CNMV
Comisión Nacional del Mercado de Valores

Testing CCP Resolution Preparedness: A Crisis Simulation by the Spanish CCP Resolution Authority

María José Gómez Yubero

Case Study
Working paper No. 97

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Abstract

Central counterparties (CCPs) play a critical role in modern financial markets, making their resilience and resolvability essential for financial stability. While regulatory frameworks for CCP recovery and resolution have been significantly strengthened since the global financial crisis, their operational implementation remains largely untested.

This paper presents a case study of the Spanish National Securities Market Commission (CNMV), acting as the CCP resolution authority, in developing an operational framework for CCP crisis management. In particular, it describes the development of a Crisis Management Handbook and the implementation of a full-scale crisis simulation exercise designed to test governance arrangements, decision-making processes and the operational deployment of recovery, early intervention and resolution tools.

The case study contributes to the emerging literature on the operationalisation of financial crisis management frameworks. It illustrates how resolution authorities can translate complex regulatory frameworks into operational procedures, documents the use of crisis simulation exercises to test resolvability, and highlights the potential role of technological tools (ResTech) in supporting crisis management.

The exercise generated a number of lessons learnt, leading to concrete action plans to strengthen crisis preparedness. The results underline the importance of operational readiness, crisis simulation exercises and technological capabilities, while also pointing to the growing need for stronger international coordination in managing crises in an increasingly interconnected financial system.

Keywords

CCP resolution, financial market infrastructures, crisis simulation, financial stability, recovery and resolution planning, ResTech.

JEL Classification: G28; G23; G01; G32; D81

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1 Introduction

Central counterparties (CCPs) have become a cornerstone of modern financial markets. Their systemic role in clearing and risk management means that their failure could pose serious risks to financial stability. While regulatory frameworks for CCP recovery and resolution have been significantly strengthened since the global financial crisis, the practical implementation of these frameworks remains largely untested. Ensuring that authorities are operationally prepared to manage a CCP crisis has therefore become a key priority for financial stability authorities worldwide.

By interposing themselves between counterparties to financial transactions, CCPs reduce counterparty risk and enhance the resilience and transparency of derivatives and securities markets. At the same time, their systemic importance implies that their distress or failure could have far-reaching implications for market functioning.

Following the global financial crisis, international and European authorities strengthened the regulatory framework governing financial market infrastructures. The CPMI-IOSCO Principles for Financial Market Infrastructures (PFMI) established global standards for the resilience and risk management of CCPs, while the Financial Stability Board (FSB) developed guidance on the resolution of CCPs. At the European level, these developments were complemented by the adoption of the Regulation on CCP Recovery and Resolution (Regulation (EU) 2021/23).

In this context, the framework governing CCP crisis management is often described through the three "R's": resilience, recovery and resolution. These three elements are closely interconnected. Strong resilience and risk management arrangements reduce the likelihood that a CCP will enter recovery or resolution. At the same time, credible recovery and resolution regimes reinforce market discipline and create incentives for CCPs and their participants to maintain robust resilience in normal times.

CCP crisis management also presents specific operational characteristics that differ from those typically associated with bank resolution. Crises may be triggered by sudden exogenous shocks, such as clearing member defaults or operational incidents, which are difficult to anticipate through traditional early warning signals. Moreover, unlike banks, CCP resolution cannot realistically be implemented over a "resolution weekend", as clearing services and financial markets must continue to operate throughout the crisis management process.

Despite these regulatory developments, the operational implementation of CCP resolution remains largely untested in practice. Authorities must translate complex legal frameworks into operational procedures capable of being implemented rapidly under severe time constraints and market stress.

Case studies can provide valuable insights into the operational challenges associated with the implementation of financial regulatory frameworks, particularly in areas where practical experience remains limited and where the operationalisation of regulatory tools remains largely undocumented.

This paper presents a case study of the Spanish National Securities Market Commission (CNMV) and its efforts to develop and test an operational framework for the resolution of CCPs. In particular, it describes the development of a Crisis Management Handbook (CMH) designed to operationalise the resolution process, together with a simulation exercise conducted to test the effectiveness of this framework.

Beyond describing the regulatory framework for CCP recovery and resolution, the paper makes three main contributions. First, it illustrates how resolution authorities can translate complex legal frameworks into operational procedures through the development of a crisis management handbook. Second, it documents the design and implementation of a full-scale crisis simulation exercise aimed at testing governance arrangements, decision-making processes and the operational feasibility of recovery and resolution tools. Third, it highlights the growing role that technological capabilities (ResTech) may play in supporting crisis management and enhancing the operational readiness of resolution authorities.

The initiative represents one of the first comprehensive attempts within the European Union to operationalise CCP resolution procedures through a structured crisis management framework and a full-scale simulation exercise involving both the CCP and the Resolution College.

The remainder of this case study is structured as follows. The next section describes the institutional and regulatory framework governing CCP recovery and resolution in Spain. It is followed by a section presenting the development of the Crisis Management Handbook, including the operational stages of the CCP crisis management process. The paper then introduces the technological infrastructure developed to support crisis management, including the ResolVia document management tool and the ResolutIA generative artificial intelligence (AI) functionality. This is followed by a discussion on the governance arrangements designed to manage a CCP crisis. The subsequent section describes the simulation exercise conducted to test the operational framework, including its preparation, participants, scenario design, materials used and the testing of recovery and resolution tools. The final sections present the lessons learnt from the exercise, discuss key insights for policymakers and highlight emerging challenges for crisis management.

Unless otherwise specified, references in this paper to the CNMV refer to the resolution authority acting within the institution. It should be noted, however, that the CNMV performs both supervisory and resolution functions in relation to CCPs. These functions are carried out with the necessary operational and hierarchical separation between the supervision of the CCP, performed by the Secondary Markets Department (SMD), and the resolution responsibilities carried out by the Resolution Unit.

The exercise was also supported by an external consultant providing specialised technical assistance. For confidentiality reasons, neither the consultant nor the CCP involved in the simulation are identified in this paper.

2 Institutional and regulatory framework

In Spain, the CNMV acts as the resolution authority for central counterparties, in accordance with national legislation implementing the European CCP recovery and resolution framework, which designates the CNMV as the competent resolution authority for CCPs (Law 6/2023, Article 251(g)).

The regulatory framework governing CCP recovery and resolution is built upon several layers:

- International standards established by CPMI-IOSCO, in particular the *Principles for Financial Market Infrastructures (PFMI)* and the guidance on the *Recovery of financial market infrastructures*, which set out the core international standards for the risk management and recovery planning of financial market infrastructures (CPMI-IOSCO, 2012, 2017).

