BANK OF CANADA
BANQUE DU CANADA

Staff Discussion Paper/Document d'analyse du personnel 2016-8

Canadian Repo Market Ecology

by Corey Garriott and Kyle Gray

www.bank-banque-canada.ca

Bank of Canada Staff Discussion Paper 2016-8

March 2016

Canadian Repo Market Ecology

by

Corey Garriott and Kyle Gray

Financial Markets Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
cgarriott@bankofcanada.ca
kgray@bankofcanada.ca

ISSN 1914-0568

Acknowledgements

We would like to thank the following people for their comments, suggestions and input into this paper: Danny Auger, Faith Chin, Jean-Philippe Dion, Adir Dishy, Adrian Eng, Catherine Girouard, Annetta Ho, Andrew Lee-Poy, Wade McMahon, Joanna Roberts, Brad Shinn, John Sim, Mike Surmak, Alexander Taryshkin and Patrick Tobin. Any errors or omissions are the authors' responsibility.

Abstract

This is the first of the Financial Markets Department's descriptions of Canadian financial industrial organization. The document discusses the organization of the repurchase-agreement (repo) market in Canada. We define the repo contract, the market infrastructures that support repo trading and the composition of the market participants. We also describe repo trading practices in Canada, risks in the repo market and repo regulation. A repo is a financial contract that resembles a collateralized loan. It is used to support the funding needs of financial institutions and to procure on a temporary basis specific securities. The Canadian repo market is primarily composed of large banks and large investment institutions such as pension funds. A unique feature of the Canadian market is that Canadian investment institutions are net borrowers of cash via repo. Repo can transmit risks in the financial system because it can create levered interconnections among participants. Risks in the Canadian repo market are relatively smaller than in other jurisdictions.

JEL classification: G18, G21, G23
Bank classification: Financial markets; Financial institutions; Financial system regulation and policies; Market structure and pricing

Résumé

La présente étude constitue le premier volet d'une série de travaux que le département des Marchés financiers consacre à la description de l'organisation industrielle du secteur financier canadien. Elle a pour objet l'organisation du marché des pensions sur titres au Canada. Nous y présentons une analyse descriptive du contrat relatif aux pensions, des infrastructures de marché qui sous-tendent les opérations de pension et de la répartition des participants à ce marché. Nous y décrivons en outre la pratique des opérations de pensions au Canada, les risques associés au marché des pensions et la réglementation applicable à ces instruments. La pension sur titres est un contrat financier qui s'apparente à un prêt garanti. Les institutions financières l'utilisent pour répondre à leurs besoins de financement ou pour se procurer temporairement des titres particuliers. Le marché canadien des pensions se compose essentiellement des grandes banques et de grands organismes investisseurs tels que les caisses de retraite. Une particularité du marché canadien tient au fait que ces organismes y sont en situation d'emprunteurs nets de liquidités. Les opérations de pension sont susceptibles de transmettre des risques à l'ensemble du système financier, car elles peuvent exposer les participants à des positions à effet de levier par l'intermédiaire des liens qu'ils ont entre eux. Dans l'ensemble, les

risques qui pèsent sur le marché des pensions sont relativement moins élevés au Canada que dans d'autres pays.

Classification JEL : G18, G21, G23
Classification de la Banque : Marchés financiers; Institutions financières; Réglementation et politiques relatives au système financier; Structure de marché et fixation des prix

1. Introduction

This is the first of the Financial Markets Department's descriptions of Canadian financial industrial organization. The descriptions are called "ecologies" because they study the interactions among market participants, infrastructures, regulations and the terms of the contract.

In this ecology, we discuss the organization of the repurchase-agreement ("repo") market in Canada. The Bank of Canada has identified this market as a core funding market because it is an important funding source for financial institutions and a source of liquidity for cash markets (Fontaine et al. 2009). After looking at what constitutes a repurchase agreement, we outline the special characteristics of the repurchase agreement as a contract. We next move to the market infrastructures that support repo and then examine the activities of repo market participants. Repo practices in Canada, risks in the repo market and finally repo regulation in Canada are then discussed.

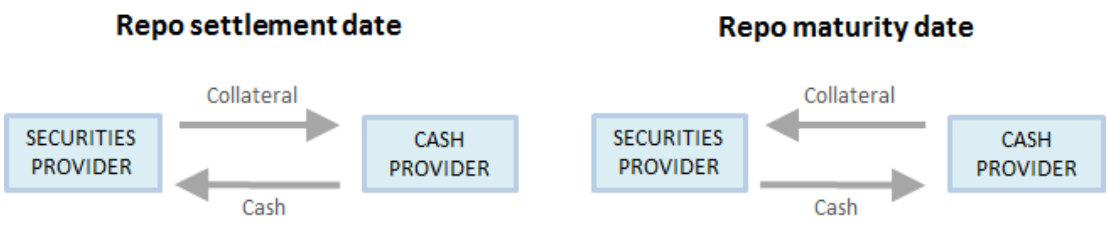
2. Defining the Repurchase Agreement

The repurchase agreement ("repo") plays an important role in Canadian financial markets. It enables quick collateralized funding, supports trading activities such as market-making and principal trading, and provides security holders with a source of income. During 2014, a daily average of about CAD 237 billion in Canadian-denominated assets were on repo.

A repo is essentially a collateralized loan. One party to a repo lends cash and earns interest on the cash lent. The other party borrows the cash and pays the interest. The borrower secures the loan by posting a security as collateral. The cash borrower may also be called the securities lender. In Canada, the posted collateral is most typically a bond, and in other jurisdictions equity securities are often used.

Though a repo is similar to a loan economically, legally a repo is structured as a sale of the collateral to the cash lender with a requirement that the borrower later repurchase the collateral. Absolute title to the collateral passes from the cash borrower to the cash lender. The lender therefore owns the collateral during the term of the repo and may use the security freely, including by posting it as collateral in another repo. The two transactions in a repo are depicted in Figure 1; the appendix gives a simplified presentation of its accounting treatment. While repo is legally structured as a sale, it is not a disposition of an asset for tax purposes, so the repurchase does not attract capital gains tax.

Figure 1: The two transactions in a repo



The main uses of repo are funding and securities borrowing. Repo is used for funding because it provides the securities provider with cash in exchange for its collateral. Funding via repo typically costs less than unsecured funding due to the collateralization. If the cash borrower defaults, the cash lender can recover value by selling the collateral, so it is a less-risky form of lending and therefore less expensive. Flexible short-term funding is important to fixed-income market-making as it enables market-makers to use inventories to finance trades. The second purpose of repo is to provide a specific, required security for a short period and on cash collateral. Short sellers and market-makers often need to procure a security either for short sale or to sell to a client. It is typically cheaper to borrow a required security than it is to buy the security outright.

3. The Repurchase-Agreement Contract

A repurchase agreement is a contract to sell a security and to repurchase it at a future date at agreed-upon prices. The contract is designed to replicate many of the conditions of a collateralized loan: the seller of collateral receives cash and pays interest on the cash for the duration of the agreement; the buyer of collateral provides cash and holds a security as collateral in case the seller should default. Since a financial participant can use repo to borrow cash on collateral, repo is a form of securities financing. Financing is not the only use of the contract, as the repo buyer can use it to borrow desired securities.

The terms of a repo specify, at a minimum, the counterparties, the security bought and sold, the date of purchase and the term, the repo rate, and the haircut (Table 1).

Table 1: Terms of the repo contract

Counterparties	A repo has two counterparties: the seller and the buyer. The seller is so-called because it begins the repo agreement by selling a security. If the repo agreement is interpreted as a collateralized loan, the seller is the cash borrower and the buyer is the cash lender.
Purchase date	The date on which the purchase of securities occurs. This date is also called the *settlement date* and the *first leg*.
Repurchase date	The date on which the repurchase of securities occurs. This transaction is also called the *maturity date* and the *second leg*. The repurchase date can be left open and determined later.
Collateral	The security sold on the purchase date. This security is called the *collateral*.
Equivalent securities	The security repurchased on the repurchase date. Securities are equivalent if they are (i) of the same issuer; (ii) part of the same issue; and (iii) of an identical type, nominal value, description and amount as the collateral. If the collateral matures before the repurchase date, the equivalent security is the sum of money equivalent to the proceeds of the redemption.

The purchase price (or value)	The cash paid for the collateral. The purchase price is also called the *value* of the repo. This number is the notional value that appears on a firm's balance sheet.
The repurchase price	The cash paid for the collateral repurchase.
Repo rate	The interest rate paid on the cash to compensate the cash lender for the collateralized loan.
Haircut	The difference between the purchase price and the market value of the collateral. A haircut protects repo buyers against some market risk should they have to liquidate the collateral.

The word "repo" refers to the repurchase agreement from the perspective of its seller, the one obtaining the cash. A reverse repurchase agreement (or "reverse repo") is the name for the same contract seen from the perspective of the buyer. A reverse repo is a contract to buy a security and to sell it at a future date at agreed-upon prices. Financial participants can repo a bond to *borrow* cash against collateral, whereas they can reverse repo a bond to *lend* cash on collateral.[1]

Repo contract mechanics

The repo contract has been standardized in a written document maintained by the International Capital Markets Association (ICMA) called the Global Master Repo Agreement (GMRA). In 1992, ICMA began to circulate the GMRA as a way to standardize repo terms so that all counterparties could agree on the meaning of the contract and so that the contract could become more fungible. Institutions that wish to enter repo agreements typically sign a GMRA with their counterparties governing the terms of their future individual repo transactions.

The GMRA focuses on the counterparties' rights in the event of a default or a failure to pay. In addition, the GMRA makes available many repo contract mechanics that can be turned on and off, depending on the style of repo desired. Here are the most-commonly used repo contract mechanics:

- **Absolute legal title:** The sale of collateral in a repo contract is defined as a true sale. In most jurisdictions including Canada, repos for most types of collateral are exempted from automatic stay in bankruptcy court, preserving the integrity of the sale and repurchase. The legal exemption from automatic stay is called safe harbour.
- **Manufacture of asset income payments:** Any income that the collateral would earn (e.g., coupon payments on a bond) is paid to the collateral seller. The payment or "manufacture" of asset income makes repo more useful as a financing tool. Many companies invest in a portfolio of securities at least in part because they are interested in the income payments. If they had to

1 It can be difficult to remember whether selling a repo means borrowing cash or lending cash. To assist, we suggest the rhyming mnemonic "repo-borrow." This is our contribution to the literature!

give up the income payments in order to obtain more funding, it would dissuade many participants from borrowing cash on that collateral.

