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The CCP-bank nexus in the time of Covid-19

Key takeaways

- *During the Covid-19-induced financial turbulence, central counterparties (CCPs) issued large margin calls, weighing on the liquidity of clearing member banks.*
- *In spite of the turbulence, CCPs remained resilient, as intended by the post-crisis reforms of financial market infrastructures.*
- *Higher margins should be expected during heightened turbulence, but the extent of the procyclicality of margining is the consequence of various design choices.*
- *Systemic considerations call to examine the nexus between banks and CCPs. Therefore, when thinking about margining, central banks need to assess banks and CCPs jointly rather than in isolation.*

The Covid-19 pandemic led to market turmoil in mid-March. Large price movements prompted large margin calls from central counterparties (CCPs). This strained the liquidity positions of large dealer banks. Banks also hoarded liquid assets, possibly in anticipation of large margin calls. This exacerbated the liquidity squeeze. Nevertheless, CCPs remained resilient, vindicating the post-crisis reforms that incentivised central clearing.

The procyclicality of leverage embedded in margining models might have played a role in the events of mid-March. These margin models are critical because they underpin the management of counterparty credit risk. Margin models of some CCPs seem to have underestimated market volatility, in part because they have relied on a short period of historical price movements from tranquil times. These CCPs had to catch up and increase margins at the wrong time, squeezing liquidity when it was most needed.

Going forward, the interaction of CCPs with clearing member banks is critical ("CCP-bank nexus"). Importantly, actions that might seem prudent from an individual institution's perspective, such as increasing margins in a turmoil, might destabilise the nexus overall. Therefore, central banks need to assess banks and CCPs jointly rather than in isolation.

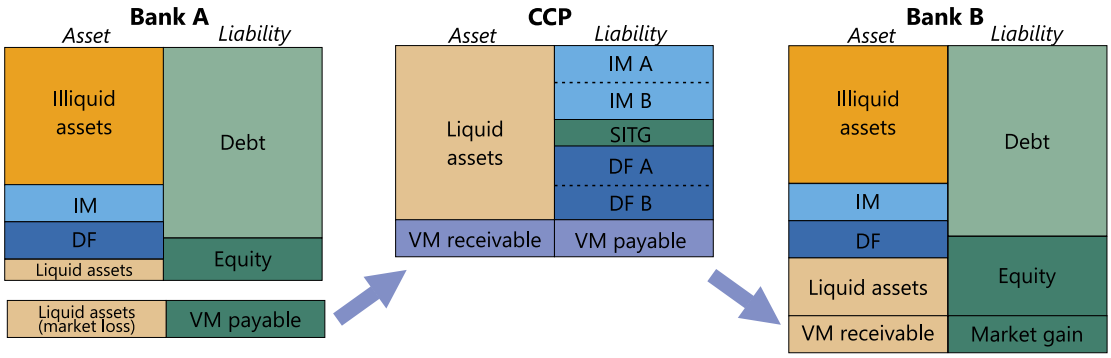
Mechanism of CCP margining

A CCP stands between two clearing members and insures them against counterparty credit risk (Graph 1). The CCP uses two kinds of margin to manage counterparty credit risk: variation margin (VM) and initial margin (IM). VM transfers marked-to-market profits and losses: when prices move, members with losing positions pay VM to the CCP and the CCP pays VM to members with winning positions (purple boxes). After VM payments, positions have zero value again. In contrast, IM is collected to cover potential changes in the value of a member's portfolio over some future period (light blue boxes).

Margining transforms counterparty credit risk into liquidity risk: VM payments settle *current* market exposure and IM covers potential *future* exposure – but liquidity risk remains due to these margin calls. Furthermore, the effects of IM and VM calls on liquid assets are different. VM calls transfer liquid assets from the losing party to the winning one – thereby having a *distributional* effect. In contrast, IM calls absorb liquid assets from all banks onto the CCP balance sheet – thereby having an *aggregate* effect.

CCP and bank balance sheets as the price of a cleared contract changes

Graph 1



DF = default fund; IM = initial margin; SITG = CCP skin in the game; VM = variation margin.

