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The development and evolution of Canada's Central Counterparty for repo

November 2018

Contents

Introduction

The Canadian Central Counterparty (CCP) for fixed income repurchase agreements (repo) launched in 2012 after a substantial period of consultation and advice from industry participants. This was an important milestone for Canada, demonstrating the collaborative efforts of key participants in the repo market, notably, the Investment Industry Association of Canada (IIAC), the Canadian Derivatives Clearing Corporation (CDCC),[1] and large institutions active in the repo market.

In June 2012, Chatterjee, Embree and Youngman published a report entitled “Reducing Systemic Risk: Canada’s New Central Counterparty for the Fixed-Income Market.”[2] The report outlines the background to the creation of the CCP and the intended benefits to the Canadian financial market, and the clearing members.

The objective of this report is to provide an update on the evolution of the CCP since its launch in 2012. The report content is a compilation of research and interviews conducted during July and August 2018, with sell-side (banks) and buy-side (pension plans) institutions, the operators of the CCP, as well as general background information from the Bank of Canada.

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[1] The CDCC operates and manages the CCP utilizing the Canadian Derivatives Clearing Service (CDCS), the incumbent clearer for exchange-traded derivative products in Canada. Please refer to Appendix A for a schematic outlining the ownership structure of the CCP and its interaction in the Canadian financial system.

[2] *Reducing Systemic Risk: Canada’s new Central Counterparty for the Fixed-Income market*. Pothik Chatterjee, Lana Embree and Peter Youngman, June 2012. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2012/06/fsr-0612-chatterjee.pdf?redirected=1

Economic function of the repo market

Repos provide an essential source of liquidity for financial markets by bringing together two financial market users, one that has cash and is prepared to enter into a secured loan, and one that requires cash and has the security to offer as collateral. Repos play an important role in the global financial market by allowing institutions to monetize their assets. At the end of 2016, there were approximately US$12 trillion of outstanding repo and reverse repo transactions globally, of which nearly US$9 trillion was collateralized with government bonds.[3] The 2008 financial crisis prompted global regulators to consider how to protect this essential market in the event of another crisis.

The table below illustrates the size of the repo market globally. At the time of publication, Canada represented 2% of the global repo value against government bonds.

Table 1: Size of Repo Markets [4]

Jurisdiction	Repo and reverse repo transactions against government bonds (mid-2016)		
	Amounts outstanding (in USD billions)	As a share of global total (in %)	As a share of outstanding government debt securities in jurisdiction (in %)
Euro area	2,800	32	32
United States	2,700	30	16
Japan[1]	2,200	23	21
United Kingdom	900	10	33
Canada	211	2	18
Australia	106	1	18
Mexico	79	1	21
Sweden	74	1	44
Switzerland[2]	10	0.1	11
Total	8,800	100	

Only repos against securities issued by the central government are included. Euro area repos include those backed by the central governments of Austria, Belgium, Finland, France, Germany, Italy, the Netherlands and Spain. The global total is defined as the total of the jurisdictions in the table. The numbers may not add up due to rounding.

[1] Includes transactions against non-government bonds; however, most repo transactions in Japan are made against government bond collateral. [2] Comprises only repo transactions denominated in Swiss francs against high-quality liquidity asset (HQLA) collateral (which does not exclusively consist of government debt) conducted in Switzerland.

Sources: Bank of England Sterling Money Market Survey (United Kingdom); other national central banks; ICMA Repo Survey (euro area); Tokyo Money Market Survey (Japan); SIFMA (United States); BIS debt securities statistics.

[3] *CGFS Papers No 59: Repo market functioning*. Study Group established by the Committee on the Global Financial System, April 2017. Retrieved from https://www.bis.org/publ/cgfs59.pdf, page 6

[4] *CGFS Papers No 59: Repo market functioning*. Study Group established by the Committee on the Global Financial System, April 2017. Retrieved from https://www.bis.org/publ/cgfs59.pdf, page 5

Benefits of a CCP

Primary benefit

The 2008 financial crisis created periods of illiquidity in the fixed income repo market, particularly in the US where large, well-established institutions collapsed. "The events of 2008 showed why the efforts [by the Federal Reserve] were needed: Panic in repos, which grease the wheels of debt trading and are a key tool for overnight financing, helped speed up the demise of Lehman and Bear Stearns Cos. in the span of six months."[5]

At the 2009 G20 Summit in Pittsburgh, global leaders agreed that standardized derivatives contracts should be traded on exchanges or electronic trading platforms where appropriate and cleared through CCPs to promote greater liquidity. CCPs had proved resilient during the crisis, continuing to clear contracts even when bilateral markets had dried up.[6] In their 2012 paper, Chatterjee, Embree and Youngman state that the primary benefit of a CCP is to "mitigate counterparty credit risk and alleviate the resulting pressures on bank balance sheets" which "supports continuously open markets."[7] The Bank of Canada encouraged the development of a repo clearing service that has a financial stability rationale similar to that for the over-the-counter derivatives market. It is however, the responsibility of the participants in this financial market to utilize and continuously improve the repo service through pro-active involvement and feedback.

The Bank of Canada is committed to promoting the economic and financial welfare of Canada by actively fostering a stable and efficient financial system.[8] Actions to address vulnerabilities and increase the resilience of the financial system help reduce systemic risk and support financial stability.[9] The creation of a CCP that becomes the counterpart to both borrower and lender in a repo transaction mitigates the impact of another credit crisis, thereby supporting financial stability. All interviewees agreed that CCP-cleared repo transactions would help to dampen the effects on the financial markets of another credit crisis.

