Assessment of Chicago Mercantile Exchange Inc.

March 2018

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Executive Summary

Purpose

This report presents the Reserve Bank of Australia's Assessment of Chicago Mercantile Exchange Inc. (CME), which operates in Australia under an overseas clearing and settlement (CS) facility licence. CME is incorporated in the United States, and is primarily regulated by the Commodity Futures Trading Commission (CFTC) under US legislation. CME has been designated in the United States as a Systemically Important Derivatives Clearing Organization (SIDCO), and therefore is also subject to oversight by the Federal Reserve Board of Governors.

Given the nature and scope of CME's current activities in Australia, the Bank has not considered it necessary at this stage to conduct a detailed assessment of CME against all of the *Financial Stability Standards for Central Counterparties* (the CCP Standards). This report covers developments relating to the Bank's Assessment of CME for the 12 months ending 31 December 2017 (the assessment period).

Conclusion

In the assessment period CME has either met or made some progress towards meeting the outstanding regulatory priorities outlined in the Bank's previous Assessment.

Progress towards regulatory priorities

During the assessment period, CME materially reduced the size and concentration of its unsecured investments of cash collateral with non-government obligors, with the majority of its investments now placed with the Federal Reserve.

CME also progressed its work on implementing its recovery and wind-down plans. The associated rule changes for its over-the-counter (OTC) Interest Rate Swap (IRS) clearing service are expected to be implemented during the next assessment period. Furthermore, CME commissioned an independent review of its Liquidity Risk Management Framework (LRMF) in 2017.

2018 priorities and supervisory focus

In the coming year the Bank expects to complete its review of CME's recovery and wind-down plans as updated by CME. The Bank will also review the results of the independent review of CME's LRMF once it is completed.

In addition, the Bank will consider the alignment of CME's practices with guidance from the Committee on Payments and Market Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO), *Resilience of central counterparties (CCPs): Further guidance on the PFMI* and will continue to expect CME to consider any implications of the CPMI-IOSCO *Guidance on cyber resilience for financial market infrastructures* for its operations.

Developments Relating to the Bank's Assessment

CME is a Chicago-based central counterparty (CCP) that provides clearing services for a number of products from its US operations. CME operates three clearing services: an over-the-counter (OTC) Interest Rate Swap (IRS) clearing service; a 'Base' clearing service; and an OTC Credit Default Swap (CDS) clearing service. The Base service accounts for the majority of CME's total clearing activity and covers exchange-traded interest rate futures and options on futures, foreign exchange (FX), equity, soft commodity, energy and metal futures, certain OTC FX forwards and options, and commodity swaps.[1] CME maintains separate default resources (i.e. default waterfalls) for each clearing service. Further background on CME's risk management is set out in Appendix B.2.

In Australia, CME holds a CS facility licence, which permits it to offer clearing services to Australian-based institutions as direct clearing participants for OTC interest rate derivatives (IRD) and non-Australian dollar-denominated IRD traded on the CME market or the Chicago Board of Trade (CBOT) market, for which CME permits portfolio margining with OTC IRD.[2]

Given the nature and scope of CME's current activities in Australia, the Bank has not considered it necessary at this stage to conduct a detailed assessment of CME against all of the CCP Standards. The Bank instead conducts and publishes a narrower assessment, focusing on CME's progress towards addressing key issues.

This document summarises developments during the assessment period in relation to the Bank's outstanding regulatory priorities for CME set out in the *Assessment of Chicago Mercantile Exchange Inc.* published in March 2017 (the March 2017 Assessment).[3] This document also summarises the Bank's priorities and supervisory focus for the 2018 assessment period and highlights other relevant regulatory developments.

Progress against Regulatory Priorities

CME was granted a CS facility licence in September 2014. In assessing CME's licence application at that time, the Bank conducted an initial assessment of CME's observance of the CCP Standards.[4] As part of that assessment, the Bank determined a set of initial regulatory priorities for CME reflecting expectations set out in the CCP Standards and by the Council of Financial Regulators (CFR) in July 2012

1 During the assessment period CME made several changes to its product and service offerings that were not directly related to the products it is licensed to clear in Australia. These changes included, among others, announcing the exit from its CDS clearing service in 2018, closing its European clearing house CME Clearing Europe Limited and launching bitcoin futures contracts in December 2017.

2 A copy of the licence is available at <http://download.asic.gov.au/media/2018403/cme-cs-facility-licence-signed-30-september-2014.pdf>.

3 See RBA (2017), 'Assessment of Chicago Mercantile Exchange Inc.', March. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/chicago-mercantile-exchange/2017/pdf/cme-assessment-2017-03.pdf>.

4 See RBA (2014), 'Initial Assessment of Chicago Mercantile Exchange Inc. against the Financial Stability Standards for Central Counterparties', September. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/chicago-mercantile-exchange/2014/pdf/cme-assess-2014-09.pdf>.

in its policy *Ensuring Appropriate Influence for Australian Regulators over Cross-border Clearing and Settlement Facilities* (CFR Regulatory Influence Policy).[5]

The Bank set out a number of regulatory priorities for CME in its March 2016 Assessment, of which several had been fully addressed by CME at the time of the March 2017 Assessment.[6] However, three regulatory priorities had not been fully addressed, and the Bank noted its supervisory focus for 2017 was to monitor the outcome of work planned or completed by CME to address these. The Bank did not set additional regulatory priorities for 2017.

