

Examining the Causes of Historical Failures of Central Counterparties

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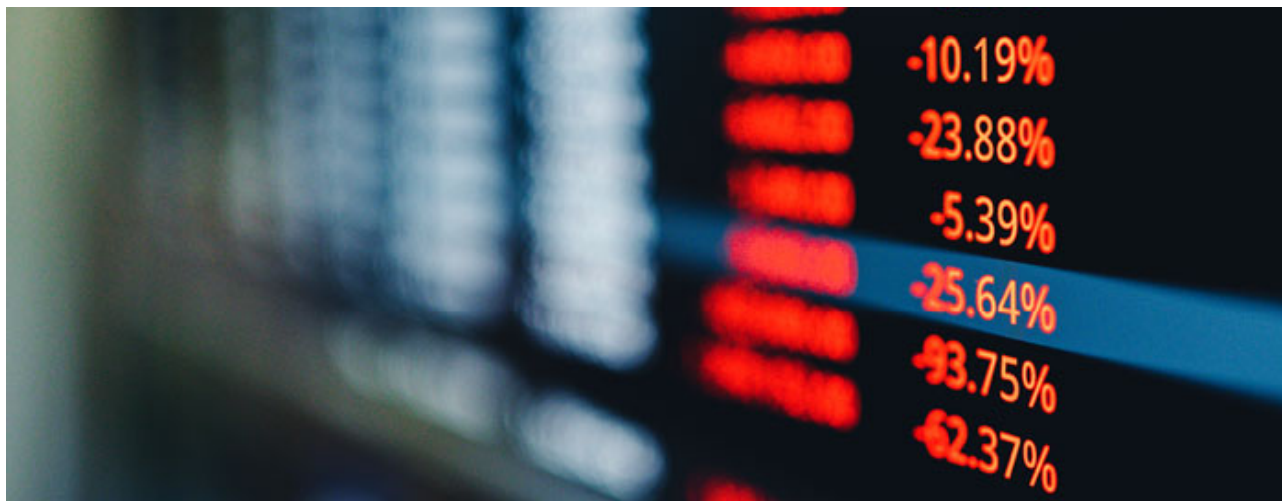


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Abstract

Although historically rare, the failure of a central counterparty (CCP) could severely disrupt and destabilise the financial system. This has driven a global push to implement resolution regimes so that authorities can support the continuity of critical functions of a distressed CCP. This article examines 3 CCP failures to identify common causes of failure that could help authorities prevent or prepare for a resolution. It finds that while there are some common causes of failure in the episodes considered, they have largely been addressed by improvements in CCP financial risk management in recent years.

Introduction

Central counterparties (CCPs) have played an important role in financial markets for many years and their importance continues to increase with clearing activity experiencing significant growth over the last decade. The main role of CCPs is managing risk, a role which they are widely regarded to have performed well during the global financial crisis (GFC). Following the GFC, an international consensus emerged for the greater use of centralised infrastructure like CCPs, trading platforms and trade repositories in over-the-counter (OTC) derivatives markets to help address some of

the concerns of regulators and market participants. Accordingly, in 2009 G20 Leaders committed to mandate centralised clearing of standardised OTC derivatives, resulting in a much greater role for CCPs. This was accompanied by a global uplift in supervisory requirements, including through implementing the Principles for Financial Market Infrastructures (PFMIs).

In the CCP context, a resolution regime gives a resolution authority (usually a central bank) powers to intervene when a CCP becomes distressed to ensure that it maintains its critical functions and thus supports financial stability. The Council of

Financial Regulators has proposed that Australia introduce a resolution regime for clearing and settlement facilities, with the Reserve Bank as the resolution authority (Council of Financial Regulators 2019). The Australian Government announced it will introduce a resolution regime for clearing and settlement facilities as part of the 2021 Budget. One challenge for CCP resolution authorities is that historically CCP failures have been rare. This makes it difficult to predict the circumstances likely to lead to CCP failure that will require resolution.

Understanding those circumstances is particularly important for resolution of CCPs, because a CCP failure could be a 'fast burn' event, requiring the resolution authority to make decisions quickly and with incomplete information.