Secondary benefits

In addition to serving as a mechanism to mitigate systemic risk, the CCP performs a number of other functions; key among these is the netting service. By netting cash flows that occur on the same day and in the same currency, the CCP is able to reduce the number of intra-day payments, as well as the size of each payment. This decreases the amount of intra-day cash a market participant needs to hold to fund repo settlements, freeing up cash positions for other uses.

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5 *Decade After Repos Hastened Lehman's Fall, the Coast Isn't Clear.* Liz Capo McCormick and Alexandra Harris, September 2018. Retrieved from https://www.garp.org/#!/risk-intelligence/all/all/a1Z1W000004B5wLUAS?utm_content=September_11_2018&utm_source=affiliates&utm_medium=email&utm_campaign=dailynews&utm_term=article1

6 *BIS Quartetly Review.* Dietrich Domanski, Leonardo Gambacorta, Cristina Pocillo, December 2015. Retrieved from https://www.bis.org/publ/qtrpdf/r_qt1512g.pdf, page 59

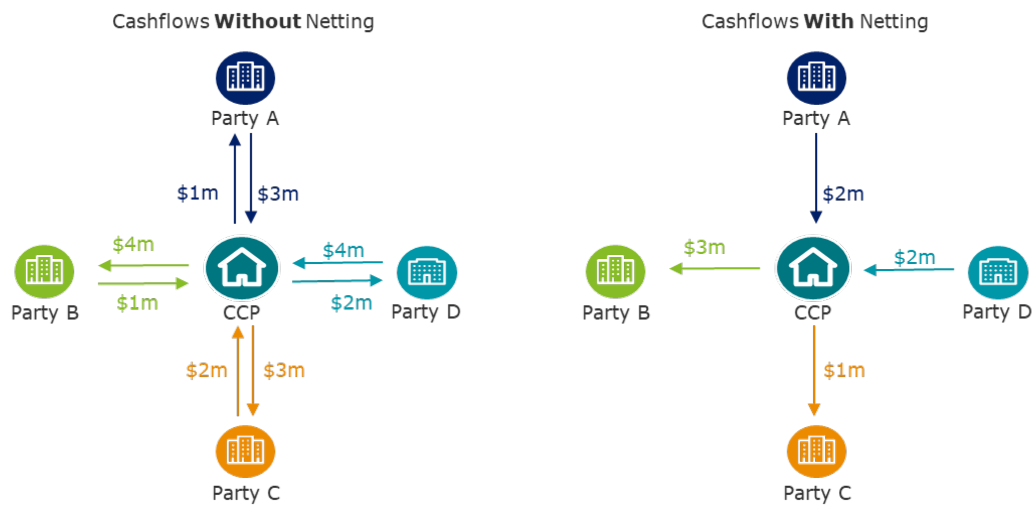
7 *Reducing Systemic Risk: Canada's new Central Counterparty for the Fixed-income market*. Pothik Chatterjee, Lana Embree and Peter Youngman, June 2012. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2012/06/fsr-0612-chatterjee.pdf?redirected=1, page 3 "Why a Fixed-Income CCP Is Necessary in Canada"

8 *Financial System Review.* Bank of Canada June 2018. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2018/06/fsr-june2018.pdf, page 2 "The Role of the Bank of Canada"

9 *Financial System Review.* Bank of Canada June 2018. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2018/06/fsr-june2018.pdf, page 2 "Systemic Risk"

The graphic below illustrates the benefits of netting to the clearing members.

Graphic 1: Comparison of cashflow with and without netting



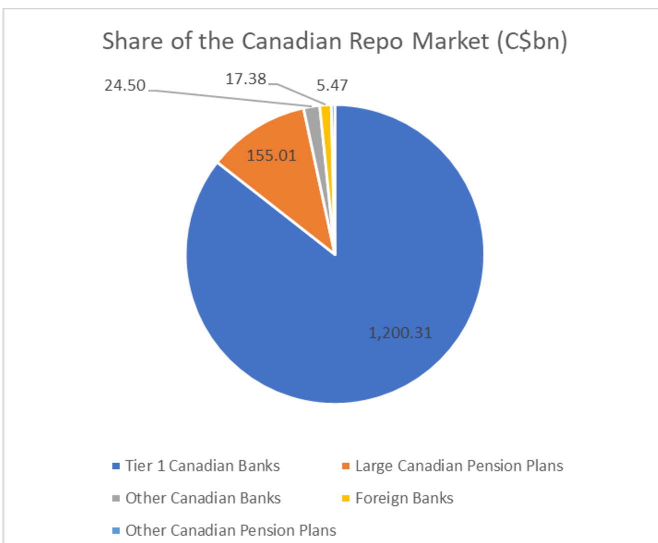
What makes the Canadian CCP different?

Sell-side institutions are the dominant players in the repo market in most countries. These institutions typically pledge securities for cash, reinvesting that cash in higher-yielding investments. The counterparties to these repos are typically other sell-side institutions who need to borrow the security to cover short positions or invest surplus cash. In Canada, sell-side institutions are increasingly becoming **net lenders**, in other words lending more cash than they borrow.[10]

Large Canadian buy-side institutions are well-established and material participants in the repo market. Unlike international buy-side firms who are net lenders, the Canadian buy-side firms are **net borrowers**.[11] The Bank of Canada and the broader Canadian repo market participants concluded that a sub-set of the large buy-side institutions, specifically a number of pension funds, should be included in the CCP given their materiality. This makes the Canadian CCP unique when compared to CCPs in other jurisdictions.

