

CDS Financial Risk Model

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1. Introduction

1.1. Purpose and Scope

The objective of this paper is to describe the elements relating to the management of financial risk in CDS's clearing, settlement and depository services. While this paper is intended to provide a comprehensive explanation of CDS's financial risk model, it does not replace the CDS Participant Rules and published procedures as the definitive description of the management of financial risk in CDS's services. This paper does not address operational risk (please refer the annual *Clearing and Depository Controls* for a review of CDS's operational risk controls). CDS also produces an annual audited Canadian Standard on Assurance Engagements (CSAE 3416) report for the use of its participants, auditors and regulators. Distribution of this detailed report is limited to qualified representatives of these organizations. Any comments or questions regarding this paper should be directed to David Stanton, Chief Risk Officer at (416) 365-8489 or via email at dstanton@cds.ca.

1.2. Financial Risk Management Principles

The following principles guide the management of financial risk resulting from the clearing, settlement and depository services offered to participants of CDS Clearing and Depository Services Inc.:

1. Manage financial risk in a manner consistent with internationally recognized standards, particularly the *CPSS/IOSCO Recommendations for Securities Settlement Systems (2001)* and *Recommendations for Central Counterparties (2004)*. Regularly assess compliance with these standards and, where possible, make the results of assessments against these standards publicly available;
2. Appropriately weigh the costs and benefits of risk mitigation and control to ensure that participants are adequately protected against financial risks while maintaining the efficiency and competitiveness of the Canadian financial markets;
3. Provide the greatest possible degree of transparency into the management of financial risks to participants, regulators and any other stakeholders so that informed assessments and decisions can be made regarding risk exposures and responses;
4. Transfer financial risk to those parties willing to accept it as the primary and preferred means of risk mitigation;
5. Explicitly identify financial risks resulting from clearing, settlement and depository services and those parties that are exposed to these risks;
6. Assess and manage financial risks as if CDS were a principal in the trade being settled. In doing so, CDS will consider adoption of risk controls that could serve to reduce reliance on survivors' financial resources. CDS should consider itself an extension of the risk management function of its participants;
7. Employ risk measurement methodologies that are relevant, effective and understandable. Recognize the limitations of these measures and strongly consider the use of multiple, complementary risk measurement approaches;
8. Design and implement financial risk controls that provide an adequate and known level of coverage against losses for system participants;

9. Require participants to bear responsibility for the risks they bring to the clearing, settlement and depository system and apply suitable extraordinary measures to participants determined to be contributing excessive risks;
10. Measure the effectiveness of risk controls through techniques such as stress testing and backtesting and, where possible, make the results of these tests publicly available;
11. Contain losses within individual settlement services and collateral pools/credit rings to eliminate the potential for risk “spill over”;
12. Transfer any residual, uncollateralized risks to participants in a given settlement service or collateral pool/credit ring. As a result, CDS is not required to maintain a reserve or capitalize itself for financial risks in the clearing, depository and settlement services;
13. Maintain sufficient financial resources to withstand, at a minimum, a default by the participant with the largest exposure in extreme but plausible market conditions. Measure and report on the effects of multiple participant defaults;
14. Ensure that risks from links with other central counterparties and central securities depositories are evaluated and managed prudently;
15. Ensure that financial risks in any new non-core settlement activities or changes to existing settlement activities in regulated subsidiaries are adequately assessed;
16. Establish a means by which participants are able to provide input into the management of financial risks in the clearing, depository and settlement services;
17. Recognize and manage the relationship between operational risk exposures and financial risk exposures, particularly where failures of business processes can affect the critical data upon which the risk measures and mitigation techniques depend.

This paper describes how these risk management principles are implemented in CDS’s settlement services.

1.3. Definitions of Financial Risks in Securities Settlement

Securities settlement systems are subject to the risk of significant potential loss. Settlement risk is the risk of financial loss in the event of the failure of a participant to fulfill its settlement obligations. There are three separate aspects of settlement risk. The first aspect is payment risk, which is the risk that a seller will deliver securities and not receive payment or that a buyer will make payment and not receive the purchased securities. The second aspect is replacement cost risk, which is the risk of loss resulting from the change in value of unsettled trades from the original trade price to the price at which replacement trades are executed. The third aspect is liquidity risk, which is the risk in settling payment obligations, liquidating collateral, as well as buying or selling positions to offset a defaulter’s obligations in the CCP services.

Each of these risks is described in more detail below.

1.3.1. Credit / Payment Risk

Credit risk is the risk of loss due to the failure of a borrower, counterparty or participant to honor its financial obligations. Payment risk is a form of credit risk in securities settlement whereby a seller will deliver securities and not receive payment, or that a buyer will make payment and not receive the

purchased securities. Payment risk is controlled through the use of a Delivery versus Payment (DVP) mechanism whereby the fund payment and security transfer of a trade are linked. While the DVP mechanism may eliminate payment risk, depending on the specific means of achieving DVP, credit risks of the same magnitude as payment risk may be created. In CDSX (the securities settlement and depository system of CDS), the exchange of securities for funds to settle a trade may result in a negative cash balance in the buyer's Funds Account¹. While DVP has been achieved, the negative cash balance in the buyer's Funds Account represents a credit risk equal to the original payment risk. The party that is supporting the negative cash balance in the buyer's Funds Account is exposed to this credit risk as explained later in this paper.

1.3.2. Market / Replacement Cost Risk

Market risk is the risk of loss due to changes in market prices and rates such as equity prices, interest rates and foreign exchange rates. Replacement cost risk is a form of market risk in securities settlement resulting from the change in value of unsettled trades from the original trade price to the price at which replacement trades are executed. Replacement cost risk exists in all trades processed by CDS regardless of service, security type or nature and timing of trade guarantee. This is because there is some amount of time between the moment that the trade is executed between two counterparties and the time that the trade is ultimately settled. During this period of time, there is a chance that one of the two counterparties (or perhaps one of the CDS participants representing one of the two counterparties) will default. If this default occurs, the surviving counterparty to the trade, upon recognizing the default, will need to execute a trade to replace the original trade with the defaulting participant. The price at which the surviving counterparty executes the replacement trade may be higher or lower than the original price. The difference between the original trade value and the replacement trade value can result in either a gain or loss for the surviving counterparty.

1.3.3. Liquidity Risk

Liquidity risk is the risk of loss due to the inability of CDS or its participants to meet their financial obligations in a timely manner (funding liquidity risk) or at reasonable prices (market liquidity risk). Funding liquidity risk is the risk that CDS or its participants will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity risk is the risk that CDS or its participants cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption. Liquidity risk exists because the participants are required to fulfill their payment obligations the same day they are due. In CDS, the liquidity risk is created by the need to sell securities pledged as collateral as well as buying or selling positions to offset a defaulter's obligations in central counterparty (CCP) services. In these cases, factors such as the willingness of buyers and sellers to trade in the market and the size of the position being purchased or sold affect liquidity, and hence the price at which transactions can be executed.

1.4. CDS Participant Risk Appetite Statement

Risk appetite expresses the total amount of risk that an organization is willing to take to achieve its strategic objectives and meet its obligations to its stakeholders. Organizations do not typically take the

¹ Each ledger maintained by CDS includes a Funds Account. A Funds Account records by currency the net amount owed to CDS by the participant (a negative balance in the Funds Account) or by CDS to the participant (a positive balance in the Funds Account), which arises from the participant's use of the settlement services and the depository service.

maximum amount of possible risk (i.e. their risk capacity) to achieve a particular strategic objective or obligation. Therefore, risk appetite is a subset of risk capacity.

The following statements express the willingness of participants using the services offered by CDS Clearing and Depository Services Inc. to take financial risks as a result of their use of those services. Participants of CDS Clearing and Depository Services Inc.:

1. Are willing to accept losses resulting from the default of a fellow member of a category credit ring up to the amount of the collateral pledged to the collateral pool by the surviving members.
2. Are willing to accept losses from the changes in value of collateral pledged to pools that exceed the haircut rates. Participants expect that these uncollateralized losses should occur in no more than 1% of potential defaults.
3. Are willing to accept losses which result from a defaulter's collateral in a central counterparty service being insufficient. Participants expect that these uncollateralized losses should occur in no more than 1% of potential defaults for CNS.
4. Are willing to accept liquidity risk exposures resulting from the default of a member of their category credit ring (with the exception of the Receivers of Credit) up to the limits established by those credit rings. Participants in New York Link are willing to accept liquidity risk exposures and the attendant consequences from the default of a user of that service that may exceed the available liquidity resources. These consequences include the potential that their individual sponsored accounts may be considered in default by DTCC.

2. Trade Settlement in CDSX

2.1. Settlement Services in CDSX

CDS offers two types of trade settlement, trade-for-trade (TFT) settlement and central counterparty (CCP) settlement². TFT settlement is offered for debt and equity transactions. TFT settlement does not provide risk protection or novation prior to settlement. As a result, each of the original counterparties to a TFT trade is exposed to risk resulting from the default of the counterparty prior to settlement. CCP settlement is offered through CDS's Continuous Net Settlement (CNS) service. In CNS service, CDS substitutes itself as the counterparty for each trade through a netting and novation process. CNS nets eligible exchange-traded equity transactions.

CDSX has three distinct trade settlement processes: (i) overnight batch settlement (CNS/BNS); (ii) real time trade-for-trade settlement (real time TFT); and (iii) real time CNS settlement (CNS). Trades in CNS are settled in either the CNS/BNS process or the real time CNS process. TFT trades are settled in either the CNS/BNS process or the real time TFT process. A trade is considered "available for settlement" if it has reached value date and is confirmed. Trades available for settlement by the time that the CNS/BNS process is initiated are processed through the batch CNS/BNS. Trades and CNS outstanding positions that do not settle in the CNS/BNS process and trades that become available for settlement after the CNS/BNS process starts, are processed through the real time TFT or CNS settlement processes.

2.1.1. Overnight Batch Settlement (CNS/BNS)

The CNS/BNS process is a batch net settlement process that increases settlement efficiency by combining the settlement of trades targeted to settle by CNS and TFT. The CNS component processes the CNS trades and the BNS component processes the TFT trades. The goal of the combined process is to allow CNS and TFT activities to net against each other and to reduce a participant's requirements for security positions, funds, cap, credit and collateral while still satisfying the appropriate risk controls as described later in this paper. The CNS/BNS process occurs once per day after the overnight period around 4:00 a.m. EST.

The combined CNS/BNS uses the following steps:

1. The system extracts all of the trades available for settlement that are targeted to settle in CNS as well as all of the trades that are targeted to settle TFT (Batch Net Settlement).
2. The system calculates a "mark-to-market" (see Mark-to-Market section 5) payment for each CNS outstanding and for each CNS trade. Once the individual marks are calculated, the price on each CNS trade and CNS outstanding position is changed to the mark price (i.e. the previous day's closing price). Each participant's net mark-to-market payment is debited or credited into the participant's Funds Account.
3. For each participant, for each account and for each security, the system calculates a provisional net security position by adding together new CNS trades, previous CNS outstanding positions, TFT confirmed trades, and the participant's ledger position in the security.

² Participants eligible for fixed income clearing (FIC) at CDCC have been provided a gateway to CDCC through CDSX whereby they can direct eligible fixed income transactions for novation, netting and settlement using CDCC's fixed income central counterparty service.

4. The system also nets together all of the funds amounts from the CNS and the TFT trades to arrive at a provisional net funds position.
5. The system finds all of the negative provisional security positions of the participant and excludes (removes) transactions to eliminate the provisionally negative position. Then, the system creates a CNS outstanding position up to a maximum of the net of the starting CNS outstanding and the new CNS trades. If necessary, the system excludes TFT transactions until the provisional negative position is eliminated.
6. The system performs the same exclusion routine for any funds position that does not fall within the participant's cap/credit or collateral limits (see section 4).
7. The system executes all of the CNS trades as settled, executes the non-excluded TFT netted trades as settled, updates the excluded TFT trades as pending.
8. All of the pending TFT trades are re-considered for settlement in the real time TFT settlement process. All of the CNS outstanding positions are re-considered for settlement in the real time CNS settlement process.

2.1.2. Real Time Trade-for-Trade (TFT)

The real time TFT process runs continuously from approximately 12:30 a.m. Eastern Standard Time (EST) to about 4:00 a.m. EST, when it stops while the CNS/BNS process executes. The CNS/BNS process stops at 6:00 a.m. EST. The TFT process runs again from approximately 7:00 a.m. EST through to 7:30 p.m. EST.

Any trade in any security is eligible for TFT. When both parties to a transaction have agreed to the details and the transaction is available for settlement, the TFT process attempts to settle the transaction. If the transaction passes all of the risk edits described in Section 4, the TFT process settles the transaction. If any of the risk edits cannot be satisfied, CDSX puts the transaction into a pending status and re-attempts settlement later when a change occurs to the participant's funds, securities or collateral positions.

2.1.3. Real Time CNS Settlement

The CNS process allows CNS participants to settle some or all of a net amount of CNS trades. For example, if a participant sold 100 shares of security A and bought 80 shares of security A, the participant would have a net CNS-to-deliver for 20 shares of security A. If the participant did not have the 20 shares to complete the net delivery to CDS, the CNS process would create a "CNS outstanding-to-deliver" for 20 shares. This CNS outstanding for 20 shares is carried forward into the real time CNS settlement and/or CNS netting process, which may not occur until the next business day.

Unlike the CNS/BNS process, which processes trades targeted to settle by TFT and CNS together, the real time CNS process only processes trades targeted to settle by CNS. This real time process is scheduled to run from 7:00 a.m. EST until 4:00 p.m. EST. Only CNS outstanding positions from the early morning CNS/BNS process are eligible for settlement by the real time CNS settlement process.

Changes to a participant's ledger positions could occur between the time the early morning CNS/BNS is completed and when the real time CNS settlement process is executed. For example, a participant could receive securities from the settlement of a TFT purchase trade. The real time CNS settlement process compares a participant's current ledger positions (both securities and funds) with their CNS outstanding positions and, where possible, settles the CNS outstanding positions either fully or partially. All of the payment risk edits (Funds and ACV edits) are applied during the real time CNS settlement process.

2.2. Risk Edits Applied in Trade Settlement

As described previously, transactions can settle through the CNS/BNS, real time TFT or CNS settlement processes. In real time TFT settlement, the risk edits are applied to each individual trade. In CNS/BNS, real time CNS, payment risk edits are applied to the projected net amounts from a group of trades and positions. Although the risk edits for CNS/BNS settlements are performed on these projected net amounts, the actual settlement of each TFT transaction occurs individually, but simultaneously, at the end of the batch process.

In order for a trade to settle, the following payment risk edits are applied to all CAD transactions:

- The seller must have sufficient securities in their securities account to complete the delivery, or a portion of the delivery (known as partials³).
- The buyer must have sufficient available funds, unused cap and/or unused lines of credit to cover their funds obligation after the settlement (the Funds edit).
- The buyer and the seller must have sufficient aggregate collateral value (ACV) after the settlement to cover the resulting funds obligation (the ACV edit).

In CDSX, lines of credit and ACV are denominated in CAD only. As a result, settlement of USD transactions is subject to the following payment risk edit process:

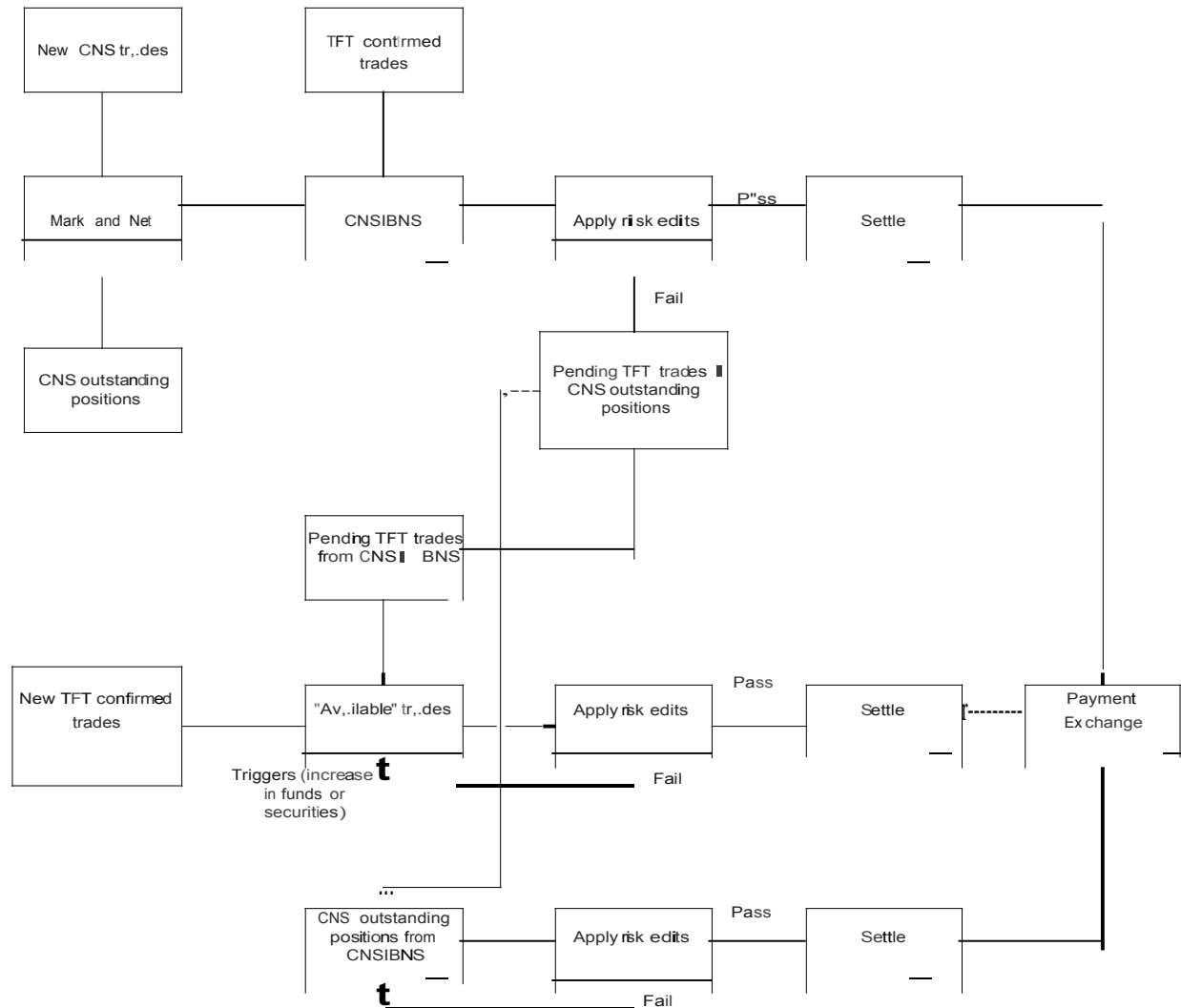
- The seller must have sufficient securities in their securities account to complete the delivery.
- The buyer must have sufficient available USD funds or unused USD cap to cover their funds obligation after the settlement.
- The seller must have sufficient ACV after settlement to continue to be able to collateralize its CAD obligation.

If all of these edits are satisfied, CDSX settles the trade by:

- Subtracting the securities from the seller's account and adding them to the buyer's account.
- Subtracting the funds from the buyer's account and adding them to the seller's account.
- Updating both the buyer's and the seller's ACV.

³ In CNS, trades are netted and the process settles as much of the resulting net position as possible.

Figure 1 - Trade Settlement Process Flowchart



2.3. Free Deliveries of Securities

CDSX allows participants to execute free deliveries of securities. A free delivery of securities is simply a trade with a net funds amount of zero. Settlement of free deliveries of securities is subject to the same risk edits as described above.

2.4. Free Deliveries of Funds

CDSX also allows participants to execute free deliveries of funds. A free delivery of funds is simply a trade type with a security quantity of zero or a Funds Transfer. Settlement of free deliveries of funds is subject to the same risk edits as described above.

2.5. Payment Exchange

Payment exchange is the end-of-day batch process when CDSX calculates participants' final net funds positions and produces the Final Consolidated Cash Recap report for each participant's ledger. Participants are required to settle their payment obligations to CDS and CDS pays participants who are owed funds. CDS must receive all funds owed to CDS before it pays participants who are owed funds by CDS. CDSX runs both a USD payment exchange and CAD payment exchange at 4:00 p.m. EST. Payment must be made in Large Value Transfer System (LVTS) funds and Fedwire funds to complete Canadian and US dollar payment exchange respectively.

2.5.1. Book-Entry Payment Method (BEPM)

CDSX employs the book-entry payment method (BEPM) process to determine with whom payments will be exchanged.

In CDSX, transactions are settled via simultaneous transfer of funds and securities between participants' accounts. The funds and securities transfers are final and irrevocable. Negative funds balances in participants' Funds Accounts are fully collateralized (see section 4 for details on how negative funds balances are collateralized), while positive funds balances are redeemable at any time during the processing day. At the end-of-day (4:00 p.m. EST), participants' used lines of credit are rolled up to the Extenders of Credit and/or the active Federated Participant who granted lines of credit. In this regard, the Extenders of Credit and the active Federated Participant are called qualified bankers. The used caps and positive funds are attributed to participants' bankers called designated bankers. Extenders of Credit, the active Federated Participant and Settlement Agents may act as designated bankers, however, only Extenders of Credit and the active Federated Participant can receive payments on another participant's behalf. Both qualified and designated bankers must be LVTS participants in order to exchange payments with CDS⁴. BEPM enables designated bankers and qualified bankers to settle funds obligations with CDS on behalf of participants at the payment exchange.

By using the BEPM, the participant authorizes (a) its designated banker to receive and make payment on its behalf; and authorizes (b) its qualified banker to make payments for used lines of credit on its behalf. The result of the BEPM is reflected on the Final Consolidated Cash Recap report, which is produced at the start of payment exchange for each currency (CAD and USD) supported by CDSX.

⁴ CDS is not an LVTS participant. The LVTS participants exchange payments with CDS through CDS's account the Bank of Canada.

3. Standards and Categories of Participants

3.1. Standards for Participation

CDS has established minimum standards for eligibility as a participant in its settlement services. The minimum standards vary depending upon the type of participant. CDS requires that every participant is a regulated entity and is a member in good standing of an industry self-regulatory organization (SRO), if applicable. CDS requires that all participants are able to demonstrate that they meet basic standards, including the financial ability to meet their obligations to CDS and that they have in place sufficient personnel and operational capabilities to fulfill their obligations to CDS and other participants. The membership standards are described in CDS's *Participant Rules* and are summarized below.

1. *Regulated financial institution*: A participant that is created and regulated under Canadian laws and is a financial institution, a broker or dealer trading in securities, an insurance company or a securities clearing corporation or depository. The participant must be in compliance with all applicable regulatory requirements including minimum capital requirements and financial stability standards.
2. *Foreign institution*: A participant that is created or regulated under laws other than Canada including brokers or dealers trading in securities, banks or savings banks, loan companies or corporations, insurance companies, securities clearing corporations or depositories, central banks or any other body trading in securities. The participant must be in compliance with any applicable regulatory requirements including minimum capital requirements and financial stability standards. The participant must have minimum capital of CAD 1,000,000.
3. *Government body*: The government of Canada or the government of any province or territory of Canada or any municipality in Canada, or any of their agencies.
4. *Bank of Canada*: The central bank of Canada.
5. *Transfer Agent (TA) participants*: A TA is a limited purpose participant. TA participants are eligible to perform the depository agent, validator and/or entitlements processor roles, and must satisfy the requirements as set out in the CDS Participant Rules.
6. *ATON participants*: An ATON (Account Transfer Online Notification Service) participant is a limited purpose participant, and its activities in CDSX are limited to receiving and delivering securities and making payments in connection with the transfer of client accounts as set out in the CDS Participant Rules.
7. *ACT participants*: An ACT (Automated Confirmation Transaction Service of NASD) participant is a limited purpose cross-border participant that uses the New York Link and is therefore also a limited purpose Link participant.

