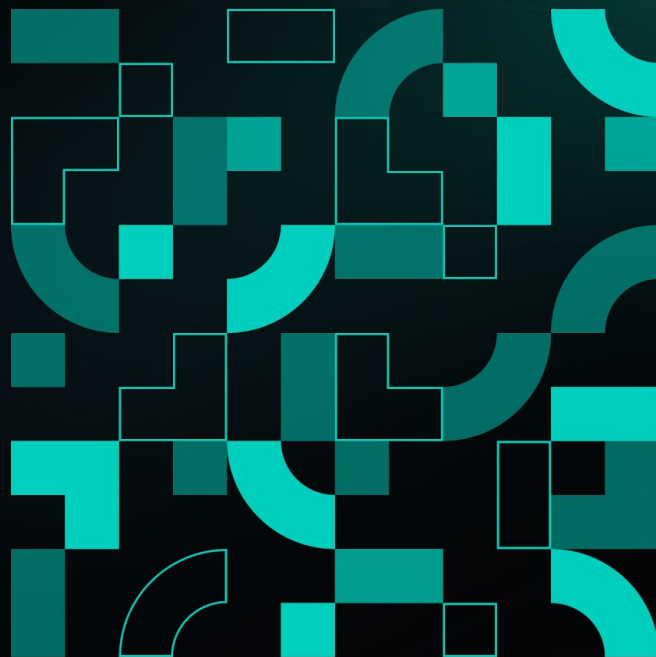


Cross Portfolio Margin (X:PM)

All your funds working for you

Last Updated on 8th June 2024



Cross Portfolio Margin (X:PM)

Introduction

Cross Portfolio Margin vs Segregated Portfolio Margin

- Cross Portfolio Margin builds upon Segregated PM and uses some very similar concepts like the Extended Table, Roll Shock and Delta Shock. Please read the Segregated Portfolio Margin guide [here](#) especially if you want to understand the differences between Legacy PM.
- The difference between Segregated and Cross Portfolio Margin is that we look at all the users positions in all the settlement currencies in one matrix.. This allows, for example:
 - Using your BTC equity to open USDC positions
 - Using your USDT equity to open ETH positions
 - Offsetting your ETH-PERPETUAL with your ETH_USDC-PERPETUAL
 - Offsetting BTC options with the BTC DVOL futures
 - Offsetting XRP short calls with XRP equity (covered calls for USDC instruments)
- Roll Shocks are calculated per base currency (instead of grouped first by settlement currency and then by base currency in Segregated PM). Delta Shocks are still calculated by currency pair which means a very large spread between BTC-PERPETUAL and BTC_USDC-PERPETUAL for example would get shocked
- The output is calculated in USD giving a USD row in the Account Summary but this USD output is then converted in each Settlement currency for the sake of backwards compatibility. Important to note that the sum of your BTC, ETH, USDC and USDT Margin Balance and margins will not be equivalent to your USD Margin Balance and margin

Overview

- All the instruments including equity go into 1 risk matrix regardless of the settlement currency. We simulate the impact in USD and calculate a USD Initial and Maintenance Margin.
- IMPORTANT: One consequence of this is that there will be margin used up for unhedged BTC and ETH equity since there is a USD PnL for these with underlying moves. There is also a haircut for USDC and USDT equity that will show up in the Initial Margin only. The default for this is 2% but can be changed with notice.
- Currently only the holdings in BTC, ETH, USDC and USDT would be considered in the USD Equity. These are called **Collateral Currencies**.
- The currencies like SOL, XRP and MATIC that can be only used to offset the upside risk of instruments with the same base currency (ie SOL offsetting SOL_USDC-PERPETUAL or MATIC offsetting MATIC_USDC options) are called **Offset Currencies**.

