
- Separately defined for each product
- Potentially different limits for on-exchange and off-book trade
- For on-exchange trades separate outright/ spread limits
- Individual trader limit is capped by overall business unit level
- On-exchange limits as well as limits for off-book trades are set in T7 system
- Maximum Order Value determining the maximum value of an order that a trader is allowed to enter

TSL: Example of On-Exchange Limits - T7

Prod	LongName	MaxOrderQty	MaxCalendarSpreadQty	EffectiveMaxOrderQty	EffectiveMaxCalendarSpreadQty	MaxOrderQtyBu	MaxCalSprdQtyBu
F2MX	FUT ON MDAX	6399	6399	2500	5000	2500	5000
FDAX	FUT ON DAX INDEX	6399	6399	2500	5000	2500	5000
FDXM	MINI-FUTURES ON DAX					2500	5000
FESX	FUT ON EURO STOXX 50	9999	9999	2500	5000	2500	5000
FLCE	FUTURE ON ESTX LARGE	9999	9999	2500	5000	2500	5000
FLCP	FUTURE ON STXE LARGE 200 (50 E	9999	9999	2500	5000	2500	5000
FMCE	FUTURE ON ESTX MID	9999	9999	2500	5000	2500	5000
FMCP	FUTURE ON STXE MID 200 (50 EUR	9999	9999	2500	5000	2500	5000
FSCE	FUTURE ON ESTX SMALL	9999	9999	2500	5000	2500	5000
FSCP	FUTURE ON STXE SMALL 200 (50 E	9999	9999	2500	5000	2500	5000
FSTB	FUT ON STOXX E 600 BANKS	9999	9999	2500	5000	2500	5000
FSTX	FUT ON STOXX EUROPE 50	9999	9999	2500	5000	2500	5000
FXXE	FUTURE ON EURO STOXX	9999	9999	2500	5000	2500	5000
FXXP	FUTURE ON STXE 600 (50 EUR)	9999	9999	2500	5000	2500	5000

3 Quote Validation

Quote Validation

- The limit price of a quote is subject to the same validations as the limit price of an order:
 - It must comply with the price step table of the instrument
 - User may request the limit prices of the quote to be validated with the Price Reasonability Check
 - Quotes not validated with the Price Reasonability Check are tested with the Extended Price Range Validation for the product (if enabled)
- Quote quantity must be equal or above the minimum quote size, defined individually per product
- Total quote quantity must be above the minimum quote size. The open quote quantity might fall below the minimum threshold but it is not considered a violation of the minimum quote size
- Different minimum quote size requirements apply during fast market state

4 Market Maker Protection (MMP)

Market Maker Protection (MMP)

- T7 offers a Market Maker Protection (MMP) mechanism, which prevents too many quotes of a market maker to be executed in a short period of time. The exchange enables or disables this feature on a product basis
- T7 calculates for each session and product several statistics on the traded volume: Volume, Delta, Vega and Percent statistic
- In order to calculate these statistics, only trades that occurred before the last trade are considered
- The size of the time window and the limit values of the four statistics are configured by the market maker
- The statistics can be set either at product level or at instrument level (for each instrument type)

Market Maker Protection (MMP)

- The four MMP statistics represent four different methods of counting the traded contracts
- Volume, Delta and Vega statistics are computed differently for futures and options:

Statistic Figures	Options	Futures
Volume Statistic	$\#BC + \#BP + \#SC + \#SP$	$\#BF + \#SF$
Delta Statistic	$(\#BC - \#SC) - (\#BP - \#SP)$	$\#BF - \#SF$
Vega Statistic	$(\#BC + \#BP) - (\#SC + \#SP)$	N/A

- The percent statistic sums up a value determined comparing the traded volume of the quote to the original total size of the quote. The idea is to have a volume statistics that gives equal weight to quotes with different quantities in different instruments
- Percent Statistic = $\sum \text{Round}(100 \times \text{Traded Quantity} \div \text{Total Quantity})$

Market Maker Protection (MMP)

- The MMP is not a mandatory feature. In case no limits are set, T7 does not perform any check. If limits are set, but an individual limit equals zero, the corresponding statistic is not checked
- Only trades during instrument state “continuous” trading are taken into consideration for the calculation of the statistics
- The statistic value is reset to 0 when the corresponding limit is exceeded
- A deactivation due to MMP takes place only after the matching of an incoming order or quote has been completed. If the limit is **exceeded**, T7 automatically triggers a quote deactivation

5 Price Reasonability Check and Extended Price Range Validation

Price Reasonability Check (PRC): Mechanism

- System-related check of limit orders/quotes in futures/options trading before the order is written into the order book, based on a reference price. Its purpose is to reduce operational risk.
- Exclusively performed in instrument state “Continuous”
- Allowed range for plausibility check:
 - **Futures** market order matching range
 - **Options** maximum market maker spread

