LCH

Stability during market uncertainty

LCH March 2020 volatility analysis

LSEG POST TRADE

One clear lesson from the market stress of 2020 is that central clearing continued to play its intended role in buffering the shock to financial markets.

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01. Executive summary

The sharp period of volatility during March 2020 produced widespread and simultaneous shocks across a broad set of asset classes and geographies and was a significant test of the cleared derivatives industry since the implementation of the post-2008 G20 financial regulatory reforms. Although the cleared derivatives industry performed well throughout this period, central counterparties (CCPs) experienced a stern test of their respective margin models.

CCPs play a unique and critical role in the financial markets and are responsible and accountable for ensuring market stability by managing the risk associated with cleared financial instruments, especially during times of market stress. One of the primary functions of a CCP is the collection of margin from its clearing members. Margin is collected in limited forms of highly liquid collateral and serves as a buffer against the risk of loss in financial instruments. Acceptable collateral types are carefully prescribed by CCP regulations and CCP's own risk policies. They primarily include cash and government debt securities.

Since the 2008 financial crisis, most over-the-counter (OTC) derivatives have been required to be collateralised through a CCP for cleared derivatives or through uncleared margin requirements (UMR) for bilateral derivatives exposures. This regulatory design naturally creates a greater demand for collateral and associated funding from market participants, particularly during periods of market stress.

As policymakers, regulators, FMIs and market participants review the impact of the March 2020 volatility across the financial markets, this paper summarises how LCH margin models performed through the March 2020 market volatility without unnecessarily increasing CCP margin requirements or related collateral demands across the market.

In section 1, we describe the distinct but related roles of initial margin (IM) and variation margin (VM), which support the core function of a CCP – to cover the risk of cleared positions within the CCP. We explain the concept of procyclicality, which refers to the fact that risk management and margin requirements naturally fluctuate between times of market stress and market stability. We also discuss the important balance risk managers must weigh between 1) avoiding unnecessary and 'procyclical' impacts of margin models and 2) the financial stability risk of being under-margined, especially during times of market stress.

LCH did not adjust or change any margin models or processes, which have remained consistent and performed well throughout the pre- and post-March 2020 period of volatility.

In section 2, we outline the core components of our margin and risk management models, which work together to minimise potentially negative procyclical impacts during market stress. These include margin floors, margin add-ons, default fund sizing, collateral acceptance policies, collateral haircuts, look-back periods and assessment protocols. At a fundamental level, our long-standing approach to mitigating procyclicality is simple: We look back through history to capture the most significant market stress scenarios and play these market moves forward to build a model that will not jump more than 25% over a specific time period, defined as the margin period of risk (MPOR), were these stressed scenarios to reappear. Given the global and multi-currency nature of LCH clearing services, our general approach to mitigating procyclicality is employed consistently across the different asset classes cleared across LCH Ltd and LCH SA, regardless of the specific margin model employed. This includes interest rate swaps (IRS), interest rate exchange traded derivatives (ETDs, or futures), credit default swaps (CDS), government debt repurchase agreements (repo), listed equities and foreign exchange (FX) products.

In section 3, we illustrate how our approach performed during March 2020 by analysing LCH margin levels before, during and after the most severe period of volatility. Specifically, the majority of increase we saw over this period was largely due to new risk positions coming into the CCP from market participants increasing their cleared position activity in response to the market volatility. We illustrate that initial margin on the existing portfolios increased gradually and predictably through the severe market stress. For example, analysis of the LCH SwapClear (IRS) data during the volatile period in March shows that the peak in margin increase across this period was 11% on 12 March, and this was mostly driven by increased member risk from new positions. LCH did not adjust or change any margin models or processes, which have remained consistent and performed well throughout the pre- and post-March 2020 period of volatility.

Although regulatory standards and guidance have been implemented to mitigate the negative procyclical effects of margin models, it is ultimately the responsibility of a CCP, in close and continuous consultation with its regulators, clearing members and clients, to develop an appropriate risk management framework for the markets they serve. There is not a one-size-fits-all approach for all CCPs or all asset classes. Margin models must consider many factors, will vary by asset class, and must reflect the size and nature of a CCP's unique mutualised risk pool.