- **Right of substitution:** If the counterparties agree to this mechanic, the repo seller may substitute the collateral during the lifetime of the agreement with another security. The rate and haircut may change after certain substitutions. The right of substitution gives flexibility in financing to repo sellers. If the seller should discover it desires a particular security that was pledged, it could recover the security and substitute another security that is considered to have similar risk characteristics. Enabling the right of substitution typically incurs a fee of 1 to 2 basis points, stipulated at the beginning of the contract.
- **Right of early return:** If the counterparties agree to this mechanic, either of the counterparties may ask for the repurchase to occur in the near future. This enables a termination of the repo agreement should credit or market conditions change. It also enables repo counterparties to leave the repurchase date open to be determined later.
- **Margin maintenance:** Together with a credit-support annex (CSA), the GMRA allows the repo buyer to call for margin should the value of the collateral fall sufficiently. It also enables repo participants to ask for margin.
- **Failure to deliver:** The repo contract stipulates what consequences follow a failure to return the collateral on the repurchase date. If the securities borrower fails to return the security when the contract matures (the borrower "fails"), the lender of the bonds may postpone the repurchase date but with no interest accruing after the repo's initial maturity date. The cash borrower continues to hold the borrowed cash but pays zero interest. The forgone interest creates an opportunity cost to failing.[2] Otherwise, the repo seller does have the legal right to purchase the undelivered bonds and bill any incurred costs to the securities borrower.

Types of repo

The contract mechanics made available by the GMRA are used to implement several well-known repo contract types (Table 2). These repo types constitute the majority of repos traded, and electronic venues such as broker screens quote these repos by name.

Table 2: Types of repo

General collateral (GC) repo	A repo quoted for any collateral on a menu of securities. A common kind of GC repo in Canada is the Government of Canada (GoC) GC repo, for which the collateral can be any bond on a particular list of GoC-issued bonds. Another common kind of Canadian GC repo is the mortgage-backed securities (MBS) GC repo, for which the collateral can be any security on a list of MBS.

2 In the case of a negative interest rate, the contract provides that the lender of the bond (the borrower of cash) continues to receive interest if the contract is rolled over. In other words, under negative rates, the borrower of the bond cannot benefit by failing to return the bond and avoiding paying the negative rate.

Specific/special repo	A repo for which the desired collateral is a single, named security. If the repo rate for a specific repo is substantially less than the rate for GC repo, the collateral of a specific repo is said to be "on special." A rate substantially less than the GC repo rate incentivizes the securities lender to lend since it can obtain cash at a cheaper rate than market.
Open-term repo	A repo for which the repurchase date is not identified and will be set later through the right of early return.
Closed-term repo	A repo for which the repurchase date is identified. In Canada, most repos, even overnight repos, are closed in term.
Evergreen repo	A term repo that automatically renews its term until either counterparty gives notice, at which point it becomes a term repo with the set term. Seen differently, it is an open-term repo with an extended notice period.
Floating-rate repo	A repo for which the repo rate is linked to a benchmark (e.g., Canadian Overnight Repo Rate Average, or CORRA) plus or minus a spread.
Sell/buybacks or buy/sellbacks	Sell/buybacks are an older-style repurchase arrangement. They differ from repo in two main ways: • The interest payments are all embedded in the repurchase price (so the repo rate is an implied one). • The manufactured payments are not paid until the repurchase date. In Canada, most "repos" are actually sell/buybacks for historical reasons. Sell/buybacks reduce interaction with the payment system since there are fewer manufactured payments.

Comparing specific repo to securities lending

A specific repo is economically similar to a securities-lending agreement, particularly if the securities-lending agreement should use cash collateral. Securities lending and specific repo (as opposed to GC repo) serve a similar purpose: for a market participant to locate and borrow a specific security. As with repo, in a securities-lending agreement, the securities borrower receives legal title of the collateral, and the asset income on the collateral is manufactured to the securities lender. But specific repo and securities lending do differ in certain ways. Participants in a securities-lending agreement may exchange one security for other securities or for letters of credit, whereas participants in a specific repo exchange a security for cash. In Canada, specific repos typically have a fixed tenor whereas securities-lending agreements are typically open. Specific repos in Canada are typically sell/buyback arrangements, in which the manufactured payments are made at maturity; in Canadian securities-lending agreements, the manufactured payments are typically made monthly. For more information on securities-lending agreements, please see the Bank of Canada's securities-lending ecology.

The effect of repo on the balance sheet

The market risk and market return of the collateral in a repo transaction remain with the seller due to the manufactured payments. For that reason, under International Financial Reporting Standards (IFRS), the collateral remains on the seller's balance sheet as an asset for the duration of the repo.[3] Though the collateral remains on the balance sheet, it is treated as encumbered (see the appendix for an illustration).

Since the repo collateral stays on the seller's balance sheet and in addition the repo seller borrows cash, a repo increases both the seller's assets and its liabilities on its balance sheet, much like any loan. The expansion of the balance sheet has regulatory implications covered in section 8; in short, selling repo affects an entity's leverage and liquidity-coverage.

Synthesizing repo using bond forwards and futures

It is possible to synthesize a repo using bond derivatives such as forwards and futures. A repo can be synthesized by purchasing a bond on the cash market and then committing to sell the same bond at a later date through a bond forward or future. Repo dealers' clients may choose to book a repo with their dealer using a forward because of differing tax, accounting and regulatory treatment. The accounting treatment can be better because the asset leaves the seller's balance sheet. There is an arbitrage relationship between repo and repo synthesized via bond derivatives—it is called cash-and-carry arbitrage.

4. Infrastructure of the Canadian Repo Market

There are three designated financial market infrastructures (FMIs) that underlie the repo market in Canada:

1. The Canadian Payments Association owns and operates the **Large Value Transfer System (LVTS),** which manages cash payment and cash settlement.
2. CDS Clearing and Depository Services Inc. (CDS) runs **CDSX**, Canada's national fixed-income securities depository and settlement system.
3. The **Canadian Derivatives Clearing Corporation** (CDCC) runs Canada's central counterparty (CCP) for repurchase agreements.

All three FMIs are designated as systemically important by the Bank of Canada and thus are overseen by the Bank under the authority granted by the *Payment Clearing and Settlement Act* (PCSA).[4]

In addition to these FMIs, there are three interdealer brokers that provide infrastructure for repo negotiation and trade. The brokers are Freedom, Shorcan and Tullett Prebon.

---

3 On 1 January 2011, IFRS replaced Canadian GAAP as the financial reporting framework for publicly accountable enterprises and government business enterprises.

4 For more information on the PCSA, see http://www.bankofcanada.ca/core-functions/financial-system/oversight-designated-clearing-settlement-systems/#responsibilities.

Trading venues

Although substantial repo trade does occur on electronic trading venues, repo negotiation in Canada is more often bilateral and voiced. Repo desks at Canadian broker-dealers are mostly client-facing. They provide access to repo markets for either external clients or other internal desks. The Canadian buy-side generally trades directly with the dealer arm of the banks and one or two independent dealers. The Canadian sell-side manages inventory by trading in a private interdealer market. Hence the repo market in Canada is an over-the-counter dealer market with a core-periphery structure.

The interdealer market in Canada is brokered by three interdealer brokers (IDBs), financial intermediaries that broker transactions between other financial intermediaries on an agency basis. The IDBs in Canada serve financial institutions that are broker-dealers registered with the Investment Industry Regulatory Organization of Canada (IIROC) and that are CDCC members; the buy-side does not participate. The IDBs in Canada are Freedom, Shorcan and Tullet Prebon; Freedom and Shorcan have most of the market share. IDBs maintain internal electronic limit-order books. In certain cases, they grant direct access to their books through application programming interfaces (APIs). Interdealer brokers can be accessed via broker screens that can run on a desktop computer at a trader's desk.

IDB negotiations are anonymous pre-trade but, in certain cases, the IDBs reveal counterparty identity before trade execution. Participants can quote bids or asks via IDBs on both GC repo and specials. If a repo is centrally cleared, CDCC immediately novates the trade, and both sides open corresponding repo agreements with CDCC. Some of the trading venues also allow a "workup": after two participants match orders, they are able to increase the volume of the trade with one another. On Freedom and Shorcan, there is a 7-second minimum lifetime for limit orders before they may be cancelled.

The IDBs have begun running periodic auctions for special repo two or three times a day. Though they are called "auctions," there is no bidding in the sense of a sealed-bid auction; it might be more accurate to call them periodic crossing venues. Before the auction, a price is fixed based on trading data and on interviews with dealers. During the auction, which lasts around 10 minutes, participants may post anonymous buy or sell orders at the price. At the end of the auction, outstanding buy and sell orders are matched at the fixed price.

CDSX

CDS Clearing and Depository Services Inc. is owned by the TMX Group and operates CDSX, a security settlement system. CDSX effects securities ownership transfers resulting from transactions both on electronic trading platforms and over the counter. All legs of repo transactions in Canada, whether traded bilaterally or centrally cleared, settle through CDSX.

For a counterparty to settle through CDSX, it must either be a direct participant or have indirect access to CDSX through a direct participant. Trades are sent to CDSX for settlement electronically and must be confirmed by both parties.

Both the sale and repurchase of a security in a repo agreement are settled in CDSX but as two separate fixed-income transactions. Once trades are entered into CDSX, they enter the settlement process on

their settlement date (e.g., GoC securities are settled same-day). On the settlement date, a simultaneous transfer of securities and funds between the two counterparties' accounts in CDSX occurs only if both participants have adequate collateral and funds to effect the transfer. Otherwise, CDSX places the trade on hold. Once both parties have adequate collateral and funds, the trade occurs immediately and simultaneously: the seller of the security receives a credit to its CDS funds account, the buyer's funds account is debited and the bond's ownership in CDSX is transferred. Participants in CDSX may hold a negative funds balance during the day up to a certain threshold depending on their level of collateralization and limits set within CDSX.

