NOTICE TO MEMBERS

No. 2014 – 159
July 29, 2014

REQUEST FOR COMMENTS

AMENDMENTS TO THE RISK MANUAL OF THE CANADIAN DERIVATIVES CLEARING CORPORATION TO ADDRESS PROCYCLICALITY OF MARGIN

Summary

On July 14, 2014, the Board of Directors of Canadian Derivatives Clearing Corporation (CDCC) approved amendments to the Risk Manual of CDCC. The purpose of the proposed amendments is to implement a new margining framework to ensure compliance with PFMI requirements and limit the procyclicality observed with the current Initial Margin model.

Please find enclosed an analysis document as well as the proposed amendments.

Process for Changes to the Rules

CDCC is recognized as a clearing house under section 12 of the *Derivatives Act* (Québec) by the Autorité des marchés financiers (AMF) and is a recognized clearing agency under section 21.2 of the *Securities Act* (Ontario) by the Ontario Securities Commission (OSC).

The Board of Directors of CDCC has the power to approve the adoption or amendment of Rules and Operations Manual of CDCC. Amendments are submitted to the AMF in accordance with the self-certification process and the Ontario Securities Commission in accordance with the process provided in its Recognition Order.

Comments on the proposed amendments must be submitted within 30 days following the date of publication of the present notice. Please submit your comments to:

Mrs. Pauline Ascoli
Assistant Secretary
Canadian Derivatives Clearing Corporation
Tour de la Bourse
P.O. Box 61, 800 Victoria Square
Montréal, Québec H4Z 1A9
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A copy of these comments shall also be forwarded to the AMF and to the OSC to:

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For any question or clarification, Clearing Members may contact CDCC's Corporate Operations.

Glenn Goucher
President and Chief Clearing Officer

AMENDMENTS TO RISK MANUAL OF THE CANADIAN DERIVATIVES CLEARING CORPORATION TO ADDRESS PROCYCLICALITY OF MARGIN

CONTENTS

I. SUMMARY

CDCC proposes to implement a new margining framework to address the procyclicality issues of the current methodology. In this context, the procyclicality is defined as "changes in risk management practices that are positively correlated with market, business or credit cycle fluctuations and that may cause or exacerbate financial instability"[1].

CDCC proposes the use of a new margining framework to ensure conformity with PFMI requirements and limit the procyclicality observed with the current Initial Margin model. The proposed model will consider an Exponentially Weighted Moving Average (EWMA) volatility estimator with 0.99 decay rate and a floor margin calibrated with 10 years of data, instead of assessing the volatility from 20 days, 90 days and 260 days standard deviations.

II. ANALYSIS

a. Background

The Initial Margin represents the difference between the current market value of a derivative product and its most unfavourable projected liquidation value. This value is currently obtained by varying the values of the derivative product according to several scenarios representing adverse changes in market conditions.

The first step to assess such Initial Margin consists in measuring the margin interval (MI) using the following formula:

$$MI = 3 \times \sqrt{n} \times Max\left[\sigma_{20days}; \sigma_{90days}; \sigma_{260days}\right]$$

The methodology currently used for the calculation of the MI is procyclical since the model is reacting quickly to market volatility because of the use of the maximum volatility between 20, 90 and 260 days.

CDCC is proposing to change the MI calculation by using an EWMA estimator for the volatility and also by using a 10 year floor on the volatility. This new methodology is reasonably smoothing the margin requirement in stressed periods and is also limiting excessive leverage in periods of low volatility due to the floor.

[1] Bank for International Settlements: "Principles for Financial Market Infrastructures". April 2012

b. Description and Analysis of Impacts

As discussed in the background section, the current margin model is responsive to market conditions but lacks stability due to the very short data series of 20 days considered in the estimation of volatility. Thus, an addition of a floor to the current model should reduce its procyclicality. Moreover, excess leverage, moral hazard and adverse selection problems that may currently drive the behaviour of clearing members should be reduced following the addition of such floor.

The level of our floor on margin requirement will be calibrated with 10 years of data[2]. Such long look-back period should cover a full cycle and is in line with ESMA requirements (Article 28). In addition, we recall that major clearing houses (Eurex[3], Chicago Mercantile Exchange -CME[4]-, LCH Clearnet[5] …) agree to consider a long look-back period to assess their Initial Margins and simultaneously deal with procyclicality.

Two objectives are achieved by introducing the 10 years data floor: when volatility rises, the responsiveness of the margin is moderately preserved; when volatility declines, the historic median or average value takes over, ensuring margins do not follow. Thus, the introduction of the floor on margin should reduce the procyclicality observed with the current margining methodology.

