CDS Financial Risk Model
Version 15.0

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1. Introduction

1.1. Purpose and Scope

The objective of this CDS Financial Risk Model is to describe the elements relating to the management of financial risk in CDS's clearing, settlement and depository services. While this document is intended to provide a comprehensive explanation of CDS's financial risk model, it does not replace any Legal Documents as the definitive description of the management of financial risk. Unless defined otherwise in this document, capitalized words in this document has the same meaning as defined in the CDS Participant Rules.

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. 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;
13. Maintain sufficient financial resources to withstand, at a minimum, a default by the participant with the largest credit exposure in extreme but plausible market conditions.
14. Maintain sufficient financial resources to withstand, at a minimum, a default by the participant with the largest liquidity exposure in extreme but plausible market conditions.
15. Ensure that risks from links with other central counterparties and central securities depositories are evaluated and managed prudently;
16. Ensure that financial risks in any new non-core settlement activities or changes to existing settlement activities in regulated subsidiaries are adequately assessed;
17. Establish a means by which participants are able to provide input into the management of financial risks in the clearing, depository and settlement services;
18. 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 CDS Financial Risk Model describes how these risk management principles are implemented in CDS.

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 credit/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 Account[1]. 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 the CDS Financial Risk Model.

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 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 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:

[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

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) settlement[2]. 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.

2.2. Risk Edits Applied in Trade Settlement

In TFT settlement, the payment risk edits are applied to each individual trade. In CNS settlement, payment risk edits are applied to the projected net amounts from a group of trades and positions.

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 partials[3]).
- 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.

[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.

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

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 obligation 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.

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 depositary 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' regulators, 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. 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.
4. 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 depositary agent and/or entitlements processor roles in addition to their validator role.
5. 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.
6. 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.
7. 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:

(i) Extenders of Credit

(ii) Settlement Agents

(iii) Contributing Receivers of Credit (CAD)

(iv) Contributing Receivers of Credit (USD)

(v) Non-contributing Receivers of Credit (CAD)

(vi) 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:

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;
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 invested in liquid securities (or cash) and held with highly rated financial institutions;
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.

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 ring[4]. 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 from their participation in the collateral pool (except from the USD RCP, which does not provide initial ACV in CDSX).

Company caps are used by the system to enforce a limit on the amount participants are eligible to use for settlement and credit extension. The size of the company cap is detailed in the CDS Participant Rules and is assigned by CDS as part of the initial setup of the participant. Only CDS can change the company cap. Company caps are input and maintained by CDS. Company caps are allocated in both Canadian and U.S. dollars. However, the U.S. dollar company cap cannot be allocated to extend credit. U.S. dollar caps can be allocated to the company's ledgers only. Settlement agents and extenders of credit elect a company cap up to the formula amount.

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 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. 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] 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. 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 currency[5]. 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 different 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 pool 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 pool 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 liquidity requirements associated with the default of the single member with the largest cap. Members of the CAD RCP receive initial ACV equal to their collateral contribution (See Appendix 3 for an illustration of cap calculations for the CAD RCP). As with the other collateral pools, the members of the CAD RCP collateralize their cap usage fully and simultaneously through their collateral contribution requirement to the CAD RCP collateral pool and an allocation of their settlement service collateral (ACV).

For the CAD RCP, CDS monitors the members of the pool through regulatory reports received on a regular 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. A CAD RCP member's utilization of the credit provided by their cap and a line of credit is collateralized fully and simultaneously by their collateral requirement to the CAD RCP collateral pool and their ACV.

Each calendar quarter-end, USD RCP members elect a cap amount subject to a maximum level of USD 10 million. The collateral requirement for each member of the USD RCP is its elected cap. In this way, each USD RCP member's cap is collateralized fully and simultaneously. 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.

[5] Membership in the CAD RCP is limited to members of the Canadian Investment Regulatory Organization. Membership in the USD RCP is open to all receivers.

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. 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).

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 time[6]. 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 illustrated in Appendices 1, 2, 3 and 4. Extenders of Credit and Settlement Agents 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) provide lines of credit to other participants. Participants may receive multiple lines of credit from multiple credit granters.

[6] 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.

Participants may have both a cap and a line of credit[7]. 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 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, 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.

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[7] 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 CDCC. 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
• Positive funds • Available CDSX cap • Available CDSX credit (lines)	• 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.

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 "Diversification-Eligible" Equities

The CDS Equity Haircut Rate model is designed to ensure that the exposure of a defaulting participant is collateralized with a very high degree of confidence, specifically exceeding a 99% confidence level. This means that uncollateralized losses should occur in no more than approximately 1% of potential defaults.

Haircut rates, which are recalculated daily, are determined based on the risk associated with each individual equity security. This risk is assessed using a technique known as the Historical Simulation methodology. This methodology incorporates two weighted components:

1. Historical Value-at-Risk Haircut (HC): This component reflects the risk based on historical data.
2. Stressed Value-at-Risk Haircut (SHC): This component accounts for extreme market conditions.

Value-at-Risk (VaR) is defined as the maximum expected loss over a specified time period, given a certain degree of confidence.

By integrating both HC and SHC components, the historical simulation methodology provides a robust approach for accurately assessing and managing the risk of equity securities, thereby enhancing the overall stability and reliability of the CDS Equity Haircut Rate model.

Finally, the historical simulation methodology for HC involves calculating profit and loss based on historical market movements. By performing statistical analysis (percentile selection) on the profit and loss vector divided by the actual price, a HC is generated for each stock. For HC and SHC calculations, the stock's currency is used as is, so prices must be in the same currency as the stock. Only equities eligible for

"Diversification" are suitable for the historical simulation methodology.

HC Calculation for "Diversification-Eligible" Equities:

The following steps are taken by the model to calculate the HC for every securities i:

a. Return: At each time t of the lookback period, the daily log return of each diversification eligible security in the portfolio is calculated as:

$$r_{i,t} = ln\ \frac{S_t^i}{S_{t-1}^i},$$

Where,

- $r_{i,t}$: $daily\ log\ return\ of\ security\ i\ at\ time\ t$
- S_t^i: $price\ of\ security\ i\ at\ time\ t$

b. Variance: At each time t of the lookback period, the filtered EWMA Variance for each security in the portfolio is calculated as:

$$\sigma_{i,t}^2 = \lambda \times \sigma_{i,t-1}^2 + (1-\lambda) \times r_{i,t-1}^2,$$

Where,

- $\sigma_{i,t}^2$: $EWMA\ variance\ of\ security\ i\ returns\ at\ time\ t$
- λ: $Time\ decay\ coefficient$

c. Volatility: Calculate the volatility of each security in the portfolio at each time t during the lookback period as:

$$\sigma_{i,t} = \sqrt{\sigma_{i,t}^2},$$

Where,

- $\sigma_{i,t}$: $volatility\ of\ diversification\ eligible\ security\ i\ at\ time\ t$

d. Scaling Factor: Calculate the scaling factor for each security in the portfolio for each time t in the lookback period as:

$$\theta_{t,T}^i = max(\frac{\sigma_T^i}{\sigma_t^i}, \delta)$$

Where,

- T: $Valuation\ date\ (date\ of\ HC\ calculation)$
- $\theta_{t,T}^i$: $Security\ i\ scaling\ factor\ at\ time\ t\ for\ valuation\ date\ T$
- δ: $Volatility\ floor$

e. Perturbed Prices: Calculate perturbed prices for each security in the portfolio for each time t in the lookback period as:

$$S_{t,T}^{i*} = S_T^i \times e^{r_t^i \times \theta_{t,T}^i \times \sqrt{HP}},$$

Where,

- $S_{t,T}^{i*}$: $Perturbed\ valuation\ date\ price\ of\ security\ i$
- S_T^i: $Valuation\ date\ price\ of\ security\ i$
- HP_T: $Holding\ Period\ at\ T$

f. Security P&L (CAD): The security P&L for each time t in the lookback period is calculated as:

$$P\&L_t^i = S_{t,T}^{i*} - S_T^i,$$

Where,

- PnL_t^i: $PnL\ at\ time\ t\ for\ security\ i$

g. Portfolio HC (CAD): Finally, the HC is calculated using the P&L vector, ordered in descending order, as follows:

$$n = (1-\alpha) \times (L-1) + 1,$$

$$k = \lfloor n \rfloor,$$

$$HC_T^i = \frac{(k+1-n) \times P\&L^i(k) + (n-k) \times P\&L^i(k+1)}{S_T^i}$$

Where,

- HC_T^i: $HC\ calculated\ at\ valuation\ date\ T\ for\ security\ i$
- L: $Number\ of\ observations\ in\ lookback\ period$
- α: $HC\ percentile\ level$
- $P\&L^i(k)$: $The\ k^{th} value\ in\ the\ sorted\ P\&L\ list\ of\ security\ i$

SHC Calculation for "Diversification-Eligible" Equities:

The methodology for calculating SHC is similar to that for HC, with two key difference:

- The lookback period is shorter, reflecting a concentrated period of "extreme market conditions".
- EWMA volatility is not calculated, and there is no scaling factor applied to historical log-returns (Steps b-d). Therefore, Step e is reduced to the following equation:

$$S_{t,T}^{i*} = S_T^i \times e^{r_{i,t} \times \sqrt{HP}}$$

Scaling factors were not applied to ensure true historical returns during the stress period were captured. The remaining steps in the calculation follow steps f-g.