The three outstanding regulatory priorities, and the Bank's assessment of the progress made by CME against these, are summarised in Table 1 and discussed in more detail below.

Table 1: Progress against Regulatory Priorities for CME

Standard	2017 Regulatory Priority	Comment
3. Framework for the comprehensive management of risks 14. General business risk	CME should complete its work to implement its recovery and wind-down plans. The Bank will expect to conduct a review of these plans once this work has been completed, and to engage with CME regarding how its recovery and wind-down plans meet the requirements of the CCP Standards and the guidance on recovery planning set out by CPMI-IOSCO.	*Ongoing. Expected to be fully addressed in 2018.* At the end of the assessment period, CME was working on implementing end of waterfall rule changes for its OTC IRS clearing service. CME has indicated these rule changes are expected to be implemented in 2018. Rule changes for the Base service were implemented at the end of 2016. The Bank has commenced a review of CME's recovery plan against the CCP Standards and the guidance on recovery planning set out by CPMI-IOSCO. The Bank expects to complete its review in the next assessment period subject to the updated recovery and wind-down plans being received.
7. Liquidity risk	The Bank expects CME to share the reports from the validations that it conducts of its liquidity stress testing model and any further validations of the LRMF, and to engage with the Bank on the results.	*Ongoing. Expected to be fully addressed in 2018.* At the end of the assessment period, CME indicated to the Bank an external validation of the LRMF and of the models underlying the liquidity tool was close to being completed. The Bank expects CME to share the reports from this validation and engage with the Bank on the results.
15. Custody and investment risks	The Bank expects CME to continue to reduce the size and concentration of its unsecured investments of cash collateral with non-government obligors.	*Fully addressed.* During the assessment period, CME expanded further the number of its investment counterparties, and substantially increased the share of cash collateral deposited at central bank accounts.

5 The CFR Regulatory Influence Policy sets out a graduated framework that imposes additional requirements on cross-border facilities proportional to the facility's activities in the Australian financial system. Available at <https://treasury.gov.au/publication/ensuring-appropriate-influence-for-australian-regulators-over-cs-facilities/>.

6 See RBA (2016), '2014/15 Assessment of Chicago Mercantile Exchange Inc.', March. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/chicago-mercantile-exchange/2016/pdf/cme-assessment-2016-03.pdf>.

Recovery and wind-down plans

During the assessment period, CME continued to work on the implementation of recovery and wind-down plans for its Base and OTC IRS clearing services. As part of implementing these plans, the CME Board approved changes to the end of waterfall rules for its Base clearing service in late 2016; at the end of the assessment period, CME was working on conforming rule changes for the OTC IRS service and has indicated to the Bank these changes are expected to be implemented in 2018.

During the assessment period the Bank commenced its review of CME's recovery plan against the CCP Standards and updated CPMI-IOSCO report on *Recovery of financial market infrastructures* (Recovery Guidance).[7] However, during the review CME informed the Bank it was updating both the recovery and wind-down plans. As a result, the Bank expects to complete its review in the next assessment period subject to the updated plans being received. The Bank will therefore carry over this regulatory priority to the next assessment period.

Unsecured investments

One of the Bank's 2016 regulatory priorities was that CME continue to reduce the size and concentration of its unsecured investments of cash collateral with non-government obligors. CME began depositing house funds in its account at the Federal Reserve Bank of Chicago in November 2016; CME's account for customer cash collateral at the Federal Reserve became operational in March 2017. As a result, the size of CME's unsecured investments of cash collateral with non-government obligors declined sharply over the assessment period. At end December 2017, CME had US$4.8 billion invested on an unsecured basis with commercial banks, down from US$15.2 billion at end December 2016.

The concentration of these unsecured investments also fell during the assessment period. At end December 2017, 56 per cent of CME's unsecured cash investments were held with three counterparties, down from 74 per cent at end December 2016. During the assessment period CME added additional counterparties to invest with on an unsecured basis, and expects to add more over time. CME continues to deposit a small amount of Canadian dollars with the Bank of Canada.

The Bank is satisfied that, by using accounts at central banks and expanding the number of investment counterparties, CME has materially reduced the size and concentration of its unsecured investments with non-government obligors. As a result, the Bank has concluded that CME has fully addressed this regulatory priority, although it will continue to collect data on unsecured investments with a view to revisiting the issue in case of any material developments.

Liquidity risk

As indicated in the March 2017 Assessment, the CME Global Assurance team conducted an independent review of the LRMF during 2016.[8] In April 2017, CME provided the Bank with a copy of this review, which concluded that CME's credit and liquidity risk management processes and controls were 'adequate', the highest possible rating. The review focused on internal processes and controls, and was not intended to address the full extent of a validation under CME's Model Validation Framework.

CME commissioned an external validation of its LRMF and at the end of the assessment period indicated to the Bank the validation report was close to being completed. CME advised the Bank that the report would include (i) a review of the completeness, appropriateness and regulatory compliance of the LRMF; and (ii) a qualitative assessment of the liquidity tool and its implementation (i.e. liquidity

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7 See CPMI-IOSCO (2017), 'Recovery of financial market infrastructures', July. Available at <http://www.bis.org/cpmi/publ/d162.pdf>.