This article examines the causes of historical CCP failures, in order to understand what might precipitate CCP stress in the future. The paper focuses on 3 cases: the Caisse de Liquidation des Affaires en Marchandises in France in 1974, the Kuala Lumpur Commodities Clearing House in 1984 and the Hong Kong Futures Exchange in 1987. While there have been other events that have stressed CCPs, with varying causes and degrees of severity (Cox, Murphy and Budding 2012), these 3 episodes have in common that they led to a CCP being closed for a period of time as well as significant consequences for the affected market.

After identifying the common factors underlying the 3 failures, this article examines how these factors are relevant to understanding potential causes of future CCP failure, considering the changes in financial risk management and supervision of CCPs that have taken place since the failures occurred.

Caisse de Liquidation des Affaires en Marchandises (1974)

Background

Caisse de Liquidation des Affaires en Marchandises (CLAM) was a CCP servicing the Paris Commodity Exchange, a market which traded cocoa, coffee and sugar futures (Bignon and Vuillemeys 2017).

Between November 1973 and November 1974 there was a sixfold increase in global sugar prices.

There was also a significant increase in speculation on sugar at the Paris Commodity Exchange, with transactions registered by CLAM increasing from 54,000 tons per month in 1971 to 1.9 million tons per month in 1974.

CLAM's risk management framework primarily consisted of collecting initial margin and variation margin, which were calculated daily. Initial margin was calculated at about 10 per cent of the value of the contract. The market had a daily 'limit down price', meaning the market would close for the day if prices fell by more than a certain amount. The purpose of a limit down price is to reduce volatility from temporary market panics.

Typically, each client would have a margin account with their participant, in which they were required to deposit initial margin plus a buffer of around 5 per cent of the value of contracts. Many participants had clients that predominantly had either long or short positions, meaning those participants were highly exposed to directional movements in prices.

CLAM had no default fund or tools to allocate default losses to participants. By implication, any losses beyond the participant's margin would be absorbed by the CCP's equity.

Default

In mid November 1974 global sugar prices began to collapse. Between 21 November and 2 December the daily limit down price was hit 7 times, with prices falling 21 per cent. This caused severe problems for several participants, including Nataf, which was the largest participant at CLAM. Over the course of 1974, clients of Nataf had increased their long exposures as global sugar prices rapidly increased. Nataf went from holding just 9 per cent of all open positions in January 1974 to 56 per cent by November, held on behalf of around 600 retail traders.

By 25 November, Nataf was technically in default, having failed to meet margin requirements. However, CLAM did not immediately call Nataf into default, allowing it to continue to register trades. By the time Nataf was called into default on 2 December, all of Nataf's initial margin had been

Box A: How do CCPs operate?

CCPs are a type of financial institution that help facilitate efficient trading in some financial products. They *clear* trades by acting as an intermediary between buyer and seller, assuming the role of buyer to every seller and seller to every buyer, guaranteeing performance of obligations. Some CCPs also *settle* trades, which is the process of finalising trades by delivering cash to the seller and assets and/or cash to the buyer. These clearing and settlement functions allow financial markets to operate smoothly and efficiently. Financial institutions that are authorised to trade directly through CCPs are called *participants*. Participants make trades on behalf of themselves or their clients (the latter is known as *client clearing*). In client clearing, if a client fails to meet its obligations the participant is responsible for those obligations. It is only when a participant fails that the CCP takes on responsibility.

A key role of CCPs is to manage counterparty credit risk (the risk that a counterparty does not fully meet its financial obligations). One way they manage this risk is by collecting margin. There are two main types of margin collected. *Initial margin* is collected on open positions at the time the transaction is made. Its size is calibrated by the CCP to cover significant price movements and is held by the CCP as collateral. *Variation margin* is collected periodically (often daily) based on price movements and is passed via the CCP from the participant whose position has lost value to the participant whose position has gained value. CCPs also maintain a prefunded buffer of pooled financial resources to cover additional losses (known as a *default fund*) that could arise if a participant were to default in stressed market conditions and its initial margin and other contributions were insufficient to cover the losses. This can include participant and CCP contributions.

A CCP may be exposed to losses if a participant fails to meet their obligation to pay margin. The CCP will then no longer have a *matched book* in that they no longer have a participant on each side of each trade, and is now exposed to market risk. CCPs will attempt to return to a matched book by closing out or auctioning the defaulter's portfolio to remaining participants. Depending on the price at which the CCP is able to dispose of the defaulter's portfolio, it may incur losses. These would be covered, in the first instance, from the initial margin provided by the defaulter. If this was not sufficient, the CCP may need to draw on its default fund.

