Final Report

Framework for the 2021 ESMA Stress Test Exercise for Central Counterparties

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1 Introduction

1. This report sets out the framework for the new ESMA stress test exercise for Central Counterparties (CCPs) including the scope, the detailed methodology, the expected deliverables and the implementation plan.

2. Section 2 discussed the different components of the stress test, which are the credit risk, the concentration risk, the operational risk component, and the reverse stress test. For the components that were already part of the third exercise and that remain (i.e. credit stress test, concentration stress test, reverse stress) the note focuses on the suggested methodological changes and implications, including the integration of concentration with credit. The design of the new operational risk analysis is discussed in full.

3. The required steps and implementation plan for the 2021 ESMA CCP stress test exercise are presented in section 3, where the framework also stipulates the resource commitments from NCAs that are needed for a successful exercise.

4. The framework is complemented by four documents, which are 1) Instructions (Annex 1); 2) Validation (Annex 2); 3) Data Request Templates (Annex 3); and 4) ESRB Adverse Scenario for ESMA CCP stress test in 2021. The first document includes instructions for the CCPs regarding the calculation and reporting of the required data. This includes instructions for translating the market stress scenarios prepared by the ESRB into profit- and loss (P&L) calculations for portfolios of the CCP. The instructions (Annex 1) will be shared with the CCPs when launching the data request together with the data request templates (Annex 3) and the ESRB market stress scenario (Annex 4). The second document (Validations - Annex 2) details the checkpoints for the validation process and specifies the allocation of work across the participating authorities (i.e. NCAs and ESMA).

2 Design of the 2021 ESMA CCP Stress Test exercise

2.1 Background

5. CCPs are systemically important and their resilience is critical to the stability of the financial system in the EU. By their nature, CCPs are counterparties to all their clearing members. Failure of CCPs to mitigate risks could potentially lead to spill-over effects and may exacerbate systemic risk. Moreover, as evidenced in previous ESMA stress test exercises, CCPs are highly interconnected through common participants, which may propagate failures in one CCP throughout the system. Stress testing CCPs' default waterfalls, both individually and EU-wide, is an important supervisory tool to ensure the sector is safe and resilient to member defaults and market shocks.

6. The ESMA stress test is different than the stress test of individual CCPs. CCPs run daily stress tests on the basis of stringent prudential requirements that focus on their own environment, including participants and cleared products. CCP stress tests mostly focus

on their own CCP within the specific markets it clears. By its nature, the individual CCP's stress test cannot take into account how a default of one of its clearing members impacts other CCPs. Therefore, the EU-wide stress test is a critical tool in assessing the systemic implications of system-wide events and thus the resilience of the system of EU CCPs.

7. One of the objectives of Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (EMIR) is to promote central clearing and ensure safe and resilient CCPs. Therefore, ESMA shall at least annually, in cooperation with the ESRB, initiate and coordinate assessments of the resilience of CCPs to adverse market developments. Following the amendments to Regulation (EU) No 648/2012 in 2019, these assessments should include both EU and third-country Tier 2 CCPs. ESMA shall develop the following, for application by the competent authorities:

- common methodologies for assessing the effect of economic scenarios on the financial position of a financial market participant;

- common approaches to communication on the outcomes of these assessments of the resilience of financial market participants;

- common methodologies for assessing the effect of particular products or distribution processes on the financial position of a financial market participant and on investors and customer information.

8. Where the assessment exposes shortcomings in the resilience of one or more CCPs, ESMA shall issue the necessary recommendations.

2.2 Objectives & principles

9. The objectives of the 2021 ESMA Stress test exercise result directly from the legal mandate given to ESMA under EMIR. The objectives are to:

- assess the resilience of CCPs to adverse market developments,

- identify any potential shortcomings in the CCPs' resilience, and

- issue recommendations as appropriate.

10. The overall design of the Stress Test framework was also guided by a number of overarching principles. ESMA will assess the resilience of all scoped CCPs, individually and as a system. This will be done on the basis of, as much as possible, common methodologies and criteria. Moreover, the stress market shocks shall be combined with the simultaneous default of market participants. The ESMA CCP stress testing exercise is not aimed at assessing the compliance of individual CCPs with regulatory requirements nor at identifying any potential deficiency of the stress testing methodology of the CCPs. It may however expose individual shortcomings in which case ESMA will issue the necessary recommendations.

2.3 Scope & overview

11. The exercise will cover all authorised EU CCPs as well as Tier 2 CCPs.15 CCPs in total will be included in the scope of the exercise.

12. The scope of the stress test exercise developed over the years. The first exercise conducted by ESMA was focused on the counterparty credit risk that EU CCPs would face as a result of clearing member defaults and simultaneous market price shocks. The second stress test introduced several methodological improvements as well as incorporating an assessment of liquidity risk. The third exercise included a concentration risk component, that was used to adjust the losses arising from the credit stress test to account for the costs of liquidating concentrated positions. In this fourth exercise, the assessment of liquidity risk will be paused, whereas the scope will include operational risk as a new component. Also, the integration of concentration with credit is an important new development in this fourth exercise that will further improve the detections of vulnerabilities in the EU system of CCPs.

13. Counterparty credit risk and concentration risk are the core types of risks faced by CCPs. The methodology has evolved to cover additional risk sources and will include (i) the integration of concentration with credit on a mutual date, (ii) an intraday test for credit risk only on a second date.

14. In addition, an analysis of operational risk will be performed. This analysis will cover a subset of operational risk sources, namely external operational dependencies that are needed by CCPs to provide their critical services.

15. While residual risks from the in-scope risk sources are analysed and highlighted in the framework, CCPs are also subject to other types of risks that are either not covered or are partially covered and could in isolation or in combination with credit and concentration risks challenge their resilience. In particular, legal and any type of business risks will be outside the scope of the exercise, because of their largely idiosyncratic nature. Also, potential shortcomings in policies and practices of individual CCPs, such as for example in the operationalisation of default handling procedures, can challenge their resilience but are beyond what will be considered in the course of this exercise.

16. Furthermore, when modelling the scenarios and credit exposure, it is not possible to cover all possible risk factors and then all possible combinations of risk factor shocks for all CCPs. This includes for example the change of spread between two particular markets, as it was the case in the relevant event. Indeed, while the architecture of the Stress Test is based on internally consistent scenarios, where N securities or contracts are cleared and possibly in the same portfolio, the number of possible basis risk movements is 2^N. The value of N is at least thousands in the case of an equity clearing service and thousands for derivatives. This makes it impossible to apply consistently all the potentially damaging scenario consistently across all portfolios CCPs. This risk is therefore outside the scope of this exercise.

17. To summarize, the 2021 ESMA stress test exercise has the following components:

- **Credit Stress**: Assess the sufficiency of CCPs' resources to absorb losses under a combination of market price shocks and member default scenarios.

- **Concentration risk**: Assess the impact of liquidation costs derived from concentrated positions.

- **Operational risk**: Analyse external operational dependencies that are needed by CCPs to provide their critical services.

- **Reverse Stress**: for credit, increase the number of defaulting entities and level of shocks to identify at which point resources are exhausted. Similarly, for concentration risk reverse stress tests will be performed to assess model risk.

2.4 Credit Stress Test

2.4.1 Objectives of the Credit risk analysis

18. The goal of the credit stress test is to assess the sufficiency of CCPs' resources to absorb losses under a combination of market price shocks and member default scenarios.
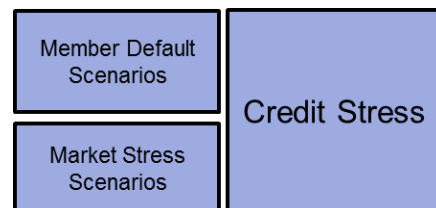
2.4.2 Scope and methodological principles

19. First, the CCPs will be asked to report the losses the CCP would face in case of the member's default under specific market stress scenarios. ESMA will then identify, based on the member default scenarios, the entities with the top exposures by aggregating, separately for each date the losses across accounts, clearing members and CCPs in order to compare the losses to the resources that are available to cope with the default.