8 The review covered processes and controls relating to credit and liquidity risk management.

stress testing, liquidity stress-test scenarios and the liquidity dashboard). In addition, the Global Assurance team continued its internal auditing of CME's credit and liquidity risk management practices during the assessment period.

The Bank expects CME to share these validation reports once they are finalised, and engage with the Bank on the results during the next assessment period. The Bank will therefore carry over this regulatory priority to the next assessment period.

2018 Priorities and Supervisory Focus

As noted above, the Bank will carry over the regulatory priorities related to recovery and wind-down plans and liquidity risk. The Bank is not setting any additional regulatory priorities for CME for 2018. During the next assessment period the Bank expects to:

- complete its review of CME's updated recovery and wind-down plans
- review the results of the external validation of CME's LRMF.

In addition, the Bank will have a supervisory focus on monitoring how CME's practices align with recent guidance from CPMI-IOSCO in relation to resilience (discussed further below); such guidance is applicable to all CCPs, and the Bank expects Australian-licensed CCPs, including CME, to align their arrangements and practices with this guidance. The Bank also continues to expect CME to consider any implications of the CPMI-IOSCO *Guidance on cyber resilience for financial market infrastructures* for its operations.

In the event that CME has material direct Australian participation, or should there be a significant increase in CME's provision of services in Australian-related products, consistent with the expectations set out in the CFR Regulatory Influence Policy, the Bank will expect that CME should:

- ensure that Australian representation in governance arrangements appropriately reflects the scale and nature of Australian participation
- ensure that local market practices are appropriately accommodated
- ensure that there is appropriate representation of Australian membership and regulators in default management
- provide adequate operational support arrangements to Australian participants, particularly during Australian market hours.

Other Regulatory Developments

CPMI-IOSCO implementation monitoring

In August 2016, CPMI and IOSCO published a report on the results of a peer review examining consistency in the outcomes of CCPs' implementation of the *Principles for Financial Market Infrastructures* (PFMI) with respect to their financial risk management and recovery practices.[9] This review covered 10 CCPs internationally that provide clearing services for derivatives, including CME.

9 See CPMI-IOSCO (2016), 'Implementation monitoring of PFMI: Level 3 assessment – Report on the financial risk management and recovery practices of 10 derivatives CCPs', August. Available at <http://www.bis.org/cpmi/publ/d148.pdf>.

Over the assessment period the Bank participated in a CPMI and IOSCO follow-up review of CCPs' progress in addressing the most serious issues of concern identified in the August 2016 report. The Bank expects to discuss the findings of the follow-up review with CME in the next assessment period.

CCP resilience and recovery guidance

In light of the increasing systemic importance of CCPs, in 2015 a number of international standard-setting bodies developed a joint workplan to further enhance the effectiveness of CCP resilience, recovery and resolution. As part of this work plan, in July 2017, CPMI and IOSCO published *Resilience of central counterparties (CCPs): Further guidance on the PFMI* (Resilience Guidance) and updated guidance on *Recovery of financial market infrastructures*.[10]

The Resilience Guidance provides further details on certain principles and key considerations in the PFMI, in order to improve the resilience of CCPs. The guidance focuses on five key aspects of a CCP's financial risk management framework: governance; stress testing for both credit and liquidity exposures; coverage of financial resources; margin; and a CCP's contribution to its pre-funded resources.

The revised Recovery Guidance provides additional clarifications in four areas of recovery planning: operationalisation of the recovery plan; replenishment; non-default-related losses; and transparency with respect to recovery tools and how they work.

During the assessment period, the Bank formally adopted both the Resilience Guidance and the revised Recovery Guidance in interpreting the relevant CCP Standards. The Bank therefore expects CME to consider the implications of this guidance for its financial risk management and recovery planning.

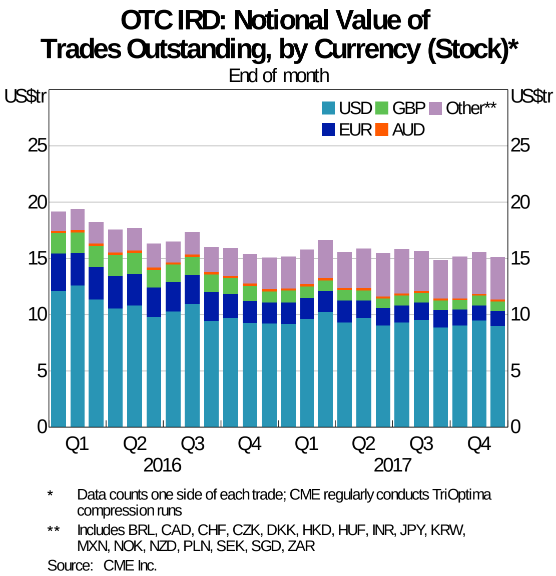
10 See CPMI-IOSCO (2017), 'Resilience of central counterparties (CCPs): Further guidance on the PFMI', July. Available at < https://www.bis.org/cpmi/publ/d163.pdf>.

