



# Capital requirements for over-the-counter derivatives central counterparties<sup>☆</sup>



Li Lin<sup>\*</sup>, Jay Surti

International Monetary Fund, 700 19th Street, N.W., Washington, D.C. 20431, United States

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## ABSTRACT

This paper assesses the sensitivity of the risk buffers, or capital requirements, of central counterparties clearing over-the-counter derivatives trades to a range of model inputs. It finds capital requirements to be highly sensitive to whether key model parameters are calibrated on a point-in-time versus stress-period basis, whether the risk tolerance metric adequately captures tail-risk events, and the ability – or lack thereof – to define exposures on the basis of netting sets spanning multiple risk factors. Our results suggest that there are considerable benefits from prudential authorities adopting a more prescriptive approach to central counterparties' risk buffers, in line with recent enhancement of the capital regime for banks' trading books.

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## 1. Motivation and overview

The scale and business activity in global over-the-counter derivatives (OTC-D) markets is very large and far outstrips global banking and economic activity. Besides size, the volatility of the market value of outstanding OTC-D exposures is also significantly higher than bank assets and economic output.

Trading in OTC-D markets is bilateral, either between dealers or between a dealer and its client. However, a very significant volume of contracts is re-traded with central counterparties (CCPs) via a process called novation or clearing, wherein the CCP becomes a buyer to one counterparty and a seller to the other. A majority of OTC-D interest rate contracts are cleared and the percentage of

OTC credit default swaps (CDS) that are cleared, while not yet comparably large, has been growing remarkably fast since the inception of the crisis.

The global market structure of the provision of clearing services is monopolistic within a number of risk and product categories. Global clearing of OTC-interest rate products occurs almost exclusively through the SwapClear subsidiary of the U.K. CCP LCH.Clearnet whereas global clearing of OTC-CDS is dominated by the CCP InterContinental Exchange's (ICE) U.S. and U.K. subsidiaries, ICE Clear Credit and ICE Clear Europe.

The market power of these major CCPs creates necessary conditions for them to be globally systemic financial institutions. Since the lion's share of these CCPs' risk exposures is to the largest global banks, this also makes them especially effective shock and risk transmitters. The post global financial crisis commitment of the G20 countries to mandate clearing of all standardized OTC-D trades will, in the absence of a change to the market structure of global clearing services, serve to exacerbate the global systemic importance of these CCPs.<sup>1</sup>

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<sup>\*</sup> Corresponding author.

E-mail addresses: [lilin@imf.org](mailto:lilin@imf.org) (L. Lin), [jsurti@imf.org](mailto:jsurti@imf.org) (J. Surti).

<sup>1</sup> See (Lin & Surti, section II) for an exposition of factors that would argue for these major CCPs to be considered as global systemically important financial institutions.

Gains from systemic risk reduction ensuing from this G20 reform initiative can only be secured, therefore, if high quality risk management practices are ensured at these major global CCPs. In this context, the CCPs' pre-funded risk buffers are arguably the most important component of their risk management frameworks. While the nature of CCPs' businesses, balance-sheets, and revenues are, in general, distinct from banks, their businesses generate the same types of financial risks. Unsurprisingly, therefore, the methodologies used by major CCPs for determining their risk buffers—referred to as capital requirements in this paper—are similar to those developed by large global banks for calculating their capital charges against such risk exposures held in their trading books.

The enhancement of international prudential standards applying to internationally active banks—and their ongoing transcription into national regulation—are yet to find a parallel in the OTC-D CCP universe. In particular, the standards applying to advanced models and techniques for calculating risk buffers are far from the level of detail and prescription that characterize the new standards agreed by the Basel Committee on Banking Supervision (BCBS) for banks using advanced internal models to capitalize their risk exposures.

Using conventional financial risk models and risk tolerance metrics, this paper conducts a range of sensitivity analyses to assess the impact of alternative model parameterizations on CCPs' capital requirements. Our results indicate that these requirements are very sensitive to a few key model inputs.

The most important of these is the definition of the netting set used to determine a CCP's outstanding risk exposures. We find that a widening of netting sets facilitated by use of model-implied correlations and bases between (the market values of) derivatives instruments that map into different risk factor classes; (e.g., maturity or currency), considerably eases capital requirements. Using instead a methodology akin to the Basel 2.5 standardized approach, wherein netting sets are defined only up to a risk factor class, results in a first-order increase in the margin and default fund requirements.

