

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

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To: Board of Governors
From: Pat White and Jennifer Lucier
Subject: Stress Testing by Central Counterparties

Introduction and summary

A central counterparty (CCP) is a financial market utility that interposes itself between counterparties to financial contracts, becoming the buyer to every seller and the seller to every buyer, guaranteeing settlement of the transaction. Consequently, a CCP is exposed to the risk of nonperformance by each counterparty, and it assumes the responsibility for managing this risk. Like other financial institutions, a CCP faces the possibility of operating in market conditions that are well outside the range of conditions planned for in its risk management systems. Stress testing is used by a CCP to evaluate the implications of possible extreme market conditions for components of its financial safeguards.

This memorandum provides an overview of CCP stress testing practices. (b) (8)

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Although the Federal Reserve does not supervise directly any CCPs, the Federal Reserve Act does give it the authority to examine affiliates of state member banks "to fully disclose the relations between such banks and their affiliates and the effect of such relations upon the affairs of such banks."³ DTC shares operational linkages and risk management guarantees with its affiliate. NSCC. (b) (8)

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The remainder of this memorandum provides an overview of stress testing methods at CCPs. The first two sections provide information on how CCPs manage risk and why they do stress testing. The third section discusses two important choices for a CCP in designing its stress testing, followed by a fourth section that reviews the types of stress tests actually employed by the CCPs we interviewed. A final section examines how those CCPs use the results of stress tests.

Key observations of the memo include:

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³ 12 U.S.C. § 338.

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I. How do CCPs manage risk?

CCPs face an array of risks that must be managed. While the exact risks will be determined by a CCP's contractual agreements with its participants, there are two key risks faced by all CCPs: counterparty credit risk and liquidity risk, which are, respectively, the risk that participants will not settle obligations when due or at any time thereafter and the risk that participants will settle obligations late.⁶ Broadly, a CCP manages these risks through membership requirements designed to limit the likelihood of defaults by only accepting financially robust firms and through procedures to limit the potential losses and liquidity pressures if a default occurs by establishing margin requirements.⁷ In addition, a CCP must have financial resources to ensure that it can cover losses and continue making payments in a timely fashion if losses exceed margin requirements.

The complex of these protections is often referred to as a financial safeguard system. The basic components of such a system are margin requirements, a clearing fund, and a liquidity facility.⁸ Margin is posted by a participant to support his positions; it can only be used to cover losses in the event of that participant's default. Since margin is not designed to cover all price movements or all scenarios, a CCP must plan for the contingency that a participant's losses exceed his margin (and other assets on which a

⁶ A CCP also is exposed to the risk of failure of a bank it uses for money settlements, custody risk from the holding of collateral and investing of clearing funds or cash posted as margin, risks from deficiencies in systems and controls (operational risk), and risk that the legal system will not support a CCP's rules or procedures. The risks and risk management of CCPs is discussed in depth in *Recommendations for Central Counterparties* (November 2004), which was prepared by the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO). The report can be found at www.bis.org/publ/cpss64.pdf.

⁷ This is, of course, a simplification of the risk management systems of CCPs. For a more thorough discussion, see the CPSS-IOSCO document, *Recommendations for Central Counterparties*. Other tools include, for example, limiting a participant's positions or requiring non-defaulting members to provide additional funds to cover the losses of defaulting members.

⁸ CCPs often use different terms for similar concepts. For example, the CME refers to "margin" as "performance bond." NSCC and FICC-GSD each maintain a single pool of collateral called a clearing fund that functions as both collateral to support the member's individual positions as well as collateral to protect the CCP in the event of a default by any clearing member. We will adopt the more standard usage of "margin" to denote resources supporting specific positions of an individual clearing member and "clearing fund" to denote resources available to the CCP in the event of default by any clearing member.

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CCP may have a claim).⁹ Thus, a CCP typically requires participants to contribute collateral to a clearing fund that can be used to cover losses from a default by any participant.¹⁰ For the purposes of this note, we take a CCP's margin system as given and focus on resources that would be necessary if margin proved inadequate. Liquidity facilities enable a CCP to continue meeting payment obligations to non-defaulting participants while it is liquidating the positions and margin assets of the defaulting participant or drawing upon the clearing fund or other financial resources.