CDSX's settlement facility is open from 4:00 a.m. to 6:00 a.m. (called "batch net settlement") and again from 7:00 a.m. to 7:30 p.m. and from 12:30 a.m. to 4:00 a.m. (called "real-time settlement"). The batch net settlement period is a trade's first chance to settle. In batch net settlement, all the participants' trades in CDSX are netted, and then settlement is attempted. Trades not eligible to settle in the batch process due to insufficient funds or collateral are reconsidered for settlement in the real-time settlement process afterwards. Same-day trades (e.g., GoCs) settle through the real-time process.

At 4:00 p.m., CDSX requires all participants to meet their payment obligations. Canadian-dollar payments are made via LVTS, and U.S.-dollar payments are made through Fedwire indirectly through a corresponding bank. CDS waits to receive all funds owed before it begins to pay participants. CDS is not an LVTS participant; LVTS participants exchange payments with CDS through CDS's account at the Bank of Canada.

CDCC

To support a well-functioning repo market, the Bank of Canada has worked closely with the Canadian financial industry and CDCC (owned by the TMX Group) to develop and expand a CCP for repo transactions (Chaterjee et al. 2012; Chande et al. 2010). CDCC began clearing repo in February 2012 and today clears roughly 10 to 20 per cent of the market; CDCC currently clears interdealer repo transactions for most of the largest sell-side participants in Canada.[5]

The repo CCP is directly linked to CDSX. A repo trade intended for clearing must first be submitted to CDSX with a repo flag. To clear a repo through CDCC, both parties to the repo trade must be members not only of CDCC but also of CDSX. Once CDCC verifies the repo is eligible for clearing, CDCC notifies CDS to nullify the original trades between the transacting counterparties and to create two new trades in CDSX with CDCC as the counterparty to each side of the trade. After the repo is novated, CDSX settles it on the trade date and the maturity date normally, treating CDCC as it does any other counterparty.

Since CDCC is treated as a normal counterparty in all the repo trades it clears, it settles the underlying fixed-income transactions in CDSX. To effect settlement, CDCC (as a receiver of credit in CDSX) has a

5 The CDCC fixed-income clearing members are Bank of Montreal, BMO Nesbitt Burns Inc., CIBC World Markets Inc., Desjardins Securities Inc., HSBC Securities Canada Inc., Merrill Lynch Canada Inc., National Bank of Canada, NBCN Inc., RBC Dominion Securities Inc., Scotia Capital Inc., Société Générale Capital Canada Inc., and The Toronto-Dominion Bank.

$600 million intraday line of credit from the Bank of Montreal (BMO) and the Royal Bank of Canada (RBC) within CDSX to ensure there are adequate funds to satisfy CDSX's risk controls during the settlement process.

CDCC is included in the CDSX batch net settlement in the early morning. Trades that do not settle during this process, plus new same-day trades, are then settled through the CDSX real-time settlement process on a gross basis throughout the day. CDCC can only novate its credit limit of $600-million worth of securities at a time before it must settle. To encourage CDCC members to settle with CDCC promptly—so CDCC can continue purchasing securities—CDCC has set a "point in time settlement obligation" (PITSO) at 10:15 a.m. by which all CDCC counterparties are required to ensure they have sufficient funds in CDSX at least equivalent to their obligations to purchase the securities currently held by CDCC.[6] This ensures CDSX will settle the securities held by CDCC (up to its $600-million limit). Once they have room again in their line of credit, CDCC resumes purchasing securities as part of its CCP obligations. PITSO ensures that participants provide enough liquidity in the system to allow continuous settlement at that point in time. To ensure ample time for CDCC to close out all remaining settlement obligations of the day, it has set a 3:30 p.m. cut-off for submission of new same-day cleared transactions. As a receiver of credit in CDSX, CDCC needs to make sure it does not have a negative funds position by the 4:00 p.m. payment exchange deadline in CDSX.

To protect itself in the event of a default of a clearing member, CDCC has obtained a $12-billion uncommitted liquidity line from a consortium of the major banks in Canada. The line would be used to fund the exposures of the defaulter, as CDCC has an obligation to assume the defaulter's portfolio in order to guarantee settlement. In addition to the liquidity line, CDCC collects initial margin, and members contribute to a clearing fund. The margin and clearing fund contributions are collected across all products offered by CDCC and can be used for a default in any of their services. As part of CDCC's default waterfall, if the margin and clearing fund of a defaulter are consumed, CDCC will contribute a portion of its own cash toward the losses. Should there still be losses beyond CDCC's own "skin in the game," the remaining losses are shared among the surviving members.

Large Value Transfer System

LVTS is an electronic funds transfer system owned and operated by the Canadian Payments Association. Among its other functions, it facilitates settlement of Canadian-dollar payment obligations arising from securities transactions in CDSX. Any funds owing in CDSX from lines of credit (e.g., CDCC's line of credit from BMO and RBC) are due by 4:00 p.m. CDCC is not an LVTS participant; LVTS participants exchange payments with CDCC through CDCC's account with the Bank of Canada. (For more information on LVTS, see http://www.bankofcanada.ca/core-functions/monetary-policy/lvts/.)

6 If not, CDCC has the discretion to place the participants into default.

5. Participants in the Canadian Repo Market

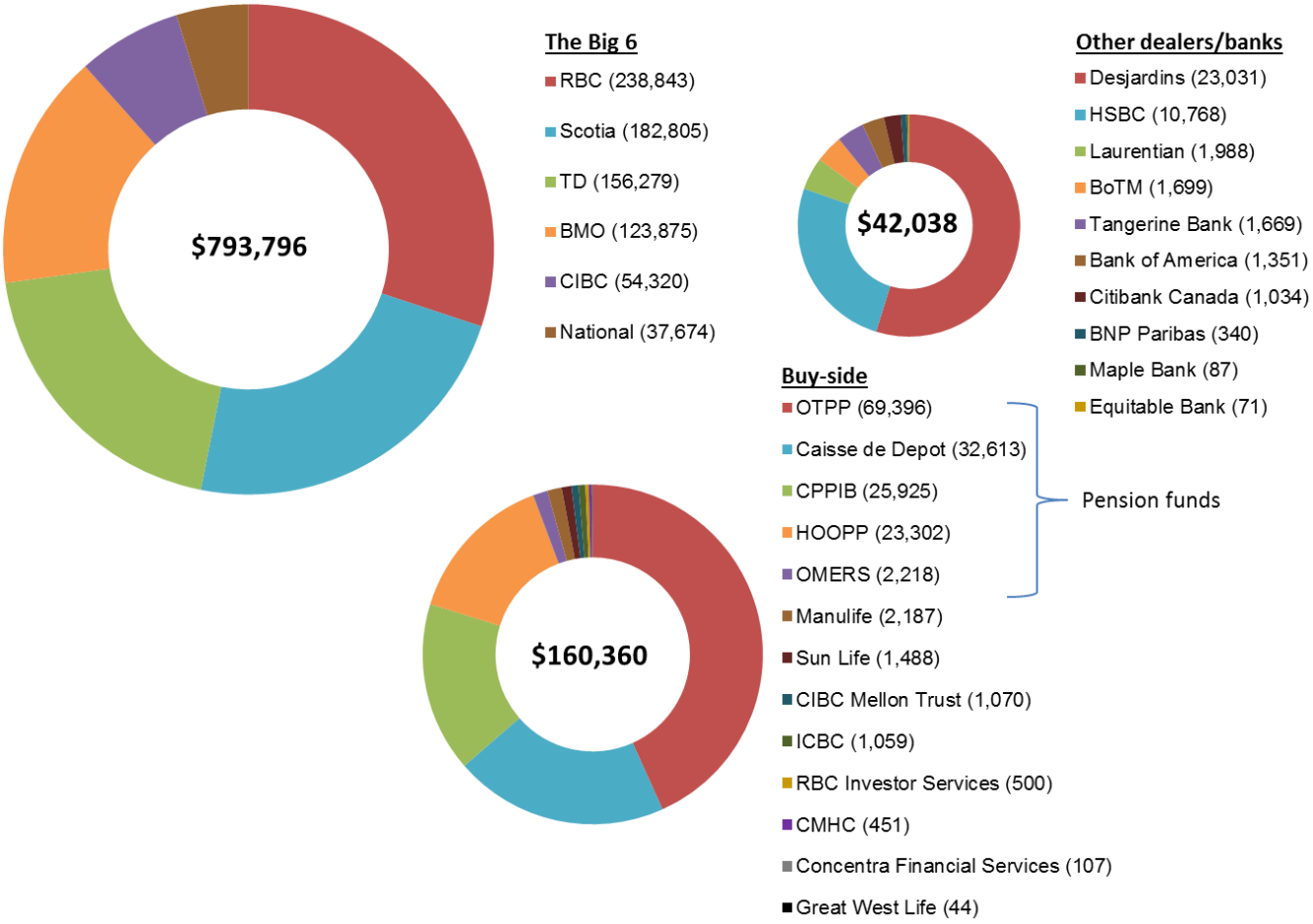
The repo market in Canada is a concentrated market; a handful of participants conduct the majority of repo trades. In this section, we use public data from the Office of the Superintendent of Financial Institutions (OSFI) and data from annual reports to estimate the distribution of repo outstanding in Canada among the various entities (buy-side and sell-side).[7] We also use aggregated data from IIROC's Market Trade Reporting System (MTRS) to provide a model estimate of the collateral structure and tenor structure of the six largest Canadian banks' repo activity.

A variety of institutions participate in the repo market:

- **Dealers:** Repo originated as a means for dealers to finance long or short positions they acquired during the normal course of their market-making activities. Without repo, dealers had to borrow either via loans in the unsecured market or by issuing commercial paper. Unsecured credit is expensive, and repo gave dealers a flexible means to access secured financing.
- **Leveraged investors:** Investors who wish to develop levered positions can use repo to fund a set of asset purchases by using the purchased assets as repo collateral. Since repo is collateralized, it is a cheaper way to achieve leverage than unsecured sources. In Canada, pension funds and insurance companies may use repo to achieve leverage.
- **Prime brokers:** Prime brokers offer securities lending and repo services to their clients as part of their value-added services. They may repo clients' investments (held by the broker) to provide clients with cheaper funding.
- **Repo conduits:** A repo conduit is a special-purpose vehicle whose purpose is to lend to other investment firms via repo. The conduit finances itself by issuing asset-backed commercial paper secured by the collateral the conduit receives as it lends. Repo conduits often make money by accepting illiquid or unusual collateral that is difficult to repo otherwise.
- **Risk-averse cash investors:** Repo offers investors who have cash an opportunity to earn interest on the cash without taking on much risk, as repo is collateralized. Money-market mutual funds are an example of risk-averse cash investors.
- **Central banks:** Central banks can use the repo market as a way to manage the cost and quantity of credit in an economy. Repo is a preferred tool in many central banks because of the size of the repo market and because it reduces the credit risk being taken with public funds. In Canada, the Bank of Canada intervenes in the overnight repo market by doing repo (called Special Purchase and Resale Agreements or SPRA), which reduces rates, or by conducting reverse repo (called Sale and Repurchase Agreements or SRA), which raises rates.

