BANK OF CANADA
BANQUE DU CANADA

Oversight Activities during 2012 under the Payment Clearing and Settlement Act

Introduction and Context

Under the Payment Clearing and Settlement Act, the Bank of Canada (the Bank) is responsible for overseeing eligible clearing and settlement systems (also referred to as financial market infrastructures, or FMIs) that could pose systemic risk to the Canadian financial system in order to ensure their safety and soundness.

The Bank's main oversight responsibilities are to (i) assess whether eligible FMIs have the potential to pose systemic risk, and, if so, to designate such systems as subject to the Bank's oversight; and (ii) oversee designated FMIs such that systemic risk is adequately controlled.[1] The Bank's approach to oversight is described in the "Guideline Related to Bank of Canada Oversight Activities under the Payment Clearing and Settlement Act" (Oversight Guideline). The Bank sets minimum standards that are based on internationally accepted risk-management and efficiency standards ("The Principles for Financial Market Infrastructures"). The Bank's main oversight activities relate to monitoring and evaluating risk in designated FMIs. Activities include assessing designated FMIs and reviewing proposed changes to their operations, rules and procedures; periodic audits and inspections; and regular monitoring and engagement with the owners and operators of designated FMIs. For foreign-domiciled FMIs, the Bank conducts its oversight primarily through co-operative oversight arrangements with the other regulators of the FMIs.

At the time of publication of this report, the Governor had designated five FMIs for oversight: the Large Value Transfer System (LVTS), CDSX, the Canadian Derivatives Clearing Service (CDCS) (designated in 2012), CLS Bank and SwapClear (designated in 2013). See Appendix 1 for more information about these FMIs.

[1] For the Governor to designate an FMI, the Minister of Finance must also be of the opinion that designation is in the public interest. Considerations for designation include the size of transactions in the FMI, the role the FMI plays in the financial system and the size of obligations incurred through participation in the FMI. These considerations are further described in the "Guideline related to Bank of Canada Oversight Activities under the Payment Clearing and Settlement Act."

Executive Summary

The purpose of this report is to provide transparency and accountability regarding the conduct of the Bank in carrying out its oversight responsibilities. The report provides a review of the Bank's key oversight activities undertaken during 2012. The Bank's key oversight activities in 2012 included:

1. **Implementation of the CPSS-IOSCO Principles for Financial Market Infrastructures**

   In April 2012, CPSS-IOSCO published "The Principles for Financial Market Infrastructures" (the Principles) [2], a stringent set of standards governing risk management, efficiency and transparency for systemically important financial market infrastructures (FMIs). In 2012, the Bank adopted the Principles as its risk-management standards, and required all Canadian designated FMIs to begin making changes to meet them. The Bank is working with the securities commissions of Ontario, Quebec and British Columbia and the Department of Finance to apply the Principles to jointly regulated Canadian FMIs in a consistent manner. The Bank expects that adoption of the Principles will enhance the risk-management practices of designated FMIs and serve to strengthen the stability of these core infrastructures.

2. **Oversight activities related to strengthening the resilience of critical markets**

   In 2012, the Bank participated in initiatives to improve the resilience of two critical markets, the market for repurchase agreements (repos) and the interest rate swap market, through the development and greater use of central counterparties.

   2.1 **Repo market:** In April 2012, the Governor designated the Canadian Derivatives Clearing Service (CDCS) for oversight following the launch of its central counterparty (CCP) service for fixed-income repos. Key oversight activities in 2012 included setting clear expectations for CDCS as a designated system and overseeing the expansion of its repo services.

   2.2 **Interest rate swap market:** In October 2012, Canadian authorities announced that Canadian financial institutions could clear standardized over-the-counter (OTC) derivatives at global CCPs. Following that decision, the Bank joined a co-operative regulatory arrangement for the oversight of SwapClear, the global leader in CCP clearing for interest rate derivatives.[3] SwapClear was designated for oversight in April 2013.

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[2] The Principles are often referred to as the PFMIs.

[3] The UK FSA invited the Bank of Canada and regulatory authorities from other jurisdictions to participate in an arrangement for regulatory, supervisory and oversight cooperation of SwapClear given the importance of SwapClear in those jurisdictions.