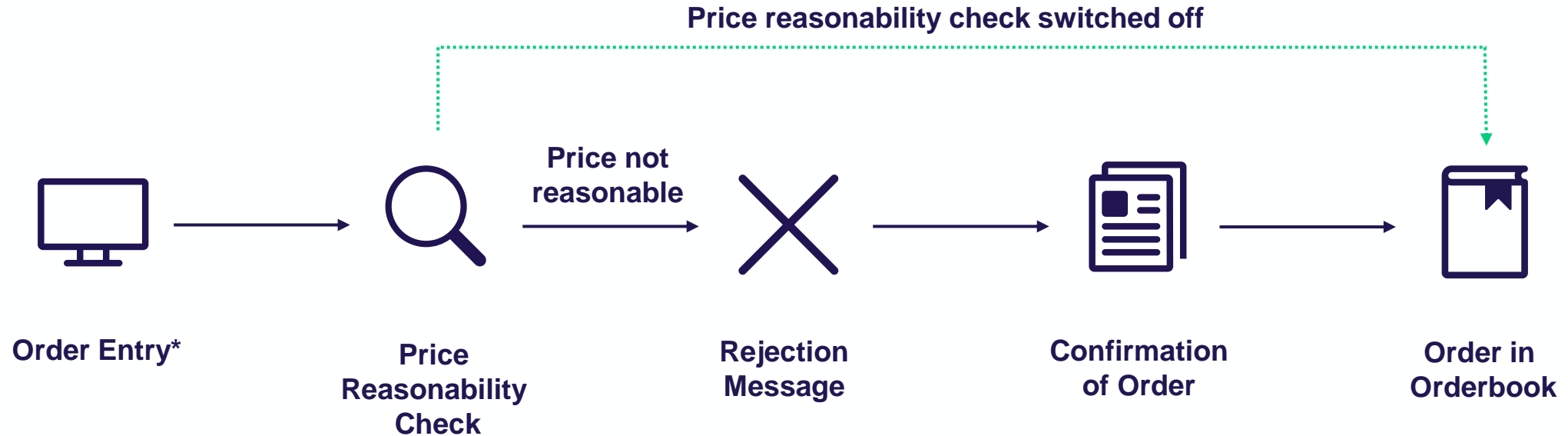
Buy Limit Price > Reference Price + Price Range
or
Sell Limit Price < Reference Price – Price Range

Price Not Reasonable Check range

Limit buy/sell orders beyond the below pre-defined range above/below the last price will generate PNR pop up			
Equity-related future products	Range in points	Equity-related future products	Range in points
FDAX Future on DAX Index	10	ODAX	Maximum quote spread
FESX Future on Euro STOXX 50 Index	10	OESX	Maximum quote spread
FSMI Future on SMI Index	15	OSMI	Maximum quote spread
FESB Future on STOXX Bank	2	OESB	Maximum quote spread
FEXD	2 if <100, 2% if >100	OEXD	Maximum quote spread
Single Stock Futures	0.2	Equity Options	Maximum quote spread
Single Stock Futures (on British Underlyings)	20		
FEDV	40	OEDV	Maximum quote spread
TESX	20		
Stoxx Index Futures	Product specific	Stock Index Options	Maximum quote spread
FVS	2 if <100, 2% if >100	OVS2	Maximum quote spread
MSCI Index Futures	Product specific	MSCI Index Options	Maximum quote spread
		OKS2	Maximum quote spread
Fixed Income-related futures products	Range in points	Fixed Income-related futures products	Range in points
FGBL, FGBM, FGBS	0.05	OGBS, OGBM, OGBL	Maximum quote spread
FGBX	0.3	OGBX	Maximum quote spread
FBTP	0.2	OEXD	Maximum quote spread
FBTM	0.1	OBTP	Maximum quote spread
FBTS, FBON, FOAT, CONF	0.15	OOAT	Maximum quote spread

* Relative value percentages refer to the product's current market level

PRC: Mechanism (cont.)



- If entered order/quote limit is outside of range, then the order/quote is not automatically admitted into order book but rejected with message “STANDARD PRICE VALIDATION FAILED”. The order can be reconfirmed by trader via the Eurex Trader GUI.
- The message can be switched on or off by the Trading Participant via the ETI settings (see next slide).

* Simplified illustration, no distinction between mandatory and optional price reasonability check

Price Reasonability Check (PRC): ETI Settings

When entering an order/quote, the trader can choose one of the following alternatives in ETI:

- **Skip price reasonability check**

In case the price reasonability check is skipped, an extended price range check is done for futures by the exchange to protect markets from obviously mispriced orders (see below for further explanations).

- **Optional price reasonability check**

Relevant parameters: order book situation, availability of an additional reference price.

If no price reasonability check is performed, the incoming order/quote is accepted without performing a PRC validation and without additional notification.

- **Mandatory price reasonability check**

Relevant parameters: order book situation, availability of an additional reference price.

If no price reasonability check can be performed by the exchange, the incoming order/quote is rejected with a specific notification to the entering trader.