7 Data as of 31 December 2014.

Figure 2: Estimated global repo and reverse repo outstanding by participant (CAD millions, 2014 end-of-year)



Sources: Annual reports, financial statements and public OSFI data

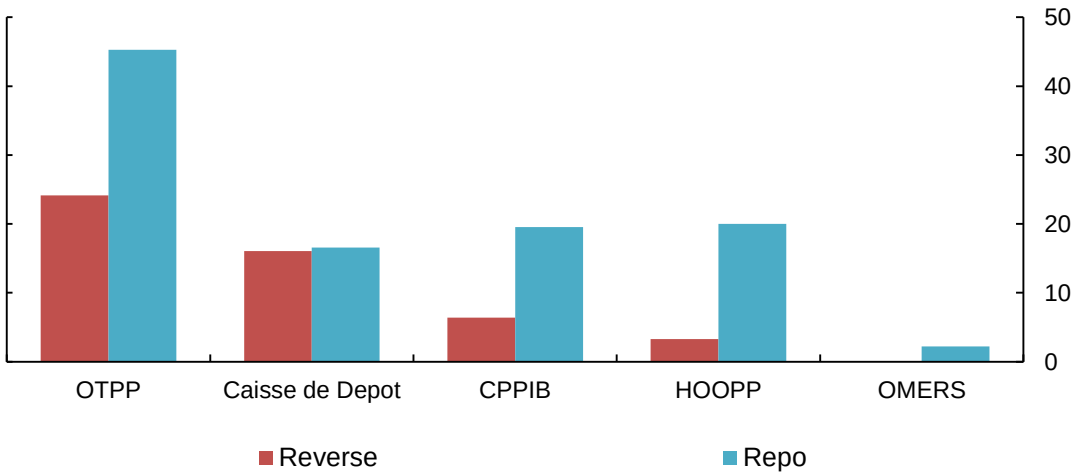
The largest players in the Canadian market are the "Big 6" Canadian banks (often through their dealer arms) and the major pension funds. Figure 2 gives the sizes of the Canadian participants' stock of repo in all currencies, including both CAD and USD currency repo. The numbers in parentheses are the sum of the entities' repo and reverse repo outstanding in millions. Repo outstanding amounts are imperfect proxies for the total quantity of repo transacted by Canadian financial intermediaries. Offsetting repo exposures can be reduced using bilateral Master Netting Agreements (MNAs) or through the netting generated when using a Repo CCP for clearing. This causes the figures to understated, to some degree, the repo transacted amounts; more so for bigger users of MNAs and repo CCPs such as the Big 6. Figures 3 and 4 give a breakdown of repo and reverse repo outstanding for various Canadian buy-side institutions in millions.

The Canadian buy-side participants

The buy-side in Canada typically transacts with broker-dealer repo desks. Buy-side-to-buy-side transactions in repo are uncommon. In aggregate, the Canadian buy-side is a net cash borrower in the repo market; the buy-side is often neutral or a net lender in other jurisdictions.

In terms of the composition of the collateral for their repo, the buy-side tends to use mostly Government of Canada (GoC) bonds; Canada Mortgage Bonds and provincial bonds are the second-most popular types of collateral.

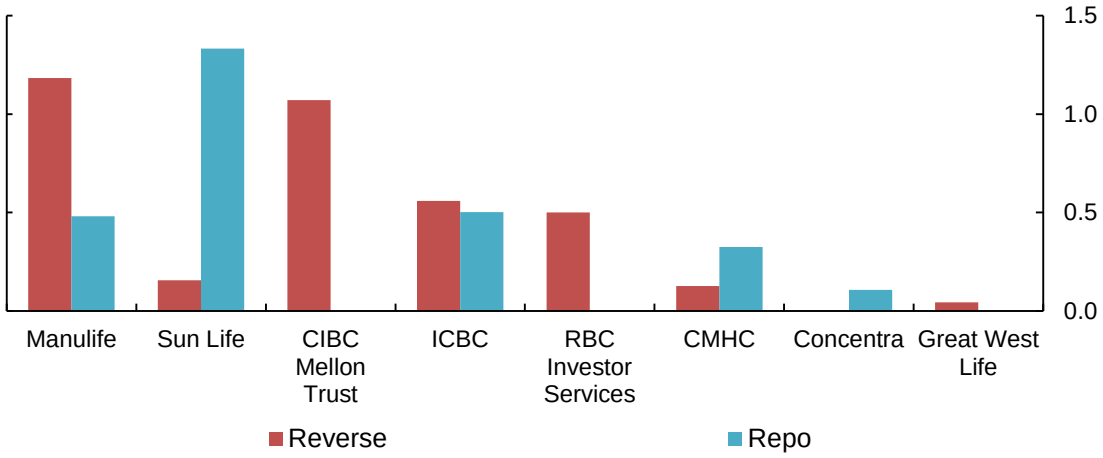
Figure 3: **Estimated global repo and reverse repo outstanding at larger Canadian buy-side firms**
(CAD billions)



Sources: Annual reports and financial statements

Last observation: Dec 2014

Figure 4: **Estimated global repo and reverse repo outstanding at smaller Canadian buy-side firms**
(CAD billions)



Sources: Annual reports and financial statements

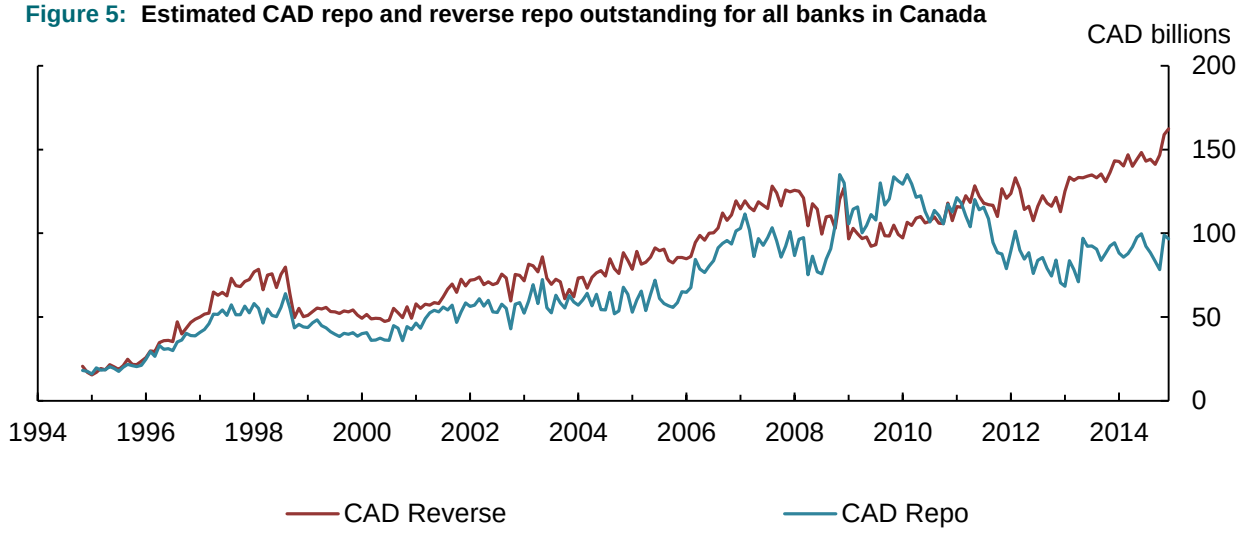
Last observation: Dec 2014

The Canadian sell-side participants

Banks in Canada have increased their presence in repo markets over the last 20 years. They have typically maintained a net lending position to facilitate the net borrowing needs of their clients. Since late 2011, as Figure 5 shows, banks have reduced their domestic (CAD only) repo activity, whereas their

reverse repo activity continues to grow. As a result, the Canadian banks have become net lenders, and much more so than they have been historically (Figure 6).

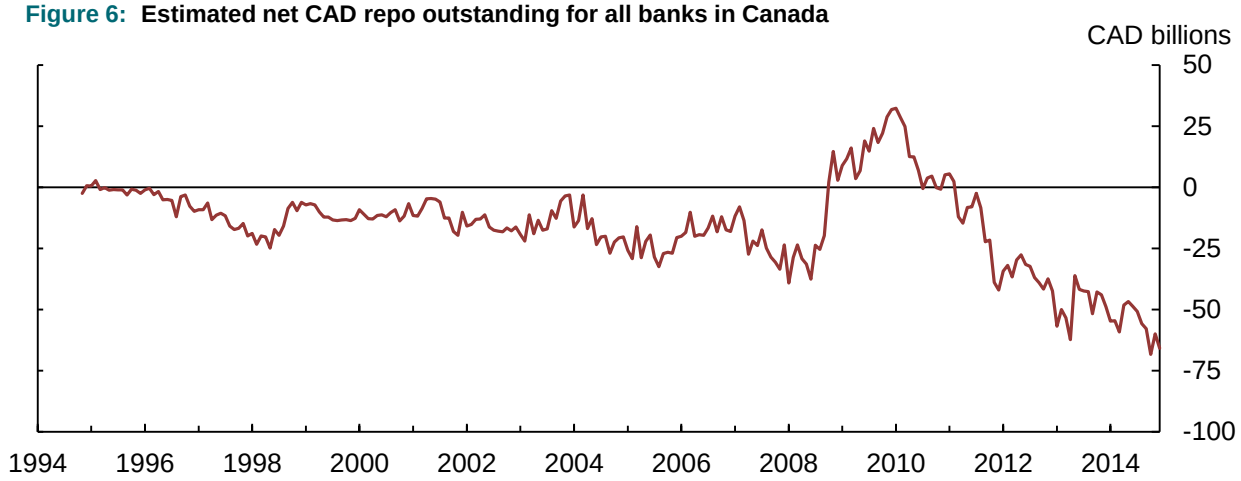
Figure 5: Estimated CAD repo and reverse repo outstanding for all banks in Canada