3. Review of payments sector governance

In 2012, following a comprehensive review of Canada's payments system by the Task Force for the Payments System Review[4], the Minister of Finance committed to take immediate action in several areas including a review of the governance framework for the payments sector. The Bank is working closely with the Department of Finance on this initiative.

4. Key activities related to designated FMIs

Each year, the Bank works with designated FMIs to monitor their activities and identify areas of priority to ensure that systemic risk continues to be adequately controlled in those FMIs. While adopting the Principles was an important priority for all of the designated FMIs in 2012, other important activities took place as well.

4.1 **Large Value Transfer System (LVTS):** In 2011, the Canadian Payments Association (CPA) (owner and operator of the LVTS) developed a long-term strategy to address the need to renew the technology in use in its payment systems. The strategy is intended to reduce the potential for operational risk from outdated technology. In 2012, the CPA developed LVTS Web Enablement which was a major initiative under this strategy.

4.2 **CDSX:** The Canadian Depository for Securities Ltd. (CDS) (owner and operator of CDSX) was acquired by Maple Group Acquisition Corporation (Maple) in August 2012. Maple also acquired TMX Group Inc. and Alpha Trading Systems LP which consolidated a substantial portion of Canadian financial infrastructure into one entity.[5] The Bank continues to monitor developments to ensure that risk management remains robust under the new ownership structure.

4.3 **CLS Bank:** CLS Bank continued to work with its members in 2012 to develop a same-day settlement session. CLS Bank also underwent changes to its executive management team, which were monitored closely by the CLS Oversight Committee.

[4] See the report "Moving Canada into the Digital Age."

[5] Maple has since been renamed TMX Group Ltd.

1. Implementation of the CPSS-IOSCO Principles for Financial Market Infrastructures

New CPSS-IOSCO Standards for FMIs

In 2012, CPSS and IOSCO[6], two international standard-setting bodies for FMIs, published the Principles for Financial Market Infrastructures (the Principles), a single set of harmonized standards for systemically important FMIs related to risk management, efficiency and transparency. The Principles replace CPSS and IOSCO's previous standards and reflect current best practices in risk management. The revised standards were initiated in part to support the goals of the Group of Twenty Finance Ministers and Central Bank Governors (G20) and Financial Stability Board (FSB) to strengthen the safety and soundness of financial markets, including critical market infrastructures. The Bank of Canada participated in the development of the new Principles and fully endorses them.

In April 2012, the Bank informed designated FMIs that it would adopt the new Principles as the minimum standards for FMIs under its oversight and that they would be required to comply with them. In December 2012, the Bank formally adopted the Principles as its risk-management standards for designated FMIs through revisions to its "Guideline Related to Bank of Canada Oversight Activities under the Payment Clearing and Settlement Act" (the Oversight Guideline).

The Bank coordinates with other authorities with oversight responsibilities for designated FMIs so that clear and consistent guidance is provided to the FMIs regarding the application of the Principles and the improvements that are needed to observe them. The Bank is working with the British Columbia Securities Commission (BCSC), the Ontario Securities Commission (OSC) and the Autorité des marches financiers (AMF) of Quebec with respect to CDSX and CDCS and with the Department of Finance with respect to the LVTS. Application of the Principles to CLS Bank and SwapClear is coordinated by their respective home-jurisdiction regulators.

Progress of Designated FMIs in Adopting the Principles

Because the new Principles are more stringent and incorporate standards in new areas, each designated FMI has to make changes to observe them. In 2012, the owners and operators of the CDCS, CDSX and the LVTS initiated detailed self-assessments to identify any gaps in their compliance with the Principles. In 2013, each FMI will complete its self-assessment and develop a plan to address its most important gaps.[7] The Bank and other regulators are currently reviewing the self-assessment and plan of CDCS and CDSX to ensure that gaps are identified

[6] The CPSS (Committee on Payment and Settlement Systems) consists of member central banks.

IOSCO (the International Organization of Securities Commissions) consists of member securities market regulators.

[7] The Canadian Payments Association (the owner and operator of the LVTS) completed a plan in early 2013 and is now working to address its major gaps.

and addressed within appropriate time frames. Each FMI will begin addressing its most significant gaps in 2013 and all FMIs are expected to make significant progress toward closing them by the end of 2014.