- The FSB's *Key Attributes of Effective Resolution Regimes for Financial Institutions*, which provide the global framework for resolution regimes, including those applicable to financial market infrastructures, together with the FSB's *Guidance on Central Counterparty Resolution and Resolution Planning*, which further develops the application of resolution principles specifically to central counterparties (Financial Stability Board, 2024; 2017).

- The EU Regulation on CCP Recovery and Resolution (Regulation (EU) 2021/23).

- Regulatory technical standards, guidelines and resolution briefings developed by the European Securities and Markets Authority (ESMA, n.d.), which provide further technical detail on the implementation of the EU CCP recovery and resolution framework.

This framework provides authorities with a set of powers and tools aimed at managing a CCP crisis while safeguarding financial stability. These include recovery measures implemented by the CCP and resolution tools that may be used by the resolution authority once the conditions for resolution are met.

However, while the regulatory framework defines the available powers and tools, it does not fully address the operational challenges that authorities may face in a real crisis scenario. These challenges include:

- Coordinating multiple internal teams and external stakeholders.

- Sequencing complex decisions under severe time pressure.

- Implementing technically demanding resolution tools.

– Ensuring clear and effective communication with market participants and relevant authorities.

Recognising these challenges, the CNMV launched an initiative aimed at strengthening its operational preparedness for CCP resolution.

3 Development of the Crisis Management Handbook

To enhance its preparedness for a potential CCP failure, the CNMV developed a Crisis Management Handbook (CMH) for CCP resolution.

The objective of the CMH was to translate the regulatory framework into a clear operational roadmap describing the actions that the resolution authority would need to take throughout the lifecycle of a CCP crisis.

3.1 Structure of the CMH

The handbook follows a chronological structure, covering four main stages:

– Crisis identification and monitoring.

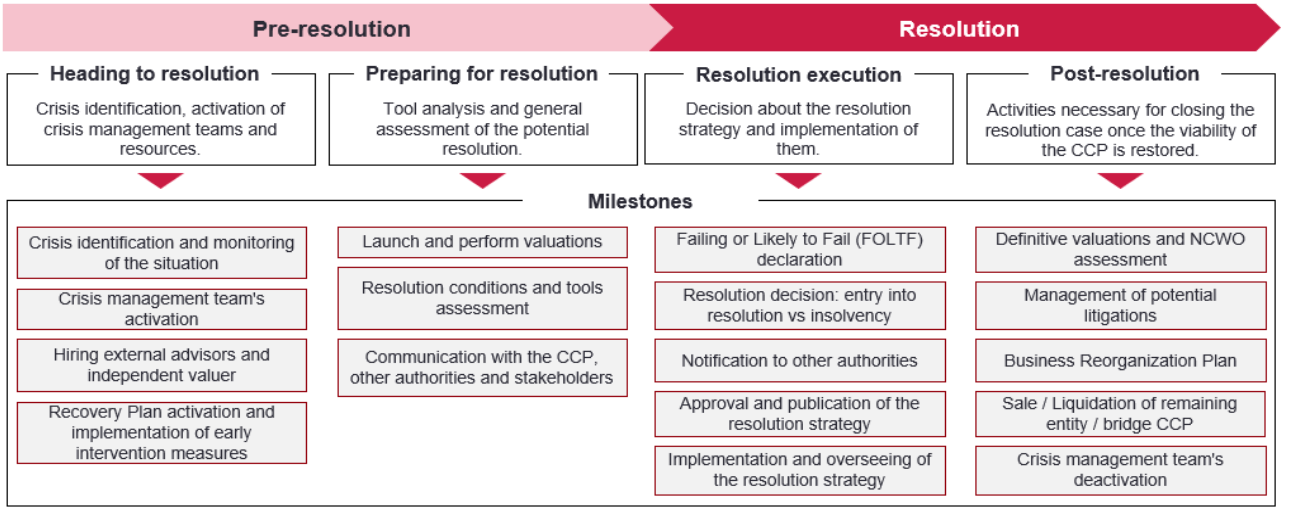
– Preparation for resolution.

– Execution of the resolution strategy.

– Post-resolution actions and closure of the case.

This structure allows the resolution authority to move from the early detection of a crisis to the implementation of resolution tools and the restoration of the CCP's viability, as illustrated in Figure 1.

Key stages of the CCP crisis management and resolution process FIGURE 1



Source: CNMV.

3.2 Operational components

The CMH also addresses several key elements required for effective crisis management, including:

– Governance arrangements within the resolution authority.

– Coordination mechanisms with supervisory authorities and other stakeholders.

– Procedures for valuations and information gathering.

– Operational considerations for the implementation of resolution tools.

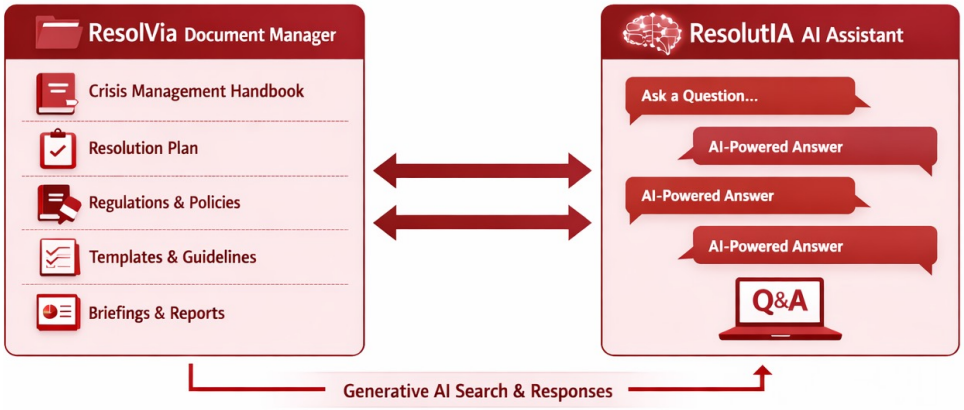
– Communication strategies during a crisis.

3.3 Digital infrastructure supporting crisis management (ResolVia and ResolutIA)

In parallel with the development of the Crisis Management Handbook, the CNMV also implemented an information technology (IT) solution designed to improve the management and accessibility of information related to CCP resolution.

