

Leverage, Liquidity and Non-bank Financial Institutions: Key Lessons from Recent Market Events

Rhea Choudhary, Suchita Mathur and Peter Wallis^[*]



Photo: CHUNYIP WONG – Getty Images

Abstract

Non-bank financial institutions (NBFIs) can pose risks to financial stability due to their size, complexity and global interconnectedness. Vulnerabilities present in some NBFIs include high levels of leverage, liquidity mismatches and weaknesses in risk management practices. This article discusses how these vulnerabilities have been exposed in multiple episodes overseas since early 2020, resulting in dysfunction in some financial markets and losses for some NBFI counterparties. While Australian markets and institutions were largely unaffected by these episodes, regulators in Australia and overseas remain vigilant to the potential future risks posed by the sector.

Introduction

The term ‘non-bank financial institution’ (NBFI) refers to a group of entities that includes insurance companies, broker-dealers, investment funds and commodity trading houses. At its broadest, it can be defined as any financial institution that is not a central bank, bank or public financial institution (such as government mortgage corporations).^[1] NBFIs complement or provide competition to the traditional banking sector by providing services that are often highly specialised and/or not suited to

banks. They offer financial services using alternative funding sources to deposits and are subject to less stringent regulatory requirements compared with banks. These services include:

- *Credit intermediation*: Non-bank lenders extend credit directly to households and businesses, funded by non-deposit sources such as warehouse financing, loan securitisation or wholesale funding markets.^[2] Non-banks’ borrower profiles are often skewed towards riskier households and small to medium-sized

firms that may have limited access to funding via the traditional banking sector.

- *Institutional investment:* Investment funds (such as pension funds or money market funds), private equity firms, family offices and insurers invest in a wide range of assets, in some cases using leverage to finance their activity or increase potential returns.
- *Market-making and prime brokerage:* Broker-dealers act as intermediaries between market participants to facilitate trades. Prime brokers offer a range of services to hedge funds, family offices and other institutional investors, including securities lending, margin lending, cash management and trade execution.
- *Central clearing:* Central counterparties (CCPs) simplify market structure by acting as an intermediary between participants and ensuring smooth market functioning.

The international NBFi sector is large and highly interconnected with both the global banking system and parts of the real economy. NBFIs are estimated to hold close to 50 per cent of global financial system assets – a share that has increased by around 7 percentage points since the global financial crisis (GFC) (Graph 1). NBFIs' credit intermediation in certain jurisdictions is significant (e.g., non-bank lending accounted for approximately 65 per cent of new mortgage credit in the United States in 2021). They are also large institutional investors in sovereign and corporate debt markets.

While the size of Australia's NBFi sector is comparable with other advanced economies, it is largely comprised of superannuation funds that are prudentially regulated (Graph 1). Features that characterise the Australian superannuation sector – such as limited use of leverage, preference for longer dated assets, stable funding sources and higher holdings of cash and deposits – make it less vulnerable to risks associated with other non-bank entities that are more highly leveraged or have runnable liabilities (such as hedge funds, discussed below). Outside of superannuation funds, the NBFi sector in Australia largely consists of insurers and managed funds investing on behalf of

superannuation funds. Credit intermediation from non-banks accounts for a small share of total credit in the Australian economy (Hudson, Kurian and Lewis 2023).

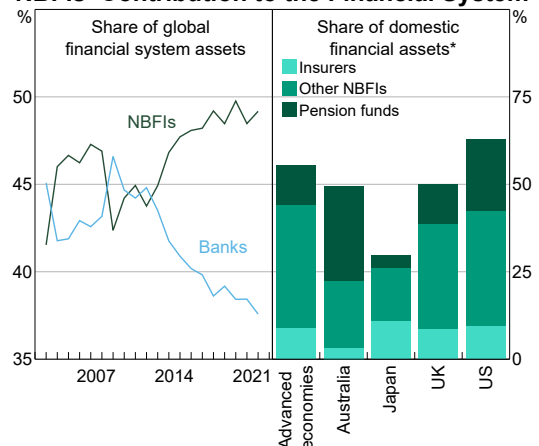
Assessing and addressing risks associated with NBFIs has been a key priority for global bodies as well as national regulators for the past decade. Events during the GFC highlighted a range of vulnerabilities, including a build-up of leverage, maturity mismatches between institutions' assets and liabilities, strong interlinkages with the traditional banking system and a general lack of transparency (Manalo, McLoughlin and Schwartz 2015). International work to monitor these vulnerabilities and strengthen oversight of the NBFi sector has been coordinated by the Financial Stability Board (FSB) in conjunction with other standard-setting bodies. This work has had two parts:

- **monitoring** trends and developments in the NBFi sector to better identify the build-up of systemic risks (FSB 2022)
- **policy recommendations** to strengthen the oversight and regulation of NBFIs, in conjunction with other international organisations (FSB 2023).^[3]

The policy response is ongoing. Furthermore, recent episodes of market stress involving NBFIs have highlighted an increase in vulnerabilities, as global reforms to enhance the resilience of the banking system have pushed certain activities and risks

Graph 1

NBFIs' Contribution to the Financial System



* Other NBFIs comprise of financial auxiliaries and other financial intermediaries. Data are as of end-2021.
Sources: FSB; RBA.

outside of the regulated sector (IMF 2023). The growing size and interconnectedness of the NBF sector has also created a greater risk for market dislocation and stress to spread across the financial system. This article discusses the common themes from recent stress events involving NBFs across a range of sectors and markets and considers policy implications for regulatory authorities in Australia and overseas.

Recent market stress events

March 2020: A ‘dash for cash’

Uncertainty arising from the rapid global spread of a new coronavirus and the economic effects of lockdowns and other government policy responses peaked in early 2020, triggering large declines in riskier asset prices and widespread asset sales, including very large outflows from investment funds. Demand for cash increased sharply due to risk aversion and as investment funds and other entities sought to reduce leverage, meet margin calls and meet redemptions. While investment funds were generally able to meet the redemption pressures without large disruptions, leverage and liquidity mismatches in some funds amplified market stress. For example, certain highly leveraged hedge funds contributed to dysfunction in the US Treasury market as large price fluctuations led to forced unwinding of positions to meet margin calls (Schrimpf, Shin and Sushko 2020). This included funds that were engaged in ‘basis’ trades that aimed to profit from small price deviations between economically similar bond exposures (such as between cash bonds and futures).

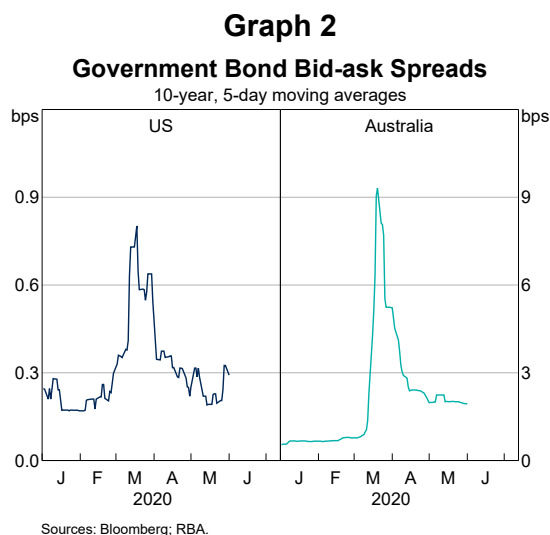
The forced selling from these funds added to widespread selling pressures in the US Treasury market by a range of entities, which overwhelmed the capacity of dealers to intermediate trades. This combination of large asset sales and constraints on dealer intermediation was self-reinforcing and resulted in severe market dysfunction.^[4] Yields on 10-year Treasuries moved by 65 basis points over nine days in March 2020 (Graph 2). Market participants faced large variation margin (mark-to-market) calls, adding to selling pressures in the US Treasury market. Initial margin requirements also

increased by over 70 per cent from the onset of the strains to their peak (Cunliffe 2022).^[5] Similar dynamics and yield movements were also present in other government bond markets, including in Australia (Finlay, Siebold and Xiang 2020).