CDS bases its participation standards on the minimum standards that have been put in place by the regulatory bodies that are responsible for oversight of the various participant groups. CDS does not apply independent minimum standards for entry into the various services that it offers to its

participants. While it is CDS's policy to refer to the compliance work executed by its participants' regulators⁵, CDS is responsible for conducting a credit assessment of new participant applications.

3.2. Participant Categories

An applicant for participation shall specify the category in which it wishes to be classified. The categories are as follows:

1. *Bank of Canada*
2. *Extender of Credit*: A financial institution, that is a direct clearer or group clearer member of the Canadian Payments Association (CPA) and accordingly has a settlement account for clearing purposes with Bank of Canada, has capital of not less than CAD 1.0 billion and is a direct participant in LVTS.
3. *Federated Participant*: A financial institution that is a group clearer of the CPA (Active Federated Participant) and accordingly has a settlement account for clearing purposes with the Bank of Canada, or is an indirect clearer member of the CPA and is a member of the group for which the Active Federated Participant acts as the group clearer or has appointed the Active Federated Participant as its clearing agent. It must have capital of not less than CAD 1.0 billion when aggregated with other members of the group described previously and be a direct participant in LVTS (if it is the Active Federated Participant).
4. *Settlement Agent*: A financial institution that is a direct clearer or group clearer member of the CPA and accordingly has a settlement account for clearing purposes with the Bank of Canada, or is an indirect clearer member and has a clearing account with a direct clearer or a group clearer member, and also has capital of not less than CAD 100 million.
5. *Transfer Agent (TA) Participant*: Is eligible to participate in CDSX as a TA participant if appointed as the Transfer Agent of a sufficient number of CDSX eligible securities. The TA participant category allows limited participation by Transfer Agents in CDSX. Transfer Agents are eligible to perform the depository agent and/or entitlements processor roles in addition to their validator role, and must satisfy the requirements as set out in the CDS Rules.
6. *ATON Participant*: An ATON (the Account Transfer Online Notification Service) participant is a limited purpose participant whose activities in CDSX are limited to receiving and delivering securities and making payments in connection with the transfer of client accounts as set out in the CDS Rules.
7. *ACT Participant*: An ACT (Automated Confirmation Transaction Service of NASD) participant is a limited purpose cross-border participant that uses the New York Link and is therefore also a limited purpose Link participant.
8. *Receiver of Credit*: A participant that does not satisfy the requirements of the previous categories, or does not choose to be classified as one of previous categories.

Once accepted, each participant (except TA, ATON and ACT participants) becomes a member of the category credit ring for the category of participant into which it is classified. The category credit rings are:

⁵ CDS has established or is working to establish a memorandum of understanding (MoU) with each primary regulator of its participants.

- (i) Extenders of Credit;
- (ii) Federated Participant;
- (iii) Settlement Agents;
- (iv) Contributing Receivers of Credit (CAD)
- (v) Contributing Receivers of Credit (USD)
- (vi) Non-contributing Receivers of Credit (CAD)
- (vii) Non-contributing Receivers of Credit (USD)

The members of each category credit ring guarantee the payment to CDS of the obligation of all the members of that category credit ring based on a formula and risk controls agreed upon by the members of the ring. With the exception of Receivers of Credit, each participant is a member of a single category credit ring.

4. Credit / Payment Risk Controls

4.1. Credit / Payment Risk Management Principles

The following principles guide the management of credit / payment risk resulting from the clearing, settlement and depository services offered to participants of CDS Clearing and Depository Services Inc.:

1. Establish and apply minimum standards for participation in clearing, settlement and depository services which are objective and publicly disclosed and which provide for fair and open access. Assess the compliance of participants to these standards on an ongoing basis;
2. Base credit risk assessments of participants upon the fact that the primary regulator of a participant is best positioned to determine and enforce appropriate financial stability and capital standards. Whenever possible, establish formal information-sharing agreements with those regulators in order to keep informed on an ongoing basis as to the financial status of participants;
3. Assign the extension of credit within the settlement services to those participants who are willing and capable of providing this role;
4. Employ a combination of limits and collateralization to contain payment risk and to mitigate the potential losses to extenders of credit or collateralized credit rings. Enforce credit limits and collateralization on an ongoing, real-time basis. When this is not possible, obtain explicit acknowledgement of participants exposed to unlimited or uncollateralized credit risk exposures and advise regulators and other stakeholders;
5. Develop, implement and test effective default procedures which allow for the completion of payment exchange on the day of default of a participant for both the CDSX and cross-border services;
6. Establish and continuously apply minimum standards to financial institutions acting as settlement banks, custodians or otherwise holding funds or securities on behalf of participants;
7. Establish procedures and controls such that payments made to CDS for settlement obligations are final and irrevocable. The use of final and irrevocable payments for entitlements should be actively encouraged. Clearly identify when payments or settlements are subject to potential adjustment;
8. Allocate losses in the event of default of a participant such that the defaulter's own assets are used first and losses are allocated to survivors of a given credit ring only when the defaulter's assets are exhausted;
9. Recognize the credit risk implications of families of associated participants where one participant may own one or more other participants;
10. Ensure that all incoming payments required for the completion of payment exchange are received prior to initiating outgoing payments to participants. Any exceptions must be approved by an appropriate authority;
11. Ensure that investments made on behalf of participants are in securities where there is essentially no possibility of issuer default;
12. Establish and enforce limits on the credit quality of securities used as collateral. Do not allow collateral value for participants where the collateral securities are issued by the participant or an associated entity;

13. Carefully examine the credit risks associated with cross-border links, particularly risks associated with the default of a participant of the foreign central counterparty or central securities depository.

4.2. Credit / Payment Risk Controls

Credit / payment risk in CDSX is controlled through the establishment of category credit rings, the use of a DVP mechanism, limits on the size of payment obligations and collateralization of those payment obligations.

4.2.1. Category Credit Rings and Collateral Pools

The members of each category credit ring guarantee the payment obligations of all the other members of their ring. In case of default, the responsibility of the category credit ring is the payment obligation created by the defaulter's use of system operating cap (SOC or cap) provided by membership in the ring⁶. Each category credit ring is collateralized by the associated collateral pool, with the exception of the two non-contributing Receivers of Credit rings. Each pool maintains collateral that is used in the event that a member of the pool defaults prior to making payment to CDS. Each member of a category credit ring receives a cap and initial aggregate collateral value or initial ACV (described in section 4) from their participation in the collateral pool (except from the USD RCP, which does not provide initial ACV in CDSX). The caps that are given to members are used to cover settlements and other debits made to the member's Funds Account but are not used to cover mark-to-market payments generated by the central counterparty (CCP) services (see section 5 regarding participant funds for CCP services).

Details about each of the collateral pools supporting the category credit rings are provided below.

4.2.1.1. Extenders of Credit Collateral Pool

The Extenders of Credit collateral pool supports the credit facilities used by the Extenders of Credit for their own settlements as well as the lines of credit they grant other participants. Each Extender provides collateral to the pool, which is updated on a calendar quarter-end basis. The collateral requirement of each Extender is based on factors including their shareholders' equity, credit rating and the maximum daily usage of their available credit facilities in the most recent quarter. The Extenders' collateral pool creates CAD cap, a maximum of 3% of which may be converted to a USD cap at the option of each Extender. Each member of the Extenders of Credit collateral pool receives initial ACV equal to the total value of its collateral requirement to the pool (see Appendix 1 for an illustration of cap calculations).

4.2.1.2. Federated Participant Collateral Pool

The Federated Participant collateral pool supports credit facilities used by the Federated Participant and to support lines of credit granted by the Federated Participant to other participants. The Federated Participant may elect a cap up to its formula amount, which is based on its regulatory capital and credit rating. The collateral requirement is based on this elected cap amount. The Federated Participant may elect to convert up to 3% of its CAD cap to a USD cap. The Federated Participant receives initial ACV equal to the collateral requirement of the pool.

⁶ Payment obligations such as entitlement reversals and losses from replacing defective securities are also covered by the defaulter's category credit ring.

4.2.1.3. Settlement Agents Collateral Pool

The Settlement Agents' collateral pool provides CAD cap to the Settlement Agents for their own use. Settlement Agents cannot grant lines of credit to other participants. Settlement Agents may supplement their available debit room from their collateral pool with a line of credit from an Extender of Credit. Each Settlement Agent may elect a cap up to the maximum amount for which it is eligible. Settlement Agents may elect to convert up to 3% of their CAD cap to a USD cap. As with the Extenders pool, each Settlement Agent receives initial ACV equal to the total value of its collateral requirement to the pool (see Appendix 2 for an illustration of cap calculations).

4.2.1.4. Receivers of Credit Collateral Pools (RCPs)

Unlike the other collateral pools, the Receivers of Credit (Receivers) have separate collateral pools (RCPs) for CAD and USD funds settlement obligations. Receivers may elect to be members of these collateral pools or may choose to be members of the non-contributing category credit ring for Receivers for each currency⁷. Members of a non-contributing credit rings do not receive a cap for that currency in CDSX and as a result do not create payment obligations to CDS. The CAD RCP is governed by an agreement signed by each of its members and a governing council of CAD RCP members.

The calculation of collateral requirements and resulting cap for RCP members is similar for both the CAD and USD pools. Each calendar quarter-end, CAD RCP members are provided the option to adjust their collateral contribution subject to a maximum level agreed to and published by the CAD RCP governing council. Based on the collateral contribution amounts, a leverage ratio is determined which is the sum of the collateral contributions divided by the largest collateral contribution. The cap for each member of the CAD RCP is its collateral contribution multiplied by the leverage ratio. In this way, the sum of the collateral contributions of each member equals the largest calculated cap of any member. As a result, the collateral in the RCP is sufficient to cover the default of the single member with the largest cap. As with the other collateral pools, this results in the sharing of risk between pool members. Members of the CAD RCP also receive initial ACV equal to their calculated cap (See Appendix 3 for an illustration of cap calculations for the CAD RCP).

For the CAD RCP, CDS monitors the members of the pool through its memorandum of understanding with the Investment Industry Regulatory Organization of Canada (IIROC). Members of the CAD RCP who are on Early Warning Level One are subject to a special collateral charge equal to their normal collateral requirement, or may elect a cap equal to 50% of their calculated cap. Members who are on Early Warning Level Two must collateralize their calculated cap on a dollar-for-dollar basis.

The CAD RCP cap is not intended to address all of the credit and ACV requirements for all the Receivers. For some Receivers, the use of the CAD RCP cap can provide sufficient credit and ACV to execute all of their business. However, for most Receivers, the use of the CAD RCP is supplemented by a line of credit provided by an Extender of Credit and their own securities (as a source of additional ACV).

Each calendar quarter-end, USD RCP members elect a cap amount subject to a maximum level of USD 10 million. Based on the elected cap amounts, a leverage ratio is determined which is the sum of the elected caps divided by the largest elected cap. The collateral requirement for each member of the USD RCP is its elected cap divided by the leverage ratio. In this way, the sum of the collateral requirements of each member equals the largest elected cap of any member. As a result, the collateral in the RCP is

⁷ Membership in the CAD RCP is limited to members of the Investment Industry Regulatory Organization of Canada (IIROC). Membership in the USD RCP is open to all receivers.

sufficient to cover the default of the single member with the largest cap. As with the other collateral pools, this results in the sharing of risk between pool members. Unlike the CAD RCP, members of the USD RCP do not receive initial ACV (see Appendix 4 for an illustration of cap calculations for USD RCP).

In contrast to the CAD RCP, the USD RCP cap is the only source of USD credit for Receivers in the USD RCP as there are no USD lines of credit available in CDSX. For settlements that are greater than a participant's USD RCP cap, the settlements must be funded by a funds deposit into their Funds Account.

4.2.2. Delivery versus Payment (DVP)

In CDSX, DVP is achieved through the simultaneous transfer of funds and securities at the time of settlement of transactions. The funds and securities transfers are final and irrevocable. In this regard, CDSX settles trades following BIS Model 1⁸. Negative funds balances in participants' Funds Accounts are fully collateralized (see section 4 for details on how negative funds balances are collateralized), while positive funds balances are redeemable at any time during the processing day. Participants' final payment obligations are settled through their designated bankers and qualified bankers (LVTS participants) via the LVTS, occurring at the end-of-day batch cycle (Payment Exchange) between 4:00 p.m. and 5:00 p.m. EST. In this regard, CDSX follows BIS Model 2 to settle funds between the participants.

4.2.3. Payment Risk Edits

During the course of trade settlement processing, funds payments may result in a negative funds balance in a given participant's Funds Account. In essence, the principal risk eliminated in the DVP process has been transformed into credit risk represented by the negative funds balance. CDSX addresses this credit risk by ensuring that these negative funds balances are collateralized at all points of time⁹. This is achieved through payment risk edits which are applied to all transactions including CCP net positions (CNS trades) and TFT transactions.

4.2.3.1. Funds Edit

All participants' Funds Accounts have a limit on the size of negative funds balances (essentially a limit on the maximum debit balance that the participant can have in its Funds Account at any point in time). The size of this limit is based on two factors:

- Caps: Only participants that are members of a collateralized category credit ring receive a cap. The amount of the cap is determined by the rules and formulae of the participants' collateral

⁸ Bank of International Settlements (BIS) Settlement Models:

Model 1: Systems that settle transfer instructions for both securities and funds on a trade-by-trade (gross) basis, with final (unconditional) transfer of securities from the seller to the buyer (delivery) occurring at the same time as final transfer of funds from the buyer to the seller (payment).

Model 2: Systems that settle securities transfer instructions on a gross basis, with final transfer of securities from the seller to the buyer (delivery) occurring throughout the processing cycle, but settle funds transfer on a net basis, with final transfer of funds from the buyer to the seller (payment) occurring at the end of the processing cycle.

Model 3: Systems that settle transfer instructions for both securities and funds on a net basis, with final transfers of both securities and funds occurring at the end of the processing cycle.

⁹ With the exception of negative funds balances due to entitlement reversals, ledger adjustments and mark-to-market payments. The risk from these negative funds balances is addressed by the Collateral Pool/Credit Rings of which the defaulter is a member. Participants that choose not to join one of the Collateral Pool/Credit Rings are required to be a member of another uncollateralized credit ring established for this purpose.

pools/credit ring as illustrated in Appendices 1, 2, 3 and 4. Extenders of Credit, Settlement Agents and the Federated Participant must be members of their respective collateral pool/credit rings. Receivers of Credit receive cap when they are members of the contributing Receivers' Collateral Pool (RCP).

- Lines of Credit: In CDSX, credit granters (Extenders of Credit and Federated Participant) provide lines of credit to other participants. Participants may receive multiple lines of credit from multiple credit granters.

Participants may have both a cap and a line of credit¹⁰. In this case, the effective limit on the participant's negative funds balance is the sum of the cap and the line of credit. The system will always use a participant's cap before drawing on a line of credit. The limit on each participant's negative funds balance meets CDS's risk management principle of limiting the potential exposure created by a participant.

The Funds edit ensures that negative funds balances in a participant's Funds Account do not exceed the participant's limit as calculated by the sum of cap and line of credit. When the system performs the Funds edit on the buyer in a trade, it calculates the buyer's projected Funds Account balance by subtracting the net settlement amount of the trade from the buyer's current Funds Account balance. If this projected balance is positive or zero, the Funds edit is satisfied. If the projected Funds Account balance is negative, the Funds edit compares this projected negative amount to the participant's limit (i.e. the sum of the participant's cap and lines of credit). If the projected balance is within the limit, then the Funds edit is satisfied. If the projected balance is not within the limit the trade is not settled (the trade is placed in a pending or failed state and settlement is re-attempted later).

4.2.3.2. ACV Edit

The ACV edit ensures that a negative CAD funds balance in a participant's CAD Funds Account is collateralized. Aggregate collateral value (ACV) is the estimated calculated value of the collateral that could be realized if the participant failed to pay their payment obligation. CDSX maintains a current ACV balance for each participant at a ledger level. A participant's current ACV is the sum of an initial ACV and the haircut adjusted value of the securities in the participant's risk accounts (essentially the

¹⁰ Participants eligible for fixed income clearing (FIC) at CDCC are permitted to designate a portion of their cap and/or line of credit exclusively for CDCC settlements. The portion of cap and/or line of credit designated for CDCC settlements is designated specifically for settling trades between themselves and the CDCC CUID. The CDSX settlement process would look to exhaust the CDCC cap/line of credit for CDCC settlement instructions prior to drawing on existing caps and lines of credit.

Funds will be drawn down as follows:

For CDSX settlements	For CDCC settlements
<ul style="list-style-type: none"> • Positive funds • Available CDSX cap • Available CDSX credit (lines) 	<ul style="list-style-type: none"> • Positive funds • Available CDCC cap • Available CDCC credit (lines) • Available CDSX cap • Available CDSX credit (lines)

Funds are repaid in the reverse order, starting with CDSX lines of credit.

participant's general and restricted collateral accounts). The current ACV fluctuates as securities are moved into or out of a participant's risk accounts.

Initial ACV is an amount of ACV assigned to the participant. Participants that are members of collateralized category credit ring receive initial ACV. [Each member of a collateral pool receives initial ACV equal to the total value of its collateral requirement to the pool.](#) The amount of initial ACV is determined by the rules governing the category credit ring. In the case of Extenders of Credit and the Federated Participant, this initial ACV can be allocated to another family member participant.

In addition, the securities in a participant's risk accounts are valued, using the appropriate haircut, at the beginning of each business day and this value is added to the initial ACV for the participant. CDS constantly maintains an ACV value of the securities in participant's risk accounts. In calculating this value, CDSX takes the latest market value (using the previous day's closing price or the most recent closing price if the previous day's closing price is not available) of the securities and deducts a margin or haircut to arrive at the ACV value assigned to the securities in the participant's risk accounts. The process of determining the appropriate haircut rate for a given security is described in detail later in this section.

CDSX performs the ACV edit on both the buyer and seller for all transactions that involve ledger changes. For the buyer, the system first calculates the buyer's projected funds balance. If the buyer's projected funds balance is zero or positive, the buyer's ACV edit is automatically satisfied since there is no negative funds balance to collateralize. If the projected funds balance is negative, CDSX then calculates the buyer's projected ACV by adding the ACV value of the securities being purchased to the buyer's current ACV. If the projected ACV is greater than or equal to the buyer's projected negative funds balance, then the ACV edit is satisfied. If the buyer's projected ACV is less than the buyer's projected negative funds balance, then the buyer's ACV edit is not satisfied and the trade is not settled (the trade is placed in a pending or failed state and settlement is re-attempted later).

For the seller, CDSX first calculates the seller's projected funds balance (the current Funds Account balance plus the net settlement amount from the trade). If the seller's projected funds balance is zero or positive, the seller's ACV edit is satisfied. If the seller's projected funds balance is negative, the system then calculates the seller's projected ACV by subtracting the ACV value of the securities being sold from the seller's current ACV. If the seller's projected ACV is greater than or equal to the seller's projected negative funds balance, then the seller's ACV edit is satisfied. If the seller's projected ACV is less than the seller's projected negative funds balance, then the seller's ACV edit is not satisfied and the trade is not settled. Some transactions are not subject to the ACV edit. For example, a participant selling securities directly out of one of its non-risk accounts (e.g. a segregated account) is not subject to the ACV edit. However, the buying participant would still have to satisfy the ACV edit for its side of the transaction.

4.2.4. Haircut Rates on Securities Used to Calculate ACV

The purpose of applying haircuts to securities in a participant's risk account to determine current ACV is to ensure that the value of securities in the risk accounts are at least as large as the negative funds balance they are intended to cover. The haircut represents the amount that a security could decline in value from the time of default to the time that the collateral securities are liquidated. Therefore, the size of the haircut depends on the risk of the securities. Securities issued by the participant themselves or their family members are not given value for ACV purposes in their own ledgers.

4.2.4.1. Haircut Rates for Equities

Since the introduction of equities in CDSX in July 2003, CDS has used its Internal Risk Management System (IRMS) to calculate haircut rates for individual equity securities that are used to calculate ACV. These haircut rates are based on the risk of the individual equity security and are recalculated on a weekly basis. IRMS calculates the risk of each equity security through the use of a risk measurement technique called Value-at-Risk (VaR). VaR is a widely used and accepted method of measuring the risk associated with changes in price and value of securities and derivative instruments. VaR is defined as the expected maximum loss for a given security or portfolio of securities with a given degree of confidence over a given period of time. Haircut rates for equities in IRMS are calculated based on a 99% confidence level and a holding period between 2 and 10 days. This means that, on average, the haircut rate should be higher than subsequent price decreases over a 2 to 10-day period 99 times out of 100. The holding period for a given security is determined by its liquidity, with less liquid securities being subject to a longer holding period and hence an higher haircut rate. The table below described the four liquidity categories for equity securities.

Table 1 – Liquidity Categories and Associated Holding Period - Equities			
Category	Holding Period	Average Daily Volume	% of Trading Days
Highly liquid	2 days	> 50,000 shares	> 80% in past 260 days
Liquid	3 days	> 25,000 shares	> 70% in past 260 days
Less liquid	5 days	> 10,000 shares	> 50% in past 260 days
Illiquid	10 days	Does not meet any of above	Does not meet any of above

The average daily trading volume and percentage of trading days criteria were developed by taking the securities which are members of the S&P/TSX Composite Index and the S&P 500 Index and determining the lower bound of average daily trading volume and percentage trading days for these securities. This means that essentially all of the securities which are in those indices have an average daily trading volume in excess of 50,000 shares per day and trade in excess of 80% of potential trading days. These securities were selected given that being a component of either of these indices requires meeting liquidity based criteria. As a result, these securities typically represent the most liquid equity securities in the market. Having established the criteria required for the most liquid category, the criteria for the remaining categories were determined by scaling back from the most liquid criteria.

It should be noted that although the securities which are components of the S&P/TSX Composite Index and the S&P 500 Index were used to determine the criteria for the highly liquid category, a security does not necessarily need to be a member of either of these indices to be considered highly liquid. For example, a security which trades on the TSX Venture Exchange can be considered highly liquid if it has an average daily trading volume of greater than 50,000 shares and trades on at least 80% of potential trading days.

The calculation of VaR in IRMS is done by measuring the standard deviation of one-day price changes for each equity security over the most recent 20, 90, 260 and through-the-cycle (TTC)¹¹ day periods. The

¹¹ The TTC period (business days) is an input that is reviewed annually and updated as necessary based on identifying economic cycles from long -term historical daily return data from the S&P/TSX Composite Index and the S&P 500 Index.

largest of these standard deviations is used along with the confidence level factor and holding period to calculate the haircut¹².

There are a number of adjustments made to the haircut rate for individual equity securities. These adjustments include a maximum haircut rate for any security of 100% and a maximum holding period of 10 days. Any equity security with less than one year of historical prices is subject to a minimum haircut of 15%. Securities where there has been a period of no trading of at least 20 consecutive days in the past year are subject to a minimum haircut rate of 75% to account for the potential illiquidity of that security. Furthermore, any equity security with trading activity in less than 10% of potential trading days in the past year is applied a 100% haircut.

