Best practices for CCPs stress tests

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Note of the EACH President:

In May 2014, the EACH Risk Committee established a task force on "Best practices for CCPs stress tests". This EACH Paper aims to summarise the EACH task force´s findings and present recommendations to address some of the best practices that have been identified.

EACH intends to present the key themes of the Paper to the CPMI-IOSCO, European Commission and ESMA as part of its continuing dialogue on CCP stress testing.

Herewith I would like to thank the task force for creating a good and informative Paper, which will be of use for many interested parties.

Marcus Zickwolff
EACH President

1. Introduction

Objective

This paper aims **to provide an overview of best practices with regard to how CCPs perform stress tests**.

This paper addresses stress tests performed by CCPs to determine the size of their default fund(s), designed to quantify the credit risk associated with the default of one or more Clearing Members. These generally include tests on price, volume, collateral and liquidity.

The European Market Infrastructure Regulation (EMIR) foresees that CCPs apply different sets of stress tests in order to ensure safe and sound risk management.

EMIR in particular refers to 'extreme but plausible market conditions'[1]. **Regulators, users and infrastructures would greatly benefit from clarification on this reference through a higher degree of standardisation of stress testing principles**. The aim of this paper is to describe how to achieve such level of standardisation through an agreed set of best practices for stress tests which include:

- **Principles** to apply when CCPs perform stress tests
- **Risk management areas** subject to best practice

Structure

- Section 2 below describes the EU regulatory regime governing stress tests performed by CCPs.
- Section 3 lists the principles to apply when CCPs perform stress tests.
- Section 4 analyses the risk management areas subject to best practice. A proposal for harmonisation is included for each of the areas.
- Section 5 sets out our conclusion.

[1] EMIR Article 42.3

2. Regulatory regime

According to EMIR article 42(3) and 43(2), CCP should perform stress tests to quantify whether they have sufficient resources to cover the losses from the default of at least one or two Clearing Members.

The Delegated Regulation 153/2013 article 29 and following provide further guidelines with regard to the performance of stress tests by mandating the data history to be used for identifying extreme but plausible market movements. They also indicate the way to use potential future scenarios based on both quantitative and qualitative assessments of potential market conditions. Article 51 and article 56 provide further details about how to perform stress tests including the factors to test and the considerations to take into account when modelling stress tests. The review of the stress tests models is described in Article 56.

3. Principles to apply when CCPs perform stress tests

EACH believes that the following principles should be used as best practices when CCPs perform stress tests:

Principle 1 – Relevance

The plausibility of the stress tests performed by CCPs to size their default funds should be defined based on historical extremes as well as on hypothetical scenarios (statistical, augmented, liquidity).

Principle 2 – Structure

The stress tests performed by CCPs to size their default funds should reflect the inherent risks of the CCP. The stress tests shall be robust whilst allowing for flexibility to reflect the changing nature of risks that a CCP faces.

Principle 3 – Governance

The stress tests performed by CCPs to size their default funds should be designed and reviewed based on an adequate structure where technical and qualitative expertise are balanced.

Principle 4 – Transparency

The disclosure framework and requested results of the stress tests performed by CCPs to size their default funds should be transparent in line with the CPMI-IOSCO Public quantitative disclosure standards for central counterparties[2].

[2] CPMI-IOSCO (2015) https://www.iosco.org/library/pubdocs/pdf/IOSCOPD475.pdf

4. Risk management areas subject to best practice

EACH believes that the following areas of risk management should be subject to best practices with regard to how risk is measured by a CCP in a stress scenario:

4.1 Scenarios	4.7 Collateral
4.2 Stress period of risk (margin period of risk)	4.8 Allocation
4.3 Stress Positions and Prices	4.9 Governance
4.4 Stress liquidity	4.10 Validation
4.5 Aggregation	4.11 Disclosure
4.6 Calculation of the stress effect	

These risk management topics are detailed below.