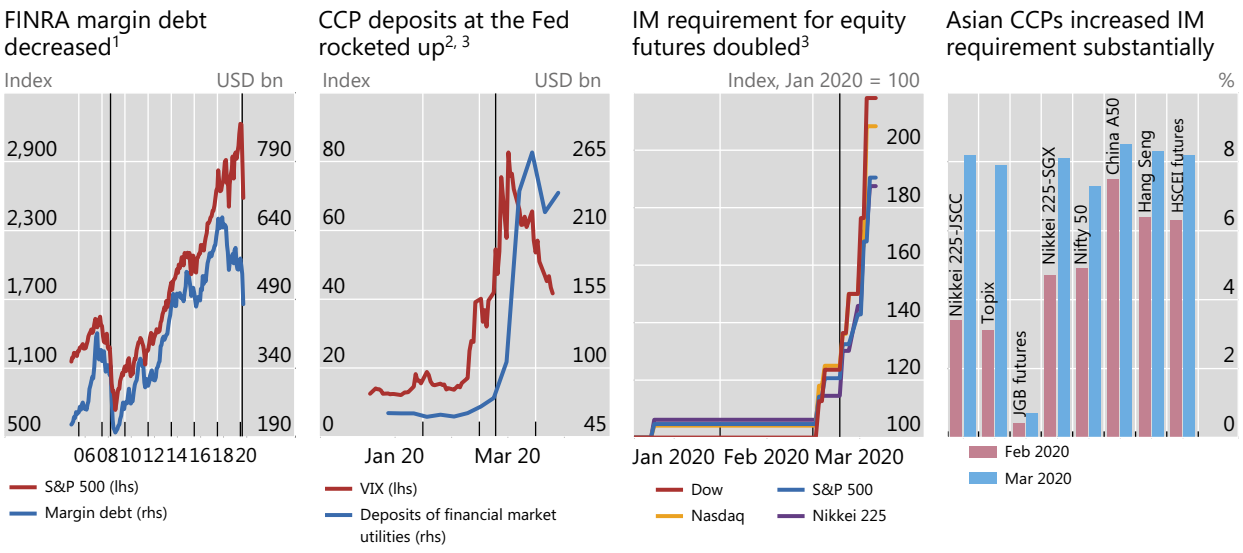
Source: Faruqui, Huang and Takáts (2018).

Procyclicality in margining

CCP margins tend to increase during times of stress (King et al (2020)). Large price movements mechanically trigger large VM calls. Traders with losing positions need to transfer cash to meet VM calls and also suffer capital losses, which could increase the leverage ratio and pressure them to reduce their positions (Schrimpf, Shin and Sushko (2020)). This took place after both the Lehman default during the Great Financial Crisis (GFC) of 2007–09 and the current market turmoil (Graph 2, first panel). In addition, if there is a lag between the time the CCP collects and distributes VM, there is a temporary negative aggregate liquidity effect.

IM increased sharply in March 2020

Graph 2



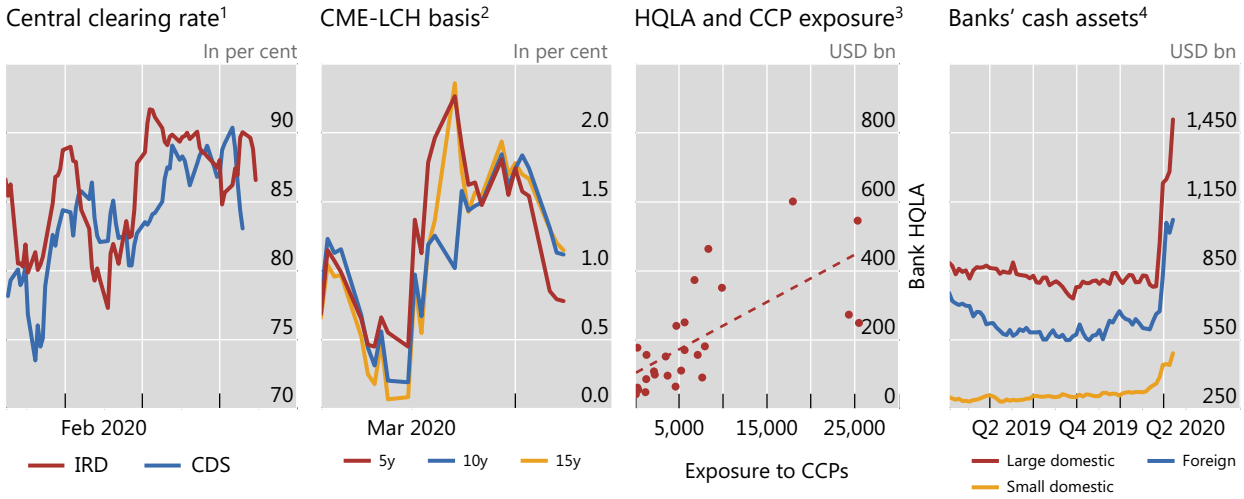
[1] The total of all debit balances in securities margin accounts reported to the Financial Industry Regulatory Authority (FINRA). The first vertical line indicates the Lehman default; the second indicates the COVID-19 related market turmoil. [2] The deposits mostly reflect those held by financial market utilities, but also include deposits held by international and multilateral organisations, government-sponsored enterprises and depository institutions. [3] The vertical line indicates 9 March, the date of the oil price drop.