A final set of adjustments are applied to securities where the backtesting results indicate that the calculated haircut rate was not sufficient to cover the historic price decreases. In those cases, the haircut rate is adjusted upwards to the level required to cover the historic price decreases at the 99% confidence level. In other words, the haircut rate is adjusted upward after-the-fact when it is not providing the necessary 99% confidence level.

Because of their option-like characteristics, rights, warrants and installment receipts are not supported by the VaR calculation in IRMS and are therefore subject to a haircut of 100%.

4.2.4.2. Haircut Rates for New Equity Issues

The VaR method cannot be used to determine the haircut for new equity issues because the VaR method requires historical price history to determine the standard deviation of price changes. In order to provide an appropriate amount of ACV for new issues, each new equity issue eligible in CDSX is assigned a haircut rate based on a standard haircut rate of 25%. This standard rate is adjusted as appropriate based on any available price history. After an initial 20-day period has elapsed, the haircut rate is calculated by IRMS at the next haircut calculation run, subject to the minimum haircut rate of 15% for the first year.

4.2.4.3. Haircut Rates for Debt

For debt instruments, haircuts are based on the security class, an issuer rating and its term to maturity. The table below outlines the haircut rates for different debt securities (including zero coupon bonds).

TABLE 2: Haircut Rates for Debt Securities					
Security Type	Years to Maturity				
	0 to 1	1 to 3	3 to 5	5 to 10	> 10
Government of Canada	0.5%	1.0%	1.5%	2.0%	11.5%
Federated guaranteed	1.0%	1.5%	2.5%	4.0%	13.0%
Provincial	1.5%	2.0%	3.0%	4.5%	14.5%
Provincial guaranteed	2.0%	2.5%	3.5%	5.0%	15.0%
Corporate AAA	3.0%	3.5%	4.0%	6.5%	9.0%
Corporate AA	3.0%	3.5%	4.0%	6.5%	9.0%
Corporate A	5.0%	5.5%	6.0%	8.5%	11.0%

¹² The maximum of the 20, 90, 260 and TTC period-day standard deviations is multiplied by 2.33 to achieve a 99% confidence level and then multiplied by the square root of the holding period.

TABLE 2: Haircut Rates for Debt Securities					
Security Type	Years to Maturity				
	0 to 1	1 to 3	3 to 5	5 to 10	> 10
Unrated public sector entities and government grants	15.0%	16.0%	17.0%	18.5%	20.0%
Unrated municipal	20.0%	21.0%	22.0%	23.5%	25.0%
Corporate BBB	30.0%		32.0%	33.0%	35.0%
Corporate BB and lower	100.0%				
U.S. T-bills, notes and bonds	1.0%		1.5%	3.0%	4.5%

5. Market / Replacement Cost Risk Controls

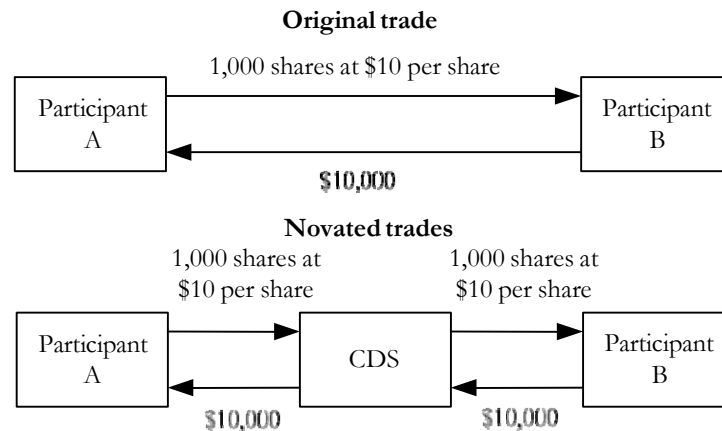
5.1. Market / Replacement Cost Risk Management Principles

The following principles guide the management of market risk resulting from the clearing, settlement and depository services offered to participants of CDS Clearing and Depository Services Inc.:

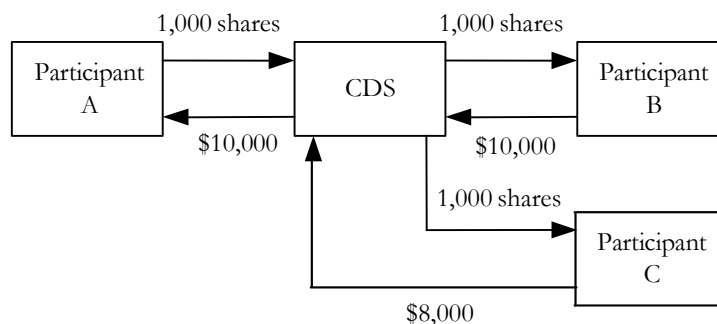
1. Rigorously manage replacement cost risk when acting as central counterparty (CCP) through daily mark-to-market of outstanding positions and risk-based collateralization of security receipt and delivery obligations;
2. Account for potential price fluctuations in securities used as collateral by discounting the market value of the collateral by an appropriate haircut rate which accounts for the vast majority of potential price changes in normal markets over the period of time it may take to liquidate the collateral;
3. Measure and report the effects of extreme but plausible market change scenarios, including scenarios that violate assumptions incorporated in market risk measures and models. Update these scenarios as market conditions warrant;
4. Account for the effect of foreign exchange rate fluctuations in collateral valuation and measurement of replacement cost risk where there is a mismatch in the currency used to denominate the risk exposure and the associated collateral;
5. Measure and report the performance of haircut rates and collateral requirements by backtesting against actual market value changes;
6. Allow for portfolio effects when calculating risk exposures to the extent that diversification can be demonstrated and measured based on available market prices;
7. Review the models, methodologies and associated parameters used to measure market risk on a regular basis and as market conditions and testing results warrant.

5.2. Market / Replacement Cost Risk Controls

CDS provides a central counterparty (CCP) service: CNS for equity securities. In CNS CDS becomes the counterparty to each of the participants' trades during the clearing and settlement process. The legal mechanism used in the CCP services to place CDS as central counterparty is called novation. For example, a trade originally between participant A and participant B is novated to become two separate trades; one between participant A and CDS and the other between participant B and CDS. In the CNS process, CDSX will net and novate all of the trades that a participant has in a given security down to a single to-deliver (i.e. the participant sold more than they bought) or to-receive (the participant bought more than they sold) position between the participant and CDS. An example of the novation of an equity trade in CNS is illustrated below.

Figure 2 – Novation of a CNS Trade

As a central counterparty, CDS faces replacement cost risk should one of the participants in the CCP service default leaving CDS's obligation to complete the transaction with the surviving counterparty. Under this scenario, CDS is required to replace the defaulter's position in the market, which may have appreciated or depreciated in value since the trade date. An example of the potential loss that could occur is provided in the following illustration. In this example, participant B defaulted and is not able to fulfill its obligation to take delivery of 1,000 shares in exchange for CAD 10,000. Nevertheless, CDS's obligation to the surviving counterparty, participant A, remains. CDS executes a trade at the current market price of CAD 8 per share with participant C to sell the 1,000 shares it has received from participant A. CDS receives less proceeds from the sale than the original trade with participant B, as the market price of the security dropped from CAD 10 to CAD 8. As a result, CDS suffers a CAD 2,000 replacement cost loss on the transaction.

Figure 3 – Example of Replacement Cost Loss in CNS from Default of Participant B

CDS protects itself against these potential losses from replacement cost risk using daily mark-to-market and collateral requirements as described later in this section.

5.2.1. Timing of Novation

CDS becomes the counterparty to all CDSX transactions, including TFT transactions, through novation. The main legal distinction between the processing of transactions in CDS's CCP service (CNS) and the processing of TFT transactions is the timing of when novation occurs and CDS becomes the counterparty. In the CCP service, novation occurs and CDS becomes the CCP as soon as the transactions are netted. For CNS, CDS becomes the CCP on the morning of value date (T+3 in the case of equities in

CNS). As a result, the replacement cost risk of trades that have not reached value date is borne by the individual participants on a bilateral basis with their counterparty to the trade. For TFT transactions, novation occurs and CDS becomes the counterparty to the resulting security and fund positions only when the TFT transaction is actually settled in CDSX.

5.2.2. Daily Mark-to-Market

CDS marks-to-market all CNS trades and outstanding positions using the previous day's closing price. This mark-to-market process addresses the potential loss from the original trade price to the current price. CDSX marks trades for the first time at netting and novation (e.g., the morning of T+3 for equities in CNS) and continues to mark daily until the position is settled. The mark-to-market amounts are debited or credited to a participant's Funds Account. Positive marks are available to be used to fund a participant's settlement activity. However, negative marks do not draw on a participant's available cap or line of credit. Therefore, CDS as CCP faces the risk of a participant having a negative mark applied against their Funds Account and subsequently defaulting. This risk is addressed in the calculation of the participant fund collateral as described below.

During the process of applying mark payments to a participant's Funds Account and subsequent settlement of trades, CDSX tracks the amount of the negative mark which is repaid during the course of the day. For example, a participant may have had a negative mark applied to their Funds Account, but subsequently have had sales, which reduced their negative funds balance or even have created a positive Funds Account balance. This repayment of the negative mark reduces CDS's exposure to the negative mark obligation of the participant. The remaining obligation not repaid by the participant during the day is referred to as the unpaid mark.

5.2.3. Participant Funds for CCP Services

CDS has established participant funds to cover the risk that CDS faces as a CCP. There is a separate and distinct participant funds for the CCP service (i.e. CNS). The collateral requirement for the CCP service participant fund is based on an estimation of the potential loss the default of each individual member of a CCP service could create. This loss can result from the failure of a defaulting CCP service participant to pay the remaining unpaid mark (the mark-to-market component of the participant fund), if any, and the potential cost to CDS to replace the defaulter's security receipt and delivery obligations in the service (the outstanding position component of the participant fund).

Consistent with CDS's risk management principle of requiring participants to be responsible for the risk they create, the participant funds are primarily defaulter-pay. This means that the potential losses of a participant default in a CCP service should be covered by the defaulter's own collateral in the vast majority of potential cases. The participant fund is designed to maintain a 99% confidence level in CNS. This means that the defaulter's own collateral should be sufficient to cover the resulting losses in 99% of potential default situations.

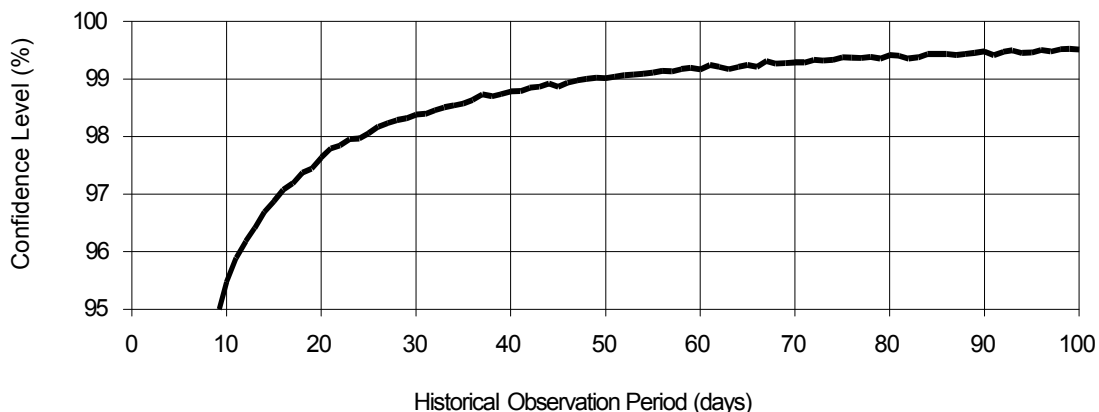
In addition, the losses generated by a default in a CCP service are contained within that service as required by CDS's risk management principle to avoid spillover between settlement services. This means that losses in excess of the collateral requirement from the defaulter are borne by the surviving participants in the service.

5.2.3.1. Mark-to-Market Component of CCP Participant Funds

The mark-to-market component (MTM component) of the participant fund is designed to cover the potential that a participant that owes a mark-to-market payment to CDS will default and not pay that amount.

The MTM component in CNS is calculated by using the largest unpaid mark paid by the participant in the last 50 business days. The calculations are used to address the risk that a default may occur prior to the participant delivering their required contribution to CDS. The use of 50 business days as the historical observation period for CNS provides approximately 99% confidence level for CNS. The connection between the length of the historical observation period of the mark payments and receipts and the confidence level is illustrated in the figure below. In this illustration, a simulation of mark-to-market payments and receipts, drawn from a normal distribution, was conducted. The simulation compared the largest absolute value of marks during the previous number of days to the mark on the next day to determine if the collateral requirement based on the previous history was enough to cover the subsequent day's mark.

Figure 4 – MTM Component – Confidence Level and Historical Observation Period



5.2.3.2. Outstanding Position Component of CCP Participant Funds

The outstanding position component of the participant fund is designed to cover the risk that CDS would face if a participant defaulted with outstanding transactions in a CCP service. In this circumstance, CDS must either sell or buy securities to close-out the participant's outstanding positions as illustrated previously. The difference between what CDS pays and receives in the marketplace for these close-out transactions and what CDS received and paid for the original positions represents the loss (or gain) that CDS needs to cover through the participant fund. The calculation of each CCP service member's outstanding position component collateral requirement is an estimate of these potential losses.

As with the calculation of haircut rates for ACV purposes for equity securities, CDS utilizes the Value-at-Risk (VaR) approach to estimate the risks to CDS from a participant's outstanding positions. This application of VaR looks at each of a participant's individual outstanding positions, as well as the history of price movements for each of those positions over the recent history. Based on these factors, the VaR calculation estimates how much the value of the portfolio of the participant's outstanding positions might change over a given period of time. This period of time is based on the expected time required to execute the offsetting transactions to close-out a defaulter's positions.

5.2.3.2.1. Outstanding Position Component Calculation for CNS

CDS calculates VaR on the outstanding positions in CNS after the overnight CNS/BNS settlement process is complete. The calculation of VaR at this point of the day assumes that the CNS participant has defaulted overnight. While it is arguably more likely that a participant would default during the business day, particularly at payment exchange (at 4:00 p.m. EST) or when collateral requirements are due (at 10:00 a.m. EST), the timing of the VaR calculation immediately after CNS/BNS provides a more conservative estimate of potential exposure. This is based on the assumption that the magnitude of outstanding positions is largest at this point and that subsequent settlement of CNS outstanding positions during the day tends to reduce risk. While this is likely the case, it is possible that settlement of outstanding positions that tend to hedge the risk of other positions could result in a net increase in the overall risk¹³.

The outstanding position component for a CNS participant is calculated as the higher of the VaR on the participant's outstanding positions or the average of the VaR over the most recent 20 business days, including the current day for which the calculation is being made.

The portfolio of a participant's outstanding positions is divided into two broad groups, those that are eligible for calculation of risk on a portfolio basis (diversification¹⁴ eligible) and those where the risk of the outstanding position is determined on a stand-alone basis (non-diversification eligible). The calculation of the outstanding position component for non-diversification eligible is the sum of the gross market value of each non-diversification eligible position multiplied by the haircut applicable to that security.

The non-diversification eligible approach does not allow for the portfolio effects that may serve to reduce the overall risk of the outstanding positions and hence reduce the collateral requirements of the CNS participant. In order to be considered as a diversification-eligible security for the purposes of calculating the outstanding position component, a security must meet the following criteria:

- a minimum price history of 90 days (the most recent 90 trading days),
- must not be classified as illiquid (must have average daily trading volume of at least 10,000 shares and have traded in at least 50% of potential trading days in the past 260 days), and
- must not have a period of inactive trading for 20 or more consecutive days in the past 260 days.

¹³ CDS does not currently have the ability to estimate the risk of CNS outstanding positions on an intra-day basis and hence is not able to capture the potential change in risk due to intra-day changes in CNS outstanding positions. The capability was investigated as part of the review of CDS's compliance with the CPSS/IOSCO standards for CCPs in 2007, and the recommendation was made against developing the functionality.

¹⁴ For the purposes of the CNS participant fund, diversification effects could result where there are multiple outstanding positions in different securities. These effects result where the risk of a portfolio of securities is less than the sum of the risk of the individual securities that make up the portfolio. For example, a participant may have outstanding long and short positions in two securities whose historical price changes are correlated (that is, their historical price changes tend to be in the same direction and magnitude). In this case, value increases in one position would tend to be offset by value decreases in the other. If risk were measured as the volatility of changes in value, then a portfolio of these two positions would represent less risk than the individual positions considered on their own. Diversification effects are not limited to risk offsets created by long and short positions, a portfolio of only long or short positions could also generate diversification effects to the extent that the securities in the portfolio are uncorrelated or negatively correlated.

The outstanding position component for diversification-eligible positions is calculated by estimating the risk of the positions through the daily changes in value of the portfolio of outstanding positions over the recent past. The risk of the outstanding positions is based on the largest of the 20, 90, 260 and TTC period-day standard deviation of portfolio value changes. Diversification effects are incorporated by allowing gains and losses to offset themselves on each of the days in the historical observation period. The holding period applied to each of the outstanding positions is determined using the same method used for calculation of haircut rates for equities for ACV purposes.

An adjustment is made in the calculation of the outstanding position component to account for the concentration risk created by large outstanding positions. For each outstanding position, the required liquidation period is calculated as the actual position size divided by the average daily trading volume (rounded to the nearest full day) plus one day¹⁵. The required liquidation period is an estimate of the number of days required to replace the outstanding position. This required liquidation period is compared to the standard holding period for a security from Table 1 above (see Section 4.2.4.1). If the required liquidation period is greater than the standard holding period, the required liquidation period is used to calculate the collateral requirement for the outstanding position (limited to a maximum holding period of 10 days). If the required liquidation period is less than the standard holding period, then the standard holding period is used to calculate the collateral requirements. The following examples illustrate the adjustments required to the holding period based on position size:

Example 1: Outstanding position of 100,000 shares and average daily trading volume of 75,000 shares in security with 3-day standard holding period.

- Position size divided by average daily trading volume = 100,000 shares / 75,000 share per day = 1.33 days
- Required liquidation period = 1.33 days rounded to nearest full day plus 1 day = 2 days
- Larger of required liquidation period or standard holding period = 3 days

Result: The standard holding period is sufficient to allow for the liquidation of this position without adjustment.

Example 2: Outstanding position of 750,000 shares and average daily trading volume of 100,000 shares in security with 5-day standard holding period.

- Position size divided by average daily trading volume = 750,000 shares / 100,000 shares per day = 7.5 days
- Required liquidation period = 7.5 rounded to nearest full day plus 1 day = 9 days
- Larger of required liquidation period or standard holding period = 9 days

Result: Since only a portion of the total position is expected to be liquidated within the standard holding period, the required liquidation period must be increased to 9 days. This would result in an

¹⁵ The additional day is required given the potential timing of a default and the latest price at which positions had been marked-to-market. Assuming default at payment exchange, there is a full day of market risk at a minimum (the difference between the mark price of the close of the previous day and the closing market price on the day of default). Therefore, a 2-day holding period would require CDS to execute offsetting trades on the business day immediately following a default.

increase in the collateral requirement for this outstanding position of approximately 34% versus the standard 5-day holding period.

The outstanding position component requirement for each CNS participant is the sum of the requirement for diversification and non-diversification eligible securities.

5.2.3.3. Adding the Mark-to-Market and Outstanding Position Components

The calculation of the total CCP service participant fund requirement for each participant is designed to take into account the diversification effects of the two separate components, that is, the mark-to-market component and the outstanding positions component. Statistically, allowing for diversification effects between the two components implies that the risks addressed by the two components are not perfectly correlated. CDS analyzed the risks covered by the two components and determined that there is effectively zero correlation between the risks. As a result, the diversification effects between the two components, assuming that the correlation between the components is zero, can be calculated by adding the two components using the square root sum of squares method¹⁶. As an example, a CNS participant with a MTM component of CAD 5 million and an outstanding component of CAD 5 million is required to post a total collateral of CAD 7.1 million as illustrated below compared to CAD 10 million if the two components are added together without taking into account the diversification effects.

$$\text{Total Collateral Requirement} = \sqrt{5,000,000^2 + 5,000,000^2} \approx 7,071,000$$

5.2.4. Backtesting of Participant Funds Collateral Requirements

In order to determine the effectiveness of the collateral requirement calculation, CDS performs backtesting on participant funds collateral requirements by comparing actual participant collateral requirements based on actual positions to historical changes in value of those positions. By assuming that a participant's default occurs on each of the dates in a selected historical period, we can determine if the participant's collateral requirement was sufficient to cover the resulting loss on each date, and if not, by how much the loss exceeded the collateral. Backtesting effectively answers the question "*if a participant defaulted today would CDS have enough collateral to cover any resulting loss or would the surviving participants be required to cover some portion of the loss?*"

In CDS, the backtesting process for CNS is completed weekly (on participants' daily activity) to determine if the participants' collateral requirement computed during the previous netting cycle (CBD – 1 in case of CNS) was sufficient to cover the losses if the participant defaulted today. The reason for backtesting against the computed collateral requirement from the previous cycle (CBD – 1 in case of CNS) is the assumption that the participant would default before pledging the collateral requirement computed during the latest netting cycle (CBD in case of CNS).

¹⁶ The risk of a portfolio of assets A and B is represented by the following equation:

$$\sigma_{AB} = \sqrt{\sigma_A^2 + 2\rho_{AB}\sigma_A\sigma_B + \sigma_B^2}$$

where σ_{AB} = the standard deviation of portfolio returns, σ_A = the standard deviation of asset A returns, σ_B = the standard deviation of asset B returns, and ρ_{AB} = the correlation between the returns of asset A and asset B. If the correlation between the assets is zero, this equation reduces to:

$$\sigma_{AB} = \sqrt{\sigma_A^2 + \sigma_B^2}$$

If the collateral requirement was more than the computed total potential loss, then the day would be counted as a “pass,” or for CNS purposes, the collateral requirement would have been sufficient to cover the loss in event of a participant default. If the total potential loss was larger than the collateral requirement, then the day was counted as a “fail,” or for CNS purposes, the collateral requirement would not have been sufficient to cover the loss in the event of a participant default. The total number of the “pass” observations as a percentage of the total number of observations tested is the “effective confidence interval”.

5.2.5. Residual Loss Allocation for CCP Services Participant Funds

The participant funds for CCP services are designed as primarily defaulter-pay and target a 99% confidence level in CNS. This means that the defaulter’s own collateral should be sufficient to cover the resulting losses in 99% of potential default situations on average for CNS.

For CNS, in case the defaulting participant’s collateral is not sufficient to cover losses arising from the close-out process, the residual loss is allocated to the surviving CNS participants. The residual loss is allocated based on the proportionate share of the surviving participants’ collateral requirements. For instance, if a survivor’s collateral requirement on the day of default is 5% of the total CNS participant fund collateral requirements, 5% of the residual loss is allocated to that surviving participant.

5.2.6. Limiting Loss Exposures of Surviving Participants in CCP Services

Participants are exposed to a potentially unlimited loss as survivors in a CCP service resulting from another participant’s default where the defaulter’s own collateral and CDS’ Dedicated Own Resources were insufficient. Since it is not possible to know the size of the mark owed by any participant or the replacement cost loss in the CCP services prior to default, there is theoretically no limit on the potential collateral shortfall and hence on the size of the losses suffered by survivors in a CCP service. Two measures were developed in order to minimize the replacement cost risk to survivors in the CCP services as described below.