Appendix A: Activity in CME

A.1 OTC IRD

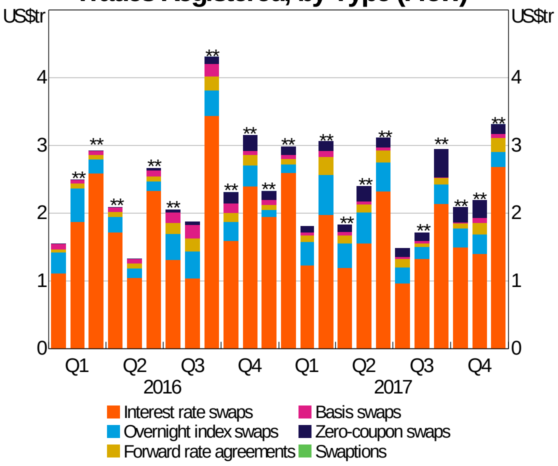
CME clears OTC IRD denominated in 21 different currencies, including Australian dollars. OTC IRD denominated in Indian rupee and Korean won were added to CME's clearing service during the assessment period. The notional value of cleared OTC IRD transactions outstanding with CME was US$15.1 trillion at end December 2017 (Graph 1), little changed since end December 2016. US dollar-denominated OTC IRD accounted for around 68 per cent of OTC IRD transactions cleared by CME in 2017. On average over the assessment period, 1 per cent of the total notional value of OTC IRD outstanding with CME was denominated in Australian dollars. CME conducted trade compression cycles for US dollar, euro, Japanese yen, Mexican peso and Brazilian real-denominated OTC IRD contracts over the assessment period. Compression runs reduce the notional value of trades outstanding.

Graph 1



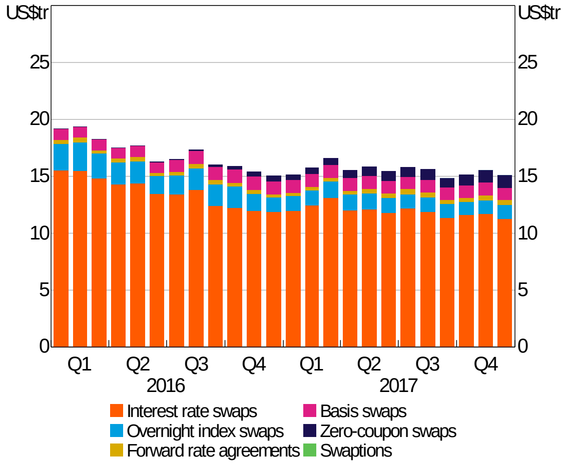
CME clears six types of OTC IRD: IRS, zero-coupon swaps, basis swaps, forward rate agreements, overnight index swaps (OIS) and swaptions. CME expanded its clearing service to include swaptions and Australian dollar-denominated OIS in 2016. Graph 2 and Graph 3 depict, respectively, notional value registered and notional value outstanding in CME's OTC IRS clearing service by product type. IRS constitute the largest component of the outstanding value of open trades.

Graph 2
OTC IRD: Notional Value of Trades Registered, by Type (Flow)*



* Data counts one side of each trade
** CME conducted a TriOptima compression run in this month; compression runs increase the notional value of trades registered in the affected month
Source: CME Inc.

Graph 3
OTC IRD: Notional Value of Trades Outstanding, by Type (Stock)*
End of month



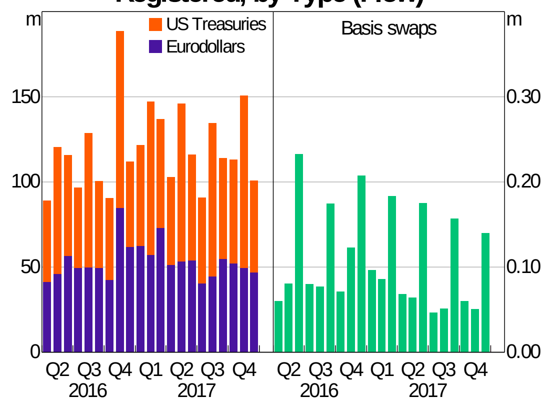
* Data counts one side of each trade; CME regularly conducts TriOptima compression runs
Source: CME Inc.

A.2 Exchange-traded Derivatives

As noted above, CME clears a range of exchange-traded derivatives through its Base service. CME is licensed in Australia to clear a subset of these products: non-Australian dollar-denominated IRD traded on the CME market or the CBOT exchange for which CME permits portfolio margining with OTC IRD – currently, US Treasury futures and US deliverable swap futures traded on the CBOT exchange, and Eurodollar futures traded on the CME exchange.[11]

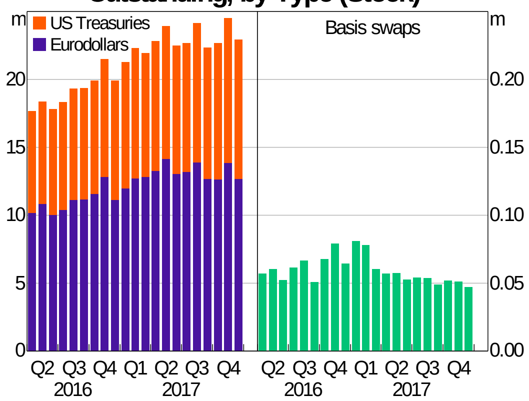
The number of trades registered and outstanding in these products, by product type, is depicted in Graph 4 and Graph 5, respectively.