Total HC Calculation for "Diversification-Eligible" Equities:

The total HC for each securities is calculated as a weighted average between HC and SHC as follows:

$$Total\ HC_T^i = (1 - w) \times HC_T^i + w\ \times\ SHC_T^i;$$

where

- $Total\ HC_T^i$: $Total\ HC\ for\ securities\ i\ at\ valuation\ date\ T$
- SHC_T^i: $SHC\ for\ security\ i\ calculated\ at\ valuation\ date\ T$
- w: $SHC\ weight$

Adjustments to the Total HC Calculation for "Diversification-Eligible" Equities:

1. FX Haircut Adjustment - For USD securities, an adjustment is added to the Total HC. This adjustment is calculated by applying the HC calculation methodology to the FX exchange rate (CAD/USD), treating the daily exchange rate as analogous to the security's daily price. Note that only an HC portion for the FX is calculated, not an SHC. The holding period (HP) used is the same as that for the HC of the security.

   The Total HC with the FX adjustment is then calculated as follows:

   $$Total\ HC_T^i = Total\ HC_T^i + \ FXHC_T,$$

   where

   - $FXHC_T$: $HC\ for\ the\ FX\ calculated\ at\ valuation\ date\ T$

2. Haircut Backtest and Spread Adjustment - Haircut rates are computed daily. CDS performs a daily backtesting of the computed haircut rates for equity instruments. If the backtesting results fall into the red zone, an additional spread will be calculated. The risk system will then apply an incremental spread to the base haircuts until the results move into the green zone.

   Once the number of backtesting failures falls into the green zone, the additional spread will be calculated based on the number of increments applied.

Holding Period for "Diversification-Eligible" Equities:

CDS employs the Dollar Average Daily Volume (Dollar ADV) methodology to assess the liquidity of equity securities and determine their holding periods. The holding period represents the estimated number of days CDS might need to execute close-out. For HC (SHC and FXHC) calculations, holding periods of 2, 3, 5, or 10 days are assumed for each security.

The Dollar ADV methodology considers both the price and trading volumes of an equity security to better classify its liquidity. The Dollar ADV is calculated as the average of the daily traded values over the past 260 days. The daily traded value is determined by multiplying the equity's closing price (in CAD) by its traded volume on that date. A Dollar ADV of $1 million or more classifies a security as highly liquid. Refer to the table below for the liquidity classifications of equity securities.

Liquidity Classification	Dollar ADV (CA$)	Holding Period
Highly liquid	> $1,000,000	2 days
Liquid	> $500,000	3 days
Less liquid	> $200,000	5 days
Illiquid	<= $200,000	10 days

4.2.4.2. Haircut Rates for "Non-Diversification-Eligible" Equities

For new equity securities or for securities with low volume that do not have an extensive history of pricing data, a flat rate haircut is applied. This approach differs from the methodology used for diversification eligible securities for which the historical simulation methodology is applied. Conversely, non-diversification eligible equity securities will use a flat rate haircut to determine an appropriate risk-adjusted value.

The appropriate haircut rate that is assigned to these equity securities will depend on the stage of issuance, type, and other qualitative factors including, (but not limited to):

- New or Initial Public Offering (IPO) securities;
- Warrants, and Rights;
- Listed Exchange, and
- Price

Adjustments to the Total HC Calculation for "Non-Diversification Eligible" Equities:

Similar to diversification eligible equities, a flat rate haircut may be adjusted by incorporating the FX adjustment and an additional haircut spread, which is determined based on backtesting results applied to the flat rate haircut.

4.2.4.3. Haircut Rates for Debt

The table below indicates the haircut rates that CDS applies to the market value of each debt instrument type.

Debt instrument type[8]	Term to maturity							
	0 to 3 months	>3 to 12 months	>1 to 3 years	>3 to 5 years	>5 to 10 years	>10 to 20 years	>20 – 35 years	Greater than 35 years
Government of Canada*	0.25%	0.5%	1.0%	1.5%	2.0%	3.5%	6.0%	6.5%
Government of Canada (Stripped)	0.25%	0.5%	1.5%	2.0%	2.5%	4.5%	7.0%	9.5%
Federated Guaranteed*	1.25%	1.5%	2.0%	2.5%	3.0%	4.5%	8.0%	8.5%
Federated Guaranteed (Stripped)	1.25%	1.5%	2.5%	3.0%	3.5%	5.0%	8.5%	10.0%
Provincial*	1.5%	1.75%	2.5%	3.0%	3.5%	5.0%	8.5%	9.0%
Provincial (Stripped)	1.5%	1.75%	3.0%	3.5%	4.0%	5.5%	9.0%	16.0%
Provincial Guaranteed*	1.75%	2.0%	3.0%	3.5%	4.0%	5.5%	9.0%	9.5%
Provincial Guaranteed (Stripped)	1.75%	2.0%	3.5%	4.0%	4.5%	6%	9.5%	17.5%
NHA Mortgage-Backed Securities	2.25%	2.5%	3.0%	3.5%	4.0%	5.5%	9.0%	9.5%
Corporate AAA	3.0%	3.0%	3.5%	4.0%	6.5%	9.0%	9.0%	9.0%
Corporate AA	3.0%	3.0%	3.5%	4.0%	6.5%	9.0%	9.0%	9.0%
Corporate A	5.0%	5.0%	5.5%	6.0%	8.5%	11.0%	11.0%	11.0%
Unrated public sector entities and government grants	15.0%	15.0%	16.0%	17.0%	18.5%	20.0%	20.0%	20.0%
Unrated municipals	20.0%	20.0%	21.0%	22.0%	23.5%	25.0%	25.0%	25.0%
Corporate BBB	30.0%	30.0%	30.0%	32.0%	33.0%	35.0%	35.0%	35.0%
Corporate BB	100.0%							
Corporate B	100.0%							
Corporate C	100.0%							
U.S. Treasury bills, notes and bonds (interest-bearing and zero-coupon bonds)*	1.0%	1.25%	1.75%	2.25%	3.5%	6.0%	9.0%	

*An additional 4% will be added to the margin requirements for USD-denominated securities to account for foreign exchange risk.

[8] CDS uses the lowest available rating from the Dominion Bond Rating Service (DBRS) and Standard & Poor's Corp. (S&P) to assign the CDS issuer rating.

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:

1. Rigorously manage replacement cost risk when acting as central counterparty (CCP) through daily mark-to-market 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 margin period of risk 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 as at value date minus one ("V-1"). 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 eligible trades that a participant has in a given security and value date 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.

CDS protects itself against these potential losses from replacement cost risk with collateral and other pre-funded resources, as described later in this section.

5.2.1. Timing of Novation

CDS becomes the counterparty to all CNS transactions through novation.

In the CCP service, novation occurs and CDS becomes the CCP as soon as the transactions are netted. For CNS, CDS becomes the CCP in the evening after system date rollover in the case of equities in CNS. As a result, the replacement cost risk of trades that have not been novated and netted is borne by the individual participants on a bilateral basis with their counterparty to the trade.

5.2.2. CNS ("Outstanding") Positions

CDS calculates CCP market/replacement cost risk on the CNS positions after the overnight CNS/BNS settlement process is complete. The calculation of risk 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 or when collateral requirements are due, 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 risk[15].

5.3. CNS 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 CNS service.

The CNS Participant Fund collateral requirement for a participant is calculated daily and consists of a Base Initial Margin (IM) plus additional margins "add-ons". The CNS Participant Fund is calculated at the ledger level for each participant and then aggregated at the participant level. Hence, the CNS Participant Fund requirement for each participant is simply the sum of the calculated CNS Participant Fund requirements for all the participant's ledgers.

5.3.1.1. Base Initial Margin (IM)

The CDS Base Initial Margin (IM) is designed to ensure that, in the event of a participant's default under normal market conditions, the pledged Base IM will sufficiently cover market risk from adverse price movements with over 99% confidence. The portfolio of a participant's CNS positions is divided into two broad groups, those that are eligible for calculation of risk on a portfolio basis ("Diversification Eligible"[9]) and those where the risk of the CNS position is determined on a stand-alone basis ("Non-Diversification Eligible").

<u>Base IM for "Diversification-Eligible" Securities:</u>

Base IM relies on a Value-at-Risk methodology for "diversification-eligible" equity securities. Diversification effects are incorporated by allowing gains and losses to offset themselves on each of the days in the historical observation period. Recall, the methodology is the weighted average of two sub-components:

1. Historical Value-at-Risk (HVaR): This component reflects the risk based on historical data, and

[9] 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.