20. The methodology used for the credit stress test has evolved significantly over the years. In the previous (3rd) exercise we introduced several improvements, including the use of two distinct reference dates, the stress valuation of collateral instead of relying on CCPs' haircuts and the introduction of a wrong-way risk adjustment for cleared exposures. These improvements are kept and in some cases further enhanced.

21. In the previous exercises, the CCPs were instructed to report losses at clearing member level, taking of course into account the impact from account segregation. In this 4th exercise the granularity of the requested reports increased and the stress P&L will be reported by CCPs at account and clearing member level. This allows ESMA to incorporate in the credit stress test results, together with the P&L from market stress scenarios, additional stress assumptions, including losses from concentrated positions.

22. Moreover, one of the two reference dates is modelled for the first time using intraday exposures. CCPs are asked to report positions and collateral as of a specific time during the day assuming an intraday member default scenario. This allows, inter alia, to test the effectiveness of the CCPs' intraday margining procedures.

23. Finally, the wrong way risk adjustment is further enhanced and will include the impact from multiple defaults on cleared exposures, i.e. the impact on instruments (or their underlyings) cleared by one clearing member and issued by another defaulting clearing member.

24. The methodological improvements are discussed in detail in the following paragraphs.

2.4.2.1 Member Default Scenarios

25. The member default scenarios define the conditions that are used to select the entities that are considered to be in default. In all cases, the defaulting members will be selected for each stress date individually and using only the required margin (i.e. excluding excess). Central banks, governments and interoperable CCPs are not included in the list of entities that may be assumed to be in default for the purpose of this exercise. The following scenarios will be employed:

- **Full scope Cover-2 groups**: Across all CCPs (full scope), identify the two clearing member groups with the highest aggregate exposure under a particular market stress scenario. All clearing members that belong to an identified corporate group are assumed to default across all CCPs. This scenario will give an aggregate view of the impact of the default of two groups of clearing members in the EU. With regards to the exact condition to be used to select the clearing member groups, the first choice is to select the top-2 groups that would lead to the highest aggregate breach of prefunded resources across all CCPs. However, depending on the results and as we have seen in the previous stress test exercises, it may be that this selection condition just focuses on the breach of one CCP (that is already presented under the cover-2 groups per CCP scenario) and propagates to all other CCPs the default of the same two clearing member groups with no material implications. In such a case, this selection condition would fail to adopt a more systemic point of view, as for example by exploring the default of pairs of groups that would put simultaneous pressure on multiple CCPs. If there is no breach of prefunded resources or if the breach is already presented under the individual CCPs' scenarios with no material implications to other CCPs, one can choose to select the two clearing member groups that would cause at an aggregate ESMA level the highest losses above the defaulters' margin and default fund contributions. The final calibration of the selection criteria will be done after the analysis of the results. In all cases, it will be ensured that if there are breaches of prefunded resources at one or more than one CCPs, these will be presented and discussed under at least one of the selected scenarios. Furthermore, as we have done in the previous stress test exercise, it can be considered to run and present in the final report more than one variant in order to make sure that all relevant results are highlighted. In general, the "full scope Cover-2 groups" scenarios may fail to stress all CCPs individually, as it

can be that defaulting entities, that are being selected as the most relevant at an ESMA level, may not be relevant or may not even be participants at some of the CCPs. Therefore, we will also run the cover-2 groups per CCP scenario.

- **Cover-2 groups per CCP:** For this scenario, we will select the defaulting clearing members as the members belonging to the top-2 groups of clearing members for each CCP. The defaulting clearing member groups are selected per CCP, hence they may be (and in most cases will be) different for each CCP and they are not considered to be in default in other CCPs. When a group is considered to be in default in one CCP, all clearing members that belong to the identified corporate group are assumed to default for the same CCP. The "full scope Cover-2 groups" scenarios, where we select the top-2 groups across all CCPs, cannot be used to assess the resilience of individual CCPs, as the selection algorithm will always focus on the two most systemically important groups and may fail to highlight shortfalls for individual CCPs. Therefore, the inclusion of this member default scenario is important in order to allow the assessment of the resilience of individual CCPs.

  The groups that will be selected for each CCP are the ones that lead to the highest resource consumption beyond required margin collateral and beyond the Default-Fund- level prefunded mutualised resources, including the default fund, the dedicated resources ("skin-in-the-game") and other prefunded Default-Fund-level resources. Thus, the selection process will select the two groups that could together lead to a depletion of the prefunded resources. If such pairs of groups are not to be found, we will select the two groups that would lead to the highest consumption. This can be done either on a relative (i.e. % of resources consumed) or on an absolute basis (amount of resources consumed). This may lead to different results for CCPs that have more than one default funds. The selection of defaulting entities on the basis of the relative consumption may focus on a smaller default fund that was closer to creating a breach, instead of selecting pairs of groups that would cause larger (in absolute terms) losses at a larger default fund. Moreover, one can choose to focus on the losses above own resources of the defaulting members (including margin and default fund contribution) or the losses above only margin. The final calibration of the selection criteria will be done after the analysis of the results. As in the case of the "full scope Cover-2 groups" scenarios, it can be considered to run and present in the final report more than one variant if needed to make sure that all relevant results are highlighted. In all cases, the same conditions will apply to all CCPs in order to ensure a fair and consistent presentation of the results.

2.4.2.2 Market Stress Scenarios

26. The ECB, in close collaboration with the ESRB and ESMA, has developed the narrative and has calibrated the adverse scenario for the 4th stress test exercise. The shocks were produced using the tool that is employed for the calibration of financial shocks for adverse scenarios at the ECB and has been in use for the calibration of financial shocks for the EBA, EIOPA and ESMA scenarios. The scenario that was produced reflects the

ESRB's assessment of prevailing sources of systemic risk for the EU financial system. It reflects the triggering of one or more of the sources of systemic risk to the EU financial system identified by the ESRB. These risks could materialise jointly and reinforce each other. The results are derived using a methodology that considers the joint empirical distribution of historical observations of the risk factors deemed relevant to CCPs to produce a coherent market risk scenario.

Box 1: Narrative of the scenario as provided by ESRB

The translation of the sources of systemic risk identified by the ESRB into instantaneous shocks following triggers initiated in various market segments is described below.

In this adverse scenario, ongoing concerns about the evolution of the COVID-19 pandemic and its economic ramifications trigger adverse confidence effects worldwide and prolong the unprecedented economic contraction. The worsening of economic prospects is reflected in a global decline in risk-free rates (from what is already a historically low level). Countries' fiscal positions weaken, as do corporate sector balance sheets. Despite the low risk-free interest rates, concerns about the sustainability of public and private debt resurface, leading to a sharp increase in credit risk premia and a widening of credit spreads worldwide. Countries with large spreads are particularly affected, whereas countries with few debt sustainability concerns experience somewhat more muted increases in sovereign spreads. As a result, the dispersion of sovereign bond yields across the EU increases. The reassessment of market participants' expectations amid declining corporate earnings results in abrupt and sizeable adjustments to financial asset valuations. Widespread downsizing of firms and rating downgrades trigger large-scale fire sales in the non-banking sector. Market volatility spikes, the correlation of asset returns increases, and borrowing costs surge on the back of expectations that non-financial corporations will default. Similarly, the global fallout in terms of economic activity and the sharp increase in non-financial corporate bond yields weigh on global investment and global demand for raw materials, causing an abrupt repricing of commodities. The risk of idiosyncratic failures by financial institutions intensifies, reflecting the deterioration of the macro-financial environment, with potentially severe consequences for the financial system as a whole.