5.2.6.1. Central Counterparty Service Exposure Cap (CCP Cap)

The CCP exposure cap sets a predefined limit on the risk created by the outstanding positions of any single participant in all of the CCP services of which they are a member. The same limit is applied to all participants. The value against which the limit is measured is the potential replacement cost risk created by each participant in the CCP services. The replacement cost risk is measured by the collateral requirement that covers the failed trades in CNS. Each participant’s risk is measured against the predetermined limit on a daily basis.

Based on estimations of the potential losses that could result under significant market events under various CCP cap limit amounts as well as the estimated historical risk levels in the CCP services, the dollar value of the CCP cap was set at CAD 70 million. A three tiered escalating response approach was designed, allowing the affected participant sufficient time to reduce their exposure and remain under the CCP cap. The following defines the three thresholds in more detail:

- Threshold 1 - When a participant’s outstanding position risk is at or above 75% of the cap, or CAD 52.5 million, CDS notifies the participant and their senior executive, copying the participant’s primary regulator. The participant is asked to advise CDS of the reason(s) for the breach of the threshold and when it plans to drop back below the threshold.
- Threshold 2 - When a participant is over 100% of the cap, or CAD70 million, they must provide CDS with additional collateral in the amount that they are exceeding the cap. For example, if a participant has reached 105% of the cap and their outstanding position risk is CAD 73.5 million,

they must also contribute additional collateral in the amount of CAD 3.5 million (the 5% that they are exceeding the cap). CDS notifies the participant and their senior executive, copying the participant's primary regulator as well as all other members of the services in which the participant who has exceeded the cap is a member of. The additional collateral will remain in place until the participant goes below threshold 2.

- **Threshold 3** - When a participant is over 150% of the cap, or CAD 105 million, they must provide CDS with an additional 200% of the collateral in the amount that they are exceeding 150% of the cap. For example, if a participant has reached 155% of the cap and their outstanding position risk is CAD 108.5 million, they must also contribute additional collateral in the amount of CAD 42 million (100% on the 50% that they are exceeding 100% of the cap, plus 200% on the amount that they are exceeding 150% of the cap). CDS notifies the participant and their senior executive, copying the participant's primary regulator as well as all other members of the services in which the participant who has exceeded the cap is a member of. The additional collateral will remain in place until the participant goes below threshold 2.

5.2.6.2. Survivor Withdrawal Option

The survivor withdrawal option allows participants in a CCP service to limit the loss allocation they are responsible for due to the default of one or more other members of the service by withdrawing from the service. If the participant chooses to withdraw from the service as a result of the default of another member, it must first provide an additional 700% for CNS of its collateral requirement in that CCP service before that withdrawal is effective. The survivor withdrawal option is applicable only in the event of default and does not affect the normal non-default withdrawal of a participant from a CCP service. The withdrawal option must be exercised by 1:00 p.m. EST on the day after the default of another CCP service member.

The survivor withdrawal option meets the objective of providing participants with a known potential maximum dollar loss in the event of default of another member assuming that they exercise the option. A risk implication for the surviving CCP service members who choose to remain is that they may be required to cover additional loss allocations. These additional loss allocations would result if the loss allocation to a withdrawing member exceeded the full amount of the collateral provided by the withdrawing member. However, based on stress analysis conducted by CDS, it was determined that the requirement for an additional contribution of 700% (in case of CNS) from each survivor seeking to withdraw from the service would adequately cover the risk to the remaining survivors and CDS that there may not be adequate collateral remaining.

5.2.7. Buying-in of Outstanding Positions

CDS allows its CCP services participants to force the settlement of outstanding to-receive positions through the buy-in process. Each buy-in involves a receiver who enters the intent to buy-in, one or more deliverers who have outstanding to-deliver positions, and CDSX, which manages the buy-in throughout its life cycle. Once CDS purchases the securities, any costs of arranging the buy-in are charged to the participant/s who failed to deliver the securities (i.e., the deliverer/s).

5.2.8. Withdrawing from CCP Services

A participant using the CCP service may withdraw from the CCP service by giving notice to CDS of its intention to withdraw. CDS informs all of the other participants making use of that CCP service that it has received a notice of intention to withdraw from that participant, and gives particulars of the withdrawal. The notice is effective as of the end of the tenth business day following the later of (i) the business day on which the participant gives such notice or (ii) the business day on which the participant,

having given such notice, has no outstanding CCP obligations and has paid the net amount owing by it in respect of CCP marks. A participant who has withdrawn from CCP service has no obligations with respect to the obligation of a defaulter who is suspended after the time at which the participant's notice of intention to withdraw is effective. Unless the participant has exercised the CCP withdrawal option mentioned above, a participant who has given a notice of intention to withdraw continues to be subject to all of its obligations with respect to the obligation of a defaulter who is suspended before the time at which the participant's notice of intention to withdraw is effective.

5.2.9. CNS Default Fund for CCP Services

The CNS Default Fund is designed to cover a residual portion of the CNS CCP service losses with CNS participants' resources through a pooling-of-resources arrangement. The CNS Default Fund is sized to have resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of a participant and its affiliates that would potentially cause the largest aggregate credit exposure for the CCP in extreme but plausible market conditions.

The size of the CNS Default Fund are determined by first accumulating CNS stress losses for the prior month, ranking the losses from smallest loss to largest loss and identifying the largest stress loss. For instance, the largest 0.5% of the ranked stress losses is equivalent to the 99.5% Tail VaR. Next, an average of the prior two months will be calculated to ultimately determine the size of the CNS default fund. A two-month equally-weighted moving average is likely to be less procyclical and less volatile than a simply using a month-by-month methodology.

Once the size of the default fund has been determined, each CNS participant will make a pro-rata contribution to the default fund based on their average CNS collateral requirement for the prior two months. The pro-rata contribution requirement is consistent with the principles of CDS' Financial Risk Model, which states that CDS requires participants to bear responsibility for the risks they bring to the clearing, settlement and depository system.

Losses arising from a CNS participant default will first be covered by the defaulting participant's CNS Participant Fund collateral. Uncollateralized losses will then be charged against the defaulting participant's CNS Default Fund collateral.

If the defaulter's CNS service collateral is used up entirely, and there are still residual losses, CDS will then look to the surviving CNS participants to cover any residual losses. Residual losses will be allocated pro-rata to the surviving CNS participants – the allocation will be in the form of a call to fund the loss allocation.

5.2.10. Application of CDS' Dedicated Own Resources in the event of a CNS Participant Default

CDS maintains its own dedicated, pre-funded resources ("Dedicated Own Resources") in the CNS default waterfall for CNS, CDS' CCP service for the central clearing of cash securities. CDS segregates the sum of one million dollars as Dedicated Own Resources.

CDS' Dedicated Own Resources would be drawn upon only after a suspended or terminated Participant's CNS Participant Fund and Default Fund contributions have been fully exhausted.

6. Liquidity Risk Controls

In CDSX, liquidity risk is created by the need to settle payment obligations on the same day that they are incurred and need to sell securities pledged as collateral as well as buying or selling positions to offset a defaulter's obligations in the CCP services.

6.1. Liquidity Risk Management Principles

The following principles guide the management of liquidity risk resulting from the clearing, settlement and depository services offered to participants of CDS Clearing and Depository Services Inc.:

1. Limit funding liquidity risks borne by CDS and its participants through the real-time enforcement of limits on the size of payment obligations of participants. Recognize that some obligations, such as mark-to-market payments in central counterparty services and settlement in certain cross-border services, cannot be strictly limited;
2. Transfer liquidity risks to participants willing and capable of accepting the risk;
3. Recognize that the sale/purchase of larger, less liquid security positions used as collateral or being liquidated to close out a defaulter's central counterparty obligations will take longer to realize than may be accounted for in standard market risk measures. A longer liquidation period creates a potential for greater price fluctuations;
4. Ensure that securities eligible to be pledged as collateral to participant funds and collateral pools have extremely high liquidity which can be readily converted to cash;
5. Measure the funding liquidity requirements of participants and CDS resulting from the default of a participant and ensure that adequate lines of credit or other effective arrangements are available to meet these liquidity requirements. For potentially unlimited liquidity risk exposures, establish a target level of coverage and manage the liquidity arrangements to meet that target;
6. Limit the concentration of collateral positions to any single type of default-risky security issuer for participants whose default could create systemic risk concerns.

6.2. Liquidity Risk Controls

CDSX controls liquidity risk by applying haircuts to securities in participants' risk accounts, restricting the amount of ACV that can be created by certain types of securities (sector limits), restricting the eligibility of collateral that can be used as collateral contributions in category credit ring collateral pools and participant funds, having back-up lines of credit with commercial banks, and performing stress tests regularly.

6.2.1. Haircut Rates for Equity Securities

Refer to section 4 for detailed discussion of how liquidity risk is accounted for in the calculation of haircut rates.

6.2.2. Sector Limits for ACV

Largely due to systemic risk concerns that could result from an extender of credit, a settlement agent or the federated participant and their associated family members, these participants are subject to

restrictions on the amount of ACV that can be created by certain types of securities. These restrictions are called sector limits. Non-family member Receivers of Credit are not subject to these sector limits.

Table 5 – Sector Limits Applied to Calculation of ACV

Sector limit	Description
Government sector limit (GSL)	Calculated as 25% of the company cap and is made up of non-federal-government-sector-issued securities (provincial debt, federally guaranteed debt and provincially guaranteed debt).
Private sector limit (PSL)	Calculated as 15% of the company cap and is made up of private-sector-issued debt securities.
Unrated debt limit (UDL)	Set at zero and is made up of unrated public sector bonds and unrated municipal bonds.
High yield debt limit (HYL)	\$100 million or less, as elected by the participant, to be shared between the participant and their family member(s) and is made up of BBB-rated corporate debt (high yield bonds).
Federal U.S. limit (FTL)	Set at zero and made up of U.S. Treasury securities.
Equity sector limit (ESL)	\$100 million or less, as elected by the participant, to be shared between the participant and their family member(s). This amount is deducted from the participant's existing PSL.

There is no limit on the amount of ACV that can be made up of federal government securities (i.e., those issued by the Government of Canada). However, limits are placed at the family level on the amount of sector limit securities that are counted towards that ledger's ACV. These limits can be distributed among family-member companies. Participants can acquire securities above their sector limits, however, their value is not included in the ACV for that ledger.

6.2.3. Eligible Collateral for Collateral Pools and Participant Funds

CDSX only permits the most liquid assets as collateral and therefore, restricts the eligibility of securities that can be pledged as collateral contribution in category credit ring collateral pools and participant funds. The detailed table for the eligible collateral is given below:

Table 6 – Eligible collateral for collateral pools and participant funds

CDSX Eligible Collateral										
CDSX Eligible Collateral	Instrument Type ¹	Extenders of Credit	Settlement Agents	Active Federated Participant	CAD Receivers of Credit	USD Receivers of Credit	CNS ⁹	NSCC participant fund for New York Link	CDS participant fund for New York Link	CDS participant fund for DTC Direct Link
Securities issued by the Government of Canada	Canada treasury bill / Government of Canada bond	√	√	√	√	√	√		√	√
Government of Canada stripped coupon and residuals	Coupon / Principal / Receipt / Payment / Package	√	√	√	√	√	√		√	√
Securities guaranteed by the Government of Canada (including Canada mortgage bonds and NHA mortgage-backed securities)	Mortgage-backed security / Other asset-backed security	√	√	√	√	√	√			
Securities issued or guaranteed by a provincial government	Provincial treasury bill / Provincial bond / Provincial note	√	√ ²	√	√	√	√			
Banker's acceptances and short-term promissory notes ^{3,4} Minimum issuer rating of A by CDS ^{4,5}	Banker's acceptance / Bearer deposit note / Certificate of deposit / Guaranteed investment certificate		√ ⁶	√	√	√	√			
Commercial paper and short-term municipal paper ^{3,4} Minimum issuer rating of A by CDS ^{4,5}	Municipal treasury bill / Commercial paper / Municipal note		√ ⁶	√	√	√	√			
Corporate bonds and municipal bonds ^{3,4} Minimum issuer rating of A by CDS ^{4,7}	Corporate bond / Municipal bond / Other market bond		√ ⁶	√	√	√	√			
U.S. treasury securities	U.S. treasury bill / U.S. treasury bond or note					√			√	√
Cash (U.S. dollars) in the form of a Fedwire payment	N/A					√		√ ⁸		
Cash (Canadian dollar) in the form of a LVTS payment	N/A	√	√	√	√		√			

¹ Instrument type. For more information, refer to [Security types, subtypes and instrument types](#) in CDSX Procedures and User Guide.

² Rated R1 [low] for short-term debt by DBRS with a minimum issuer rating of A by CDS and rated AA [low] for long-term debt by DBRS with a minimum issuer rating of AA by CDS.

³ No more than 20 per cent of the value of collateral pledged can be the obligations of private and municipal sector issuers – subject to the additional restriction on that (i) only 10 percent of the value of collateral pledged can be from LVTS and related issuers; and (ii) only 5 per cent of the value of collateral pledged can be the obligation of a single private and municipal sector issuer.

⁴ Securities issued by members of a pool or fund, or “family” of a pool or fund member, are not eligible for collateral related to the pool or fund.

⁵ Rated R-1 [low] by DBRS or A-1 [mid] by S&P or P1 by Moody's.

⁶ Rated R1 [mid] by DBRS or A-1 [mid] by S&P. Minimum issuer rating of AA by CDS.

⁷ Rated A [low] by DBRS or A- by S&P or A3 by Moody's.

⁸ 100 per cent of the contribution must be made in U.S. cash.

⁹ Eligible collateral for the CNS Participant Fund and CNS Default Fund.

6.2.4. Back-up Liquidity Providers

CDS has established a standby line of credit in US Dollars that can be converted into Canadian Dollars with a commercial liquidity provider. This line can be activated to obtain liquidity in the event of default of a participant using CCP services and/or default of a member of contributing CAD and/or USD Receivers of Credit Pools.

CDSX is a DVP settlement system with irrevocable funds transfer through LVTS at the payment exchange. The procedures within LVTS guarantee that there will be enough collateral pledged by the participants (Extenders of Credit, Federated Participant, Settlement Agents) in LVTS to generate the necessary liquidity to permit settlement in LVTS in the event that the LVTS participant with the largest net debit position defaults.

The Bank of Canada also guarantees settlement in LVTS in the extremely unlikely event of the default of more than one LVTS participant on the same day during LVTS operating hours, where the sum of exposures of the defaulting LVTS participants exceeds the value of all collateral pledged in the system. Under the Payment Clearing and Settlement Act (PCSA), no payment confirmed by LVTS would ever be unwound due to settlement problems. LVTS payments provide clients with finality and irrevocability for each payment received.

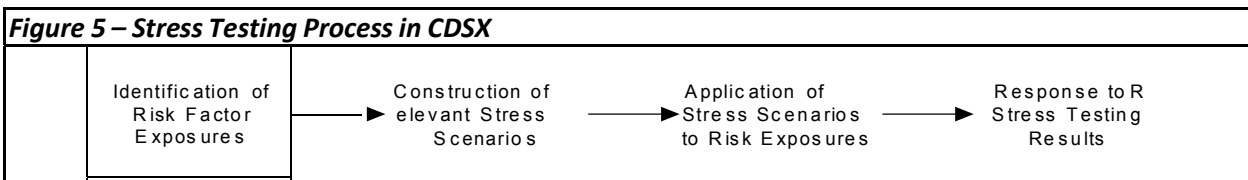
6.2.5. Stress Testing

Stress testing is a risk management tool used to evaluate the potential impact on a financial institution or system to “exceptional but plausible” events and/or movement in a set of financial variables. Stress testing is generally used as an additional tool to statistical models, such as value-at-risk (VaR).

As applied to CDSX, stress testing quantifies the impact of a market event, such as the stock market decline in October 1987, as well as the default of one or more participants. At a minimum, the risk model for CDSX must be able to withstand severe market shocks combined with the default of the participant with the largest exposure. This is a fundamental principle underlying the CDSX risk model and is required to comply with the CPSS/IOSCO report¹⁷ outlining standards for a central counterparty (CCP).

6.2.5.1. Process of Stress Testing in CDSX

The CDSX stress testing process, which consists of four parts, is illustrated in Figure 4 below.



6.2.5.2. Identification of Risk Factor Exposures

CDS identified the following exposures as the key risk factors for a given event:

¹⁷ Recommendations for Central Counterparties, Bank for International Settlements / Technical Committee of the International Organization of Securities Commissions, March 2004.

Credit risk - The most important financial risk addressed by CDSX is the default of a participant resulting in an unpaid payment obligation, collateral call or unfulfilled security receipt or delivery obligation. These failures may occur regardless of market risk events described above; however, the likelihood of a participant defaulting is higher during market stress events. As a result, these events are not independent and the stress testing framework considers the results of both market shocks with the coincident default of one or more Participants.

Equity price risk - The CDSX risk model is exposed to losses due to equity price risk in three ways. The first exposure is the potential for a decline the prices of equities which make up a given participant's ACV. Secondly, outstanding positions in CNS are exposed to equity price changes resulting in gains or losses when buying or selling securities to meet a defaulter's security receipt and delivery obligations (replacement cost risk). Thirdly, equity price changes affect the magnitude of mark payments owed by a defaulter and survivors in CNS.

Interest rate risk - The CDSX risk model is exposed to changes in the factors that affect debt prices including directional interest rate changes, changes in the spread between yields of debt securities of various credit qualities and to changes in repo rates. An increase in the level of general interest rates (represented by shifts and twists in yield curves for government debt) and/or widening credit spreads result in a decrease to debt prices. Decreases in debt prices negatively affect the value of debt securities used for ACV and pledged to the various collateral pools funds in CDSX.

Foreign exchange risk - Settlement in CDSX is currently limited to either Canadian (CAD) or US Dollars (USD). Securities in CDSX can be priced in either of these currencies. A risk exists when the collateral pledged is denominated in a currency different than currency of the obligation. Currency movements can change the value of outstanding positions in CCP services, value of securities used for ACV and collateral pledged to various collateral pools in CDSX.

Liquidity risk - Liquidity risk exposures in the CDSX risk model can be classified into two broad categories. Firstly, market liquidity can impact the timing and value realized when liquidating collateral or executing offsetting transactions in CCP services. Liquidity risk of this type can be incorporated into market price shocks by estimating the potential price changes caused by either the size of the position or the additional time required to buy or sell a position. Secondly, liquidity risk encompasses the requirements of CDS and participants to provide collateral and cash to meet margin calls and payment obligations that could result from market shocks.

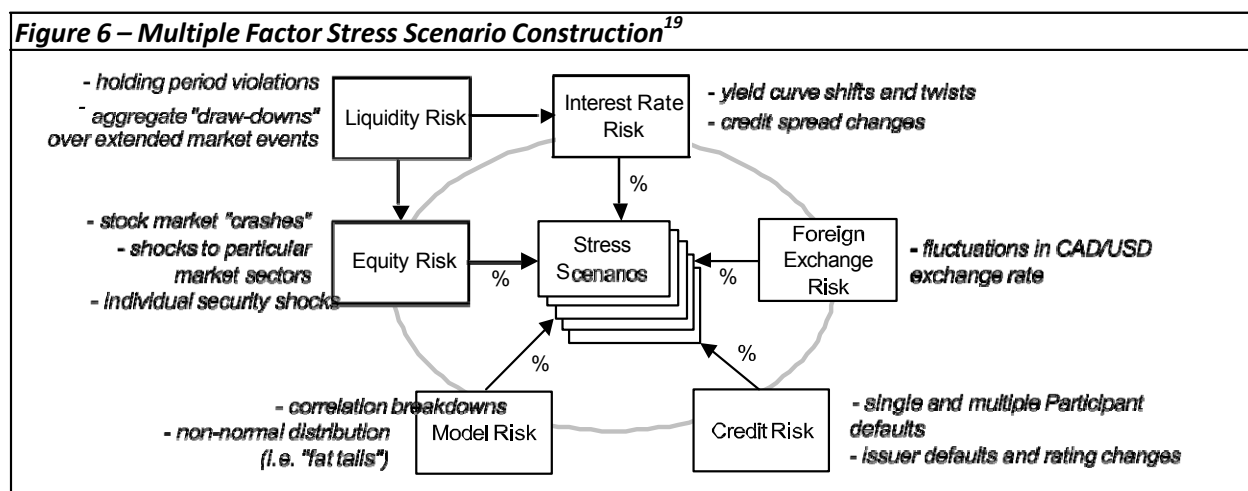
Option-specific risk - While settlement of derivative instruments typically does not take place in CDSX (exchange traded options and futures in Canada are settled by the Canadian Derivatives Clearing Corporation), there are some securities with option-like characteristics in CDSX. These securities include rights, warrants and installment receipts and any debt or equity instrument with conversion or other features that create option-like pricing characteristics.

Model risk - By incorporating sophisticated risk measurement methods such as VaR into the CDSX risk model, new risk exposures are created which must be addressed by the stress testing framework. Examples of these exposures include: (i) the collapse of correlation effects implicit in the diversification benefits in the CCP Services; (ii) the liquidation period assumptions in haircut rates and collateral requirement calculations; (iii) the assumption of the normality of the distribution of price changes in the VaR model used for haircut and collateral calculations. Stress scenarios include the effects of the violation of these assumptions.

6.2.5.3. Construction of Relevant Stress Scenarios

The Risk Metrics Group developed a list of the characteristics of good stress tests¹⁸. CDS adopted this list in developing stress scenarios. The characteristics of a good stress test are (i) relevance to current positions; (ii) considers changes to all relevant market rates; (iii) examines potential regime shifts; (iv) spurs discussion; (v) considers market illiquidity; (vi) considers the interplay of market and credit risk.

Figure 6 below illustrates the approach CDS uses in creating stress scenarios by accounting for all of the risk factors that can create potential losses in CDSX.



The stress testing application applies three different types of market scenarios to the actual positions and obligations of participants. The first type of scenario is an historical scenario where changes in risk factors are assigned based on observed changes in the marketplace. The classic example of an historical scenario is the stock market crash in October 1987. For historical scenarios, the changes in all the risk factors were researched and are applied. For example, the interest rate and CAD/USD exchange rate changes are also included with the equity price changes. Historical scenarios are based on observed 3-day changes in risk factors. The second type of scenario is a theoretical scenario where arbitrary but plausible changes in risk factors are applied in isolation or together with other factor changes. Examples of these scenarios include a 25% drop in equity prices or a 100 basis point upward shift in the yield curve. The final type of scenario is an actual scenario where normal day-to-day price changes are applied. While not a stress event, using this type of scenario allows CDS to perform a backtest in aggregate terms based on what actually happened in the market each day. This aggregate backtesting allows CDS essentially perform daily default simulations of each participant and supplements the current backtesting which is focused on individual components of the CDSX risk model. An illustration of the construction of stress scenarios is provided in Figure 6 above.

