

Variance Futures



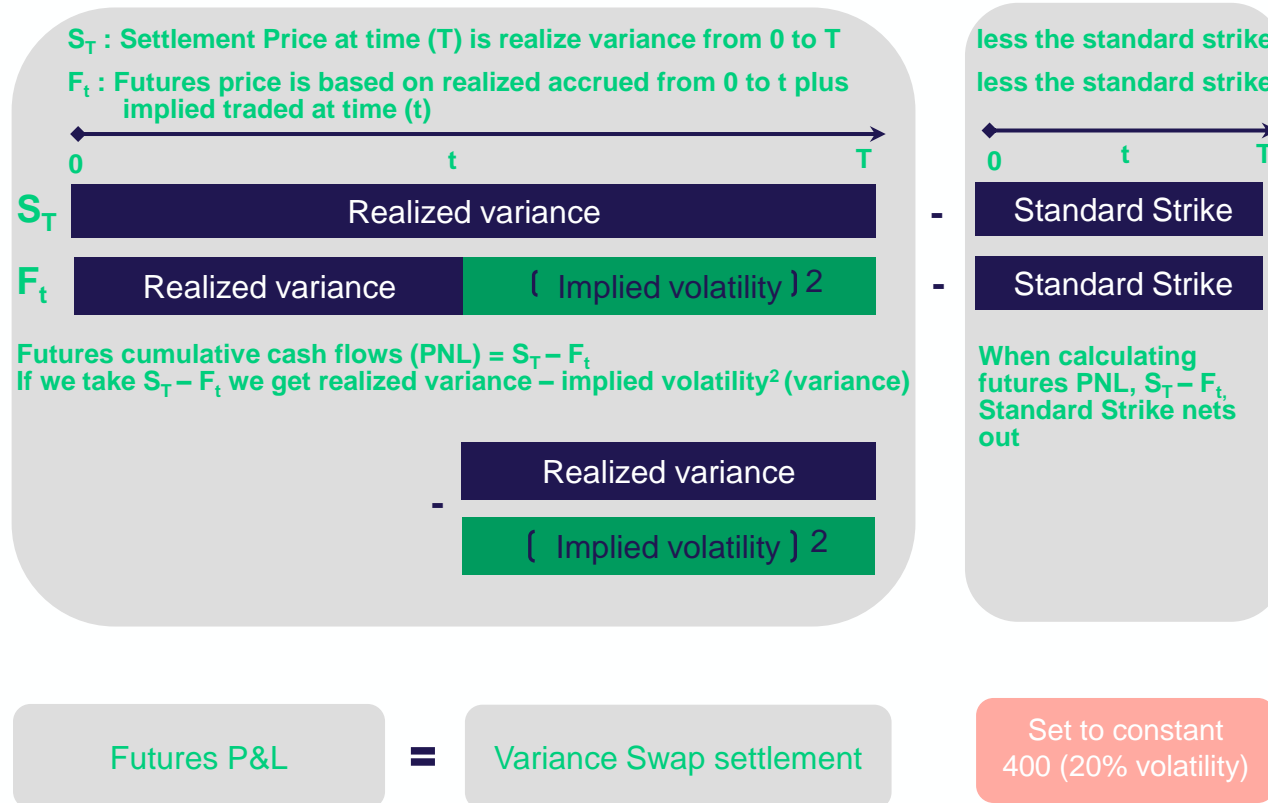
Variance Futures

changed from Trade at Close to Trade at Market

- Variance Futures trade in Volatility/ Vega and clear in futures at futures prices
- During the conversion from trading to clearing notation Eurex used to use many conversion parameters that are calculated and updated daily
- These conversion parameters were for users not easy to reconcile. We have dropped most of them and only kept the ones that are really needed
- One conversion parameter, the “realized variance” could only be updated at the end of the trading day (“Trade at Close”). This resulted into the complicated double-booking mechanism. But the change to “Trade at Market” (TAM) allows to book in real time – without an end of day update and avoiding the previous double-booking process. The result is a **“Spot-starting Variance Swap”**.
- **With the Go Live of Eurex T7 Release 10.1 on 27 June 2022**, Variance Futures trade “at market” and no longer require double booking. In addition, the conversion process is simplified by either removing some of the conversion parameters or setting them to constant values

Recap: How Variance Futures mimic the OTC Variance Swap PNL

- OTC Variance Swaps PNL is made in one payment at the end of the lifetime of the contract based on the realized variance over the lifetime of the swap less traded implied.
- Variance Futures PNL is made in daily variation margins. The cumulative payments of variation margin at the end of the lifetime of the contract nets out to equal the OTC pay out.