March 2021: Archegos collapse

Archegos was a US-based family office that held highly leveraged long positions in a range of US and Chinese technology stocks. These positions were built up using equity derivatives such as total return swaps, in which Archegos paid a fixed fee and received a return based on price movements in an underlying stock. Archegos obtained derivatives exposure from a group of prime brokers that included several global systemically important banks (G-SIBs). These prime brokers hedged their positions by purchasing the underlying securities. Archegos used derivatives across multiple prime brokers to accumulate very large positions in individual stocks without disclosing the extent of its position to its brokers, other market participants and regulators. This included gaining effective control of more than 50 per cent of the freely trading shares in ViacomCBS, according to investigations by the US Department of Justice (discussed below).

In March 2021, a decline in ViacomCBS’ equity price triggered margin calls on Archegos’ leveraged positions, which the fund was unable to pay. This left Archegos’ prime brokers holding long unhedged positions in the underlying stocks, which



they sold to unwind their positions. The fire sale resulted in significant price declines for the stocks involved, and prime brokers that were slower to unwind their positions faced large losses as a result (Graph 3). Credit Suisse (a G-SIB) reported US\$5.5 billion in losses associated with the incident. This was one of multiple incidents that damaged the bank's reputation (RBA 2023a). Nomura reported losses of US\$2.8 billion associated with the incident, while Morgan Stanley reported losses of around US\$1 billion and UBS reported losses of around US\$770 million.

Archegos' failure highlighted the extent to which leverage can accumulate while remaining 'hidden' from regulators and market participants. In the case of Archegos, the fund allegedly engaged in deliberately fraudulent conduct to conceal details of its positions from its prime brokers; the head of Archegos and three other senior members of the fund were charged with fraud offences by the US Department of Justice in April 2022. The build-up of concentrated leveraged exposures was also enabled by the fund's status as a family office, which meant it was subject to minimal regulatory disclosure requirements, as well as deficiencies in banks' counterparty credit risk management.

March and September 2022: Liquidity stress in commodities markets

Russia's invasion of Ukraine triggered large increases in commodity prices and significant financial market volatility, which in turn led to higher margin

requirements. Participants with short positions, such as commodity producers hedging natural exposures, faced large variation margin calls. While most firms were able to meet these calls through existing facilities (such as bank credit lines), the liquidity stress posed systemic risks in some cases.

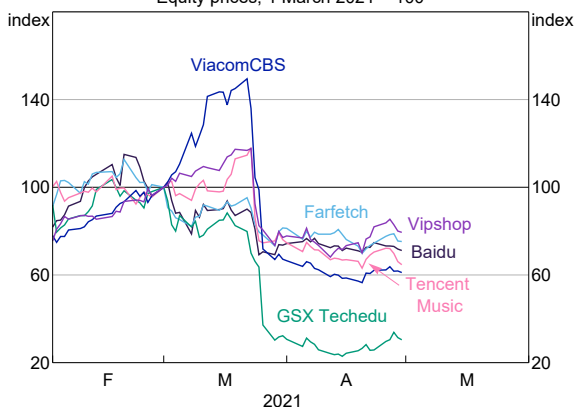
- In March 2022, the nickel futures market on the London Metal Exchange (LME) was suspended following a period of market dysfunction, initially triggered by liquidity stress at nickel producer Tsingshan. When nickel prices increased, Tsingshan was unable to meet margin calls associated with a very large short futures position. Tsingshan's brokers and bank counterparties sought to reduce their exposures by purchasing offsetting futures contracts, putting further upwards pressure on prices. This resulted in further margin calls for other participants with short positions, which also attempted to reduce or unwind their exposure. This created a dysfunctional price-margin cycle that saw the price of LME nickel rise by more than 250 per cent over 24 hours (Graph 4). In response, the LME retroactively cancelled trades entered into on 8 March, which helped to limit the extent of margin calls that brokers were facing. It also suspended trade between 8–15 March, and trading in LME nickel futures remained disorderly for several days following the resumption of trade.
- In September 2022, authorities in continental Europe and the United Kingdom announced liquidity support to energy companies, after a surge in gas prices led to large margin calls for companies hedging natural exposures with futures contracts. These liquidity facilities aimed to prevent the potential default of otherwise solvent energy producers, which would have been disruptive for both physical energy markets and the financial system. Some countries have since closed these facilities following a decline in gas prices.