PRC: Reference Price Determination

Standard procedure

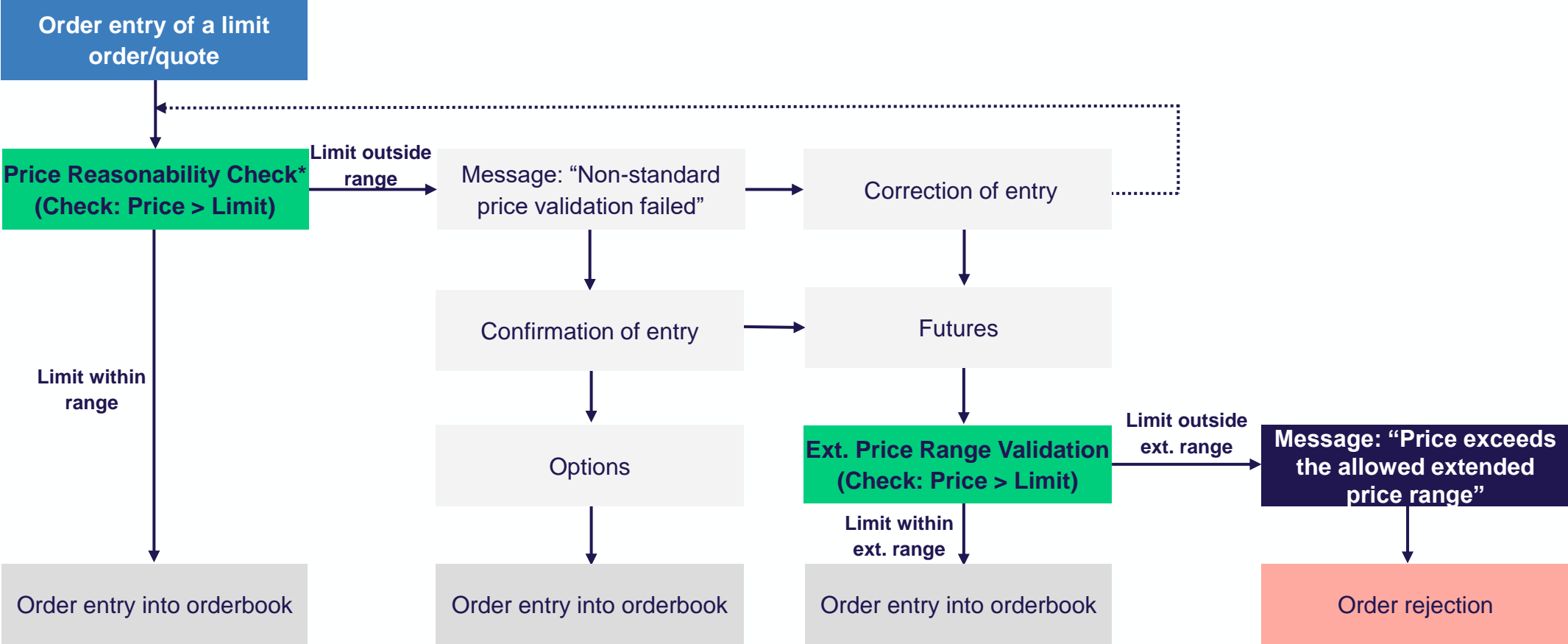
- Best available price on opposite side of incoming order (for buy order the best sell price and vice versa) as published by market data feed.
- **Conditions:**
 - Best buy and sell price are available
 - Price difference between best buy and best sell price equal or smaller than applied price range
 - Exception: No best buy price available > smallest allowed limit price is used (OTM options)

PRC: Reference Price Determination (cont.)

Non-Standard Procedure (exchange configuration)

- Alternative reference price must be available
- Reference price can be:
 - Last traded price
 - Theoretical price
 - Previous day's settlement price
- If none of the prices are available, no check is done and incoming order/quote is rejected (for option “mandatory price reasonability check”) or accepted (for option “optional price reasonability check”)

PRC for Limit Orders



* Simplified illustration, no distinction between mandatory and optional price reasonability check

Limit orders: Extended price range validation (Futures)

Maximum permitted deviation from the reference price		
Product	Relative value	Absolute value (min)
FDAX Future on DAX Index	1,00%	4,00
FESX Future on Euro STOXX [®] 50 Index	1,00%	4,00
FSMI Future on SMI Index	1,00%	4,00
FSTX Future on STOXX [®] 50 Index	1,00%	4,00
Futures on STOXX [®] Sector Indices	1,00%	1,00
Futures on Euro STOXX [®] Sector Indices	1,00%	1,00
FFOX Future on HEX 25 Index	1,00%	4,00
FGBL Future on 8 ½ – 10 ½ Yr. German Gov. Bonds	0,30%	0,15
FGBM Future on 4 ½ – 5 ½ Yr. German Gov. Bonds	0,20%	0,10
FGBS Future on 1 ¾ – 2 ¼ Yr. German Gov. Bonds	0,10%	0,05
FGBX Future on 24 – 35 Yr. German Gov. Bonds	0,40%	0,20
FBTP Future on 8 ½ – 11 Yr. Italian Gov. Bonds	0,40%	0,20
FBTM Future on 4 ½ – 6 Yr. Italian Gov. Bonds	0,15%	0,10
FBTS Future on 2 – 3 ¼ Yr. Italian Gov. Bonds	0,40%	0,20
FOAT Future on 8 ½ – 10 ½ Yr. French Gov. Bonds	0,30%	0,15
FOAM Future on 4 ½ – 5 ½ Yr. French Gov. Bonds	0,30%	0,15
FBON Future on 8 ½ – 10 ½ Yr. Spanish Gov. Bonds	0,30%	0,15
CONF Future on 8 – 13 Yr. Swiss Gov. Bonds	0,30%	0,15

* Relative value percentages refer to the product's current market level

6 Pre-Trade Risk Quantity Limits

Pre-Trade Risk Quantity Limits

- The pre-trade risk limits functionality provides the possibility to continuously check in real-time whether traded quantities (on-book/off-book) in combination with incoming transactions will breach the pre-defined risk limits. In case the pre-trade risk limit functionality is activated and a newly submitted transaction (on-book/off-book) would breach the defined pre-trade risk limit, the transaction will be rejected.
- Limits set separately for order book and TES trades, defined at product level and changeable intraday
- The limits can be set:
 - by the NCM for his own risk groups
 - By a GCM his NCM and his own risk groups
 - by the Exchange for a business unit
- Quantities from the previous day are not taken into consideration. In case of a complex instrument, the quantity of an open order or quote is given by the sum of all legs with a buy (sell) side indicator multiplied with the corresponding leg ratio. The futures leg of an option volatility strategy as well as the futures leg of a vola trade attached to a TES options trade are not taken into account for the limits.