The document manager tool, referred to as "ResolVia", serves as a centralised repository that consolidates the content of the CMH together with other relevant materials required during a crisis, including the CCP resolution plan, operational templates, applicable regulations, internal policies and procedures, guidelines and relevant resolution briefings. By structuring and centralising this information, the tool facilitates rapid access to key documentation during crisis situations and supports more efficient coordination within the resolution authority, as well as internal communications and interactions with external stakeholders (see Figure 2).

ResTech infrastructure supporting CCP crisis management FIGURE 2



Source: CNMV.

The tool also incorporates a generative artificial intelligence layer, referred to as the “ResolutIA” functionality. This feature includes an interactive chat interface through which users can submit questions and receive responses generated on the basis of the documentation stored in the system. By leveraging generative AI to process and query large volumes of regulatory and operational information, the system aims to support decision-making during crisis situations and further enhance the operational readiness of the resolution authority.

Beyond these tools, more targeted analytical solutions have also been developed, including automated tools designed to assess the impact of specific resolution tools, such as cash calls, on clearing members, thereby strengthening the analytical capabilities of the resolution authority.

Together with the CMH, this technological infrastructure contributes to the establishment of a comprehensive operational framework aimed at ensuring that the resolution authority is able to respond quickly and effectively in the event of a CCP crisis.

4 Governance framework for crisis management

An important element of the CMH is the definition of a crisis governance structure within the resolution authority.

The governance framework establishes clear roles and responsibilities for the different bodies involved in crisis management. Figure 3 illustrates the governance structure activated during a crisis, including the role of the executive committee, the crisis management committee and the resolution work team, as well as the support provided by the operational network and external advisors.

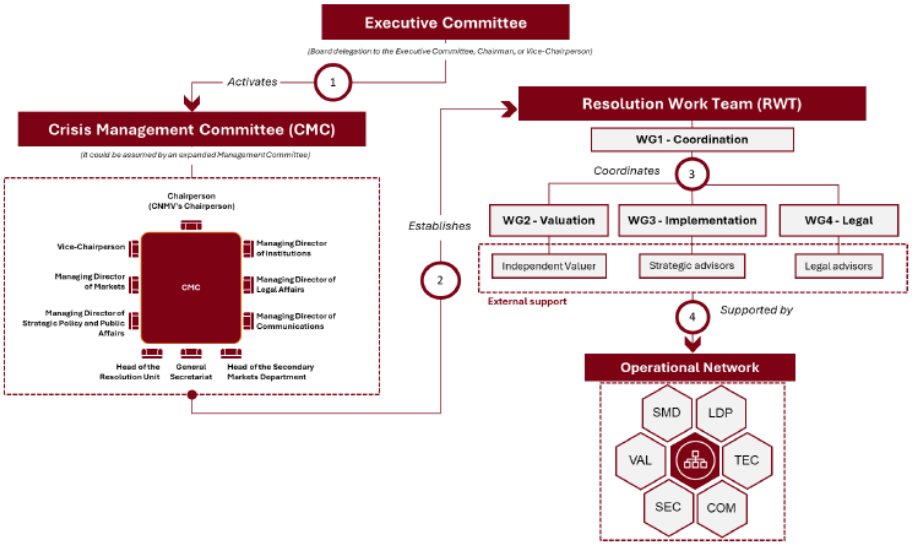
- At the highest level, the executive committee is responsible for overseeing the crisis management process and approving key strategic decisions related to the resolution of the CCP.

- Supporting this body is the crisis management committee, which coordinates the operational response to the crisis and supervises the work carried out by the technical teams involved in the resolution process.

- At the operational level, resolution working teams perform the technical and analytical tasks required to prepare and implement the resolution strategy. The resolution framework is organised around several specialised working groups supported by an operational network, which coordinates all necessary tasks required to prepare and execute the resolution strategy. The operational network brings together expertise from different areas of the authority, including legal, supervisory, IT and communications functions, ensuring effective coordination across the institution during a crisis.

- External advisors may also support the work of the resolution working teams in specific areas requiring specialised expertise, such as valuation, legal analysis and strategic advisory services, thereby complementing the internal capabilities of the resolution authority.

Governance structure for CCP crisis management and resolution FIGURE 3



Source: CNMV.

This governance structure ensures that decisions can be taken efficiently while maintaining effective coordination among the various functions involved in CCP resolution.

5 Simulation exercise

Once the Crisis Management Handbook had been completed, the CNMV conducted a simulation exercise aimed at testing the effectiveness and completeness of the operational framework.

The objectives of the exercise were fourfold: i) to assess whether the procedures described in the CMH were operationally feasible; ii) to test coordination among the different internal teams involved in CCP resolution; iii) to simulate interaction with external stakeholders, including the CCP and members of the Resolution College; and iv) to identify potential gaps or areas for improvement in the crisis management framework.

5.1 Participants

The simulation exercise involved a broad set of participants in order to replicate, as closely as possible, the institutional environment in which a CCP crisis would be managed.

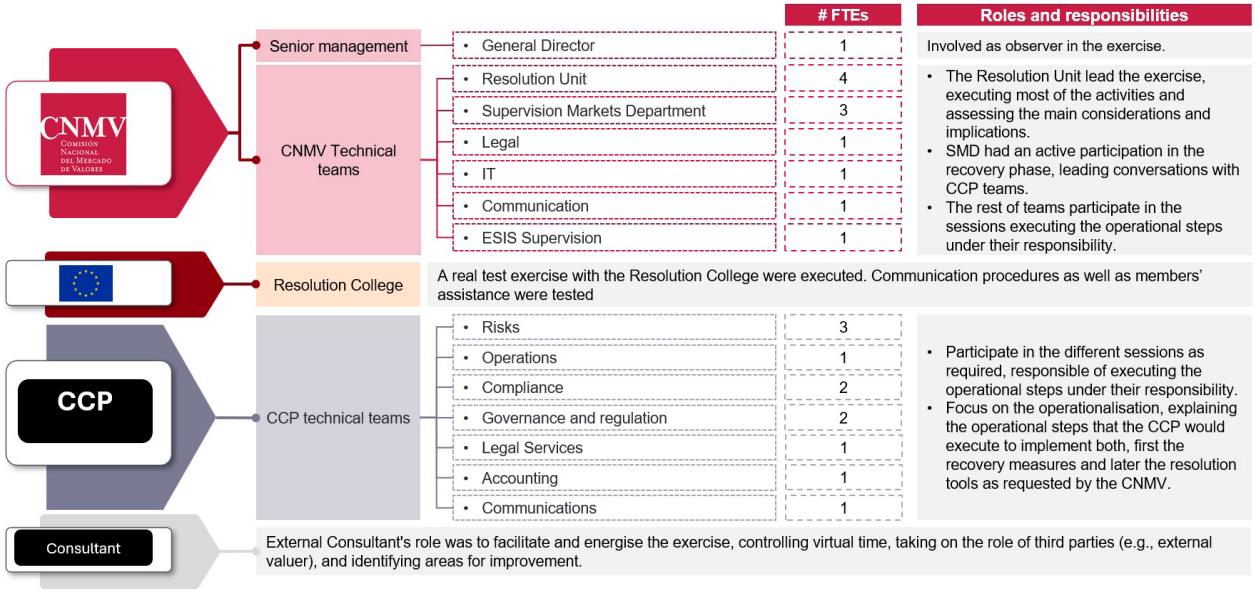
Participants included several departments of the CNMV, acting as the supervisory and the resolution authority, representatives from the CCP, and members of the Resolution College. Within the CNMV, the exercise mobilised staff from different functions, including resolution planning, supervision, legal services, communications and information technology. This cross-functional participation was essential to test the internal coordination mechanisms established in the Crisis Management Handbook.