Graph 4
Futures: Number of Trades Registered, by Type (Flow)*



* Only includes Base products that are eligible for portfolio margining; data counts one side of each trade
Source: CME Inc.

Graph 5
Futures: Number of Trades Outstanding, by Type (Stock)*



* Only includes Base products that are eligible for portfolio margining; data counts one side of each trade
Source: CME Inc.

11 Portfolio margining is where margin calculations are made at the portfolio level rather than at the product level, allowing for reduced margin requirements to the extent that there are offsetting open positions across the portfolio of products.

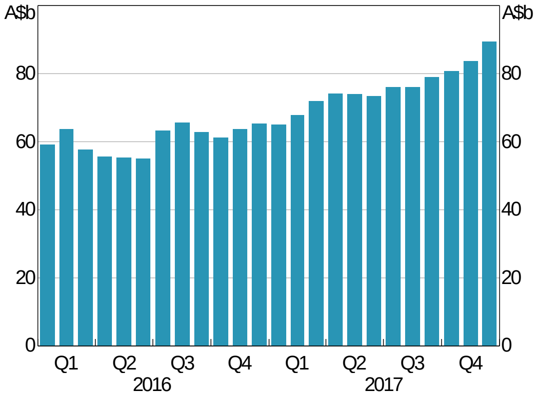
A.3 Australian Activity

CME does not currently have any direct Australian clearing participants. However, a number of Australian-based banks, superannuation funds and other institutional investors clear OTC IRD products indirectly through CME, as clients of direct clearing participants. At end December 2017, the notional value outstanding of indirect Australian participants' OTC IRD trades in all currencies was around A$89 billion (Graph 6).

Graph 6

OTC IRD: Notional Value Outstanding of Australian Indirect Participants (Stock)*

End of month



* Data counts one side of each trade

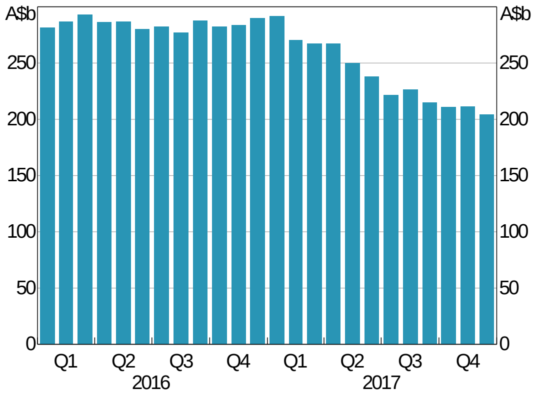
Source: CME Inc

Graph 7 and Graph 8 depict the notional value of Australian dollar-denominated OTC IRD trades outstanding and registered with CME. At end December 2017, CME had around A$204 billion notional value of Australian dollar-denominated OTC IRD trades outstanding.[12] This represents around 1.5 per cent of the notional value outstanding of all centrally cleared Australian dollar-denominated OTC IRD trades (around A$12 trillion at end December 2017).[13]

Graph 7

OTC IRD: Notional Value of AUD-denominated Trades Outstanding (Stock)*

End of month



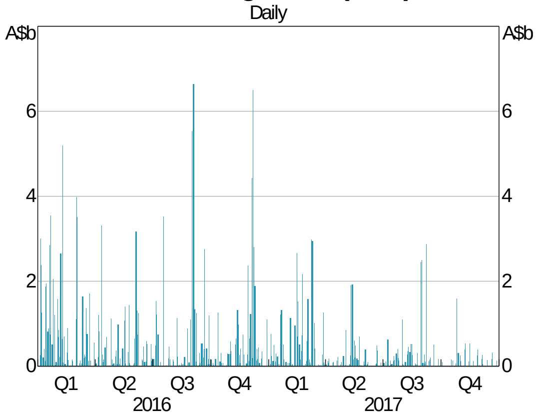
* Data counts one side of each trade

Source: CME Inc.

Graph 8

OTC IRD: Notional Value of AUD-denominated Trades Registered (Flow)*

Daily



* Data counts one side of each trade

Source: CME Inc.

12 This figure counts one side of each trade.

13 This is as a proportion of the Australian dollar-denominated OTC IRD trades cleared at ASX Clear (Futures), CME Inc. and LCH Limited's SwapClear service. These figures count one side of each trade.

Appendix B: CME Regulatory Environment and Risk Management

B.1 Regulatory Framework

CME is incorporated in the United States and is primarily regulated by the CFTC under US legislation. As a designated SIDCO, CME is also subject to oversight by the Federal Reserve Board of Governors.

In Australia, CME is licensed under section 824B(2) of the *Corporations Act 2001*, which provides an alternative licensing route for an overseas-based CS facility subject to requirements and supervision in its home country that are considered to be sufficiently equivalent to those in Australia. The regulatory regime in the United States, as administered by the CFTC, is considered to be sufficiently equivalent to that in Australia.[14] The Bank and the Australian Securities and Investments Commission (ASIC) have established a joint Memorandum of Understanding (MoU) with the CFTC regarding supervision of CCPs that operate in both the United States and Australia.[15] The MoU provides a framework for cooperation among the authorities, including information sharing and investigative assistance.