Additional Guidance to Complement the Principles

In some cases, FMIs require additional detailed guidance on how they should comply with a particular requirement set by the Principles. The Bank is therefore working with other Canadian authorities and the international community to provide supplementary guidance. Key areas include the following:

- **FMI recovery plans:** Systemically important FMIs are required to develop a plan to replenish their financial resources should they become depleted so that the FMI can continue to provide critical services as a going concern. The Bank has been participating in a CPSS-IOSCO working group to develop detailed guidance for FMIs on the development of such recovery plans.
- **Segregation and portability:** Systemically important CCPs are required to adopt rules and procedures that will enable the segregation and portability of participants' collateral and positions separately from those of their customers. The objective of this principle is to reduce the impact of a participant's insolvency on its customers.[8] The Bank and other Canadian authorities are developing guidance on the implementation of this principle for different types of markets in Canada.
- **Tiered participation arrangements:** Systemically important FMIs are required to adequately identify, monitor and manage the risks that arise from tiered participation arrangements, under which some institutions access an FMI's services indirectly through the participants in the FMI. The Bank and other Canadian authorities are considering approaches to implementing this principle in Canada and are developing guidance on the types of information that FMIs should collect from participants concerning their customer arrangements, as well as on methods for FMIs to manage their risk exposures from indirect participants.

The development of guidance for FMIs will continue to be a priority for the Bank and other authorities in 2013.

Conducting Oversight in Accordance with the Responsibilities of Overseers

The Principles for FMIs include a set of five responsibilities for overseers that are intended to facilitate consistent and effective oversight among authorities. The Bank has adopted these responsibilities and exercises its oversight in a manner consistent with them.

One of the responsibilities relates specifically to co-operation among FMI oversight authorities. The Bank shares oversight responsibility for designated

[8] This principle also anticipates that CCPs for certain markets could achieve the necessary objective by means other than segregation and portability at the CCP level.

FMIs with other authorities, and therefore co-operates with them in conducting its oversight. In 2012, staff at the Bank and the AMF, BCSC and OSC agreed to adopt a joint memorandum of understanding (MOU) to formalize their framework for information sharing, consultation and coordination with respect to their oversight of CDSX and CDCS. The co-operative oversight MOU includes a framework covering the following components: sharing information, handling routine issues and FMI changes, coordinating regulatory oversight responses, crisis management, and meetings with the authorities and the FMIs. The authorities expect to finalize the MOU in the second half of 2013.

2. Oversight Activities Related to Strengthening the Resilience of Critical Markets

Following the financial crisis, authorities promoted greater use of CCPs in OTC markets to address problems with the resilience of market infrastructure, the management of counterparty credit risk and the lack of market transparency and, ultimately, to mitigate systemic risk in these markets. In 2012, the Bank participated in initiatives to improve the resilience of two critical markets, the repo market and the interest rate swap market, through the development and increased use of CCPs.

2.1 Strengthening the Resilience of the Canadian Repo Market

Designation of the Canadian Derivatives Clearing Service

On 21 February 2012, Canadian Derivatives Clearing Corporation (CDCC) commenced the first phase of its fixed-income CCP service in the Canadian Derivatives Clearing Service (CDCS). In light of the critical role that the new fixed-income service would play in supporting the repo market in Canada, the Bank determined that CDCS had the potential to pose systemic risk, and therefore designated it under the PCSA on 30 April 2012.[9] CDCS also centrally clears OTC equity derivatives and all derivatives traded on the Montréal Exchange. Because these transactions are all cleared through the designated FMI, they also come under Bank of Canada oversight.

As explained in the Bank's Oversight Guideline, designation creates a number of obligations for the system operator. Most importantly, designated systems must understand and manage the risks to which they are exposed. The Bank expects designated FMIs to understand their role in the financial system and to have an organizational culture and practices that are commensurate with their role as systemically important FMIs. In June 2012, the Bank presented its expectations to the senior management of CDCC as well as its parent organizations, the Montréal Exchange and TMX Group.

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[9] The article "Reducing Systemic Risk: Canada's New Central Counterparty for the Fixed-Income Market" provides a description of the CDCS's new fixed-income service and the Bank's rationale for designating it.