2. Stressed Value-at-Risk (SVaR): This component accounts for extreme market conditions.

The following steps are taken by the model to calculate the HVaR for the diversification eligible portion of a portfolio:

a. Return: At each time t of the lookback period, the daily log return of each diversification eligible security in the portfolio is calculated as:

$$r_{i,t} = ln\ \frac{S_t^i}{S_{t-1}^i},$$

Where,

- $r_{i,t}$: $daily\ log\ return\ of\ security\ i\ at\ time\ t$
- S_t^i: $price\ of\ security\ i\ at\ time\ t$

b. Variance: At each time t of the lookback period, the filtered EWMA Variance for each security in the portfolio is calculated as:

$$\sigma_{i,t}^2 = \lambda \times \sigma_{i,t-1}^2 + (1-\lambda) \times r_{i,t-1}^2,$$

Where,

- $\sigma_{i,t}^2$: $EWMA\ variance\ of\ security\ i\ returns\ at\ time\ t$
- λ: $Time\ decay\ coefficient$

c. Volatility: Calculate the volatility of each security in the portfolio at each time t during the lookback period as:

$$\sigma_{i,t} = \sqrt{\sigma_{i,t}^2},$$

Where,

- $\sigma_{i,t}$: $volatility\ of\ diversification\ eligible\ security\ i\ at\ time\ t$

d. Scaling Factor: Calculate the scaling factor for each security in the portfolio for each time t in the lookback period as:

$$\theta_{t,T}^i = max(\frac{\sigma_T^i}{\sigma_t^i}, \delta)$$

Where,

- T: $Valuation\ date\ (date\ of\ HC\ calculation)$
- $\theta_{t,T}^i$: $Security\ i\ scaling\ factor\ at\ time\ t\ for\ valuation\ date\ T$
- δ: $Volatility\ floor$

e. Perturbed Prices: Calculate perturbed prices for each security in the portfolio for each time t in the lookback period as:

$$S_{t,T}^{i*} = S_T^i \times e^{r_t^i \times \theta_{t,T}^i \times \sqrt{HP}},$$

Where,

- $S_{t,T}^{i*}$: $Perturbed\ valuation\ date\ price\ of\ security\ i$
- S_T^i: $Valuation\ date\ price\ of\ security\ i$
- HP_T: $Holding\ Period\ at\ T$

f. Perturbed Portfolio Values: Calculate the perturbed portfolio values, denominated in a particular trade settlement currency, at each time t in the lookback period as:

$$\pi_{t,T}^* = \sum_{i=1}^{N} S_{t,T}^{i*} \times \Delta_T^i,$$

Where,

- $\pi_{t,T}^*$: $Perturbed\ portfolio\ value\ at\ time\ t\ using\ valuation\ date\ T$
- Δ_T^i: $Position\ in\ security\ i\ at\ valuation\ date\ T$
- N: $Number\ of\ diversification\ eligible\ securities\ in\ the\ portfolio$

g. Portfolio P&L (CAD): The CAD portfolio P&L for each time t in the lookback period is calculated as:

$$P\&L_t = \left(\pi_{t,T}^* - \pi_T\right) \times R_t$$

Where,

- PnL_t: $PnL\ at\ time\ t$
- π_T: $Portfolio\ value\ at\ valuation\ date\ T = \sum_{i=1}^{N} S_T^i \times \Delta_T^i$
- R_t: $FX\ rate\ at\ time\ t\ used\ to\ convert\ portfolio\ P\&L\ (in\ trade\ settlement\ currency)$

$$to\ CNS\ Portfolio\ Margin\ Currency\ (CAD)$$

h. Portfolio HVaR: Finally, the HVaR is calculated using the P&L vector, ordered in descending order, as follows:

$$n = (1 - \alpha) \times (L - 1) + 1,$$

$$k = \lfloor n \rfloor,$$

$$HVaR_T = (k + 1 - n) \times P\&L(k) + (n - k) \times P\&L(k + 1)$$

Where,

- $HVaR_T$: $HVaR\ calculated\ at\ valuation\ date\ T$
- α: $HVaR\ percentile\ level$
- L: $Number\ of\ observations\ in\ lookback\ period$
- $P\&L(k)$: $The\ k^{th} value\ in\ the\ sorted\ P\&L\ list$

The following steps are taken by the model to calculate the SVaR for the diversification eligible portion of a portfolio:

The methodology for calculating SVaR is similar to that for HVaR, with two key difference:

- The lookback period is shorter, reflecting a concentrated period of "extreme market conditions.
- EWMA volatility is not calculated, and there is no scaling factor applied to historical log-returns. Therefore, the perturbed prices are reduced to the following equation:

$$S_{t,T}^{i*} = S_T^i \times e^{r_t^{i}*\sqrt{2}}$$

Scaling factors were not applied to ensure true historical returns during the stress period were captured. The remaining steps in the calculation follow steps f-h of the HVaR section.

Total Base IM for Diversification Eligible Securities

The final Base IM for diversification eligible securities is calculated as a weighted average between HVaR and SVaR as follows:

$$Total\ Div.Base\ IM_T = (1-w) \times HVaR_T + w \times SVaR_T;$$

Base IM for "Non-Diversification Eligible" Securities:

For "non-diversification eligible" securities, a flat rate margining methodology is used. The non-diversification eligible approach does not allow for the portfolio effects that may serve to reduce the overall risk of the CNS positions and hence reduce the collateral requirements of the CNS participant.

Flat rate margining applies the security's haircut to the market value of the security to obtain its margin requirement. These margin requirements are then summed for all these securities to obtain the flat rate margin component.

The Flat Rate VaR for *each* non-diversification eligible security within a portfolio is calculated as follows:

$$Flat\ Rate\ VaR_T^i = S_T^i \times \Delta_T^i \times HC_T^i \times R_T,$$

Where:

- $Flat\ Rate\ VaR_T^i$: $Flat\ rate\ margin\ of\ security\ i\ at\ valuation\ date\ T$
- Δ_T^i: $Position\ in\ security\ i\ at\ valuation\ date\ T$
- HC_T^i: $Haircut\ rate\ (\%)\ of\ security\ i\ at\ valuation\ date\ T\ as\ calculated\ by\ the\ Equity\ Haircut\ Rate\ model$
- R_T: $FX\ rate\ at\ time\ T\ used\ to\ convert\ portfolio\ P\&L\ (in\ trade\ settlement\ currency)\ to\ CNS\ Portfolio\ Margin\ Currency\ (CAD)$

The *total* Base IM for non-diversification eligible securities is then calculated as follows:

$$Total\ Non\ Div.Base\ IM_T = \sum_{i=1}^{K} Flat\ Rate\ VaR_T^i,$$

Where,

- $Total\ Non\ Div.Base\ IM_T$: $Total\ Non\ Diversifiable\ base\ IM\ at\ valuation\ date\ T$
- K: $Number\ of\ non\ diversifiable\ securities\ in\ the\ portfolio$

Total Base IM Calculation:

The Total Base IM for a portfolio is calculated as follows:

$$Total\ Base\ IM_T = Total\ Non\ Div.Base\ IM_T + Total\ Div.Base\ IM_T$$

5.3.1.2. Margin Add-On: Mark-to-Market (MTM)

CDS marks-to-market all CNS trades and CNS positions that are outstanding (i.e., novated and unsettled). CNS trades are marked-to-market the first time when novation and netting occurs and then the resulting CNS positions continue to be marked-to-market until they settle. This mark- to-market process addresses the potential loss from the original trade price or last mark-to-market price to the current price. 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 is exposed to the risk of a participant having a negative mark applied against their Funds Account and subsequently defaulting.

To mitigate this risk, CDS collects a Mark-to-Market (MTM) margin add-on, as the sum of two sub-components:

- The **Settlement Value Mark (SVM)** is the additional margin required at the beginning of the day to account for any net negative mark-to-market of CNS positions calculated prior to the CNS batch settlement process. For each ledger, the SVM sub-component will either be a positive value (i.e., negative marks owed) or 0.
- The **Variation Margin (VM)** is the additional margin required to account for the difference between the last close prices (used for SVM) and the new intraday prices of CNS positions. The VM marks all positions to the new intraday prices from the last close prices. For each ledger, the VM sub-component will either be a positive value (i.e., negative intraday marks owed) or 0.

The MTM margin add-on will be computed in terms of CAD currency. SVM and VM in USD currency will be converted to CAD by applying the corresponding exchange rate for the business date.

5.3.1.3. Margin Add-On: Market Liquidity Risk (MLR)

Market liquidity risk arises when CDS cannot liquidate CNS outstanding positions at the existing market prices because of insufficient market depth, a scarcity of potential buyers for the assets in question, or other market frictions. If it is estimated that such a close-out period would take much longer than the minimum CNS holding period, an additional margin for market liquidity risk will be charged. The MLR represents a fixed dollar amount applies on an individual basis for CNS outstanding positions held by a CNS Participant. This add-on is initially computed at the Ledger level (and subsequently aggregated at the Participant level).

CDS's MLR margin add-on decomposes this risk into two sub-components:

1. **Liquidity Risk Premium** is the risk associated with the ability to convert securities into currency in a timely manner at a fair price. The liquidity risk premium is determined by the bid-ask spread and measures

the cost associated with executing a trade.