6.2.5.4. Application of Stress Scenarios to Risk Exposures

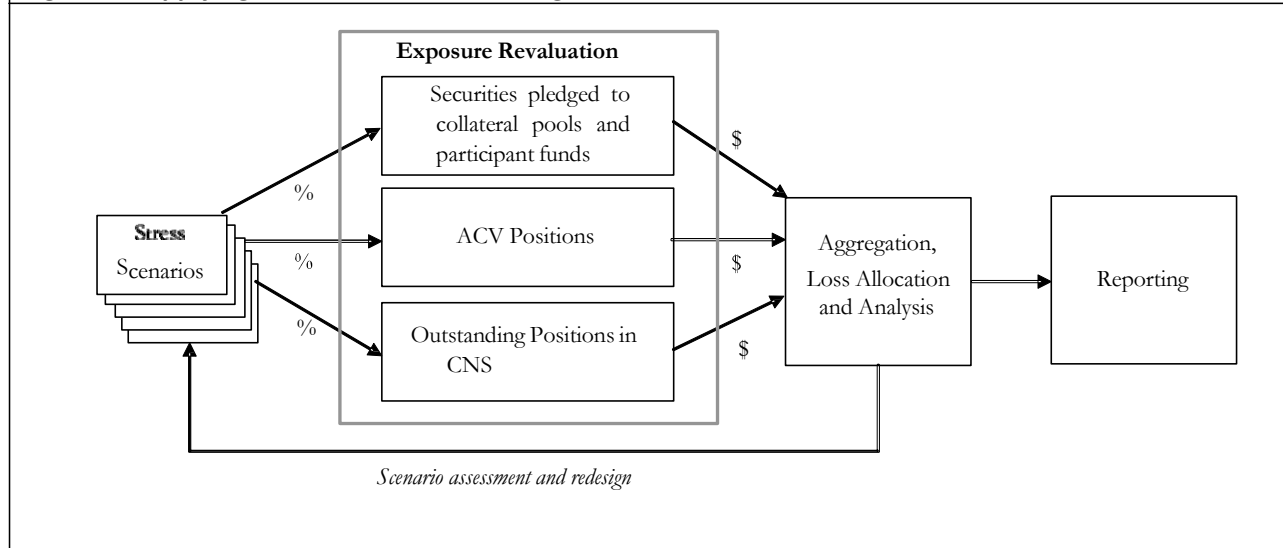
The next step of the stress testing process involves applying the stress scenarios to the risk exposures identified above to determine the resulting gains and losses. For each stress scenario, the stress testing application calculates the gains or losses that would result from the default of each participant. Figure 7 below illustrates how the stress scenarios are applied to the various risk exposures.

¹⁸ *Risk Management: A Practical Guide*, RiskMetrics Group, August 1999

¹⁹ Adapted from Crouhy, Galai and Mark, *Risk Management*, McGraw-Hill, 2001

In Figure 7, each of the stress scenarios are applied to the various risk exposures for each participant. For example, a scenario could be composed of a 10% decline in all equity prices and a 50 basis point increase interest rates (causing a decrease in the price of debt securities). These price changes are applied to the ACV used by the defaulter to cover a line of credit from an Extender. The resulting ACV value is compared to the amount drawn on the line of credit to determine if the Extender who granted the line suffered an uncollateralized loss. This process of loss allocation and aggregation is illustrated in Figure 7 where the various gains and losses in the exposure revaluation process come together to determine the net loss for surviving participants in each credit ring.

Figure 7 – Applying Scenarios and Generating Results



7. US Dollar Risk Model – Domestic Settlements

This section of the US Dollar (USD) risk model addresses payment, replacement cost and liquidity risks in domestic USD denominated settlements in CDSX. Section 8 deals with the cross-border settlements. The USD risk model in CDSX is based upon the equivalent components of the Canadian Dollar (CAD) risk model. There are some differences between the CAD and USD risk models resulting from the significantly lower values processed in USD as well as some of the constraints on CDS in processing USD transactions (i.e. liquidity for USD).

7.1. Payment Risk Controls

The main similarity between the CAD and USD risk models is that a Funds edit is performed on both types of transactions. The main difference in the two models is that the ACV edit is not performed on the buyer in a USD transaction (see the ACV edit section below).

7.1.1. Funds Edit

CDSX performs a Funds edit on all USD transactions, just as it does for CAD transactions. The Funds edit ensures that negative USD funds balances in a participant's Funds Account do not exceed the participant's USD cap. All USD transactions (TFT or CNS) use this USD cap. Extenders of Credit are not able to grant USD lines of credit in CDSX.

For Extenders of Credit, Settlement Agents and the Federated Participant, an option is available to "carve out" 3% of each participant's CAD cap and converting to the USD equivalent to create a USD cap in CDSX. This USD equivalent is reduced by 10% to account for foreign exchange risk due to exchange rate fluctuations between the quarterly recalculation dates. In the event of default by a member of one of these three collateral pools/credit rings, the surviving members of the collateral pool/credit ring are responsible for paying the defaulter's USD obligation to CDS.

For USD Receivers of Credit Collateral Pool (USD RCP), the formula for the calculation of USD cap is based upon the Participant's elected cap to the USD RCP as well as the total amount of caps that are elected by the participants in the USD RCP. The main features of USD-RCP are given below.

- Participation in the USD RCP is voluntary, but open to any Receiver of Credit.
- Participants in the USD RCP elect a cap (but receive no initial ACV) in the RCP.
- Participation in the USD RCP involves risk sharing with the other members of the USD RCP. Risk sharing is a means of reducing the cost of providing a cap to the members of the USD RCP.
- The RCP-generated cap may be used to cover any type of USD settlement in CDSX (i.e. CNS settlement or TFT settlement).
- The USD RCP is designed to cover the default of the participant with the largest USD RCP cap.

7.1.2. ACV Edit

In CDSX, the amount of ACV that is recorded for a participant is always denominated in CAD. When a participant buys a security for CAD, their ACV is increased by the ACV value of the purchased securities. When a participant sells a security for CAD, their ACV is decreased by the ACV value of the securities.

The ACV edit itself would not allow a purchase or sale for CAD that would cause a participant's negative funds account balance to exceed their ACV.

With US dollar transactions, the ACV edit is applied differently. When a participant buys a security for USD, their (CAD) ACV is increased by the CAD equivalent ACV of the purchased securities (if the purchased securities are targeted to one of the buyer's risk accounts such as the general account). The ACV edit itself is not applied to the USD purchase (i.e. the transaction could not fail to settle because of the ACV edit). When a participant sells a security for USD, the participant's (CAD) ACV is decreased by the CAD equivalent ACV of the securities (if the sale came out of one of the participant's risk accounts). The ACV edit could prevent this transaction from settling if the (CAD) ACV after the settlement would be less than the participant's negative Funds Account balance in CAD. Since ACV is not needed to cover USD Funds Account balances, the value of those securities purchased for USD can be used to cover CAD funds obligations. If the original purchase of the securities for USD went into one of the buying participant's non-risk accounts (such as a segregated account) then the participant's ACV would not be updated. Similarly, if the sale of the securities for CAD also came out of a non-risk account, then the ACV edit would not be applied to the CAD sale of the securities.

Securities purchased for USD and targeted for a risk account are added to a participant's ACV. The value that is added to the participant's ACV is based on a USD price for the security that is converted to CAD using a CAD/USD exchange rate. Sales of securities, for either USD or CAD are deducted from a Participant's ACV if the sale comes out of a risk account. However, positive balances of USD funds in a Participant's Funds Account do not count as ACV. This is due to the expected timing of USD payment exchange. The only scenario where positive USD Funds Account balances are used as ACV is if CDS did not pay out those USD funds before the participant paid CDS any CAD amounts owing. If that were the case, then CDS could use the USD funds owed to the participant to collateralize the CAD obligation owed by the participant. DTCC controls the timing of the USD payment exchange process. Therefore, USD funds could already have been paid to the participant before CDS knew whether or not the participant was going to pay their CAD obligation. If the participant defaulted on their CAD obligation, CDS would no longer have the participant's USD funds to use as "collateral". For this reason, positive USD Funds Account balance does not count as ACV.

7.2. Replacement Cost Risk Controls

The replacement cost risk controls applied to domestic USD transactions in CNS are the same as those applied to CAD transactions. The controls take into account the foreign exchange risk when processing transactions (explained below).

7.3. Liquidity Risk Controls

The liquidity risk controls applied to domestic USD transactions are the same as those applied to CAD transactions.

7.4. Foreign Exchange Risk for Securities Priced in US Dollars

A number of securities used for ACV and that make up outstanding positions in CNS are priced in USD. As a result, in addition to the market price risk associated with these securities, there is the potential for losses resulting from fluctuations in the CAD and USD exchange rate. To account for foreign exchange risk for securities priced in USD, IRMS adds a foreign exchange factor to the risk calculation and haircut rate for USD priced securities. The foreign exchange risk is calculated by using the largest standard deviation of one-day price change of CAD/USD exchange rate over the most recent 20, 90, 260 and TTC period and multiplying it by 2.33 to scale the volatility measure to 99% confidence level.

8. US Dollar Risk Model - Cross-Border Services

CDS offers two cross-border services, DTC Direct Link (DDL) and New York Link (NYL), which provide participants with the ability to settle USD transactions at the Depository Trust and Clearing Corp. (DTCC) in New York.

8.1. DTC Direct Link (DDL)

Through DDL, participants are sponsored by CDS for membership in DTC only. Just as CDS is the central depository for Canadian securities, DTC is the central depository for U.S. securities providing custodial and settlement services for its members. DDL differs from NYL in that DDL members conduct trading activity exclusively on a trade-for-trade (TFT) basis.

8.2. New York Link (NYL)

New York Link (NYL) has two primary components:

- trade clearing and settlement services through National Securities Clearing Corporation (NSCC).
- access to custodial and settlement services offered by the Depository Trust Company (DTC).

NYL allows CDS participants to become sponsored members of NSCC and DTC (subsidiaries of DTCC), thus enabling them to clear and settle over-the-counter (OTC) trades made with U.S. broker/dealers. As a sponsored member, a CDS participant has all the privileges of direct membership in the two organizations. NYL differs from DDL as NYL members, while able to trade on a trade-for-trade (TFT) basis, conduct the majority of their transactions on a continuous net settlement (CNS) basis.

8.3. DTC Direct Link Participant Funds

As sponsored members, participants using the DDL service are required to pledge collateral to DTC based on requirements calculated by DTC. In addition, participants are required to pledge collateral to CDS to support liquidity requirements in case a participant fails to honor their settlement obligation in CDS's DDL service. Each participant using the DDL service indemnifies CDS for all of CDS's obligations to DTC in respect of any cross-border claims, obligation to deliver securities, to make payments or to contribute to any funds of DTC. Since settlements occur in DTC (and not in CDSX), the system risk controls for DDL are not part of CDSX.

DDL participants contribute to the following two participant funds:

- DTC Participant Fund for DTC Direct Link (administered by DTC)
- CDS Participant Fund for DTC Direct Link (administered by CDS)

8.3.1. DTC Participant Fund for DTC Direct Link

DTC Direct Link participants must contribute to a participant fund administered by DTC to support liquidity requirements if a participant fails to honor their settlement obligations.

DTC calculates the participant fund requirement daily and obtains payment by same-day settlement through Fedwire. If an increased contribution is not delivered by the specified deadline, the participant may be subject to suspension from CDS.

A minimum USD 10,000 initial contribution is required from each participant, with subsequent fund requirements fluctuating in accordance with each participant's trading activities. Participants must send their initial cash contribution to CDS by sending a payment in U.S. funds through Fedwire. DTC assesses participants' trading activities on a daily basis and informs both CDS and the participant if an additional contribution is required. This is done in writing at least two business days before the due date and is charged directly as part of the participant's settlement. Each quarter, DTC informs CDS and the participant if they have excess contributions. Upon request, excess contributions are returned as part of daily settlement.

8.3.2. CDS Participant Fund for DTC Direct Link

The CDS participant fund for DTC Direct Link covers the risk of default for the DDL participant with the largest payment obligation to DTC. In a default situation, CDS must pay DTC the amount owed by the DDL participant by the end-of-day.

Participants are notified of their collateral requirements on a quarterly basis. Collateral requirements may be satisfied by delivering the collateral to CDS in the form of the eligible collateral and within the collateral limits. If an increased contribution is not delivered by the specified deadline, the participant may be subject to suspension from CDS.

CDS will update collateral requirements for CDS participant fund for DTC Direct Link on a quarterly basis as follows:

1. Each DDL participant is allocated DTC net debit cap by CDS. The maximum net debit cap allocated to a DDL participant or DDL participant family is USD \$10 million. DDL participants are able to elect a zero DTC net debit cap, which would enable them to reduce their collateral requirement to zero. However, as a consequence of having zero DTC net debit cap, they would be required to pre-fund their DTC settlements. DDL participants can only adjust their CDS allocated DTC net debit cap on a quarterly basis. As part of the quarterly process, each DDL participant informs CDS in writing if any changes are required to the amount of their CDS allocated DTC net debit cap at least 10 business days before the end of the quarter. In case of an increase in the DTC net debit cap, CDS may require the DDL participant to provide information, such as the reasons for the increase, pre-funding incidents and a business plan.
2. To calculate the collateral requirements for each DDL participant, CDS calculates the leverage factor as follows:

$$\text{Leverage Factor} = \frac{\text{Total of all DDL participants' allocated DTC net debit caps}}{\text{Largest CDS allocated individual DTC net debit cap}}$$

3. CDS calculates each DDL participant's required collateral requirement as follows:

$$\text{Individual participant's required collateral} = \frac{\text{CDS allocated DTC net debit cap}}{\text{Leverage factor}}$$

The aggregate value of the DTC settlement component must be equal to the maximum individual DTC net debit cap.

8.4. New York Link Participant Funds

As a member of NSCC and DTC, CDS is obligated to make contributions to funds established by NSCC and DTC. As sponsored members, participants using the NYL service are required to pledge collateral to CDS based on collateral requirements calculated by NSCC and DTC. In addition, participants are required to pledge collateral to CDS to support liquidity requirements in case a participant fails to honor their settlement obligation in CDS's NYL service. Each participant using the NYL service indemnifies CDS for all of CDS's obligations to NSCC and DTC in respect of any cross-border claims, obligation to deliver securities, to make payments, to pay marks or to contribute to any funds of NSCC or DTC. Since settlements occur in NSCC and DTC (and not in CDSX), the system risk controls for NYL are not part of CDSX.

NYL participants contribute to the following three participant funds:

- NSCC Participant Fund for New York Link (administered by NSCC and CDS)
- DTC Participant Fund for New York Link (administered by DTC)
- CDS Participant Fund for New York Link (administered by CDS)

8.4.1. NSCC Participant Fund for New York Link

NSCC applies risk-based margining (RBM) methodology (explained later in this section) to participant accounts that are sponsored by CDS into NSCC. NSCC calculates each participant's RBM requirement daily. All participant fund requirements must be satisfied in the form of U.S. funds (through Fedwire).

A minimum USD 10,000 initial contribution is required from each participant. Participants must send their initial cash contribution to CDS by sending a payment in US funds through Fedwire. Participants are notified of any additional participant fund requirements by 8:00 a.m. EST daily. Additional participant fund requirements are satisfied by delivering a contribution to CDS in the form of USD cash collateral. The provision of collateral must be completed before collateral deadlines as outlined in the CDS procedures. If the required additional contribution is not received by CDS by the specified deadline, the participant may be subject to suspension from CDS. For Canadian holidays in which NSCC and DTC (including Fedwire) are open, CDS participants are required to pledge any additional collateral in the normal manner.

Participants must submit a written request to CDS to withdraw excess cash contributions. Participants may request excess pledged contributions be released prior to the collateral deadline through the Collateral Management Group.

8.4.2. DTC Participant Fund for New York Link

New York Link participants must also contribute to a participant fund administered by DTC. DTC calculates the participant fund requirement daily and obtains payment by same day settlement through Fedwire. If an increased contribution is not delivered by the specified deadline, the participant may be subject to suspension from CDS.

A minimum USD 10,000 initial contribution is required from each participant, with subsequent fund requirements fluctuating in accordance with each participant's trading activities. Participants must send their initial cash contribution to CDS by sending a payment in U.S. funds through Fedwire. DTC assesses participants' trading activities on a daily basis and informs both CDS and the participant if an additional contribution is required. This is done in writing at least two business days before the due date and is

charged directly as part of the participant's settlement. Each quarter, DTC informs CDS and the participant if they have excess contributions. Upon request, excess contributions are returned as part of daily settlement.

8.4.3. CDS Participant Fund for New York Link

New York Link participants must also contribute to a participant fund administered by CDS. Participants are notified of their collateral requirements on a quarterly basis. Collateral requirements may be satisfied by delivering the collateral to CDS in the form of eligible collateral and within the collateral limits. If CDS does not receive the required collateral contribution by the specified deadline, the participant may be subject to suspension from CDS.

The CDS participant fund for New York Link will be made up of the following components:

- DTC settlements component
- NSCC settlements component

DTC Settlements Component

The DTC settlements component of the CDS participant fund for New York Link covers the risk of default for the NYL participant with the largest payment obligation to DTC. In a default situation, CDS must pay DTC the amount owed by the NYL participant by the end-of-day.

CDS will update the DTC settlements component requirements on a quarterly basis as follows:

1. Each NYL participant is allocated a DTC net debit cap by CDS. The maximum net debit cap allocated to a NYL participant or NYL participant family is USD \$20 million. NYL participants are able to elect a zero DTC net debit cap, which would enable them to reduce their DTC settlements component amount to zero. However, as a consequence of having zero DTC net debit cap, they would be required to pre-fund their DTC settlements. NYL participants can only adjust their CDS allocated DTC net debit cap on a quarterly basis. As part of the quarterly process, each NYL participant informs CDS in writing if any changes are required to the amount of their CDS allocated DTC net debit cap at least 10 business days before the end of the quarter. In case of an increase in the DTC net debit cap, CDS may require the NYL participant to provide information, such as the reasons for the increase, pre-funding incidents and a business plan.
2. To calculate the DTC settlements component for each NYL participant, CDS calculates the leverage factor as follows:

$$\text{Leverage Factor} = \frac{\text{Total of all NYL participants' allocated DTC net debit caps}}{\text{Largest CDS allocated individual DTC net debit cap}}$$

3. CDS calculates each NYL participant's required DTC settlements component collateral contribution as follows:

$$\text{Individual participant's required collateral} = \frac{\text{CDS allocated DTC net debit cap}}{\text{Leverage factor}}$$

The aggregate value of the DTC settlement component collateral must be equal to the maximum individual DTC net debit cap.

NSCC Settlements Component

Unlike DTC, where an individual participant's payment obligation is capped by the DTC net debit cap, NSCC does not cap an individual participant's payment obligation. Therefore, CDS estimates an individual participant's NSCC payment obligations within a pre-determined confidence level.

The NSCC settlements component of the CDS participant fund for NYL covers the risk of default for the NYL participant with the largest payment obligation to NSCC within the pre-determined confidence level. In a default situation, CDS must pay NSCC the amount owed by the NYL participant by the end-of-day.

CDS updates the NSCC settlements component requirements on a quarterly basis as follows:

1. CDS calculates the amount and number of instances in which each NYL participant owed money to NSCC during the preceding quarter.
2. CDS compares these amounts and numbers to the total amounts and number of instances in which all NYL participants' owed money to NSCC during the preceding quarter.
3. CDS calculates the NSCC settlements component for each NYL participant given the pre-determined confidence level.

8.4.4. New York Link Liquidity Risk Waterfall

The liquidity risk associated with a defaulting NYL participant is the amount of its payment obligation. NSCC settlements for NYL participants are not subject to a cap as is the case for DTC settlements²⁰. As a result, there is no limit to the size of a payment obligation of a defaulting NYL participant resulting from their NSCC settlements.

CDS would cover its liquidity exposure through a 4 step waterfall – as follows:

1. Apply the defaulter's USD CDSX credits to reduce the NYL payment obligation
2. Use CDS's existing USD 400 million LOC
3. Any remaining liquidity requirement not covered by CDS's LOC would be transferred to NYL participants as follows:
 - a) Allocate against surviving NYL participants as a haircut to their credits based on each NYL participant's pro-rata share of total credits
 - b) Allocate the defaulter's CAD credits to the surviving NYL participants
4. Any remaining liquidity shortfall would be managed via a same-day cash call on surviving CDS sponsored NYL participants.

²⁰ Net Debit Cap: DTC settlements in a participant's account are subject to a limit on the amount of the participant's payment obligation (the "net debit cap" assigned to the account) and are also subject to collateralization (the "collateral monitor") based on the haircut value of the securities in the participant's account. As a result, the credit risk associated with the default of a participant's DTC settlements is contained and mitigated.

8.5. Soft Cap Mechanism for NYL Service

Since NSCC payment obligations are not capped, there is a possibility that an individual NYL participant's net payment obligations to DTCC (NSCC and DTC combined) exceed the lines of credit available to mitigate the payment risk. The CDS participant fund for New York Link is designed to cover the default of an NYL participant with the largest net payment obligation to DTCC in most cases. As such, CDS monitors NYL participant's net payment obligations to DTCC to see if they exceed a pre-defined threshold or soft cap.

The soft cap is calculated as follows:

- Total Available CDS Liquidity Facility
- Less: Liquidity Facility Required for CAD RCP
- Less: Liquidity Facility Required for USD RCP
- Less: Liquidity Facility Required for DDL service
- Equal: Soft Cap for NYL service (in USD)

NYL participants are required to monitor and manage their daily payment obligations to DTCC such that their individual net payment obligations to DTCC do not exceed the soft cap. Participants may need to pre-fund their settlements in DTCC to ensure that their end-of-day payment obligations do not exceed the soft cap. CDS imposes a fixed and variable fee in the event that an individual NYL participant's end-of-day net payment obligation to DTCC exceeds the soft cap.

Fixed CDS imposes a fee of USD 1,000 per incident for up to 4 incidents in a rolling 12-month period. The fee is increased to USD 10,000 per incident for a participant breaching the soft cap more than 4 times during the rolling 12-month period.

Variable The variable fee is applied to every instance that a participant exceeds the soft cap

This fee is calculated as follows: The amount that a participant has exceeded the soft cap by is multiplied by the overnight cost of borrowing and divided by 365. The daily variable fee is calculated based on the number of calendar days (e.g., breaches occurring over a normal weekend would be counted as two calendar days) of non-compliance

Similar to domestic CCP cap breach, CDS reports all soft cap breaches to the participant's primary regulator. CDS also reports soft cap breaches to other New York Link service participants once a participant breaches the soft cap more than four times over a rolling 12 month period.

8.6. Risk Controls at DTC and NSCC

Although the risk controls in CDS's cross-border services are not part of CDSX, it is important to describe how DTC and NSCC control their settlement risk exposure from each participant. The mechanism is summarized below:

8.6.1. Net Debit Cap

The net debit cap is a risk control mechanism used by DTC to limit its settlement risk exposure from each participant. The net debit cap sets the maximum limit for each participant's net debit at DTC.

Transactions creating net debit requirements that exceed the participant's net debit cap can only be settled at DTC by pre-funding the account using Fedwire payments.

CDS is responsible for allocating its net debit cap at DTC to each of the sponsored participants in the DTC Direct Link and New York Link services based on their net debit requirements at DTC.

DTC recalculates each participant's net debit cap daily and the cap automatically increases or decreases relative to the participant's average intra-day net debit peaks. This cap is referred to as the system generated net debit cap. The actual net debit cap applied by DTC to each participant is the lower of the net debit cap allocated by CDS and the system generated net debit cap.

CDS allocates a net debit cap of no more than USD 20 million per participant (including family members) for NYL participants, and no more than USD 10 million per participant (including family members) for DDL participants across the cross-border services. While DTC's system generated net debit cap fluctuates daily, the net debit cap allocated by CDS remains unchanged.