Pre-Trade Risk Quantity Limits for Outright futures

The limit quantities are calculated differently for Order Book trading and TES trading.

On-book Trading

- Buy side on-book statistics = Traded on-book quantity on buy side
- Traded on-book quantity on sell side
+ Quantity of open orders & quotes on sell side,
- Sell side on-book statistics = Traded on-book quantity on sell side
- Traded on-book quantity on buy side
+ Quantity of open orders & quotes on sell side.

Off-book Trading

- Buy side off-book statistics = Traded off-book quantity on buy side
- Traded off-book quantity on sell side
+ Quantity of pending off-book trades on buy side,
- Sell side off-book statistics = Traded off-book quantity on sell side
- Traded off-book quantity on buy side
+ Quantity of pending off-book trades on sell side.

Pre-Trade Risk Quantity Limits for Future Spreads

At present quantity of each Futures Spread leg counts 100% in Short & Long Limit when being unexecuted and only 0% once executed as legs can be netted off.

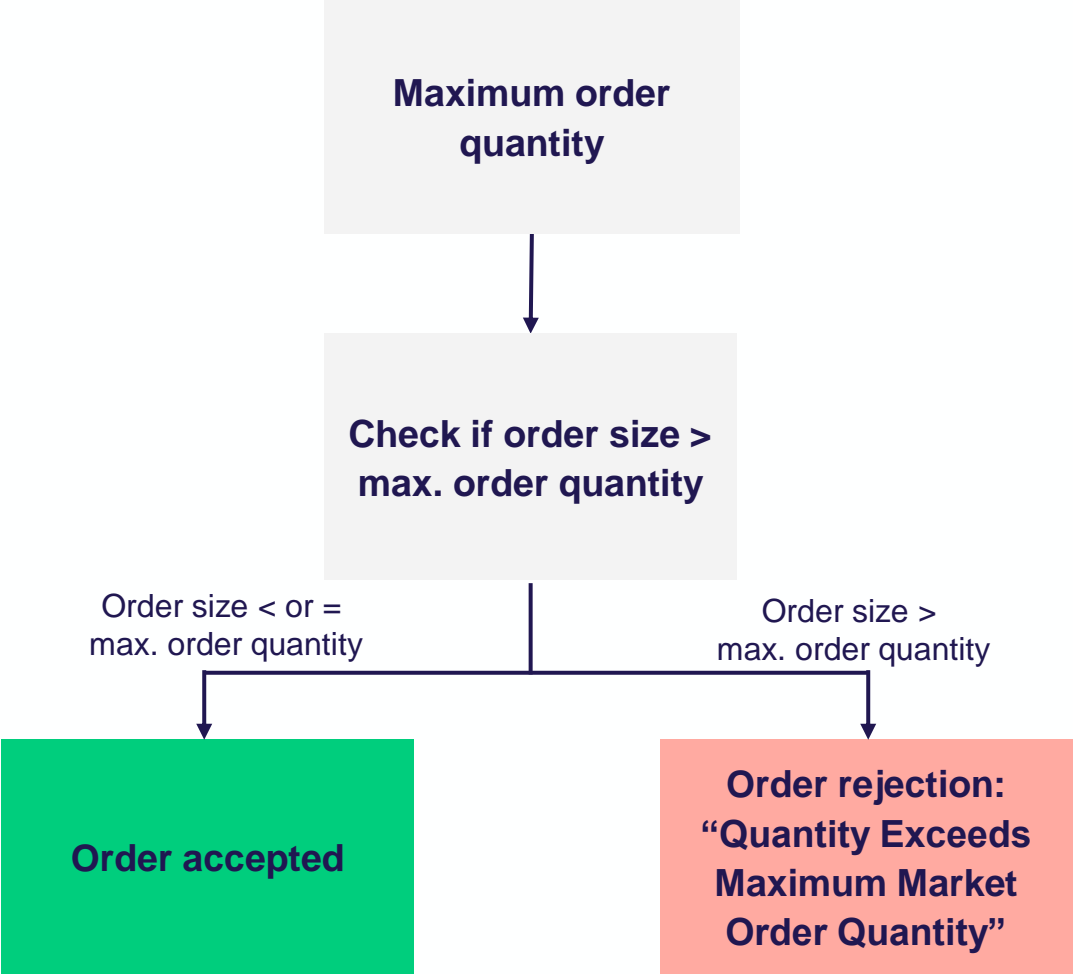
With release of T7 10.0, a **Netting Coefficient** (NC) is introduced where members can define how much of the quantity of a Future Spread is considered in existing PTRL checks for TES & CLOB.