As with any period of market stress, there will be lessons learned from the March 2020 volatility, which was fundamentally different from previous events in that:

01. It appeared to impact all financial markets globally, and simultaneously, regardless of asset class, so margin models/CCP default funds will need to accurately reflect the increased chances that multiple asset classes experience a simultaneous stress event.
02. The shock was global in nature and extended well beyond the financial services sector into the real economy, with severe impacts on sectors such as tourism, travel and retail.
03. The emergence of the pandemic and its resultant effects have persisted, with many countries remaining in partial lockdowns as of early 2021.

These elements will undoubtedly be factored into risk assessments and capital and margin requirements going forward.

One clear lesson from the market stress of 2020 is that central clearing continued to play its intended role in buffering the shock to financial markets. It remains incumbent upon all financial market stakeholders – including policymakers, regulators, CCPs, other FMI providers, clearing members and clients – to work together as partners in evaluating and strengthening the clearing industry's role in promoting market and financial stability and the resilience of the global financial system.

02. Setting the context: procyclicality and margin defined

The ‘natural’ response of a CCP during severe market stress is to implement tighter risk management criteria, e.g., increase initial margins, reduce limits, require more collateral or restrict investment criteria. This tendency for risk management requirements (and the actions of financial intermediaries more generally) to fluctuate over the course of the business cycle, and to become more conservative during times of stress, is known as ‘procyclicality’.[1]

For the specific purposes of this paper, procyclicality refers to components of CCPs’ initial margin models that generate greater directional fluctuations of all margin and collateral intake, especially during periods of market volatility. Such actions could have the unintended effect of exacerbating a financial crisis. By its very nature and purpose, a CCP’s natural response to increasing market volatility is to call:

1) increased collateral against existing positions to provide a prescribed buffer against market moves, and
2) additional collateral associated with new positions brought on by increased trades, including activity driven to manage additional risk in periods of market distress.

This trade-off is at the heart of any CCP's approach to mitigating procyclicality — the desire of the CCP to avoid any procyclical actions balanced against the very real concern of being under-margined, especially during crisis.

Some level of procyclicality is unavoidable, as the CCP must protect the clearing ecosystem and the mutualising clearing members by ensuring that adequate initial and variation margins are held against the risk. However, risk-mitigating actions that are excessively procyclical are undesirable both from a narrow risk management perspective, as well as from a macroeconomic and financial stability perspective. Risk management actions will be ineffective if they create greater systemic risk because of feedback loops. For example, if requiring more collateral during times of stress generates a run on collateral, the risk of a member default might increase. To the extent that positive feedback amplifies financial instability, it runs directly counter to macro-prudential regulatory objectives.

Margin and other financial resources

CCPs play a systemically important, central role in the stability and resilience of financial markets. CCPs, clearing members and clients have distinct roles in the clearing ecosystem. Clearing members are an integral part of a CCP's formal governance process, through Risk Committee seats and board membership. CCPs mutualise the risk that clearing members bring into a CCP, either from their own proprietary house positions or client positions, through a comprehensive risk management framework that includes margin and other financial resources.

1 The Financial Stability Board explains procyclicality as follows: 'The term "procyclicality" refers to the dynamic interactions (positive feedback mechanisms) between the financial and the real sectors of the economy. These mutually reinforcing interactions tend to amplify business cycle fluctuations and cause or exacerbate financial instability'. 'Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System', April 2009. https://www.fsb.org/wp-content/uploads/r_0904a.pdf.

To manage inherent marketplace risks effectively and minimise the impacts of unnecessary procyclicality, LCH collects the following financial resources from members:

a) Margin

There are three basic types of margins received from members:

01. **Variation margin:** This marks each member's book to market at least daily and calls any resulting shortfall. Any member surplus margin held is also returned.
02. **Initial margin:** This is the margin called and held against potential future market moves between variation margin true-ups. Initial margin includes margin add-ons (described below).
03. **Excess margin:** Left up to member discretion, excess margin can be left on account to pay potential future initial or variation margin calls.

Variation margin reflects exactly the profits and losses on the member's positions, which the member can observe in the market in real time. It is not procyclical by definition and is considered exogenous. Indeed, the Bank of England has recently stated:

> *Large moves in asset prices led to significant increases in CCPs' variation margin requirements, which mirror actual price moves in underlying markets. As variation margin reflects the new market price of a product, gains by market participants on one side of the trade are equal to the losses incurred by other market participants. This means that, in aggregate, variation margin does not typically remove liquidity from the system, but rather redistributes it. It ensures that financial firms can depend upon the derivative instruments they have bought to manage their risks once those risks start to crystallise.*[2]

Initial margin, on the other hand, is derived from the CCP's own models and is determined by various risk parameters. It is an estimate of how much the market price of the member portfolio will move in the future to some specified confidence level. This estimate has the potential to be procyclical if the model is very sensitive to market moves through the particular calibration employed.

