



شركة مركز مقاصة الأوراق المالية
Securities Clearing Center Company

Exchange Traded Derivatives Margining Guide March 3, 2020

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Contents

MARGINS.....	4
DELTA HEDGE METHODOLOGY	5
Introduction	5
Combined Commodity.....	5
Risk Array and Scanning Risk.....	5
Inter Month Spread Charge	8
Total Initial Margin Requirement.....	9

Documents details:

<p>Overview</p>	<p>This document explains the methodology adopted by Securities Clearing Center Company (Muqassa) to determine initial margins requirement for exchange traded derivatives.</p>
<p>Objective</p>	<p>This document is intended as a generic guide for the industry to understand the concept of margining and is solely for information purpose only. Therefore, it does not provide a comprehensive explanation of all the process involved in margining or cover all the contract scenarios encountered by clearing members. For enquiries please contact the Muqassa Risk Management at ccprm@muqassa.sa.</p>

MARGINS

Securities Clearing Center Company (Muqassa), the clearing house serves as the central counterparty (CCP) to every cleared transaction, becoming seller to the buying clearing member and buyer to the selling clearing member. In doing so, Muqassa provides undertaking to fulfill obligations under each contract thereby limiting credit risk in the market. The clearing house employs a range of risk management tools in managing its exposure to the credit risk of its clearing members. These include the collection of margins on open positions and the revaluation of contracts on at least a daily basis.

Type of margins

Margins are intended to provide protection to the clearing house from current exposures as well as from the potential future increase in exposures. Muqassa collects mainly two types of margins:

- Variation margin
 - to cover losses arising from revaluation of open contracts at current prices, usually performed once daily, so that the exposure is limited and does not get accumulated
- Initial margin
 - to cover potential losses arising from liquidation of a defaulting participant's position, also known as performance bond

Initial margin

Initial margin is calculated for all open positions to protect the clearing house against potential exposure. This amount is intended to cover the expected largest exposure fluctuation over a defined liquidation period which is derived from a set of risk based parameters. Its objective is to uphold integrity and ensure continuous operations of the market.

Muqassa uses the Nasdaq Delta Hedge to determine the appropriate margin level for a portfolio of positions. This margin calculation system is compatible with the commonly-used Standard Portfolio Analysis of Risk® (SPAN®). The next section describes the methodology of the Delta Hedge initial margin calculation.

DELTA HEDGE METHODOLOGY

Introduction

Delta Hedge is a portfolio risk-based margining system and uses the scenario approach to determine the initial margin requirement. Open positions across multiple derivatives products are assessed as one portfolio and overall risk exposure is calculated to arrive at the initial margin requirement. A set of risk scenarios are applied to estimate the liquidation value of a portfolio in adverse market conditions. In general, the following events are considered:

- possible underlying price movement
- possible underlying volatility movement
- impact of decrease in time to expiration (mainly on options)

Initial margin therefore represents the most unfavorable liquidation value and this data is recorded in risk arrays, which are specific to each contract and updated on a daily basis.

Combined Commodity

The fundamental concept of Delta Hedge is to simulate potential market moves and calculate the profit or loss on individual contracts. All products such as futures and options relating to the same underlying are grouped in one combined commodity for evaluation. For example, futures on MSCI Tadawul 30 Index (MT30) and options on MT30 will be grouped together. In doing so, simulated gains of one contract can be used to offset the simulated losses from another contract. If there is more than one combined commodity in the portfolio, the risk of each combined commodity will firstly be analyzed in isolation from others, before seeking risk reducing offsets between different combined commodities.

Risk Array and Scanning Risk

The risk array is a set of 16 scenarios defined for a particular contract specifying how a hypothetical single long position will loss or gain value if corresponding risk scenario occurs. By convention, losses for long positions are expressed as positive numbers, and gains as negative numbers. Each risk scenario is defined in the following terms:

- the (underlying) price shift: upward (+) and downward (-) with corresponding scan range fraction (0, 1/3, 2/3, 1, or 3);
- the (underlying) volatility shift: upward (+) and downward (-) with corresponding scan range;
- the weight, also called the covered fraction

For futures product, the price shift mentioned above refers to price of the instrument itself as volatility shift is only relevant for options. Price shift for options is often applied to the underlying instrument.

The scale of the price shift and volatility shift, as well as the associated weight are defined for each of the 16 scenario points. Two scan ranges, the **price scan range (PSR)** and the **volatility scan range (VSR)** are the deciding variables to arrive at risk array values. These two key variables, among other margining parameters are determined by the Muqassa risk management team in accordance to the international recommended practices. The price scan range is also known as initial margin rate.

Each risk array value is calculated as the current value of the contract less the estimated future value, taking into account the (underlying) price and volatility shift associated with the risk scenarios then multiplied by the weight. Typically, the change in value for futures product is determined by the price shift alone. For option's estimated future value, the underlying price and volatility change; decrease in time to expiration as well as associated interest rates and/or dividend yield will be taken into account.