Conversion from Vol Price to Futures Price

From volatility strike to futures price and from notional Vega to a futures position

- The conversion is only driven by Realized Variance, Time, Notional Vega and Traded Volatility Strike

$$\text{traded variance strike}(\sigma_t)^2 = \frac{\text{traded vol strike}^2 * (\text{Total days} - \text{elapsed days}) + \text{realized variance} * \text{elapsed days}}{\text{Total days}}$$

Expected realized variance at expiry

The only moving conversion parameters: realized variance and t

$$\text{traded Futures price}(F_t) = (\text{traded variance strike}(\sigma_t)^2 - 400) + 3000$$

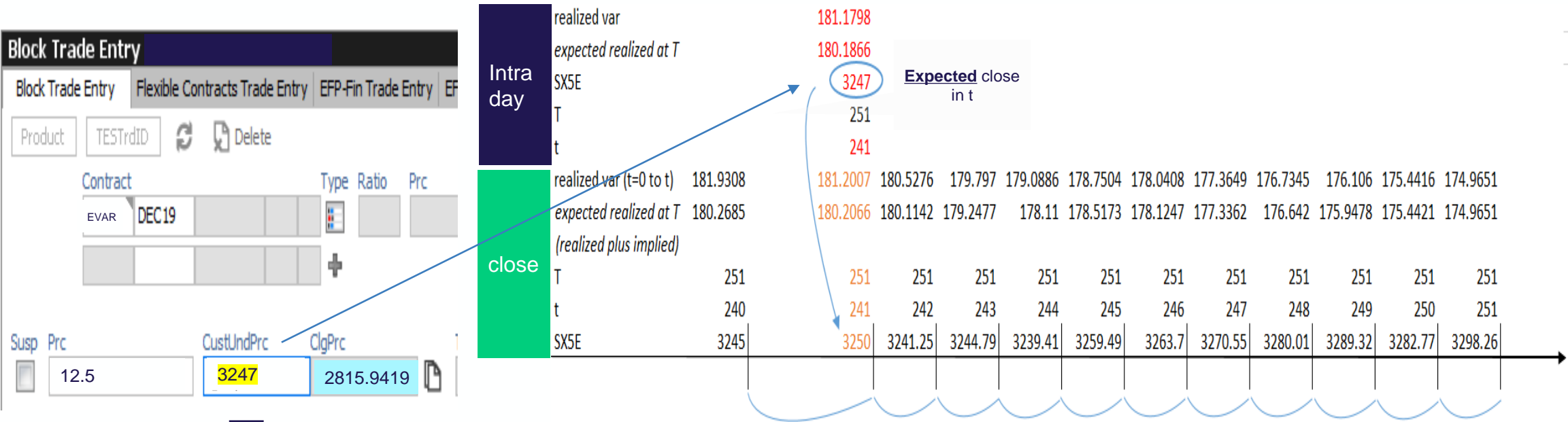
Expected Variance swap settlement at expiry – against 20 Vol

Keeps the futures price above zero

- The futures quantity is calculated in line with the OTC convention. However, the quantity is adjusted by the remaining lifetime of the contract to account for the decay in Vega