While Calendar Spread Orders were considered in Long & Short Limit simultaneously, they will only be considered in one, depending on trade direction (like any other outright order)

PTR Limit	=	Open Orders / Quote	+	Net Position (Trades)
Current		100%		0%
Proposal		Configurable NC %		Configurable NC %

7 Maximum Order Quantity

Maximum Order Quantity (Market/Stop Orders, Futures)



Maximum order quantity for market- and stop market-orders (Futures)	
Product	No. of Contracts
FDAX Future on DAX Index	500
FESX Future on Euro STOXX® 50 Index	1000
FSMI Future on SMI Index	500
FSTX Future on STOXX® 50 Index	250
Futures on STOXX® Sector Indices	250
Futures on Euro STOXX® Sector Indices	500
FFOX Future on HEX 25 Index	50
FGBL Future on 8 ½ – 10 ½ Yr. German Gov. Bonds	2000
FGBM Future on 4 ½ – 5 ½ Yr. German Gov. Bonds	2000
FGBS Future on 1 ¾ – 2 ¼ Yr. German Gov. Bonds	2000
FGBX Future on 24 – 35 Yr. German Gov. Bonds	250
FBTP Future on 8 ½ – 11 Yr. Italian Gov. Bonds	2000
FBTM Future on 4 ½ – 6 Yr. Italian Gov. Bonds	2000
FBTS Future on 2 – 3 ¼ Yr. Italian Gov. Bonds	2000
FOAT Future on 8 ½ – 10 ½ Yr. French Gov. Bonds	2000
FOAM Future on 4 ½ – 5 ½ Yr. French Gov. Bonds	2000
FBNON Future on 8 ½ – 10 ½ Yr. Spanish Gov. Bonds	2000
CONF Future on 8 – 13 Yr. Swiss Gov. Bonds	250