2. **Concentration Risk Premium** refers to the negative price impact that the liquidation of concentrated positions could entail. The concentration risk premium is derived from the concept of market impact and measures the cost resulting from price changes due to the liquidation of large positions.

The formula for the MLR margin add-on is as follows:

$$MLR\ per\ Share = \ Multiplier * \left\{ ADS + \left[\sigma * \sqrt{MPOR} * Price * \alpha \sqrt{\frac{\hat{Q}}{EV}} \right] * Max\left(\frac{\hat{Q} - EV}{\hat{Q}}; 0 \right) \right\}$$

Where:

a. $\hat{Q}$: The mid-interval position of a given stock in CDS's proprietary MLR matrix
b. ADS: Average Daily Spread
c. $\sigma =$ The volatility based on an EWMA estimator
d. Price = The End of Day (EOD) price of a given stock;
e. EV: Expected Volume. The EV is the quantity CDS assumes it can liquidate without creating any price impact;
f. Multiplier: Buffer

5.3.1.4. Margin Add-On: Specific Wrong Way Risk (WWR)

Specific Wrong-way risk occurs when exposure to a CNS Participant is adversely correlated with the credit quality of that CNS Participant. This means that the risk increases precisely when the likelihood of default is higher, which can exacerbate potential losses in times of stress.

For the purposes of quantifying the WWR margin add-on, CNS outstanding positions held by a CNS Participant and their affiliates, specifically common shares and preferred shares issued by the Participant or their affiliate (Parent), must be identified. Those CNS outstanding positions will then be assessed, and CDS will calculate the WWR exposure and the right-way-risk (RWR) exposure. The WWR exposure is based on the assumption that the price of these shares drops to zero, thereby determining the additional margin that needs to be accounted for in the total risk exposure. In other words, this additional margin always charges the full amount of the total wrong-way risk (i.e., 100% of the risk exposure). RWR occurs when a CNS participant holds a net short position in either their own or their parent company's stock. In such cases, a 100% collateral charge is also applied, but with a specific purpose: to offset any WWR exposure.

The total WWR Add-on collateral charge cannot be negative, and the WWR Add-on must either be zero or positive, even when both WWR and RWR charges are applicable (i.e., no margin relief is allowed). This WWR add-on is initially computed at the Ledger level (and subsequently aggregated at the Participant level):

Specific WWR Add-on per Ledger$_L$:

$$Specific\ WWR_i\ \ Add - on_L = Max\left[0; \sum_{i=1}^{N} WWR_i + RWR_i \right]$$

Where:

- $N = Total\ number\ of\ ISINs\ where\ WWR\ or\ RWR\ are\ applicable$;

5.3.1.5. Margin Add-On: Residual Incremental Margin (RIM)

Adequacy risk refers to the potential insufficiency of the CNS Participant Fund to cover losses from daily portfolio changes. This add-on is initially computed at the Ledger level (and subsequently aggregated at the Participant level).

The Residual Incremental Margin Additional Margin (add-on) is designed to mitigate the risk originating from daily portfolio fluctuations since the previous business day's margin collection that could arise from the build-up of market risk originating from daily portfolio fluctuations. The adequacy risk exposure is captured through the calibration and sizing of the RIM add-on, which, together with the Base Initial Margin and all other Add-Ons, makes up the CNS Participant Fund.

Under this context, and in light of maintaining compliance with standard 99% adequacy coverage requirement, the calibration and sizing of the RIM add-on is specifically measured by the variability of the Base IM and the MtM add-on over a lookback period. As such, in addition to the standard market risks that are captured by these two margin components (i.e. volatility and price market risks), the RIM add-on can be viewed as a complement to the Base IM for position risk.

The following steps are taken by the model to calculate the RIM add-on:

a. Uncovered Residual Incremental risks

   Daily changes in the CNS Participant's Base Initial Margin and Mark-to-Market requirements are collected, over a lookback period.

   Uncovered Residual Incremental Base IM (URI-BIM):

   $$URI_{BIM}(t) = BASE\ IM\ (t-i) - Base\ IM(t-(i+1))$$

   Uncovered Residual Incremental MtM (URI-MtM):

   $$URI_{MtM}(t) = MtM\ (t-i) - MtM(t-(i+1))$$

b. Uncovered Residual Incremental Margin (URIM)

   The sum of the Uncovered Residual Incremental risks are floored at zero (i.e., URI-BIM and URI-MtM).

   $$URIM(t) = Max[\ URI_{BIM}(t); 0]\ + Max[URI_{MtM}(t); 0]$$

c. Residual Incremental Margin

   RIM is calibrated by applying an Exponentially Weighted Moving Average (EWMA) smoothing function over a lookback period with a decay factor.

   $$RIM(t) = EWMA\ [URIM(t), \ldots, URIM(t - lookback\ period)]$$

For each CNS Participant, CDS activates and sizes the RIM add-on charge based on the number of Adequacy breaches observed by the Participant over a lookback period.

$$RIM\ AddOn = Adjustment\ Factor * Max\ [RIM(t), \ldots, RIM(t-n)]$$

Where,

- "n" represents the number of business days of the previous month.

5.3.2. Backtesting of Participant Funds Collateral Requirements

The essence of the CNS backtesting program is the daily comparison of the margin requirements with the corresponding profit and loss (P&L) on CNS outstanding positions held over the appropriate liquidation horizon (or, holding period). The CNS backtesting program consists of monitoring whether the number of losses that exceed the margin requirements is statistically consistent with the coverage target over a year.

CNS backtesting is performed to assess whether:

- The Base IM Model used by CDS is performing as expected. CDS calculates a portfolio's P&L by comparing the prices of the CNS outstanding positions as held at the close of business day "t" with the prices of the same positions at the close of business day "t + HP". This is referred to as "Base IM Model Backtesting".
- The resulting losses from a participant's default on day "t" could be covered by the CNS participant margin collected on the day before default ("t-1"), using only Base IM, MTM and RIM margin add-ons, while meeting a required coverage target. Although additional margin is collected (i.e. MLR and WWR Add-ons) are also part of the participant's CNS Participant Fund requirements, these resources are not considered for this backtesting process. This is referred to as "Adequacy Backtesting", and assumes that the CNS participant would default before a new CNS Participant Fund requirement is computed on "t".

5.3.3. 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 limit the surviving Participants' loss exposures:

5.3.3.1. 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 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.

5.3.4. 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[10] 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.

5.4. 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.

CDS calculates the CNS Default Fund collateral requirement on a monthly basis using stress testing results. CDS monitors the value of the CNS Default Fund on a daily basis and can adjust the size of the fund on an intra-month basis.

The Default Fund will consist of two tiers (Tier 1 and Tier 2), and it is structured to mitigate the largest of the daily residual stress-test losses under extreme but plausible market conditions of all CNS Participants and their affiliate(s).

- Tier 1 CNS Default Fund will be based on the daily CNS outstanding positions of all CNS participants*, excluding* those CNS outstanding positions that are included in Tier 2.
- Tier 2 CNS Default Fund will be based on the specific subset of CNS outstanding positions attributed to those CNS participants whose activity levels have demonstrated spikes in CNS activity on certain specific business days. For these CNS participants, only CNS outstanding positions from those specific business days are used to size the Tier 2 CNS Default Fund collateral requirement. CNS outstanding positions for all other business days are used to size the Tier 1 CNS Default Fund collateral requirement.

Note that CNS positions considered for participants' default fund sizing exclude those participants' Wrong Way Risk positions, consistent with their exclusion in the calculation of CNS participants' Base IMs.

Triple Witching Days

The Triple Witching Day occurs once per quarter (four (4) times per year) on the third Friday of March, June, September and December.

CDS uses a threshold to determine whether a CNS participant had Triple Witching Activity for the calculation of the CNS Default Fund. CDS measures the relative change in the participant's Base IM requirement between the Triple Witching settlement date and the Triple Witching trade date. A CNS participant will be deemed to have Triple Witching activity when the day-over-day increase in that participant's Base IM requirements is greater than or equal to (≥) 100% in the lookback period.

[10] Outstanding CCP obligations include novated positions that did not settle the prior business day (i.e., they are past their original value date), novated positions with a value date equal to the current business day which have not settled and positions that have been novated but may have a future value date.

The CNS Default Fund is then calculated to collateralize the largest of the daily residual stress-test losses over the lookback period for each Tier.

The daily residual stress-test profit / losses for each CNS participant and for each stress test scenario are calculated by summing the following:

- The post stress-test profit or loss of unwinding a participant's CNS positions on that day
- The participant's Base IM;

The CNS Default Fund collateralizes, on a mutualized basis, the risk associated with CNS participants' positions that would result in the largest credit risk (residual stress test loss) under extreme, but plausible, market conditions. The CNS Default Fund allocates the collateral requirements on a pro-rata basis, taking into account the cumulative Base IM, over the look-back period, for those business days associated with either of Tier 1 or Tier 2 activity.