At the end of 2017, the top 10 OSFI-regulated[12] institutions by outstanding repo value, accounted for 97% of the total outstanding repo market in Canada. At the time of publication, all 10 of these institutions are clearing members.

Graphic 2: Share of the Canadian Repo Market by participant group[13]



[10] *Canadian Repo Market Ecology.* Corey Garriott & Kyle Gray, March 2016. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2016/03/sdp2016-8.pdf, page 13 "The Canadian sell-side participants"

[11] *Canadian Repo Market Ecology.* Corey Garriott & Kyle Gray, March 2016. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2016/03/sdp2016-8.pdf, page 11 "The Canadian buy-side participants"

[12] The Office of the Superintendent of Financial Institutions (OSFI) is an independent federal government agency that regulates and supervises more than 400 federally regulated financial institutions and 1,200 pension plans to determine whether they are in sound financial condition and meeting their requirements

[13] *Financial Data for Banks.* Office of the Superintendent of Financial Institutions, December 2017. Retrieved from http://www.osfi-bsif.gc.ca/Eng/wt-ow/Pages/FINDAT.aspx

In Canada, the desire to include a sub-set of buy-side firms in the CCP prompted the key repo market participants to work together over a period of several years to create a member category specific to that sub-set, called the Limited Clearing Member (LCM) category, who are restricted participants in the CCP.

One of the main challenges in creating a CCP that includes buy-side institutions is defining rules that results in a framework suitable to all parties where members contribute in an economically consistent manner. The most notable difference in the rules regulating sell- and buy-side (LCM) participants is that these buy-side institutions are prohibited from assuming mutualized risk that is not a direct result of their own investment decisions. The mutualization of risk among the clearing members is a key tenet of any CCP.

The LCM is distinct from the Direct Clearing Members (DCM) category in three main areas:

- LCMs do not participate in the Default Fund nor do they share in the mutualized risk of the system and are, therefore, not subject to Clearing Fund contribution. They are however, required to deposit margin subject to a multiplier[14], currently 1.3 times the amount that a DCM would deposit for the same position. The multiplier is subject to recalibration from time-to-time. This is a means of ensuring parity of financial resources provided across DCMs and LCMs.
- LCMs have no obligation resulting from the default of another Clearing Member, except where an LCM has trades outstanding with the defaulting Clearing Member and those trades have a positive mark to market value. In this instance, those trades may be subject to variation margin gains haircutting once the CCP's default waterfall has been exhausted.
- LCMs are subject to Recovery Powers in a modified fashion as CDCC shall not reduce its obligation toward an LCM as part of the Recovery Process, with the exception of the application of Reduced Amounts Distribution, which shall be limited to such Fixed Income transactions entered into before novation between the LCM and the suspended Clearing Member.

A lesser complexity, but one that relates to the Canadian market structure, is the mismatch in the term of the repo contracts between sell- and buy-side institutions: sell-side repo is typically overnight to seven days in duration, whereas buy-side is 30+ days to well over one year. This mismatch limits the balance sheet netting opportunities available to CCP participants.

Since Canada made provision for the inclusion of buy-side institutions, other global-clearing houses have started to consider their inclusion as well.[15]

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[14] *Notice to Members No. 2017-126.* CDCC, August 2017*.* Retrieved from https://www.cdcc.ca/u_avis_en/126-17_en.pdf, page 5 "Core Principles"

[15] *DTCC Opens New Chapter for Buyside Participation in Repo Clearing.* January 2018. Retrieved from http://www.dtcc.com/news/2018/january/30/dtcc-opens-new-chapter-for-buyside-participation-in-repo-clearing

Progress since the CCP launch in 2012

In the six years since the CCP has launched, the following notable progress has been made:

- **Payment Clearing and Settlement Act (PCSA) oversight:** In April 2012, the Bank of Canada designated that the CDCS be subject to the ongoing regulatory oversight by the Bank of Canada under the PCSA since "the Bank has determined that CDCS has the potential to pose systemic risk"[16]
- **Increased membership**: When the CCP was launched in February 2012, there were seven clearing members. An eighth member was added in June 2012. There are now 18 clearing members, including four buy-side members.
- **Introduction of 'blind repo'**: Repos that had been executed anonymously through inter-dealer brokers (IDBs) can now be cleared via the CCP.
- **Launch of cash trades**: Cash fixed income securities were included in the service in March 2013. By combining transactions in the cash and repo markets, participants would benefit from additional settlement efficiencies.
- **Increased list of eligible collateral**: At launch, only a limited number of eligible securities were included in the service. Additional securities have been included in the service thereby increasing volumes and potential netting.
- **Creation of the LCM member category**: As mentioned above, the process to include buy-side institutions as clearing members commenced in 2014. In 2015, a small group of large pension plans agreed in principle to pursue membership. The first buy-side member joined in April 2018 and in early November 2018 three more institutions became members.
- **Upgrades to the technology platform**: The CDCS platform has been upgraded to support the inclusion of fixed income repo products, the addition of the LCM category and compliance with the Bank of International Settlements (BIS) Principles for Financial Markets Infrastructure guidelines (PFMI). The CDCC has begun a multi-year modernization initiative to upgrade the platform to the new PFMI standards.

Given the relatively short timespan since the CCP has launched a lot of progress has been made. There are however, areas that require focus and attention to address in order to continue the development and evolution of the CCP.