$$Q(F) = \frac{\text{notional Vega}(v)}{2 * \sigma} * \frac{T}{T - t}$$

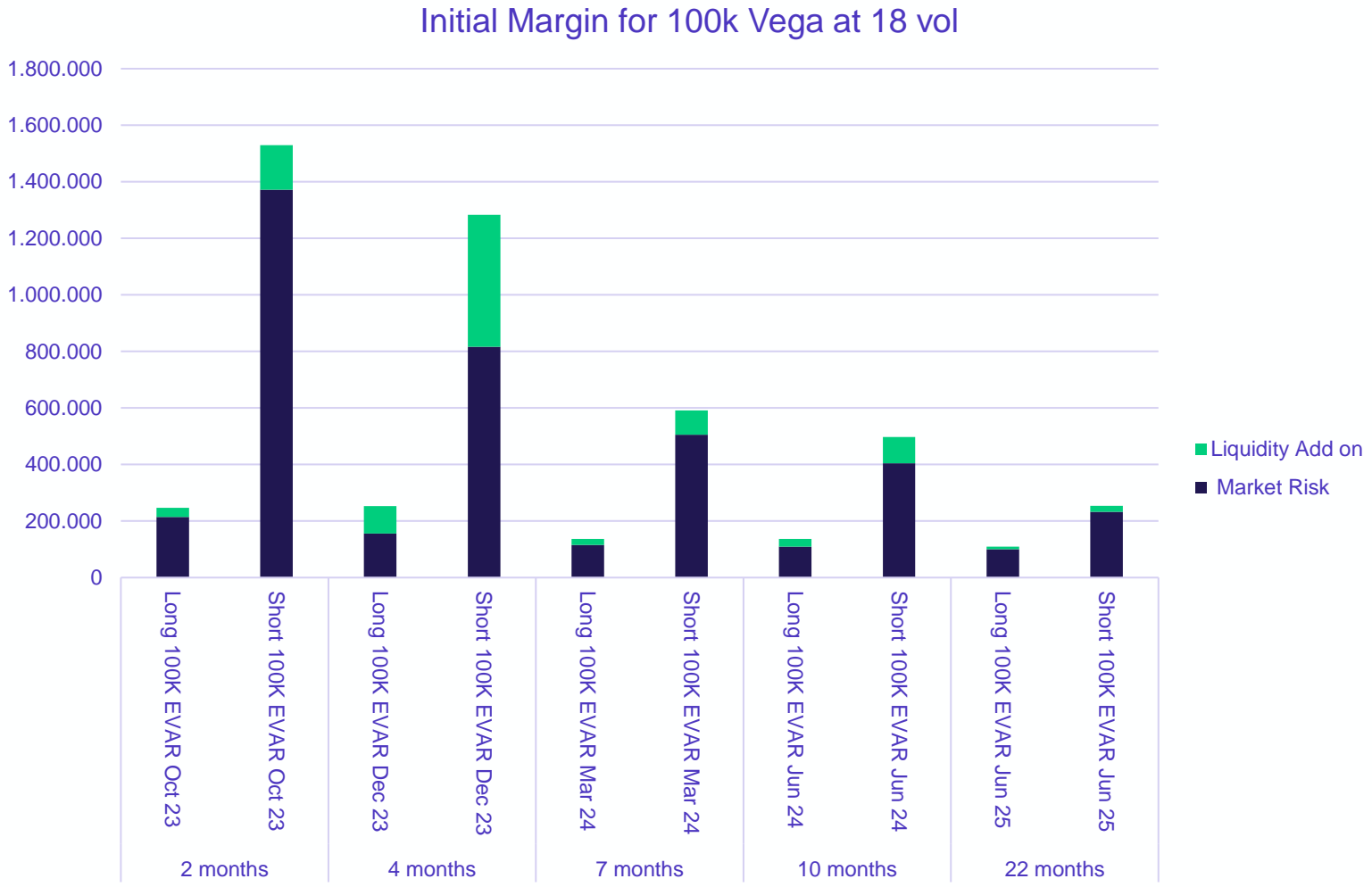
Trade at Market – What it means



For order book trades, Eurex uses the last price to update the realized variance. The level is reported to clients