Expanding the Role of CDCS in the Canadian Fixed-Income Market

The Bank has been monitoring and assessing the risk implications associated with expansion of CDCC's central counterparty service for the repo market.[10] In December 2012, CDCC added a service that allows members to clear "blind" repos, which are transacted and settled anonymously through interdealer brokers. In March 2013, it added the clearing of cash trades, which are trades involving the outright purchase and sale of fixed-income securities. CDCC plans to clear cash and repo trades in provincial securities in the near future.

As of the end of 2012, CDCC had cleared an average daily value of $8.5 billion of fixed-income repo transactions, which is a relatively small percentage of the total market. CDCC has been working to expand its participant base in order to serve a larger share of the fixed-income market.[11] It is especially important for CDCS to attract major "buy-side" participants, including pension funds, because these firms are on one side of a large proportion of transactions.[12] CDCC and the industry started discussions with key buy-side institutions in 2012. The Bank will continue to be involved to ensure that the solutions put in place meet the Bank's high standards for risk management. In addition, as described in Section 4.2, CDCC has been working with CDS to develop a collateral-management service that would allow CDCC to offer central clearing of repos supported by a basket of general collateral securities.

2.2 Strengthening the Resilience of the Interest Rate Swap Market

Canada's Decision to Meet Its G-20 Commitment through Offshore Clearing

In September 2009, leaders of the Group of 20 (G-20) agreed to reform over-the-counter (OTC) derivatives markets to improve their transparency, protect against market abuse and mitigate systemic risk. The reforms included a commitment that all standardized OTC derivatives should be cleared through CCPs.

Canadian authorities worked jointly to assess the two options to meet this commitment, either by allowing Canadian financial institutions to use global CCPs recognized by Canadian authorities or by requiring Canadian market participants to clear through a CCP located in Canada, based on considerations of financial stability, efficiency and market-development. In October 2012, Canadian authorities expressed confidence that they will have the tools to protect

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[10] See remarks by Deputy Governor Agathe Côté, "Toward a Stronger Financial Market Infrastructure for Canada: Taking Stock" for more details on the expansion of the repo service.

[11] Current participants in the CDCS fixed-income clearing service include BMO, CIBC World Markets, Desjardins Securities, Merrill Lynch Canada, Morgan Stanley Canada, the National Bank of Canada, NBCN, RBC Dominion Securities, RBC, Scotia Capital and TD Bank Group.

[12] The CDCS can only clear transactions when both counterparties participate in its service.

the financial stability of Canada's OTC interest rate derivatives market under the global approach to clearing.[13]

Establishment of Co-Operative Oversight of SwapClear and Designation for Oversight by the Bank of Canada

The Canadian central clearing decision on global CCPs focused on OTC interest rate derivatives denominated in Canadian dollars, since the Bank of Canada considers this market to be both systemically important and largely clearable. Internationally, LCH.Clearnet Limited's SwapClear service is the dominant CCP for OTC interest rate derivatives, clearing contracts in 17 currencies, including the Canadian dollar, and representing the vast majority of outstanding cleared interest rate derivatives.

During 2012, the U.K. Financial Services Authority (UK FSA) worked with regulators in other countries for which SwapClear clears a material volume of interest rate derivatives to develop frameworks for bilateral and multilateral co-operation and information sharing. [14] The UK FSA invited the Bank of Canada and regulatory authorities from Australia, France, Germany, Japan, Sweden, Switzerland and the United States to participate in an arrangement for regulatory, supervisory and oversight cooperation of SwapClear, given the importance of the service in those jurisdictions. The regulatory group held its first meeting in December 2012, and plans to meet at least semi-annually. [15] Participation in this arrangement will enhance the Bank's monitoring of the risks associated with SwapClear and thus will help fulfill its oversight responsibilities for this designated FMI.

Considering the important role that SwapClear has started to play in the Canadian financial system, the Bank began a review of SwapClear's potential to pose systemic risk in 2012 (completed in 2013) and concluded that SwapClear is systemically important to the Canadian financial system. SwapClear was designated on 2 April 2013.

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[13] Canadian market participants may use any CCP recognized by Canadian authorities, including global CCPs, to clear OTC derivatives. See "Statement by Canadian authorities on clearing of standardized OTC derivatives contracts."

[14] Oversight responsibility for SwapClear was assumed by the UK FSA until 1 April 2013, when the responsibility was transferred to the Bank of England.