Many CCPs also have the power to allocate default losses to participants where they do not have the resources to absorb them, or even to tear up contracts as a last resort if they are unable to liquidate the defaulting participant's portfolio.

A CCP could fail for a number of reasons, including that it runs out of financial resources to meet its obligations and is forced to cease provision of services, or that its actions substantially undermine confidence in the market it clears for. The failure of a systemically important CCP could significantly undermine the stability of the markets in which it operates or even the global financial system.

exhausted and approximately 50 per cent of Nataf's clients were in default.

With sugar prices down 21 per cent, another limit down price movement would result in 2 more participants defaulting, with the potential for 8 to 10 participants to default if the price continued to fall. On this basis, the French Minister of Commerce

authorised the temporary closure of the market at CLAM's request.

CLAM then attempted to close out open positions at a settlement price that would minimise its losses. A clause in CLAM's rulebook provided that if trading is suspended due to exceptional circumstances the technical committee of CLAM sets a price for the immediate settlement of outstanding positions

equal to the average price in the last 20 trading days. This would have been well above the closing price on 2 December, and at that price Nataf would not have been in default (meaning the CCP would bear no losses).

Clients with short positions disputed the claim that a collapse in the price of a commodity constituted exceptional circumstances. They pushed for an arrangement with CLAM to allow the market to reopen, offering to buy Nataf's defaulted position at a price of sugar when the market was closed on 2 December. This offer would have enabled CLAM to continue operating after absorbing losses of less than a third of its equity. However CLAM refused, even as global sugar prices continued to fall further.

In June 1975, a French court declared the decision to close the market was unlawful. This ended any hopes of CLAM reopening, and the French Government appointed an administrator to the CCP.

Kuala Lumpur Commodities Clearing House (1984)

Background

Established in 1980, the Kuala Lumpur Commodities Exchange (KLCE) was a futures market for palm oil, rubber, tin and other commodities with trades cleared by the Kuala Lumpur Commodities Clearing House (KLCCH). It was the world's only commodity exchange for palm oil futures, with Malaysia being the world's largest exporter of palm oil. The KLCE experienced strong growth in its first years of operating, with trading volumes growing over 150 per cent between 1982 and 1983 on one-month forward contracts (Asian Wall Street Journal 1984).

Over the second half of 1983 palm oil prices began to rise steeply due to lower production of palm oil in Malaysia, lower production of soybean in the United States and strong global demand. Between 1 July 1983 and mid January 1984 palm oil prices grew by 275 percent (Financial Times 1984), with particularly strong growth in early January.

Participants at KLCCH conducted client clearing, and were subject to membership requirements including minimum paid-up capital and net asset

requirements. Participants were also required to make a contribution with the KLCCH as a deposit to cover their own exposure, but there were no mutualised default resources. From the available sources, specifics on how the margin framework at the KLCCH worked are unclear (Financial Times 1984).

The KLCE and KLCCH were regulated by the Malaysian Commissioner of Commodities Trading and run by a 12 person Exchange Management Board. Under the KLCE's rules, it had various emergency powers, including powers to limit trading.

Default

The default was primarily caused by one trader, Loo Cheng Ghee. Mr Loo began trading palm oil in early January 1984. He sold contracts through a participant, Sakapp Commodities (Sakapp).

Mr Loo built up a large short position through January and February 1984, leading the KLCCH to ask Sakapp to restrict its trading on 22 February. Mr Loo responded by spreading his trading among 5 other participants. At the beginning of March, Mr Loo held a large number of short positions maturing that month, requiring him to buy offsetting long positions since he could not deliver the physical palm oil. This caused the price to rise further. On 12 March, the KLCE responded by activating emergency regulations to limit trading. On 13 March and 14 March, the 6 participants clearing for Mr Loo defaulted.

Following the defaults, trading was suspended for a week. When the market reopened, palm oil prices had fallen more than 50 per cent. While the market continued to operate, volumes were down by over 95 per cent a year later relative to pre-suspension levels, reflecting a loss of confidence in the CCP and the futures market more broadly due to the incident. The Malaysian Government established a task force to investigate the incident, which published a report (Asian Wall Street Journal 1984).