As of 8 June 2024

Wallet Currencies

Currencies that the platform accepts for depositing funds

- BTC (Bitcoin)
- ETH (Ethereum)
- USDC (USD Coin, Stablecoin)
- USDT (Tether, Stablecoin)
- SOL (Solana)
- MATIC (Polygon)
- XRP (XRP)
- ETHW (EthereumPoW)

API Call: https://www.deribit.com/api/v2/public/get_currencies
(but some can be in the pipeline)

Settlement Currencies

Currencies that the platform has instruments that settle into

- BTC - perpetual, dated futures, options
- ETH - perpetual, dated futures, options
- USDC - perpetuals, options (SOL, MATIC, XRP)
- USDT - perpetuals (BTC, ETH)

Collateral Currencies

Currencies that can be used in Cross Collateral to increase USD Equity

- BTC - added to Risk Matrix for PM
- ETH - added to Risk Matrix for PM
- USDC - 2% haircut seen in Initial Margin
- USDT - 2% haircut seen in Initial Margin

API Call: https://www.deribit.com/api/v2/public/get_currencies
and those with "in_cross_collateral_pool":true

Offset Currencies

Currencies that can be used Cross Collateral to offset the upside risk of instruments in the same base currency

- SOL (SOL_USDC instruments: perpetual, options)
- MATIC (MATIC_USDC instruments: perpetual, options)
- XRP (XRP_USDC instruments: perpetual, options)

API Call: https://www.deribit.com/api/v2/public/pme/get_params
and those with "equity_side_impact": "upside"

Cross Portfolio Margin (X:PM)

Collateral Fees and Account Rebalancing

Collateral Fees

- When cross collateral is enabled, it is possible for the equity of a particular settlement currency to go negative, while the account as a whole remains solvent
- While the equity of a currency in an account remains negative, a collateral fee will be charged to that account. This fee is charged daily in the same currency as the negative balance (default = 0.05% per day). The fee is charged against the time of holding the negative amount to a granularity of seconds
- To avoid paying collateral fees, a trader may replenish the currency with the negative equity themselves instead, by either depositing more or trading between currencies via the spot market
- The collateral fee rates can be seen on the fees page [here](#)
- The output is calculated in USD giving a USD row in the Account Summary but this USD output is then converted in each Settlement currency for the sake of backwards compatibility. Important to note that the value sum of your BTC, ETH, USDC and USDT Margin Balance and margins will not be equivalent to your USD Margin Balance and margin

Account Rebalancing

- There are two limits to how large a negative equity in a particular currency can go. There is an absolute limit, and a relative limit
- The absolute limit is a fixed value chosen by the Deribit risk department (default = \$100k), and the relative limit is a percentage of your cross equity (default = 100%). Once either limit is breached, Deribit will rebalance the account by using one of the currencies in the account with a positive equity to purchase some of the currency with a negative equity
- Account rebalancing is a separate process from liquidation. Even a healthy account with sufficient maintenance margin may require account rebalancing if the equity of a particular settlement currency is sufficiently negative. Account rebalancing uses no fees and also zero spot fees
- Account rebalancing will only rebalance the currencies held in the account, positions in derivatives instruments (e.g. options, futures, perpetuals) will not be liquidated during this process

Cross Portfolio Margin (X:PM)

Overview of Margin Components

Cross PM Components

- The model treats equity as a position and looks at all positions in equity, futures, options in all currencies in one matrix and nets positions based on the same base currency
- PM **Initial Margin** is determined by calculating the maximum loss that can occur in a portfolio with the following components:
 - For the Main Table, the Price Range is defined per Currency Pair and defines the Underlying Price Move buckets. The buckets range are -4, -3, -2, -1, 0, +1, +2, +3, +4 and the underlying price move for an instrument is the bucket number * Price Range / 4. For example a Price Range of 16% for btc_usd means that an inverse btc option would look at an underlying move of $-3 * 16\% / 4 = -12\%$ for the -3 bucket
 - Volatility Stress Scenarios (Volatility Range Up, Same and Down) are calculated for each bucket of underlying price move
 - Extended Table - this is primarily meant to localise large open short options positions. Only Volatility Range Up is calculated here and the output is multiplied by a factor and then dampened per base currency
 - Delta Shock and Roll Shock
- X:PM Matrix: 9 buckets in Main Table and 8 buckets in Extended Table
- For the PNL in the table, we calculate for USDC and USDT settled instruments like in Segregated PM but then multiply by the USDC_USD and USDT_USD indices respectively, to get the USD PNL. For BTC and ETH settled instrument, we calculate like in Segregated PM but then multiply by the simulated BTC and ETH indices respectively for that underlying price move bucket to get the USD PNL
- Volatility Stress Scenarios, now with a Minimum Volatility for Volatility Range Up
- Extended Table
 - Calculations of price moves of -66%, -33%, +50%, +100%, +200%, +300%, +400%, +500%
 - Only on Volatility Range Up
 - Only a fraction of simulated P&L
 - Application of a dampener
 - Worst case scenario is then taken for each base currency and summed to give the Risk Matrix Output
- Position Initial Margin = Worst case loss scenario per base currency (including Extended Table) per Base Currency + Delta Shock + Roll Shock
- Maintenance Margin: Position Initial Margin * Maintenance Margin Factor (default = 0.80)
- Position Initial Margin is added with the Initial Margin for open orders and Initial Margin for MMP Settings to give the final Initial Margin