Sources: Fed H.4.1; FINRA; Chicago Mercantile Exchange (CME); DataStream; Risk.net; futures commission merchant (FCM) and exchange data; authors' calculations.

Elevated volatility can also prompt large IM calls, though less directly. Observing larger than expected volatility, CCPs might realise that the IM set beforehand is insufficient, thus issuing IM calls to return to the safer levels. Indeed, this seems to have happened during the turmoil. As market volatility and trading increased in March (Graph 2, second panel, red line), CCP deposits at the Federal Reserve more than tripled (blue line) within a month. From end-February to end-March, they grew from around US$ 70 billion to more than US$ 270 billion. This most likely reflects the increasing amount of IM pledged by clearing members. For instance, the IM requirements for major US equity futures have doubled since March (third panel). Similarly, Asian CCPs have also hiked their IM requirements substantially (fourth panel). JSCC, the largest Japanese clearing house, doubled IM requirements for Nikkei 225 futures.[1]

The large margin calls were significant, because clearing rates have increased substantially since the GFC (Faruqui, Huang and Takáts (2018)). The clearing rates further increased during the run-up to the current turmoil. As counterparty credit risk heightened, trades migrated to central clearing, which implies that margin calls affected a wider ranges of trades (Graph 3, first panel).

The costs of high margin in times of stress — Graph 3



[1] The clearing rate is calculated as the share of new trades cleared by CCPs in total new trades reported to DTCC. [2] This is a relative measure. It is the ratio of the CME-LCH basis to the swap rate. The CME-LCH basis is the difference between the swap rates of two otherwise identical US dollar-denominated interest rate swaps (IRS) cleared by the Chicago Mercantile Exchange (CME) and by the London Clearing House (LCH). It arises when dealers cannot net positions across CCPs, which is in turn due to the fact that one CCP is dominated by natural sellers whereas the other by natural buyers. [3] Latest available figures. [4] Includes vault cash, cash items in the process of collection, balances due from depository institutions, and balances due from Federal Reserve Banks.

Sources: Fed H8 report; European Banking Authority (EBA); Depository Trust and Clearing Corporation (DTCC); Bloomberg; Options Clearing Corporation (OCC); JPMorgan Chase; bank financials; authors' calculations.

One measure of liquidity squeeze is collateral cost. As large dealer banks pass over collateral costs to their clients via pricing, price divergence of identical products across different CCPs reveals dealer banks' collateral costs (Benos et al (2019)). For instance, the CME-LCH basis is the difference between the swap rates of two otherwise identical US dollar-denominated interest rate swaps (IRS) cleared by the Chicago Mercantile Exchange (CME) and by the London Clearing House (LCH). The five-year basis reached 2.3% of the swap rate on 20 March compared with a close-to-zero level in early March (Graph 3, second panel).