Hong Kong Futures Exchange (1987)

Background

The Hong Kong Futures Exchange (HKFE) began trading Hong Kong stock market index (Hang Seng Index or HSI) futures in 1986, operating separately from the Stock Exchange of Hong Kong (SEHK). The HKFE quickly experienced sharp growth, with daily trading volumes in HSI futures rising by over 1,800 per cent between May 1986 and September 1987. The HSI rose 55 per cent between 1 January 1987 and 1 October 1987.

Key aspects of financial risk management, including initial margin setting at HKFE, were undertaken by the International Commodities Clearing House Ltd (ICCH), a separate entity from the HKFE (Davison 1988). Trades at HKFE were guaranteed by a further separate entity operated by ICCH, the Future Guarantees Corporation (FGC), which did not have mutualised default resources.

Hong Kong had 2 market regulators: the Securities Commission and the Commodities Trading Commission (Cox 2015).

Default

One trader, Robert Ng, along with a handful of business associates, amassed a long position in HSI futures that constituted over 50 per cent of open long positions. They made these trades through a small number of participants, which in turn led to 3 participants holding 50 per cent of long positions. The long side of the market also had a large number of small and unsophisticated retail speculators, who in many cases were financed by their participants to post margins, giving participants even greater exposure to losses incurred by their clients.

The short side of the market was dominated by arbitrageurs, who were taking advantage of a large premium in the pricing structure of HSI futures contracts over their normal pricing (cash equities price, plus cost of interest, less the dividend rate) by buying stock and selling futures contracts. Around 80 per cent of short positions were held by just 4 participants.

On Monday 19 October 1987 the HSI fell by around 11 per cent, one of the first events in a global equity

market crash. This exceeded coverage of initial margin, which was set at roughly 8 per cent of the HSI futures contract value. In anticipation of further falls, the HKFE substantially increased initial margin requirements through an intraday margin call. The large intraday margin call led to some defaults, however over 96% of the intraday margin was collected.

That same day in the United States, following the close in Hong Kong, the Dow Jones Industrial Average fell 22.6 per cent (an event known as Black Monday). In response both the SEHK and the HKFE closed for the rest of the week. However the closures could not prevent large defaults occurring on contracts from the previous day's margin calls – nearly 30 per cent of margin owed to the CCP was not paid, an amount exceeding the total financial resources of the FGC. More defaults were expected when markets reopened.

In response to the situation, various parties including the Hong Kong Government, shareholders of the FGC and participants at the HKFE agreed to fund a HK\$2 billion bailout package of the FGC, intended to enable it to meet its obligation to guarantee trades.

When the markets reopened on 26 October, the HSI closed down 33 per cent and the HSI futures closed down 44 per cent. This resulted in 45 participants defaulting, as clients (including Mr Ng) failed to pay margin. Eventually some participants met margin payments on a delayed basis, but the positions of 34 participants were liquidated by the HKFE between 27 October and 2 November. This used the HK\$2 billion bailout package, however it enabled the HKFE to recommence operations.

Key causes of failure

In all cases, the key precipitating factor in the lead-up to the failure was a rapid unwinding of a large increase in the price of a futures product (sugar futures, palm oil futures and equities index futures respectively). Without a large price movement, participants are unlikely to default, and even if they do a CCP should be able to liquidate defaulting participants' portfolios and return to a matched

book without incurring significant losses if the market is sufficiently liquid.

However, a large price movement is not usually sufficient to cause a CCP failure. Other CCPs have faced similar-sized price cycles without failing; for example the other CCPs clearing sugar futures did not fail in 1974, and no other CCPs failed during the 1987 global stock market crash (Bernanke 1990). In each of the cases examined above, there were other actions or elements of risk management frameworks that contributed to the failure. These are examined below.

1. Nature of participants and clients

A common factor in the failures considered was the nature of the participants and the clients they serviced. Where one, or a group of participants or clients had very large directional positions, a major price movement was more likely to threaten the CCP. In the case of the KLCCH, a single individual's short position in palm oil futures ultimately led to the failure of the CCP.

The lack of financial sophistication among clients was also a contributing factor in these failures. At CLAM, most of the clients were small retail traders. Many clients were taking on risks they did not understand and they were not prepared for large margin calls when the price corrected rapidly. Some clients did not have enough liquid financial resources while others did not know they could be called for margin at all. Many clients stopped paying margin after sending sell orders to exit their positions, even though these orders were not executed due to limit down trading halts (Bignon and Vuillemeay 2017).