Source: Public OSFI data

Last observation: Dec 2014

Figure 6: Estimated net CAD repo outstanding for all banks in Canada



Source: Public OSFI data

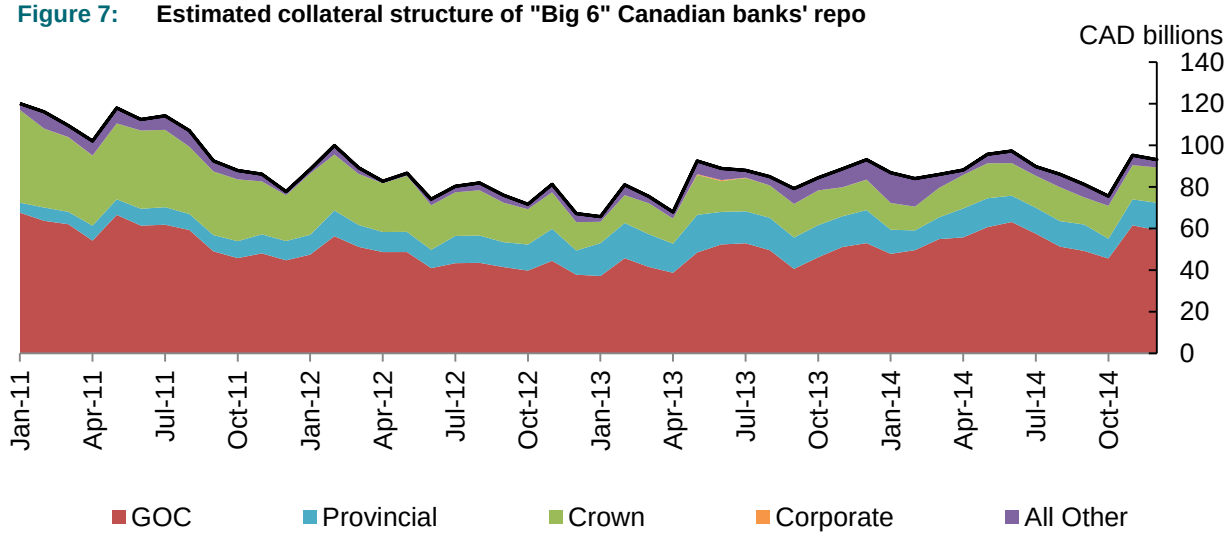
Last observation: Dec 2014

The only time period since 1994 when Canadian banks were net borrowing was 2009, shortly after the financial crisis. The Bank of Canada engaged in a program of term repo lending to the Canadian banks to ensure financial stability. For the Canadian banks during the crisis, both their repo exposures increased and their reverse repo exposures decreased, and they became net cash borrowers.

To collateralize the cash borrowed, the major Canadian banks use mostly GoC bonds and other Crown corporation debt (e.g., Canada Mortgage Bonds). The distribution of collateral remains fairly consistent over time and is similar for both repos and reverse repos. Figures 7 to 10 use public OSFI data and the

Bank of Canada's Market Trade Reporting System (MTRS) to estimate the collateral and tenor structure of the "Big 6" Canadian banks' repo holdings. Figures 7 and 8 focus on the collateral structure, and Figures 9 and 10 on the tenor structure.[8]

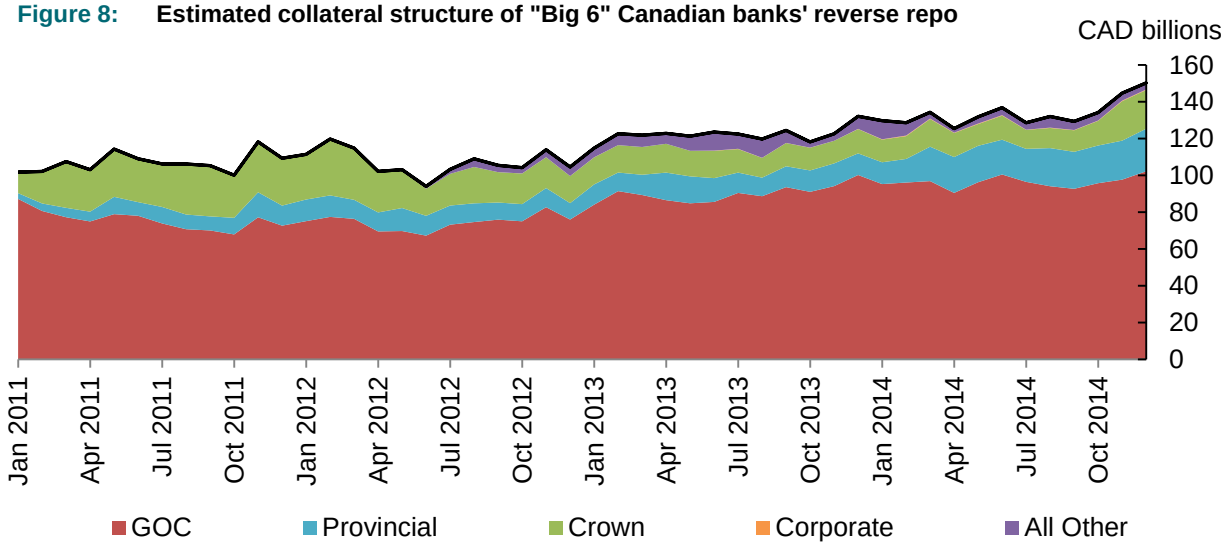
Figure 7: Estimated collateral structure of "Big 6" Canadian banks' repo



Sources: Public OSFI data, the Bank of Canada MTRS and Bank of Canada computations

Last observation: Dec 2014

Figure 8: Estimated collateral structure of "Big 6" Canadian banks' reverse repo



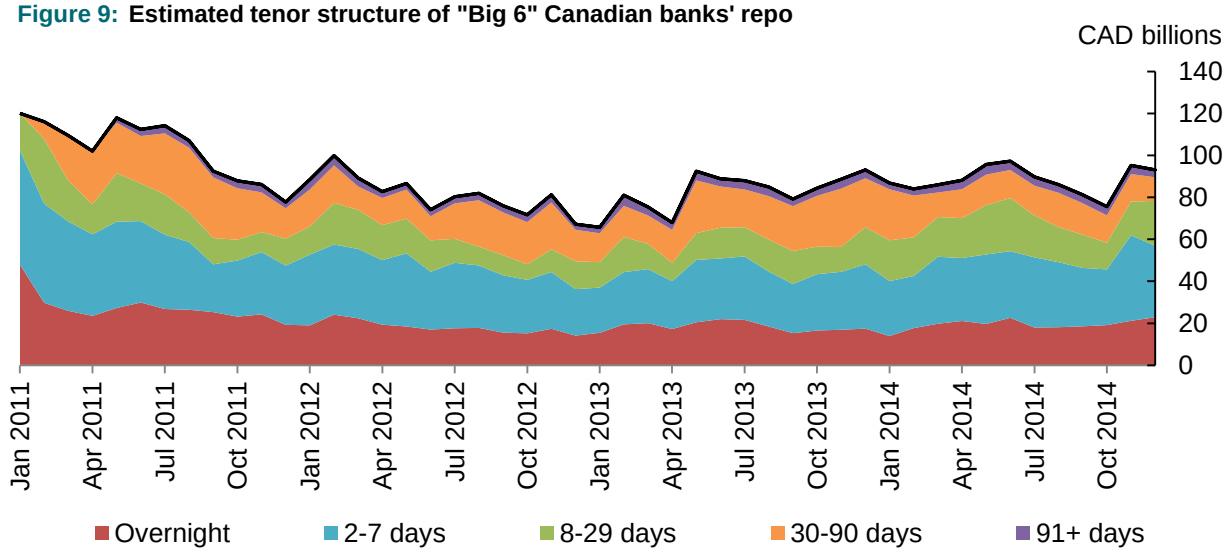
Sources: Public OSFI data, the Bank of Canada MTRS and Bank of Canada computations

Last observation: Dec 2014

8 OSFI data were used to identify the notional outstanding, and MTRS volumes were used to infer the tenor and collateral proportions of the notional. MTRS volumes are weekly aggregates of bill, bond and repo volumes reported by Government Securities Distributors. Unfortunately, MTRS volumes are in some cases quadruple-counted and reported in broad tenor and collateral bins. All volumes were divided by four, and repo terms of 1, 4, 15, 60 and 120 days were assigned to volumes reported under the five tenor bins.

The banks' tenor structures differ by repo or reverse repo. For repos, most tenor structures are shorter-term, and about half the repos are for fewer than seven days (Figure 9). On the other hand, reverse repos have markedly longer terms (Figure 10). A significant portion of reverse repo transactions are for longer than 30 days. This could be due to the term preferences of dealers' clients, who are net borrowers via repo.