Default Fund Sizing and Allocation - Tier 1

The largest residual stress-test loss of the CNS positions in Tier 1 (as defined above) for all days in lookback period which do not have associated Triple Witching Activity is used to calculate the size of the CNS Default Fund.

The largest Tier 1 residual stress-test loss of the CNS Default Fund is then allocated amongst all CNS Service participants according to their pro-rata share of the cumulative Base IM collateral requirements over the days in the look-back period, excluding the Triple Witching days.

CDS's monthly re-sizing of the CNS Default Fund will advise CNS participants of any changes to their Tier 1 CNS Default Fund collateral requirements to ensure the CNS Default Fund remains Cover-1 compliant. The Tier 1 CNS Default Fund requirements will be in effect for all CNS participants throughout the month, subject to intra-month resizing. See Intra-month Monitoring section below.

Default Fund Sizing and Allocation - Tier 2

The difference between the largest residual stress loss of the CNS outstanding positions contained in Tier 2 and the largest residual stress loss of the CNS outstanding positions in Tier 1 is allocated against those CNS Participants having Triple Witching Activity.

The Tier 2 CNS Default Fund collateral requirement is allocated incrementally to, and in addition to, the Tier 1 CNS Default Fund collateral requirement – and only against CNS Participants identified as having Triple Witching Activity.

The Tier 2 CNS Default Fund requirement is based on a Triple witching participant's pro-rata share of the cumulative Base IM collateral requirements on Triple Witching activity days only during the 1- year lookback period[11].

CDS's monthly resizing of the CNS Default Fund will advise CNS participants of any revisions to their Tier 2 CNS Default Fund collateral requirement on the applicable months of March, June, September and December only. The Tier 2 collateral requirements will remain in effect for a period of up to 10 business days, subject to the affected participants' Base IM collateral requirement returning to a level similar to that which existed prior to the Triple Witching Activity.

[11] Four days every year – for every quarter on their value date (the day they are first eligible to settle).

Intra-month Monitoring

Daily residual stress-test profits and losses will be calculated every business day between the regularly scheduled monthly reviews of the CNS Default Fund size to ensure that the CNS Default Fund remains Cover-1 compliant intra-month.

CDS will monitor daily residual stress-test losses intra-month. In the event that an intra- month residual stress-test loss (in either the non-Triple Witching or Triple Witching days) exceeds the Tier 1 and/or Tier 2 residual stress losses used to calculate the size of the CNS Default Fund, CDS will make an intra-month CNS Default Fund collateral call against both Tier 1 and Tier 2 Participants according to the following criteria and thresholds:

i. Single CNS Participant Cover-1 breach:
   - Targeted collateral call to the CNS Participant responsible for the breach

ii. Two CNS Participant Cover-1 breaches with both breaches being individually less than 10% of CNS Default Fund:
   - Targeted collateral call to those CNS Participants responsible for the breach

iii. Two CNS Participant Cover-1 breaches, with either of the individual breaches being greater than 10% of CNS Default Fund:
   - Allocation to all CNS Participants of the new Cover-1 amount

iv. More than two CNS Participant breaches
   - Allocation to all CNS Participants of the new Cover-1 amount

For example, if an intra-month stress-test loss exceeding the stress-test loss used to calculate the size of Tier 1 of the CNS Default Fund, on a non-Triple Witching day, the above calls will apply when additional collateral is required for either: (a) the Tier 1 collateral requirement to remain Cover-1 - for both (i) and (ii); or (b) on the new Tier 1 amount across all CNS service Participants – for both (iii) and (iv).

Alternatively, if an intra-month stress-test loss on a Triple Witching day occurs, the above calls will kick in when additional collateral is required for either: (a) the Tier 2 collateral requirement to remain Cover-1 - for both (i) and (ii); or (b) on the new Tier 2 amount across all CNS service Participants – for both (iii) and (iv).

In all instances, the allocation is based on the year to date lookback period.

5.4.1. 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 CNS 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:

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, sufficient available financial resources in the Supplemental Liquidity Fund 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

Sector limits are applied to extenders of credit, settlement agents 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 3 – 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. Supplemental Liquidity Fund

CDS calculates the CNS Supplemental Liquidity Fund (SLF) collateral requirement on a monthly basis using liquidity stress scenarios. CDS monitors the value of the Supplemental Liquidity Fund on a daily basis and can adjust the size of the fund between the monthly updates.

The CNS SLF is designed to cover the liquidity shortfalls of the CNS CCP service with CNS participants' resources through a pooling-of-resources arrangement. The CNS SLF is sized to have resources sufficient to cover potential liquidity stress scenarios that include, but are not limited to, the default of a participant and its affiliates that would potentially cause the largest aggregate liquidity exposure for the CCP in extreme but plausible market conditions.

CDS has implemented a multi-component Supplemental Liquidity Fund:

A. Main CNS Settlement Component
B. Prefunded CNS Settlement Component.

A. Main CNS Settlement Component

The Main CNS settlement component requirements are based on the activity level of the participants in the CNS service to reflect the risks that such participants pose to the operations of the clearing and settlement system.

To determine the size of the liquidity shortfalls used to calculate the Main CNS settlement component, the liquidity shortfall of unwinding CNS outstanding positions on each day is calculated for every CNS

participant, for every day of the lookback periods, using stress- test scenarios and all available qualifying financial resources.

The daily liquidity shortfalls are calculated based on the following inputs:
1. Liquidity requirements over the close out period; and
2. Qualifying financial resources

The Main CNS settlement component is then calculated to collateralize the largest daily liquidity shortfalls over the lookback periods. To determine the size of the Main CNS settlement component, CDS takes the greater of:

i) a weighted average lookback period amount, determined using the following formula:
a) w x the maximum liquidity shortfall amount identified during a short-term lookback period;
b) (1 - w) x the maximum liquidity shortfall amount identified during a medium-term lookback period;

Where,
w = weight of the short-term lookback period
(1 - w) = weight of the medium-term lookback period
or

ii) a long-term floor amount, determined as an average of the weighted average lookback period amount during a long-term lookback period, times an applicable buffer determined by CDS from time to time, plus any amount that may be required to be paid or disbursed by CDS to access any other qualifying financial resources, when needed.

The variables will be updated by CDS from time to time.

CDS allocates the Main CNS settlement component on a pro-rata basis, taking into account each participant's largest liquidity shortfall during a lookback period. At a minimum, the CNS settlement component will be updated on a monthly basis. This approach ensures that CNS participants that bring the most liquidity risk are asked to mutualize a greater share of the Main
CNS settlement component.

B. Prefunded CNS settlement component

CDS may also require a Prefunded CNS settlement component amount in the event CDS anticipates an increase in the daily liquidity shortfall from one or more CNS participants.

The primary causes for such an increase could be due to, without limitation (i) an increase in market volume related to the expiry period for stock options, (ii) an overall increase in market volume from one or more Participants, or (iii) any other market factors that may impact liquidity exposure.

This Prefunded CNS settlement component may be required by CDS at its discretion and at any time including, without limitation, in expectation of any relevant expiry periods for stock options and at any time between those expiry periods. In addition, in the event a CNS participant provides CDS with a Prefunded CNS settlement component amount, CDS may return such amount to the CNS participant in full when such amount is not required anymore, or in part when CDS determines that the CNS participant’s anticipated level of activity in the near future may reasonably be expected to remain at a level materially different than its historic level of activity, among other reasons.

Notwithstanding the foregoing, in the context of expiry periods for stock options, also known as the triple witching activity periods:

Step 1: CDS will calculate and determine if a Prefunded CNS settlement component must be required from an CNS participant, and require such a Prefunded CNS settlement component, on the third business day that precedes the Triple Witching Settlement Day (as defined in section 5.2.9). The amount calculated as part of this step 1 remains valid until Triple Witching Settlement Day.

Step 2: On Triple Witching Settlement Day, CDS will calculate and update the CNS Participants' value of the CNS settlement component. If the difference between (i) the amount calculated in step 2; and (ii) the total of any previous requested Main CNS settlement component plus the amount calculated and requested in step 1;

(a) is greater than zero, CDS will, on that business day, require the CNS participant to provide CDS with the incremental requirements; or

(b) is lower than zero, CDS may, after the Triple Witching Settlement Day, and subject to the other provisions herein, return, partially return or keep the excess of the Prefunded CNS settlement component amount.

As indicated above, CDS may return any excess amount to the CNS participant in full when such amount is not required anymore, or in part when CDS determines that the CNS participant's anticipated level of activity in the near future may reasonably be expected to remain at a level materially different than its historic level of activity, among other reasons.

Daily Monitoring of the CNS settlement component

CDS monitors the value of the CNS settlement component on a daily basis to ensure that it covers the highest shortfall observed. As such, the Main CNS settlement component may be resized on any given day due to a newly observed liquidity shortfall. At a minimum, the CNS settlement component will be updated on a monthly basis. If a resizing occurs, a collateral call is then allocated amongst all CNS participants using the same methodology. For greater certainty, although the daily monitoring only applies to the calculation of the Main CNS settlement component, such daily monitoring shall take into account the value of the Prefunded CNS settlement component.