The HKFE faced issues arising from its pool of clients. On the long side, there was very high concentration through one large client whose default caused very large losses. It also experienced problems associated with clients taking on excessive risk, sometimes with the assistance of participants. On the short side, the practice of arbitraging the premium between HSI futures and the equities market by shorting futures contracts meant that tearing up the futures contracts at a higher than market value would cause significant

losses to the arbitraging short sellers. This would force them to sell stocks to unwind their arbitrage, which would further drive down the HSI and threaten the stability of the financial system. This made tear-up an unviable strategy once the HKFE was closed and contributed to the need for a bail out.

2. Perverse incentives for CCPs that do not align with responsible financial risk management

The episodes considered highlight some perverse incentives for CCPs that may cause them to depart from responsible financial risk management.

The first arises where the interests of the CCP's managers are not aligned with those of the shareholders. For example, at KLCCH it was reported that one reason the KLCE and KLCCH did not act more decisively in January or February, despite concerns about market manipulation by Mr Loo being raised by some stakeholders, was that members of its board themselves held positions on palm oil and so felt conflicted from taking action.

The second arises where the CCP does not have sufficient incentive to call a participant who misses margin payments into default because of the possibility that the market could reverse, sparing the CCP from incurring losses (Bignon and Vuillemeay 2017). Bignon and Vuillemeay argue that this can arise when a CCP is undercapitalised. For example, in a scenario where a participant has missed margin payments because of losses on a directional position on a commodity, the CCP avoids all losses if the CCP does not call the participant into default and the commodity price reverses. While this creates a much greater risk of significant loss if the commodity price continues its trend, the CCP's losses are capped at its equity. If its equity is small and there is a chance that the commodity price will reverse, the CCP may decide to not default the participant. This approach is reckless from a financial stability perspective as it risks much larger losses for the CCP and its failure if the market movement does not reverse, causing instability which impacts all market participants. Note that this approach does not consider several factors such as reputational risks for those making decisions at the CCP.

The third is that once a CCP takes on a defaulting participant's portfolio, it has an incentive to pursue market outcomes which favour the defaulting portfolio, even if doing so departs from best practice financial risk management. The CCP cannot ordinarily act to influence prices in the market for which it clears, however in default management and recovery, CCPs have extraordinary powers including the power to tear up contracts in some circumstances, effectively ending the contract at a price fixed by the CCP. While tear-up may be a useful 'last resort' loss allocation strategy for a CCP, it is likely to severely damage market confidence if the CCP is seen to be undertaking tear-up in an inequitable way, or when other solutions are available.

Bignon and Vuillemeys suggest that these perverse incentives influenced CLAM's actions. This may explain why CLAM did not call its largest participant into default when the participant was first unable to meet margin it owed. CLAM may have calculated that the expected value of not defaulting the participant was greater than defaulting it, because the CCP's losses were limited to its relatively low equity and the value of the firm as a going concern. CLAM also attempted to minimise its losses after the default by setting the settlement price of futures contracts higher than the current market price under the 'force majeure' clause in its rulebook. Because the option to tear up at the average settlement price over the previous 20 days was only available when the market was closed, the existence of this clause made closing the market most viable strategy for the CCP to minimise its losses.

3. Inadequate supervision

A common theme of each episode examined in this article is that supervision arrangements for the CCP were inadequate. While supervision will not by itself prevent CCP failure, a competent supervisor with a financial stability mandate can act preventatively, including by promoting sound financial risk management, to make a CCP failure less likely during a stress event.

In the case of CLAM, the power to close the market was held by a minister in the French Government

rather than an independent supervisor. This had a significant impact on the eventual failure of the CCP. The French court decision in June 1975 that the minister's decision to close the market was unlawful ultimately caused the CCP to fail. Bignon and Vuillemeys argue that CLAM exploited the minister's imperfect knowledge of CLAM's rulebook to claim that a market closure would be legal and thus obtain a favourable decision. It is possible that an independent, expert regulator may have better understood the CCP rulebook and acted differently to preserve the continuity of the CCP.