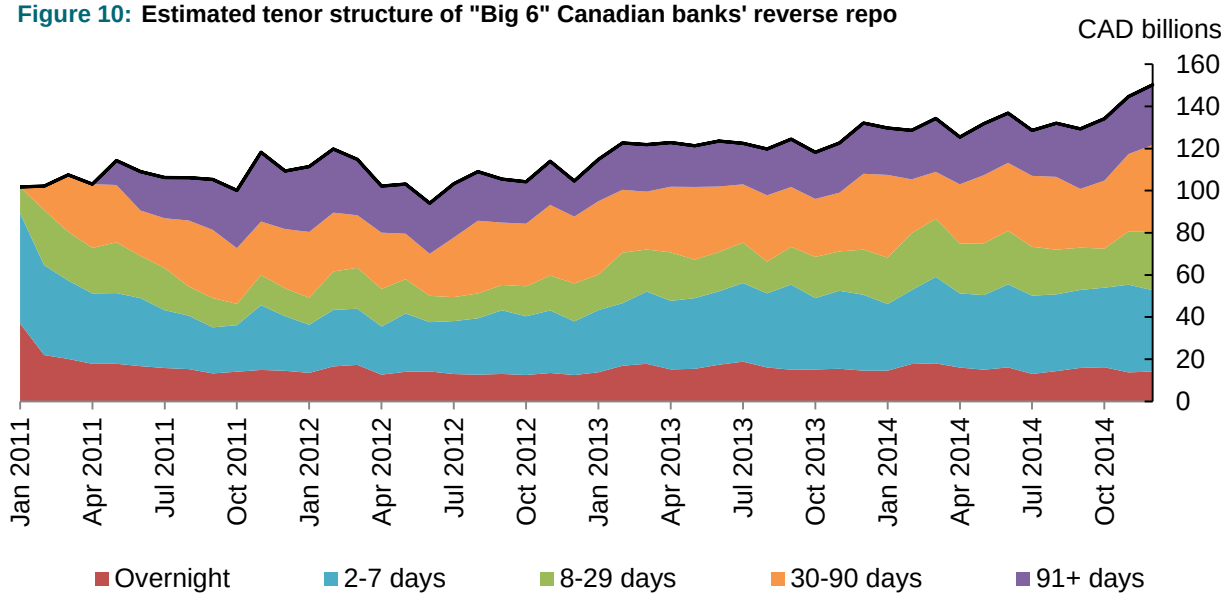
Figure 9: Estimated tenor structure of "Big 6" Canadian banks' repo



Sources: Public OSFI data, the Bank of Canada MTRS and Bank of Canada computations

Last observation: Dec 2014

Figure 10: Estimated tenor structure of "Big 6" Canadian banks' reverse repo



Sources: Public OSFI data, the Bank of Canada MTRS and Bank of Canada computations

Last observation: Dec 2014

6. Repo Practices in Canada

This section covers how repo is traded in Canada: the way a repo rate and haircut are determined in negotiation, the uses of repo, and the common repo trading strategies. A variety of trading activities, such as market-making, shorting, hedging and borrowing, all benefit from access to quick funding at a cheap rate. The repo market is useful for these trading activities because it provides access to cash or a security at a rate that is better than an unsecured loan. Funding or securities obtained via repo are used by almost every other trading desk in an institution—thus, it is colloquially said that "every fixed-income trader is a repo trader." Although a repo desk typically acts to serve a client or to enable an institution's other operations, financial participants increasingly use repo desks as a revenue source. A repo desk can collect a return by lending to clients, by performing broker-dealing or other forms of intermediation for repo market participants, or by speculating (or "expressing a view") via the repo market.

Negotiating the repo rate and haircut (or initial margin)

Financial institutions negotiate a repo rate and a repo collateral haircut (or initial margin) by taking into account their counterparty's credit quality and the quality of its collateral. Both the repo rate and the haircut respond to variations in the quality of both the collateral and the counterparty. Canadian institutions say it is "counterparty first, collateral second."

- **The counterparty:** A lender is typically more willing to fund a large pension fund on AA collateral than a hedge fund on AAA collateral. The collateral in a repo is there to decrease the market risk of liquidation after a default, and there is less credit risk in the first place with a large pension fund. The repo rate and haircut for high-quality borrowers are lower.
- **The collateral:** Nevertheless, the collateral is important. In the case of a failure to pay or a default, the lender may choose to liquidate the collateral in order to regain the cash lent. The repo rate and haircut are lower for collateral that is believed to have low market risk, to be liquid and to retain value during periods of financial stress.

The repo rate is negotiated per contract and can be different for each repo. The rate compensates the lender for the opportunity cost of the cash loan. As such, repo rates reflect wider funding conditions in the money market, such as the term structure of interest rates.

Haircuts are agreed upon before two counterparties enter any individual repo agreement. Repo desks agree bilaterally on haircuts during a periodic negotiation of the terms of their credit-support annex (CSA). The annex typically contains a list of haircuts each participant will normally charge the other on particular buckets of collateral. These terms are unique to the two participants and are often private information.

Haircuts not only provide security but also change incentives. They make counterparties put "skin in the game" and limit the amount of leverage that one party will extend to the other. Haircuts tend to vary more by the collateral than they do by counterparties' credit quality, but high-risk counterparties do receive overall higher haircuts as they are more likely to default. Counterparties that are high-volume

broker-dealers tend to receive lower haircuts and sometimes zero haircuts on GoC securities. For example, haircuts are typically zero for interdealer trades.

It can be confusing that a haircut would vary by the counterparty's credit. A haircut that fully covers the market risk of liquidating collateral would make a counterparty's credit risk irrelevant and would not vary by counterparty credit. Haircuts are not always set this high due to competition. It is costly to post collateral, so counterparties offer discounts on the haircut in order to compete for business. Some counterparties are willing to trade off lower haircuts for higher rates.

Cleared repo agreements (e.g., through CDCC) do not have a haircut as there is no bilateral exposure. Instead, the clearinghouse asks for initial margin, an economic equivalent. Initial margins have the same incentive effects as do haircuts. Margins often change if markets become more volatile, resulting in margin calls.

Putting collateral "on special"

The majority of Canadian repo is general collateral repo. The specific repo market is smaller though still significant. Specific rates are often similar to general collateral rates except when the particular collateral is hard to find. Counterparties that are competing to obtain a scarce security will offer better and better rates for its delivery. When financial participants offer to repo a specific security at a rate that is substantially lower than the rate for comparable bonds, the security is said to be "on special."

A security goes on special because of supply and demand in the market for collateral. A security that is difficult to find commands a premium in the repo market. The special rate for a security becomes aggressive in order to solicit its delivery from sources that might otherwise be uninterested in supplying the collateral. This can occur when

- a participant may need to deliver a particular security and does not have it;
- a participant may be shorting a specific security; and
- a participant may be trying to reduce settlement frictions (bonds destined for Asia and settled through Euroclear or Clearstream are tied up for an extra day because of the difference in trading hours).

How repo is used for funding and investment

The primary use of repo is for funding and investment. Canadian "end-users" of repo tend to be securities investors looking to gain leverage or to short a bond; securities dealers looking to cover a short position; and risk-averse cash investors (such as money-market mutual funds) that want a low-risk way to invest money and gain a return (Table 3).

Table 3: Repo and trading strategies for funding and investment

Increasing leverage to enhance yields	Repo can be used to enhance yields. After a bond is purchased, it can be sold via repo to obtain more funding, and the proceeds can be invested in another (typically higher-yield) product or even the same bond. A yield-enhancement strategy typically relies on funding a longer-dated asset with shorter-dated repo.
Shorting bonds	Repo can be used to bet on or hedge against an interest rate change. An institution sells a bond that it does not own and borrows the bond in the repo market to cover delivery. If the interest rate increases, the institution buys the bond for a profit and delivers it to the repo counterparty.
Stripping bonds	Repo can be used to construct a strip bond cheaply. An institution that desires inflation protection can purchase an inflation-linked bond, which is expensive, and use repo to sell short the corresponding nominal bond, decreasing the expense.
Demonstrating holdings in certain assets for regulatory purposes	Since a bond purchase via reverse repo is an absolute transfer of title, financial institutions can change their asset mix via reverse repo to demonstrate compliance with regulation.

How repo is used in broker-dealing

Financial intermediaries (both prudentially regulated institutions and "shadow bank" institutions that are not) can derive revenue from their repo desk by offering a variety of intermediation services (Table 4).

Table 4: Trading strategies for repo desks acting as intermediaries

Lending	Repo can be used to earn an interest rate on cash loans. A repo desk at an institution with a long cash position may lend it in the repo market. As a loan via repo is secured by collateral, it enjoys better regulatory capital treatment than an unsecured loan.
Matched-book trading	Repo can be used to earn market-making revenues. The name "matched book" refers to the matching of repo with corresponding (or closely corresponding) reverse repo.
Arbitrage	Repo can be used to exploit a number of arbitrages, e.g., cash-and-carry, covered-interest parity arbitrage, implied repo trading, basis trading, etc. Many arbitrage strategies available in repo markets are hedged in the corresponding derivatives and futures markets.
Maturity transformation	Repo can be used to match offers to borrow and lend at different terms. A repo desk may borrow at one term and lend at another

	term. The intermediary profits from the term spread.
Collateral transformation (also called liquidity transformation)	Repo can be used to match offers to borrow and lend on different collateral. A repo desk may take one side of repos on several low-quality collaterals, pool them, and take the other side of a repo on good collateral (or simply issue debt). The intermediary profits from the collateral spread.
Credit transformation	Repo can be used to match borrowers and lenders of varying credit quality. A repo desk may lend via repo to institutions with low credit quality, pool the collateral, and take the opposite position with an institution with better credit (or borrow). The intermediary profits from the credit spread.

How repo is used for principal trading

Financial institutions that have a view of the term structure, of the tightness of funding conditions, of the scarcity of a particular issue, or of the price of a particular set of bonds can profit from those views in a number of ways (Table 5).

Table 5: Trading strategies for repo desks expressing a view

Yield curve trades	Repo can be used to finance a speculation that future interest rates will be higher or lower than expected. A desk that expects the yield curve to steepen or flatten may take a long position in bonds in which the yield is expected to fall and an offsetting short position in bonds from the same issuer with a different maturity in which the yield is expected to rise. Repo can be used to finance a long position, and a reverse repo can be used to cover a short.
Carry trades	Repo can be used to speculate that future interest rates will more or less equal the market's expectation. A desk that expects the yield curve will not change much can use repo to provide short-term financing for reinvestment in longer-term bonds. The desk earns the spread between the bond yield and the repo rate.
Relative value trades	Repo can be used to finance a speculation that a bond is mispriced relative to a related security. A desk that observes one bond trading at a price different from a related security or from the yield curve may take a long position in some bond that is "cheap" or a short position in some bond that is "rich" compared with the related security or the curve. Such positions are financed using repo and reverse repo.

Credit spread trades	Repo can be used to finance a speculation that the credit quality of an institution will change. A desk that views two bonds from different issuers trading at a credit spread that the desk expects to widen or narrow may take an offsetting short and long position in the two bonds, financed by repo.