6.2.4. 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 4 – Eligible collateral for collateral pools and Participant Funds

CDSX Eligible Collateral

CDSX Eligible Collateral	Instrument Type[1]	Extenders of Credit	Settlement Agents		CAD Receivers of Credit	USD Receivers of Credit	CNS Participant Fund	CNS Default Fund	Supplemental Liquidity Fund	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 percent of the contribution must be made in U.S. cash.

[9]

6.2.5. Back-up Liquidity Providers

CDS has established a standby line of credit in Canadian dollars with a set of commercial liquidity providers. This line can be activated to obtain liquidity in the event of default of a participant using the CNS Service. To cover the potential liquidity needs arising from the New York Link Service, CDS has a standby line in US Dollars.

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, 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 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.

6.2.6. Stress Testing

Stress testing is a fundamental risk management tool. While margin models are calibrated to ensure that sufficient financial resources are available in the event of a default of a participant under normal market conditions, stress testing aims to ensure that financial resources are sufficient to withstand the default of one participant and its affiliates under extreme but plausible market conditions.

Credit and liquidity stress tests enable CDS to size and to monitor the required prefunded financial resources according to the global regulatory standards in place for CDS.

6.2.6.1. Credit stress testing

On a daily basis, CDS calculates the impact on the CDS participants and their affiliates of a wide range of historical, and theoretical credit stress tests scenarios. All stress tests are governed in the stress testing framework and reviewed from time to time. Stress tests cover the relevant risk factors to which CDS may be exposed through the CNS positions (e.g. change in the yield curve, change in the equity prices, etc.). Credit stress tests results could be used to monitor the risk of the CDS participants and to calibrate specific funds such as the CNS Default Fund.

For the CNS Default Fund, the daily results are analyzed and compared to the existing pre-funded financial resources. Residual losses are then calculated after deducting the pre-funded financial resources and allocated to the CDS participants according to the risk methodology described in the section CNS Default Fund for CCP Services.

6.2.6.2. Liquidity stress testing

On a daily basis, CDS calculates the impact on the CDS participants and its affiliates of a wide range of historical and theoretical liquidity stress tests scenarios. All stress tests are governed in the stress testing framework and reviewed from time to time. Stress tests cover the relevant risk factors associated with the liquidity risks and to which CDS may be exposed through the CNS positions (e.g. settlements, etc.). Liquidity stress tests results could be used to monitor the risk of the CDS participants and to calibrate specific funds such as the Supplemental Liquidity Fund.

For the Supplemental Fund, the daily results are analyzed and compared to the qualifying financial resources. Liquidity shortfalls are then calculated after deducting the qualifying financial resources and allocated to the CDS participants according to the risk methodology described in the section Supplemental Liquidity Fund.

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 and Settlement Agents, 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 USD cap is based upon the Participant's election. 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).

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 CNS outstanding positions 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, a foreign exchange haircut is applied. The foreign exchange haircut is calculated using the same historical value-at-risk methodology as defined for Equity Haircuts.

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:

a) trade clearing and settlement services through National Securities Clearing Corporation (NSCC).

b) 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).

Participants must send their initial cash contribution to CDS by sending a payment in US funds through Fedwire. Additional participant fund requirements are satisfied by delivering a contribution to CDS in the form of USD cash collateral.

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.

Fund requirements fluctuate 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. The CDS Participant Fund for New York Link will be made up of the following components:

1. DTC settlement component; and
2. NSCC settlement component.

The NSCC settlement component is itself comprised of two amounts:

a. Main NSCC settlement component; and
b. Prefunded NSCC settlement component.

Participants will be notified of their:

- DTC settlement component requirements on a quarterly basis;
- Main NSCC settlement component requirements on a monthly-basis (at a minimum); and
- Prefunded NSCC settlement component requirements on an "as needed or ad hoc 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.

DTC Settlement Component

The DTC settlement 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 the day.

CDS will update the DTC settlement 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 a 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 settlement 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 settlement 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 Settlement Component

The NSCC settlement component covers the liquidity shortfalls of the NYL service with CDS participants' resources through a pooling-of-resources arrangement. The NSCC settlement component is sized to have resources sufficient to cover potential liquidity stress scenarios that include, but are not limited to, the default of a NYL participant and its affiliates that would potentially cause the largest aggregate liquidity exposure in extreme, but plausible, market conditions.

The NSCC settlement component is composed of two amounts: (a) the Main NSCC settlement component, and (b) the Prefunded NSCC settlement component.

a. **Main NSCC settlement component**

The Main NSCC settlement component requirements are based on the activity level of the participants in the NYL service to reflect the risks that such participants pose to the operations of the clearing and settlement system.

To determine the size of the liquidity shortfall used to calculate the Main NSCC settlement component, the liquidity shortfall of unwinding NYL outstanding positions on each day is calculated for every NYL participant, for every day of the lookback periods, using stress-test scenarios and all available qualifying financial resources.

The daily liquidity shortfalls are calculated based on the following inputs:
1. Liquidity requirements over the close out period; and
2. Qualifying financial resources

The Main NSCC settlement component is then calculated to collateralize the largest daily liquidity shortfalls over the lookback periods. To determine the size of the Main NSCC settlement component, CDS takes the greater of:

i) a weighted average lookback period amount, determined using the following formula:
   a) *w* x the maximum liquidity shortfall amount identified during a short-term lookback period;
   b) (1 - *w*) x the maximum liquidity shortfall amount identified during a medium-term lookback period;

   Where,
   w = weight of the short-term lookback period
   (1 - *w*) = weight of the medium-term lookback period

or

ii) a long-term floor amount, determined as an average of the weighted average lookback period amount during a long-term lookback period, times an applicable buffer determined by CDS from time to time, plus any amount that may be required to be paid or disbursed by CDS to access any other qualifying financial resources, when needed.

The variables will be updated by CDS from time to time.

CDS allocates the Main NSCC settlement component on a pro-rata basis, taking into account each participant's largest liquidity shortfall during a lookback period. At a minimum, the NSCC settlement component will be updated on a monthly basis. This approach ensures that NYL participants that bring the most liquidity risk are asked to mutualize a greater share of the Main NSCC settlement component.

b. **Prefunded NSCC settlement component**

CDS may also require a Prefunded NSCC settlement component amount in the event CDS anticipates an increase in the daily liquidity shortfall from one or more NYL participants.

The primary causes for such an increase could be due to, without limitation (i) an increase in market volume related to the expiry period for stock options, (ii) an overall increase in market volume from one or more Participants, or (iii) any other market factors that may impact liquidity exposure.

This Prefunded NSCC settlement component may be required by CDS at its discretion and at any time including, without limitation, in expectation of any relevant expiry periods for stock options and at any time between those expiry periods. In addition, in the event an NYL participant provides CDS with a Prefunded NSCC settlement component amount, CDS may return such amount to the NYL participant in full when such amount is not required anymore, or in part when CDS determines that the NYL participant's anticipated level of activity in the near future may reasonably be expected to remain at a level materially different than its historic level of activity, among other reasons.

Notwithstanding the foregoing, in the context of expiry periods for stock options, also known as the triple witching activity periods:

Step 1: CDS will calculate and determine if a Prefunded NSCC settlement component must be required from an NYL participant, and require such a Prefunded NSCC settlement component, on the third business day that precedes the Triple Witching Settlement Day (as defined in section 5.2.9). The amount calculated as part of this step 1 remains valid until Triple Witching Settlement Day.

Step 2: On Triple Witching Settlement Day, CDS will calculate and update the NYL Participants' value of the NSCC settlement component.

If the difference between (i) the amount calculated in step 2; and (ii) the total of any previous requested Main NSCC settlement component plus the amount calculated and requested in step 1

(a) is greater than zero, CDS will, on that business day, require the NYL participant to provide CDS with the incremental requirements; or
(b) is lower than zero, CDS may, after the Triple Witching Settlement Day, and subject to the other provisions herein, return, partially return or keep the excess of the Prefunded NSCC settlement component amount.

As indicated above, CDS may return any excess amount to the NYL participant in full when such amount is not required anymore, or in part when CDS determines that the NYL participant's anticipated level of activity in the near future may reasonably be expected to remain at a level materially different than its historic level of activity, among other reasons.

Daily Monitoring of the NSCC settlement component

CDS monitors the value of the NSCC settlement component on a daily basis to ensure that it covers the highest shortfall observed. As such, the Main NSCC settlement component may be resized on any given day

due to a newly observed liquidity shortfall. At a minimum, the NSCC settlement component will be updated on a monthly basis. If a resizing occurs, a collateral call is then allocated amongst all NYL participants using the same methodology. For greater certainty, although the daily monitoring only applies to the calculation of the Main NSCC settlement component, such daily monitoring shall take into account the value of the Prefunded NSCC settlement component.