Many CCPs offer their members the ability to keep excess margin on account. This helps to limit procyclicality and potential drains on liquidity, because members and clients will be able to meet calls without taking liquidity away from other business segments.

FIGURE 1.

Categories of Margin

These three components are summarized in Figure 1 below:

Margin type	Measure	Definition	Acceptable margin type	Framework	Timing
Initial Margin (IM)	Total portfolio risk	Margin required to cover potential market risk of open positions	Cash or securities	Regulatory requirements + CCP risk policy	Collected daily
Variation Margin (VM)	Change in market value	– Represents the mark to market (unrealised profit or loss) of the portfolio – Portfolios are revalued three times daily	Cash only	Regulatory requirements + CCP risk policy	When a derivatives portfolio value changes intraday, VM is calculated and collected (T), invested (overnight) and winners are paid (T+1)
Excess Margin	Member discretion	Margin left on account to serve as buffer against potential future calls	Cash or securities	Member discretion	Member discretion

2 Annual Report, The Bank of England's supervision of financial market infrastructure, December 2020.

b) Initial margin add-ons

Initial margin add-ons are designed to cover the concentration, liquidity and other risks not covered by the main model and are specific to each member's portfolio and should be included in fundamental initial margin methodologies so they can be anticipated. Add-ons vary by member as they are designed to cover the additional cost due to concentration/liquidity concerns in liquidating the member portfolio during a stress period, as a complement to the core initial margin model. These charges are specific to each member portfolio and are reviewed regularly to ensure initial margin levels are proportionate.

The underlying models used to calculate these add-ons are often based on rules that are updated less frequently; hence, their procyclicality impact is easier to observe and control than for the more dynamic initial margin models. Nevertheless, procyclicality is still a potential issue here.

c) Default fund contributions

The size of the default fund is determined by assessing the financial resources needed to cover the simultaneous default of the largest two members ("Cover 2" standard) and then subtracting any initial margins held bilaterally from these two members.

The actual stress scenarios used to size the Cover 2 financial resources needed are determined from periodic market and credit reviews, which, by definition, are relatively stable. The impact of these scenario reviews is easy to observe, and any potential procyclicality impacts can be controlled. Hence, the main procyclicality concern from sizing the default fund is in controlling the potential changes in the initial margin component of the calculation, particularly when the initial margin models used are dynamic (as in Value-at-Risk models).

There are other financial resources not directly related to initial margin models:

d) Collateral

Collateral refers to the type of instrument used to cover all margin requirements. LCH members post cash or securities as collateral and the CCP applies a collateral haircut to ensure the financial value of the collateral that will be available during times of stress.

There are two elements here.

The first element is the acceptance criteria for collateral, which could potentially be tightened during times of stress as a conservative collateral approach reduces liquidity risk. This could potentially exacerbate a market crisis. However, there is no real need to reduce limits on collateral that can be posted by members during a stress period as long as:

- The collateral is still acceptable at a central bank, and LCH can still reverse repo the collateral into a central bank, and
- The haircuts on the collateral are at least as big as those charged by the central bank

The second element is the setting of the haircuts to be applied to the acceptable collateral. Haircuts are reset periodically, but concerns about procyclicality are still relevant here.

Another important consideration is CCP access to central bank deposit accounts. This can support regulatory oversight and financial stability objectives by enhancing visibility into collateral flows. It is the safest and most liquid placement option for CCPs and helps strengthen the initial line of defence in default management. Central bank deposits also limit strains on liquidity in the system. Moreover, a central bank gives a risk-free counterparty with which to deposit cash of CCPs' members and their clients in a volatile market, and this risk reduction is consistent with the central bank mission to manage systemic risk.

e) Assessments

Assessments are only levied if a service depletes all available financial resources and must turn to its membership and draw on unfunded resources. There is a strict protocol here on how many assessments can be mandated and over what time period, and the size of assessments is also capped. This process is part of the recovery toolkit available to both LCH Ltd and LCH SA.

Ultimately, the level of assessments required is driven by how adequate the funded resources (i.e., all margins collected) prove to be relative to the loss to be covered in *extremis*.