The impact of large margin calls also depends on clearing member banks' liquidity, such as the amount of high-quality liquid assets (HQLA). In general, dealer banks with larger exposure to CCPs tended to have more HQLA (Graph 3, third panel, trend line). This suggests that the large dealer banks were

[1] Regulators are aware of potential procyclicality. The European Securities and Markets Authority (ESMA) has issued guidelines against procyclicality under the European Market Infrastructure Regulation (EMIR).

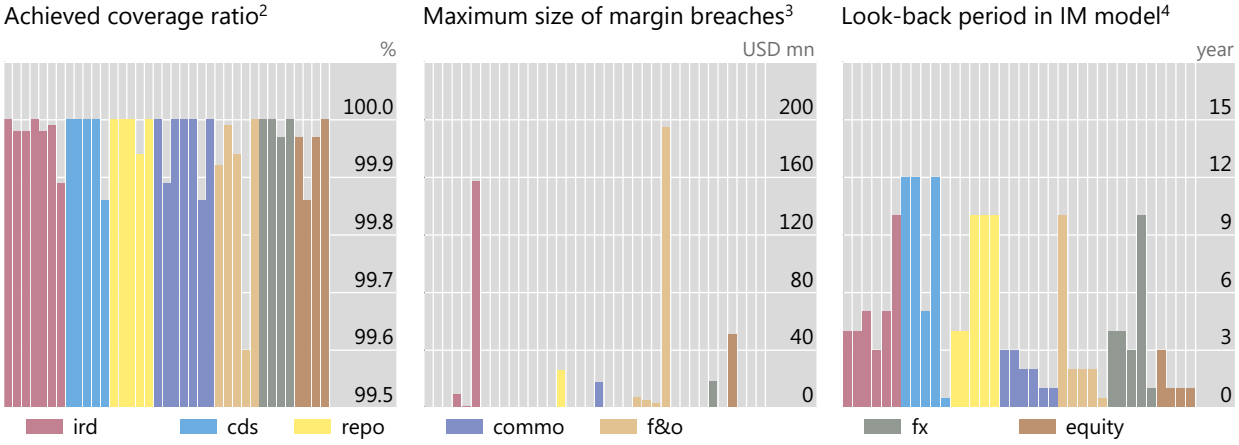
prepared and had capacity to meet margin calls during the turmoil. However, this was not universally true. Two large dealer banks had large exposure to CCPs but had relatively small amounts of HQLA (bottom right-hand corner).

The liquidity squeeze can also further intensify if banks hoard liquidity in anticipation of margin calls.[2] And indeed, large US commercial banks hoarded liquidity: in less than two months, between end-February and early April, they doubled their cash assets from US$ 789 billion to US$ 1.5 trillion (Graph 3, fourth panel, red line). The increase was also sharp, though slightly less pronounced, for foreign commercial banks (blue line) and small banks (yellow line). Naturally, such hoarding reflects many considerations, and expected margining is only one of them.

Model risk behind IM procyclicality

Procyclicality of IM depends on how well CCP IM models capture counterparty credit risks. These models work as follows: CCPs set IM to cover the potential default losses with a very high probability, typically at 99% or higher. To estimate these potential default losses, CCPs examine historical observations. The length of this historical period ("look-back" period) is critical. With a long look-back period, IM models are more likely to include high levels of historical volatility – and volatility spikes would be less likely to surprise.

Model risks of CCPs' margining practices, by product line[1] Graph 4



ird = interest rate derivative; cds = credit default swap; commo = commodities; f&o = futures and options; fx = forex derivatives.

[1] Most recent data, December 2019. Each bar represents a CCP. [2] The achieved coverage ratio is defined as (1 – number of margin breaches / number of total observations). Margin breach occurs when margin coverage held against any account falls below the actual marked-to-market exposure of that member account. [3] The maximum size of the uncovered exposure in the event of a margin breach. [4] The length of the period of historical observations that is used to calibrate a CCP's IM.

Sources: CCP quantitative disclosure; ClarusFT; authors' calculations.

However, IM models that rely on a short look-back period are more likely to be procyclical. When entering a crisis, such models rely only on observations from more tranquil times, and are thus unable to capture the suddenly rising counterparty credit risk in times of stress. This is when "model risk" materialises, forcing CCPs to "catch up" by increasing IM – exactly at the wrong time.