The scenario has been obtained by choosing the mean response for each conditioned variable in an adverse scenario where the triggering variables are stressed over a two or five day horizon depending on the asset class. The sample chosen for the calibration spans the period from January 2005 to December 2020.

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27. It is important to note that the EU-wide stress scenarios should not be bound to only replicate past historical scenarios, but also use past observations in combination with a narrative that reflects the assessment of prevailing sources of systemic risk for the EU financial system to produce shocks that model potential future market conditions.

28. When modelling the stress scenario, it is not possible to cover all possible movements of different risk factors and their co-movements within and across asset classes. The scenario constitutes a severe yet plausible scenario that could arise if a risk environment such as the one explained in the narrative were to materialise.

2.4.3 Proposed modelling

29. The set of common and internally consistent price shocks will need to be run by individual CCPs. Given that it is not feasible to define scenarios for each and every risk factor of all CCP-cleared contracts, the scenarios are defined for a set of high level risk factors across different asset classes and the CCPs will need to translate the risk factor shocks into P&L for their cleared products and the members' portfolios. Therefore, the ESMA Stress Test Expert Group has developed and we will provide together with the data request and the high level market stress scenario a set of instructions that explain how these are expected to be implemented.

30. The instructions were drafted to provide clarity and address all material implementation challenges. The instructions were shared with EACH for consultation before the finalisation of the design.

31. Some of the key provisions in the instructions are listed below for illustration purposes and to better represent the assumptions, possible limitations, and resources implications of the exercise. The detailed instructions are included as Annex 1 to this note.

    - In the previous exercise we used two stress dates and one common market stress scenario. The experience has shown that running the same shocks on different dates can lead to significantly different results. This may be due to differences in positions, the prevailing level of resources (e.g. margin requirement, size of default fund), the level of prices, etc. Hence, the credit stress test will again be based on two distinct dates (19/3/2021 and 21/4/2021) and one common market stress scenario. Moreover, for one of the two dates (21/4/2021), the default event will be modelled as an intraday default, and the CCPs are asked to report exposures and collateral as of a specific time window on this date. This change is further detailed in the following paragraphs as with all methodological improvements. For the other date (19/3/2021), the default will be modelled as a weekend default, similar to the previous exercise.

    - Compared to the previous exercise, the data will need to be reported by CCPs at a more granular level. In particular, for one of the dates (19/3/2021), the stress calculations will be reported at account and clearing member level. This will allow ESMA to incorporate additional stress assumptions, including the losses from concentrated positions. For the second date (21/4/2021), the results will be reported only at clearing member level and ESMA will not be able to reflect the additional stress assumptions (impact from concentration or wrong-way risk). This will allow to manage the overall effort while allowing to explore and incorporate significant methodological improvements, i.e. additional stress assumptions for 19/3/2021 and intraday exposures for 21/4/2021.

- The CCPs are again asked to report separately the minimum required collateral, not including any excess amounts, and the total available collateral. The usage of the minimum required collateral is meant to reflect a scenario where members would withdraw under stressed conditions any collateral exceeding the minimum required. The CCPs are asked to revalue the collateral alongside the cleared products using the market stress scenarios shocks. CCPs will again report and use for the credit stress component the stressed values of margin & default fund collateral actually provided by clearing members (as opposed to the stressed values of relevant resources following re-investment). This implies that any market risk P&L for such collateral beyond haircuts will affect the default waterfall.

- For one of the dates (19/3/2021), we will include in the credit stress test results the impact from liquidating concentrated positions. The methodology used for the calculation of this impact is described in the concentration component (2.5) and detailed in the instructions (Annex 1).

- For the same date (19/3/2021), the new exercise will also reflect an assessment of wrong way risk, which has been enhanced compared to the previous exercise. As with all methodological improvements, this is further detailed in the following paragraphs.

- The CCPs are asked to report separately any Powers of Assessment that can be called from non-defaulting members and additional own resources subject to further conditions detailed in the instructions.

- The CCPs are instructed on how to identify or adjust when needed the shocks to be applied to their own products using the high level risk factor shocks and how to calculate the P&L stemming from those shocks.

- The amounts will again be reported in currency (EUR) also accounting for the provided FX shocks.

32. The new elements that were introduced in this fourth exercise are discussed in detail below:

Account-level reporting

33. For one of the stress dates (19/3/2021), the CCPs are asked to report data at a more granular level. In particular, the stress P&L and corresponding collateral will need to be reported at clearing member and account level and the concentrated positions only at an account level. For the other date (21/4/2021) the CCPs will not report concentrated positions and will only report the stress P&L and collateral at clearing member level.

34. Where data is reported at account level, the instructions and reporting templates have been revised to allow ESMA to have the information required to aggregate results from account level to clearing members level, while incorporating the effects from any additional stress assumptions (e.g. concentration and wrong-way-risk). The CCPs will need to report the data for the accounts that were 'active' (i.e. had open positions or provided collateral) on 19/3/2021, specifying also the relationships between different

accounts and priorities in loss absorption reflecting their segregation rules in case of default.

35. It is understood that CCPs have different accounts that serve different purposes (e.g. position accounts, margin accounts, collateral accounts). For the purpose of this exercise, an account is defined as the level at which collateral can be fully offset against P&L from all positions recorded in the account. Moreover, the level at which a CCP will report should allow ESMA to correctly aggregate all fields from account to clearing member level by implementing the reported relationships / segregation rules. For example, we would not need to receive the report at a position account level where these accounts are only used to record the positions of individual indirect clients where the rules of the CCP allow the full netting of P&L and collateral across these accounts in case of default.

36. It is understood that this change implies a significant increase in the data to be reported for the credit stress test. For this reason, it was decided to only request this additional, more granular data for one of the dates (19/3/2021) and for only one of the scenario severity steps (i.e. step 0, which corresponds to the base scenario shock). This means that the additional stress assumptions (e.g. concentration impact and wrong-way-risk) will not be reflected in the credit stress test results for the second date (21/4/2021) or in the reverse credit stress test results for the first date (19/3/2021). The granular reports will enhance the visibility in calculations and together with the detailed instructions provided by ESMA will help to further strengthen the data validation process and the credibility of the exercise.

37. Finally, ESMA will explore the possibility to run a sensitivity analysis of potential correlation breakdowns by relying on account-level reporting of positions and testing for different spread movements.

Intraday Exposures

38. For the first (19/3/2021) date, the default event will be modelled as a weekend default, similar to the previous exercise. All payments/obligations due on Friday prior to the default are assumed to be met in full. After the default (which occurs during the week-end), no payments are exchanged between the CCP and the defaulting member. For the second (21/4/2021) date, the default event will be modelled as an 'intraday' default. The assumption is that the defaulting clearing members have met all payments/obligations due before a cut-off time on 21/4/2021, excluding the settlement of any securities transactions that are to be settled on 21/4/2021. After this time, no payments are exchanged between the CCP and the defaulting member. The exposures will include any positions assumed by the member as a result of trading/novation during 21/4/2021 up to this time and any securities transactions that are due to be settled on 21/4/2021 or

after this date[1]. The collateral will include any collateral required and collected up to this time on 21/4/2021[2].

39. The underlying assumption is that the two members meet all payments before the start of the day and are allowed to trade normally until a specific time during the day. The members would then stop honouring any obligations after this time. The CCP would stop accepting new transactions from these members after this time and would declare them in default later the same day. Finally, the CCP would launch its default management procedures that would allow it to start the liquidation of the positions on the morning of the next day.