Cross Portfolio Margin (X:PM)

Delta and Roll Shocks (1/2)

Delta Shock

- Delta shock is calculated per currency pair for large delta positions and gives a result in USD (unlike in Segregated PM which gives output in the settlement currency)
- We look at the net delta on long option positions separately to futures+short option positions
- The net deltas on long options are not taken into account unless they help offset the net deltas from futures + short options
- The deltas for the shock (DeltasToShock) are the net delta of futures + short options that are not offset by the net delta from long options
- We then convert these to dollar deltas by multiplying by the index and the amount in excess of the Delta Total Liquidity Shock Threshold are multiplied by the increment used in standard margin for the perpetual, and if no perpetual, for the dated future.
- A cap is applied to this charge: the Max Delta Shock
- Note that the Perpetual deltas are considered as the Perpetual being its own expiry

Delta Shock Formulas

$$DeltaForShock = \begin{cases} \left| \min(\max(Delta1 + Delta2, Delta2), 0) \right|, & \text{if } Delta2 < 0, \\ \left| \max(\min(Delta1 + Delta2, Delta2), 0) \right|, & \text{if } Delta2 \geq 0 \end{cases}$$

where Delta1 = net delta of long options and Delta2 = net delta of short options + delta of futures

$$DeltaShock = \sum_{eachCurrencyPair} \min \left[\max(DeltaForShock \times Index - DeltaTotalLiquidityShockThreshold, 0) \times DeltaForShock \times Increment, MaxDeltaShock \times Index \times DeltaForShock \right] \times StableIndex$$

$$StableIndex = \begin{cases} 1, & \text{if Settlement Currency is BTC, ETH,} \\ USDC_USD \text{ Index,} & \text{if Settlement Currency is USDC,} \\ USDT_USD \text{ Index,} & \text{if Settlement Currency is USDT} \end{cases}$$

Cross Portfolio Margin (X:PM)

Delta and Roll Shocks (2/2)

Roll Shock

- Roll Shock is calculated per base currency and gives a result in USD (unlike in Segregated PM which gives output in the settlement currency)
- Roll Shock replaces Futures Contingency from the Legacy Portfolio Margin
- We first calculate a Minimum Roll Shock as shown in formula on right using the Net Notional USD Delta per Expiry
- Net Notional USD Delta = Net Delta * Index
- We then calculate an Annualised Roll Shock as shown in formula on right
- The Roll Shock per base currency in each settlement currency = $\max(\text{Minimum Roll Shock}, \text{abs}(\text{Annualised Roll Shock}))$. Sum this across all the base currencies to give a Final Roll Shock in each settlement currency
- Note that in API, the Min Expiry Delta Shock is shown as min_annualised_move
- Note that the Perpetual deltas are considered as the Perpetual being its own expiry with time to expiry equal 0

Roll Shock Formulas

$$\text{Minimum Roll Shock} = \sum_{\text{Expiry}} \text{MinExpiryDeltaShock} \times |\text{NetNotionalUSD}\Delta_{\text{Expiry}}|$$

$$\text{Annualised Roll Shock} = \sum_{\text{Expiry}} \max(e^{\text{AnnualisedMoveRisk} \times \text{YearsToExpiry}} - 1, \text{MinExpiryDeltaShock}) \times \text{NetNotionalUSD}\Delta_{\text{Expiry}}$$