Other model inputs also exert a substantial impact. CDS contracts are characterized by discrete increases in loss experience when a default event occurs during a period of stressed markets. For CCPs clearing OTC-CDS, a departure from risk tolerance metrics that limit losses up to tail events towards metrics that limit losses in the tail can materially increase capital requirements. Calibrating returns, their volatility and market liquidity parameters on a stress period basis— similar to the stressed Value-at-Risk (VaR) capital charge against banks' market risk exposures— significantly increases a CCPs' required margin and default fund. Capital requirements set by using VaR type metrics and based on point-in-time model inputs exhibit a high degree of procyclicality which can be mitigated by moving to stress period based parameter inputs. This has the benefits of attenuating the contagion impact on CCPs' clearing members (CMs), and through them, also on the wider financial system.

Our results suggest that there may be considerable benefits from prudential authorities adopting a more prescriptive approach that identifies acceptable risk tolerance metrics and sets a perimeter within which CCPs may calibrate key parameter inputs into their risk models. This process is already substantially advanced for banks. Given banks' dominant role in the market for OTC-D clearing, as the CCPs' counterparties, there is a risk of providing them arbitrage opportunities if prudential standards for the same financial risks are different for banks and for CCPs. This concern may be brought into sharper relief going forward if the BCBS's ongoing fundamental review of banks' trading book capitalization results in standardized supervisory approaches setting a floor for internal model based capitalization.

The rest of this paper is organized as follows. Section II describes CCPs' risk management frameworks and the models they

use to calculate their capital requirements. Section III describes our approach to calculating CCPs' risk buffers for OTC-interest rate swaps and OTC-CDS while Section IV describes our results. Section V concludes with a discussion of policy implications.

## 2. CCP's risk management framework and capital buffer

Given their global systemic importance, adoption of comprehensive and conservative risk management practices by the major CCPs, and ensuring this through the prudential frameworks applying to them is important for financial stability.

A sound risk management framework contains a number of important elements. Among the most critical of these are the models CCPs use to set their pre-funded risk buffers. Their importance in the risk management framework derives in no small part from the fact that contingency arrangements providing additional layers of protection, including liquidity backstops and capital calls on CMs are susceptible to **wrong-way risk**; i.e., the risk that the value of such contingent arrangements falls at the same time as the financial risks that they are designed to protect against are realized.

Any cleared OTC-D contract generates two types of credit exposures. The first type of exposure arises from the current market value of the contract. When this moves in favor of the CCP, it acquires a credit exposure to the CM, and vice versa. Industry practice and now regulation require that such exposures be fully provisioned on a daily basis. The amount of provisioning arising from a non-zero market value of the contract is called the contracts variation margin (VM), which can be posted either by the CCP or by the CM depending on whether the market value of the contract is positive or negative for the CM. Counterparty VM, the total amount due from a CM, is the sum of the market values to the CCP of all its contracts with that CM. The second type of credit exposure is the potential future exposure (PFE) and is covered by the **initial margin** (IM). The value of a contract will typically fluctuate widely over its tenor and conservative risk management entails that a CCP require CMs to provision for potential movements— normal and extreme— in the CCP's exposure to them. Practically, this is done by calculating the maximum exposure of the CCP to a CM at a given level of confidence over a fixed time horizon. The IM required of a CM is the sum of PFEs over that CM's set of outstanding cleared contracts. As in the case of VM, full daily, or more frequent provisioning and adjustment of IM is required of all CMs on their cleared OTC-D portfolio. Unlike VM, IM posting is one-sided; i.e., it is only posted by CMs to the CCP.

In addition to risks arising from movements in credit spreads and the term structure of interest rates, CCPs are also subject to tail risk that is not captured by the margin models. Consequently, the CCPs build a second layer of risk buffer called the **default fund** (DF) to pre-fund tail risk related losses. Unlike IM, wherein each CM pays 100 percent of their own contribution to potential losses to the CCP, the allocation of the DF burden is mutualized across the membership. Industry practice typically requires recalculation and adjustment of the CMs' DF contributions at least at a monthly frequency.<sup>2</sup>

IM and DF requirements are calculated by SwapClear and ICE using models similar to those developed and used by large global banks to calculate capital to be held against market and counterparty credit risks in their trading books. This is intuitive considering that the nature of financial risks applicable to the CCPs' and CMs' exposures on cleared OTC-D trades is similar to risks to banks on their trading book exposures.

<sup>2</sup> Appendices A.1 and A.2 provide details regarding the methodologies used by SwapClear and ICE for calibrating the DF and their CMs' IM.

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