It also appears that oversight was inadequate at the HKFE. The government took a relatively light touch approach to regulation (Cox 2015). Subsequent examination of the failure in the Davison report described the approach of the Hong Kong Government as 'positive non-interventionism', meaning that the government favoured limited financial regulation in order to promote the development of Hong Kong as a financial centre (Davison 1988). Regulators were described in the Davison report as having a 'general absence of direction', and taking a 'passive and reactive role'. Requests for additional resources from regulators were also ignored by the government.

The KLCCH had a very limited regulatory oversight. Subsequent to the failure, a Malaysian Government report found that the Commissioner of Commodities Trading, the main regulator, did not have any powers and that those in charge of the regulator believed that the local market was self-regulating.

Have these issues been addressed?

The financial risk management frameworks of the 3 CCPs examined were very different from those of modern CCPs. Many of the developments in modern CCP financial risk management have been driven by the implementation of the PFMI, which are international standards for financial market infrastructures including CCPs that aim to strengthen and preserve financial stability (Bank for International Settlements 2012). In Australia, the principles in the PFMI are implemented through the Financial Stability Standards for Central Counterparties.

Some of the key elements of modern CCP risk management frameworks include:

- A legally certain rulebook, which sets out the financial risk management framework of the CCP, and is binding on all participants and the CCP.
- Margin requirements on the positions of participants that take into account a number of factors including risks from the positions of participants, concentration of risk from large participants and liquidity risks.
- A default fund, which includes participant and CCP contributions to absorb default losses. Default funds are sized to meet either a 'cover 1' or 'cover 2' requirement, meaning they should be large enough to cover the default of the largest or 2 largest participants respectively.
- Tools to allocate losses to participants rather than the CCP, should default losses exceed a participant's margin and the default fund held by the CCP.

Modern CCPs have in part addressed issues relating to the nature of their participants and clients through membership requirements for participants, which aim to prevent them from bringing risk to the CCP that is disproportionate to the participant's own ability to absorb risk. These include minimum capital requirements for participants that are related to the number of clients the participant is permitted to service, and additional margin for participants who bring concentrated risk to the CCP. Data collection on clients can also help CCPs to understand the risks associated with clients and to account for this as part of their financial risk management. However, in practice the amount of information available to CCPs on clients varies, and it is often left to participants to monitor risk arising from their clients' positions.

Issues relating to the sophistication of clients of participants are more subjective, hard to monitor even when client information is available, and may only appear as an obvious source of risk in retrospect. This source of risk is likely to be ameliorated at CCPs where the largest participants are highly capitalised globally systemically

important banks (GSIBs), which are likely to have more diversified and institutional clients.

In some cases, perverse incentives for the CCP that do not align with responsible financial risk management could still exist in the event of a default. If the CCP is unable to liquidate a defaulting participant's portfolio, it could still seek to manage clearing and settlement in a way that favours its interests. However, the right tools are in place to address perverse incentives. Notably, CCPs are required to maintain a minimum level of equity, and contribute to their default fund alongside participants. This ensures that CCPs bear significant losses from poor risk management, and also provides an incentive for all participants to closely monitor financial risk management at the CCP. In addition, supervision by independent regulators would make it difficult for CCPs to behave irresponsibly during default management as the regulators would likely notice this behaviour and may use their powers to intervene.

Supervision of CCPs is generally much stronger now than in the cases examined. The PFMI outline responsibilities of central banks, market regulators and other relevant authorities in supervising financial market infrastructures and implementing the PFMI.

Conclusion

This article identified 3 factors that were highlighted by the failures of the 3 CCPs examined. First, the CCP had a particular make-up of participants and clients which left them vulnerable to the consequences of major price movements. Second, perverse incentives for the CCPs led them to behave in ways that departed from appropriate financial risk management. Third, the CCPs had inadequate regulatory supervision and oversight. These factors, combined with a rapid unwinding of a large price increase, resulted in the CCPs' failure.

These factors have, to a large extent, been mitigated by modern CCP risk management frameworks and stronger supervision, including through the implementation of the PFMI. However, CCPs are often systemically important and their failures could be sudden. It is therefore important for CCP

supervisors and resolution authorities to remain vigilant to these factors, as well as emerging factors, which could cause a CCP failure. It will continue to be important that CCP supervisors and resolution

authorities explore possible factors that could lead to a CCP failure, how to mitigate these factors, and how these factors might influence a possible CCP resolution. ✎

Footnote

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