[15] The Bank of England hosted the second semi-annual meeting in July 2013.

3. Review of Payments Sector Governance

Given the importance of payment systems to the financial system and economy, in 2010, Canada's Minister of Finance established the Task Force for the Payments System Review to conduct a comprehensive review of the Canadian payments sector. In response to the recommendations made by the Task Force in March 2012[16], the Minister committed to take immediate action in the following areas[17]:

(i) A review of payments system governance issues, including the governance of the Canadian Payments Association, to ensure the continued safety and soundness of the payments system, spur innovation, and promote the consideration of user interests. The Bank is working closely with the Department of Finance on this initiative. A new framework for the governance of the payments sector is being developed. It is expected that a public consultation of the proposals will be conducted in due course.

(ii)The establishment of the Finance Canada Payments Consultative Committee (FinPay), a senior-level advisory committee made up of public and private sector stakeholders, including payment card network operators, financial institutions and merchant and consumer groups that broadly represent the payments system.[18] FinPay meets regularly with officials from the Department of Finance to discuss emerging issues within the payments system including elements of the review of payments sector governance. A senior officer of the Bank is a member of the committee.

(iii) A review of the "Code of Conduct for the Credit and Debit Card Industry in Canada" to ensure its principles apply in a mobile payments environment. The Government released a draft mobile addendum for public consultation in fall 2012 and is working to finalize and release the addendum as soon as possible.

4. Key Activities Related to Designated FMIs

4.1 Large Value Transfer System

Following a thorough review, the Canadian Payments Association (CPA), the owner and operator of the Large Value Transfer System (LVTS), developed a long-term strategy to address the need to renew the technology used in its payment systems. A major initiative in 2012 included in the strategy was the LVTS Web Enablement project, which replaces LVTS workstations and the network used by participants to connect to the LVTS and perform administrative functions. Implementation of the Web-based application is expected to be phased in starting in the second quarter of 2013. The changes will ensure that the LVTS technology will remain robust and reliable, thereby reducing the potential for

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[16] See the report "Moving Canada into the Digital Age."

[17] See "Minister of Finance Welcomes Findings of the Task Force for the Payments System Review."

[18] See "Finance Canada Payments Consultative Committee."

increased operational risk from outdated technology. LVTS payments will continue to be submitted through the SWIFT network and will be subject to the same risk controls as they are today.[19] The LVTS core functionality will not be affected by these changes.

The LVTS continued to operate reliably over 2012 and was available 99.9 per cent of the time. While direct participants also had a high overall availability of 99.85 per cent throughout the year, two direct participants experienced unusually frequent technical difficulties. These incidents highlighted the need for improvements in the effectiveness of operational event management. In 2013, the CPA will conduct a holistic review of how participants manage operational events to identify areas for improvement to mitigate the associated risks.

In 2012, the CPA completed its assessment of the LVTS against the Principles to identify gaps in complying with the new standards. The CPA completed its plan to address its major gaps in early 2013. It is now working on addressing those gaps.

4.2 CDSX

The Canadian Depository for Securities Ltd. (CDS), owner and operator of CDSX, was acquired in August 2012 by a group of major Canadian pension funds and investment dealers, Maple Group Acquisition Corporation (Maple). Maple also acquired TMX Group Inc. and Alpha Trading Systems LP to form TMX Group Ltd. This consolidated a substantial portion of Canadian financial infrastructure into one entity.[20] As overseer of CDSX, the Bank's primary oversight interest in the restructuring is to ensure that risk management at CDSX is not negatively affected. The Bank is particularly interested in two key areas related to risk management: (i) the increased concentration and consolidation of critical and systemically important infrastructure within a single entity; and (ii) the change in ownership of CDS to a for-profit company.[21]

To reduce the potential for risks to spill over from other business lines at TMX Group to its core market infrastructures (or from one core infrastructure to another), CDCC, CDS and TMX's other businesses each remain legally separate subsidiaries. However, CDS and TMX Group are integrating their corporate support functions. The Bank approved the proposal for this integration in 2012. Integration continues to be a major initiative for CDS and TMX Group in 2013. The Bank will continue to monitor these developments to ensure that risk management in CDSX and CDCS remain robust under the new ownership structure.