40. This member default scenario will allow us to test the intraday risk management procedures of the CCPs, including margining and settlement procedures. Moreover, it is common that clearing members increase significantly their exposures during the day (day trading) and this member default scenario will explore the consequences of the CCP having to face the default of members carrying these increased positions, while having available only the collateral that was required and collected up to this time.

41. While recognising how informative this scenario can be, we also fully acknowledge the challenges surrounding the implementation of such a supervisory stress test scenario for the first time globally. Increased effort is required from all stakeholders, including from the CCPs to correctly identify and report intraday exposures and from the NCAs/ESMA to validate the relevant data. In order to manage the required effort, the cut-off time will not be exactly the same for all CCPs and services but will be set by each CCP according to the schedule of its margin calls subject to conditions. For this purpose, we have defined a common target time (14:00 CET) and each CCP is asked to identify the cut-off time to be used for the exercise as the cut-off time of its scheduled intraday margin calls that is (a) closer to the common target time and (b) in all cases after 12:45 CET and before 15:15 CET. The cut-off time selected should reflect the time that is used to take a snapshot of the positions and collateral in order to execute the intraday margin call and not the time of executing the margin call or the time reflecting the deadline given to members to provide the collateral. Moreover, the CCPs are not asked to report the data at account level for this date (21/4/2021) but only at clearing member level, respecting of course any applicable segregation rules. This comes at the cost of the stress test results for this date not being able to reflect the additional stress assumptions (e.g. impact from concentration and wrong-way risk).

Wrong-way risk

42. Ideally, when assuming that an entity is in default, one should also reflect this in the price of the cleared instruments and collateral for all clearing members and CCPs.

43. In the previous exercise the CCPs were instructed to incorporate, in the P&L calculations for each member, this effect for all cleared instruments issued by this specific clearing

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[1] The assumption is that the defaulting clearing member would not have settled any transactions on this date.
[2] The collateral will be adjusted for cases where additional margin would have been required, called and collected by the CCP according to the CCP's existing rules and procedures as a direct result of the assumption that no securities transactions were settled by the defaulting member on 21/4/2021. The conditions for this adjustment are detailed in the instructions.

member or its affiliates. This covered securities, corporate debt, covered bonds, derivatives on securities/debt and single-name CDS's. This means that, with regard to cleared instruments, we did not model the effect from the default of all entities, e.g. when we assumed the default of two clearing members, we would only have for each clearing member the effect from instruments issued by itself. Therefore, the scope of this adjustment was limited and was also not applied consistently across all members.

44. The more granular reports of the new exercise will allow us to address this limitation. The CCPs will report stress data and concentrated positions at account level (stress data also at clearing member level). Moreover, CCPs are asked to identify which cleared instruments (or underlyings of cleared instruments) are issued or guaranteed by one of their clearing members or affiliates. Hence, where reported positions reference instruments issued by the defaulting entity or its affiliates, ESMA can estimate and incorporate in the stress test results the impact that the default of the entity will have on the positions of all clearing members. However, Index products are again left out of scope of this assessment in order to avoid complexity. The methodology used to estimate the impact is further detailed in the instructions (Annex 1).

45. Moreover, considering the fact that assessment of liquidity risk is not part of the new exercise and, hence, CCPs will not be asked to report detailed collateral positions, we will again not consider in the credit stress test the effect that the default of specific entities (clearing members) will have on collateral or investments issued/guaranteed by such entities.

2.4.4 Residual limitations for Credit Stress

46. As in all exercises of this scale and type, there are residual limitations.

- The credit stress test exercise has evolved to include the impact from concentrated positions for one of the stress dates. However, the estimation of this impact is subject to limitations, which are described in the relevant methodology, including due to the restricted modelling of the default management procedure, the model granularity and the uncertainties around the estimation of the market impact parameters.

- Investment risks, including credit risks arising from the default of an issuer or custodian of collateral or other resources are not assessed in the exercise. The exercise does incorporate an assessment of the market risk for provided collateral using the common market stress scenarios. Any additional market or credit risks resulting from the re-investment of provided collateral are not covered. These limitations are due to the fact that these risks are linked to the individual actions and rules of the CCP and are thus difficult to model consistently across CCPs.

- The wrong-way-risk adjustment is applied for one of the stress dates and has been enhanced to also reflect the risk that would materialise if one defaulting clearing member clears instruments issued by another defaulting clearing member. However, the estimation of this impact is subject to limitations, including due to uncertainties in the estimation of the recovery values. Moreover, in the interest of

avoiding complexity, the wrong-way risk effects on cleared index products are not modelled.

- Operational risks, including those that may lead to increased credit risks, such as the operationalisation of default procedures, are also not reflected in the credit stress test results. The ESMA stress test exercise includes for the first time an assessment of operational risks in a separate component, but these are not reflected in the credit stress test results.

- Any additional second round effects to prices following the default of entities will not be modelled (i.e. the price shocks are the ones provided by the ESRB and the number of defaults are the ones described above, but the two are taken exogenously). Also, the default of additional entities due to losses accumulated from non-cleared portfolios will not be modelled because the scope of the exercise is limited to CCPs exposures.

- When modelling the scenarios and credit exposure, it is not possible to cover all possible risk factors and then all possible combinations of risk factor shocks for all CCPs. That would require modelling several thousands of risk factors and then all their co-movements. Since the exercise has to be run on the basis of common methodology and criteria, it cannot be aimed to identify topical deficiencies of individual CCPs.

2.5 Concentration Risk Analysis

2.5.1 Objectives of the Concentration risk analysis

47. The Credit component of the Stress Test applies a market shock to all positions regardless of their size. All positions are valued at the so-called mid-price, regardless of their size and direction. However, in practice, it may be expected that a CCP would incur costs beyond this price. This inability to perform market transactions at the current mark-to-market value is the Market illiquidity risk. It depends on the size of the position and the depth of the market.

Concentration Risk

48. Market illiquidity can be broken down in two parts:

- an exogenous factor which is the relative size of the bid-ask spread. Spreads would represent a cost even for small positions.

- an endogenous factor, when positions are too large and cause the market to move against them (one can think of a forced liquidation). Market impact depends on the comparison of the size of the position and the market depth, which is the ability of the market to absorb a substantial amount without materially impacting the mid-price.

49. For the world's main future and currency markets, exogenous liquidity adjustment is of negligible importance. It is larger in some other markets like credit or energy.

50. For large positions, market impact is usually much larger than bid-ask spreads. The market impact or concentration risk is the increase in the cost of liquidating in the market a large position in a short amount of time (in practice the time allocated to the management of a default by a CCP). In the context of a portfolio containing a single asset, e.g. an equity, the concept is quite straightforward. There is only so much the market can absorb in one day before the market price of the security moves in an adverse direction.

51. The analysis will consist of an assessment of the concentrated positions present in the portfolios of CCPs, an estimation of the potential liquidation costs that could be derived from their closing out and the potential implications to CCP resources these positions pose. This analysis will aim to tackle the following objectives:

- Identify concentrated positions of Clearing Members both at an individual CCP level and across CCPs.

- Assess the potential liquidation costs of concentrated positions for CCPs at EU wide level during a market stress situation and the potential implications of the simultaneous liquidations at different CCPs of the same asset or contract.

- Assess the combined costs stemming from market shocks and liquidation costs that would need to be absorbed by CCPs in the event of a default of a Clearing Member.

- Assess concentration and liquidity add-ons and the impact of concentrated positions on the required margins calculated by CCPs in their internal margin models for the different asset classes and products they clear.