In each of these events, many of the entities that faced liquidity stress were using futures contracts to hedge natural exposures. Nevertheless, there was a risk of widespread defaults if entities were unable to meet margin calls. For example, during the period

Graph 3

Selected Stocks held by Archegos

Equity prices, 1 March 2021 = 100



Source: Bloomberg.

of dysfunction in the LME nickel market, LME Clear suffered the largest initial margin breach in its history. If there had been widespread participant defaults, CCPs may have been exposed to large price moves and unable to absorb losses, which would have had significant implications for participants and financial stability.

September 2022: UK gilt market stress

In September 2022, UK long-term government bond yields rose sharply following the UK Government’s announcement of a large debt-financed fiscal stimulus package. The large increase in yields resulted in liquidity stress in some defined benefit pension funds engaged in ‘liability driven investment’ (LDI).^[6]

UK LDI pension funds purchase government bonds and interest rate derivatives to match their liabilities. Some LDI funds also use leverage, generated through the purchase of derivatives, to further grow the value of their assets to meet future liabilities. However, this increases their exposures to changes in asset prices, thereby increasing the potential size of margin they may need to provide to counterparties in the event the derivative prices move against their position.

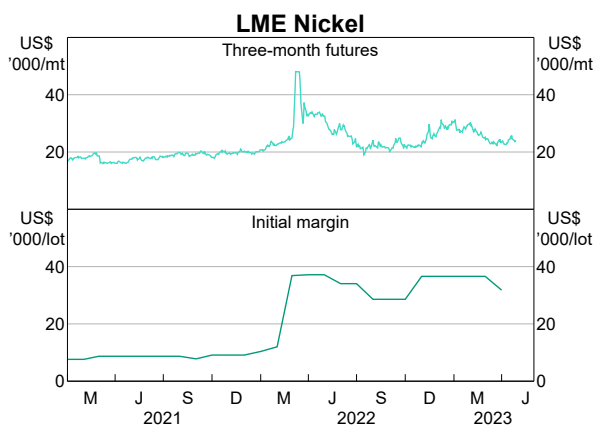
The sharp increase in UK yields had two effects on LDI pension funds. It reduced the future value of liabilities as the discount rate rose. However, the large yield movements also resulted in sizeable variation margin calls on derivatives purchased to match the liabilities. Funds that did not hold

enough cash sold assets including government bonds to meet the calls.

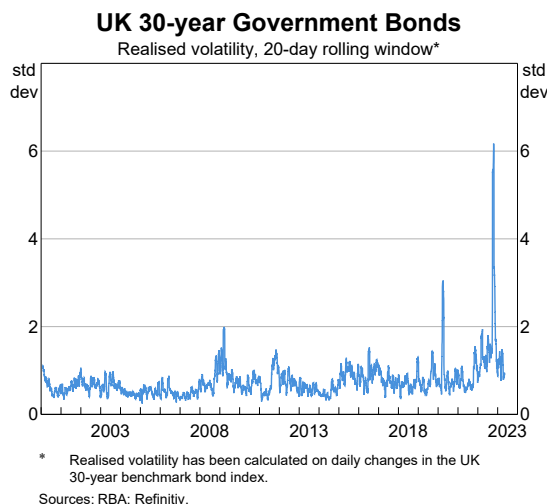
The sale of government bonds and interest rate derivatives in the market when the price of these assets was already falling created a feedback loop. The fall in price in 30-year gilts over a four-day period was over 65 per cent – more than twice as large as the moves during March 2020 and three times larger than any recent historical move (Graph 5) (Bank of England 2023). The disorderly conditions prompted the Bank of England (BoE) to purchase government bonds with the aim of restoring market functioning. The purchases occurred amidst the BoE’s monetary policy tightening cycle and required them to defer their government bond sale program.

Events in the UK gilt market highlighted the financial stability implications from investment strategies that involve high amounts of leverage that may be inadequately managed. In times of stress, entities with insufficient liquidity to hold their leveraged positions may be forced to liquidate their holdings to minimise their losses. This can exacerbate market volatility. The BoE has since made recommendations to improve LDI funds’ ability to withstand ‘severe but plausible’ stresses in the gilt market and meet margin calls without engaging in asset sales.