4.1. Scenarios

4.1.1. Historical scenarios

Best practice 1

Historical scenarios should be applied by taking **the historically observed stress shifts and make them relevant to today**. This would ensure that the historical scenarios are tailored to the current economic conditions, as the conditions of the time when they originally occurred may no longer be relevant.

With this approach, the Lehman's crisis, 1987 stock market crash, Euro Crisis, gulf war etc. would all be captured and applied but in a way that is relevant to the current market conditions.

The example of Nickel

In 2007 Nickel was trading at c$50,000 a ton, with a severe shortage of Nickel in the marketplace and huge pre-crisis demand and speculation. The price collapsed by close to %, c$4,450 overnight. This contrasts with today where prices are c$13,000 a ton and there is huge over supply, lots of warehouse stocks and far less demand and speculation. With the application of shifts to today's prevailing prices and market conditions, a $4,450 stress would reflect a 34% price fall, significantly higher than the 9% observed in 2007.

4.1.2. Hypothetical scenarios

Best practice 2

When creating hypothetical scenarios, **CCPs should consider the following factors**:

- **Use of augmented scenarios** determined using historical data in order to create a new situation. During periods of stress, previously observed correlation breaks may occur which create the breakdown of model assumptions and must be taken into account.
- Use of scenarios created from purely **simulated factors**, which must be plausible and explainable.

4.1.3. Magnitude of scenarios (purpose 'Sizing')

EACH proposes an approach towards defining 'extremeness' in respect of market events that impact positions cleared and the default waterfall of CCPs.

Best practice 3

Minimum standards for confidence level and holding period

EACH proposes the use of a model to generate comparable magnitude of shifts across products in terms of level of extremeness and plausibility. This is particularly important in the situation where different lengths of history are available, and hence where a where a purely historical approach may lead to misleading results.

EACH believes that this model should target a minimum level of confidence of 99.9%. The events modelled through historical or hypothetical scenarios are expected to occur infrequently, but potentially with a high impact for financial markets. Therefore, given the limited number of such stressed observations, statistical significance for such high confidence levels will not be possible. Depending on the specific characteristic of a product or risk profile, the 99.9% confidence level may be subject to adaptations by one or more CCPs. CCPs may therefore apply a scaling factor in terms of number of standard deviations relative to its margin rates in order to obtain market scenarios that would be above the 99.9% level of confidence.

In order to ensure a level playing field amongst CCPs across the world, this minimum confidence level should be adopted globally.

Definition of 'extremeness'

The definition of '**extremeness**' is specific to particular products and markets, therefore it is difficult to assign a specific value. CCPs should consider the following issues when assigning such a value:

- EACH believes the price shock should be relevant for the underlying products. Justification should be provided to ensure transparency and when both absolute and relative may be acceptable, the choice should be rationalised.
- The price shock should be applied to the current market price and volatility levels.
- The price shock should be appropriate to the number of risk factors describing the exposure of the portfolio. This means that for relevant products, orders higher than parallel shift should be considered and justified to ensure appropriate transparency.

Economically relevant events could be used and must have significance for the products cleared by the CCP. Should the product not have a significant history a relevant proxy could be used. Shocks that result in losses that exceed margin will typically (though not exclusively) be used.

Definition of 'plausible'

- Scenarios shall be consistent from a macro-economic perspective
- Scenarios, whether historical or hypothetical, should be assessed based on their plausibility – scenarios having an infinitesimally low probability of occurrence should be remodeled in order to satisfy the assumption of plausibility

4.2. Stress period of risk (margin period of risk)

The stress period of risk (SPOR) can be defined as the number of days to be taken into consideration when determining the price movement parameters. It is a similar concept to the margin period of risk (MPOR), with the difference that the SPOR is applied as a single shock.

According to article 53.5 of the European Commission Delegated Regulation 153/2013, for European CCPs the stress tests shall consider the liquidation period as provided for in article 26 of the Delegated Regulation 153/2013: at least 5 days for OTC derivatives and at least 2 days for financial instruments other than OTC derivatives.