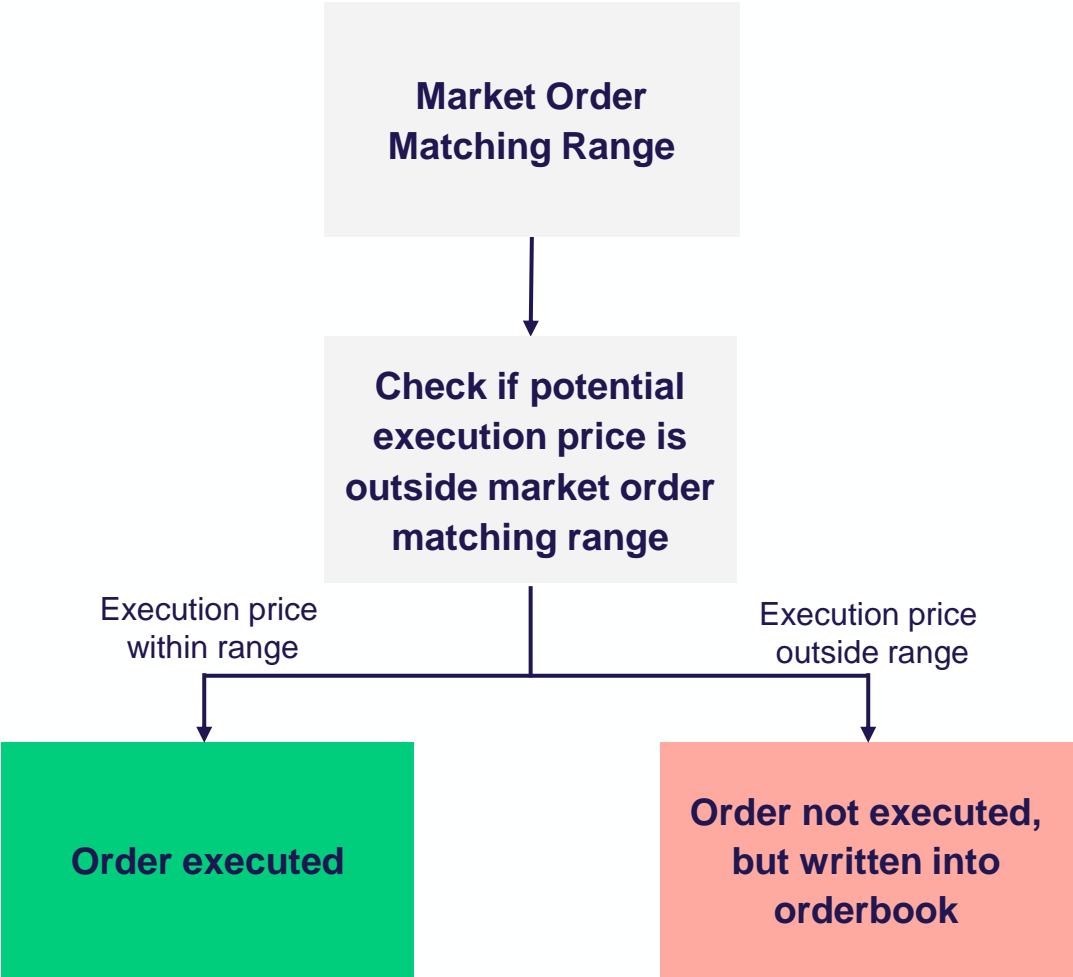
8 Market Order Matching Range

Market Order Matching Range

Matching rules for market orders

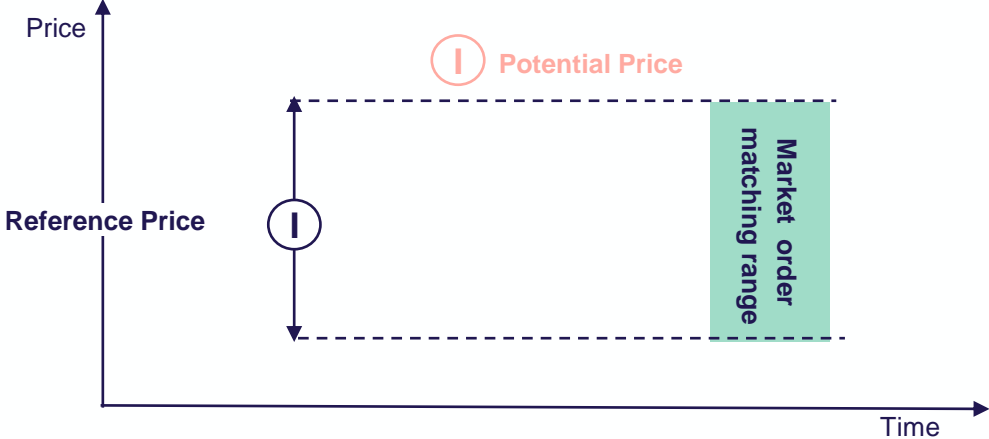
- Market orders: Matched at best available bid or ask price or saved on the order book when they cannot match due to the validation (partial match possible)
 - Market order matching range defines price interval, outside which no matching takes place
 - The market order matching range helps to prevent extreme price fluctuations
 - Incoming market buy order: Match against sell book order until the execution price exceeds the value of best buy price + market order matching range
 - Incoming market sell order: Match against buy book order until the execution price falls below the value of best sell price - market order matching range
 - If difference between best buy price and best sell price, i.e. bid/ask spread > market order matching range, incoming market orders are not executed
- Instrument states which offer market order for Options:
 - Instrument state **Book**: Market orders will be rejected
 - Instrument state **Continuous**: Market orders will be rejected if there is no valid bid / ask price available on opposite side of incoming Market order (validation to be applied also to Market order modifications)
 - Instrument state **Auction**: Market orders generally allowed
Transition to **Continuous**: Sitting Market orders are validated and, if necessary, cancelled (valid also for Auction Uncrossing)
 - **Stop** Market orders to be generally rejected

Market Order Matching Range



Product related limits (examples)

Max. deviation in points	Market order matching range
FDAX	10
FESX	10
FGBL	0,05
FGBM	0,05
FGBS	0,05
FGBX	0,3
FBTP	0,2
FBTM	0,1
FBTS	0,15
FOAT	0,15
FOAM	0,15
FBON	0,15
CONF	0,15



Market Order Matching Range: Example

- The current order book for FEXF is as shown. The market order matching range for FEXF is 10 points
- A buy market order for 60 lots gets entered
- From the market order 50 contracts are executed (@1790). The remaining 10 contracts don't get executed because potential execution price outside market order matching range (= best buy price + 10 points = 1780+10=1790). The unexecuted part of the market order is written into the order book but can't be seen by the Trading Participants

Order book before execution

FM	CPhase	Contract	Curr	CPrevSetlPrc	CNetChg	SetlPrcNetChg	CBQty	CBid	CAsk	CAQty
	Cont	FEXF Sep17	EUR	1,774.500		25.500	10	1,780.0	1,790.0	50
							10	1,770.0	1,800.0	40
							50	1,760.0		

BUY	Contract	Vol	O/C	Act	Tot	TotQty
	FEXF SEP17		O	A1	✓	60

BOOK: 10 EXECUTED: 50 ORDER NO: 1501218043252063032

Order book after the first execution

FM	CPhase	Contract	Curr	CPrevSetlPrc	CNetChg	SetlPrcNetChg	CBQty	CBid	CAsk	CAQty
	Cont	FEXF Sep17	EUR	1,774.500		25.500	10	1,780.0	1,800.0	40
							10	1,770.0		
							50	1,760.0		

Market Order Matching Range: Example (cont.)

- New buy limit order necessary to trigger the remaining part of the market order
- Book market orders are executed at the best available limit price and not protected by the market order matching range like incoming market orders
- A buy limit order with price of 1800 for 30 lots is entered. The resting book market order is triggered and executed for the remaining 10 lots against the best available price of 1800. Afterwards the new buy limit order (@ 1800, Qty 30) gets executed for the full quantity
- With T7, the market order matching range works in the same way for futures and options

Order book before the second execution

FM	CPhase	Contract	Curr	CPrevSetlPrc	CNetChg	SetlPrcNetChg	CBQty	CBid	CAsk	CAQty
	Cont	FEXF Sep17	EUR	1,774.500		25.500	10	1,780.0	1,800.0	40
							10	1,770.0		
							50	1,760.0		

Order book after the second execution

FM	CPhase	TrdUnit	CPrevSetlPrc	CVol	CBQty	CBid	CAsk	CAQty
	Cont	1.0000	1,774.500	90	10	1,780.0		
					10	1,770.0		
					50	1,760.0		

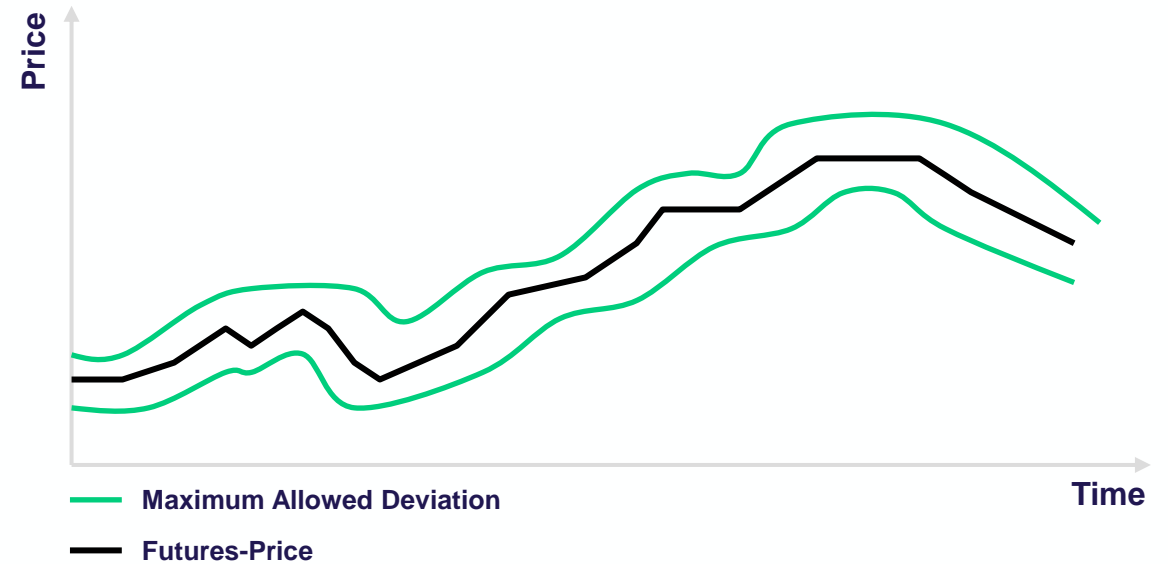
Contract	Vol	O/C	Act	Tot	TotQty	Limit
BUY FEXF SEP17		0	A1	30		1800 EUR