7. Risks in the Repo Market in Canada

Repo markets may contribute to systemic risk in certain situations. Systemic risk is the risk that the failure or poor performance of one financial entity can cause a cascading failure or a cascade of poor performance of other financial entities or markets. The Financial Stability Board (FSB 2013) acknowledges the importance of repo markets to market-making and to portfolio management. The FSB states ways that repo nevertheless can amplify risks, particularly among institutions that are not prudentially regulated and that are carrying on bank-like activities ("shadow banks").

Repos can transmit risks through the financial system because they can create levered interconnections between market participants. When repos create interconnected and levered exposures, the failure of one entity can spread to others and may cascade. Moreover, repos are used in ways that can magnify the vulnerability inherent in leverage. Many repo credit intermediation strategies—described in section 6—magnify the impact of leverage because they tend to decrease operating funding (cash and assets that can be sold soon) while increasing operating liabilities (payments that must be made soon) (Table 6).

Table 6: Transformation risks

Transformation	Risk
Maturity transformation	If short-term funding is halted, longer-term assets may not be able to be liquidated in time to cover any payment shortfall.
Collateral transformation (also called liquidity transformation)	If the lower-quality collateral loses substantial value quickly, additional collateral may be required during a period of market stress. If the counterparty providing the low-quality collateral defaults, the lender may need to liquidate the collateral quickly.
Credit transformation	If an intermediary suddenly halts a credit line, the lower-credit-quality entity may lack good alternatives.

A cascading failure could spread in a repo market during a costly and rapid deleveraging. Such a failure may have played a role during the financial crisis in the repo market for mortgage-backed securities (Gorton and Metrick 2012). A substantial drop in the value of a security often used as collateral could replicate the conditions of a bank run: counterparties would recall any loans collateralized by the

devalued security, which could create short-term funding problems at institutions that had funded on the security. The run could force borrowers to hold fire sales in order to meet current obligations, which could exacerbate the drop in asset values, creating more fire sales. Another example is the aftermath of a counterparty default. A defaulter's counterparties may attempt to liquidate the defaulter's collateral at the same time, generating a substantial drop in the collateral's value, leading to the above scenario. A third example is the margin spiral: increased volatility could lead to margin calls; margin calls would reduce market liquidity, leading to further volatility; further volatility leads to further margin calls (Brunnermeier and Pedersen 2009). Many of the failure mechanics of dealer banks can take place in a repo setting (Duffie 2010).

The risks faced by the Canadian repo market are relatively smaller than in other jurisdictions. This is in part due to the Canadian repo market predominantly collateralized by state-issued or state-guaranteed securities. In addition, Canada has a repo clearing house. However, there are some risks present in the Canadian repo market:

- *Canadian firms use substantial amounts of short-term funding.* Between one-half and two-thirds of outstanding repo transactions in Canada have a term of fewer than seven days and are rolled over regularly, primarily overnight (i.e., maturity transformation). In aggregate, dealers maintain large gross positions with a tenor of fewer than seven days. Rollover risk is a vulnerability even if participants hold repo and reverse positions with matched maturities, since only the borrowing leg is exposed to this risk.
- *The Canadian buy-side uses substantial amounts of dealer funding.* A reversal by the large Canadian dealers of their repo lending positions could force their counterparties to reallocate portfolios, possibly reducing bond market liquidity. The Canadian dealers have historically built large portfolios of reverse repos (in other words, collateralized loans). Since late 2011, lending has increased by more than $40 billion. At the same time, investors have become significant net borrowers via repo, presumably to lever their existing portfolios and purchase additional bonds (e.g., as part of leveraged liability investment strategies).

8. Repo Regulation in Canada

Two Canadian regulators set rules that are directly applicable to repo. The first is the Office of the Superintendent of Financial Institutions (OSFI), which is the sole banking regulator and the primary regulator of insurance companies, trusts, loan companies and private pension plans. The second is the Investment Industry Regulatory Organization of Canada (IIROC), which is the securities market self-regulator. In addition, the Canadian Securities Administrators have rules relating to repo for investment funds. In general, OSFI's repo rules govern the levels and types of exposures an institution may have and the minimum haircuts it must use. IIROC's repo rules give requirements for trade reporting and, to a limited extent, for margins.

OSFI is a member of the Basel Committee on Banking Supervision (BCBS), which coordinates and harmonizes banking regulation across many jurisdictions. OSFI regulations are guided by BCBS principles and OSFI provides domestic guidance on how to apply the Basel Committee's regulatory frameworks in

Canada. Currently, Canada and the other G-20 nations have implemented regulations consistent with the first and second sets of Basel frameworks (called Basel I and II), and the BCBS is working with national regulators to implement the third (Basel III).

OSFI requirements

OSFI issues guidelines that it expects federally regulated financial institutions in Canada to follow. It can enforce its guidelines by requiring remedial action from regulated institutions. The requirements that most affect repo can be placed in four categories: capital, liquidity, haircuts and reporting.

Capital requirements

Consistent with BCBS principles, OSFI sets minimum capital requirements through a risk-based capital ratio and a leverage ratio. The risk-based capital ratio is defined in the capital adequacy requirements (CAR) guideline and has available capital in the numerator and a measure of risk-weighted assets in the denominator:

$$\frac{\text{Available capital}}{\text{Credit risk weighted assets} + \text{Operational risk weighted assets} + \text{Market risk weighted assets}}$$

Each of the risk-based capital ratios asks banks to maintain a minimum of available capital relative to a measure of the institution's risk-weighted assets. The risk-based capital ratios ensure a minimum standard of balance-sheet health. There are three risk-based capital ratios, each focusing on a different type of capital: common equity Tier 1, Tier 1 capital, and total capital. Each type of capital is a constituent of the next. The measures of the institution's assets in the denominator have risk-weightings, meaning the sums vary according to the assets' credit risk and their market risk. The OSFI capital adequacy requirements are that each bank must hold at a minimum common equity Tier 1 capital equal to at least 4.5 per cent of risk-weighted assets; Tier 1 capital equal to at least 6 per cent; and total capital equal to at least 8 per cent.

The leverage ratio asks banks to hold an amount of capital that is sufficiently large relative to an exposure measure:

$$\frac{\text{Tier 1 Capital}}{\text{Exposure measure}} \geq 3\%$$

OSFI mandated a leverage ratio of 3 per cent to take effect in January 2015. The leverage ratio limits banks' leverage and hence the possibility of a rapid and destabilizing deleveraging. In particular, it limits leverage using a measure of exposures that is *not* risk-weighted, because much of the Basel framework is already risk-weighted and the leverage ratio is intended as a catch-all or backstop to constrain any leverage that might not be captured by more specific risk controls (such as the capital adequacy ratios). The measure of exposure includes all on- and off-balance-sheet exposures, including derivatives and any securities-financing transactions. In Canada, the leverage ratio replaced the asset-to-capital multiple (ACM), which was a similar requirement.

Repo is counted as a securities-financing transaction. The gross notional values of repos are often quite high, and frequent repo usage can enlarge exposures rather quickly, necessitating more capital to be set aside (see the appendix for an example). Many participants use repo, not to lever exposures but as a support for ordinary market-making, so there are several adjustments permitted in order to reduce the exposure measure in these cases. Cash payables and receivables of repos may be netted in the exposure measure if they have the same counterparty, the same final settlement date, and both counterparties have agreed on net settlement.

Liquidity requirements

Consistent with BCBS principles, OSFI's liquidity adequacy requirements include two measures: the liquidity-coverage ratio, and the net stable funding ratio.

The liquidity-coverage ratio (LCR) asks a bank to hold a stock of assets that is easily convertible into cash and that is large enough to cover cash flow needs that could arise in a 30-day stress scenario:

$$\frac{\text{High quality liquid assets (HQLA)}}{\text{Net cash outflows over the next 30 calendar days}} \geq 100\%$$

OSFI fully mandated the LCR in January 2015. The intent of the LCR is to improve the short-term funding profile of banks. The assets the banks must hold must be unencumbered high-quality liquid assets (HQLA). Assets that count as HQLA are mainly sovereign bonds, various government-backed securities, and very-high-quality private debt; different assets contribute to the HQLA measure with different weights.

Repos that mature within the 30-day stress horizon are included in the liquidity-coverage ratio's calculation of net cash outflow, since the second leg of a repo necessitates a cash payment. The amount of the cash outflow and inflow caused by a given repo depends on whether it is reasonable to expect the repo to roll over. The LCR ranks the quality of repo collateral by the ease of rolling it over, and hence different repo may contribute to HQLA with different weights.

The net stable funding ratio (NSFR) will become a minimum standard by 1 January 2018. The NSFR asks banks to hold a minimum amount of assets that can provide "stable" funding based on their expected liquidity characteristics during a 1-year horizon:

$$\frac{\text{Available stable funding}}{\text{Required stable funding}} \geq 100\%$$

The intent of the NSFR is to reduce the likelihood that disruptions to a bank's regular funding sources would lead to a bank failure and potentially to broader systemic stress. The ratio is of available stable funding (ASF) to required stable funding (RSF). ASF is a weighted measure of a bank's assets; RSF is a sum of payment obligations, including off-balance-sheet activity. The BCBS provides weightings (or "factors") for different components of the ASF and RSF based on asset quality and liquidity value.

Minimum haircuts for repo between banks and non-banks

The Financial Stability Board (FSB 2014) has proposed a set of minimum haircut floors for certain securities-financing transactions (such as repos) between banks and non-banks (Table 7). The haircut floors are for securities financing on corporate debt and securitized products, not for sovereign debt.

Table 7: Minimum haircuts for different collateral

Type of collateral	Proposed minimum haircut	
	For corporate debt	*For securitized products*
Debt, maturity less than 1 year	0.5%	1.0%
Debt, maturity 1 to 5 years	1.5%	4.0%
Debt, maturity 5 to 10 years	3.0%	6.0%
Debt, maturity of 10+ years	4.0%	7.0%
Main index equities	6%	
Other non-sovereign assets	10%	

The haircut floors are intended to ensure the dealer arms of banks collect a sufficient haircut on risky collateral when dealing with a non-bank. Dealers who use repo to perform credit, collateral and liquidity transformation may be engaging in market-based financing or "shadow banking." The FSB defines shadow banking as credit intermediation involving entities or activities that are substantially outside of prudential regulation.