For new participants joining the cross-border services, CDS allocates an initial net debit cap of USD \$1 million unless the participant requests an alternative amount. Upon receiving a request for an increase in the net debit cap, CDS may require the DDL participant to provide information, such as the reasons for the increase, pre-funding incidents and a business plan. In addition, CDS reserves the right to increase or decrease the net debit cap at its discretion.

8.6.2. The Collateral Monitor

The collateral monitor at DTC is similar to the ACV edit in CDSX. The collateral monitor ensures that there is enough collateral in the accounts of both the seller (the deliverer) and the buyer (the receiver) to support each of their net debits. If a completed transaction will produce a net settlement debit that is not fully collateralized or exceeds the participant's net debit cap, the transaction will be automatically blocked and become pending.

8.6.3. NSCC's Clearing Fund and Risk Based Margining (RBM)

NSCC requires members to contribute collateral to a Clearing Fund to support the trade guarantee and cover their exposures with NSCC. Any net market loss on the close-out of guaranteed transactions of a defaulting member is first covered by the defaulter's contribution to the Clearing Fund plus any other collateral of the defaulter available to NSCC. Any part of the loss not covered by the defaulter's collateral is borne by NSCC's surviving members.

Contributions to the Clearing Fund are based on the Risk Based Margining (RBM) methodology. The rationale for implementing RBM is that it facilitates a more accurate determination of NSCC's risk exposure from participants' outstanding positions, as compared to the earlier activity-based model. The RBM methodology is primarily based on defaulter pay model, similar to the CDSX Risk Model. NSCC's RBM methodology takes into account a number of risk factors that are used to determine a participant's contribution to the Clearing Fund.

Volatility (Value-at-Risk Model) - The volatility of each member's net of its pending positions i.e., net positions that have not reached settlement and its fail positions (net positions that did not settle on settlement date), otherwise known as Net Unsettled Positions, is determined after taking into account offsetting pending transactions that have been confirmed and/or affirmed through an institutional delivery system.

The volatility of these positions is determined using a VaR methodology with a 99% confidence level and a three-day holding period. Price changes are exponentially weighted, so greater weight is placed on more recent price movements.

NSCC excludes Net Unsettled Positions in classes of securities whose volatility is a) less amenable to statistical analysis, such as OTC Bulletin Board or Pink Sheet issues or issues trading below a designated dollar threshold (e.g., \$5.00), or b) amenable to generally accepted statistical analysis only in a complex manner, such as municipal or corporate bonds. Contributions to the Clearing Fund for these Net Unsettled Positions in these classes of securities are determined by multiplying the absolute value of such positions by a percentage determined by NSCC. For securities in a), the percentage shall not be <10% and for securities in b), the percentage shall not be <2%.

plus

Mark-to-Market - Pending positions (i.e., outstanding positions) are marked-to-market on a daily basis.

plus

Special Charges - For volatility or lack of liquidity of any security

plus

Non-Standard Charges - For transactions processed on a shortened processing cycle (i.e., otherwise than on a three-day processing and settlement cycle)

plus

Other Charges - for CNS long and short fails

8.7. Default of NYL or DDL Participant

Each participant using NYL and/or DDL service is a member of the respective link fund credit ring supported by the participant fund/s as described above. If a participant fails to fulfill their obligations arising from their participation in a cross-border service, then each surviving member of the respective credit ring would pay their proportionate share of that obligation upon request by CDS. The members of each link credit ring have no obligation to CDS with respect to any obligation of a defaulting participant arising from that participant's use of another service or function.

8.8. U.S. Settling Bank Risk

Unlike in Canada, CDS is not able to settle transactions through the central bank (the Federal Reserve) in the United States. Therefore, CDS requires a settlement bank for settling USD domestic and cross-border transactions in the U.S. As a result, CDS is exposed to the risk that its obligations would not be settled with DTC if the settlement bank were to fail. In addition, if that bank failed CDS would be unable to access any cash deposits it may have with that bank.

8.9. Reclaims

Settlements at DTC are subject to reclaims, which have the effect of reversing previously settled transactions. Therefore, reclaims represent a material risk to participants using cross-border services. DTC has confirmed that CDS is not liable for unsettled trade-for-trade (TFT) transactions in New York Link and DTC Direct Link. Once the trades have passed the DTC risk controls and have settled, CDS is

responsible for the payment obligation for those settlements. However, reclaims are not subject to the risk controls at DTC and therefore a payment obligation resulting from a reclaim could exceed the Net Debit Cap or the Collateral Monitor controls. After analyzing the nature of reclaims and receiving feedback from participants using cross-border services, CDS concluded that the risk from reclaims against the New York Link (NYL) and DTC Direct Link (DDL) participants did not need to be collateralized as it could be adequately covered by the NYL and DDL credit rings.

9. Participant Suspension and Default Management

CDS Participant Rules outline the grounds for suspension and the process for default management. This section is a summary of the main points contained in the rules, and how a suspension is handled within each collateral pool and participant fund. During the processing of a suspension, CDS allocates the suspended participant's current payment obligation to the appropriate mechanism, which in turn is responsible for paying CDS the default amount allocated to them.

9.1. Grounds for Suspension

CDS rules divide suspension into automatic and discretionary suspension.

9.1.1. Automatic Suspension

CDS shall automatically suspend a participant if the participant fails:

- (i) to make a required payment in full at CDSX payment exchange or link payment exchange;
- (ii) to provide specific collateral, CCP collateral or cross-border specific collateral;
- (iii) to make its required contribution to a fund, a collateral pool or a Link fund;
- (iv) to pay its obligation to CDS as a surety pursuant to a line of credit; or
- (v) to pay its proportionate share, as a member of a fund credit ring, category credit ring or link fund credit ring, of the obligation of another member of that credit ring.

9.1.2. Discretionary Suspension

CDS has discretion to suspend a participant if the participant is in such financial or operating condition that its continuation as a participant would cause material disruption to the services or would jeopardize the interests of CDS or other participants. In exercising its discretion whether or not to suspend a participant, CDS may consider any information it considers relevant, including the occurrence of any of the following events:

- (i) the participant ceases to be eligible for participation in CDS or to satisfy the qualifications or standards set by the Rules;
- (ii) the participant commits a breach of the provisions of the legal documents that CDS in its discretion considers to be a material breach;
- (iii) the participant fails to settle a central counterparty obligation as and when required; or
- (iv) the registration or license of the participant has been cancelled or suspended by a regulatory body, the membership of the participant in a regulatory body that is a self-regulatory organization has been suspended or terminated, a regulatory body has taken steps to re-structure the participant, or a receiver or trustee has been appointed with respect to the participant or its assets.

9.2. Initiation of Suspension and Default Procedures

CDS initiates suspension and default procedures against a participant if they fail to fulfill any of the obligations indicated in the Participant Rules as summarized above. The same suspension and default procedures are applied regardless of the cause of the suspension. The suspension applies to both currencies although the defaulter may have an obligation to CDS in only one currency.

If a suspension is initiated against a participant, CDS does the following:

- Notifies the participant that it has been suspended from participating in all CDS services and that it will not be permitted to engage in payment exchange with CDS
- Freezes the participant's functional capabilities in CDSX such that the suspended participant cannot create further obligations in CDSX
- Notifies all other participants that the suspension and default procedure has been initiated against the suspended participant
- Initiates the appropriate suspension and default procedure for the type of participant that is suspended.

9.3. Allocating Payment Obligations of Suspended Participant

The payment obligation in CDSX of any suspended participant (i.e., extender of credit, settlement agent, federated participant or receiver of credit) must be replaced on the day of suspension. Settled transactions cannot be unwound during the processing of a suspension nor can the suspended participant's payment obligation be delayed beyond the date of suspension. On the day of suspension, an alternative source of funds must be available to replace the amount that was owed to CDS by the suspended participant. The process of determining the payment obligation amount is conducted separately for each currency in which the suspended participant has an obligation owing to CDS.

9.3.1. Allocating Positive Ledger Balances

If a participant defaults in its obligation to make payment to CDS with respect to a negative balance in the Funds Account in one ledger, and that participant has a positive balance denominated in another currency in the Funds Account in another ledger, then CDS does not allocate the positive balance to the suspended participant's designated banker nor pay the positive balance to the suspended participant.

Instead, for the purpose of determining the net obligation owed by the suspended participant, CDS may apply the positive balance in a Funds Account of the suspended participant against any negative balance denominated in the same currency in any other funds account of the suspended participant. If the suspended participant has more than one Funds Account with a negative balance, then the positive balance shall be allocated to reduce the negative balances denominated in the same currency on a *pro rata* basis.

9.3.2. Allocating Partial Payments

To determine the net obligation owed by the suspended participant, CDS may apply any partial payment made directly by the suspended participant, before it was suspended, against any negative balance denominated in the same currency in any Funds Account of the suspended participant. If a partial payment was made by a designated banker through the Book Entry Payment Method (BEPM) that partial payment shall be returned to the designated banker. If the partial payment was made by a qualified banker through BEPM with respect to the suspended participant's use of a line of credit, that partial payment shall be allocated by CDS to discharge the liability of the qualified banker as surety and accordingly shall be applied against the negative balance in the Funds Account for which that line of credit was established.

9.3.3. Allocating Suspended Participant's Payment Obligation Amount

Once CDS has determined the amount of the suspended participant's obligation that must be replaced, individual portions of the suspended participant's payment obligation amount are allocated to the

various risk containment mechanisms. The allocation of the payment obligation amount is done as follows:

- Amounts drawn under a cap—Survivors in the suspended participant’s collateral pool and category credit ring that generated the cap
- Amounts drawn under a line of credit—Suspended participant’s extender(s) of credit
- Mark-to-market payments—Survivors in the suspended participant’s CCP participant fund(s)
- Other amounts that exceed the cap or line of credit—Survivors in the suspended participant’s collateral pool and category credit ring (or the non-contributing credit ring).

9.4. Collateral

There are several sources of collateral that can be obtained for use during the processing of a suspension in CDSX. Part of this collateral comes from the suspended participant and part from the suspended participant’s collateral pool or CCP participant fund.

The types of collateral that may be used in a CDSX suspension are:

- Suspended participant’s settlement service collateral - The securities and funds in the suspended participant’s risk accounts (i.e., the general accounts and restricted collateral accounts). This type of collateral is also known as the ACV collateral since the purpose of the ACV edit is to ensure that this collateral is available and in place in the event of a suspension.
- Suspended participant’s collateral pool contributions - The securities pledged by the suspended participant to a collateral pool supporting a category credit ring.
- Suspended participant’s CCP participant fund contributions - The securities pledged by the suspended participant to a CCP participant fund.
- Suspended participant’s specific collateral - The securities that have been pledged by the suspended participant to CDS as specific collateral. CDS may require a participant to pledge specific collateral if CDS determines that a participant’s activities present extra risks to CDS and the other participants that may not be covered by the normal risk containment mechanisms. For example, CDS may require specific collateral from a participant if the participant has breached CCP cap.
- Survivors’ collateral pool contributions - The securities pledged by the other members of a suspended participant’s collateral pool and category credit ring.
- Survivors’ CCP participant fund contributions - The securities pledged by the other members of a suspended participant’s CCP participant fund.

9.4.1. Collateral Sequence

The sequence in which the collateral is used is designed to ensure that there is no spill-over of risk between the various risk containment mechanisms. For example, the payment obligations that are covered by a collateral pool are never transferred to an extender of credit. Each type of collateral has a primary use.

Table 7 – Sources and Uses of Collateral – Receiver of Credit Default

Source of Collateral	Primary Use	Sequence of Secondary Use
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Table 7 – Sources and Uses of Collateral – Receiver of Credit Default

Source of Collateral	Primary Use	Sequence of Secondary Use
Defaulter's ACV Collateral	Extenders of credit (if any).	Any remaining collateral goes next to the survivors of the RCP in either currency (if the defaulter was a member of that collateral pool). Any excess is used by CDS to mitigate other losses.
Defaulter's collateral pool contribution (if any)	Survivors of the collateral pools of which the defaulter was a member.	Any remaining collateral goes next to the defaulter's extenders of credit (if necessary). Any remaining collateral goes to CDS to mitigate other losses.
Defaulter's CCP participant fund contributions (if any)	Survivors of the CCP participant fund.	Any remaining collateral goes to CDS to mitigate other losses.
Defaulter's specific collateral	Survivors of the CCP participant fund or collateral pool for which the specific collateral was required.	Any excess specific collateral is shared pro-rata by the defaulter's extenders of credit (if any) and the survivors of the collateral pools of which the defaulter was a member.
Survivors' collateral pool contributions	Survivors of the collateral pool.	This type of collateral is never used for any other purpose.
Survivors' CCP participant fund contributions	Survivors of the CCP participant fund.	This type of collateral is never used for any other purpose.

Table 8 – Sources and Uses of Collateral – Non-Receiver Default (Extender of Credit, Settlement Agent, Federated Participant)

Source of Collateral	Primary Use	Sequence of Secondary Use
Defaulter's ACV Collateral	Survivors of the collateral pool.	Any remaining collateral goes next to the defaulter's extenders of credit (if any). Any excess is used by CDS to mitigate other losses.
Defaulter's collateral pool contribution (if any)	Survivors of the collateral pool.	Any remaining collateral goes next to the defaulter's extenders of credit (if any). Any excess is used by CDS to mitigate other losses.
Defaulter's CCP participant fund contributions (if any)	Survivors of the CCP participant fund.	Any remaining collateral goes to CDS to mitigate other losses.
Defaulter's specific collateral	Survivors of the CCP participant fund or collateral pool for which the specific collateral was required.	Any excess specific collateral is shared pro-rata by the defaulter's extenders of credit (if any) and the survivors of the collateral pool of which the defaulter was a member.
Survivors' collateral pool contributions	Survivors of the collateral pool.	This type of collateral is never used for any other purpose.
Survivors' CCP participant fund contributions	Survivors of the CCP participant fund.	This type of collateral is never used for any other purpose.

In cases where there is excess collateral available from the suspended participant, the use of this excess collateral is also specified. For example, collateral pledged to the CNS participant fund must first be used to cover any CNS mark-to-market amounts of the suspended participant and any losses generated by the close-out of the suspended participant's CNS outstanding positions. After these two items have been addressed, any excess amounts of CNS collateral from the suspended participant itself would be used by CDS to mitigate other losses.

9.4.2. Collateral Administration Ledgers

CDS maintains collateral administration ledgers for each participant and for CDS. These ledgers hold all of the collateral pledged by the participant for various purposes (i.e., collateral pool contributions, CCP participant fund contributions, specific collateral). During the processing of a suspension, the suspended participant's settlement service collateral is first moved to CDS's collateral administration ledger and then to the collateral administration ledgers of other participants.

The extenders of credit, the survivors in the suspended participant's collateral pool and the survivors in the suspended participant's CCP participant fund are entitled to use their share of the suspended participant's own collateral to make their replacement payment to CDS.

In the case of the CCP participant funds, CDS initially retains the collateral in its own collateral administration ledger for use in obtaining the liquidity to make the replacement payment(s).

In the case of the extenders, collateral is moved first to the lead extender (appointed by the other extenders) and then to the other surviving extenders. In the case of the settlement agents, collateral is moved pro rata to the surviving settlement agents based on each survivor's replacement payment. In the case of the federated participant, collateral is moved to the collateral administration ledger of the replacement federated participant. In the case of the receiver's collateral pool, CDS initially retains the collateral in its own collateral administration ledger for use in obtaining the liquidity to make the replacement payment(s).

9.5. Processing Suspension

In the event that a participant fails to pay their payment obligation to CDS (or if some other failure causes CDS to invoke the suspension and default procedures) and CDS has exhausted all of the escalation procedures, the following occurs for all types of suspensions:

1. CDS convenes the Default Management Group (DMG), which is responsible for suspending the participant from all CDS services and functions.
2. CDS notifies all participants that the suspension and default procedures have been initiated against the participant.
3. CDS immediately moves all of the suspended participant's settlement service collateral from their risk accounts to CDS's collateral administration ledger.
4. CDS calculates the suspended participant's obligation to CDS.
5. CDS determines the portion of the suspended participant's obligation that is the responsibility of each extender of credit, collateral pool, category credit ring survivor, CDS' Dedicated Own Resources and central counterparty participant fund survivor.

9.5.1. Processing an Extender of Credit Suspension

To process suspension of an Extender of Credit:

1. The surviving Extenders appoint the Lead Extender who is responsible to make replacement payment of the suspended Extender.
2. CDS requests a replacement payment from the Lead Extender equal to the suspended participant's obligation to CDS.

3. For each CCP service the suspended participant is a member of, CDS arranges for a replacement payment equal to the mark-to-market payment (if any) that the participant made on the day of suspension. To obtain the necessary liquidity to make the replacement payment, CDS uses the suspended participant's own CCP participant fund contributions and any specific collateral that the suspended participant had pledged to the CCP participant fund. If necessary, the contributions of the survivors in the suspended participant's CCP participant fund are also used by CDS to obtain liquidity.

9.5.2. Processing the Federated Participant Suspension

The Federated Participant's suspension follows the same procedure as Extender of Credit suspension with an exception that the original agreement between CDS and the Federated Participant established the Replacement Federated Participant who will be responsible for payment to CDS in lieu of the suspended Federated Participant. The Replacement Federated Participant's role is similar to that of the Lead Extender of Credit.

9.5.3. Processing a Settlement Agent Suspension

To process suspension of a Settlement Agent:

1. CDS requests a replacement payment from each Extender of Credit equal to the used amount of each Extender's line of credit.
2. CDS requests a replacement payment from each surviving Settlement Agent equal to their proportionate share of the suspended Settlement Agent's obligation to CDS.
3. For each CCP service the suspended participant is a member of, CDS arranges for a replacement payment equal to the mark-to-market payment (if any) that the suspended participant made on the day of suspension. To obtain the necessary liquidity to make the replacement payment, CDS uses the suspended participant's own CCP participant fund contributions and any specific collateral that the suspended participant had pledged to the CCP participant fund. If necessary, the contributions of the survivors in the suspended participant's CCP participant fund are also used by CDS to obtain liquidity.

9.5.4. Processing a Receiver of Credit Suspension

To process a suspension of a Receiver of Credit:

1. CDS requests a replacement payment from each Extender of Credit equal to the used amount of each extender's line of credit.
2. CDS arranges for a replacement payment equal to the used amount of the suspended participant's cap (if any). To obtain the necessary liquidity to make the replacement payment, CDS uses the suspended participant's own collateral pool contributions and any specific collateral that the suspended participant had pledged to the collateral pool. If necessary, the contributions of the survivors in the suspended participant's collateral pool are also used by CDS to obtain liquidity.
3. For each CCP service the suspended participant is a member of, CDS arranges for a replacement payment equal to the unpaid mark-to-market payment (if any) that the suspended participant made on the day of suspension. To obtain the necessary liquidity to make the replacement payment, CDS uses the suspended participant's own CCP participant fund contributions and any specific collateral that the suspended participant had pledged to the CCP participant fund. If

necessary, the contributions of the survivors in the suspended participant's CCP participant fund are also used by CDS to obtain liquidity.

4. CDS moves the suspended participant's settlement service (ACV) collateral to its Surety (Extender of Credit of the suspended receiver) or to the Lead Surety (in case there are multiple Extenders, a Lead Surety is appointed by the Extenders) who are required to make payment to CDS. If there is no such surety, then CDS will provide for immediate payment of the amounts owing by the suspended Receiver by means of an advance to CDS and may use the securities of the suspended Receiver to secure such advance.

9.6. CCP Outstanding Obligations

If a suspended participant has outstanding CCP obligations (i.e., outstanding to-deliver or to-receive positions in CNS), CDS executes close-out transactions to clear these outstanding positions. For example, if the suspended participant left a CNS outstanding to-deliver position, CDS buys the securities in the market to clear the outstanding position. Similarly, if the suspended participant left an outstanding to-receive position, CDS sells the securities in the market to clear the outstanding position.

Any loss that is generated by the execution of these close-out transactions becomes an obligation of the CCP participant fund for the service in which the outstanding position originated. Any gain generated by the execution of these close-out transactions is allocated to the CCP participant fund for the service in which the outstanding position originated.

9.7. Credit Ring Obligations

Each collateral pool has a credit ring associated with it. In the event that the replacement payments owed by the collateral pool exceed the value of the collateral in the collateral pool, each member of the credit ring is responsible for paying their share of the excess obligation. In addition to paying their share of suspended participant's payment obligations, the Extenders of Credit, the Federated Participant and the Settlement Agents are also obligated to reconstitute their respective collateral pools according to the formula size defined by their individual groups. However, there is no formula size defined for the Receivers of Credit collateral pools, and therefore the Receivers are not obligated to reconstitute their pools to any prescribed size.

Each CCP participant fund has a credit ring associated with it. In the event that the replacement payments owed by the CCP participant fund exceed the value of the collateral in the CCP participant fund, each member of the credit ring is responsible for paying their share of the excess obligation. In addition to paying their share of suspended participant's payment obligations, the members of the CCP services are also obligated to reconstitute their respective participant funds although CDS allows CCP services members to withdraw from the respective service through the CCP withdrawal option as described in section 5.2.6.

Failure of any participant to reconstitute the collateral pool or participant fund by the specified time is a ground for automatic suspension.

10. Depository Service

CDS is the sole central securities depository (CSD) in the Canadian market. CDS holds eligible securities²¹ on behalf of participants and maintains appropriate ledgers through its depository service. A participant may deposit securities into or withdraw securities from the depository service. CDS also receives entitlements²² on the securities held by CDS on behalf of participants and credits their account upon receipt.

10.1. Deposit of Securities

A participant deposits eligible securities into the depository service by requesting deposit to its ledger and taking necessary steps as set out in procedures and user guides. Upon deposit confirmation, CDS gives value to the participant depositing securities by crediting the participant's Securities account²³ and permitting the deposited securities to be held in the depository service and made available for transactions in the settlement service.

10.2. Withdrawal of Securities

A participant withdraws eligible securities from the depository service by requesting a withdrawal from its ledger and taking steps as set out in procedures and user guide. Withdrawal of securities prior to payment exchange must satisfy the ACV edit. Upon receiving request of withdrawal, CDS debits the participant's Securities account and credits the participant's Withdrawal account. Securities credited to a Withdrawal account are held for the participant, but the participant cannot effect any transactions affecting such securities. Upon withdrawal confirmation, CDS debits the securities from the Withdrawal account of the participant and making the securities available in accordance with instructions of the withdrawing participant. At any time, CDS may compel a participant to withdraw all or any quantity of a security held for it, if CDS considers it necessary or desirable to do so.

10.3. Entitlements Processing

CDS receives entitlements on the securities held by CDS on behalf of participants to whose account the securities are credited. CDS maintains entitlements ledgers in its own name for the management and control of the processing of entitlements on securities. CDS controls and administers each entitlements ledger and has sole control and possession of the securities and funds credited to the accounts of an entitlements ledger.

A participant, acting in its capacity as the issuer of the security, the agent of the issuer or the entitlements processor, may distribute an entitlement to CDS in the form of a payment of money or another security that is itself eligible for the depository service. On the distribution of an entitlement on

²¹ The Board of Directors of CDS determines the classes of securities that may be eligible for the depository service and the classes of securities for which transactions may be processed in particular services or functions.

²² Entitlements (also known as corporate actions or events) include dividends, interest, payment upon redemption or maturity of securities and other events involving payments or distributions to holders of securities. Entitlements may be distributed in the form of payment of money or a distribution of securities or other property. Securities entitlements include stock dividends, dividends in kind, and securities issued on the subdivision, consolidation or conversion of securities held for participant.