[16] *Bank of Canada designates Canadian Derivatives Clearing Service under the Payment Clearing and Settlement Act*. Bank of Canada, 27 April 2012. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2012/04/fmd-270412.pdf

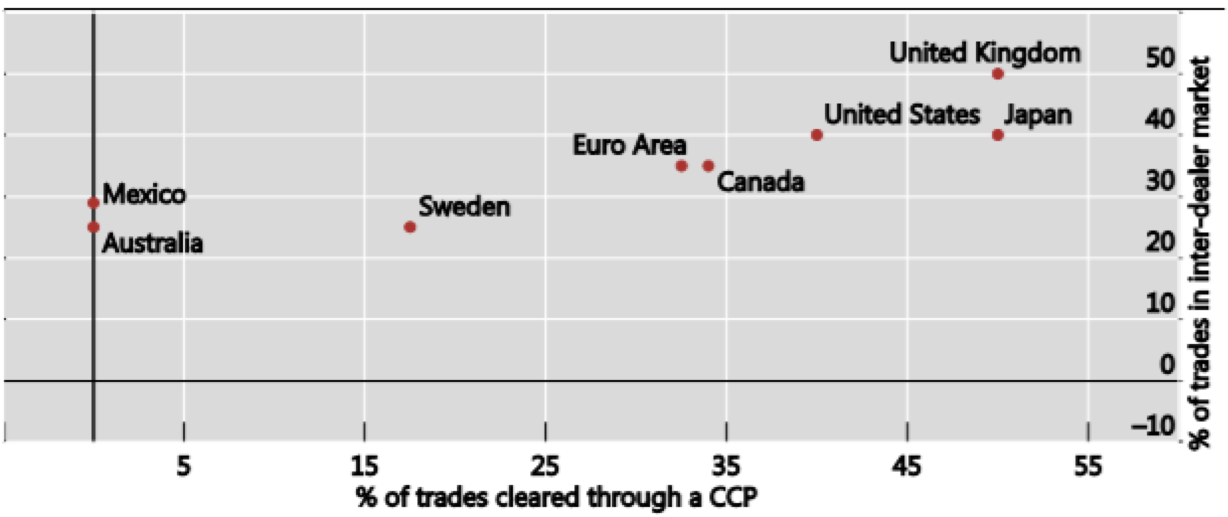
The path forward

While the primary purpose of a CCP is to mitigate systemic risk, the operational and financial aspects, including the associated benefits of a cost-effective service, reduced capital and improved liquidity, are important considerations for the CCP participants. The interviewees highlighted a number of areas to focus on to continue improving the effectiveness of the CCP; all participants need to work together to ensure that these improvements are realized.

Increasing cleared volumes

The volume cleared through the CCP is directly correlated to the benefits that will be realized. To mitigate systemic credit risk effectively, cleared volumes should represent a substantial portion of the volumes traded. Statistics gathered from central banks on behalf of the BIS in mid-2016 reflect that Canada cleared approximately 35% of repos through a CCP (see Graphic 3 below). Coincidentally, this represents a similar percentage to the volume of repo traded in the Canadian inter-bank market. In more mature markets such as the United Kingdom and United States, the percentage repo cleared through a CCP is 50% and 40%**,** respectively.

Graphic 3: Inter-Bank and CCP-cleared trades[17]



[1] Calculations are based on the sum of repos and reverse repos. Only repos against securities issued by the central government are included. Euro area repos include those backed by the central governments of Austria, Belgium, Finland, France, Germany, Italy, the Netherlands and Spain.

Sources: Bank of England Sterling Money Market Survey (UK); Federal Reserve Bank of New York and FRBNY calculations (US); national central banks; FICC; ICMA Repo Survey (euro area); Tokyo Money Market Survey (Japan).

The onboarding of three additional buy-side institutions in November 2018 will increase the cleared percentage and, over time it is hoped that the volumes will continue to rise to levels similar to the

[17] *CGFS Papers No 59: Repo market functioning*. Study Group established by the Committee on the Global Financial System, April 2017. Retrieved from https://www.bis.org/publ/cgfs59.pdf, page 24

UK and US. This should improve the relative efficiency and functioning of the Canadian repo marketplace.

Increasing membership: Interviewees suggested that volumes cleared would increase by including additional members. Trading with non-members is currently bilateral (uncleared).

Graphic 2 illustrates that the top 10 institutions traded 97% of Canadian repos.[18] The inclusion of additional OSFI-regulated entities will only address the remaining 3% of the market. There is however, no clear data available for non-OSFI regulated entities.

Interviewees also stated that expanding membership would increase liquidity in the repo market. Money funds and insurance companies could inject cash thereby increasing liquidity, although the current regulatory framework may limit their participation.

Increasing eligible collateral: The inclusion of additional securities as eligible collateral would increase cleared volume, but there would be related CCP set-up costs. The 2012 Chatterjee, Embree and Youngman paper[19] referenced the creation of General Collateral or GC as "Phase 3"; there are currently no target dates planned for this phase, although the CDCC is actively exploring avenues to evaluate what this involves. There is recognition, however, that the introduction of this category of repo is an important step in the evolution of the CCP. Interviewees also noted that the CCP is currently unable to process two types of security - accreting income and floating rate mortgage-backed securities – both of which are traded extensively by the buy-side. The inclusion of these securities as eligible collateral is seen as an important step towards increasing cleared volume.

