

RCaR – Capital at Risk valuation methodology and system

A clearing organization is required to have financial resources as a consequence of the risks assumed in the clearing activities. This section describes RCaR, a proprietary methodology and system developed by NASDAQ OMX Derivatives Markets to estimate the required clearing capital.

A clearing organization assumes the counterparty risk in each position which is cleared. To cover this risk, the clearing organization calculates and requires its counterparties to pledge a margin, which is also referred to as collateral. The residual risk which exists is if the pledged margin based on the margining methodology applied, proves to be insufficient to cover the costs when the clearing organization closes out the positions of a defaulted counterparty. To estimate the total costs associated with assumed extreme or exaggerated worst case price movements and assumed extreme levels of simultaneous defaulting counterparties, a proprietary methodology called “RIVA Capital at Risk” (RCaR) was developed within NASDAQ OMX Derivatives Markets.

There are two main differences between the assumptions in RCaR compared with the ones applied in standard margining systems (e.g. OMS-II, SPAN, TIMS):

- Market movements in margin calculations can be described being as “near worst-case scenario” whereas the ones applied in RCaR are designed to be “extreme or exaggerated worst-case scenarios.”
- Margins are applied to all accounts, but the RCaR value is calculated as the aggregated loss for a predefined number of simultaneous defaulting accounts in the worst extreme scenario applicable that day.

In the process of calculating margins for one account, NASDAQ OMX Derivatives Markets applies the OMS II methodology. It determines the implied future market scenario that causes the account to decrease most in market value. The difference between the actual market value of the account today and the market value of the implied future market scenario is the margin requirement calculation for the respective account. The number of potential market scenarios is effectively unlimited. Within an account, the number of possible scenarios is not difficult to calculate since the positions are restricted to the account. This means in theory that each of the accounts in a clearing organization can have its margin calculated based on a unique future market scenario.

For an individual account, RCaR calculates the market value of the account for one scenario and compares it with the margin that has already been pledged by the account. The difference between the market value of a counterparty’s portfolio of derivative contracts (after applying the stressed RCaR assumptions) and the value of the margin pledged by the counterparty on the previous business day is the amount of the NASDAQ OMX Derivatives Markets’ capital that is implied as being at risk for each scenario if that counterparty were to default. In RCaR, the same future market scenario, with higher parameters, is applied to all accounts at the same time. Given a group of defaulting accounts that are assumed to have defaulted, the sum of each account’s RCaR figure, is the amount of money that would be at risk for loss if this defaulting event and exaggerated worst-case scenario were to be realized. If one goes through a wide range of scenarios, the implied maximum capital that NASDAQ OMX Derivatives Markets would have at risk tied to these defined scenarios would be the largest calculated loss caused by the number of counterparties which are assumed to have defaulted in what is the worst-case scenario for that specific date.

Using the same number of scenarios as in the standard RIVA margining algorithm would mean going through approximately 31 200 different combinations. This is clearly not feasible. In order to limit the number of combinations without losing too much in terms of accuracy, RCaR methodology

assumes that all underlying instruments in a specific market (e.g. Swedish stock market vs. Swedish index market vs. Danish, Finnish or Norwegian markets) move in perfect correlation and only to the maximum/ minimum RCaR levels. For example, in the Swedish stock market, this would mean that the prices of all stocks increase or decrease significantly at the same time. If this is applied to all current markets, the range of possible scenarios is narrowed down to fewer than 100 scenarios.

Since June 30, 2003 NASDAQ OMX Derivatives Markets has been generating daily, implied, loss-given default calculations based on extreme yet plausible market conditions and extremely conservative simultaneous counterparty default assumptions using RCaR methodology and the RCaR system. NASDAQ OMX Derivatives Markets has used the information as a crucial element of its capital adequacy and NASDAQ OMX's overall capital/ treasury efficiency planning.