Best practice 4

Period of risk

The stress period of risk should be aligned with the MPOR. A default process can extend over several days with some positions being liquidated before others. The actual close out process will be specific to the type of product and the positions of the clearing member in default.

Application

In order to ensure clarity, it **should be assumed that the shock is applied as one movement over the entire stress period of risk** (which makes no assumptions when positions are closed out or hedged during the stress period of risk).

Flexibility

Different liquidation periods can be applied for different products/accounts when calculating initial margins. Since there is only one theoretical price movement scenario for the whole portfolio, **the most conservative practice is to apply the largest MPORs if there is more than one possibility**. For example, in the case where house account is applied a 5 day MPOR and clients 7 day, use the one that leads to the largest price variation.

4.3. Stress positions and prices

Stress positions are the positions used for calculating the effects of a price shock. Prices are usually used as a starting point for applying the price shock.

A default can happen during a day when positions from the last end of day exist. Positions might have become more or less stress containing and therefore the last overnight position should be used as the best estimate.

Best practice 5

To avoid making arbitrary assumptions about the transactions that are concluded during the day and the price changes, the **stress test should be performed using end of day positions and prices**. This would ensure achieving more comparable results.

4.4. Stress liquidity

EACH believes it is important to understand how to deal with market liquidity in a stress scenario. Liquidity can be modelled in different ways (MPOR, quantile, etc.). CCPs require some flexibility in respect of the definition of stress liquidity.

Best practice 6

In the definition of stress liquidity, CCPs should consider the following:

- The liquidity or concentration risk resulting from large positions must be explicitly evaluated.
- This exposure can be:
  - Embedded in the IM or stress model itself (e.g. in case liquidity risk is already conservatively captured in the IM, it is not needed in the stress model, as this would mean double counting)
  - Applied in the form of a penalty multiplier for large positions (concentration) to be used for IM and/or stress test calculations based on the assumption made
  - An extension of MPOR, which could for example be done by multiplying IM parameter by square root (MPOR for large positions / MPOR for normal positions), and for those large positions with stress test losses apply the ratio 'IM increased for large positions / Basis IM', for instance.

4.5. Aggregation

Best practice 7

Impact of client default on guarantee fund sizing

With regard to Cover 2, EACH believes that the stress tests to size the default fund should reflect the different levels of client protection of different segregated models. The underlying assumptions should be clearly detailed and consistent with the overall risk framework.

Respect of the segregation structure

When calculating the stress shortage on a clearing member level, the segregation structure of the clients of this clearing member has to be respected (i.e. no offsets are allowed between the segregated pools).

Inclusion of SIG

When sizing the default fund to cover the stress test risk of the two riskiest clearing members (cover 2), the skin in the game (SIG) shall be deducted from the stress shortage, considering that in a real situation the SIG goes before the default fund.

4.6. Calculation of the stress effect

CCPs calculate the stress effect by applying the price shock to the end of day positions of the last business day and calculating the P&L (i.e. the theoretical variation margin) for each portfolio.

Best practice 8

A portfolio in this context is any portfolio that has to be recorded separately under the EMIR requirements i.e. a house portfolio, individually segregated client or omnibus segregated client account. This means that the positions within such an account should be netted before the P&L is calculated.

4.7. Collateral

According to EMIR article 46 and Chapter X of Delegated Regulation 153/2013 article 41 (2) the collateral haircuts should take into account liquidation in stressed conditions.

Best practice 9

Stress testing must take into account adequate collateral haircuts, to account for changes in liquidity, during stressed conditions. **The collateral value should therefore generally be used in stress testing.**

Only with the prior approval of a CCP's Risk Management department, excess collateral could be withdrawn prior to a default by the Clearing Member in question, and this must be taken into account. Therefore **the amount used as a measure for collateral available should be no more than the overall margin requirement as of the same end of day as the positions**.

4.8. Allocation

Best practice 10

Although CCPs generally define how to allocate the overall default fund size to individual clearing members based on a measure of the risk exposure, **they should have the flexibility to perform this allocation in a way that promotes prudent risk management**. A one-size-fits-all approach would be inadequate.