CME is recognised as a third-country CCP by the European Securities and Markets Authority (ESMA) under Regulation (EU) No 648/2012 of the European Parliament and of the council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (commonly known as the European Market Infrastructure Regulation (EMIR)). CME is also authorised in Japan, Singapore, Hong Kong and Mexico. The Dubai Financial Services Authority (DFSA) has authorised CME as a Recognised Body. CME provides clearing services to Dubai Mercantile Exchange Limited (DME).

CME is exempt from the requirement to register as a clearing agency in Alberta, Ontario and Québec.

During the assessment period, a CME crisis management group led by the CFTC and the Federal Deposit Insurance Corporation (FDIC) was established, consistent with a recommendation by the Financial Stability Board (FSB) in its report: *Key Attributes of Effective Resolution Regimes for Financial Institutions*.[16] The purpose of this group is to coordinate with respect to resolution planning. The Bank is not a member of this group.

B.2 Risk Management in CME

A CCP acts as the buyer to every seller and the seller to every buyer in a market. This is commonly achieved by the CCP interposing itself as the legal counterparty to all purchases and sales via a process known as novation. These arrangements provide substantial benefits to participants in terms of counterparty credit risk management, as well as greater opportunities for netting of obligations. At the same time, however, they result in a significant concentration of risk in the CCP. This risk can

14 More detail on the supervisory approach of the CFTC is available in the Bank's March 2016 Assessment. Available at <https://www.rba.gov.au/payments-and-infrastructure/financial-market-infrastructure/clearing-and-settlement-facilities/assessments/chicago-mercantile-exchange/2016/pdf/cme-assessment-2016-03.pdf>.

15 The MoU is available at <https://www.rba.gov.au/payments-and-infrastructure/payments-system-regulation/pdf/memorandum-20140606.pdf>.

16 See Financial Stability Board (2014), 'Key Attributes of Effective Resolution Regimes for Financial Institutions', October. Available at <http://www.fsb.org/wp-content/uploads/r_141015.pdf>.

crystallise if a clearing participant defaults on its obligations to the CCP, since the CCP must continue to meet its obligations to all of the non-defaulting participants.

CME manages this risk in a number of ways, including through participation requirements, margin collection, the maintenance of pooled resources and loss allocation arrangements.

B.2.1 Clearing participation requirements

To manage its exposure to its participants, CME only allows institutions to become clearing participants (referred to as 'clearing members' in the *CME Rulebook*) if they meet certain financial and operational requirements. Prospective clearing participants are required to meet minimum capital requirements. These requirements are set at: US$50 million for OTC IRS clearing participants; and US$5 billion or US$5 million for Base clearing participants that clear exchange-traded products only, depending on whether the participant is a bank or non-bank.[17] Prospective participants must also satisfy a number of other requirements, including regarding their operational and technological capabilities, and disaster recovery and business continuity arrangements. Once accepted, clearing participants must meet minimum guaranty fund contributions, set at a minimum of US$0.5 million for Base clearing participants (US$2.5 million for those clearing OTC-traded Base products) and US$15 million for OTC IRS clearing participants. CME also maintains the right to impose additional requirements on clearing participants specific to the type of entity or products they propose to clear.

B.2.2 Margin collection

To cover its credit exposures, CME collects several types of margin from its clearing participants.

- *Variation margin*. CME collects and pays out 'settlement variation' margin (which corresponds to variation margin as defined in the CCP Standards) for all cleared products. Variation margin is calculated to cover gains or losses on positions arising from observed price movements. This practice ensures that losses on CME participants' positions do not accrue over time. Variation margin is called twice a day for Base products and once a day for OTC IRS.
- *Initial margin*. In the event of a clearing participant default, CME would be exposed to risk arising from potential changes in the market value of the defaulting participant's open position between the last settlement of variation margin and the close-out of these positions. To mitigate this risk, CME collects 'performance bonds' (which corresponds to initial margin as defined in the CCP Standards) for all cleared products. Initial margin is called twice a day for Base products and once a day for OTC IRS. Consistent with CFTC Regulations, CME requires clearing participants to deposit gross initial margin for customer accounts, but allows net initial margin deposits for house positions. Clearing participants are required by CME and applicable CFTC Regulations to collect at least as much initial margin from each customer as CME collects from the clearing participants and to lodge this minimum amount with CME. CME requires clearing participants with speculative customer accounts to collect a higher level of margin from these accounts.[18]

17 Participants in the Base service that clear OTC-traded Base products, regardless of the type of entity, must have at least US$50 million in capital (US$5 million if only clearing agricultural OTC products). Banks that clear OTC-traded Base products as well as exchange-traded derivatives must meet the higher capital requirement of US$5 billion.

18 In addition to maintenance performance margin, CME also sets 'minimum initial margin', which is applied only to speculative customer accounts that are cleared through a clearing participant. Customers who are charged minimum initial margin are required to deposit this amount with their clearing participant. The clearing participant is, in turn, responsible for depositing the maintenance performance margin portion with CME. The level of these minimum initial requirements is based on the risk characteristics of each product and is set at least 10 per cent higher than the maintenance performance margin level. If the customer's total margin holdings fall below the maintenance performance level, they will be re-margined at the higher minimum initial margin level.