CDS organized its first annual default simulation in late 2012. The simulation was successful in helping CDS and its external stakeholders familiarize themselves

[19] SWIFT is the acronym for the Society for Worldwide Interbank Financial Telecommunication.

[20] TMX Group Inc. owns Canada's primary exchanges and CCPs for equities, derivatives and energy, including the Montréal Exchange, which owns CDCC, the owner and operator of CDCS.

[21] While CDCC was already owned by TMX Group Inc., the Bank also considered the effects of the merger on CDCC's central clearing services.

with the default-management procedures for CDSX. In addition, CDS identified changes to its current default-management process to improve efficiency and reduce risk.

In co-operation with CDCC, CDS made system changes in 2012 to support CDCC's fixed-income clearing service. Additional upgrades were made in December to support CDCC's blind repo service (see Section 2.1). CDS is working with CDCC on the development of a service for general collateral repo to be offered by CDCC. CDS signed a letter of intent with Clearstream in March 2012 under which CDS would use Clearstream technology to support this initiative. More broadly, the Clearstream Collateral Management Services (CMS) could also support collateral optimization for domestic and international collateral requirements.

4.3 CLS Bank

CLS Bank settles payment instructions for foreign exchange (FX) transactions in 17 currencies, including the Canadian dollar. The Bank of Canada is a member of the CLS Oversight Committee (OC), which is the primary forum for the participating central banks to carry out their co-operative oversight of CLS Bank.[22] A focus of the OC in 2012 was to oversee transitions in the executive management of CLS Bank, particularly the transition of its new chief executive officer (CEO).

Over the past few years, CLS Bank has been working with its members to introduce a same-day settlement session to further reduce FX settlement risk in same-day FX trades between the U.S. dollar and the Canadian dollar. Same-day FX trades cannot currently be settled in CLS Bank owing to the timing of the existing settlement session. CLS Bank plans to launch this new service in the third quarter of 2013.

[22] The U.S. Federal Reserve Board is the lead overseer of CLS Bank.

Appendix 1: Background on FMIs Overseen by the Bank of Canada

Financial market infrastructures (FMIs) are systems that facilitate the clearing, settling or recording of payments, securities, derivatives or other financial transactions among participating entities. FMIs allow consumers and firms to safely and efficiently purchase goods and services, make financial investments and transfer funds. FMIs can therefore play an important role in enhancing financial stability. Some FMIs (referred to as “systemically important FMIs”) have the potential to pose *systemic risk*, in that the inability of one participant to meet its obligations to the FMI could, by transmitting financial problems through the FMI, cause other participants to be unable to meet their obligations. It is therefore essential that FMIs incorporate appropriate risk-control mechanisms to ensure that systemic risk is adequately managed.

Three types of FMIs are eligible for Bank oversight:

- **payment systems (PSs)** – which facilitate the transfer of funds.
- **securities settlement systems (SSSs)** – which facilitate the transfer of securities and other financial assets. SSSs often operate in conjunction with central securities depositories (CSDs), which provide securities accounts, central safekeeping and asset services. SSSs may provide additional securities clearing and settlement services, such as CCP clearing services.
- **central counterparties (CCPs)** – which become the buyer to every seller and the seller to every buyer of a financial contract to ensure that, even if a buyer or a seller fails to meet its obligation to the CCP, obligations will be met on all contracts.

The Governor of the Bank of Canada has designated five FMIs for oversight:

- The **Large Value Transfer System (LVTS),** a Canadian electronic funds-transfer system that settles large-value and time-critical Canadian-dollar payments.
- **CDSX**, a Canadian system that consists of a securities settlement system, a central securities depository (CSD) and central counterparty services for eligible Canadian exchange-traded and over-the-counter (OTC) equity, debt and money market transactions. The Bank oversees all of these elements of the system.
- The **Canadian Derivatives Clearing Service (CDCS)**, a Canadian central counterparty that clears transactions in certain fixed-income securities, repurchase agreements (repos), OTC equity derivatives and all derivatives traded on the Montréal Exchange.
- **CLS Bank**, a global payment system for the settlement of foreign exchange transactions, including those involving the Canadian dollar.
- **SwapClear**, a U.K.-based central counterparty designated in 2013 that clears interest rate swaps and other OTC interest rate derivatives denominated in multiple currencies, including the Canadian dollar.