Initial Margins

The sum of Liquidity Add on and Market Risk



Variance vs 30 Delta Put

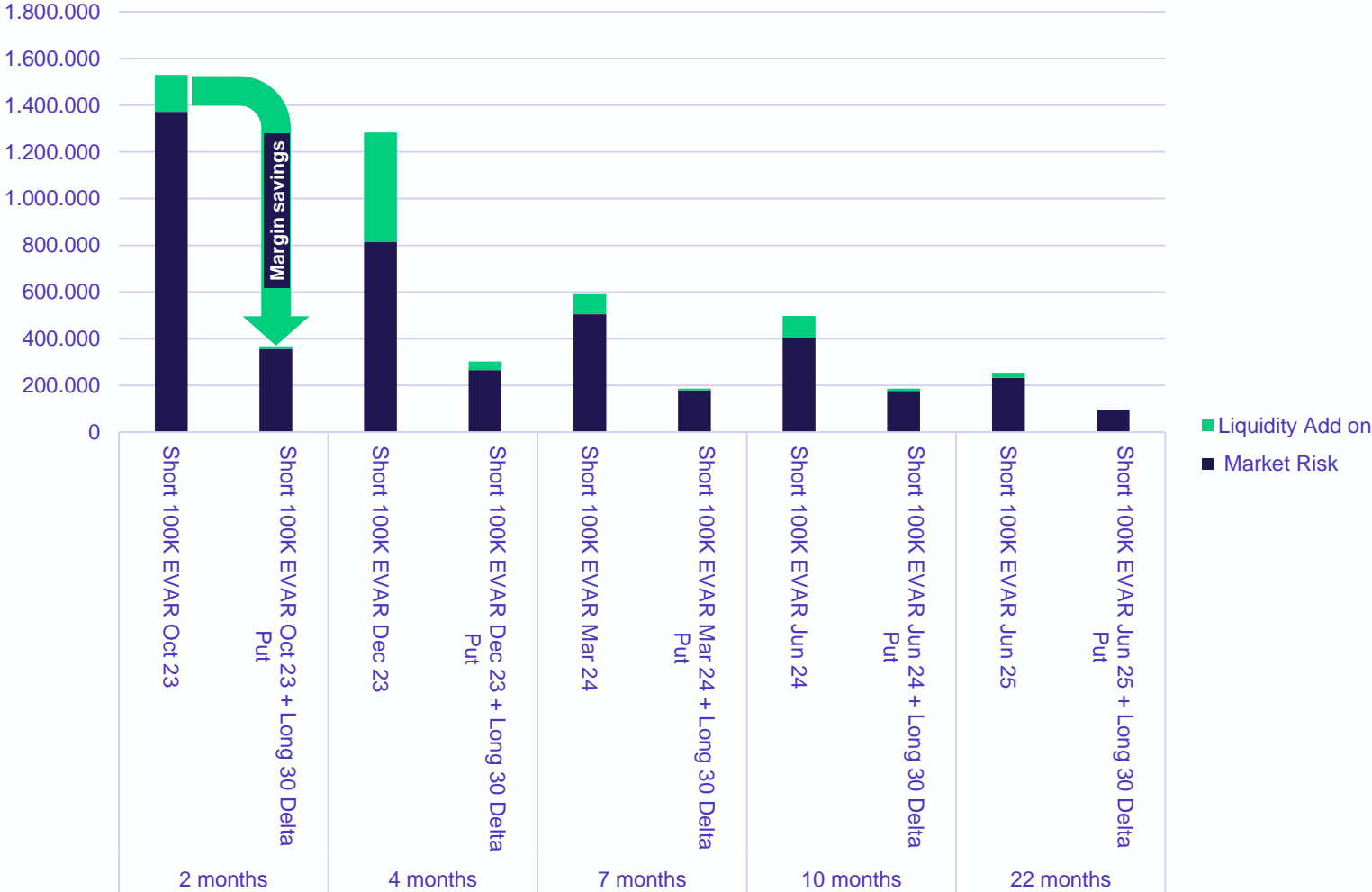
2 months, 4 months, 7 months, 10 and 22 months maturities

- Eurex Clearing PRISMA calculates the market risk of a combined portfolio of Variance Futures and Euro Stoxx options
- Combinations like long Variance and short Euro Stoxx options reduce the market risk of the overall portfolio and lead to lower margin requirements for the portfolio versus the individual positions
- Data as of 14 August 2023. We use 18 as volatility strike for the Variance futures

Expiration day	Expiry	Strike	Delta	Vega	# of Put options	# of Euro Stoxx futures	# of Variance futures
20.10.2023	Oct-23	4200	0.31	6.75	1481	464	3555
15.12.2023	Dec-23	4175	0.31	8.97	1115	341	15772
15.03.2024	Mar-24	4125	0.30	11.67	857	257	4624
21.06.2024	Jun-24	4050	0.31	14.16	706	215	6520
20.06.2025	Jun-25	4000	0.30	20.65	484	146	3008