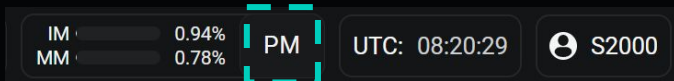
$$\text{Final Roll Shock} = \sum_{\text{BaseCurrency}} \max(\text{MinimumRollShock}, |\text{AnnualisedRollShock}_{\text{BaseCurrency}}|)$$

Segregated and Cross PM

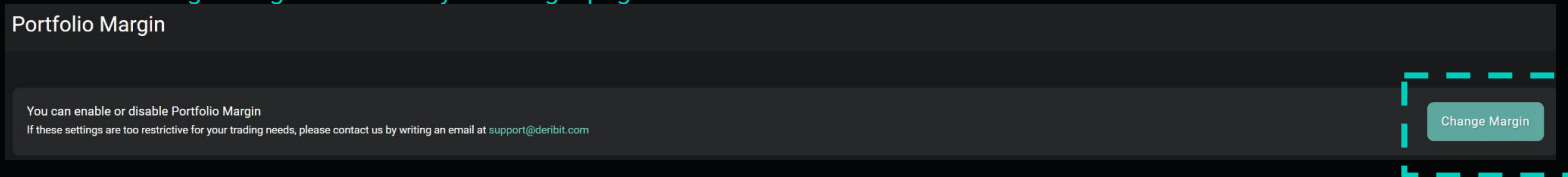
Switching Margin Model 1/2

- You can change your Margin Model by going to the Margin page and clicking on Change Margin. Or go directly to this link (<https://www.deribit.com/account/BTC/change-margin-model>). Here you will see the different margin types and if permissible without breaching margin requirements, you will be able to switch your Margin Model

- Go to the main or subaccount you would like to switch to a different Margin Model. Click your current Margin model type in the header to go to Margin page



- Click the "Change Margin" button on your Margin page



Segregated and Cross PM

Switching Margin Model 2/2

3. Select the Margin Model you would like from the drop down and then Accept Terms of Service and click “Change Margin Model” button

Choose Margin Model

Segregated: Portfolio Margin (S: PM) ▼

Margins Calculations

Refresh

Cross: Standard Margin X: SM

Cross: Portfolio Margin X: PM

Currency	Available Balance	IM	MM
CROSS	\$1,152,689.59	1.51 %	0.97 %

Currency	Available Balance	IM	MM
CROSS	\$1,383,976.04	12.71 %	9.15 %

Segregated: Standard Margin S: SM

Segregated: Portfolio Margin S: PM

Currency	Available Balance	IM	MM
BTC	3.15214510	1.44 %	0.88 %
ETH	1.795981	16.44 %	8.44 %
USDC	995,815.50	1.44 %	0.94 %
USDT	0.00	0.00 %	0.00 %

Currency	Available Balance	IM	MM
BTC	9.78597530	17.66 %	14.13 %
ETH	1.662009	22.67 %	18.14 %
USDC	1,001,873.56	0.39 %	0.31 %
USDT	0.00	0.00 %	0.00 %

☒ Accept Terms of Service

☒ By accepting the Terms of Service for changin margin model you confirm you are familiar with our margin model details as described in our Knowledge Base.

Change Margin Model

This operation is limited to 10 times per 24 hours.

Segregated and Cross PM

Model Parameters (1/2)

- Parameters for the model can be found on the PM page (<https://www.deribit.com/account/BTC/portfolio-margin>). This shows parameters based on the instruments you have in your position. To see all parameters, you can use the API call `public/pme/get_params`

Parameters per Currency

Base currency	N/A	N/A	For Extended Table	N/A	For Roll Shock		N/A	N/A	Applies only to Cross PM For Equity in Risk Matrix
	PNL Offset	Max PNL Offset	Extended Dampener	Correlation Set	Min Expiry Delta Shock	Annualised % move risk	Include in USD Equity	Haircut	Equity Impact
USD	0 %	0	25,000	NO	1 %	10 %	NO	0 %	none
XRP	0 %	0	25,000	NO	2 %	10 %	NO	0 %	upside
SOL	0 %	0	25,000	NO	2 %	10 %	NO	0 %	upside
USDC	0 %	0	25,000	NO	1 %	10 %	NO	2 %	none