2.5.2 Regulatory background of the ESMA CCP Concentration Risk Analysis

52. Under the Article 53(3) of the RTS (Commission Delegated Regulation EU No 153/2013), a CCP shall conduct a thorough analysis of the potential losses it could suffer and shall evaluate the potential losses in clearing member positions, including the risk that liquidating such positions could have an impact on the market and the CCP's level of margin coverage.

53. Under the 2017 CPMI-IOSCO further guidance on the PFMI, a CCP's margin model assumptions should incorporate estimates of market liquidation costs, including bid-ask spreads not otherwise modelled in the price returns or explicit fees paid to trading platforms or liquidation agents. These market liquidation costs should also reflect the market impact of liquidation activity, when applicable. When a portfolio liquidation requires the disposal of concentrated positions or portfolios that are otherwise significant in terms of anticipated impacts on market liquidity in the relevant product, a CCP should contemplate the possibility that assumed market liquidation costs, such as bid-ask spreads or mid-market pricing, will not in fact be actionable or otherwise predictable in the face of an actual liquidation.

54. ESMA intends to reflect the above regulatory requirements in the design of Concentration Risk Analysis of CCPs.

2.5.3 Scope and methodological principles

2.5.3.1 General structure of the Concentration Risk analysis

55. The concentration risk analysis consists of the following elements:

- CCPs calculate the aggregated positions per instrument/asset class following specific guidelines detailed in the instructions annex.

- CCPs compare the aggregated positions to thresholds detailed in the instructions annex to determine which aggregated positions are categorized as concentrated positions and need to be reported for the concentration risk analysis.

- CCPs provide liquidation costs estimates for the asset classes they clear following specific guidelines detailed in the instructions annex.

- ESMA will develop liquidation cost models for all asset classes from the CCPs' liquidation estimates. Specific details on the process are specified in the *Proposed modelling* section of this document.

- Using these models and the reported concentrated positions by CCPs, ESMA will calculate potential concentration costs for the different CCPs, Clearing Members and asset classes.

- ESMA will perform different analyses with the calculated concentration costs as detailed in the *Analysis of results* section.

- ESMA will perform a model risk assessment as detailed in the *Assessment of model risk* section.

2.5.3.2 Methodology and assumptions of the concentration risk analysis

56. The analysis of concentration risk will not replicate an actual default situation but aims at identifying and quantifying potential risks due to concentrated positions. Therefore, CCPs will be requested to provide:

- The details at account level of the positions defined as concentrated positions (i.e. which are above a certain threshold).

- The level of concentration add-ons in the CCP's margin framework (i.e. the additional margin called and received from each clearing member specifically to cover concentrated positions).

- Sensitivity tables providing the expected market impact of liquidating in stressed conditions large positions relative to the average volumes.

57. From all the contributions received, ESMA staff will then propose a common ESMA sensitivity table for each asset class.

58. The concentration risk analysis will be carried out by ESMA staff using the same modelling and parameters for all CCPs in scope. In other words, the same position cleared at different CCPs will lead to the same concentrated risk estimate.

59. ESMA staff will then compute the concentration risk levels in each service and asset class and perform an analysis of the results in terms of absolute risk and against the concentration provisions of the CCP. The exercise will include the market impact of the liquidation on most cleared positions. The scope of considered cleared positions will include most securities and derivatives markets.

60. To best reflect the characteristics of the covered asset classes, the specific modelling choices will present some differences. For securities, the exercise will consider the concentration of instruments at the ISIN level. For most listed derivatives, we will consider the risk concentration within one aggregated sub-class. For fixed income and credit derivatives, we will consider the market impact cost of setting-up a relevant hedging portfolio.

61. The design of the framework ensures that concentrated spread positions, even market neutral ones, will in general be captured by the analysis. Spread positions between two correlated but different underlyings will not be modelled as offsetting in respect of the concentration component of the ST, because it is not assumed that the transaction costs are offset between the two underlyings in which there are concentrated positions. For

example, a large short position in one equity and a large long position in another equity do not offset each other's costs. Likewise, electricity or commodity derivatives with different delivery points will be captured.

62. Curve / calendar spreads in the same underlying will be captured to the extent that the spread position doesn't get aggregated following the aggregation rules of its asset class.

63. Also, ESMA staff will be able to assess the impact of porting, as positions will be reported at account level.

2.5.3.1 Features out of scope

64. Modelling any auction mechanism presents many theoretical and practical challenges. This would even more challenging in an ESMA exercise with a large variety of market and service structures. Therefore, modelling the auction mechanism is out of reach for this exercise.

65. The concentration framework will not be applied to collateral due to the complexity of doing so. For instance, it would have been necessary to model the change in the order with which resources are used for each CCP and depending on which CM is in default.

2.5.4 Proposed modelling

2.5.4.1 Asset class scope

66. The equity and bond securities markets are in scope.

67. Equity, Fixed Income, Commodities, Credit, Freight and Emission allowance derivatives are covered.

68. To limit the overall complexity, some asset classes and sub-classes have been excluded from the scope. Foreign exchange derivatives, cross-currency and inflation swaps, structured finance products, ETCs and ETNs bond types, securitised derivatives, CFDs, volatility index derivatives and dividend derivatives are not covered.

69. The choices of asset classes to be excluded have been done following different criteria:

- Small volumes in CCPs (structured finance products, ETCs and ETN bond types, securitised derivatives, CFDs)

- Highly liquid markets (Foreign exchange derivatives)

- Complex sub-asset classes decided on a case-by-case basis to limit overall complexity of calculations (volatility index derivatives, dividend derivatives, inflation and cross-currency swaps).

70. The implication of leaving out some asset classes is the lack of information of concentration risks present in these segments as well as the difficulty of assessing the impact to CCPs which share Default Funds between included and excluded asset classes.

71. The detailed coverage is available in the instructions.

2.5.4.2 Aggregation and reporting of positions

72. To limit the volume of data, CCPs will report positions on instruments within the scope of the exercise that are greater than class-specific thresholds.

73. The instruction document details the aggregation rules for each asset class. The target sub-classes are built from tables of the annex III of the Commission Delegated Regulation 2017/583 on MiIFID II, dealing with transparency requirements. The segmentation criteria are complemented where necessary to improve the granularity, with for instance, the introduction of a delivery / cash settlement location for some commodity derivatives.

74. To allow for a simpler implementation, the positions should be valued without the impact of any market risk scenario.

75. The principles governing that aggregation are the following:

- For securities, the positions will be aggregated at the ISIN level.

- For derivatives, non-linear positions (e.g. options) will be aggregated with linear positions (e.g. futures/forwards) using their delta.

- For equity derivatives, the aggregated vega will also be reported.

- The aggregation of single stock equity derivatives will be done at an underlying ISIN level. For the rest of derivatives, the aggregation will be done according to different categories and maturity buckets. The details for each asset class can be found in the instructions.

2.5.4.3 Determination of the common market-impact sensitivity tables

76. For each asset class it clears in, each CCP will be requested to provide a sensitivity table. This sensitivity table will contain the estimates of liquidation costs gathered by CCPs for the different asset classes they work with. The explanation of the procedure to generate the sensitivity tables is defined in the instructions annex. The CCP should be able to justify the numbers provided to its NCA as realistic measures of potential liquidation costs during a stress situation.

77. Typically, for any given asset sub-class within that asset class, the table should give the cost (bps or % of market value) for executing trades that are x0.5, x1, x2, x5 of the average daily volume (or average daily notional amount when relevant) in stressed market conditions after at least one large clearing member just defaulted. The exact content of each table is specified in the instructions.