Past quantitative disclosure from CCPs suggest generally robust modelling. Most CCPs set IM such that it covered the potential default losses with a probability higher than 99.8% in Q4 2019 (Graph 4, left-

[2] In addition to margining, CCPs might ask for larger haircuts on collateral, which can lead to a shift away from the affected assets (eg from Italian government bonds during euro area crisis), thereby intensifying the price pressure on those assets. When members cannot substitute collateral, they may need to find additional funds and/or close existing positions.

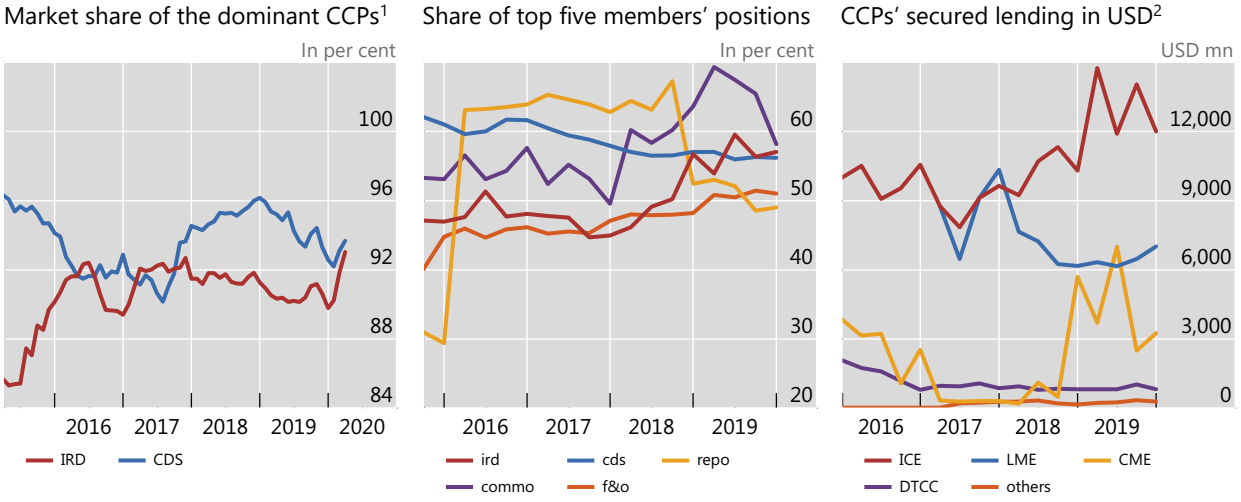
hand panel). That said, margin breaches, ie changes in portfolio value exceeding the preset IM, did occur. This is expected: if the CCP aims for a 99% coverage, then margin breach should occur in 1% of the total cases. Yet large margin breaches are not ideal. For instance, in Q4 2019 a CCP clearing futures and options (f&o) experienced a margin breach of roughly US$ 195 million (centre panel). And suggesting a potential relationship, f&o CCPs indeed tend to have a short look-back period, together with CCPs clearing commodities and equities (right-hand panel).

Naturally, other factors, such as risk aversion, can also play a role. For instance, Canada's largest clearing house (TMX) has attempted to raise all members' IM by 15% during the Covid-19 crisis, as it "re-evaluated risks more broadly" (*Risk* (2020b)).[3] As quantitative disclosure data covering the March stress become available in a few months, model risk and IM procyclicality can be assessed more precisely.

Going forward: CCP-bank nexus

Going forward, whether CCPs will amplify or absorb further shocks hinges on their interdependencies with large dealer banks. CCPs and banks form a nexus (Faruqui, Huang and Takáts (2018)). There are only a handful of CCPs that are active in over-the-counter derivatives clearing. In interest rate derivatives, the largest CCP cleared more than 85% of the new trades since 2015 (Graph 5, left-hand panel, red line). In credit swap defaults, the concentration is even higher (blue line).

CCP-bank nexus: highly concentrated banks and CCPs interact closely — Graph 5



[1] The dominant CCP in IRD is LCH and that in CDS is ICE. The market share is calculated as the share of the cleared volume in the dominant CCP in the total cleared volume collected in Clarus CCPview. [2] Secured cash deposited at commercial banks, including reverse repos.