Graph 4



Graph 5



Key features of recent market stress events

Although the events discussed above occurred across a range of countries, sectors and markets, they were underpinned by common vulnerabilities. These vulnerabilities included high levels of 'hidden' leverage, liquidity mismatches between entities' assets and liabilities in stressed conditions, and deficiencies in risk management processes that left entities poorly prepared to manage market volatility.

Hidden leverage

Financial markets can become destabilised by a build-up of leverage, particularly where this occurs outside of the view of regulators. For example, some NBFIs employ leveraged trades on non-centrally cleared markets, which are subject to less oversight and where risk management practices may be less rigorous. Entities can also be structured and use financial instruments in ways that obscure their activity from regulatory view, as seen with Archegos.

Reforms following the GFC have intended to reduce hidden leverage, such as by recommending greater central clearing of derivatives contracts. However, centralised exchanges may also be vulnerable to the effects of hidden leverage, as regulatory oversight of these risks can be hampered by confidentiality issues that restrict data sharing with relevant supervisors (IMF 2023). While there are regulatory requirements on CCPs to manage the risks posed by participants and their clients, CCPs themselves may also have limited visibility of leverage and concentration risks if entity positions are spread across multiple brokers, as occurred in the LME nickel market event and in the case of Archegos, which had positions both on and off central exchanges.

Liquidity mismatches

The balance sheet structure of NBFIs can leave them vulnerable to liquidity mismatches that can pose financial stability risks, especially when combined with highly leveraged trading strategies. In periods of stress, outsized leveraged positions that need to be marked-to-market may generate liquidity stress. Entities with illiquid assets and short-term liabilities

may also find it difficult to liquidate assets to meet obligations associated with their leveraged positions, a risk that materialised for many open-ended funds during March 2020.

Asset fire sales from entities facing liquidity pressure can cause dysfunction in asset markets. Liquidity stress can also transmit to other participants if entities are unable to acquire sufficient liquidity to post margin.

Deficiencies in risk management practices

A common feature across the recent episodes of market dysfunction was NBFIs' inability to meet unexpected and large increases in margin calls as their existing liquidity buffers were inadequate and other assets were too illiquid to meet their obligations.

In many instances, such as in the LME nickel and UK gilt markets episodes, the price movements were favourable to their underlying or natural position – for example, a higher nickel price increased Tsingshan's future profits as a nickel producer. However, the speed and magnitude of price moves generated immediate liquidity needs from margin calls that could not be met without accessing external sources of funding (which can be slow or difficult to acquire, especially in times of broader stress) or liquidating their existing positions (which can amplify market volatility).

These deficiencies were exacerbated by the limited transparency and oversight of entities' risk management practices. This was particularly evident in the cases of Archegos and Tsingshan, which were able to build up positions across multiple brokers and across on-exchange and over-the-counter markets. Limited visibility over the nature and extent of these exposures can impact CCPs' risk management to ensure ongoing market functioning.

Policy implications

Recent market stress events have highlighted the increasing importance of the NBFIs sector in financial markets. These events have also raised a number of issues for policymakers.

Procyclical margining

In many cases, market stress emerged from leveraged participants with losing positions and limited liquidity to meet margin calls. This was met by either selling other assets to fund margin, leading to stress contagion, or winding down positions, which can exacerbate price movements and generate a re-enforcing feedback loop.

The expanded use of margin was a significant global policy initiative resulting from the GFC. The exchange of margin is designed to mitigate risks between financial market participants. It provides an early warning signal of a participant under liquidity stress and reduces the credit risk exposures between participants, thereby reducing the potential for contagion in the event of a participant default.

An anticipated consequence of the greater use of margin is that participants must be prepared to meet the liquidity demands from changes in margin requirements. Some of the events indicate that not all participants are adequately prepared. This may be a consequence of the lack of transparency of margin models or their excessive procyclicality.

Procyclicality in margining has been a focus of authorities in recent years, with international guidance encouraging CCPs to maintain higher initial margin requirements ‘through the cycle’ to limit the need for destabilising changes in times of stress (RBA 2020b). In 2022 the global standard-setting bodies for market infrastructures, banking and securities markets issued the ‘Review of Margining Practices’ (BCBS-CPMI and IOSCO 2022). The Review details how these bodies plan to set baseline expectations for margin procyclicality, and the role of clearing participants’ practices when passing on CCP margin calls to clients in dampening or exacerbating procyclical margins.