See **Table 1** for a summary of these FMIs and the functions they perform in the Canadian financial system.

FMIs are interdependent, relying on the services provided by one another. These relationships increase the potential for risk to be transmitted from one FMI to another and thus underscore the importance of robust risk management in these FMIs.

Table 1. Summary of the activities of designated FMIs in 2012

		Volume[1] 2012	Volume[1] 2011	Value[1] 2012	Value[1] 2011
Large Value Transfer System (LVTS) **PS** - Designated in 1999 - Large-value funds transfer - Payment exchange for other FMIs	Daily average transactions settled:	28 Th	26 Th	$151 B	$158 B
CDSX **SSS, CSD and CCP** - Designated in 2003 - Equity and fixed-income securities - Securities clearing and settlement and safekeeping of assets	Daily average transactions settled:	1,480 Th	1,650 Th	$352 B	$363 B
	Securities at CSD:			$4.1 Tr	$3.9 Tr
Canadian Derivatives Clearing Service (CDCS) **CCP** - Designated in 2012 - OTC repos	Daily average value cleared:			$8.5 B[2]	$0
- Exchange-traded financial derivatives	notional traded:			$88 B	$91 B
- OTC-traded financial derivatives	notional traded:			$8 M	$1 M
Continuous Linked Settlement Bank (CLS Bank) **PS** - Designated in 2002	Daily average transactions settled total (in US$):	705 Th	822 Th	$4,687 B	$4,773 B
- Foreign exchange settlement	Can$:	27 Th	28 Th	$117 B	$115 B
SwapClear **CCP** - Designated in 2013	Notional outstanding at end 2012 Total (in US$):			$340 Tr	$283 Tr
- OTC interest rate swaps	Can$:			$4.5 Tr	$1.8 Tr

[1] The volume and value of transactions are expressed in thousands (Th), millions (M), billions (B) or trillions (Tr) of dollars.

[2] The CDCS fixed-income service was launched in phases during 2012. Owing to the incremental activity in the service during these phases, the amount provided represents the average value of repo trades cleared in December 2012 rather than for the entire year.

Appendix 2: Relevant Research and Publications issued by the Bank of Canada in 2012

Allen, J., J. Chapman, F. Echenique and M. Shum. 2012. "Efficiency and Bargaining Power in the Interbank Loan Market." Bank of Canada Working Paper No. 2012-29.

Arango, C., K. Huynh, B. Fung and G. Stuber. 2012. "The Changing Landscape for Retail Payments in Canada and the Implications for the Demand for Cash." *Bank of Canada Review* (Autumn): 31–40.

Arango, C. and A. Welte. 2012. "The Bank of Canada's 2009 Methods-of-Payment Survey: Methodology and Key Results." Bank of Canada Discussion Paper No. 2012-6.

Chande, N., J.-P. Dion, D. McVanel and J. Slive. 2012. "The Canadian Approach to Central Clearing for Over-the-Counter Derivatives." Bank of Canada *Financial System Review* (December): 43–49.

Chatterjee, P., L. Embree and P. Youngman. 2012. "Reducing Systemic Risk: Canada's New Central Counterparty for the Fixed-Income Market." Bank of Canada *Financial System Review* (June): 43–49.

Chiu, J., M. Dong and E. Shao. 2012. "On the Welfare Effects of Credit Arrangements." Bank of Canada Working Paper No. 2012-43.

Fung, B., K Huynh and L. Sabetti. 2012. "The Impact of Retail Payment Innovations on Cash Usage." Bank of Canada Working Paper No. 2012-14.

Fung, B. and M. Molico. 2012. "Conference Summary: New Developments in Payments and Settlement." *Bank of Canada Review* (Spring): 39–46.

McVanel, D. and J. Murray. 2012. "The Bank of Canada's Approach to Adopting the Principles for Financial Market Infrastructures." Bank of Canada *Financial System Review* (December): 51–55.

Tomura H. 2012. "A Note on Central Counterparties in Repo Markets." Bank of Canada Discussion Paper No. 2012-4.

———. 2012. "On the Existence and Fragility of Repo Markets." Bank of Canada Working Paper No. 2012-17.

Zhang, N. 2012. "Estimating the Demand for Settlement Balances in the Canadian Large Value Transfer System." Bank of Canada Working Paper No. 2012-15.