78. From all the contributions received, ESMA staff will then propose a common ESMA sensitivity table for that asset class. This step will likely involve the scrutiny for accuracy and plausibility as well as the removal of outliers.

79. For each table, ESMA staff will also propose a methodology to get the market impact given a position size. This could involve simple interpolation / extrapolation techniques or the fitting of a functional form.

80. After consultation with the stress test task force, the common set of tables and interpretation techniques will be finalised and used as baselines.

81. The final report will provide an order of magnitude of the market impact for a representative large position in each asset class. This will make sure that if unrealistic estimates were not identified by ESMA staff or NCAs, there will be transparency around that so that the market can duly understand ESMA results and the inputs provided by CCPs. This transparency should also act as an incentive for CCPs to provide adequate estimates.

2.5.4.4 Computation of concentration risk

82. Following the framework aggregation rules and required granularity, the CCPs will have reported the concentrated positions of each of its clearing members at account level.

83. For each aggregation level, the size of the position to be liquidated will be computed under the chosen assumption (i.e. assuming porting or no porting).

84. ESMA staff will evaluate the size of this position (or its hedge) relative to the average daily volume (or such relevant parameter). Then, using the common ESMA sensitivity tables, the liquidation market impact of the position will be determined.

85. This market impact will then be allocated at account level to include concentration costs into the waterfall.

86. When estimating concentrated positions, ESMA staff will allow for hedges with economic rationale such as delta hedging single stock derivatives with the underlying stock. For fixed income and credit derivatives, the permitted hedges are fully specified in the instructions.

87. In case of multiple clearing member defaults, the total position will be used to get the total market impact. This market impact will then be apportioned to the different clearing members.

2.5.4.5 Analysis of results

Descriptive analysis

88. For each CCP, a descriptive analysis of the concentration risk across asset classes and clearing members will be performed.

89. The computed concentration risks will be compared to the reported concentration add-ons and required margins of the CCPs. We will also analyse whether there is a statistical relationship between the total margin required and the liquidation costs of the model.

90. Through these analyses, we will assess the effectiveness of the CCP models to account for the concentration risk. For instance, the asset classes for which the CCP and the model of the component identify concentrated positions may differ. In addition, instances where the computed concentration risk is high in relation to the total margin required could point to insufficient concentration add-ons.

91. The impact of the porting assumption of some or all client accounts will be assessed. Porting could significantly increase the concentration of remaining positions as a netted position between house and client could become a large concentrated position when the client is ported.

Combined concentration and market shock scenario

92. The losses stemming for the liquidation of concentrated positions will be added to the scenario P&L caused by the market shocks. ESMA staff will then run the waterfall to get the stressed loss over the members' required resources. The impact of concentration risk on mutualised resources will be analysed.

93. ESMA staff will check whether the inclusion of concentration risk would have changed the choice of Cover 2 defaulting clearing members.

2.5.4.6 Assessment of model risk

94. It is notoriously difficult to estimate the price impact as a function of the sold volume for hypothetical sales, in particular under stressed market conditions. Moreover, the market impact parameters are derived from the CCPs' own estimates, with only few contributions for some asset classes.

95. As in the previous exercise, the order of magnitude of the chosen estimates will be reported for transparency.

96. Model risk will be further assessed. When possible, this will include reverse stress testing to test the level of market impact at which the Cover 2 resources would be breached (instead of relying solely on CCPs' market impact sensitivity estimates).

97. The approach used in studies such as ESMA STRESI report[3] (2019) and initially developed in Cont and Schaanning (2017) will also be considered. This approach uses the volatility and market depth to estimate the market impact.

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[3] *ESMA Economic Report: Stress simulation for investment funds.*

2.5.5 Residual limitations of the Concentration Risk Analysis

98. In this exercise, we are not modelling the whole default management procedure. More specifically, there is no attempt to factor in the impact of an auction which could lead to smaller or bigger concentration costs. This impact could be significant for Credit and Fixed Income Derivatives that are modelled through their hedging portfolios.

99. Some calendar / curve risks within asset classes are not being considered when they are categorized within the same proposed buckets. These are not being considered to limit the complexity of the exercise. Likewise, for some asset classes, market practices could allow for more aggregation than considered in the framework.

2.6 Operational risk analysis

2.6.1 Operational risk in the context of CCPs

100. Operational risk encompasses a variety of risk types and sources to the organization. Making use of the definition stated in the glossary (annex H) of the Principles for Financial Market Infrastructures (PFMI), operational risk is defined as:

"The risk that deficiencies in information systems or internal processes, human errors, management failures, or disruptions from external events will result in the reduction, deterioration, or breakdown of services provided by an FMI."

101. The focus in the PFMI definition is on the risk that failures from different sources can affect the ability of an FMI to provide its services. This is further expanded in "Principle 17: Operational risk" of the PFMI, where the focus is on operational reliability.

102. On the banking side, the Basel regulatory framework defines operational risk in the "Principles for the Sound Management of Operational Risk" as:

"The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk"

103. Different from the PFMI definition, the focus in the Basel definition is on the losses that are produced by operational risk events, rather than the loss of the ability to provide services.

104. This divergence reflects that it is possible to look at the consequences of an operational risk event from two perspectives: the financial impact of an event and the non-financial impact of the event.

105. For CCPs, as financial market infrastructures on which markets depend for an orderly functioning, the impact of operational risk events on the operational ability of CCPs to provide critical services, is most relevant.

106. For the 2021 ESMA stress test, ESMA will conduct an analysis of operational risk focused on the impact of certain operational risk events that would result in the reduction, deterioration, or breakdown of critical services provided by a CCP.

2.6.2 Scope of the operational risk analysis

107. The operational risk analysis for the 2021 stress test will be focused on a specific sub-set of operational risks:

The risks from operational risk events affecting third-party entities on which CCPs rely to provide their services.

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108. Using the PFMI definition, these risks would fall under the category of *disruptions from external events.*

109. The decision to focus only on a specific sub-set of operational risks is guided by the need to maintain a manageable level of complexity and effort for all stakeholders in this first assessment of operational risk at a system-wide level.

110. The selection of the specific sub-set of operational risks under scope has been performed using a risk-based approach: Third-party entities may be critical service providers of multiple CCPs, and individual supervision at entity level may not reveal hidden risks and concentration issues derived from interconnections through these operational dependencies. The failure of the third-party entity may impact multiple EU and Tier 2 CCPs simultaneously and create a systemic risk event.

2.6.3 Regulatory background of the CCP operational risk analysis

111. The regulatory requirements for identifying, managing and mitigating operational risks through appropriate risk management tools are defined in RTS 153/2013:

Article 17 of RTS 153/2013:

The business continuity policy shall take into account external links and interdependencies within the financial infrastructure including trading venues cleared by the CCP, securities settlement and payment systems and credit institutions used by the CCP or a linked CCP. It shall also take into account critical functions or services which have been outsourced to third-party providers.

Article 18 of RTS 153/2013:

In assessing risks, a CCP shall take into account dependencies on external providers, including utilities services. A CCP shall take action to manage such dependencies through appropriate contractual and organisational arrangements.

Article 20 of RTS 153/2013:

A CCP shall test and monitor its business continuity policy and disaster recovery plan at regular intervals

20.2.(b) include involvement of clearing members, external providers and relevant institutions in the financial infrastructure with which interdependencies have been identified in the business continuity policy.

112. The relevant tolerance levels with respect to operational risk are specified both in EMIR and RTS 153/2013:

Article 34 of EMIR:

…recovery of all transactions at the time of disruption to allow the CCP to continue to operate with certainty and to complete settlement on the scheduled date.