The resolution framework used in the simulation was organised around four specialised working groups, responsible for carrying out the technical and analytical tasks required to prepare and execute the resolution strategy. These working groups were supported by the operational network, which coordinates the different functions involved in the resolution process and ensures the effective execution of the tasks required to prepare and implement the resolution strategy.

The involvement of the CCP allowed the exercise to simulate the interaction between the resolution authority and the clearing infrastructure during a crisis scenario, including the provision of information, the implementation of recovery measures and the operational execution of resolution tools.

Figure 4 summarises the main categories of participants involved in the simulation exercise.

Participants in the simulation exercise FIGURE 4



Source: CNMV.

5.2 Preparation of the simulation exercise

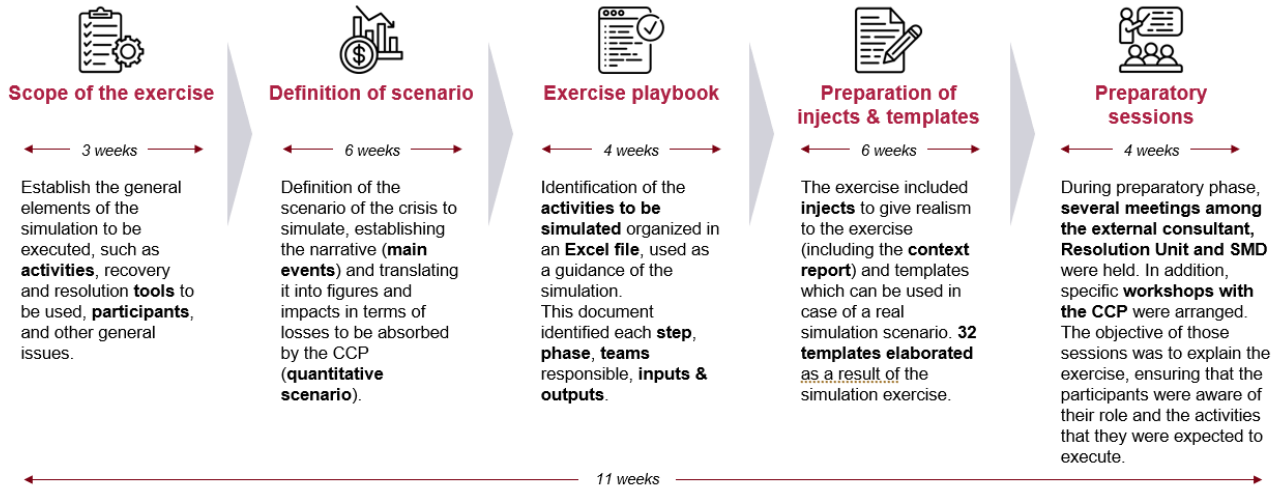
The simulation exercise required a structured preparation phase involving several units of the CNMV and external stakeholders. The exercise was jointly prepared by the Resolution Unit and the Secondary Markets Department, acting respectively as the resolution and supervisory authorities.

The preparation phase took place over several months and included the definition of the scope of the exercise, the development of the crisis scenario, the preparation of the exercise playbook and the design of the materials required to conduct the simulation. These materials included both injects, specifically developed for the exercise, and templates that could also be used in a real crisis management situation.

During the preparation phase, several meetings were held among the Resolution Unit, the Secondary Markets Department and an external consultant to refine the scenario and organise the simulation. In addition, workshops were organised with the CCP to explain the exercise, identify the materials required and ensure that participants were aware of their roles and responsibilities during the simulation.

Figure 5 illustrates the main steps followed during the preparation phase of the simulation exercise, including the definition of the scope, the development of the scenario, the preparation of the exercise playbook, the elaboration of injects and templates, and the organisation of preparatory sessions.

Preparation stages of the CCP crisis simulation exercise FIGURE 5



Source: CNMV.

5.3 Scenario design

The simulation exercise was based on a hybrid crisis scenario combining both default-related and non-default losses.

The scenario was designed to represent a "beyond extreme but plausible" stress situation affecting the CCP and its clearing members. Such an approach allows authorities to test the robustness of crisis management frameworks under conditions that go beyond standard stress scenarios.

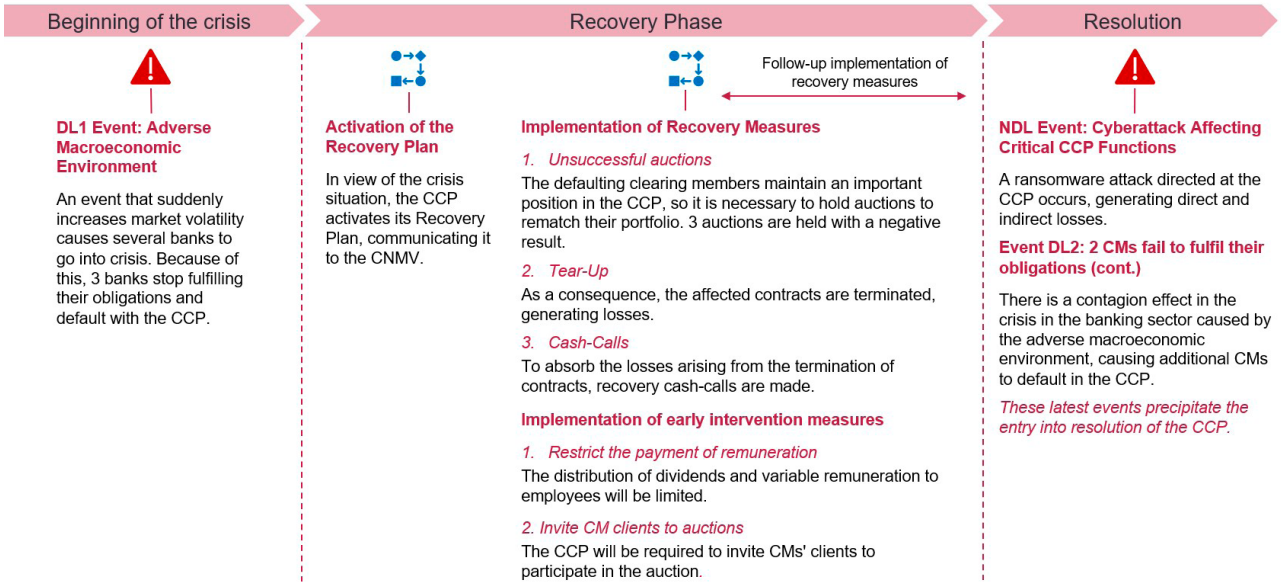
The crisis scenario incorporated several types of events that could occur in a severely stressed market environment, including an adverse macroeconomic shock affecting clearing members, the default of clearing members, operational disruptions affecting critical CCP functions and the progressive deterioration of market conditions.