03. LCH's approach to limiting procyclical effects of market stress

LCH continues to calibrate its approaches to strike the optimal balance between avoiding unnecessary procyclical actions and the financial stability risk of being under-margined, especially during times of market stress. To ensure individual LCH members do not (with high confidence) experience a jump in initial margin of more than 25%, we require our initial margin models to be built to a standard in which no member would experience an increase of more than 25% over the MPOR in the hypothetical future (generated by a re-run of historical events, including previous crises).

LCH's procyclicality standard was developed in response to the need to control initial and variation margin procyclicality in an international multi-currency CCP operating across different legal/regulatory jurisdictions with product sets encompassing OTC derivatives (FX, rates and credit), repos, and exchange-traded cash and derivative products. It is not simple to design an approach that is broad enough to encompass all these elements while at the same time remaining consistent with prevailing regulatory standards. The LCH approach deals with the problem by reducing it to the essential challenge of ensuring that models are designed and built to the standard that in hypothetical future market scenarios, the initial margin requirements will not excessively jump in response to a market stress.

It is challenging to lay out a standard for procyclicality that dictates a tolerance for sudden increase in financial resources, since there is no knowledge as to the potential future market events that would require a response in terms of increased initial margin. The best guide here is the crisis replay approach: Use the actual observed market history and demand a standard for how initial margin models should behave if history were to repeat itself. This suggests the following internal initial margin standard:

CCP standards have been rigorously tested several times during significant market events, including during the heightened March 2020 market volatility. LCH was able to run its initial margin models as normal through this period without introducing ad hoc margin calls or intervening in models to change any margin parameters.

An individual member's financial resource requirements should not jump too significantly (by more than 25%) over the MPOR at any point in the hypothetical future generated by a replay of history covering a previous crisis.

This provides a way to 'future proof' initial margin changes in the dynamic setting of VAR models, where the model parameters are automatically updating as the market evolves, as it is challenging to intervene in the model directly to control procyclicality.

The appropriate length of history, or look-back period, required is a fundamental choice for each product. For example, LCH includes a replay of the Eurozone crisis for European debt repo and the 2008/2009 financial crisis for interest rate derivatives. These are direct applications of the LCH procyclicality approach, which is designed and approved by the LCH Risk Committee[3], in ensuring that initial margin models are built to a standard to handle replay of past 'significant' crises and not just to focus on a mechanical look-back over a mandated time period.

At the core of this internal standard is a mechanism to ensure that initial margins do not fall too low during lower volatility or 'quieter' periods, so that when the stress event inevitably occurs, it will not be necessary to rapidly increase initial margin requirements too steeply to compensate for the increased risk profile. This is achieved by proactively requiring that initial margin models are designed to behave in a controlled manner through hypothetical replays of past crises. This results implicitly in applying back-tested margin floors on member initial margin requirements that complement minimum requirements established by regulators. If implemented correctly, this will ensure that CCP initial margin models are not a source of additional stress in the next crisis and prevent a race to the bottom – where CCPs compete for the lowest margins, resulting in negative implications on market and financial stability.

3 LCH Ltd Risk Committee is comprised of eight voting members and six external members, including three independent board directors. LCH SA Risk Committee is comprised of six voting members and four external members, including three independent board directors. Voting rights are rotated periodically among clearing member representatives. https://www.lch.com/about-us/structure-and-governance/board-committees.

04. LCH's initial margin model response to March 2020 volatility

The timeline of the March 2020 market volatility has been described by industry bodies including the FIA[4], CCP12[5] and Bank for International Settlements[6]. During this period, all major asset classes experienced large, abrupt moves:

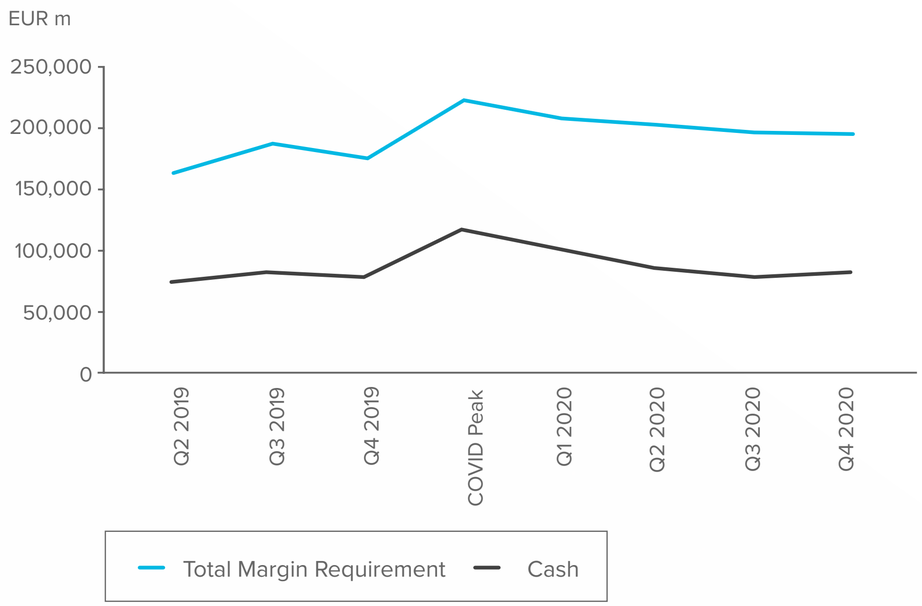
	Worst 1-day drop	Date
CAC40	-12,28%	12/03/2020
FTSE MIB	-16,92%	12/03/2020
FTSE 100	-10,87%	12/03/2020
NIKKEI	-6,08%	13/03/2020
SPX Index	-11,98%	16/03/2020

4 FIA_WP_Procyclicality_CCP Margin Requirements_1.pdf (Oct 2020).
5 CCPs_again_demonstrate_strong_resilience_in_times_of_crisis.pdf (ccp12.org) (Jul 2020).
6 Leverage and margin spirals in fixed income markets during the COVID-19 crisis (bis.org) (Apr 2020).

FIGURE 2.