Balance-sheet reporting requirements

OSFI's balance-sheet reporting guidelines require financial institutions to submit monthly a consolidated balance sheet containing information required by several regulatory institutions. The assets section includes reverse purchase agreements (under "loans"); the liabilities section includes obligations related to assets sold under repurchase agreements (under "other liabilities"). In addition, in February 2015, OSFI began requiring banks to report their liquidity-coverage ratio. The report includes line items for repo.

IIROC requirements

IIROC has set two requirements for repo transactions: minimum margins and trade reporting. Its minimum margin requirement applies to GoC repos and is based on the tenor of the collateral (Table 8).

Table 8: IIROC margins for GoC repo

Maturity less than 1 year	(days/365)%
Maturity of 1 to 3 years:	0.5%
Maturity of 3 to 7 years:	1.5%
Maturity of 7 to 11 years:	3.0%
Maturity of 11+ years:	4.0%

The margin requirements are infrequently applied. IIROC exempts from the margin requirements a set of acceptable institutions that includes certain Canadian banks and dealers, government entities, foreign banks, foreign trusts and pension funds. In addition, the margin requirements do not apply to overnight

repo or to reverse repo of fewer than five days and, if a repo has an offsetting position, IIROC permits participants to net their margin requirements.

In November 2015, every IIROC dealer member began reporting each of its repo transactions for debt securities, submitting them to IIROC's Market Trade Reporting System (MTRS). IIROC will collect such repo data elements as the notional amount, the term, the currency, the repo rate, the repo haircut, identifying information about the collateral, the trading venue (if any) and the clearing house (if any).

Participant concerns with regulation

Market participants have expressed concerns about the unintended consequences of future rules for the repo market. Many concerns are about the leverage ratio. There are also concerns about the LCR.

The leverage ratio currently does not allow the netting of repo exposures across counterparties (as discussed, it allows netting only for contracts with the same counterparty and settlement date). An intermediary conducting a low-risk, matched-book trading strategy could be unduly constrained. Many repo desks intermediate by lending to one client and financing the loan by borrowing from another. Such a repo desk has taken no net position but, since the gross repo exposures can be quite large, repo contracts that offset across clients will nevertheless count heavily toward the leverage ratio.

In addition, if the leverage ratio is binding, it may incentivize banks to hold riskier assets (or rely more on unsecured funding). The leverage ratio is not intended to be the binding capital constraint as it is not risk-weighted. Nevertheless, should the leverage ratio bind, banks might be able to satisfy it by acquiring lower-quality (and higher-return) assets. In addition to the financial-stability consequences of a riskier asset base, the problem might also reduce the ability of banks to engage in SRAs and SPRAs with the Bank of Canada. This is because the Bank takes only higher-quality collateral when it conducts repo transactions, so banks may not be able to rely as much on the standing liquidity facility.

Last, participants have also expressed concern about the way the NSFR weights the risk of various exposures. It gives heavy risk weight to repos conducted on non-federal-government debt. Since repo gross notional values are typically large, the treatment could discourage market-makers from intermediating repo with lower-quality collateral.

References

Brunnermeier, M. K. and L. H. Pedersen. 2009. "Market Liquidity and Funding Liquidity." *Review of Financial Studies* 22 (6): 2201-38.

Chande, N., N. Labelle and E. Tuer. 2010. "Central Counterparties and Systemic Risk." Bank of Canada *Financial System Review* (December): 43–50.

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.

Duffie, D. 2010. "The Failure Mechanics of Dealer Banks." *Journal of Economic Perspectives* 24 (1): 51–72.

Financial Stability Board (FSB). 2013. *Strengthening Oversight and Regulation of Shadow Banking: Policy Framework for Addressing Shadow Banking Risks in Securities Lending and Repos* (Basel: FSB, August). http://www.fsb.org/wp-content/uploads/r_130829b.pdf.

———. 2014. *Strengthening Oversight and Regulation of Shadow Banking: Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions* (Basel: FSB, October). http://www.financialstabilityboard.org/wp-content/uploads/r_141013a.pdf.

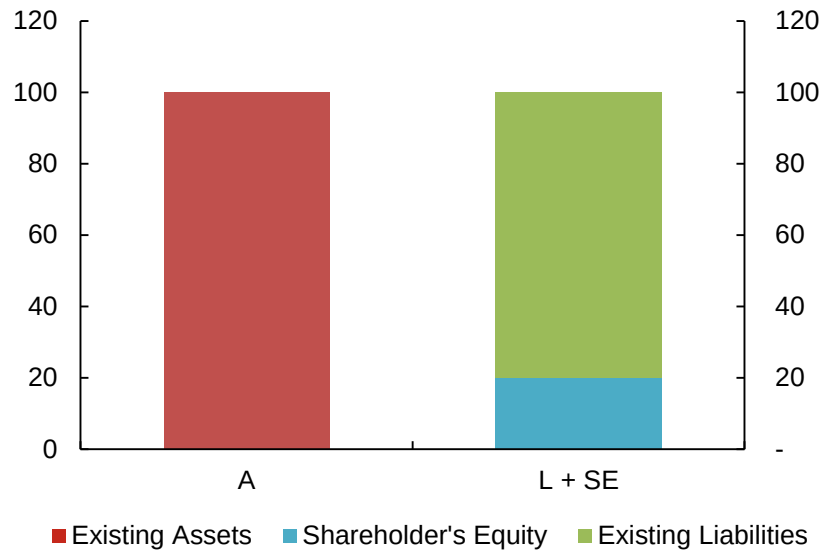
Fontaine, J.-S., J. Selody and C. Wilkins. 2009. "Improving the Resilience of Core Funding Markets." Bank of Canada *Financial System Review* (December): 41–46.

Gorton, G. and A. Metrick. 2012. "Securitized Banking and the Run on Repo." *Journal of Financial Economics* 104 (3): 425–51.

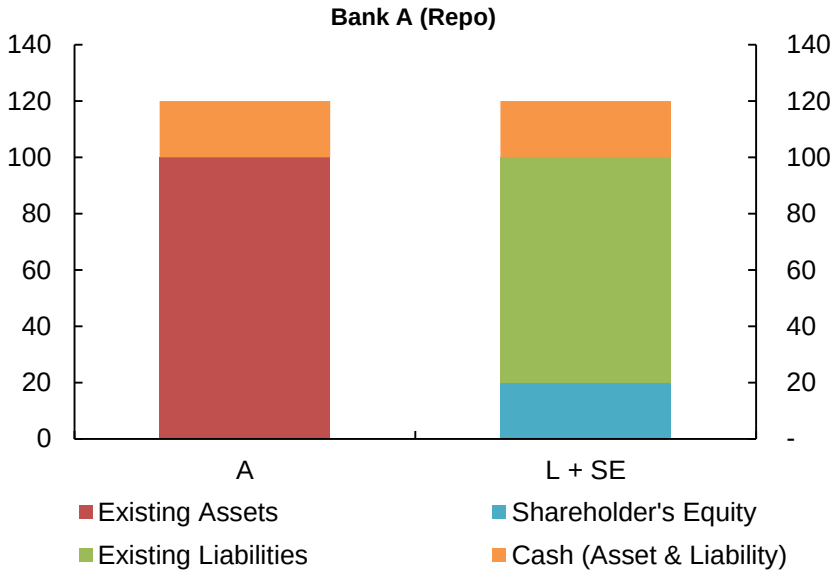
Appendix

Repo's effect on the balance sheet

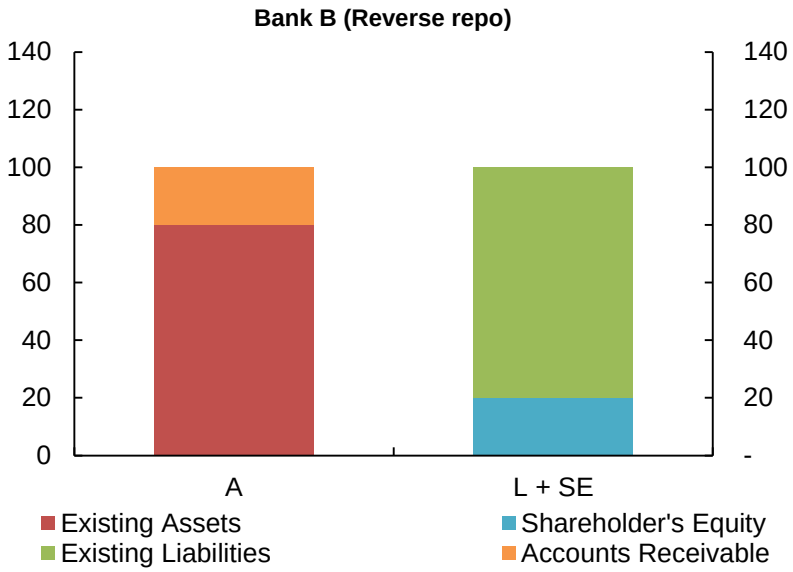
Assume that the chart below is a visual representation of the balance sheet of both Bank A and Bank B prior to their engaging in a repo transaction. In this stylized example, they hold 100 in assets and have 80 in liabilities with 20 in shareholder's equity.



Assume that Bank A agrees to sell 20 worth of securities to Bank B in a repo with no initial margin. Under IFRS, there is no change on the asset side of Bank A's balance sheet. Because Bank B purchased the securities with cash, Bank A's assets increase by 20, but a liability is also created for 20 because, on the maturity of the repo, Bank A has to use the cash to repurchase the securities from Bank B.



On Bank B's balance sheet, there is no sign of the collateral from the repo given that, economically, the risk and return of that collateral are still with Bank A. For Bank B, its cash account has decreased by 20, but this is counteracted by an increase of 20 in accounts receivables, reflecting no change in the total of Bank B's assets. Given the increase in both assets and liabilities for Bank A—same absolute dollar increase, but a larger percentage increase in liabilities than assets—without any changes to shareholder's equity, this negatively affects both the bank's leverage ratio and capital adequacy requirement.



Note that Bank A's balance sheet has expanded during the repo, demonstrating that it has borrowed, but Bank B's balance sheet does not change for the duration of the repo. However, at maturity of the repo, the only difference between the balance sheets of the two banks will be the cost of the cash loan (i.e., interest cost). Given that the total amount of assets does not change, a reverse repo has no impact on a bank's leverage ratio or capital adequacy requirement.