Sources: CCP quantitative disclosure; ClarusFT; authors' calculations.

Positions vis-à-vis CCPs are mainly concentrated among a few large clearing member banks. The five largest members together account for more than one half of the total outstanding positions at CCPs (Graph 5, centre panel). Furthermore, some CCPs are active players in repo markets, the key funding markets for banks. For instance, at end-2019 ICE Group had around US$ 12.5 billion in secured cash deposited at commercial banks, mostly reverse repos (right-hand panel).

The small number of interconnected actors gives rise to strategic interactions. Banks and CCPs seem to be increasingly aware of these interdependences. This can be positive. For instance, they worked

[3] TMX eventually abandoned these plans, as clearing members protested that such increases would put further liquidity strain on markets in a procyclical fashion.

together to ensure market functioning in oil derivative clearing. On Friday 6 March, the talks between Russia and Saudi Arabia broke down. Over the weekend of 7–8 March, banks and CCPs prepared margining logistics to avoid disorderly market movements. These preparations helped to avert a meltdown when the expected price shock came on Monday 9 March (*Risk* (2020a)).

Issues for consideration

CCPs have withstood the first few weeks of the coronavirus turmoil. Albeit with the help of central bank liquidity injections in markets, centrally cleared markets have generally functioned well and allowed continued price discovery. The resilience of central clearing has vindicated the post-crisis regulatory efforts towards central clearing. Central clearing mitigated counterparty credit risk and provided transparency, which is a clear improvement in comparison with the counterfactual of bilateral clearing that was the norm before the Lehman collapse.

At the same time, the events of mid-March also showed that, in the CCP-bank nexus, actions which seem prudent from the perspective of an individual institution in isolation have the potential to strain the stability of the whole nexus through interactions. For instance, increasing margin during market stress does address increased counterparty risk. However, it can put undue pressure on clearing member banks exactly at the wrong time. The resulting bank liquidity squeeze might be particularly harmful now, as corporates and households rely on banks for funding. Therefore, central banks and regulators need to think about CCPs and banks jointly rather than in isolation.

One area for such thinking is a trade-off in margin setting guidance. On the one hand, a microprudential perspective would call for adjusting margins dynamically to reflect changing risks, even in times of stress. On the other hand, a macroprudential perspective would aim to limit margin increases in times of stress – for example, through precautionary higher margins in tranquil times. Regulators are aware of the trade-off: indeed, they required CCPs to avoid excessive procyclicality in margin requirements (CPMI-IOSCO (2017)). However, the March episode provided a real-life test of the framework – and ample data for future analysis to fine-tune the assessment. The analysis on the CCP-bank nexus highlights the need to use such data not only from CCPs but also from banks when thinking about the margin trade-off.

References

Benos, E, W Huang, A Menkveld and M Vasios (2019): "The cost of clearing fragmentation", *BIS Working Papers*, no 826, December.

Committee on Payments and Market Infrastructures and International Organization of Securities Commissions (CPMI-IOSCO) (2017): *Resilience of central counterparties (CCPs): further guidance on the PFMI*, July.

Faruqui, U, W Huang and E Takáts (2018): "The CCP-bank nexus", *BIS Quarterly Review*, December.

Huang, W and E Takáts (2020): "Model risk at central counterparties: is skin in the game a game changer?", *BIS Working Papers*, forthcoming

King, T, T Nesmith, A Paulson and T Prono (2020): "Central clearing and systemic liquidity risk", Board of Governors of the Federal Reserve System, *Finance and Economics Discussion Series*, 2020-009.

Reuters (2020): "CME Group announces auction of clearing firm Ronin Capital's portfolios", 20 March.

Risk (2020a): "Oil price shock triggers big margin calls", *Risk.net*, 10 March.

——— (2020b): "TMX backs down on blanket margin hike after members revolt", *Risk.net*, 3 April.

Schrimpf, A, H S Shin and V Sushko (2020): "Leverage and margin spirals in fixed income markets during the Covid-19 crisis", *BIS Bulletin*, no 2, April.

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