EXECUTED: 30 ORDER NO: 1501218043252063062

9 Volatility Interruption



Volatility Interruption: Basic Principle

- Aim of a volatility interruption: Efficient price determination under highly volatile market conditions
- Only applied to simple futures instruments
- Check of possible execution price against available execution prices – matching only up to an acceptable limit.
- If new potential execution price in a defined time interval differs significantly, a volatility interruption occurs automatically and further executions are prevented
- Regularly calculated price corridors. Price corridors and time intervals not public
- Trigger before execution at a bad price



Volatility Interruption: Process Steps

- Change of trading phase occurs: pre-opening
- Information to trading members via news board

News Board							
<input type="checkbox"/> SYSTEM-NEWS <input type="checkbox"/> MS-NEWS <input type="checkbox"/> GUI <input type="checkbox"/> LEGAL <input type="checkbox"/> RISK <input type="checkbox"/> SYSTEM > 02.08.2016 05:00:00 							
Source	Type	Market	Time	Product	Contract	Title	Text
SYSTEM-NEWS	 Info	XEUR	01.08.2017 14:48:42.662	FV5	FV5 Sep17	VOLATILITY_INTERRUPT	VOLATILITY INTERRUPT IN PRODUCT FV5

- Non-persistent orders/quotes are deleted
- Re-opening of trading phase: Pre-opening period/netting process

Volatility Interruption: Process Steps (cont.)

- Intention: determine a price in line with the market and restart continuous trading
- Preliminary opening price continuously displayed
- Netting process: final opening price calculated (principle of maximizing execution)

Interruption of continuous trading as the potential execution price lies outside of the pre-defined price range



- Ensure price continuity process
- Prevent adverse effects that may result e.g. due to triggered stop order cascades

10 Trade Cancellation



Cancellation of Transactions (Mistrade Rule)

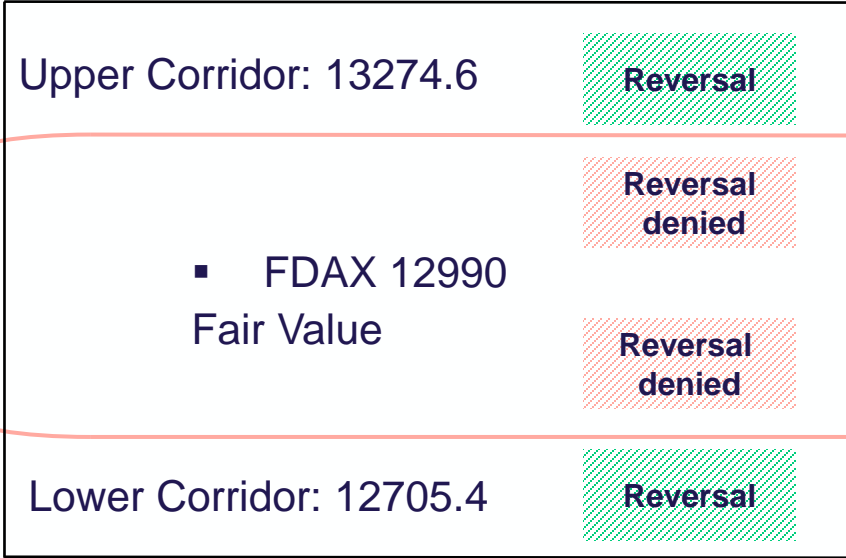
Factors impacting chance for cancellation of transactions:

- Request submitted in correct format
- Timing of submission
- Price outside mistrade range
- Loss amount
- Decision of counterparty

