

Public disclosure of CCP.A's Risk Management Systems, Test Policy and Model Validation

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Document Information

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Change Log¹

Version	Effective Date	Change Description
V1.0	11.06.2014	Initial Document, Summary of Test Results May 2014
V1.1	01.12.2014	Reduction of holding period from T+4 to T+3 due to introduction of settlement period T+2
V1.2	04.05.2016	Including back test of r Factor for all traded instruments, Update on Summary of results
V1.3	15.11.2016	Clarification on applied procedures to assess tests results and performance of stress tests; Link to CPMI-IOSCO Disclosure Framework added in Chapter 4
V1.4	20.10.2017	Annual review: Minor editorial changes

¹ The Change log is only used for final versions.

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1 Introduction

EMIR Art 49 sets several requirements to ensure that the models used for margin calculation and default procedures are based on solid assumptions and reflect the 'real world' as much as possible. Key points of these requirements are:

- Conduction of tests and analysis of results
- Information to National Competent Authority, Finanzmarktaufsicht (FMA)
- Integration of members
- Public disclosure of key aspects

ESMA has detailed these key aspects in the delegated Regulation (EU) No 153/2013, Chapter XII, Art. 47-57. CCP.A has implemented a Policy for Tests and Model Validation to comply with EMIR Art. 49 and the standards defined by ESMA. This document gives an overview of the applied procedures.

2 Models to be validated an applied methodology

2.1 Margin Calculation

All Clearing Members of CCP.A must deposit collateral with OeKB for securing the clearing risk. The margin requirements are calculated at least daily on the basis of the balance of open trades (res. Open positions) and risk parameters using Risk Based Margining.

Margin is calculated on instrument level on each Margin account, CCP.A does not consider correlations between different instruments to reduce margin requirement.

Basic steps are:

- Net open positions on margin account
- For each instrument of the position
 - Calculate current value (current close out cost if position will be liquidated immediately) on instrument level
 - Calculate potential additional close out (if position will be liquidating at t+4) under assumption of price changes up to x% (Margin Parameter) in the worst case scenario
- Add the two liquidation values to determine the basic risk per instrument and position
- Add basic Risk Margin Requirement of all instruments
- Multiply result with Member Rating factor and procyclicality buffer to obtain final margin requirement for each margin account

Important parameters are:

- Holding period 3 days (cash market)
- Look back period for margin parameter calculation: 250 Days and 600 days
- Confidence level: 99%

Margin parameters (i.e. “r-factor” on cash market) are published on CCP.A’s website.

For details regarding calculation see “Margin Calculation Methodology” available on CCP.A’s website.

2.2 Default Fund Calculation

CCP.A’s Default Fund is calculated to cover the simultaneous default of the 3 largest Clearing Members. The methodology how the total size of the Default Fund is determined and the allocation of this amount to the individual member is published on CCP.As website (see document “Public Information on Default Fund Calculation”).

To validate its model for computing the default fund contributions, CCP.A uses back testing, stress testing and reverse stress testing. The stress testing process is fully automated and is performed daily. The reverse stress test process is also fully automated and executed on daily basis, the analysis of results takes place quarterly.

2.3 Overall available resources

The total available resources to cover defaults consist of margin requirements, Default Fund contribution and CCP.A’s own resources. The order of usage is compliant with the waterfall principle defined in EMIR (see document “Default Waterfall”).

To validate the overall resources of the default waterfall, the results of the stress tests and reverse stress tests are used.

2.4 Collateral

Each member has to fulfil its margin requirements and Default Fund contribution with assets according to CCP.A’s *Collateral Policy*. CCP.A’s *Collateral Policy* defines which assets CCP.A accepts and how these assets are valued.

To validate the Collateral Policy (collateral evaluation), the adequacy of the accepted collateral and the applied haircuts are reviewed regularly. This is done by analysing the price series of the pledged securities. For instruments tradeable at Wiener Börse AG, prices (including PWTs² and reference prices) of WBAG are used. For other instruments prices are provided by OeKB (i.e. prices from the vendor Telekurs which were concluded at the home market (first priority) or the market Frankfurt (second priority)). The parameters used by CCP.A’s *Collateral Policy* are benchmarked against those parameters published by ECB on their list of eligible collateral. This is done on a monthly basis.

2.5 Default procedures

The procedures, which CCP.A undertakes in the event of a Clearing Member’s default, are summarized in the document “procedures in the event of a default”.

² PWT = Price without Turnover

CCP.A's rules stipulate the circumstances, in which CCP.A will declare a default and what kind of action will be taken for each kind of default. Basic steps are:

1. CCP.A will declare default on Clearing Member
2. CCP.A will immediately inform Wiener Börse AG
3. Wiener Börse AG will suspend the member (and allocated Non-Clearing Members and Registered Clients) from trading immediately
4. FMA will be informed
5. Penalty fees have to be paid to the Austrian government according to Exchange Law
6. CCP.A will port the position and assets of segregated accounts as far as possible
7. Remaining positions will be liquidated using resources according to the default waterfall
 - a. Cash collaterals and all cash balances from defaulting member
 - b. Securities deposited as collateral and securities from defaulting member
 - c. contributions to the clearing fund from defaulting member
 - d. own dedicated sources of CCP.A
 - e. contributions to the clearing fund from non-defaulting members on pro rata basis

To validate the general default procedures and to ensure that members are familiar with the default procedures, CCP.A will simulate a default of member in simulation environment using a pre-defined screenplay, including some “what if” scenarios. To the extent possible, members will be integrated in this simulation (e.g. portability of assets and collaterals).