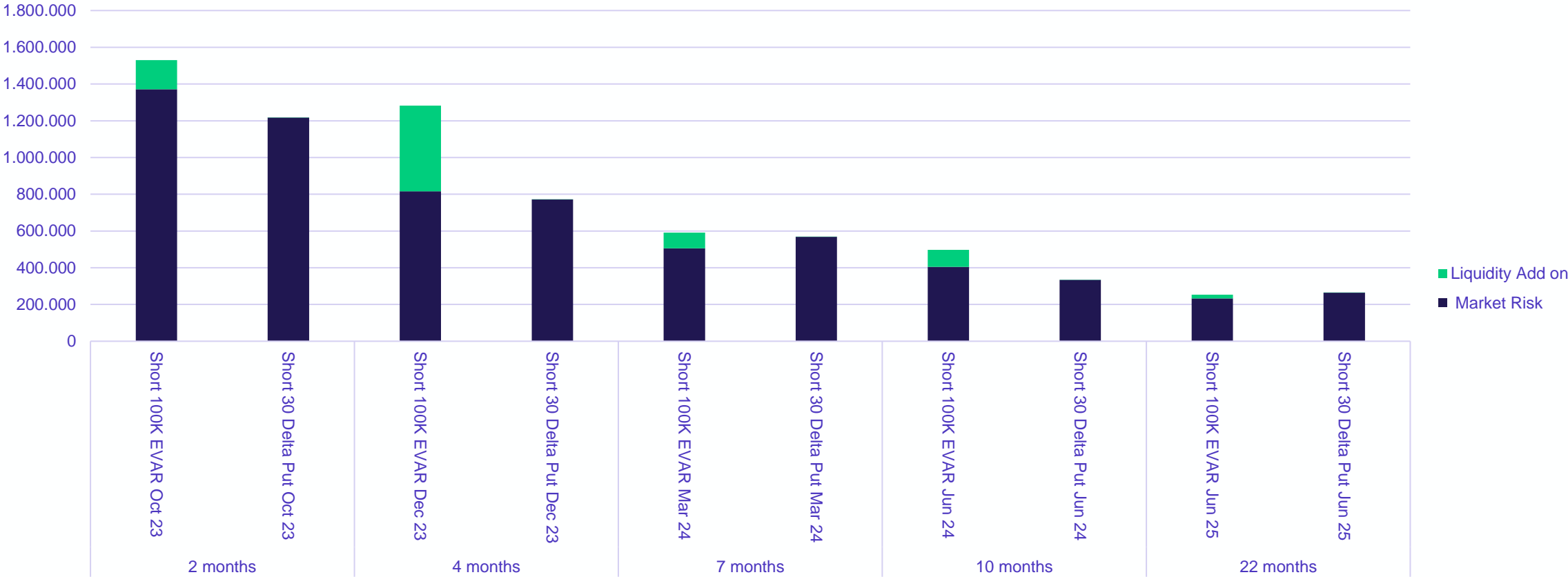
Portfolio Margins

- Short Variance in combination with the 30 Delta put, hedged with front month Euro Stoxx futures generates substantial margin offsets
- The offset can go up to 80% reduction versus the cumulative outright margins