LCH Ltd and LCH SA Total Margin vs Cash Margin

LCH Ltd Total Margins and Cash Portfolio

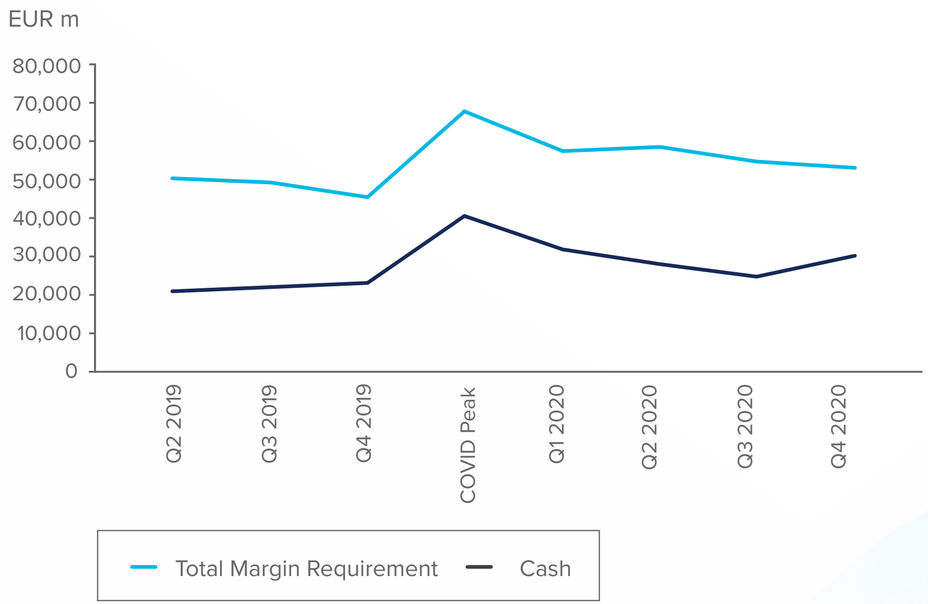


01. **Equities:** On 12 March, the FTSE 100 fell by 10.87%, the CAC 40 fell by 12.28% (worst single-day fall since 1987) and the FTSE MIB fell 16.9%; S&P 500 fell by 12% on 16 March; Nikkei dropped by 6.08% on 13 March.
02. **Interest rate swaps:** The USD LIBOR swap rate fell from 160 bps in mid-February to around 60 bps by the end of March.
03. **Bonds:** Yields saw significant swings, with moves reaching magnitudes of 50-60 bps on core Eurozone bonds and 125 bps for peripherals on five days; the core peripheral Eurozone spread spiked at 279 bps on 17 March.
04. **Foreign exchange:** The GBP USD rate reached a 25-year low of 1.15 in mid-March; GBP EUR dropped from 1.20 pre-March 2020 market volatility and has only recently returned to levels around 1.12.
05. **Swap rates across majors:** USD/GBP/EUR saw daily moves with magnitudes in the range of 10-30 bps as governments announced various interventions.
    - The Euribor swap rate was oscillated significantly, starting around 0 at the end of January 2020 and falling to around -30 bps in early March, then recovering to +15 bps in mid-March. It settled down around -20 bps in Q3 2020.
    - The GBP LIBOR swap rate saw similar volatility moves to Euribor beginning around +80 bps at end of January and finishing around +40 bps by the end of Q3 2020.

To get a better view of how LCH managed the volatility, Figure 2 shows the evolution of the total margin requirements for all member portfolios across all services in LCH Ltd and LCH SA during the past year and includes the cash balances posted.[7]

7 See CPMI IOSCO public disclosures: https://ccp12.org/papers/.

LCH SA Total Margins and Cash Portfolio



There were no changes to LCH's normal risk and operational processes in terms of the timing and number of initial or variation margin calls, nor to the models or methodology themselves, during the height of the crisis.

The peak total margin requirement for the period across LCH occurred on 12 March, when LCH Ltd total margin requirements reached €221 billion, up from €200 billion at the beginning of March. This is shown in Figure 2 and represents a 10.3% increase in total margin requirements across the board, with the total margin requirements having risen incrementally, helping to avoid any further drain of cash from the economy during this period. In fact, the largest daily increase in total margin during March happened on 6 March and was only an increase of 3.5%.

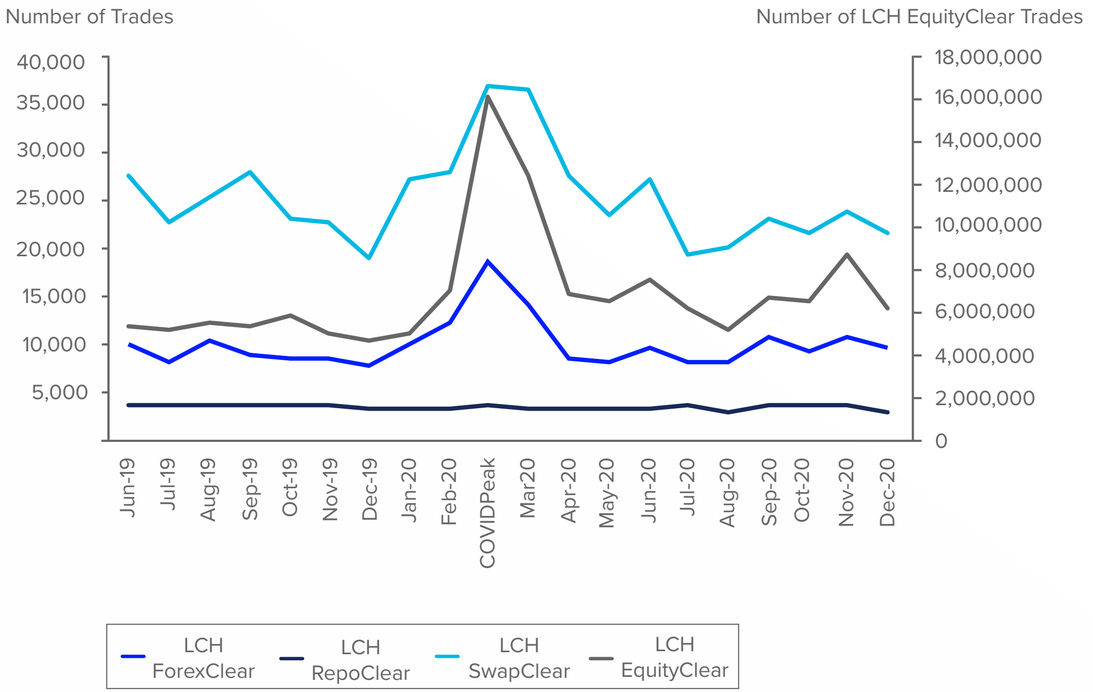
Regarding LCH SA, the peak total margin requirement occurred on 13 March, when LCH total margin requirement incrementally increased to €67 billion, up from €57 billion at the beginning of March. This is shown in Figure 2 above and represents a 17.5% increase in total margin requirements. This total margin increase is mainly explained by the significant increase in new risk entering the CCP, as shown in Figure 3 on page 15.