Central bank intervention

In response to the recent instances of severe market disruption, central banks have provided policy support to restore orderly market functioning, including via liquidity provision to NBFIs and asset purchases (FSB 2020; RBA 2020a).

While central banks may be available to support financial markets and participants when tail-risk events occur, there remains a question on the level of market dysfunction regulators should be willing to accept to minimise moral hazard and encourage self-insurance by market participants, particularly from NBFI entities that often fall outside of the purview of regulators. As NBFI participation grows in key markets (such as US Treasury securities), policymakers are considering the effects that structural changes in financial markets and its participants may have on the prevalence of episodes of market dysfunction and the impacts of frequent intervention. Alongside this, there remains uncertainty over the optimal type of intervention (i.e. the relative merits of standing versus more ad-hoc facilities), and whether non-bank entities should have access to central bank liquidity facilities (and if so, under what circumstances) (Schrimpf, Shin and Sushko 2020; Breckenfelder and Hoerova 2023; IMF 2023).

Could these issues arise in Australia?

The scope for financial stability risks stemming from NBFIs operating in Australia is limited by the differences in the composition and structural features of the sector compared with other jurisdictions; Australia’s NBFI sector is largely comprised of superannuation funds, and credit intermediation from non-banks is limited.

However, stress arising in overseas financial markets can transmit to Australia, as Australian banks and NBFIs are active in global financial markets. To date, market stress from events overseas has had minimal effects on Australian markets and institutions.

Australian superannuation funds

One channel through which international stress events could transmit domestically is through the superannuation sector, due to its size and significant international financial market participation. Superannuation funds constitute the largest share of the Australian NBFI sector, with assets under management equivalent to around 140 per cent of domestic GDP in 2022. While Australian funds’ use of leverage is limited, around 35 per cent of their funds are invested offshore and

survey data indicate that around 40 per cent of these offshore investments are hedged (RBA 2023b). As a result, stress in international markets that increases foreign exchange volatility could trigger large margin calls for superannuation funds.

In addition, domestic superannuation funds could face liquidity risks from unanticipated member withdrawals and/or switching to safe assets, which can be large during periods of high market uncertainty. This risk crystallised in March 2020, when Australian superannuation funds faced a combination of liquidity pressures from: investors switching away from more risky and thus less liquid investment options; increased margin calls from foreign currency hedges; and the Australian Government's early release of superannuation scheme that created unanticipated liquidity needs. However, the superannuation industry managed these extreme circumstances without causing disruptions to underlying asset markets (RBA 2021).

The disruptions that affected UK pension funds in 2022 did not directly affect Australian superannuation funds other than through increased volatility in foreign exchange and government bond markets. More broadly, there are key differences between the UK pension fund industry and the Australian superannuation industry that make such an event unlikely to occur in Australia (RBA 2023b). For example, in comparison with UK pension funds that are mostly defined benefit, Australian superannuation funds are mostly defined contribution, where investment risk is borne by members rather than the fund. This reduces the need to hedge long-run interest rate risk, which is typically done using interest rate swaps and results in embedded leverage. Australian superannuation funds also make less use of derivatives overall (21 per cent of assets compared with 62 per cent in the United Kingdom) and have larger cash holdings that can be used to meet margin calls (12 per cent of assets versus 2 per cent in the United Kingdom).

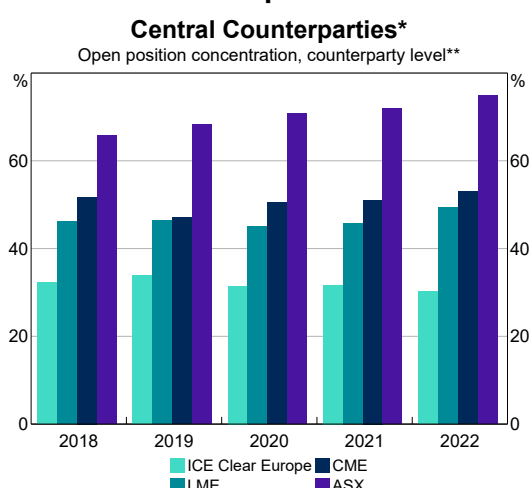
Domestic and international CCPs

CCPs are classified as systemically important institutions in many jurisdictions, including Australia. As such, a stress event that threatens the solvency of the CCP would be a significant risk to