3 Testing programs

3.1 Back Testing

The purpose of back testing is to check the adequacy of the margin calculation on each margin account. Back testing is performed on 2 functional levels:

- Level 1: Back test of margin requirement
- Level 2: Back test of margin parameters

Level 1: The margin requirements should cover the close out value (net profit and loss) of a portfolio within a confidence level of 99% under all circumstances, i.e. the change of the portfolio value between t and $t+n$ of the portfolios of the Clearing Members.

In back testing the margin requirement for a portfolio on a margin account on a given past day t is being compared with the close out value of that portfolio on $t+n$, thus measuring whether the initial margin requirement computed at t would have been sufficient to cover for losses incurred after n days. A net loss exceeding the margin requirement is defined as “uncovered loss”. The allowed number of breaches has to be defined by the CRO and should be consistent with the applied confidence level chosen by CCP.A.

The model is said to be adequate, if the observed number of breaches is equal or lower than the expected breaches given for the specified confidence interval. A higher number of breaches gives an indication of an underestimation of the potential close out cost. In this

case, the parameters of the margin model shall be adjusted. It may also be necessary to analyse whether the margin algorithm is adequate for a given instrument type.

Level 2: CCP.A conducts regularly tests on the appropriateness of the r-factors.

Therefore the daily price variation (from t to $t+2$) of all traded instruments is compared to the r-factor applied on t . This is done monthly taken the close prices of these instruments in the past 12 months into account.

If the price variation is higher than the applied r-factor, a breach is counted. The number of observed breaches shall support the null hypothesis "The applied r-factor is sufficient to cover T+2 price variation at a confidence level of 99%" at a significance level of 5%.

3.2 Stress Testing

EMIR Art. 51 states that a CCP shall perform stress tests to estimate the exposure of the n largest members in extreme but plausible events. Stress tests provide information on risk exposure under stressed market conditions and give information on financial capacity which will be needed to cover the default of one or more member in stressed market conditions.

The standard stress tests for cash market instruments are based on shocking the variations of the instrument price.

The standard stress factor to stress the prices is determined by

1. Analysing the historic trade prices
2. Analysing the historic fair value prices (like "PWT", "NAV") provided by issuers
3. Hypothetic assumptions on potential price variations

Additional specific stress scenarios are used to determine stressed prices of

- Instruments traded in non EUR currency but settled in EUR (currency rate stress scenarios)
- Bonds (interest rate stress scenarios)
- Instruments issued by a defaulting issuer

Standard Stress scenarios are created for an upside price scenarios and a downside price scenario and include observed data (n -th largest shock in a given time frame (historical observation approach) as well as hypothetical scenarios like " k " times the size of the r-factor (r-factor approach) or a third approach based on statistics, using " d " times the standard deviation (standard deviation approach).

3.3 Reverse Stress Tests

EMIR Art. 60 states that a CCP shall conduct reverse stress tests which are designed to identify under which circumstances the combination of margin, Default Fund plus other financial resources may provide insufficient coverage of credit exposure and for which its liquid financial resources may not be sufficient.

The reverse stress test methodology consists in a reprocessing of the stress tests using a "trial and error" approach until the objective is met. The relevant risk factor (which is the price for cash market instruments and the settlement price for derivatives) will be shocked by applying a factor to it (e.g. current price*1.5).

The results of the reverse stress tests enable CCP.A to identify the market conditions, under which a predefined threshold (in EUR) is reached. The threshold gives the breakeven point between available financial resources and necessary resources to cover the simultaneous default of 10 Clearing Members.

3.4 Sensitivity Tests

CCP.A conducts monthly sensitivity tests to assess its margin coverage under various market conditions using historical data from stress tests made.

Such analysis shall be performed on a number of portfolios and shall be designed to test key parameters of the initial margin model. The test shall include the simultaneous default of Clearing Members that issue financial instruments cleared by the CCP. For these test cases, the CCP shall evaluate the potential close out values of Clearing Member positions.

The sensitivity test procedure is based on the execution of several margin computation iterations. The result of the iteration is a new set of r-factors and prices. CCP.A will perform its sensitivity tests concerning:

- Changes in confidence interval
- Delta % variation of the price for n securities issued by Clearing Members under the assumption of simultaneously default
- Delta % variation of the price of the remaining securities

The result of a sensitivity test is the margin requirement of a Clearing Member under the different sensitivity-test market conditions, which include irregular price variations of several instruments issued by the defaulting Clearing Member.

This amount is compared with the available financial resources to cover the default of the 3 largest Clearing Members.

3.5 Assessment of Results

CCP.A has established criteria to assess whether its models, methodologies and liquidity risk management framework have been successfully validated. These criteria include the analysis of test results as well as clear statistical tests.

CCP.A has defined the procedures to detail the actions it could take given the results of the tests.

4 Summary of Test Results

During the last 12 months, all tests have been performed and successfully validated according to CCP.A's test schedule. There was no evidence of any inappropriateness of CCP.A's models used for margin calculation, Determination of the Default Fund Size, liquidity needs and default procedures. No corrective actions have been undertaken.

Quantitative information including basic test results are published following the "CPMI-IOSCO quantitative disclosure framework for CCPs" on CCP.A's website (section "Statistics").³

³ <https://www.ccpa.at/en/cpmi-iosco/>