The scenario was structured as a sequence of escalating events, beginning with a macroeconomic shock that triggered the activation of the CCP's recovery plan. During the recovery phase, several recovery tools were implemented, including unsuccessful auctions, contract tear-up and recovery cash calls. In addition, certain early intervention measures were also incorporated into the exercise, including the suspension of variable remuneration and the issuance of information requests by the resolution authority.

The scenario subsequently escalated through additional stress events, including a cyberattack affecting critical CCP functions and further clearing member defaults, ultimately precipitating the potential entry of the CCP into resolution.

Figure 6 illustrates the structure and escalation of the simulated crisis scenario, including the sequence of recovery measures, early intervention actions and the events leading to the potential resolution of the CCP.

Structure of the simulated crisis scenario FIGURE 6



Source: CNMV.

5.4 Calendar and dynamics of the exercise

The simulation was organised over three consecutive days, following a structured sequence designed to replicate how a CCP crisis could unfold in practice.

The timeline of the exercise was organised around several key stages reflecting the evolution of the crisis scenario:

i) **Recovery phase**, during which the CCP activates its recovery plan and implements recovery tools in response to the initial stress events.

ii) **Pre-resolution phase**, during which the resolution authority assesses whether the conditions for resolution are met and prepares potential resolution actions.

iii) **Resolution phase**, during which the resolution authority adopts the implementing act and manages the execution of the resolution strategy.

iv) **Post-resolution phase**, during which the stabilisation of the CCP is assessed, the implementation of resolution measures is monitored, and follow-up actions are considered.

v) **Lessons learnt phase**, in which participants reviewed the outcomes of the exercise, identified operational challenges encountered during the simulation and discussed potential improvements to the crisis management framework.

The exercise combined calendar time with virtual time, allowing participants to simulate the rapid succession of events that could occur during a real crisis situation while maintaining a structured decision-making environment.

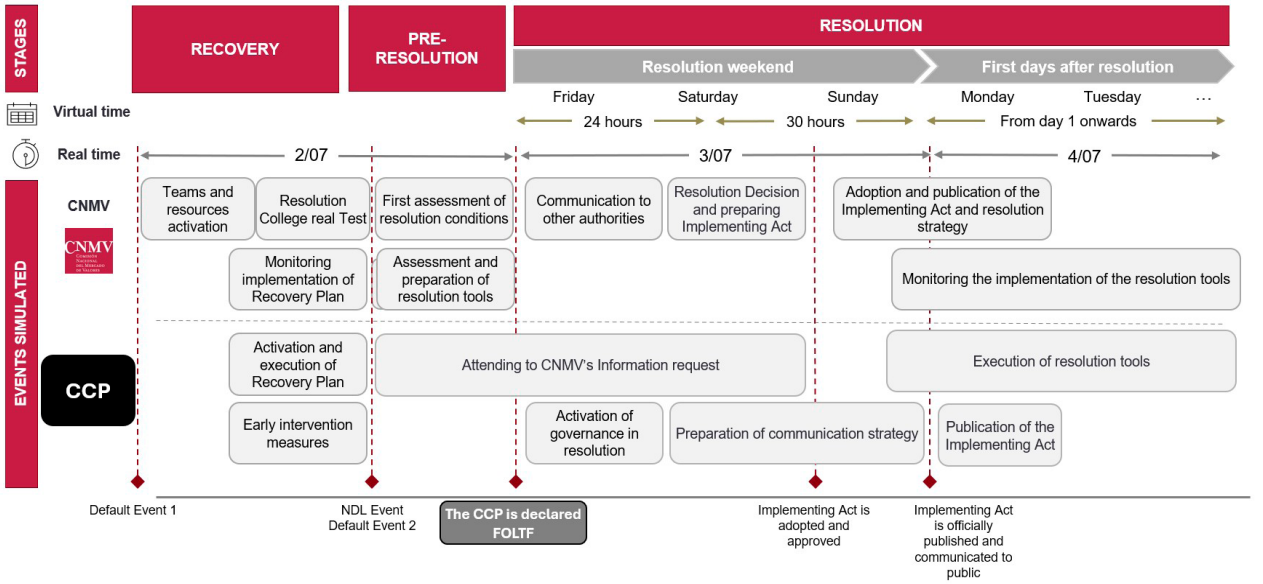
Figure 7 illustrates the overall timeline of the simulated crisis management and resolution process, showing the sequence of actions undertaken by both the resolution authority and the CCP across the different stages of the exercise.

Timeline of the simulated CCP crisis management and resolution process FIGURE 7

Source: CNMV.

Figure 8 illustrates the dynamics and timeline of the simulated crisis management and resolution process. The figure presents the sequence of actions undertaken by the resolution authority and the CCP during the recovery, pre-resolution and resolution phases.

Dynamics and timeline of the simulated CCP crisis management and resolution process FIGURE 8



Source: CNMV.

The exercise covered the entire lifecycle of a CCP crisis, from the initial identification of the crisis and the activation of crisis governance arrangements to the potential entry into resolution and the implementation of resolution measures.

The timeline reflects the progression from the monitoring of recovery measures and the assessment of resolution conditions to the adoption of the implementing act and the execution of resolution tools.

Together, these figures provide a visual representation of both the temporal structure of the exercise and the evolution of the crisis scenario used in the simulation.