- *Intraday margin*. CME may also collect intraday margin in addition to routine margin calls throughout a trading session in situations it deems appropriate, such as in the event of significant market movements. CME made no ad hoc intraday margin calls over the assessment period. The last ad hoc intraday margin call for the OTC IRS service was made in response to market movements on the day after the UK referendum on EU membership on 24 June 2016.

- *Additional margin*. CME may also collect additional margin from clearing participants in the form of 'concentration margin'. Concentration margin is intended to cover potential market exposures due to a clearing participant holding positions that take longer or are more costly to liquidate, and provides an additional incentive for clearing participants to manage and contain the risk of their portfolios. For Base products, concentration margin can be applied if the results of stress tests exceed both a participant's variation margin pays threshold (an average of the three highest variation margin pays over the past 12 months) and capital threshold (or a pre-defined absolute threshold).[19] For OTC IRS, CME may apply a concentration margin in the form of a liquidity charge multiplier. CME routinely calls concentration margin from clearing participants.

CME calculates initial margin requirements for OTC IRS products using an Historical Value at Risk (HVaR) methodology, with historical returns scaled using exponentially-weighted moving-average volatility. To provide a set of historical scenarios CME uses a rolling look-back period of five years, in addition to including stressed periods such as the global financial crisis period of 2008–09. CME targets an *ex post* coverage of 99 per cent assuming a close-out period of five days. CME also has a volatility floor to protect against procyclicality.

Initial margin requirements for Base products are calculated using the CME SPAN methodology. This methodology calculates initial margin that reflects the total risk of each portfolio based on, but not limited to, historical price changes and volatility. CME calibrates initial margin requirements for Base products to cover 99 per cent of forecast price moves for a position over a minimum close-out period of one trading day. Base products that are portfolio-margined with OTC IRS positions are HVaR margined and so are subject to a five-day close-out period.

CME assesses the adequacy of its margin models through daily and monthly back-testing. CME also conducts sensitivity analysis on a monthly basis to assess the adequacy of its margin models.

B.2.3 Pooled financial resources

CME has separate default waterfalls (which CME calls 'financial safeguards packages') for its OTC IRS clearing service and its Base clearing service (as well as for its CDS clearing service), which determine the order in which financial resources would be used to cover default losses within each of the services. As noted above, this Assessment does not cover CDS products, as CME is not licensed to clear CDS in Australia.

Each waterfall is segregated from the others, ensuring that clearing participants are only liable for losses associated with a default within the services in which they participate. In the event of a clearing participant default, any losses arising would first be covered by the assets of the defaulted clearing participant, including its margin, contribution to guaranty fund(s) and any other of its assets that are available to CME. If the assets of the defaulted clearing participant are exhausted, CME may draw on other resources in the relevant default waterfall to meet remaining obligations.

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19 For non-bank clearing participants, capital is defined as adjusted net capital and calculated in accordance with CFTC Regulations. For bank clearing participants, capital is defined as Tier 1 Capital, which is defined in accordance with regulations applicable to the bank clearing participant.

Pre-funded resources

In the event that all of the defaulted clearing participant's margin, contribution to guaranty fund(s) and any other assets available to CME are exhausted, CME would seek to cover remaining losses arising from the default with a pool of pre-funded mutualised resources, which comprise CME's capital contributions and the guaranty fund contributions of non-defaulting clearing participants for the relevant service. CME would use its capital contributions (US$100 million for Base and US$150 million for OTC IRS, as at end December 2017) before allocating losses to the guaranty fund contributions of non-defaulting clearing participants. All clearing participants are required to contribute to the guaranty fund of each service in which they participate.

The Base and OTC IRS clearing service guaranty funds are each sized to cover the default of the two clearing participants and their affiliates that would give rise to the largest credit exposure to CME under a wide range of extreme but plausible scenarios, as determined by stress testing (the 'Cover 2' requirement). As at end December 2017, the sizes of the Base and OTC IRS guaranty funds were US$4.64 billion and US$2.57 billion, respectively. The value of each fund is set equal to the greater of: the Cover 2 stress exposure on the last day of the calculation period; or the average of the Cover 2 stress exposures during the entire calculation period. CME also adds a buffer to the guaranty funds, to account for potential increases in the exposures of participants between scheduled resizing dates. The scheduled calculation period is one month for both the Base and OTC IRS guaranty funds. When sizing the Base guaranty fund, CME considers the sum of the two highest stressed exposures from the same stress scenario. When sizing the OTC IRS guaranty fund, CME considers the sum of the two highest stressed exposures, irrespective of stress scenario.