Parameters per Currency Pair

Currency Pair	Price Range	For Volatility Shocks						For Delta Shock	
		Volatility Range Up	Volatility Range Down	Min Volatility For Shock Up	Short Term Vega Power	Long Term Vega Power	Extended Table Factor	Delta Total Liquid. Shock Threshold	Max Delta Shock
XRP_USDC	24 %	60 %	30 %	60 %	0.30	0.13	1.00	2,000,000	20 %
SOL_USDC	24 %	60 %	30 %	60 %	0.30	0.13	1.00	5,000,000	20 %

Segregated and Cross PM

Model Parameters (2/2)

- Default parameters for BTC and ETH

Parameters per Currency

Base currency	PNL Offset	Max PNL Offset	Extended Dampener	Correlation Set	Min Expiry Delta Shock	Annualised % move risk	Include in USD Equity	Haircut	Equity Impact
BTC	0 %	0	100,000	NO	1 %	8 %	NO	0 %	both
ETH	0 %	0	100,000	NO	1 %	8 %	NO	0 %	both

Parameters per Currency Pair

Currency Pair	Price Range	Volatility Range Up	Volatility Range Down	Min Volatility For Shock Up	Short Term Vega Power	Long Term Vega Power	Extended Table Factor	Delta Total Liquid. Shock Threshold	Max Delta Shock
BTC_USD	16 %	50 %	25 %	50 %	0.30	0.13	1.00	20,000,000	10 %
ETH_USD	16 %	50 %	25 %	50 %	0.30	0.13	1.00	20,000,000	10 %

Segregated and Cross PM Risk Matrix Structure (1/2)

- Each calculated value in the table represents a Simulated PNL for that instrument for a particular Underlying Move and volatility shock

Extended Table (downside)						Main Table (downside)						Main Table (no underlying price move)							
Instrument	Amount	Base Amount	-66%	-33%	↓	-4	↑	↓	-3	↑	↓	-2	↑	↓	-1	↑	↓	0	↑
▼ Total			-49,280.5342	-40,745.1953	-39,667.5609	-39,675.6816	-40,312.5240	-25,085.9466	-25,315.8164	-27,544.2703	-10,708.0272	-12,519.9790	-17,020.9138	-456.1010	-3,867.8620	-9,271.4566	1,380.5582	1.4718	-4,108.6110
▼ Futures			4,835.4176	4,835.4176	4,835.4176	4,835.4176	4,835.4176	3,626.5632	3,626.5632	3,626.5632	2,417.7088	2,417.7088	2,417.7088	1,208.8544	1,208.8544	1,208.8544	0.0000	0.0000	0.0000
XRP_USDC-PERPETUAL (\$0.52)	× -10,000	-	1,674.8800	1,674.8800	1,674.8800	1,674.8800	1,674.8800	1,256.1600	1,256.1600	1,256.1600	837.4400	837.4400	837.4400	418.7200	418.7200	418.7200	0.0000	0.0000	0.0000
SOL_USDC-PERPETUAL (\$98.77)	≡ -100.0	-	3,160.5376	3,160.5376	3,160.5376	3,160.5376	3,160.5376	2,370.4032	2,370.4032	2,370.4032	1,580.2688	1,580.2688	1,580.2688	790.1344	790.1344	790.1344	0.0000	0.0000	0.0000
▼ Options			-54,115.9518	-45,580.6129	-44,502.9785	-44,511.0992	-45,147.9416	-28,712.5098	-28,942.3796	-31,170.8335	-13,125.7360	-14,937.6878	-19,438.6226	-1,664.9554	-5,076.7164	-10,480.3110	1,380.5582	1.4718	-4,108.6110
▼ SOL_USDC-9FEB24 (\$98.69)	-170	≡ -1,700	-54,115.9518	-45,580.6129	-44,502.9785	-44,511.0992	-45,147.9416	-28,712.5098	-28,942.3796	-31,170.8335	-13,125.7360	-14,937.6878	-19,438.6226	-1,664.9554	-5,076.7164	-10,480.3110	1,380.5582	1.4718	-4,108.6110
98-C	10	≡ 100	-208.8213	-409.5301	-430.6938	-430.6771	-420.1536	-430.6938	-429.6284	-380.2654	-430.6264	-412.4133	-268.9897	-416.1704	-307.6810	-42.7054	-193.0484	0.1630	322.7022
90-P	-200	≡ -2,000	-53,834.0153	-45,027.3412	-43,921.4845	-43,929.6220	-44,580.3644	-28,131.0158	-28,361.9823	-30,661.9116	-12,544.3094	-14,375.9073	-19,111.5475	-1,098.0070	-4,640.2741	-10,565.2057	1,717.7967	1.2258	-4,932.1193
110-C	20	≡ 200	-73.1152	-143.7416	-150.8002	-150.8000	-147.4236	-150.8002	-150.7690	-128.6564	-150.8002	-149.3673	-58.0855	-150.7780	-128.7613	127.6002	-144.1901	0.0829	500.8060