In fact, during the same period, the volumes processed at LCH Ltd increased dramatically, particularly in equities, as shown in Figure 3. In LCH SA, trading volumes reached their highest levels during the March 2020 market volatility, as shown in Figure 3 on page 15.

FIGURE 3.

Cleared Volumes by Service (Average Daily Traded Volumes per Month)

LCH Ltd



LCH SA

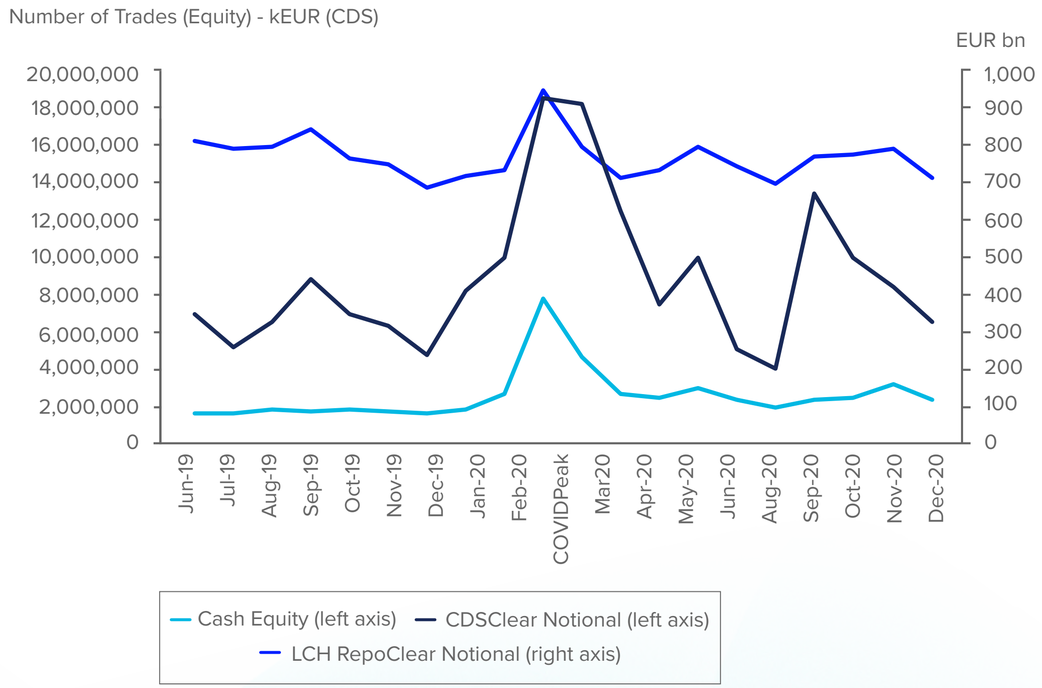
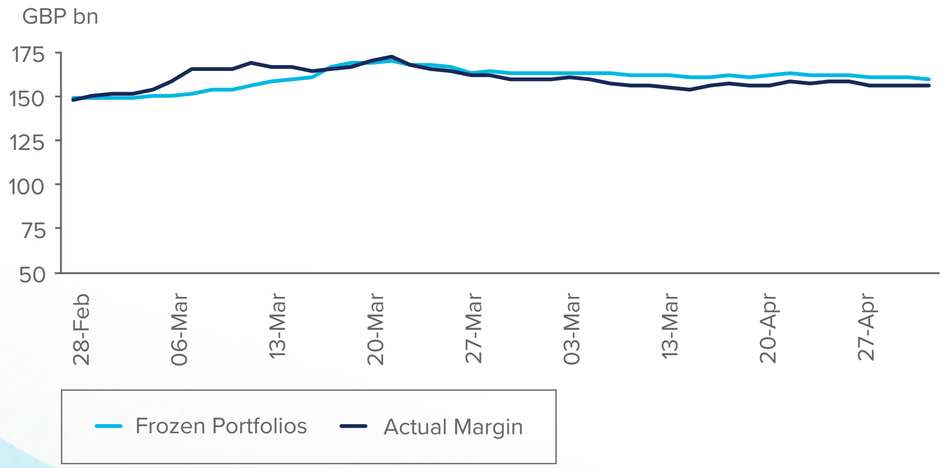


FIGURE 4.