4.9. Governance

A CCP's stress test should be subject to an appropriate governance structure, which should be tailored to the particular case of the CCP. Stress test governance structures like those applied to banks cannot be used as a reference. The purposes of stress testing in banks and in CCPs are very different:

	CCPs	Banks
Objective	To determine the level of required financial resources that are called for from the participants (as the default fund is only financed by the Clearing Members) whereas for banks they are used to determine the adequate level of capital that a bank must hold.	To determine the adequacy of overall capital that the bank should hold against their risk.
Scope	Specific to the type of product and the respective market conditions in order to fulfil the requirements of EMIR and the Delegated Regulation 153/2013, whereas for bank stress tests are defined based on more global macroeconomic scenarios	Broad-based macro-prudential scenarios impacting the bank's various business lines.
Frequency	Performed daily in line with the PFMIs, whereas bank stress tests are typically performed on a monthly or quarterly basis.	Monthly or Quarterly basis
Transparency	CCPs already provide a high level of transparency given their adoption of the CPMI-IOSCO qualitative and quantitative disclosure standards.	Bank stress tests were created to provide transparency about the resilience of financial institutions to adverse market developments, as well as to contribute to the overall assessment of systemic risk in the EU financial system.
Responsibility	CCPs must continue to administer their stress tests as they hold the requisite data on member and client portfolio composition. CCPs should continue to operate the stress tests under the EMIR framework and supervision of their regulators. Bank stress tests were mainly driven by the lack of external governance/transparency on the banks' stress magnitudes/parameters. CCPs are very transparent already.	The broad-based macro-prudential scenarios require a specific administration of the stress tests.

Best practice 11

A CCP's stress test should be subject to an appropriate governance structure including:

- **Risk management team** – responsible for carrying out the daily stress testing procedures and tasks that may be documented within internal policies. The teams are responsible for monitoring, analysing and escalating any issues to senior management in case there is an emergency from a client or market activity.
- **Senior management** - accountable for the development, implementation and management oversight of the stress testing framework.
- **Risk Committee** – acts as an external market representative in assessing the risk profile of the CCP and provides expert opinion when required.
- **Independent validation** – responsible for confirming the accuracy and appropriateness of the stress testing methodology and framework of the CCP.

4.10. Validation

Best practice 12

In line with the EMIR legislation, **the stress test framework applied by CCPs should be validated by an independent party**. This party could be internal or external. In both cases, the governance and the absence of conflict of interest needs to be clearly defined and transparent.

4.11. Disclosure

Best practice 13

EACH agrees with the **public disclosure framework defined by CPMI-IOSCO** in their document 'Public quantitative disclosure standards for central counterparties'[3].

5. Conclusion

The above principles and risk management areas subject to best practice should set a common ground for CCPs to perform stress tests to size the default funds. EACH hopes this contributes to the regulatory debate and specifically to the current work of CPMI-IOSCO[4]. EACH stands ready to engage with regulators and policy makers to discuss this paper in detail and provide the relevant expertise on this subject.

[3] https://www.bis.org/cpmi/publ/d125.pdf
[4] https://www.bis.org/press/p150311.htm

6. Annex 1 - EACH task force on "Best practices for CCPs stress tests"

The EACH task force on "Best practices for CCPs stress tests" has 19 members:

ATHEXClear S.A.
BME Clearing, S.A.
CC&G (Cassa di Compensazione e Garanzia S.p.A.)
CCP Austria
CME Clearing Europe
Eurex Clearing AG
EuroCCP N.V.
European Commodity Clearing AG
ICE Clear Europe
Irgit S.A. (Warsaw Commodity Clearing House)
KDPW_CCP S.A.
KELER CCP Ltd
LCH.Clearnet Ltd
LCH.Clearnet SA
LME Clear
Nasdaq Clearing
National Clearing Centre (NCC)
OMIClear
SIX x-clear AG
Takasbank

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