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 settlements[12]. 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 shortfall using the following waterfall:

1. Apply the defaulter's CDS Participant Fund for New York Link.
2. Use CDS's existing USD LOC.
3. Allocate against surviving NYL participants based on each CDS Participant Fund for New York Link's pro-rata share of total CDS Participant Fund for New York Link.
4. Any remaining liquidity requirement will be allocated against NYL participants as follows:
   a) Apply the defaulter's USD CDSX credits to reduce the NYL payment obligation.
   b) Allocate against surviving NYL participants as a haircut to their USD credit based on each NYL participant's pro-rata share of total credits.
   c) Allocate the defaulter's CAD credits to the surviving NYL participants.

8.5. 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:

8.5.1. 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

[12] 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.

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.

8.5.2. 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.

8.5.3. 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.

8.6. 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.

8.6.1. 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.

8.7. 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.

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 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, 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 central counterparty service fund(s) (i.e., CNS Participant Fund and CNS Default Fund)
- 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, CCP Participant Fund or Supplemental Liquidity Fund.

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

- Suspended participant's settlement service collateral - The collateral 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 collateral pledged by the suspended participant to a collateral pool supporting a category credit ring.
- Suspended participant's CNS Participant Fund contributions - The collateral pledged by the suspended participant to the CNS Participant Fund.
- Suspended participant's CNS Default Fund contributions - The collateral pledged by the suspended participant to a CNS Default Fund.
- Suspended participant's Supplemental Liquidity Fund contributions - The collateral pledged by the suspended participant to Supplemental Liquidity Fund.
- Suspended participant's specific collateral - The collateral 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.
- Survivors' collateral pool contributions - The collateral pledged by the other members of a suspended participant's collateral pool and category credit ring.
- Survivors' CNS Default Fund contributions - The collateral pledged by the other members of a suspended participant's CNS Default Fund.
- Survivors' CNS Supplemental Liquidity Fund contributions - The collateral pledged by the other members of a suspended participant's CCP Supplemental Liquidity 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 5 –Using Collateral of a Receiver of Credit		
Type of Collateral	**Primary use**	**Sequence of secondary use**
Suspended receiver of credit's settlement service collateral	CDS (on behalf of the members of the CAD Receivers of Credit CCR) and Extenders of Credit (if any) according to the use and allocation methodology described in section Processing a receiver of credit suspension".	Any remaining collateral goes next to the survivors of the c o l la t e r a l p o o l s in either currency (if the suspended receiver of credit was a member of that collateral pool). Any excess is used by CDS to mitigate other losses.
Suspended receiver of credit's collateral pool contribution (if any)	Survivors of the collateral pools of which the suspended receiver of credit was a member.	Any remaining collateral goes next to the extenders of credit (if necessary). Any excess is used by CDS to mitigate other losses.
Suspended receiver of credit's CNS Participant Fund, CNS Default Fund, **and CNS Supplemental Liquidity Fund contributions (if any)**	Extinguish defaulter's losses in the central counterparty service	Any remaining collateral goes to CDS to mitigate other losses.
Suspended receiver of credit's specific collateral (if any)	Survivors of the central counterparty service or collateral pool for which the specific collateral was required.	Any excess specific collateral is shared pro-rata by the suspended receiver of credit's extenders (if any) and the survivors of the receiver of credit collateral pools of which the suspended receiver of credit was a member.
Survivors' central counterparty CNS Participant Fund and CNS Default Fund contributions	Extinguish the defaulter' losses in the central counterparty service	This type of collateral is never used for any other purpose.

Table 6 –Using Collateral of a suspended non-receiver of credit (Extender of Credit, Settlement Agent)		
Type of Collateral	**Primary Use**	**Sequence of Secondary Use**
Suspended participant's settlement service collateral	Survivors of the collateral pool.	Any remaining collateral goes next to the suspended participant's extenders of credit (if any). Any excess is used by CDS to mitigate other losses.
Suspended participant's collateral pool contribution (if any)	Survivors of the collateral pool.	Any remaining collateral goes next to the suspended participant's extenders of credit (if any). Any excess is used by CDS to mitigate other losses.
Suspended participant's CNS Participant Fund, CNS Default Fund, **and CNS Supplemental Liquidity Fund contributions (if any)**	Extinguish defaulter's losses of the central counterparty service	Any remaining collateral goes to CDS to mitigate other losses.

Suspended participant's specific collateral	Survivors of the central counterparty service or collateral pool for which the specific collateral was required.	Any excess specific collateral is shared pro-rata by the suspended participant's extenders of credit (if any) and the survivors of the collateral pool of which the defaulter was a member (if any).
Survivors' collateral pool contributions	Survivors of the collateral pool.	This type of collateral is never used for any other purpose.
Survivors' central counterparty CNS Participant Fund and CNS Default Fund contributions	Extinguish the defaulter' losses of the central counterparty service	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 (e.g., collateral pool contributions, CCP Participant Fund contributions, Supplemental Liquidity Fund contributions and 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 and the Supplemental Liquidity Fund, 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 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

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 CNS Participant Fund contributions, CNS Default Fund contributions, Supplemental Liquidity 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 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, CNS Default Fund, Supplemental Liquidity Fund 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.

9.5.3. 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, eligible settlement service collateral allocated to CDS[13] 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, CNS Default Fund, Supplemental Liquidity Fund 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[14] (i.e., outstanding to-deliver or to-receive positions in CNS), CDS executes close-out transactions to clear these CNS 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.

If the suspended participant left a CNS outstanding or value-dated to-receive position CDS will use a CNS Central Ledger to facilitate the settlement of all Participant obligations to CNS. Under this model, CDS is able to take control of the outstanding to-receive positions, fund the settlements using Default Management Liquidity Waterfall, and then seek to further deliver through the Central Ledger or liquidate using the CDS broker. CDS as the CCP will be in a position to manage a default scenario and ensure that it is designed to honor its obligations in the most effective, efficient, and timely manner as is required by global regulatory standards for CCPs. The Central Ledger provides CDS with the level of control over securities and legal title over the securities purchased to efficiently secure liquidity in a default situation and continue to service the market independently of the defaulting participant.

Any loss that is generated by the execution of these close-out transactions are allocated against the suspended financial resources (Participant Fund contributions, Default Fund contributions and Supplemental Liquidity Fund), CDS's Dedicated Own Resources and the survivors' Default fund contributions. In the event that CDS is later able to recover from the suspended Participant any amount, such amount shall be returned to the other Participants to compensate for any amount charged to them and for the financial resources levied from them as part of the Default Management in the reverse order that these

[13] Refer to "Participating in CDS Services" for the allocation methodology for the CAD RCP Defaulter's ACV.

[14] Outstanding CCP obligations include novated positions that did not settle the prior business day (i.e., they are past their original value date), novated positions with a value date equal to the current business day which have not settled and positions that have been novated but may have a future value date.

resources were used to cover the losses. At the exception of the defaulter's Supplemental Liquidity Fund contribution, the Supplemental Liquidity Fund may not be used in the loss allocation process.

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 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 discretionary suspension.

10. Depository Service

CDS is the sole central securities depository (CSD) in the Canadian market. CDS holds eligible securities[15] 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 entitlements[16] 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 account[17] 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 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

[15] 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.

[16] 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.

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

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 event[18] information.
- Risk of missed actions related to voluntary instructions.
- Risk of proxies not being sent.

CDS controls these risks through the following processes:

[18] Security holders must take an action to receive an entitlement payment on a voluntary event.

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 position[19];
- 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 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.

[19] 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.

- 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 OPERATINGCAP CALCULATION - EXTENDERS OF CREDIT

EXTENDERS OF CREDIT	CAPITAL	ADJUSTMENT FACTOR	RATING DISCOUNT	FORMULA AMOUNT	ACTUAL CAP (Rounded)	USDCAPCalculations CDN$EQUIV. (3%ofElectedCap)	ExchangeRate 88.0000%	LessFX Risk 10.0000%	U_{SD} CA	CAD CAP
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)[20] 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**

[20] 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 → CDN$EQUIV. (3% of Elected Cap)	ExchangeRate	LessFXRisk	USD CAP	CAD CAP
										88.0000%
Extender 1	12,111,000,000	110%	95%	12,655,995,000	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
Extender 3	6,555,444,333	110%	95%	6,850,439,328	6,850,000,000	205,500,000				180,840,000
Extender 4	4,333,222,111	110%	90%	4,289,889,890	4,290,000,000	128,700,000				113,256,000
	31,777,332,999			**32,968,985,768**	**20,313,000,000**	**609,390,000**				**536,263,200**

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	437,142,286
12. 5% Net Market Decline in Pool Collateral (11 * 5%)	(21,857,114)
13. Market Value of Survivors' Collateral Liquidated (11 -12)	**415,285,714**
14. Total Loss to be Funded (10 - 13)	**217,514,286**

Pool Share/Residual Loss Share Calculation after Default

EXTENDERS OF T

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	184,571,429	**96,673,016**
Extender 3	1,500,000,000	164,333,333	145,714,286	138,428,571	**72,504,762**
Extender 4	1,000,000,000	109,555,556	97,142,857	92,285,714	**48,336,508**
	4,500,000,000	**493,000,000**	**680,000,000**	**12,438,485,714**	**217,514,286**

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] ($CM)	USDCAPCalculations → CDN$ EQUIV. (3% ofElectedCap)	Exchange Rate (USD/CAD) 0.88	LessFXRisk 10.0000%	USD CAP	CAD CAP	Pool Collateral Share Contribution[2] (C$M)	RatingsDiscount Appliedto Collateral Requirement (%)	Pool Collateral Requirement (C$M)	"InitialACV"[3] (C$M)
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. SettlementAgents can choose from the Maximum Available SOCas determined by the S.A. CCRmembers. In this example theelection can be less than or equal toC$1,000M.