Segregated and Cross PM

Risk Matrix Structure (2/2)

- Each calculated value in the table represent a Simulated PNL for that instrument for a particular Underlying Move and volatility shock
- **For Cross PM only:** Equity can be used to offset positions in X:PM. For example SOL equity can offset short SOL calls
- Haircuts are not applicable under X:PM

Main Table (upside)

Extended Table (upside)

Instrument	↓	1	↑	↓	2	↑	↓	3	↑	↓	4	↑	50%	100%	200%	300%	400%	500%
▼ Total	1,117.2947	1,232.6565	-866.2146	1,545.6538	1,896.4327	1,200.9503	2,569.9941	2,734.4781	2,666.0832	3,721.8045	3,768.2501	3,876.2474	4,096.7840	4,345.8300	4,492.3084	4,541.2392	4,565.7046	4,580.3838
▼ Futures	-1,208.8544	-1,208.8544	-1,208.8544	-2,417.7088	-2,417.7088	-2,417.7088	-3,626.5632	-3,626.5632	-3,626.5632	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176	-4,835.4176
XRP_USDC-PERPETUAL (\$0.52)	-418.7200	-418.7200	-418.7200	-837.4400	-837.4400	-837.4400	-1,256.1600	-1,256.1600	-1,256.1600	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800	-1,674.8800
SOL_USDC-PERPETUAL (\$98.77)	-790.1344	-790.1344	-790.1344	-1,580.2688	-1,580.2688	-1,580.2688	-2,370.4032	-2,370.4032	-2,370.4032	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376	-3,160.5376
▼ Options	2,326.1491	2,441.5109	342.6398	3,963.3626	4,314.1415	3,618.6591	6,196.5573	6,361.0413	6,292.6464	8,557.2221	8,603.6677	8,711.6650	8,932.2016	9,181.2476	9,327.7260	9,376.6568	9,401.1222	9,415.8014
▼ SOL_USDC-9FEB24 (\$98.69)	2,326.1491	2,441.5109	342.6398	3,963.3626	4,314.1415	3,618.6591	6,196.5573	6,361.0413	6,292.6464	8,557.2221	8,603.6677	8,711.6650	8,932.2016	9,181.2476	9,327.7260	9,376.6568	9,401.1222	9,415.8014
98-C	439.2439	544.7145	822.6011	1,217.8673	1,246.0268	1,431.4128	2,007.2266	2,012.5481	2,116.8237	2,796.7690	2,797.5657	2,850.3474	2,932.8331	3,042.5363	3,100.3482	3,119.6231	3,129.2605	3,135.0430
90-P	1,854.8937	1,476.1591	-1,592.9713	1,856.1688	1,798.4488	211.6021	1,856.1716	1,849.3942	1,113.4120	1,856.1716	1,855.5307	1,535.6304	1,160.6965	593.9445	296.9874	197.9916	148.4937	118.7950
110-C	32.0115	420.6373	1,113.0100	889.3265	1,269.6659	1,975.6442	2,333.1591	2,499.0991	3,062.4107	3,904.2816	3,950.5714	4,325.6873	4,838.6720	5,544.7669	5,930.3904	6,059.0421	6,123.3680	6,161.9635

Segregated and Cross PM

Risk Matrix Calculations (1/6)

The red arrow represents where liquidation would first check to then see the biggest contributor

This represents an underlying move % of $(\text{PriceRange} / 4) * -3$. So a PriceRange of 32% for XRP_USDC would mean an underlying move of -24% whilst a PriceRange of 16% for BTC_USDC would mean an underlying move simulation of -12% in this bucket