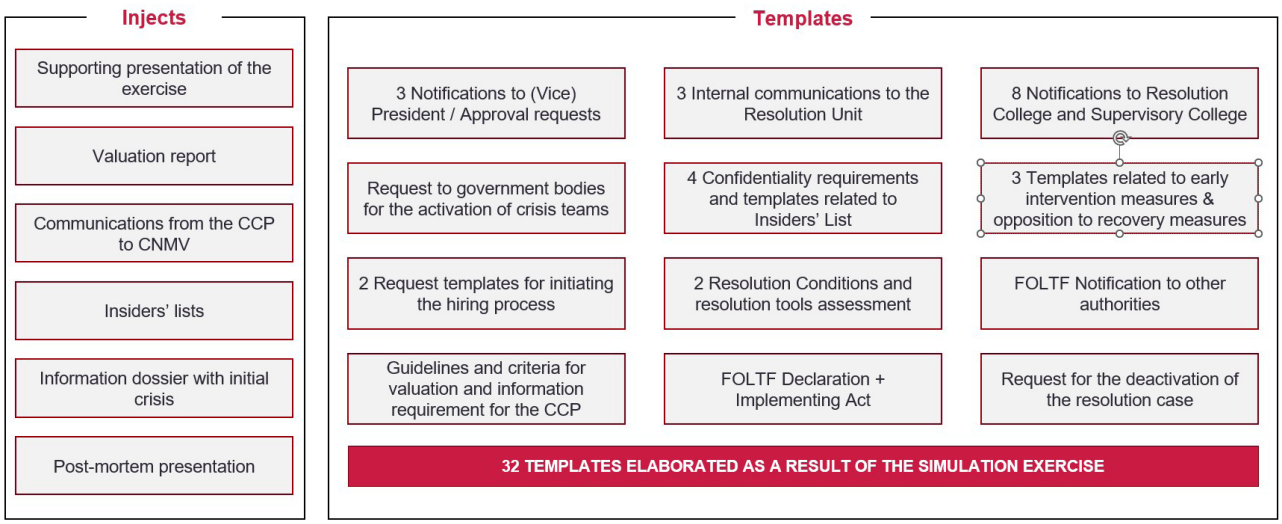
5.5 Materials used in the exercise

To enhance realism, participants received a set of simulation materials replicating the type of information that would typically be available during an actual CCP crisis. These materials included simulated market data and stress indicators, information on the financial situation of clearing members, CCP risk management reports, valuations prepared by independent valuers, draft communications between authorities and internal decision-making documents.

The exercise relied on two types of materials. On the one hand, injects, which are materials prepared specifically for the exercise and tailored to the simulated scenario. On the other hand, templates, which correspond to operational documents that could also be used in a real crisis management or resolution situation.

These materials included supporting presentations, valuation reports, information requests, draft communications, internal decision-making documents and templates for notifications to authorities and members of the Resolution College. Figure 9 provides an overview of the different injects and templates developed for the exercise.

Materials used in the simulation exercise: injects and templates FIGURE 9



Source: CNMV.

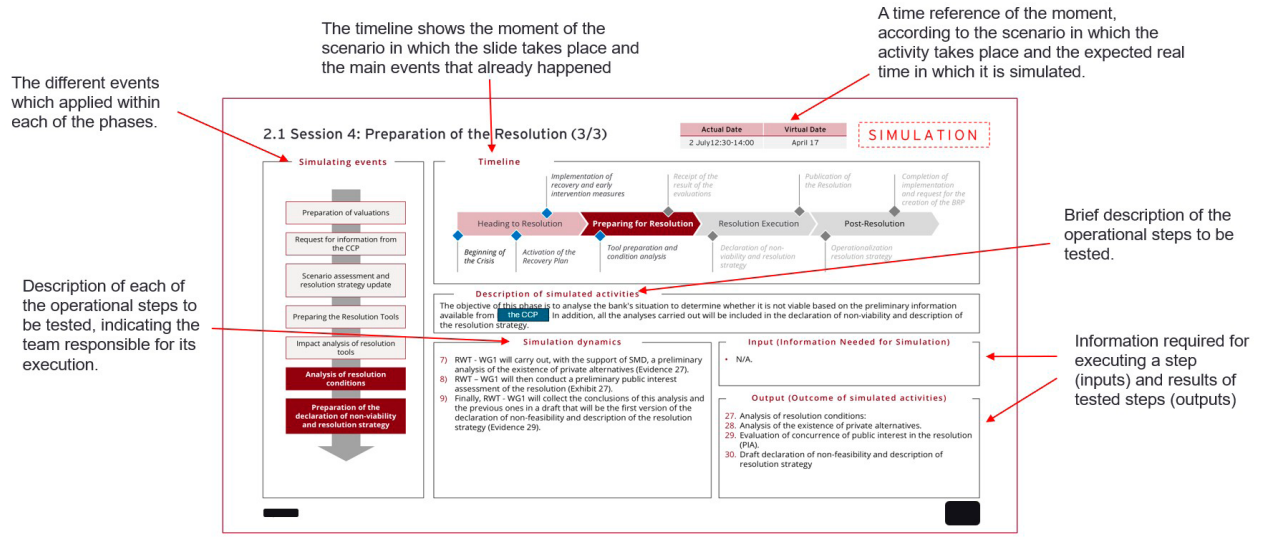
Participants were required to analyse the information provided and take decisions in real time, following the procedures established in the Crisis Management Handbook. This approach allowed the exercise to test not only the governance structure defined in the framework but also the practical ability of participants to process information and take decisions under time pressure.

The simulation was conducted over several sessions across three days and followed a chronological sequence of events reflecting how a crisis could unfold in practice. In particular, the exercise tested key operational elements such as the activation of internal crisis management teams, coordination with the Resolution College, the preparation of the implementing act, and the execution and monitoring of resolution tools.

A specific presentation was used as supporting material to guide participants during the execution of the exercise. The presentation described the activities to be performed at each stage of the simulation, the events that had already occurred in the scenario, and the materials associated with each activity (including both inputs and expected outputs).

Figure 10 shows one of the slides used during the exercise as an example.

Example of simulation exercise slide used to guide participants FIGURE 10



Source: CNMV.

The simulation exercise provided a valuable opportunity to assess the operational readiness of the resolution framework in a controlled environment and to identify areas where further refinements to procedures, coordination mechanisms and information flows may be required.

5.6 Testing recovery and resolution tools

A key objective of the simulation exercise was to assess the operational feasibility of the recovery and resolution tools available under the regulatory framework.