II. Why do CCPs do stress testing?

Many CCPs use stress tests to assess the adequacy and liquidity of the financial resources that are tapped in circumstances when normal risk protections such as margin assets prove inadequate.¹¹ In the most basic type of stress tests, a CCP assumes price moves substantially larger than those its margin requirements are designed to cover. It computes the exposures not covered by margin that would result from such price moves, and it evaluates whether its resources would be large enough to cover them if one or more participants defaulted. Different dimensions of financial resources typically would be examined: the adequacy of the absolute size of the clearing fund, the largest payments a CCP or individual participant might have to cover, and a CCP's potential exposure if certain types of margin assets' value proved difficult to realize.

Of late, stress testing has been incorporated into regulatory requirements and international standards. For example, while stress testing is not a statutory requirement *per se*, it has been referenced as an acceptable analytical tool in guidance published by the CFTC.¹² As such, a futures clearing organization may develop stress testing programs in order to meet its regulator's continuing risk management expectations. At the international level, a CCP may be asked to demonstrate to its authorities, users, or potential users, its compliance with the *Recommendations for Central Counterparties* (developed by the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO)) and conduct stress tests in a manner consistent with these minimum standards.¹³ Compliance with the CPSS-IOSCO recommendations is sometimes assessed in the IMF's Financial Sector Assessment Programs.

⁹ For example, liquidating a defaulting participant's portfolio in an actual default scenario may take longer than the time period assumed in the CCP's margin calculation thereby creating an uncovered exposure for the CCP.

¹⁰ The balance of resources in the form of margin versus a clearing fund determines the degree to which potential losses are mutualized.

¹¹ Some CCPs use the term "stress testing" or "back testing" to describe activities that evaluate the coverage of their margin systems. This note does not address these types of tests.

¹² The Commodity Exchange Act requires that an applicant for registration as a derivatives clearing organization demonstrate compliance with 14 Core Principles listed in the statute. 7 U.S.C. §7a 1(c)(2)(A)-(N). CFTC guidance accompanying these principles states that the use of stress tests is one way for an applicant to demonstrate it has the ability to manage its risks (Core Principle B, Risk Management). Guidance accompanying Core Principle J regarding "Reporting" also mentions stress tests results as the type of information the CFTC may routinely request from a derivatives clearing organization.

¹³ Compliance with these recommendations may be voluntary or mandatory depending on the jurisdiction.

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IV. Key choices for a CCP in designing stress tests

By construction, stress tests examine a CCP's ability to withstand failures of participants in abnormal market conditions. Key choices in designing the tests are thus the assumed market conditions and the assumed number, and size, of participants that default. Market conditions are generally chosen to be "extreme yet plausible," and the participant that presents the largest exposure to a CCP is assumed to default. These are the criteria CPSS-IOSCO recommend for evaluating the adequacy of a CCP's financial resources in its report. But, as noted below, a CCP has substantial discretion, particularly in its choice of time period and data, to determine what is "extreme."

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V. Linking stress test results to risk management policy

In order for stress tests to be of value, a CCP must link the results of the tests to its risk management policies. Most critically, a CCP should reach a judgment about the adequacy of its financial resources, and if resources are found wanting, it should either augment resources or take steps to reduce potential exposures. (b) (8)



Another important role of stress tests is to identify the participants whose potential exposures are most troublesome so that a CCP can adjust its risk controls appropriately. For such participants, CCPs may raise margin requirements or clearing fund requirements or ask them to reduce or transfer positions. Often the results of stress tests may precipitate discussions between the risk management function at a CCP and management of the participant. (b) (8)



In some cases, a stress test might highlight potential exposures arising in a participant's customer business. A CCP likely would initiate discussion with the participant to better understand how the participant is managing its customers' risk in that instance.

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A CCP also uses the results of stress tests to evaluate its risk management tools and procedures in more general ways. (b) (8)

[Redacted] Stress tests also provide a mechanism for CCPs to evaluate the risk of common participants. (b) (8)

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