²³ Securities accounts include General account, Segregated account and RSP account. See Appendix 5 for details of accounts.

a security held for a participant in the form of a payment of money, the amount of the entitlement is credited to the funds account of the CDS entitlements ledger. Then the proportionate amount of the entitlement due with respect to securities held in the participant's ledger is debited from CDS' entitlements funds account and credited to the funds account or collateral account for that ledger (depending on the account in which the securities for which the entitlement is distributed are held), or, in the circumstances set out in the Procedures and User Guide, paid to the participant by means of an acceptable payment. On the distribution of an entitlement on a security held for a participant in the form of another security that is itself eligible for the depository service, the entitlement securities are credited to a securities account in a CDS entitlements ledger when the entitlement securities are delivered to CDS. The proportionate quantity of entitlement securities due with respect to the securities held in the participant's ledger is debited from CDS's entitlements securities account and credited to the securities account or collateral account for that ledger (depending on the account in which the securities for which the entitlement is distributed are held).

10.3.1. Entitlement Adjustments for CCP Obligations

If an entitlement is processed in respect of the security to be delivered under a CNS obligation, then the security becomes temporarily ineligible for CNS to facilitate the processing of the entitlement. In such a case, CDS converts the CNS trade into TFT trade. As a result, the outstanding CNS trade converted into a TFT mode is settled between the participants.

10.3.2. Conversion of Entitlement Cheques into LVTS Payment

CDS has a bank account with each Financial Institution (FI) on which the entitlement cheques can be drawn. Once CDS receives a cheque for the entitlement payment, CDS deposits the cheque with the FI, which in turn replaces the cheque with irrevocable LVTS funds by either funds debit with CDSX, funds transfer to CDS' Entitlements Funds account or an LVTS payment to CDS' account at Bank of Canada.

10.3.3. Reversal of Entitlements

CDS debits the account (Fund or Securities account) of a participant if the entitlement (whether in the form of a payment of money or securities) credited to that participant is refused, is returned through the clearing, is otherwise found not to be final, irrevocable and good payment or delivery, or if CDS is required to repay or reimburse the entitlement payment, or if CDS is required to return the entitlement securities, or if CDS has otherwise credited the account of the participant with the entitlement that is not received by CDS. If the entitlement was in the form of securities, then such debit may result in a short position.

10.3.4. ACV for Maturing Securities

Entitlement Processors are not provided ACV for maturing debt and money market securities on the date of the maturity. This is because legal certainty is required with respect to the use of the collateral for its intended purpose and there needs to be certainty that the collateral can be used to provide the necessary liquidity on the day of default in order for CDS to complete payment exchange. Entitlement Processors must therefore either collateralize maturity payments with other securities or use LVTS to make a cash deposit in CDSX to fund the maturity payment.

10.4. Risks Controls in Depository Service

Primary risks associated with CDS' depository service are as follows:

- Risk of participants depositing defective securities.
- Risk of missing voluntary event²⁴ information.
- Risk of missed actions related to voluntary instructions.
- Risk of proxies not being sent.

CDS controls these risks through the following processes:

10.4.1. Security Master File (SMF) System

All new CDSX-eligible securities are set up through CDSX Security Master File (SMF) system, which contains all relevant details about eligible securities, issuers and features (such as interest rate, interest frequencies, maturity dates etc.). The SMF is available as a database of current securities and as a daily file of updates.

10.4.2. Handling of Defective Securities

If CDS determines that securities deposited by a participant are defective securities, then CDS may take steps as it considers necessary in the best interest of CDS, including:

- Debiting the same quantity of securities from any Securities account of the depositing participant, which may result in a short position²⁵;
- Requiring the participant to grant to CDS a security interest in specific collateral in order to meet all or any part of its obligations to CDS that may arise with respect to the deposited securities;
- Requiring the participant to provide evidence of its financial ability to meet its obligations to CDS, including any obligation that may arise with respect to the deposited securities; or
- Imposing conditions on any securities of the class deposited, whether held by that participant or other participants.

10.4.3. The Entitlement System

The Entitlement System (also known as NCS Corporate Action Processing System or simply NCS) interacts with CDSX and the SMF to automate the entitlement processing of all CDSX-eligible securities. When there is an entitlement event on a CDSX-eligible security, the Entitlement System reviews participants' ledgers to determine their holdings in the security, calculates the event proceeds and releases payment for the event. Securities and/or funds are either debited from or credited to the ledger accounts of participants who are eligible to participate in the event. When there is an entitlement event, the Entitlement System reads the CDSX ledger, calculates the paying agent's obligation and the participants' proceeds, and releases the payment for the event. Payments are released automatically by the system or manually by the paying agent for the issue.

Paying agents are advised of all upcoming events for which they are responsible either through the Entitlement System or by reports. CDS starts notification of a participant's projected entitlement obligations one day prior to the payable date of the event. Depending on the event type and the

²⁴ Security holders must take an action to receive an entitlement payment on a voluntary event.

²⁵ A short position is a negative balance in a participant's Securities account. CDS may take several steps including buy-in to clear the short position as defined under Participant Rules.

security involved, these projected positions may change as a result of trade, pledge, deposit, withdrawal or adjustment transactions.

The paying agents are responsible for reconciling their entitlement payment obligations with CDS to ensure that correct payments are taken, and for managing their available ACV and funds to meet their paying agent obligations. When payable date occurs, paying agent is required to have sufficient funds and collateral (ACV) to meet payment obligations.

If there are insufficient funds or collateral (ACV) in the paying agent's ledger, the Entitlement System assigns a pending status to the payment. Paying agents must take the following actions to remove pending status to the payment:

- **Insufficient funds (cap or line of credit)** - To remove a pending status due to insufficient funds, participants must increase their cap, line of credit or funds positions by the required amount. This will trigger the entitlement settlement process to attempt payment release again or request an LVTS funds deposit.
- **Insufficient ACV** - To remove a pending status due to insufficient collateral, participants must increase their ACV by the required quantity to trigger the entitlement settlement process to attempt payment release again. For entitlement payments only, the ACV edit nets what the participant has to pay as a paying agent against what they receive as a participant. This process reduces the chances of the payment failing the ACV edit check. The netting benefit applies only if the paying agent ledger from which the participant made the payment is the same as the participant ledger into which the entitlement is paid.

Pending transactions are continually re-evaluated based on paying agent activities, and are reconsidered for settlement if their circumstances change and settlement conditions are met. Participants can also allocate an LVTS payment to a specific event or apply an LVTS funds deposit to meet payment obligations.

Appendix 1 – Extenders of Credit Collateral Pool

Extenders of Credit – System Operating Cap, Pool Amount and Pool Share Calculations before and after Default

System Operating Cap Calculation

SYSTEM OPERATING CAP CALCULATION - EXTENDERS OF CREDIT										
EXTENDERS OF CREDIT	CAPITAL	ADJUSTMENT FACTOR	RATING DISCOUNT	FORMULA AMOUNT	ACTUAL CAP (Rounded)	USD CAP Calculations			USD CAP	CAD CAP
						CDN\$ EQUIV. (3% of Elected Cap)	Exchange Rate 88.0000%	Less FX Risk 10.0000%		
Extender 1	12,111,000,000	110%	95%	12,655,995,000	12,656,000,000	379,680,000	334,118,400	33,411,840	300,706,560	12,276,320,000
Extender 2	8,777,666,555	110%	95%	9,172,661,550	9,173,000,000	275,190,000	242,167,200	24,216,720	217,950,480	8,897,810,000
Extender 3	6,555,444,333	110%	95%	6,850,439,328	6,850,000,000	205,500,000	180,840,000	18,084,000	162,756,000	6,644,500,000
Extender 4	4,333,222,111	110%	90%	4,289,889,890	4,290,000,000	128,700,000	113,256,000	11,325,600	101,930,400	4,161,300,000
	31,777,332,999		TOTALS	32,968,985,768	32,969,000,000	989,070,000	870,381,600	87,038,160	783,343,440	31,979,930,000

Pool Amount Calculation

1	Largest Cap	12,656,000,000
2	Adjustment Factor	60% / 150%
3	Adjusted Cap (1 * 2)	5,062,400,000
4	Maximum Potential Loss Factor	80.00%
5	Maximum Potential Loss (3 * 4)	4,049,920,000
6	Adjusted Maximum Potential Loss Factor	85.00%
7	Adjusted Maximum Potential Loss (5 * 6)	3,442,432,000
8	Haircut	2.10%
9	Basic Pool Amount [(5) - (7) + (7 * 8)]	680,000,000

To calculate an Extenders proportionate share of the pool amount, CDS divides each Extenders average Maximum Exposure Point (MEP)²⁶ by the total MEP averages of all Extenders. The pool share percentage for each Extender is multiplied by the basic pool amount to determine their contribution.

Pool Share Calculation

EXTENDERS OF CREDIT	AVERAGE MEP	POOL SHARE PERCENTAGE	POOL SHARE VALUE
Extender 1	2,500,000,000	35.7143%	242,857,143
Extender 2	2,000,000,000	28.5714%	194,285,714
Extender 3	1,500,000,000	21.4286%	145,714,286
Extender 4	1,000,000,000	14.2857%	97,142,857
	7,000,000,000	100.0000%	680,000,000

²⁶ Maximum Exposure Point (MEP) is the sum of the credit extended (utilized lines of credit) and funds used (negative funds) by each Extender calculated on daily basis. A 65-day average is calculated for loss-sharing purposes in the above formula.

Assume that the Extender of Credit with the largest cap defaults for an amount equal to its cap. The defaulting Extender is removed from the SOC calculation spreadsheet and the new highest cap is determined. In the example below, the largest cap is now CAD 9.17 billion.

System Operating Cap Calculation – After Default of Extender with Largest Cap

EXTENDERS OF CREDIT	CAPITAL	ADJUSTMENT FACTOR	RATING DISCOUNT	FORMULA AMOUNT	ACTUAL CAP (Rounded)	USD CAP Calculations			USD CAP	CAD CAP
						CDN\$ EQUIV. (3% of Elected Cap)	ExchangeRate 88.0000%	Less FX Risk 10.0000%		
Extender 1	12,111,000,000	110%	95%	12,655,995,000	0	0	0	0	0	0
Extender 2	8,777,666,555	110%	95%	9,172,661,550	9,173,000,000	275,190,000	242,167,200	24,216,720	217,950,480	8,897,810,000
Extender 3	6,555,444,333	110%	95%	6,850,439,328	6,850,000,000	205,500,000	180,840,000	18,084,000	162,756,000	6,644,500,000
Extender 4	4,333,222,111	110%	90%	4,289,889,890	4,290,000,000	128,700,000	113,256,000	11,325,600	101,930,400	4,161,300,000
	31,777,332,999			32,968,985,768	20,313,000,000	609,390,000	536,263,200	53,626,320	482,636,880	19,703,610,000

Pool Amount Calculation – After Default of Extender with Largest Cap

1	Largest Cap	9,173,000,000
2	Adjustment Factor	60% / 150%
3	Adjusted Cap (1 * 2)	3,669,200,000
4	Maximum Potential Loss Factor	80.00%
5	Maximum Potential Loss (3 * 4)	2,935,360,000
6	Adjusted Maximum Potential Loss Factor	85.00%
7	Adjusted Maximum Potential Loss (5 * 6)	2,495,056,000
8	Haircut	2.10%
9	Basic Pool Amount [(5) - (7) + (7 * 8)]	493,000,000

The survivors must pay CAD 12.656 billion (payment obligation of the defaulter, which is assumed to be equal to its cap) to CDS through CDS's Bank of Canada account in order to complete payment exchange.

Survivors' Payment Obligation Calculation after Default

EXTENDERS OF CREDIT	AVERAGE MEP	NEW POOL SHARE	POOL SHARE PERCENTAGE	DEFAULTER'S OBLIGATION PAYABLE
Extender 1	-	-	-	-
Extender 2	2,000,000,000	219,111,111	44.4444%	5,624,888,889
Extender 3	1,500,000,000	164,333,333	33.3333%	4,218,666,667
Extender 4	1,000,000,000	109,555,556	22.2222%	2,812,444,444
	4,500,000,000	493,000,000	100.0000%	12,656,000,000

The following assumptions are made in determining the residual loss:

- There is no cash collateral available, as all pool collateral requirements were met using Government of Canada bonds and treasury bills.
- The survivors contributed additional collateral to cover the new pool collateral requirements to reconstitute the collateral pool to the new calculated pool size.
- Defaulter's ACV consists of Initial ACV (equal to the total value of its collateral requirement to the pool) and ACV consisting of securities in defaulter's risk accounts with assumed average haircut of

10%. There is a 15% total market value decline in the defaulter's ACV, which means a 5% net decline in the market value of the ACV.

- There is a 5% net decline in defaulter's as well as survivors' collateral pool contributions.

In addition to reconstituting the pool, the total loss covered by the survivors is CAD 632 million, out of which CAD 468 million is covered through the survivors' original collateral pool contributions and the residual loss of CAD 164 million is shared by the survivors in the proportion given below.

1. Default = Highest Cap = Initial ACV + ACV	12,656,000,000
2. Initial ACV = Collateral Pool before Default	242,857,143
3. Haircut Adjusted ACV in Defaulter's Risk Accounts (1 - 2)	12,413,142,857
4. 5% Net Market Decline in ACV (3 * 5%)	(620,657,143)
5. Market Value of Defaulter's ACV Liquidated = (3 - 4)	11,792,485,714
6. Residual Loss to be Covered (1 - 5)	863,514,286
7. Defaulter's Collateral Pool Contribution	242,857,143
8. 5% Net Market Decline in Defaulter's Collateral (7 * 5%)	(12,142,857)
9. Market Value of Defaulter's Collateral Liquidated (7 - 8)	230,714,286
10. Total Loss to be Covered by Survivors (6 - 9)	632,800,000
11. Survivors' Collateral Pool Contribution = Total New	493,000,000
12. 5% Net Market Decline in Pool Collateral (11 * 5%)	(24,650,000)
13. Market Value of Survivors' Collateral Liquidated (11 - 12)	468,350,000
14. Total Loss to be Funded (10 - 13)	164,450,000

Pool Share/Residual Loss Share Calculation after Default

EXTENDERS OF CREDIT POOL SHARE/RESIDUAL LOSS SHARE CALCULATION AFTER DEFAULT					
EXTENDERS OF CREDIT	AVERAGE MEP	NEW POOL SHARE	ORIGINAL POOL SHARE	MARKET VALUE LIQUIDATED	LOSS TO BE FUNDED
Extender 1	-	-	242,857,143	12,023,200,000	-
Extender 2	2,000,000,000	219,111,111	194,285,714	208,155,556	73,088,889
Extender 3	1,500,000,000	164,333,333	145,714,286	156,116,667	54,816,667
Extender 4	1,000,000,000	109,555,556	97,142,857	104,077,778	36,544,444
	4,500,000,000	493,000,000	680,000,000	12,491,550,000	164,450,000

Appendix 2 - Settlement Agents Collateral Pool

Settlement Agents – System Operating Cap, Pool Amount and Pool Share Calculations before and after Default

System Operating Cap Calculation

SYSTEM OPERATING CAP, COLLATERAL REQUIREMENT AND INITIAL ACV CALCULATIONS										
SETTLEMENT AGENTS										
SETTLEMENT AGENTS	Elected/Available SOC ¹ (\$CM)	USD CAP Calculations			USD CAP	CAD CAP	Pool Collateral Share Contribution ² (C\$M)	Ratings Discount Applied to Collateral Requirement (%)	Pool Collateral Requirement (C\$M)	"Initial ACV" ³ (C\$M)
		CDN\$ EQUIV. (3% of Elected Cap)	Exchange Rate (USD/CAD)	Less FX Risk						
			0.88	10.0000%						
Settlement Agent 1	150,000,000	4,500,000	3,960,000	396,000	3,564,000	145,500,000	6.2%	100%	15,495,868	15,495,868
Settlement Agent 2	300,000,000	9,000,000	7,920,000	792,000	7,128,000	291,000,000	12.4%	95%	30,991,736	29,442,149
Settlement Agent 3	800,000,000	24,000,000	21,120,000	2,112,000	19,008,000	776,000,000	33.1%	80%	82,644,628	66,115,702
Settlement Agent 4	170,000,000	5,100,000	4,488,000	448,800	4,039,200	164,900,000	7.0%	95%	17,561,983	16,683,884
Settlement Agent 5	1,000,000,000	30,000,000	26,400,000	2,640,000	23,760,000	970,000,000	41.3%	95%	103,305,785	98,140,496
	2,420,000,000	72,600,000	63,888,000	6,388,800	57,499,200	2,347,400,000	100.0%	TOTALS	250,000,000	225,878,099
Percentage of Maximum "Available SOC" use to calculate "Total Pool										
	25%									
Maximum "Available SOC"										
	1,000,000,000									
Total Pool Collateral Requirement										
	250,000,000									
1. Settlement Agents can choose from the Maximum Available SOC as determined by the S.A. CCR members. In this example the election can be less than or equal to C\$1,000 M.										
2. The percentage pool share contribution is defined as a percentage of the total SOC elected by the members of the pool.										
3. Equal to the "Pool Collateral Requirement" scaled down by the "Ratings Discount Applied to Collateral Requirement or Initial ACV"										

Pool Amount Calculation

SETTLEMENT AGENTS POOL CALCULATION	
1. Largest Elected Cap	1,000,000,000
2. Percentage of Maximum "Available SOC" use to calculate "Total Pool Collateral"	25%
3. Basic Pool Amount [(1) * (2)]	250,000,000

To calculate a Settlement Agents proportionate share of the pool amount, CDS divides each Settlement Agents elected cap by the total elected caps of all Settlement Agents. The pool share percentage for each Settlement Agent is multiplied by the basic pool amount to determine their contribution.

Pool Share Calculation

SETTLEMENT AGENTS POOL SHARE CALCULATION				
SETTLEMENT	ELECTED	POOL SHARE PERCENTAGE	POOL SHARE VALUE	
Settlement Agent 1	150,000,000	6.1983%	15,495,868	
Settlement Agent 2	300,000,000	12.3967%	30,991,736	
Settlement Agent 3	800,000,000	33.0579%	82,644,628	
Settlement Agent 4	170,000,000	7.0248%	17,561,983	
Settlement Agent 5	1,000,000,000	41.3223%	103,305,785	
	2,420,000,000	58.6777%	250,000,000	

Assume that the Settlement Agent with the largest cap defaults for an amount equal to its cap and that Settlement Agent did not have any lines of credit. The defaulting Settlement Agent is removed from the cap calculation spreadsheet and the new highest cap is determined. In the example below, the largest cap is now CAD 800 million.

System Operating Cap Calculation – After Default of Settlement Agent with Largest Cap

SYSTEM OPERATING CAP, COLLATERAL REQUIREMENT AND INITIAL ACV CALCULATIONS SETTLEMENT AGENTS AFTER DEFAULT OF SETTLEMENT AGENT WITH LARGEST CAP										
SETTLEMENT AGENTS	Elected/Available SOC (\$CM)	USD CAP Calculations			USD CAP	CAD CAP	Pool Collateral Share Contribution ² (C\$M)	Ratings Discount Applied to Collateral Requirement (%)	Pool Collateral Requirement (C\$M)	"Initial ACV" ³
		CDN\$ EQUIV. (3% of Elected Cap)	Exchange Rate (USD/CAD) 0.88	Less FX Risk 10.0000%						
Settlement Agent1	150,000,000	4,500,000	3,960,000	396,000	3,564,000	16,626,761	10.6%	100%	21,126,761	21,126,761
Settlement Agent2	300,000,000	9,000,000	7,920,000	792,000	7,128,000	31,140,845	21.1%	95%	42,253,521	40,140,845
Settlement Agent3	800,000,000	24,000,000	21,120,000	2,112,000	19,008,000	66,140,845	56.3%	80%	112,676,056	90,140,845
Settlement Agent4	170,000,000	5,100,000	4,488,000	448,800	4,039,200	17,646,479	12.0%	95%	23,943,662	22,746,479
Settlement Agent5	-	-	-	-	-	-	-	-	-	-
	1,420,000,000	42,600,000	37,488,000	3,748,800	33,739,200	131,554,930	100.0%	TOTALS	200,000,000	174,154,930
Percentage of Maximum "Available SOC" use to calculate "Total Pool Collateral" 25% Maximum "Available SOC" 800,000,000 Total Pool Collateral Requirement 200,000,000										
1. Settlement Agents can choose from the Maximum Available SOC as determined by the S.A. CCR members. In this example the election can be less than or equal to C\$1,000M. 2. The percentage pool share contribution is defined as a percentage of the total SOC elected by the members of the pool. 3. Equal to the "Pool Collateral Requirement" scaled down by the "Ratings Discount Applied to Collateral Requirement or Initial ACV"										

Pool Amount Calculation – After Default of Settlement Agent with Largest Cap

SETTLEMENT AGENTS	
NEW POOL REQUIREMENT CALCULATION AFTER DEFAULT	
1. Largest Elected Cap	800,000,000
2. Adjustment Factor	25%
3. Basic Pool Amount [(1) * (2)]	200,000,000

The survivors must pay CAD 1,000 million (payment obligation of the defaulter, which is assumed to be equal to its cap) to CDS through CDS's Bank of Canada account in order to complete payment exchange.

Survivors' Payment Obligation Calculation after Default

SETTLEMENT AGENTS				
SURVIVORS' PAYMENT OBLIGATIONS CALCULATION AFTER DEFAULT				
	ELECTED CAP	NEW POOL SHARE	POOL SHARE PERCENTAGE	DEFAULTER'S LIGATION PAYABLE
Settlement Agent 1	150,000,000	21,126,761	10.5634%	105,633,803
Settlement Agent 2	300,000,000	42,253,521	21.1268%	211,267,606
Settlement Agent 3	800,000,000	112,676,056	56.3380%	563,380,282
Settlement Agent 4	170,000,000	23,943,662	11.9718%	119,718,310
Settlement Agent 5	-	-	-	-
	1,420,000,000	200,000,000	100.0000%	1,000,000,000

The following assumptions are made in determining the residual loss:

- There is no cash collateral available, as all pool requirements were met using Government of Canada bonds and treasury bills.
- The survivors have contributed additional collateral to cover their new pool requirements in order to reconstitute the collateral pool to the new calculated pool size.
- Defaulter's ACV consists of Initial ACV (equal to the size of the collateral pool) and ACV consisting of securities in defaulter's risk accounts with assumed average haircut of 10%. There is a 15% total market value decline in the defaulter's ACV, which means a 5% net decline in the market value of the ACV.
- There is a 5% net decline in defaulter's as well as survivors' collateral pool contribution

In addition to reconstituting the pool, the total loss covered by the survivors is CAD 50.0 million, out of which CAD 139.36 million is covered through the liquidation of the survivors' original collateral pool contributions and the balance of CAD 89.36 million is the residual collateral to be shared by the survivors in the proportion given below.