broader financial stability (Debelle 2018). Similar to their international counterparts, domestic CCPs (such as the ASX) have margining methodologies that may respond procyclically in times of market stress. In addition, the ASX has concentrated participant exposures in certain markets (Graph 6). In tail-risk scenarios where shocks cause these participants to withdraw from market-making, this decline in market depth could materially affect price volatility and reduce the efficacy of the ASX's initial margin calculations (and thus its ability to absorb losses). If a large participant faces liquidity stress that leaves it unable to meet margin calls, the ASX may also find it difficult to close out these positions, especially if the participant's default affects the health of other participants in the market.

Domestic financial markets could also experience spillovers from stress events in international CCPs, as some of these CCPs operate in Australia and clear Australian securities. International stress tests, such as in Europe, have revealed that some CCPs have a shortfall of collateral to manage the extent of their concentrated participants' exposures (ESMA 2022). Stress that affects the ongoing viability of international CCPs has the potential to affect domestic market functioning, although contagion from international CCPs has not occurred in past stress episodes.

Graph 6



* ASX, ICE Clear Europe and CME clear a range of interest rate, commodity and fixed income derivatives. LME is a commodities exchange.

** For clearing services with 25 or more members, the average percentage of open positions held by the largest 10 clearing members (item 18.2.2 from CPMI-IOSCO disclosures). For ASX, this is for 10 or more members (disclosure item 18.2.1).

*** Open position concentration for CME refers to their Base products category.

Sources: ASX; CME; ICE; LME.

Conclusion

NBFIs are an increasingly important part of the global financial system, providing a broad range of financial services that are not well suited to the traditional banking sector. However, recent episodes of market stress have highlighted the complexity of the sector and how NBFI-driven stress can be a source of instability for the broader financial system. Prevailing market volatility and liquidity stress during these events were exacerbated by a rapid, disorderly unwinding of positions by certain NBFIs, underpinned by common vulnerabilities such as highly leveraged

investment strategies, liquidity mismatches and weaknesses in risk management practices. These events have reignited ongoing discussions among policymakers on strengthening NBFIs' and market resilience to such shocks, and the role of central bank intervention in response to NBFI-driven stress. The NBFI sector and financial markets in Australia have proven to be largely resilient to international market stress to date, due to structural and compositional differences that mitigate the vulnerabilities identified internationally. Nevertheless, regulators both internationally and in Australia remain attentive to risks and developments in the NBFI sector to ensure financial system stability. ❖

Endnotes

- [*] The authors are from Financial Stability and Domestic Markets departments. This article draws on work completed by Julie Guo. The authors are grateful for feedback provided by Jon Cheshire, Mustafa Yuksel, Jordan Brell, Claude Lopez, Michelle Lewis, Eden Hatzvi, Andrea Brischetto and Brad Jones.
- [1] The Financial Stability Board (FSB) defines the NBFI sector as all financial institutions that are not central banks, banks or public financial institutions. The FSB also defines NBFIs in a narrower sense such as to exclude insurers and pension funds, as they are prudentially regulated and employ different leverage and trading strategies. This article relies on this definition to focus largely on investment funds, family offices, CCPs and other financial intermediaries. The term 'bank' is defined by the FSB to include other deposit-taking institutions such as credit unions. The NBFI sector was previously referred to as the 'shadow banking' sector, defined as credit intermediation involving entities and activities (fully or partially) outside the regular banking system. The term NBFI captures a broader range of entities performing a more diverse range of services.
- [2] Warehouse facilities act like a line of credit and are collateralised by the securitisers' originated loans (Hudson, Kurian and Lewis 2023).
- [3] These included policies that aimed to: mitigate spillovers between banks and the NBFI sector; reduce the susceptibility of money market funds (MMFs) to runs; align incentives associated with securitisation; dampen financial stability risks and procyclical incentives associated with securities financing transactions; and mitigate systemic risks posed by other non-bank entities and activities. The FSB is monitoring implementation of these recommendations into members' regulatory frameworks (see FSB 2023).
- [4] These constraints on dealer intermediation include ensuring that banks have sufficient stock of high-quality liquid assets and disincentivising over-reliance on short-term funding that can be more volatile during market stress. Such reforms were instituted as part of post-GFC reforms to minimise instances of oversupply and underpricing of liquidity that encouraged excessive risk-taking. However, as seen in March 2020, they may be less able or willing to warehouse or absorb risk. This may lead price volatility to persist for longer (DeBelle 2015).
- [5] Variation margin is typically collected at least daily from participants to cover daily market movements, preventing the build-up of exposures. Initial and additional margin is used to cover potential future exposures that a CCP would take on in the event of a participant default (e.g. price movements between the last variation margin payment and the time that a defaulting participant's portfolio can be closed out). For additional background on CCP margin frameworks, see Carter and Cole (2017).
- [6] An LDI strategy involves purchasing assets to match liabilities. The process of liability matching is dynamic because the value of future liabilities is dependent on the level of interest rates – that is, the present value of future liabilities increases if interest rates fall.