Instrument	↓	-4	↑	↓	-3	↑
✓ Total	-40,585.0651	-40,589.5914	-41,112.5093	-26,127.4931	-26,287.3461	-28,254.7116
✓ Futures	4,801.0432	4,801.0432	4,801.0432	3,600.7824	3,600.7824	3,600.7824
XRP_USDC-PERPETUAL (\$0.52)	1,667.8400	1,667.8400	1,667.8400	1,250.8800	1,250.8800	1,250.8800
SOL_USDC-PERPETUAL (\$97.91)	3,133.2032	3,133.2032	3,133.2032	2,349.9024	2,349.9024	2,349.9024
✓ Options	-45,386.1083	-45,390.6346	-45,913.5525	-29,728.2755	-29,888.1285	-31,855.4940
✓ SOL_USDC-9FEB24 (\$97.86)	-45,386.1083	-45,390.6346	-45,913.5525	-29,728.2755	-29,888.1285	-31,855.4940
98-C	-378.0867	-378.0792	-369.9141	-378.0867	-377.4582	-336.3147
90-P	-44,890.5444	-44,895.0783	-45,428.5715	-29,232.7116	-29,393.2071	-31,418.8236

In the Main Table, the Underlying Price Move buckets are [-4, -3, -2, -1, 0, 1, 2, 3, 4]. For a PriceRange = 16% for BTC_USD, this corresponds with underlying price move simulations (PriceMove%) of [-16%, -12%, -8%, -4%, 0%, +4%, +8%, +12%, -16%]

For each underlying price move simulation, there are 3 volatility simulations, Volatility Shock Down (ie 25%), Volatility Unchanged, Volatility Shock Up (ie 50%). The Volatility used is the current Volatility (Mark IV) of the instrument

Segregated and Cross PM

Risk Matrix Calculations (2/6)

Instrument	↓	-4	↑	↓	-3	↑
▼ Total	-40,585.0651	-40,589.5914	-41,112.5093	-26,127.4931	-26,287.3461	-28,254.7116
▼ Futures	4,801.0432	4,801.0432	4,801.0432	3,600.7824	3,600.7824	3,600.7824
XRP_USDC-PERPETUAL (\$0.52)	1,667.8400	1,667.8400	1,667.8400	1,250.8800	1,250.8800	1,250.8800
SOL_USDC-PERPETUAL (\$97.91)	3,133.2032	3,133.2032	3,133.2032	2,349.9024	2,349.9024	2,349.9024
▼ Options	-45,386.1083	-45,390.6346	-45,913.5525	-29,728.2755	-29,888.1285	-31,855.4940
▼ SOL_USDC-9FEB24 (\$97.86)	-45,386.1083	-45,390.6346	-45,913.5525	-29,728.2755	-29,888.1285	-31,855.4940
98-C	-378.0867	-378.0792	-369.9141	-378.0867	-377.4582	-336.3147
90-P	-44,890.5444	-44,895.0783	-45,428.5715	-29,232.7116	-29,393.2071	-31,418.8236

Vol Shock Down in this Underlying Price Move bucket.

Vol Shock Up in this Underlying Price Move bucket

$$simVolatility = \max \left(StrikeVolatility \times \left[1 + \left(\frac{30}{DaysToExpiry} \right)^{vegaPower} \times volatilityRangeUp \right], minVolatilityForShockUp \right)$$

$$simVolatility = \max \left(StrikeVolatility \times \left[1 - \left(\frac{30}{DaysToExpiry} \right)^{vegaPower} \times volatilityRangeDown \right], 0 \right)$$

$$vegaPower = \begin{cases} vegaPower_{ST}, & \text{Short Term Vega Power for when } DaysToExpiry < 30, \\ vegaPower_{LT}, & \text{Long Term Vega Power for when } DaysToExpiry \geq 30 \end{cases}$$

Segregated and Cross PM

Risk Matrix Calculations (3/6)

- The Extended Table are underlying price move simulations (PriceMove%) of [-66%, -33%, +50%, +100%, +200%, +300%, +400%, +500%]. These price moves are the same for all currency pairs and are always with just the Volatility Shock Up simulation