The exercise provided an opportunity to analyse how these tools could be implemented in practice and to test the coordination mechanisms required for their activation. In particular, the simulation allowed participants to examine the operational implications of different tools, including the information requirements, governance arrangements and potential market impacts associated with their use.

On the recovery side, the exercise tested the implementation of several tools available to the CCP under its recovery plan. These tools are designed to restore the financial position of the CCP and to allocate losses among clearing members while maintaining the continuity of clearing services. The simulation focused in particular on the activation sequence of recovery measures and the interaction between the CCP and the resolution authority during this phase.

In addition, the exercise also incorporated certain early intervention measures available to the resolution authority. In particular, the simulation included the suspension of variable remuneration and the issuance of formal information requests to the CCP. These measures allowed the authority to assess how supervisory and resolution tools could be used to stabilise the situation before a potential entry into resolution.

On the resolution side, the simulation focused on the preparation and potential implementation of resolution actions by the resolution authority once the relevant conditions for resolution were met. This included the preparation of the implementing act initiating resolution, coordination with the Resolution College and the assessment of the resolution tools available to maintain the continuity of the CCP's critical functions.

During the preparation of the exercise, particular attention was given to defining the scope of the recovery and resolution tools to be included in the simulation. The final set of tools combined measures applicable in the recovery phase, tools that could be used both in recovery and resolution, and tools specifically designed for the resolution phase.

In particular, the simulation included tear-up or termination of contracts, cash calls, and variation margin gains haircutting (VMGH) as mechanisms to allocate losses and restore the CCP's financial position. In addition, the exercise considered write-down and conversion of capital instruments, as well as structural resolution tools such as the bridge CCP and the sale of business, which could serve as mechanisms to recapitalise the CCP or ensure the continuity of its critical clearing functions.

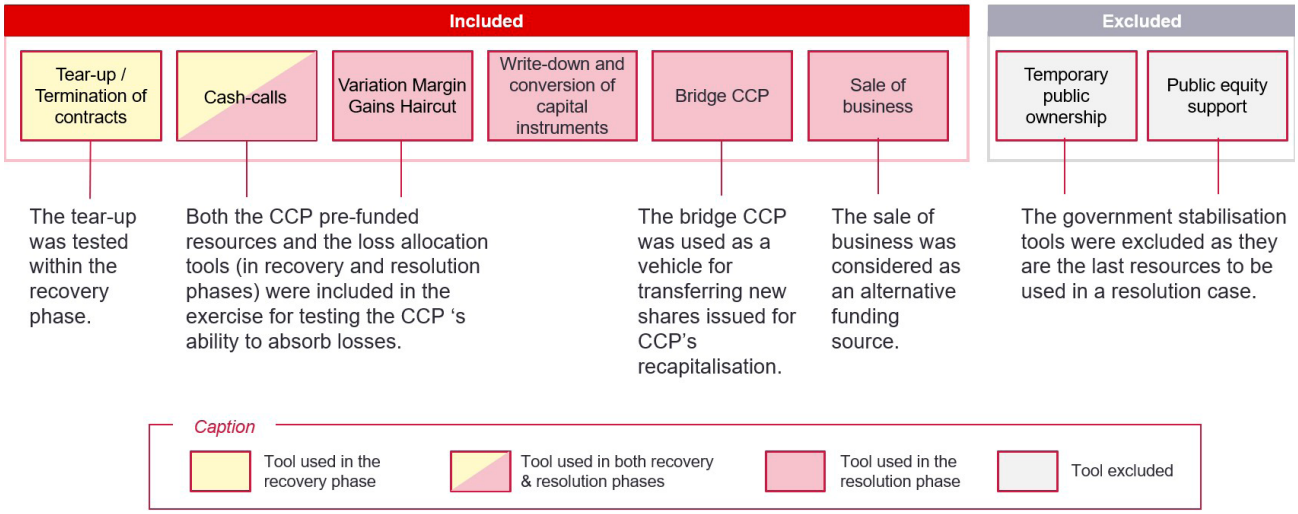
Conversely, government stabilisation tools, such as temporary public ownership and public equity support, were not included in the simulation, as these measures are generally considered instruments of last resort within the resolution framework.

The exercise also allowed participants to analyse the transition from recovery to resolution, including the decision-making process associated with determining whether recovery measures were sufficient or whether entry into resolution was required.

Figure 11 illustrates the set of recovery and resolution tools considered in the simulation exercise, distinguishing between those applied in the recovery phase, those potentially applicable in both the recovery and resolution phases, and those designed specifically for the resolution phase.

Recovery and resolution tools tested in the simulation FIGURE 11

During the preparation of the exercise, one of the discussions was around the scope of the recovery & resolution tools to include in the simulation. The final set of tools included were the following:



Source: CNMV.

Testing these tools in a simulated environment helped identify operational challenges related to their practical implementation, including information availability, coordination among authorities and the timing of key decisions during a crisis.

6 Lessons learnt

The simulation exercise generated a large number of insights into the operational challenges associated with CCP resolution.

In total, 39 lessons learnt were identified during the exercise. These lessons were grouped into three main categories:

– Improvements to the Crisis Management Handbook, aimed at refining the operational procedures described in the document.

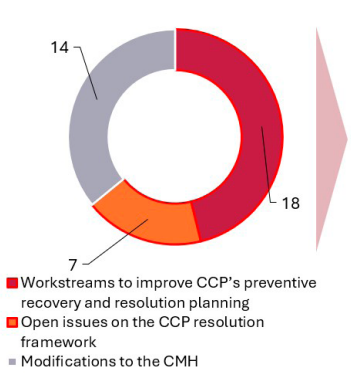
– Workstreams to strengthen preventive recovery and resolution planning, both within the resolution authority and in cooperation with the CCP.

– Open issues related to the CCP resolution framework, including areas where additional regulatory or operational guidance may be required.

Based on these findings, several action plans were defined to enhance the resolution authority's preparedness for managing a CCP crisis. In order to prioritise these actions, the lessons learnt were assessed according to their relevance for the effectiveness of the resolution framework and the complexity of their implementation within the organisation.

Figure 12 summarises the main categories of lessons learnt identified during the simulation exercise and illustrates the prioritisation framework used to define the corresponding action plans.