Article 17.6 of RTS 153/2013:

The maximum recovery time for the CCP's critical functions to be included in the business continuity policy shall not be higher than two hours. End of day procedures and payments shall be completed on the required time and day in all circumstances.

113. Finally, following the revisions to EMIR in 2019, the operational component is explicitly required by EMIR:

Article 25 (b3):

114.

ESMA shall, in cooperation with the ESRB, carry out assessments of the resilience of recognised Tier 2 CCPs to adverse market developments in accordance with Article 32(2) of Regulation (EU) No 1095/2010, in coordination with the assessments referred to in point (b) of Article 24a(7). Central banks of issue referred to in point (f) of Article 25(3) may contribute to such assessments in the carrying out of their monetary policy tasks. In carrying out those assessments, ESMA shall include at least financial and operational risks, and ensure consistency with the assessments of the resilience of Union CCPs carried out pursuant to point (b) of Article 24a(7) of this Regulation.

2.6.4 Objectives of the Operational risk analysis

115. The objectives of the 2021 ESMA assessment of operational risk are the following:

- Identify external third-party entities or systems that have the potential to create a business disruption or system failure leading to a material reduction, deterioration, or breakdown of services of a CCP.

- Identify potential risks for CCPs in a scenario of an operational risk event affecting a critical third-party service provider.

- Assess the risk management tools that CCPs use to manage risks from these external third-party entities.

- Perform an interconnectedness analysis of the network of third-party entities that have the potential to create a business disruption or system failure of a potentially systemic nature.

2.6.5 Methodology for the operational risk analysis

2.6.5.1 Methodological approach

116. For the purpose of defining operational risk management, we can refer to the PFMI section 3.17.4:

An FMI should establish clear policies, procedures, and controls that mitigate and manage its sources of operational risk. Overall, operational risk management is a continuous process encompassing risk assessment, defining an acceptable tolerance for risk, and implementing risk controls. This process results in an FMI accepting, mitigating, or avoiding risks consistent with its operational reliability objectives.

117. The definition of the PFMI is consistent with its overall focus on operational reliability. While the main tool for managing financial impact from operational risk events is monetary capital resources, the tools available for the purpose of managing non-financial impacts are any system, policy, procedure or control that allows the entity to limit or mitigate risks.

118. The operational risk analysis will be built around four blocks and comprise of:

1. Risk identification: CCPs will be provided with a common methodology to identify and report third-party entities on which they depend for their critical clearing services and critical supporting functions.

2. Risk assessment: CCPs will be provided with a common methodology to assess and report the impact and likelihood of operational risk events affecting these third-party entities. ESMA staff will perform a parallel analysis of the likelihood of operational risk events using data from past operational risk events of CCPs and statistical techniques.

3. Risk mitigation and monitoring: ESMA staff will request information and assess the risk mitigation and monitoring tools of CCPs for risks coming from the third-party entities in scope.

4. Additionally, ESMA staff will perform an interconnectedness analysis of the CCPs with respect to the third-party entities in scope.

2.6.5.2 Risk identification

119. In order to identify risks from third party service providers, CCPs will be asked to identify a list of external entities or systems on which they depend to provide their critical clearing services and critical supporting functions. The types of entities in scope will be any third-party entity, external system, or external resources that are involved in the provision of clearing services by CCPs, including FMIs, payment infrastructures, and central banks; interoperable CCPs, banks, ICT providers, utility providers and other operational service providers.

120. ESMA will provide CCPs with a common methodology for:

    1. The identification of critical clearing services and critical supporting functions.

    2. The filtering of third-party services in scope using as criteria the potential impact from the outage or failure to perform of the specific entity.

    3. The criteria for identifying and reporting third-party services across different operational layers such as outsourcing / intragroup contracts, technology services involving multiple providers, operational processes involving multiple entities.

2.6.5.3 Risk assessment

121. CCPs will be asked to assess the impact from the failure of the identified third-party services. ESMA will provide CCPs with a common methodology to categorize the type of impact (no settlement possible, supporting function unavailable...) and the scope of impact (CCP, asset class…).

122. A common methodology will be provided to assess severity and likelihood of incidents affecting the third-party services. Severity will be measured using different incident time ranges (such as less than 2h, greater than 2h up to 24h…) and for likelihood, a qualitative rating methodology will be used.

123. Additionally, ESMA staff will perform an analysis of likelihood using historical operational risk events data and statistical techniques.

2.6.5.4 Reporting of operational risk events data

124. CCPs will be asked to report detailed information on operational risk events covering the last [5] years. The information to be provided shall include fields such as duration of the outage (in minutes), root cause, whether the outage was due to internal/external factors (including dependencies reported per the previous section) etc.

125. A dedicated template will be produced and shared with CCPs. The methodology used will be the ORX reporting standards used for banks.

126. The requested data is in line with voluntary CPMI-IOSCO Quantitative disclosures.

127. The data will be used to assess potential frequency and severity of outages, using a loss distribution approach.

2.6.5.5 Reporting of risk mitigation and monitoring tools

128. CCPs will be asked to report the risk mitigation and monitoring tools that are in place to manage risks from the identified third-party services. ESMA will provide CCPs with a predefined list of risk management tools and will also be able to report other tools that are used for the purpose.

129. Any systems, policies, procedures, or controls are in scope, including:

- Redundancy

- Recovery processes / tools

- Contractual agreements

- Policies, procedures, and controls

- Other risk mitigation tools

130. Manual paper-based or internal emergency procedures are acceptable backup alternatives. They will be reported as recovery processes / tools unless they are operationally set-up leading to a Recovery Time = 0 (no downtime).

2.6.5.6 Operational risk analysis

131. ESMA will perform two types of analysis using the information received from CCPs concerning risk sources and risk mitigation tools:

- Assessment of risks and operational risk management practices of CCPs for scenarios involving operational risk events affecting external third-party service providers.

- Interconnectedness analysis of the network of external operational dependencies.

132. The interconnectedness analysis aims to describe the operational dependencies for individual CCPs, and for the whole universe of tested CCPs. Potential concentration issues will be assessed as part of this analysis.

133. The loss-distribution approach will be used to estimate the probability and severity of operational risk events using a standardized methodology for all CCPs.

2.6.5.7 Limitations

134. The operational or compliance validation of individual systems, policies, procedures or controls is out of the scope of this exercise.

2.7 Reverse Stress Test

135. For this year exercise, there will be no major methodological changes to the credit reverse stress test methodology. The analysis will consider a number of defaulting entities under the member default scenarios of up to 5. The analysis will be complemented by also scaling the market stress shocks. The CCPs are asked to calculate and report the losses also after scaling the shocks in the provided market scenarios for a number of steps (i.e. x0.7, x1.2, x1.5, x2).
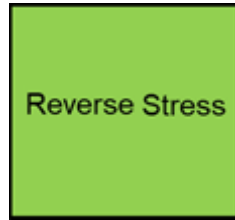
136. CCPs will need to recalculate losses after scaling the shocks and cannot scale directly the P&L as this will not be correct especially for products with leverage / non-linear pay-offs (e.g. options).

137. The objective of this analysis is to identify whether there are plausible combinations of market stress scenarios and member default scenarios with systemic risk implications. The analysis will be focused on the systemic risk and not on individual CCPs. Results of individual CCPs will be analysed only if needed to explore the source of events that may have systemic relevance. We will try to capture the sensitivity of the results to the considered market stress scenarios and understand how the results are affected by changing the underlying conditions.

138. ESMA will perform a two-dimensional analysis of the absorption capacity of the system of CCPs by stepwise increasing the number of defaulting entities and the severity of the market shocks. As explained in the credit stress description, the additional stress assumptions (e.g. concentration impact and wrong-way-risk) will not be reflected in this two-dimensional analysis.