Instrument	Amount	Base Amount	-66%	-33%	50%	100%	200%	300%	400%	500%
▼ Total			-49,599.5554	-41,477.3788	3,878.1780	4,241.6589	4,442.5767	4,509.5941	4,543.1027	4,563.2080
▼ Futures			4,779.4816	4,779.4816	-4,779.4816	-4,779.4816	-4,779.4816	-4,779.4816	-4,779.4816	-4,779.4816
XRP_USDC-PERPETUAL (\$0.51)	× -10,000	-	1,640.3200	1,640.3200	-1,640.3200	-1,640.3200	-1,640.3200	-1,640.3200	-1,640.3200	-1,640.3200
SOL_USDC-PERPETUAL (\$98.10)	≡ -100.0	-	3,139.1616	3,139.1616	-3,139.1616	-3,139.1616	-3,139.1616	-3,139.1616	-3,139.1616	-3,139.1616
▼ Options			-54,379.0370	-46,256.8604	8,657.6596	9,021.1405	9,222.0583	9,289.0757	9,322.5843	9,342.6896
▼ SOL_USDC-9FEB24 (\$98.16)	-170	≡ -1,700	-54,379.0370	-46,256.8604	8,657.6596	9,021.1405	9,222.0583	9,289.0757	9,322.5843	9,342.6896
98-C	10	≡ 100	-176.5341	-348.7997	2,921.7364	3,029.5649	3,085.2990	3,103.8782	3,113.1679	3,118.7417
90-P	-200	≡ -2,000	-54,156.2406	-45,816.5295	981.6813	497.8242	248.9155	165.9437	124.4577	99.5662
110-C	20	≡ 200	-46.2623	-91.5312	4,754.2420	5,493.7514	5,887.8438	6,019.2538	6,084.9587	6,124.3817

Cross PM (X:PM)

Risk Matrix Calculations (4/6)

- For the final risk matrix calculations, only a fraction of the Simulated PNL is used from the Extended Table and a dampener is also used in this section. The fraction for each bucket in the Extended Table are calculated as below.

$$\text{MarginMultiplier} = \text{extendedFactor} \times \frac{\text{priceRange}}{|\text{PriceMove\%}|}$$

For all instruments:

$$\text{AdjustedSimulatedPNL} = \text{SimulatedPNL} \times \text{MarginMultiplier}$$

Cross PM

Risk Matrix Calculations (5/6)

- For the Main Table and Extended Table, we sum the rows on each base currency to get a matrix output grouped by base currency. In this step, BTCVOL is grouped with BTC. For the Extended Table, we then apply a dampener to reduce its impact. It means that only very large option positions will cause an impact in the Extended Table.

For all instruments:

$$AmountToBeDampened = \min \left[\left(\max \left(\frac{|PriceMove|}{PriceRange}, 1 \right) - 1 \right) \times ExtendedDampener, |AdjustedSimulatedPNL| \right]$$

Segregated and Cross PM

Risk Matrix Calculations (6/6)

- On the Portfolio Margin page, above the Risk Matrix, you will see a summary of the margin

Portfolio Margin Data

Snapshot taken at 12 Jun 2024, 10:40:25 UTC

Title	IM	MM
Worst Case Scenario (Bucket 4, Vol Down)	167.35	133.88
Basis Shock	18.21	14.57
Delta Shock	0.00	0.00
Effective Equity Margin	1.41	-
USDC	1.41	-
Decoupling Shock	15.96	12.77
Open Orders Margin	0.00	-
MMP Margin	0.00	-
Spot Reserve	0.00	-
Total	202.92	161.21

This is where we take the sum of each column (after dampeners are applied) and take the lowest negative value and return the absolute value

Shocks as described on pages 6 and 7

ONLY FOR CROSS PM: Haircuts taken on the equity

From the matrix, we take the worst case scenario of each base currency and sum those up. Let's call that *Matrix Output Margin*. Then *Decoupling Shock* = *Matrix Output Margin* - *Worst Case Scenario*

For market makers who use Market Maker Protection, this would be the margin utilised for that which is the Quantity in Units * 0.03 for BTC and ETH and Quantity in Units * 0.03 * Index for the other settlement currencies

Thank you
for your attention!