References

- Bank of England (2023), 'Bank Staff Paper: LDI Minimum Resilience – Recommendation and Explainer', 29 March.
- BCBS-CPMI (Basel Committee on Banking Supervision Committee on Payments and Market Infrastructures) and IOSCO (Board of the International Organization of Securities Commissions) (2022), 'Review of Margining Practices', September.
- Breckenfelder J and M Hoerova (2023), 'Do Non-banks Need Access to the Lender of Last Resort? Evidence from Fund Runs', ECB Working Paper No 2805.
- Carter L and D Cole (2017), 'Central Counterparty Margin Frameworks', *RBA Bulletin*, December.
- Cunliffe J (2022), 'Learning from the Dash for Cash – Findings and Next Steps for Margining Practices', Speech at Futures Industry Association and Securities Industry and Financial Markets Association (SIFMA) Asset Management Derivatives Forum, Dana Point, 9 February.
- Debelle G (2015), 'Bond Market Liquidity, Long-term Rates and China', Speech at the Actuaries Institute's 'Banking on Change' Seminar, Sydney, 16 September.
- Debelle G (2018), 'Lessons and Questions from the GFC', Speech at the Australian Business Economists Annual Dinner, Sydney, 6 December.
- ESMA (European Securities and Markets Authority) (2022), '4th ESMA Stress Test Exercise for Central Counterparties', July.
- Finlay R, C Siebold and M Xiang (2020), 'Government Bond Functioning and COVID-19', *RBA Bulletin*, September.
- FSB (Financial Stability Board) (2020), 'Holistic Review of the March Market Turmoil', November.
- FSB (2022), 'Global Monitoring Report on Non-Bank Financial Intermediation 2022', December.
- FSB (2023), 'Implementation of G20 Non-Bank Financial Intermediation Reforms: Progress Report', January.
- Hudson C, S Kurian and M Lewis (2023), 'Non-bank Lending in Australia and the Implications for Financial Stability', *RBA Bulletin*, March.
- IMF (International Monetary Fund) (2023), 'Global Financial Stability Report', April.
- Manalo J, K McLoughlin and C Schwartz (2015), 'Shadow Banking – International and Domestic Developments', *RBA Bulletin*, March.
- RBA (Reserve Bank of Australia) (2020a), 'Box A: Risks from Investment Funds and the COVID-19 Pandemic', *Financial Stability Review*, October.
- RBA (2020b), 'Response to COVID-19', *2019/20 Assessment of ASX Clearing and Settlement Facilities*, April.
- RBA (2021), 'Box C: What Did 2020 Reveal About Liquidity Challenges Facing Superannuation Funds?', *Financial Stability Review*, April.
- RBA (2023a), 'Box A: Recent International Bank Failures: Causes, Regulatory Responses and Implications', *Financial Stability Review*, April.
- RBA (2023b), 'Chapter 2: The Australian Financial System', *Financial Stability Review*, April.
- Schrimpf A, HS Shin and V Sushko (2020), 'Leverage and Margin Spirals in Fixed Income Markets During the Covid-19 Crisis', *BIS Bulletin*, 2 April.