139. One of the limitations of this exercise is that second round effects are increasingly relevant as scenarios become more extreme. However, as in the core credit stress analysis, second round effects will not be accounted for in this year's exercise.

140. On the assessment of concentration costs, as highlighted in the section on Concentration Risk Analysis, model risk will be further assessed.

3 ESMAs Implementation Plan

3.1.1 Overview of the process

141. The implementation plan for the 2021 ESMA CCP stress exercise consists of a design phase, which includes a description of the scope and improvements compared to the previous exercise, as well as six steps to conduct the stress test.

142. The design phase of the 4th stress test exercise will be completed in May 2021 when the ESMA Board of Supervisors (BoS) approves the framework, including the annexes on the market stress scenarios, the data request, the instructions and the validation rules.

143. The next steps will be:

> 1) the launch of the data request;
>
> 2) the validation by the NCAs of the data provided by CCPs;
>
> 3) the validation of the data by ESMA;
>
> 4) the validation of the common sensitivity tables;
>
> 5) The computation of the results;
>
> 6) The finalisation of the report
>
> We also plan to reconcile the aggregate results with CCPs before finalising the analysis and discuss the results with NCAs before sending for discussion at the CCPSC and approval at the BoS.

144. According to the projected plan, the exercise would be finalised in H1 of 2022.
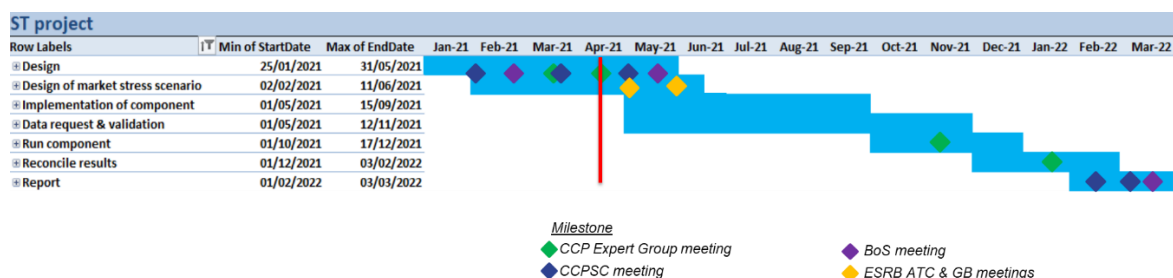
3.1.2 Implications on Resources

145. As discussed, there are a number of suggested changes for the implementation of the new exercise compared to the previous exercise. In addition to limited changes to the credit and concentration components, a new operational risk analysis is introduced and concentration will be integrated with credit. Earlier experience with the credit and

concentration components will support the ease of running these components, however, additional resources are required, as CCPs will report data at account level instead of clearing member level for both credit and concentration components. This effort should however be compensated by the exclusion of the liquidity component this time.

146. The draft framework, data request, instructions and timeline were shared with EACH to collect the feedback from EU and Tier 2 CCPs and to inform the CCPs of required actions and challenges. It is envisaged to ask the CCPs to provide the required data within 10 weeks from the launch of the data request.

147. A continued involvement of NCAs during the validation process is necessary to ensure overall data quality and safeguard the credibility of the exercise. In particular, there is a need to validate the individual CCPs' credit and concentration calculations with help of the provided instructions.

148. In order to streamline the validation procedure, to ensure a level playing field across CCPs, and to further reduce the overall efforts required from NCAs, ESMA drafted the validation document with details about minimum checkpoints that will need to be validated by the NCAs. The validation document also describes the validation process including the deadlines and response times. This document is attached to this note for approval (Annex 2).

149. Each NCA is expected to appoint one officer (per CCP or for all CCPs) that will be the single point of communication between the NCA and ESMA staff during the data request and validation phases. This officer is expected to be in regular contact with ESMA staff and fellow officers from other NCAs during the validation phase in order to facilitate the consistent implementation of the scenarios across all CCPs. ESMA staff will coordinate and facilitate the convergent interpretation of the modelling requirements if material divergent approaches are identified.

150. For the first phase of the validation process, the NCAs are requested to perform a series of checks that are detailed in the validation document and can be summarised as follows:

    A. **Completeness** of the data delivered, e.g. all required fields are reported in all cases and the number of records match the expected number;

    B. **Format** of the data delivered conforms to the data request, e.g. numbers or text subject to the maximum or minimum restrictions are reported as required;

    C. **Consistency** of the data delivered, e.g. the data reported across identical or linked fields can be matched, or that the total P&L across members is 0;

    D. **Sanity** of the data delivered, e.g. amounts reported are in line with data reported regularly to NCAs;

    E. **Scope** of the data delivered, e.g. data covers all services, products and members;

    F. **Amounts** reported comply with the instructions;

       o Amounts reported respect the conditions set in the instructions, e.g. for credit not including / including excess collateral;

- o EMIR / Rules of the CCP are respected, e.g. no use of client's collateral for house losses or reported data to meet all settlement obligations unless the CCP has specific provisions to defer, postpone or cancel settlement;
- o The position levels and average daily notional amounts reported respect the aggregation rules of the concentration component.

G. **Calculations** comply with the instructions;

- o Use of reference data as required by the instructions, e.g. use of the appropriate base prices to apply the shocks or FX rates to change currency;
- o The CCP applies the provided stress shocks also adjusted where required by the instructions, e.g. calibration of multipliers for more volatile instruments or adjustment of implied volatility;
- o Use of the pricing models as required in the instructions.

151. We expect that the NCAs will be able to finish the first set of checks (i.e. A - E) using a maximum of 1 FTE for 1 week, where they supervise one CCP, even for multiple default funds or business lines. A maximum of 2 FTEs for 1 week would be required where one NCA supervises more than one CCP, since the authority would be able to automate a large portion of the checks across CCPs. The second set of checks (F – G) is more complex and may also require on-site visits. We believe that the NCAs can finish this task within a period of 2 weeks by assigning 1 FTE for each CCP. According to the suggested time plan, the NCAs will need to provide the validated data to ESMA within 7 weeks from the time that the data was delivered by the CCP. NCAs that supervise more than one CCPs could extend the working period in order to limit the total number of resources. Therefore, we believe that NCAs that supervise 1 CCP can carry out this task using 1 person, while even for NCAs that supervise more than one CCP, this task can be completed within the given timeframe using a maximum of 2 persons including potential interactions with the CCPs.

152. Following the NCA's validation, ESMA staff will first verify within 1 week its ability to use the data (complete, in the correct format, able to import and use the data) and then perform a second level of validation (timing specified below) that will include (a) check of selected samples of data and where possible that the reported data conform to the requirements included in the instructions; (b) Verify the consistency of data reported across tables and CCPs; (c) Verify on the basis of available data that reported quantities are reasonable; (d) Assess the overall plausibility of results, and on the basis of the comparison between CCP results (to detect any outlier). Where ESMA staff detect issues, the NCA will need to obtain from the CCP the updated data and submit it to ESMA within 5 business days from ESMA request. In exceptional cases of major gaps, the deadline can be extended for an additional 5 days. Overall, we expect the second phase of validation to last a maximum period of 7 weeks. The level of involvement and number of resources needed for NCAs for this phase will depend on the identified issues and the quality of the validation performed by the NCAs during the first phase.

153. Overall, in terms of the maximum number of resources needed, we believe that NCAs supervising one CCP can carry out the tasks by committing 1 person, while NCAs that supervise more than one CCPs will need a maximum of 2 persons.

154. By agreeing to this work plan, BoS members would be also committing the availability of those resources at NCA level, so that the joint exercise can be performed simultaneously and successfully.