Transaction fees: The CDCC operates the CCP as a "for-profit" business. Costs are largely fixed (real estate, technology, resources), requiring the fees charged to be set at a level sufficient to cover these costs. Fees charged today are higher than when the CCP was launched and will not be reduced until the cleared volumes increase substantially.[20]

Interviewed members provided varied feedback on the subject of fees. Some members viewed the level of fees as a necessary cost of market resiliency. Others mentioned that, when combined with the other costs associated with becoming a clearing member (set-up costs, initial margin), the costs may be an economic barrier to additional members' participating, e.g. money funds and insurance companies.

The CDCC has negotiated a profit-share arrangement with clearing members, predicated on meeting certain volumes. This is seen as a collaborative effort by the CCP to incentivize the increasing of volumes and to defray additional costs.

Netting benefits: The netting service should be far more effective with higher volumes. Increasing netting should benefit all clearing members, reducing the size of intra-day payments, increasing intra-day liquidity and improving liquidity ratios.

Capital: Higher cleared volume should reduce credit exposure and, in turn, result in lower capital charges.

Term mismatch

The efficiency and cost-effectiveness of the Canadian repo market is constrained by the term mismatch of trades between participants and the imbalance between lenders and borrowers. The sell-side repo term is

[18] See Appendix D for a full list of Clearing Members (CCP Membership)

[19] *Reducing Systemic Risk: Canada's new Central Counterparty for the Fixed-Income market*. Pothik Chatterjee, Lana Embree and Peter Youngman, June 2012. Retrieved from https://www.bankofcanada.ca/wp-content/uploads/2012/06/fsr-0612-chatterjee.pdf?redirected=1

[20] See Appendix C for a comparison of fees (CDCC Fee Schedule for Repo Product)

usually between overnight and seven days while the buy-side repo is normally between 30 days and out to five years. In the absence of matched terms, the volume of trades netted reduces significantly, which in turn dilutes the intra-day cash benefit participants receive.

To increase netting, sell-side institutions would need to extend their trade period and buy-side institutions, in turn, reduce theirs. This would create a large pool of trades in the 'middle' and increase the volume of netting. There are challenges with this:

- Sell-side firms use their high-quality liquid assets for capital purposes and need quick access to them if their daily capital requirement increases. As a result, extending the duration of repos is difficult to achieve.
- Buy-side institutions invest fund monies to maximize return, typically in longer-dated assets. Reducing the period of their repos challenges the notion of term investing.

Members interviewed suggested that there was a need to change 'market structure' in order to address the term mismatch. This could include the addition of market participants not originally contemplated, with flexibility around participation rules to get them onboard, but would require market-wide effort to achieve.

Investment in operations and infrastructure

Several interviewees stated that the CDCC platform needs modernizing, citing the technology's age and the desire to improve flexibility to accommodate change. The addition of new members will further increase demand on CCP's infrastructure. Additionally, members interviewed recommended that the CDCC review the current and future level of resourcing in order to deal with the increased membership and to ensure that operational processes are efficient and scalable.

Specific examples of areas that require improvement are:

- Onboarding of new members – this has required significant manual intervention.
- Testing – described by some interviewees as "cumbersome."
- Access to supporting information - difficulties in analyzing netting information.
- Netting - manual processes to amend netting sets.
- Thresholds for partial settlement of trades – currently set at CAD$10m, considered too high.
- Minimum value for margin calls – value to be commensurate with the economics benefit of the call.

The CDCC has embarked on a multi-year technology modernization program to implement recommended improvements as well as to comply with the new PFMI standards.

Members believe that more attention is required to address concerns raised by the Membership Committee. Any uplift of the operations (technology and processes) should take into consideration known limitations as well as ensure the flexibility and scalability to deal with future requirements. Resources supporting the CCP should be commensurate with the volume cleared and have sufficient capacity to deal with both planned and unexpected events.

Optimizing the netting cycle

The sequencing of the netting cycle should deliver optimal outcomes. Interviews with participants suggest that the current cycle requires attention to provide members with an improvement of the netting results. Reducing the number of netting cycles in a business day would result in greater pools of trades to net, which would increase the netting benefit to the members.

Increasing funding lines

The CCP has a range of credit lines with the banks for immediate draw-down should their own cash flow become insufficient to cover netted payments. Members noted that with the inclusion of LCM members, the intra-day cash flow could exceed the current funding lines available to the CDCC.

The CDCC recently undertook a review of these facilities and concluded that they were indeed sufficient. The recommendation is that these lines should be actively monitored going forward to ensure that they remain adequate.

There is clearly work to do and this can only be achieved through the collective efforts of all market participants since they all stand to benefit from these improvements.

Managing systemic risk in the Canadian repo market

Systemic risk is defined as "a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy."[21] Oversight of designated financial market infrastructures contributes to the Bank of Canada's broader mandate of promoting the stability and efficiency of the Canadian financial system and also to reduce systemic risk.

The financial eco-system comprises several components, each subject to regulation. The CCP plays a critical role in the management of systemic risk to the Canadian financial system. The Bank of Canada and the Canadian Securities Administrators are responsible for the effective oversight of the CCP, including ensuring that:

- The Payment Clearing and Settlement Act is properly implemented and complied with, and
- All financial market infrastructures (FMIs) in Canada adhere to BIS PFMI, co-written by the BIS and IOSCO.[22]

The Bank of Canada's oversight includes semi-annual reviews across all dimensions covered by the PFMI, with recommendations presented to the Board of the TMX. These reviews include a follow-up on previously made recommendations. The CCP's regulators are observers on the Risk Committee. The responsibility for the day-to-day operations of the CCP does not extend to the Bank of Canada, but rests with the CDCC.