Summary and prioritisation of lessons learnt from the simulation exercise FIGURE 12



Impact that the action plan may have on CCP resolution framework and/or readiness of CNMV and the CCP to effectively execute recovery and resolution procedures

How difficult it is to implement the proposed action plan within the organisation

Complexity

Relevance	Low	Medium	High
Low	Priority 3	Priority 3	Priority 3
Medium	Priority 1	Priority 2	Priority 2
High	Priority 1	Priority 1	Priority 2

#	Lesson learnt	ID	Proposed action plan	Relevance	Complexity	Priority
15	Amendment of BoD delegation of powers agreement	15a	Amend current BoD delegation of powers agreement.	High	Low	Priority 1
16	Service instruction for the CMC and Resolution working Groups.	16a	Develop and approve a Terms of Reference document for CMC and WG.	High	Low	Priority 1
17	Promoting resolution culture within CNMV.	17a	Identify key staff of teams involved in resolution.	Medium	Low	Priority 1
		17b	Convene regular meetings with key staff.	Medium	Medium	Priority 2

Illustrative example

Source: CNMV.

The exercise also highlighted broader policy considerations relevant for strengthening CCP crisis preparedness. In particular, it underlined the importance of further operationalising recovery and resolution tools and enhancing testing protocols to ensure that authorities are able to act effectively under crisis conditions. At the same time, resolution frameworks must preserve a sufficient degree of flexibility and optionality, allowing authorities to adapt their response to the specific circumstances of a crisis.

The exercise also emphasised the growing importance of resolution technology (ResTech). The use of technological tools by both financial institutions and resolution authorities can significantly facilitate crisis management by improving data accessibility, supporting valuations and enhancing coordination among authorities. In this respect, ResTech has the potential to strengthen both the speed and effectiveness of resolution decision-making (Gómez Yubero & Gullón Ojesto, 2025).

Finally, the exercise highlighted the importance of enhancing transparency and understanding of resolution frameworks among market participants. A clearer understanding of how resolution regimes operate can contribute to strengthening market confidence and ensuring that stakeholders are better prepared to respond in a crisis scenario.

7 Key insights for policymakers

The experience of the CNMV provides several broader insights that may be relevant for authorities responsible for CCP resolution.

– **Operational readiness is critical.**

  The existence of a robust legal framework is a necessary condition for effective crisis management, but it is not sufficient. Resolution authorities must complement legal frameworks with detailed operational procedures, governance arrangements and decision-making processes that can be activated rapidly under crisis conditions.

  At the same time, CCP crisis management presents specific operational challenges that differ from those typically associated with bank resolution. Due to the nature of CCPs, crises are likely to be triggered by exogenous shocks, such as clearing member defaults, market disruptions or operational incidents, which may be difficult to anticipate through traditional early warning indicators. Moreover, unlike banks, CCP resolution cannot realistically be executed over a "resolution weekend". Clearing services and financial markets must continue to operate throughout the crisis management process, requiring authorities to take decisions and implement resolution actions in real time while markets remain open. This makes operational preparedness, real-time coordination and continuous crisis management capabilities particularly critical for CCP resolution authorities.

– **Simulation exercises are an effective preparedness tool.**

  Crisis simulations allow authorities to test their operational frameworks in a controlled environment. By reproducing complex crisis scenarios, authorities can identify operational gaps, strengthen internal coordination mechanisms and improve institutional readiness before a real crisis occurs.

– **Cross-institutional coordination is essential.**

  The resolution of a CCP involves multiple stakeholders, including supervisory authorities, resolution authorities, market infrastructures, clearing members and international resolution colleges. Effective communication, information sharing and coordination among these actors are therefore critical to ensure that crisis management actions can be implemented quickly and coherently.

– **The CCP resolution framework continues to evolve.**

  Practical exercises such as crisis simulations can help identify areas where further policy development, regulatory clarification or operational guidance may be required. These exercises therefore play an important role in supporting the continued evolution of CCP recovery and resolution frameworks.

8 Emerging challenges for crisis management

In addition to the operational lessons derived from the simulation exercise, a number of structural developments are increasing the complexity of crisis management for financial market infrastructures.

First, settlement cycles are accelerating, with many markets moving towards T+1 settlement, and potentially even atomic settlement environments based on distributed ledger technologies. These developments reduce the time available for authorities to assess crisis situations and prepare interventions during periods of severe stress.

Second, the increasing trend towards 24/5 and even 24/7 trading environments reduces traditional market downtime, which historically provided a window for authorities to assess crises and implement resolution actions.

Third, the speed at which financial distress can propagate across markets has increased significantly, amplified by digital technologies, algorithmic trading and the rapid dissemination of information through social media.

Together, these developments place additional pressure on traditional crisis management frameworks. They highlight the need to further operationalise recovery and resolution tools, strengthen testing and simulation protocols, and increasingly leverage ResTech to support faster and more effective decision-making by resolution authorities.

9 Conclusion

The development of recovery and resolution frameworks for central counterparties represents an important milestone in strengthening the resilience of the global financial system. However, the existence of a legal framework alone is not sufficient to ensure effective crisis management. Resolution authorities must also develop the operational capabilities required to respond rapidly and decisively in a crisis scenario.

This paper has presented the experience of the CNMV in developing an operational framework for CCP crisis management through the preparation of a Crisis Management Handbook and the implementation of a full-scale crisis simulation exercise. The case illustrates how resolution authorities can translate complex regulatory frameworks into operational procedures and test the effectiveness of governance arrangements, decision-making processes and resolution tools in a simulated environment.

By testing procedures, governance structures, and resolution tools before a crisis occurs, authorities can significantly strengthen their preparedness and identify potential gaps in crisis management frameworks. In this respect, crisis simulation exercises represent a valuable instrument for improving the operational readiness of resolution authorities and for ensuring that resolution frameworks can function effectively in practice.

CCP crisis management differs in important respects from traditional bank resolution. Crises may be triggered by sudden exogenous shocks, such as clearing member defaults or operational incidents, and resolution must be implemented while clearing services and financial markets continue to operate. This reinforces the importance of strong operational preparedness, continuous testing and realistic crisis simulation exercises.

At the same time, crisis preparedness cannot remain confined to individual authorities or specific jurisdictions. CCPs operate in a highly interconnected, global and increasingly digital financial system, where interdependencies between market infrastructures may amplify the propagation of shocks. These features reinforce the need for stronger international coordination in crisis preparedness and crisis management.

In this context, the development of cross-border crisis simulation exercises involving multiple CCPs and authorities could represent an important next step in strengthening global financial stability. Given the global nature of CCP clearing networks, international organisations with a global mandate could play a key role in promoting and coordinating such initiatives, helping to ensure that resolution frameworks are not only robust in theory but also effective in practice.

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