1. Default = Highest Cap = Initial ACV + ACV	1,000,000,000
2. Pool Collateral Requirement	103,305,785
3. Haircut Adjusted ACV in Defaulter's Risk Accounts (1 - 2)	896,694,215
4. 5% Net Market Decline in Pool Collateral Requirement (3 * 5%)	(44,834,711)
5. Market Value of Defaulter's ACV Liquidated = (3 - 4)	851,859,504
6. Residual Loss to be Covered (1 - 5)	148,140,496
7. Defaulter's Collateral Pool Contribution	103,305,785
8. 5% Net Market Decline in Defaulter's Collateral (7 * 5%)	(5,165,289)
9. Market Value of Defaulter's Collateral Liquidated (7 - 8)	98,140,496
10. Total Loss to be Covered by Survivors (6 - 9)	50,000,000
11. Survivors' Collateral Pool Contributions	146,694,215
12. 5% Net Market Decline in Pool Collateral (11 * 5%)	(7,334,711)
13. Market Value of Survivors' Collateral Liquidated (11 - 12)	139,359,504
14. Additional Loss to be Funded (10 - 13)	(89,359,504)

Pool Share/Residual Loss Share Calculation after Default

SETTLEMENT AGENTS					
POOL SHARE/RESIDUAL LOSS SHARE CALCULATION AFTER DEFAULT					
SETTLEMENT AGENTS	ELECTED CAP	NEW POOL SHARE	ORIGINAL POOL SHARE	MARKET VALUE LIQUIDATED	LOSS TO BE FUNDED
Settlement Agent 1	150,000,000	21,126,761	15,495,868	950,000,000	(9,439,384)
Settlement Agent 2	300,000,000	42,253,521	30,991,736	29,442,149	(18,878,768)
Settlement Agent 3	800,000,000	112,676,056	82,644,628	78,512,397	(50,343,383)
Settlement Agent 4	170,000,000	23,943,662	17,561,983	16,683,884	(10,697,969)
Settlement Agent 5	-	-	-	-	-
TOTALS	1,420,000,000	200,000,000	146,694,215	1,074,638,430	(89,359,504)

Appendix 3 - CAD Receivers of Credit Collateral Pool (CAD RCP)

CAD RCP – System Operating Cap, Pool Amount and Pool Share Calculations before and after Default

Each receiver selects their elected collateral contribution within the maximum allowed limit of CAD 2.5 million. CDS calculates the leverage ratio by dividing the total collateral contribution of the receivers participating in the CAD RCP by the largest CAD receiver's individual collateral contribution. The RCP cap is calculated by multiplying the leverage ratio by CAD receiver's individual collateral contribution. This ensures that the largest CAD receivers' cap is equal to the aggregate value of the CAD receivers' collateral, as illustrated below.

Name	Collateral Contribution	Final RCP Cap and Initial ACV
Receiver 1	2,500,000	13,000,000
Receiver 2	2,000,000	10,400,000
Receiver 3	1,750,000	9,100,000
Receiver 4	1,500,000	7,800,000
Receiver 5	1,250,000	6,500,000
Receiver 6	1,000,000	5,200,000
Receiver 7	900,000	4,680,000
Receiver 8	800,000	4,160,000
Receiver 9	700,000	3,640,000
Receiver 10	600,000	3,120,000
	13,000,000	67,600,000

Total Collateral Contribution	13,000,000
Largest Collateral Contribution	2,500,000
Leverage Ratio	5.20

Assume that the Receiver with the largest cap defaults for an amount equal to its cap plus line(s) of credit. Unlike the Extenders', Federated Participant's and the Settlement Agents' collateral pools, there is no formula size defined for the Receivers' collateral pools (RCP) and therefore the Receivers are not obligated to reconstitute their pools to any minimum size.

In order to complete payment exchange, CDS arranges replacement payment of CAD 13.0 million (the amount of cap used by the defaulting Receiver). To achieve this, CDS transfers the entire collateral from the Receivers' collateral pool to its liquidity provider in exchange for liquidity and return the excess collateral to the pool as soon as possible.

The following assumptions are made in determining the residual loss:

- There is no cash collateral available, as all pool requirements were met using Government of Canada bonds and treasury bills.
- Survivors have not reconstituted the pool and their caps have been set to zero.

- There is no ACV available as all ACV has been transferred to the Extender(s) of Credit with whom the defaulting Receiver had drawn the Line(s) of Credit.
- There is a 5% net decline in defaulter's collateral pool contribution.
- There is a 5% net decline in survivors' collateral pool contributions.

The residual loss to be funded by survivors is approximately CAD 650,000.

1. Default Amount Not Guaranteed by Extenders = Highest Cap Used	13,000,000
2. Defaulter's Available ACV	-
3. Market Value of Defaulter's ACV Liquidated = (1 - 2)	-
4. Residual Loss to be Covered (1 - 3)	13,000,000
5. Defaulter's Collateral Pool Contribution	2,500,000
6. 5% Net Market Decline in Defaulter's Collateral (5 * 5%)	(125,000)
7. Market Value of Defaulter's Collateral Liquidated (5 - 6)	2,375,000
8. Total Loss to be Covered by Survivors (4 - 7)	10,625,000
9. Survivors' Collateral Pool Contribution	10,500,000
10. 5% Net Market Decline in Pool Collateral (9 * 5%)	(525,000)
11. Market Value of Survivors' Collateral Liquidated (9 - 10)	9,975,000
12. Total Loss to be Funded (8 - 11)	650,000

Pool Share/Residual Loss Share Calculation after Default

RECEIVERS OF CREDIT	RCP CAP	NEW POOL SHARE	ORIGINAL POOL SHARE	MARKET VALUE LIQUIDATED	LOSS TO BE FUNDED
Receiver 1	-	-	2,500,000	2,375,000	-
Receiver 2	-	-	2,000,000	1,900,000	123,810
Receiver 3	-	-	1,750,000	1,662,500	108,333
Receiver 4	-	-	1,500,000	1,425,000	92,857
Receiver 5	-	-	1,250,000	1,187,500	77,381
Receiver 6	-	-	1,000,000	950,000	61,905
Receiver 7	-	-	900,000	855,000	55,714
Receiver 8	-	-	800,000	760,000	49,524
Receiver 9	-	-	700,000	665,000	43,333
Receiver 10	-	-	600,000	570,000	37,143
TOTALS	-	-	13,000,000	12,350,000	650,000

Appendix 4 - USD Receivers of Credit Collateral Pool (USD RCP)

USD RCP – System Operating Cap, Aggregate Pool, Pool Share Calculations before and after Default

Each receiver selects their elected cap within the maximum allowed limit of USD 10.0 million. CDS calculates the leverage ratio by dividing the total of all the receivers' elected cap USD RCP by the largest USD receiver's cap. The collateral contribution is calculated by dividing the receivers' elected cap by the leverage ratio. This ensures that the largest USD receivers' cap is equal to the aggregate value of the USD receivers' collateral, as illustrated below.

Name	Receivers' Elected Cap	Collateral Contribution
Receiver 1	10,000,000	1,428,571
Receiver 2	10,000,000	1,428,571
Receiver 3	9,000,000	1,285,714
Receiver 4	8,000,000	1,142,857
Receiver 5	8,000,000	1,142,857
Receiver 6	7,000,000	1,000,000
Receiver 7	6,000,000	857,143
Receiver 8	6,000,000	857,143
Receiver 9	5,000,000	714,286
Receiver 10	1,000,000	142,857
	70,000,000	10,000,000

Total of all Receivers' Elected Cap	70,000,000
Largest Receiver's Cap	10,000,000
Leverage Ratio	7.00

Assume that the Receiver with the largest cap defaults for an amount equal to its cap. Unlike the Extenders', Federated Participant's and the Settlement Agents' collateral pools, there is no formula size defined for the Receivers' collateral pools (RCP) and therefore the Receivers are not obligated to reconstitute their pools to any minimum size.

In order to complete payment exchange, CDS arranges replacement payment equal to USD 10.0 million (the amount of cap used by the defaulting Receiver). To achieve this, CDS transfers the entire collateral from the Receivers' collateral pool to its liquidity provider in exchange for liquidity and return the excess collateral to the pool as soon as possible.

The following assumptions are made in determining the residual loss:

- There is no cash collateral available, as all pool requirements were met using Government of Canada bonds and treasury bills.
- Survivors have not reconstituted the pool and their caps have been set to zero.
- There is no ACV available.
- There is a 5% net decline in defaulter's collateral pool contribution.

- There is a 5% net decline in survivors' pool collateral contributions.

The residual loss to be funded by survivors is approximately USD 500,000.

1. Default = Highest Cap	10,000,000
2. Defaulter's Available ACV	-
3. Market Value of Defaulter's ACV Liquidated = (1 - 2)	-
4. Residual Loss to be Covered (1 - 3)	10,000,000
5. Defaulter's Collateral Pool Contribution	1,428,571
6. 5% Net Market Decline in Defaulter's Collateral (5 * 5%)	(71,429)
7. Market Value of Defaulter's Collateral Liquidated (5 - 6)	1,357,143
8. Total Loss to be Covered by Survivors (4 - 7)	8,642,857
9. Survivors' Pool Collateral Contribution	8,571,429
10. 5% Net Market Decline in Pool Collateral (9 * 5%)	(428,571)
11. Market Value of Survivors' Collateral Liquidated (9 - 10)	8,142,857
12. Total Loss to be Funded (8 - 11)	500,000

Pool Share/Residual Loss Share Calculation after Default

RECEIVERS OF CREDIT	RCP ELECTED CAP	NEW POOL SHARE	ORIGINAL POOL SHARE	MARKET VALUE LIQUIDATED	LOSS TO BE FUNDED
Receiver1	-	-	1,428,571	1,357,143	-
Receiver2	-	-	1,428,571	1,357,143	83,333
Receiver3	-	-	1,285,714	1,221,429	75,000
Receiver4	-	-	1,142,857	1,085,714	66,667
Receiver5	-	-	1,142,857	1,085,714	66,667
Receiver6	-	-	1,000,000	950,000	58,333
Receiver7	-	-	857,143	814,286	50,000
Receiver8	-	-	857,143	814,286	50,000
Receiver9	-	-	714,286	678,571	41,667
Receiver10	-	-	142,857	135,714	8,333
TOTALS	-	-	10,000,000	9,500,000	500,000

Appendix 5 -Account Types, Codes and Description

Account Types, Codes and Description

Account type	Code	Description
Funds account	FA	Holds funds separated by currency
General account	GA	Holds securities and is used for all CDSX transactions except security withdrawals
RSP account	RA	Holds securities that relate to RSP investments and is used for all CDSX transactions except for trades targeted to settle by CNS
Segregated account	SA	Holds securities that have been segregated and is used for all CDSX transactions except for trades targeted to settle by CNS
Unrestricted collateral account	CA	Holds securities or funds that a lender has received as unrestricted collateral in a pledge
Restricted collateral account	EX	Holds securities or funds that a lender has received as restricted collateral in a pledge
Pledge account	PA	Holds a memo entry of securities or funds that a borrower has pledged as collateral
Offer account	OA	A depositary agent's account to which tendered positions are moved
Tender account	TN	Holds a memo entry of securities that have been tendered to a corporate action event
Withdrawal account	W/O	Holds securities being withdrawn from a segregated account or RSP account. The securities are in this account from the time a withdrawal is requested until the custodian confirms or rejects it.

Appendix 6 - Glossary of Terms Used in Payments and Settlement Systems

assured payment system: an arrangement in an exchange-for-value system under which completion of timely settlement of a payment instruction is supported by an irrevocable and unconditional commitment from a third party (typically a bank, syndicate of banks or clearing house).

batch: the transmission or processing of a group of payment orders and/or securities transfer instructions as a set at discrete intervals of time.

bilateral netting: an arrangement between two parties to net their bilateral obligations. The obligations covered by the arrangement may arise from financial contracts, transfers or both.

book-entry system: an accounting system that permits the transfer of claims (e.g. electronic transfer of securities) without the physical movement of paper documents or certificates.

business continuity: a payment system's arrangements which aim to ensure that it meets agreed service levels even if one or more components of the system fail or if it is affected by an abnormal external event. Include both preventative measures and arrangements to deal with contingencies.

caps: quantitative limits on the funds transfer activity of individual participants in a system; limits may be set by each individual participant or may be imposed by the body managing the system; limits can be placed on the net debit position or net credit position of participants in the system.

central counterparty (CCP): an entity that is the buyer to every seller and seller to every buyer of a specified set of contracts, e.g. those executed on a particular exchange or exchanges.

central securities depository (CSD): a facility (or an institution) for holding securities, which enables securities transactions to be processed by book entry. Physical securities may be immobilized by the depository or securities may be dematerialized (i.e. so that they exist only as electronic records). In addition to safekeeping, a central securities depository may incorporate comparison, clearing and settlement functions.

clearing/clearance: the process of transmitting, reconciling and, in some cases, confirming payment orders or security transfer instructions prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement.

closeout netting: a special form of netting which occurs following some predefined events such as default. Closeout netting is intended to reduce exposures on open contracts if one party meets certain conditions specified by the contract (e.g. becomes subject to insolvency procedures) before the settlement date.

collateral: an asset or third-party commitment that is accepted by the collateral taker to secure an obligation of the collateral provider vis-à-vis the collateral taker.

collateral management service: a centralized service that may handle any of a variety of collateral-related functions for a client firm, including valuation of collateral, confirmation of valuations with counterparties, optimization of collateral usage and transfer of collateral.

collateral pool: assets owned by members of a payment system that are collectively available to the system as collateral to enable it to obtain funds in circumstances specified in its rules.

counterparty: the opposite party to a financial transaction such as a securities trade or swap.

credit limit: limit on the credit exposure a payment system participant incurs vis-à-vis another participant (bilateral credit limit) or vis-à-vis all other participants (multilateral credit limit) as a result of receiving payments that have not yet been settled.

credit risk/exposure: the risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. In exchange-for value systems, the risk is generally defined to include replacement cost risk and principal risk.

cross-border settlement: a settlement that takes place in a country other than the country in which one trade counterparty or both are located.

cross margining agreement: an agreement between CCPs to consider positions and supporting collateral as a portfolio for participants that are members of both CCPs. Positions held in cross-margined accounts are subject to lower collateral requirements because the positions held at one CCP collateralize part of the exposure of related positions at the other CCP. In the event of a default by a participant whose account is cross-margined, one CCP can use the positions and collateral in the cross-margined account at the other CCP to cover losses.

cross-system settlement: a settlement of a trade that is effected through a link between two separate securities transfer systems.

custody risk: the risk of loss of securities held in custody occasioned by the insolvency, negligence or fraudulent action of the custodian or of a subcustodian.

day of value: day on which a payment is due to be credited to the receiving participant in the payment system.

default: failure to complete a funds or securities transfer according to its terms for reasons that are not technical or temporary, usually as a result of bankruptcy. Default is usually distinguished from a “failed transaction”.

defaulter pays: a loss-sharing arrangement where each participant is required to collateralize any exposures it creates for other participants. As a result, losses from a party’s default are borne by the defaulting party.

deferred net settlement system: a system that effects the settlement of obligations or transfers between or among counterparties on a net basis at some later time.

delivery by value: a mechanism in a settlement systems to assist a participant to borrow money from or lend money to another participant against collateral held in the system. The system will select and deliver securities to the appropriate party and arrange that equivalent securities be returned the following business day.

delivery versus delivery: a link between two securities transfer (settlement) systems that ensures that a delivery occurs if, and only if, another delivery occurs and vice versa.

delivery versus payment (DVP): a link between a securities transfer system and a funds transfer system that ensures that delivery occurs if, and only if, payment occurs.

dematerialization: the elimination of physical certificates or documents of title which represent ownership of securities so that securities exist only as accounting records.

depository: an agent with the primary role of recording securities either physically or electronically and keeping records of the ownership of these securities.

event of default: an event stipulated in an agreement as constituting a default. Generally, the occurrence of a failure to pay or deliver on the due date, breach of agreement and insolvency are events of default.

exchange-for-value settlement system: system which involves the exchange of assets, such as money, foreign exchange, securities or other financial instruments, in order to discharge settlement obligations. These systems may use one or more funds transfer systems in order to satisfy the payment obligations that are generated. The links between the exchange of assets and the payment system(s) may be manual or electronic.

failed transaction: a securities transaction in which the securities and cash are not exchanged as agreed on the settlement date, usually because of technical or temporary causes.

finality risk: the risk that a provisional transfer of funds or securities will be rescinded.

financial risk: a range of risks incurred in financial transactions – including both liquidity and credit risks.

gross margining: margining system in which the clearing member is required to deposit with the clearing house sufficient initial margin to cover the gross positions of its clients.

gross settlement system: a transfer system in which the settlement of funds or securities transfer instructions occurs individually (on an instruction by instruction basis).

haircut: the difference between the market value of a security and its collateral value. Haircuts are taken by a lender of funds in order to protect the lender, should the need arise to liquidate the collateral, from losses owing to declines in the market value of the security.

immobilization: placement of physical certificates for securities and financial instruments in a central securities depository so that subsequent transfers can be made by book entry, that is, by debits from and credits to holders' accounts at the depository.

indirect market participant: a market participant that uses an intermediary for the execution of trades on its behalf. Generally, institutional and cross-border clients are indirect market participants.

initial margin: cash or collateral that is deposited with the clearing house to ensure performance on obligations to it.

intraday liquidity: funds which can be accessed during the business day, usually to enable financial institutions to make payments in real time.

irrevocable and unconditional transfer: a transfer which cannot be revoked by the transferor and is unconditional.

large-value funds transfer system: a funds transfer system through which large-value and high priority funds transfers are made between participants in the system for their own account or on behalf of their customers. Although, as a rule, no minimum value is set for the payments they carry, the average size of payments passed through such systems is usually relatively large.

legal risk: the risk of loss because of the unexpected application of a law or regulation or because a contract cannot be enforced.

liquidity risk: the risk stemming from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimize a loss.

loss-sharing agreement: an agreement among participants in a clearing or settlement system regarding the allocation of any losses arising from the default of a participant in the system or of the system itself.

loss-sharing pools: cash, securities or possibly other assets that are provided by the participants in advance and are held by the system to ensure that commitments arising from loss-sharing agreements can be met.

margin: generally, the term for collateral used to secure an obligation, either realized or potential. In a central counterparty system, the deposit of collateral to guarantee performance on an obligation or cover potential market movements on unsettled transactions is sometimes referred to as margin.

market risk: the risk of losses arising from movements in market prices. The four standard market risk categories are equity risk, interest rate risk, currency risk, and commodity risk.

market value: the cost that would be incurred or the gain that would be realized if an outstanding contract were replaced at current market prices.

marking to market: the practice of revaluing securities and financial instruments using current market prices.

master agreement: an agreement that sets forth the standard terms and conditions applicable to all or a defined subset of transactions that the parties may enter into from time to time, including the terms and conditions for closeout netting.

matching: the process of comparing the trade or settlement details (such as number of contracts, contract month and price) provided by counterparties to ensure they agree with respect to the terms of the transaction.

multilateral netting: netting on a multilateral basis is arithmetically achieved by summing each participant's bilateral net positions with the other participants to arrive at a multilateral net position. Such netting is conducted through a central counterparty (such as a clearinghouse) that is legally substituted as the buyer to every seller and the seller to every buyer. The multilateral net position represents the bilateral net position between each participant and the central counterparty.

net margining: margining system in which the clearing member is required to deposit with the clearing house sufficient initial margin to cover the net positions of its clients.

net settlement system: a settlement system in which final settlement of transfer instructions occurs on a net basis at one or more discrete, prespecified times during the processing day.

netting: an agreed offsetting of positions or obligations by trading partners or participants. The netting reduces a large number of individual positions or obligations to a smaller number of obligations or positions.

netting by novation: replacement of two existing contracts between two parties for delivery, of a specified currency on the same date by one single net contract for that date, such that the original contracts are satisfied and discharged.

novation: the act of either replacing an obligation to perform with a new obligation, or replacing a party to an agreement with a new party.

operational risk: the risk that deficiencies in information systems or internal controls could result in unexpected losses.

overnight money: a loan with a maturity of one business day.

participant/member: a party who participates in a transfer system.

payment system: a payment system consists of a set of instruments, banking procedures and, typically, interbank funds transfer systems that ensure the circulation of money.

pledge: a delivery of property to secure the performance of an obligation owed by one party (debtor/pledgor) to another (secured party). A pledge creates a security interest (lien) in the property so delivered.

position limit: a restriction on the number of contracts or share of a contract's open interest that a single entity may hold.

prefunding: the requirement that funds be available in accounts at the settlement institution before institutions use these accounts to extinguish their settlement obligations.

pre-settlement risk: see replacement cost risk.

principal risk: the risk that the seller of a security delivers a security but does not receive payment or that the buyer of a security makes payment but does not receive delivery. In this event, the full principal value of the securities or funds transferred is at risk.

real-time gross settlement: the continuous (real-time) settlement of funds or securities transfers individually on an order by order basis (without netting).

replacement cost risk: the risk that a counterparty to an outstanding transaction for completion at a future date will fail to perform on the contract or agreement during the life of the transaction. The resulting exposure is the cost of replacing the original transaction at current market prices.

repurchase agreement (repo): a contract to sell and subsequently repurchase securities at a specified date and price. Also known as an RP or buyback agreement.

retail payments: this term describes all payments which are not included in the definition of large-value payments. Retail payments are mainly consumer payments of relatively low value and urgency.

reverse repo: a contract with a counterparty to buy and subsequently resell securities at a specified date and price, the mirror image of a repo.

revocable transfer: a transfer that a system operator or a system participant can rescind.

risk factor: a variable that affects the value of financial instruments or an entire portfolio. The most common market risk factors are interest rates, foreign exchange rates, equity prices and commodity prices.

rolling settlement: a procedure in which settlement takes place a given number of business days after the date of the trade.

same day funds: money balances that the recipient has a right to transfer or withdraw from an account on the day of receipt.

securities borrowing and lending programme: a facility whereby a loan of securities is made to facilitate timely fulfilment of settlement obligations.

securities settlement system (SSS): the full set of institutional arrangements for confirmation, clearance and settlement of securities trades and safekeeping of securities.

security interest: a form of interest in property which provides that the property may be sold on default in order to satisfy the obligation covered by the security interest.

self collateralizing: an arrangement whereby securities being transferred can be used as collateral to secure risks involved in the transfer process.

settlement: the completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller. A settlement may be final or provisional.

settlement/settling bank: the entity that maintains accounts with the settlement agent to settle payment obligations arising from securities transfers, both on its own behalf and for other market participants.

settlement risk: general term used to designate the risk that settlement in a transfer system will not take place as expected. This risk may comprise both credit and liquidity risk.

short sale: a sale of securities which the seller does not own and thus must be covered by the time of delivery; a technique used (1) to take advantage of an anticipated decline in the price or (2) to protect a profit in a long position.

straight through processing: the capture of trade details directly from front-end trading systems and complete automated processing of confirmations and settlement instructions without the need for rekeying or reformatting data.

stress testing: the estimation of credit and liquidity exposures that would result from the realization of extreme price and implied volatility scenarios.

survivors pay: loss-sharing arrangements which, in the event of a participant's inability to settle, require losses to be borne by the surviving participants according to some predetermined formula.

systemic risk: the risk that the failure of one participant in a transfer system, or in financial markets generally, to meet its required obligations will cause other participants or financial institutions to be unable to meet their obligations (including settlement obligations in a transfer system) when due. Such a failure may cause significant liquidity or credit problems and, as a result, might threaten the stability of financial markets.

trade-for-trade settlement (TFT): the settlement of individual transactions between counterparties.

value-at-risk: an estimate of the upper bound on losses an institution would expect to incur during a given period (e.g. one day) for a given confidence level (e.g. 95%).

variation margin: funds that are paid to (or received from) a counterparty (clearing house or clearing member) to settle any losses (gains) that are implied by marking open positions to market.

Glossary Reference: Committee on Payment and Settlement Systems - A glossary of terms used in payments and settlement systems, March 2003

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