The Bank of Canada has a substantial task of ensuring that the eco-system as a whole is robust and has sufficient oversight to prevent a single event from creating market contagion. Systemic events can be classified into three distinct groups as outlined below.

Credit risk

Documented evidence suggests that during the 2008 financial crisis, those markets where CCPs existed experienced less impact on credit than those where a CCP was not established. A properly structured CCP mechanism should reduce the amount of credit risk in the system.

A CCP's effectiveness as an insurance against a potential future credit crisis can only be tested by a repeat of the events of 2008. In order to simulate the worst-case scenario, the CDCC runs modelled stress scenarios to assess the robustness of the CCP and, where issues are identified, the models and methodologies must be realigned.

Principle 4 consideration 5 of the PFMI states, "A CCP should determine the amount and regularly test the sufficiency of its total financial resources available in the event of a default or multiple defaults in extreme

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[21] *Systemic risk: how to deal with it.* Jaime Caruana, February 2010. Retrieved from https://www.bis.org/publ/othp08.htm, page 1 "Full Paper"

[22] *Principles for financial market infrastructures.* Bank of International Settlements, April 2012. Retrieved from https://www.bis.org/cpmi/publ/d101a.pdf

but plausible market conditions through rigorous stress testing."[23] Stress testing is conducted daily and reviewed quarterly.

In a recent review by the Bank of Canada, recommendations were made to strengthen credit and liquidity stress-testing, which the CDCC is in the progress of implementing.

Operational risk

An operational failure of the CCP can have a consequential effect across the financial system. The CDCC has participated in street-wide scenario testing to ensure that the recovery plans are effective, and additionally performed its own Business Recovery testing.

Principle 17 of the PFMI states: "An FMI should identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the FMI's obligations, including in the event of a wide-scale or major disruption."[24]

Several members questioned the operating standards at the CCP; the Membership Committee has also highlighted a number of operational areas for review to the CDCC. A lack of transparency around the comprehensiveness of the operational risk management policies and procedures, supported by relevant and timely risk reporting, is likely driving these comments. Participants have suggested that the members should have greater authority on the CCP's Membership Committee.

Liquidity risk

In the event of a material event in the market, there is a likely impact on liquidity. For example, if the CCP is unable to settle trades, there will be liquidity locked within the CCP and while participants can continue to trade bilaterally, the locked-in liquidity will be unavailable.

Principle 7 of the PFMI states: "An FMI should effectively measure, monitor, and manage its liquidity risk. An FMI should maintain sufficient liquid resources in all relevant currencies to effect same day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the FMI in extreme but plausible market conditions."[25]

The CDCC is currently implementing improvements in this area.

Federal and provincial regulators have created a tiered oversight framework to ensure the resilience of the Canadian financial market. By leveraging the globally accepted principles of the PFMI there is consistency of oversight with other countries.

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[23] *Principles for financial market infrastructures.* Bank of International Settlements, April 2012. Retrieved from https://www.bis.org/cpmi/publ/d101a.pdf, page 37 "Principle 4: Credit Risk"

[24] *Principles for financial market infrastructures.* Bank of International Settlements, April 2012. Retrieved from https://www.bis.org/cpmi/publ/d101a.pdf, page 3 "Principle 17: Operational Risk"

[25] *Principles for financial market infrastructures.* Bank of International Settlements, April 2012. Retrieved from https://www.bis.org/cpmi/publ/d101a.pdf, page 1 "Principle 7: Liquidity Risk"

In Summary

The Canadian repo CCP is still evolving and there has been good progress made since its launch. Canada is the first jurisdiction globally to have built out buy-side participation in repo clearing. This has increased total volumes cleared by the CCP and as a result, increased the potential for netting and efficiencies in the market. There has been extensive collaboration among financial market participants, with regulators, sell- and buy-side participants and CDCC all working jointly towards building a Canadian solution for the financial industry.

To continue to evolve and enhance its operations and infrastructure, the CDCC is in the process of addressing the following:

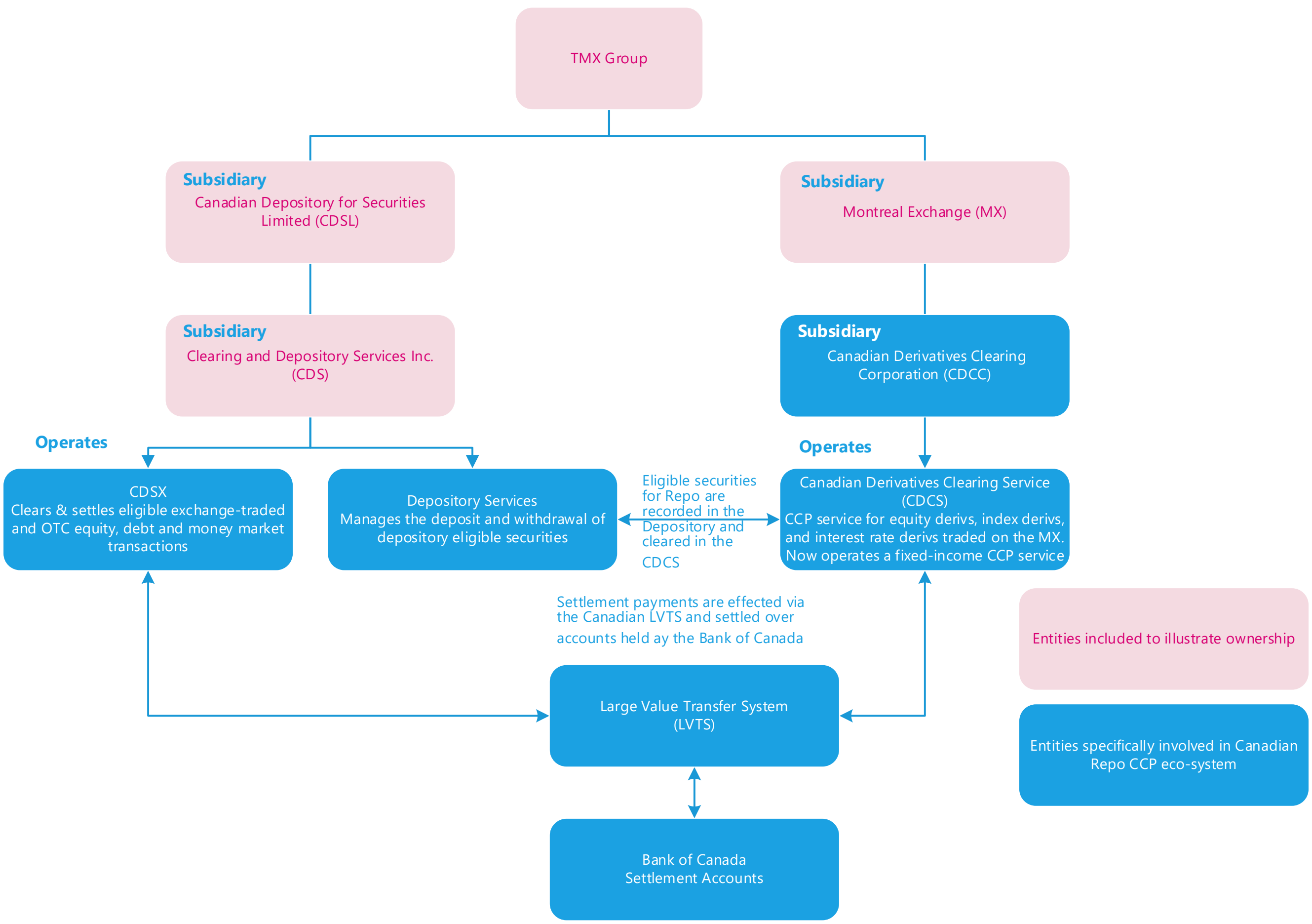
- The volume of cleared repos needs to increase in order for its stakeholders to realize the benefits. The collective group (CDCC and clearing members) needs to further their collaborative efforts to address this.
- The CCP operations should be robust and efficient under all conditions in order to retain the trust of the members who rely on the utility as an integral part of their own operations. This requires an effective and efficient operating model properly governed and risk-assessed, supported by adequate resourcing.
- The CCP is an extension of each member's business; while the CCP Membership Committee is the forum for members to raise operational concerns, the CDCC should consider increasing the authority of the committee to include the prioritization of operational improvements. This could alleviate any concerns around transparency.

The history of collaboration between the Canadian stakeholders of the repo CCP has been remarkable; it is the collective responsibility of same participants to evolve the CCP in a manner appropriate to the Canadian context, but mindful of the ultimate objective of the CCP.

Systemic risk management should supersede the realization of secondary benefits; however, these are not mutually exclusive. The stability of the financial system remains the primary objective, but it can only be achieved with the support and contribution from all participants.

Appendix A: Repo CCP eco-system

The diagram below provides an illustration of the repo Canadian CCP eco-system.[26]

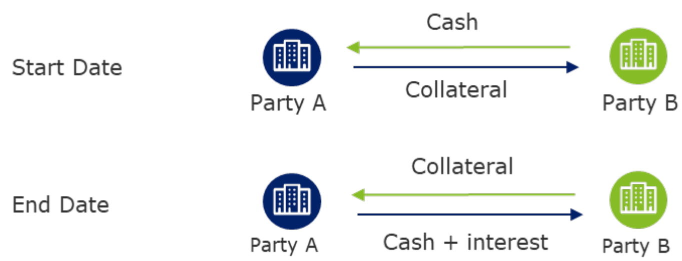


[26] Schematic prepared using information from the Bank of Canada website https://www.bankofcanada.ca/core-functions/financial-system/clearing-and-settlement-systems/

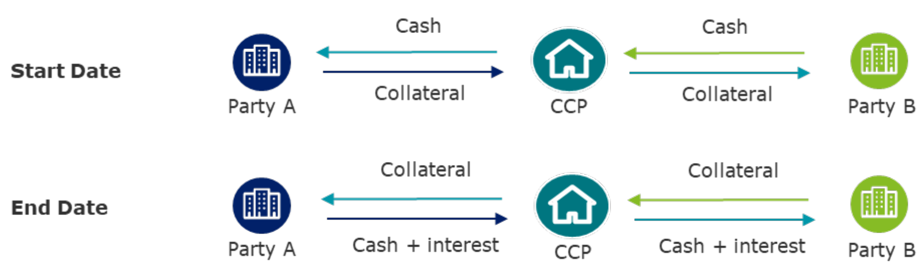
Appendix B: Repo trade effect

Repo trades in Canada can be transacted either bilaterally, i.e. between two parties directly, or using the clearing mechanism, i.e. the CCP. Each of these are illustrated below.

1. Bilateral transaction



2. Cleared transaction



The net effect of a repo transaction on each party across key dimensions is described in the table below.