Frozen Portfolio Total Margin vs Actual Portfolio Total Margin

LCH SwapClear Total Margin



A significant percentage of the collateral increase in LCH CCPs was derived from new risk positions, rather than additional collateral being called against existing positions. This demonstrates the importance of setting initial margin requirements conservatively at all times, rather than tailoring them to specific market conditions.

Given the significant size of the LCH SwapClear portfolio in particular, Figure 4 assesses the impact in more detail. This chart shows the actual total margin requirements for LCH SwapClear members over the volatile period (dark blue line) and also shows the total margin requirements over the same period if the member portfolios had been frozen ('frozen portfolios') at the end of February (light blue line).

01. At the end of February 2020, the total margin requirement stood at £149 billion.
02. By 5 March 2020, the total margin requirement had jumped to £153 billion, while the frozen portfolios stood at £148 billion.
03. Figure 4 shows that the biggest total margin jump happened between 5 and 11 March 2020, where the actual total margin requirements for members increased by 8.3% while over the corresponding period, the total margin requirement for the frozen portfolios increased by only 3%.
04. This demonstrates clearly that approximately 67% of the total margin increase over the most volatile period in the service was due to members repositioning their portfolios to adapt to the changing risk environment, with the remaining 33% due to data-driven effects (i.e., the automatic introduction of new, volatile market data into the initial margin models, which are Value-at-Risk models based on historic simulation).

This analysis shows that the initial margin model requirements were stable and predictable, not procyclical, and were behaving as designed, so there was no intervention needed either to increase initial margin parameters or to run ad hoc margin calls.

The March 2020 market volatility showed that LCH's risk models performed as designed, with no adjustments required to accommodate the heightened volatility.

05. Conclusion

The March 2020 market volatility showed that LCH's risk models performed as designed, with no adjustment required to accommodate the heightened volatility. The largest increase in total margin requirements, driven by the risk model, at the CCP level on any one day during March occurred on 6 March in LCH Ltd and 12 March in LCH SA – both were less than 8%. Crucially, a significant percentage of the collateral increase in LCH CCPs was derived from new risk positions, rather than additional collateral being called against existing positions. This demonstrates the importance of setting initial margin requirements conservatively at all times, rather than tailoring them to specific market conditions.

However, with initial margins beginning to fall as the volatility subsided after mid-March, there is clearly an ongoing opportunity for the broader industry to review its initial margin rules and guidelines. Indeed, the FSB has made clear that 'all major CCPs are required to have, or voluntarily have in place, anti-procyclicality measures of some type to dampen or slow down the changes in initial margin. Most anti-procyclicality measures entail higher initial margin when market volatility is low, thereby reducing the extent of the upward adjustment when volatility increases. This may provide market participants some additional time to prepare for further initial margin calls, should those calls hit them unexpectedly'.[8]

Risk-mitigating actions that are too procyclical are undesirable from both a narrow risk management perspective and a macroeconomic and financial stability perspective. At LCH, therefore, our focus is on carefully balancing the avoidance of procyclical actions against the real possibility of being under-margined.

We continue to work closely with policymakers, regulators, CCPs, and other market infrastructure providers, clearing members and clients on how to most effectively manage initial margin in all market conditions, and we look forward to an ongoing dialogue around how best to reduce systemic risk and improve financial stability – a goal that is of mutual benefit and significant importance to all industry participants globally.

8 FSB: 'Holistic Review of the March Market Turmoil'. https://www.fsb.org/wp-content/uploads/P171120-2.pdf.

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LCH. The Markets' Partner.

LCH builds strong relationships with commodity, credit, equity, fixed income, foreign exchange (FX) and rates market participants to help drive superior performance and deliver best-in-class risk management.

As a member or client, partnering with us helps you increase capital and operational efficiency, while adhering to an expanding and complex set of cross-border regulations, thanks to our experience and expertise.

Working closely with our stakeholders, we have helped the market transition to central clearing and continue to introduce innovative enhancements. Choose from a variety of solutions such as compression, sponsored clearing, credit index options clearing, contracts for differences clearing and LCH SwapAgent for managing uncleared swaps. Our focus on innovation and our uncompromising commitment to service delivery make LCH, an LSEG business, the natural choice of the world's leading market participants globally.

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