Short Variance vs short Put

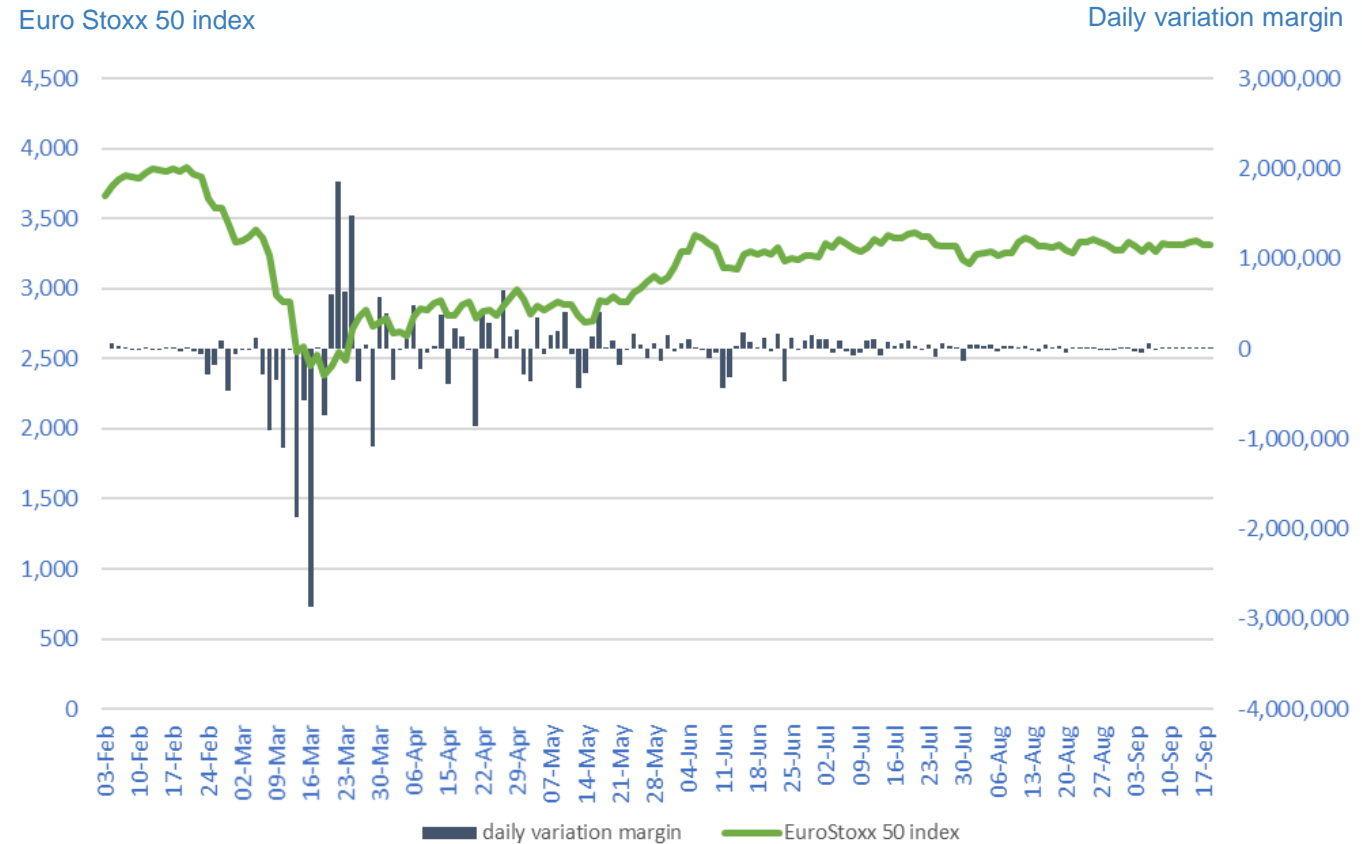
Short 100k of Vega in Variance at 18 vol and the 30 Delta Put



Variance in market stress

Example:

- Short 100k Variance with six months maturity (SEP 2020) during the Covid crash
- Sold at 16.5 on 3 February 2020
- The largest intraday variation margin was on 16 March with 2.9 mn €
- Total P&L until September expiry was -3,432,205 €
- The equivalent OTC Variance Swap would have paid -3,432,205 €



The real time trade broadcast

ETI messages

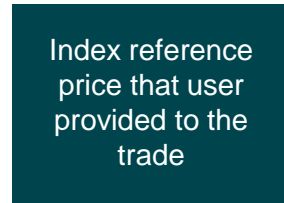
Information on Clearing- (Futures-) prices and quantities and the underlying reference price can only be found in the **ETI Trade Broadcast**. Messages on orders and quotes do not contain this information

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Block Trade

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The reports

T7 daily trade confirmation report TE810

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Vega
Vol Strike
of futures
Futures price

Index price that
T7 used to update
the realized
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Index reference
price that user
provided to the
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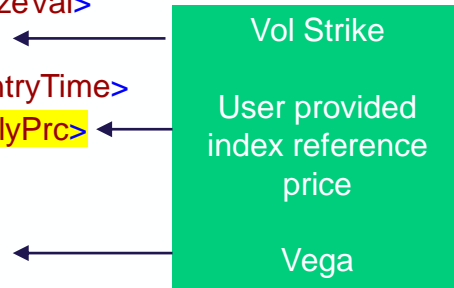
The reports

Daily TES maintenances TE545 and Variance Futures Parameter TA114

Daily TES maintenance

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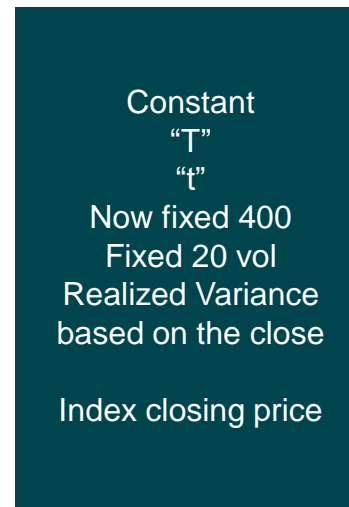
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TA114 – daily conversion parameters

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