	Party A (Borrower)	Party B (Lender)	CCP
Legal ownership of security	Original owner retains, although now classified as "encumbered" i.e., not available for sale	n/a	n/a
Initial Margin (IM)	Paid, but only if cleared via CCP		Receive if cleared
Variation Margin (VM)	Paid, but only if included in the contractual terms OR if cleared via CCP	Received, if included in the contractual terms	Receive if cleared
Balance Sheet: Cash	Increases due to receipt of borrowing	Decreases due to payment of loan	Net zero as pass-through

	Party A (Borrower)	Party B (Lender)	CCP
Balance Sheet: Payable	Equal to the value of the cash received on day 1; will increase as interest on the payable accrues	n/a	Net of Borrower and Lender positions should net to zero
Balance Sheet: Receivable	n/a	Equal to the value of the cash loaned on day 1; will increase as interest on the loan accrues and as variation margin is	
Credit Risk	Issuer risk remains the same	Bilateral: Small increases on Borrower due to the loan, offset by the collateral Cleared: Decrease due to lower credit risk on CCP	Assumes the credit risk from the Lender, i.e., of the Borrower
Capital	**Increases** due to holding capital on both the security and the increased cash balance	**Decreases** as cash balance lower and the new receivable attracts little to no capital as collateralized	n/a
Liquidity Ratio	**Improves** as converted a term assets into cash	**Worsens** due to lower available cash balance	n/a
Cash flow	**Improves** when cleared as CCP will net flows to reduce intra-day volumes	**Improves** when cleared as CCP will net flows to reduce intra-day volumes	Managed by netting and optimizing settlements; draw on credit facility when extra cash required

Appendix C: CDCC fee schedule for repo product

Clearing fees, per day - Fixed Income Transactions* (2012) [27]

Tenor of original trade submitted	Direct clearing member	Limited clearing member
Overnight	0.00175% (or 0.175 bps)	n/a
2-7 days Repurchase Transactions	0.00150% (or 0.150 bps)	n/a
8 days or greater Repurchase Transactions	0.00125% (or 0.125 bps)	n/a
Minimum clearing fee – per month	$5,000	n/a

*In addition to clearing fees, the CDCC will be recovering from Clearing Members any and all settlement costs incurred in the course of settlement activities at CDS. This cost recovery will occur quarterly on a pro-rata volume basis among Fixed Income Clearing Members

Clearing fees, per day - Fixed Income Transactions (current) [28]

Tenor of original trade submitted	Direct clearing member	Limited clearing member
1-3 days Repurchase Transactions	0.007% (or 0.7 bps)	0.00175% (or 0.175 bps)
4-7 days Repurchase Transactions	0.004% (or 0.4 bps)	0.001% (or (0.1 bps)
8 days or greater Repurchase Transactions	0.003% (or 0.3 bps)	0.00075% (or 0.075 bps)

While comparisons are not absolute as the categories have changed over the course of time, the increase in the rates for up to 7 days is 260% and for 8 days or greater is 240%. The overnight vs 1-3 day comparison may be misleading but represents an increase of 400%. The monthly minimum fee has been removed.

Fixed Income Transactions processing fees

	Repurchase transactions	Cash transactions
CDCC will be charging the following processing fees for every record received from CDS and for every fixed income position created from a future's tender process into a physical bond delivery/receive. Physical deliveries/receives stemming from a tendered future will be considered as cash transaction(s) for the purpose of the processing fees.	$2.50	$1.25

Revenue sharing arrangement

	Share of revenue returned to clearing members
Band 1: Less than $5M in Fixed Income revenues*	0%
Band 2: Between $5M and $6,999,999 in Fixed Income revenues*	20%

[27] Information extracted from an electronic copy of the TMX | CDCC 2012 List of Fees obtained from the IIAC

[28] Information extracted from an electronic copy of the TMX CDCC List of Fees, Effective as of August 1st, 2018 from https://www.cdcc.ca/f_en/cdcc_fees.pdf

	Share of revenue returned to clearing members
Band 3: Between $7M and $12,499,999 in Fixed Income revenues*	30%
Band 4: Greater than $12,5M in Fixed Income revenues*	50%

For the purposes of the revenue sharing arrangement, Fixed Income revenues includes: Fixed income clearing fees, fixed income transaction processing fees, less CDS settlement costs, less costs associated with its Daylight Credit Arrangements (DCA).

Appendix D: Current Membership

The table below provides a list of CDCC members for repo products.[29]

Institution name	Institution type	Member type
Bank of Montreal	Local Bank	DCM
BMO Nesbitt Burns Inc.	Local Dealer	DCM
Casgrain & Company Limited	Local Dealer	DCM
CIBC World Markets Inc.	Local Bank	DCM
Desjardins Securities Inc.	Local Dealer	DCM
Healthcare of Ontario Pension Plan	Pension Fund	LCM
HSBC Securities (Canada) Inc.	Foreign Bank Sub/Branch	DCM
Laurentian Bank Securities	Local Dealer	DCM
Merrill Lynch Canada Inc.	Foreign Bank Sub/Branch	DCM
National Bank Financial Inc.	Local Dealer	DCM
National Bank Of Canada	Local Bank	DCM
RBC Dominion Securities Inc.	Local Dealer	DCM
Scotia Capital Inc.	Local Dealer	DCM
Societe Generale Capital Canada Inc.	Foreign Bank Sub/Branch	DCM
The Toronto-Dominion Bank	Local Bank	DCM

[29] Information extracted from the CDCC website https://www.cdcc.ca/members_en