The 16 risk scenarios adopted by Muqassa:

Risk Scenario / Scan Point	Price Shift in Multiple of Scan Range	Volatility Shift in Multiple of Scan Range	Weight / Covered Fraction
1	0	1	100%
2	0	-1	100%
3	1/3	1	100%
4	1/3	-1	100%
5	-1/3	1	100%
6	-1/3	-1	100%
7	2/3	1	100%
8	2/3	-1	100%
9	-2/3	1	100%
10	-2/3	-1	100%
11	1	1	100%
12	1	-1	100%
13	-1	1	100%
14	-1	-1	100%
15	3	0	33%
16	-3	0	33%

Scenario 15 and 16 are designed to cover losses arising from deep out-of-the-money options as a result of unexpected extreme price movement. Therefore, a portfolio with futures only positions would typically have the worst loss in scenario point 11 or 13, which is equivalent to the price scan range. Risk array values are represented in the currency in which the contract is denominated and as mentioned earlier a positive value represents losses. The following table is an example of risk array for futures on Saudi Index, assuming the price scan range is SAR12,000.

Risk Scenario / Scan Point	Risk Array Value (in SAR)
1	0
2	0
3	4,000
4	4,000
5	-4,000
6	-4,000
7	8,000
8	8,000
9	-8,000
10	-8,000
11	12,000
12	12,000
13	-12,000
14	-12,000
15	11,880
16	-11,880

With the risk array values, scanning risk can be determined as the first step of calculating the initial margin requirement of a portfolio. Scanning risk is calculated independently for every combined commodity if there are more than one in the portfolio. The steps to calculate scanning risk at combined commodity level is shown as below:

1. Multiply each of the 16 risk array values, for which the portfolio holds position, by the position quantity. For long positions, multiply by a positive position size and vice versa. This yields the positional risk array;
2. Sum the total across all scenarios for the combined commodity, ignoring any differences between expirations, series or strike prices. This will result in 16 aggregated amount for this combined commodity;
3. The largest positive value of the 16 represents largest loss, this will be the scanning risk for this combined commodity. Scanning risk will be set to zero if all 16 values are negative.

The scenario that results in scanning risk is known as the active scenario. A scanning risk calculation example is shown in the following table for this portfolio:

- 1 long position in Saudi Index futures contract with expiration in May 2020;
- 2 short positions in Saudi Index futures contract with expiration in June 2020;
- Assuming price scan range is SAR12,000

Risk Scenario / Scan Point	May2020 (+1)	Jun2020 (-2)	Simulated Gain / Loss
1	0	0	0
2	0	0	0
3	4,000	-8,000	-4,000
4	4,000	-8,000	-4,000
5	-4,000	8,000	4,000
6	-4,000	8,000	4,000
7	8,000	-16,000	-8,000
8	8,000	-16,000	-8,000
9	-8,000	16,000	8,000
10	-8,000	16,000	8,000
11	12,000	-24,000	-12,000
12	12,000	-24,000	-12,000
13	-12,000	24,000	12,000
14	-12,000	24,000	12,000
15	11,880	-23,760	-11,880
16	-11,880	23,760	11,880

Therefore, the scanning risk for the combined commodity in the portfolio is SAR12,000 with active scenario 13.

Inter Month Spread Charge

As Delta Hedge scans across contracts within the combined commodity, it assumes perfect correlation in price movements between different expirations. However, in reality price movements across contract months do not always move in the same direction and by the exact identical magnitude. In order to account for the inter month basis risk, whereby gains in one contract month may not exactly offset losses in another contract month, Delta Hedge imposes the inter month spread charge.

Delta Hedge begins with determining the long or short net delta for every contract month within the combined commodity, and typically for futures product the delta is always 1 per contract held as open position. Following that, Delta Hedge defines tiers which essentially groups a set of contract months by different expirations and assigns priority for which spreads will be formed. Inter month spread is then determined between the long and short delta by the priority defined, after which the associated charge rate is imposed. The following example demonstrate how inter month spread is determined:

Tier	Contract Month Sequence
1	1
2	2 - 4

Priority	Spread Pairing	Inter Month Spread Charge
1	Tier 1 : Tier 2	7,000
2	Tier 2 : Tier 2	6,000

Using the same portfolio from earlier scanning risk example:

- Tier 1: Saudi Index May 2020 contract has net delta of +1 (long);
- Tier 2: Saudi Index June 2020 contract has net delta of -2 (short);
- One inter month pair can be formed under priority 1;
- Inter month spread charge of SAR7,000 will be imposed for this portfolio

Total Initial Margin Requirement

The initial margin requirement for a combined commodity is then the summation of scanning risk and inter month spread charge. Using again the same sample portfolio:

- Initial margin requirement for Saudi Index combined commodity
 = scanning risk + inter month spread charge
 = SAR12,000 + SAR7,000
 = SAR19,000

In the event there is more than one combined commodities in a portfolio, repeat the steps by combined commodity and sum the initial requirement to get the total portfolio's initial margin requirement.

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