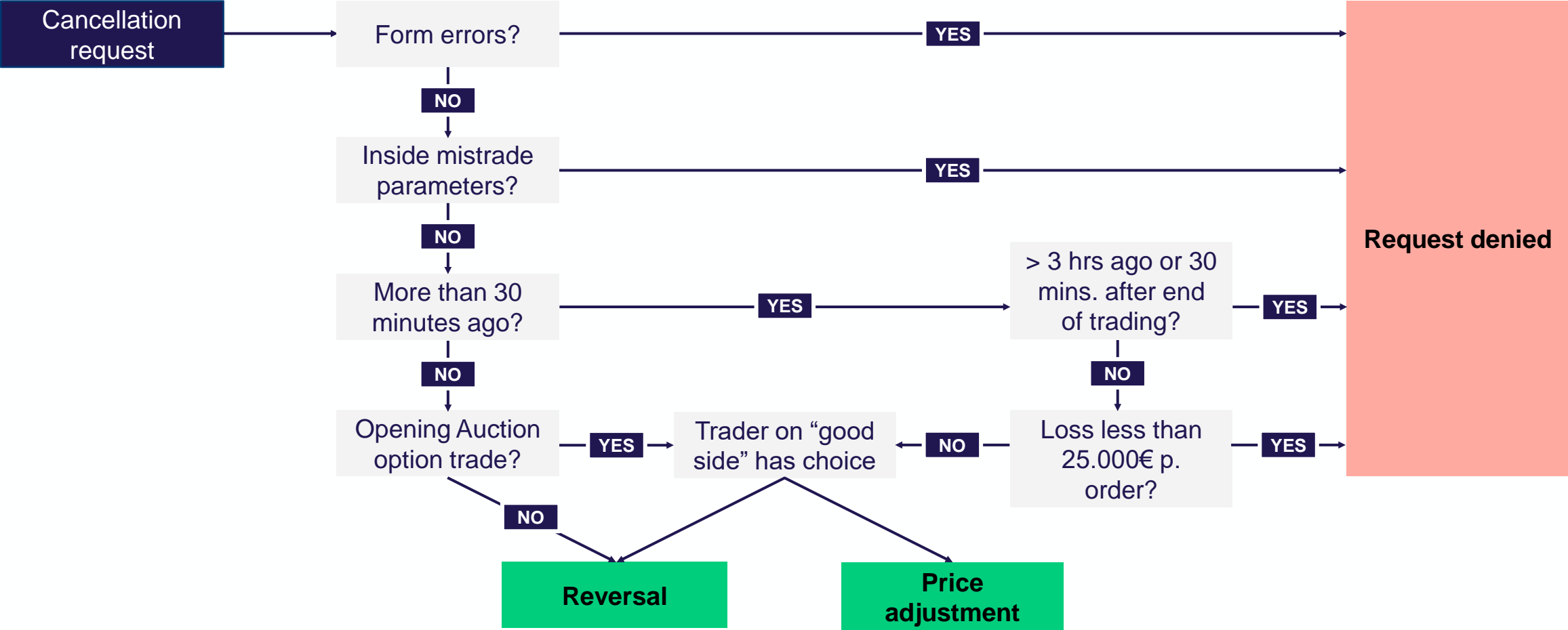
Example:

- Product: FDAX Sep 20
- Fair value: 12990
- Mistrade range: 284.6 points
- Mistrade low/high corridor: 12705.4/13274.6

Mistrade Corridor



Cancellation of Transactions



Mistrade Parameters

- **Futures:** 20% of the reference price Price Change Percentile (PCP)
 - **Future spread:** 20% of the reference price, Price Change Percentile (PCP) or mistrade range floor
 - Mistrade range floor: max of 10% of the corresponding outright futures mistrade range and an absolute value of four ticks.
 - **Standard future strategy (FBUT, FCOND):** strategy mistrade range depending on no. of total contracts within strategy:
 - 2 contracts 100%, 3 contracts 125%, 4 or more contracts 150%
 - **Strip & non-standard future strategy =100%**
- **Options:** Individual parameters are defined per product
 - **Strategies:** Special mistrade rules and weights are defined at strategy and leg levels to calculate the mistrade range:
 - Strategy: weight factor 100%
 - Strategy with a single contract for each leg: weight factor 100%
 - Strategy with multiple contracts for each leg (ex. ratio strategies):
 - 2 contracts: weight factor 125%, 3 or more contracts: weight factor 150%

The mistrade parameters are available on the Eurex webpage www.eurex.com under the relevant product specifications. The updated rule for the calculation and examples of the mistrade ranges for option strategies is available in the circular 070/17 and for future spread floor in the circular 066/19.

Mistrade Parameters (cont.)

Example: 2x1 Ratio Call Spread on ODAX (2 legs strategy)

- Sell One ODAX SEP 2020 C, Strike 13600, Price 51.5
- Buy Two ODAX SEP 2020 C, Strike 13700, Price 32.5
- Strategy price 13.5

Mistrade parameters:

ODAX mistrade parameters	
Reference price (currency units)	Mistrade Range (currency units)
0 - 25	2
25 - 300	8%
> 300	24

Mistrade range calculation:

Basis	Buy / Sell	Reference price	Factor	Calculation	Mistrade range
net strategy premium	Buy	13.5	100%	2	2
13600 call price	Sell	51.5	100% (leg has 1 contracts)	$100\% * 8\% * 51.5$	4.12
13700 call price	Buy	32.5	125% (leg has 2 contract)	$125\% * 8\% * 32.5$	3.25

* The strategy has 2 legs, 3 values have to be calculated, one for each leg and one for the the strategy. The highest of those values has to be chosen as mistrade range. In the example above, the leg with mistrade range 4.12

Mistrade Parameters (cont.)

- **Fast market:** mistrade range + 100% for all options (all legs and strategy)
- **Last trading day:** mistrade range + 100% for all equity and equity index-options for corresponding leg(s) and strategy
- **Expiry threshold:** mistrade range + 100% for all equity and equity index-options for corresponding leg(s) and if all legs have far expiry, mistrade range + 100% for strategy
- **Important:** The mistrade fee is charged per order number (EUR 500 per order number) irrespective of any final decision to cancel/let the trade stand by Eurex Exchange.
Mistrade regulations integrated into Conditions for Trading at Eurex Deutschland, chapter 2.9

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Thank you!

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