The adequacy of the guaranty funds is assessed by CME on a daily basis through stress testing. As part of its daily stress testing process, CME calculates 'portfolio residual losses', which are stress test losses in excess of total collateral posted by the clearing participant.[20] In the event that CME is concerned that the value of the guaranty fund is insufficient, it has the ability under its rules to resize the guaranty fund and call additional guaranty fund contributions from all clearing participants outside the scheduled recalculation dates. A review of the guaranty fund would be prompted if the Cover 2 requirement was greater than 80 per cent of the guaranty fund size. The decision to resize the guaranty fund is discretionary and would be made by the Stress Testing Committee within 24 hours, taking into account how close the next scheduled resizing date is and how close the Cover 2 requirement has come to CME's pre-funded resources. In situations where one clearing participant is driving the increase in the Cover 2 requirement, CME may choose to call additional margin from that clearing participant. During the assessment period, CME performed off-cycle resizings of the OTC IRS guaranty fund on 12 January, 21 February, 25 August and 5 September. CME also performed off-cycle resizings of its Base guaranty fund, on 26 January, 12 July, 27 July, 7 September and 25 September.

Unfunded resources and loss allocation rules

In very extreme circumstances it is possible that CME's pool of pre-funded mutualised resources for the relevant clearing service could be used or even exhausted. In these circumstances, CME is able to call for additional resources from non-defaulting clearing participants using its 'assessment powers' to replenish the relevant guaranty fund or to allocate losses beyond the available pre-funded resources.

Calls for additional resources to allocate losses are due to be paid to CME on the day they are called.[21] In the event that the guaranty fund was drawn on to meet losses arising from a clearing participant default, each non-defaulting clearing participant would be required to replenish its guaranty fund contributions by close of business on the business day following the assessment call.

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20 Total collateral posted by the clearing participant includes collateral posted to meet initial margin requirements, additional margin requirements and any excess collateral posted by the clearing participant.

21 However, if the call for additional resources is made within an hour of the close of Fedwire, then these are due to be paid to CME within one hour of when Fedwire next opens.

These payments are subject to participants' maximum obligations during the relevant 'cooling off period'.[22] For the Base guaranty fund, the maximum amount CME can call varies depending on how many clearing participants have defaulted. If only one clearing participant defaults, the maximum amount is 2.75 times each clearing participant's Base guaranty fund contribution. If multiple clearing participants default within a five-day period (the Base cooling off period), the maximum amount CME can call is 5.5 times each clearing participant's Base guaranty fund contribution. Subject to these limits, CME would call for the required amount of additional resources from each non-defaulting clearing participant in proportion to that participant's contribution to the Base guaranty fund. For the OTC IRS guaranty fund, the maximum amount is sized to cover potential losses arising in the event of the default of the clearing participants with the third and fourth largest stress test losses. Subject to this limit, CME would call for additional resources from each non-defaulting clearing participant based on the relative size of that participant's stress testing result. After the cooling off period, clearing participants must fully replenish their guaranty fund contributions.

CME would implement its recovery plan when it utilises financial resources resulting from assessments. CME's recovery and wind-down plans have been developed in accordance with CFTC Regulations. The recovery plan outlines the tools available to address uncovered credit losses, liquidity shortfalls, or other business risks that could threaten CME's viability as a going concern. In late 2016, CME implemented rule changes to add voluntary contributions, voluntary tear-ups, and mandatory portfolio gains haircuts and partial tear-ups and full tear-ups as recovery tools for the Base service in the event that a clearing participant default(s) exceeds CME's pre-funded resources and assessment powers. For its OTC IRS service, CME would implement variation margin gains haircutting in conjunction with a full tear-up of contracts.[23] CME has indicated to the Bank that end of waterfall rule changes for its OTC IRS service are expected to be implemented in 2018.

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22 The cooling off period limits a clearing participant's maximum obligation to contribute to the guaranty fund and to fund losses, and lasts for a predetermined number of days following the default of a clearing participant. The cooling off period for the Base guaranty fund is five days and for the OTC IRS guaranty fund is 25 business days. It is due to the longer cooling off period for OTC IRS, during which multiple stress scenarios may be experienced, that CME uses a more conservative approach when sizing the OTC IRS guaranty fund.

23 CME's Rule 8G802.B permits it to use variation margin gains haircutting in an OTC IRS 'termination event' (i.e. in the event of bankruptcy of CME Inc.), at which time all OTC IRS contacts shall be closed. The *CME Rulebook* is available at: <http://www.cmegroup.com/rulebook/CME/>.

Abbreviations

ASIC	Australian Securities and Investments Commission	FDIC	Federal Deposit Insurance Corporation
CBOT	Chicago Board of Trade	FSB	Financial Stability Board
CCP	Central counterparty	FX	Foreign exchange
CCP Standards	Financial Stability Standards for Central Counterparties	HVaR	Historical Value at Risk
CDS	Credit default swap	IOSCO	International Organization of Securities Commissions
CFR	Council of Financial Regulators	IRD	Interest rate derivatives
CFTC	Commodity Futures Trading Commission	IRS	Interest rate swap
CME	Chicago Mercantile Exchange Inc.	LRMF	Liquidity Risk Management Framework
CPMI	Committee on Payments and Market Infrastructures	MoU	Memorandum of Understanding
CS	Clearing and settlement	OIS	Overnight index swaps
DFSA	Dubai Financial Services Authority	OTC	Over-the-counter
DME	Dubai Mercantile Exchange Limited	PFMI	Principles for Financial Market Infrastructures
EMIR	European Regulation on OTC derivatives, central counterparties and trade repositories	SIDCO	Systemically Important Derivatives Clearing Organization
ESMA	European Securities and Markets Authority	SPAN	Standard Portfolio Analysis of Risk