2. Thepercentage pool share contributionis defined as a percentage of thetotal SOCelected by themembers of thepool.

3. Equaltothe"PoolCollateralRequirement"scaled down bythe"Ratings DiscountApplied toCollateralRequirement orInitial 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

SETTLEMENTAGENTS
POOL SHARECALCULATION

SETTLEMENT	ELECTED	POOL SHARE PERCENTAGE	POOL SHARE VALU
Settlement Agent 1	150,000,000	6.1983%	15, 95,868
Settlement Agent 2	300,000,000	12.39 67%	30, 91,736
Settlement Agent 3	800,000,000	33.05 79%	82, 44,628
Settlement Agent 4	170,000,000	7.0248%	17, 61,983
Settlement Agent 5	1,000,000,000	41.32 23%	103,305,785
	2,420,000,000	**58.67 77%**	**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

SYSTEMOPERATING CAP, COLLATERAL REQUIREMENT AND INITIAL ACVCALCULATIONS
SETTLEMENT AGENTS AFTER DEFAULT OF SETTLEMENT AGENT WITHLARGEST CAP

SETTLEMENT AGENTS	Elected/Available SOC ($CM)[1]	USD CAP Calculations CDN$ EQUIV. (3%ofElectedCap)	ExchangeRate (USD/CAD) 0.88	LessFXRisk 10.0000%	USD CAP	CAD CAP	Pool Collateral Share Contribution[2] (C$M)	Ratings Discount Appliedto Collateral Requirement (%)	Pool Collateral Requirement (C$M)	"Initial ACV"[3]
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 canchoose fromtheMaximumAvailable SOCas determined by theS.A.CCRmembers. In this example theelectioncan be less than orequal toC$1,000M.
2. The percentage poolshare contribution is defined as a percentage of thetotal SOCelected by the members ofthepool.
3. Equal tothe "Pool Collateral Requirement" scaled down bythe "Ratings Discount Applied toCollateral Requirement or Initial ACV"

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

SETTLEMENT AGENTS NEW POOL REQUIREMENT CALCULATION AFTER DEFAULT	
2. Largest Elected Cap	800,000,000
3. 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	NEWPOOL 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	NEWPOOL SHARE	ORIGINAL POOL SHARE	MARKET VALUE LIQUIDATED	LOSS TOBE 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 pool 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 pool ratio by the 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
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
Pool 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' 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.

As noted above, the defaulting member's utilization of the credit provided by the cap and line of credit is collateralized fully and simultaneously by their collateral requirement to the CAD RCP collateral pool and their ACV.

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 collateral contributed by the defaulter to the Receivers' collateral pool and may as well transfer any eligible collateral in the defaulter's ACV allocated to CDS (on behalf of the CAD RCP CCR) to cover its cap usage. Any deficiency between that total and the CAD 13.0 million required is seized from the CAD RCP survivors to the CAD RCP collateral pool. The collateral thus seized from the survivors is transferred by CDS to its liquidity provider in exchange for liquidity and any excess collateral is returned 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 CAD 5.0 million of eligible collateral amongst the defaulter's ACV allocated to cover its cap usage, which CDS elects to transfer.
- There is a 5% net decline in defaulter's collateral pool contribution.
- There is a 5% net decline in survivors' collateral pool contributions.

The survivors' collateral seized in order to cover the defaulter's end-of-day payment obligation associated with its used cap is CAD 5,875,000.

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

1. Defaulter's cap utilization	13,000,000
2. Collateral required for end-of-day liquidity purposes	**13,000,000**
3. Defaulter's Collateral Pool Contribution (SLF Eligible)	2,500,000
4. Defaulter's ACV allocated to collateralize its cap utilization	10,500,000
5. Total Defaulter's collateral available to collateralize its cap utilization	13,000,000
6. SLF eligible collateral available from ACV allocated to cover the Defaulter's cap utilization	5,000,000
7. Non-SLF eligible collateral available from the ACV allocated to cover the Defaulter's cap utilization	5,500,000
8. Defaulter's SLF eligible collateral (3+5)	7,500,000
9. 5% net market decline in Defaulter's collateral – Defaulter's residual loss (5 * 5%)	(650,000)
10. 5% net market decline in Defaulter's SLF eligible collateral (8 * 5%)	(375,000)
11. Market value of Defaulter's SLF eligible collateral (3 + 6 + 10)	**7,125,000**
12. Survivors' available pool collateral (SLF eligible)	10,500,000
13. 5% net market decline in Survivors' available SLF eligible pool collateral (12 * 5%)	(525,000)
14. Market value of Survivors' available SLF eligible pool collateral (12 – 13)	9,975,000
15. Total Survivors' available SLF eligible collateral seized for end-of-day liquidity purposes (2 – 11)	5,875,000
16. Total collateral transferred for end-of-day liquidity purposes (11 +15)	**13,000,000**
17. Total loss to be funded (9)	**(650,000)**

Pool Share/Residual Loss Share Calculation after Default

RECEIVERS OF CREDIT	RCP CAP	NEW POOL SHARE	ORIGINAL POOL SHARE	LOSS TO BE FUNDED
Receiver 1	-	-	2,500,000	-
Receiver 2	-	-	2,000,000	**(123,810)**
Receiver 3	-	-	1,750,000	**(108,333)**
Receiver 4	-	-	1,500,000	**(92,857)**
Receiver 5	-	-	1,250,000	**(77,381)**
Receiver 6	-	-	1,000,000	**(61,905)**
Receiver 7	-	-	900,000	**(55,714)**
Receiver 8	-	-	800,000	**(49,524)**
Receiver 9	-	-	700,000	**(43,333)**
Receiver 10	-	-	600,000	**(37,143)**
TOTALS	**-**	**-**	**13,000,000**	**(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. The collateral contribution is equal to the receivers' elected cap.

Name	Receivers' Elected Cap	Collateral Contribution
Receiver 1	10,000,000	10,000,000
Receiver 2	10,000,000	10,000,000
Receiver 3	9,000,000	9,000,000
Receiver 4	8,000,000	8,000,000
Receiver 5	8,000,000	8,000,000
Receiver 6	7,000,000	7,000,000
Receiver 7	6,000,000	6,000,000
Receiver 8	6,000,000	6,000,000
Receiver 9	5,000,000	5,000,000
Receiver 10	1,000,000	1,000,000
	70,000,000	**70,000,000**

Assume that the Receiver with the largest cap defaults for an amount equal to its cap. Unlike the Extenders' 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 seizes the entire collateral contributed by the defaulter to the Receivers' collateral pool. Any deficiency between that total and the USD 10.0 million required is seized from the USD RCP survivors' contributions to the USD RCP collateral pool. The collateral thus seized is transferred to its liquidity provider in exchange for liquidity and any excess collateral is returned 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. Defaulter's cap utilization	10,000,000
2. **Defaulter's pool collateral (SLF eligible)**	**10,000,000**
3. 5% Net Market Decline in Defaulter's Collateral (2 * 5%)	**(500,000)**
4. Market value of Defaulter's collateral (2 – 3)	9,500,000
5. Total Survivors' pool collateral seized for end-of-day liquidity purposes	500,000
6. Total Survivors' pool collateral contribution (SLF eligible)	60,000,000
7. 5% net market decline in Survivors' eligible pool collateral (6 * 5%)	(3,000,000)
8. Market value of Survivors' pool collateral (6 – 7)	57,000,000
9. **Total loss to be funded by Survivors**	(500,000)

Pool Share/Residual Loss Share Calculation after Default

RECEIVERS OF CREDIT	RCP ELECTED CAP	NEW POOL SHARE	ORIGINAL POOL SHARE	LOSS TO BE FUNDED
Receiver1	-	-	10,000,000	-
Receiver2	-	-	10,000,000	**(83,333)**
Receiver3	-	-	9,000,000	**(75,000)**
Receiver4	-	-	8,000,000	**(66,667)**
Receiver5	-	-	8,000,000	**(66,667)**
Receiver6	-	-	7,000,000	**(58,333)**
Receiver7	-	-	6,000,000	**(50,000)**
Receiver8	-	-	6,000,000	**(50,000)**
Receiver9	-	-	5,000,000	**(41,667)**
Receiver10	-	-	1,000,000	**(8,333)**
TOTALS	**-**	**-**	**70,000,000**	**(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	CX	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	WD	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

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: 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.

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.

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.

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”.

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.

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.

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.

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.

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.

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

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.

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.

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.

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.

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.

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.

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.

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.

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.