A second improvement will be also considered through our proposed model and relates to the estimation of volatility. Currently, the volatility corresponds to the standard deviation of historical data. Such estimator assigns the same weighting for all considered data. Thus, responsiveness to market conditions would be limited if the time interval is relatively long. A more appropriate model should assign more weight for more recent data. The Exponentially Weighted Moving Average (EWMA) volatility estimator seems suitable for such purpose. Such estimator is defined as following:

$$\sigma_n^2 = \lambda\sigma_{n-1}^2 + (1-\lambda)u_{n-1}^2$$

Where, σ_n is the volatility of day n, λ is a constant between 0 and 1, and u_{n-1} corresponds to the most recent observation.

[2] A proxy could be used to calibrate this floor for options and futures without historical data.

[3] See « *Eurex Clearing Prisma Portfolio-based risk management* » and « *Eurex Clearing Prisma – Setting new standards in CCP risk management* » documents published by Eurex in November 2012 and June 2013, respectively.

[4] See rule amendment n° 13-263 as of June 27, 2013 submitted by CME group to the Commodity Futures Trading Commission, regarding interest rate swap margin calculation.

[5] See amendment submitted as of May 13, 2013 by LCH Clearnet to the Commodity Futures Trading Commission regarding the SwapClear Initial Margin model.

Such estimator corresponds to a particular case of Auto-Regressive Conditional Heteroskedasticity ("ARCH") models which are appropriate for modeling volatility clustering typically observed in financial markets (large changes in market data are usually followed by large changes).

RiskMetrics (1996), which was the first to introduce such volatility estimator, has considered a λ ranging from 0.94 to 0.97. A higher λ leads to a relatively low importance assigned to the most recent observation and to a smooth variation of the volatility estimator within time. Thus, λ could be perceived as a decay rate.

By considering a decay rate of 0.94 and daily data, the first 60 days would contribute by 97.6% to the volatility estimator. Such contribution decreases to only 83.9% if the decay rate increases to 0.97. However, the optimal decay rate to be selected should follow two properties:

- Assigning a non-negligible weight to all data observed during the last twelve months
- Ensuring that the obtained volatility estimator is reactive to most recent data.

Thus, a decay rate of 0.99 would be considered in our proposed Initial Margin framework[6, 7]. Such decay rate will assign 48.9% of weight to data observed during the first 60 days and 51.1% weight to data observed during the remaining days of the year.

In addition, a 0.99 decay rate should provide a moderate responsiveness of the proposed margining methodology to latest market events and, thus, reduce procyclicality[8].

c. Proposed Amendments

The proposed amendments are presented in Appendix 1.

[6] As an example, a decay rate of 0.995 would not be appropriate if the aim is to consider daily data during the last twelve months to estimate volatility. Indeed, the total weight for the first 60 days will be lower than 36% with such decay rate and thus will lead to very low reactivity of the volatility estimator to more recent data.

[7] We have also performed a Maximum Likelihood Estimation (MLE) of the decay rate to apply for a sample of contracts (SXF, CGB, BAX1, and GC5Y). The obtained decay rates from our MLE estimation are in the range 0.935 to 0.969.

[8] RiskMetrics has indicated in its 1996 technical document that, for risk management purposes, it may not be optimal to derive the decay factors only from purely statistical analysis.

d. Benchmarking

CDCC noticed that central counterparties (CCPs) worldwide are heading to thE EWMA approach in their assessment of Initial Margin. Indeed, Eurex applies an EWMA estimator to assess volatilities and the required Initial Margin[9] for FX futures and options. The European Commodity Clearing[10] ("ECC") has also applied the EWMA approach to estimate volatilities which are necessary to derive Initial Margins. Singapore Mercantile Exchange[11] (SMX) also employs EWMA for fixing Initial Margins against each contract. In addition, a survey performed by Hong Kong Exchange (HKEx) clearing house in March 2012 shows the superiority of margining approaches based on EWMA. Indeed, 93% of 217 HKSCC's[12] clearing participants which responded to the survey indicated agreement to the proposed margining arrangements[13]. We mention that CME[14] and Australian Securities Exhange[15] (ASX), even if they had implemented a HVaR approach for margining, scale the historical scenarios through EWMA based volatility forecasts to assess the required margins. LCH Clearnet[16] also scales historical returns through an EWMA estimator to assess Initial Margins.

III. DRAFTING PROCESS

The Committee on Payment and Settlement Systems had clearly stated in April 2012 that CCP should appropriately address procyclicality in their margin arrangements to prevent from potential adverse effects:

- In periods of turbulent markets, a CCP may ask for additional Initial Margins and could exacerbate further market stress and volatility, resulting in supplementary margins.
- In periods of expansion, a very low level of Initial Margins may lead to excessive leverage and thus increases the risk of feeding bubbles.

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[9] See Eurex clearing circular 105/13.

[10] See the "ECC margining" document prepared by the European Commodity Clearing AG, as of December 13th, 2013.

[11] www.smx.com.sg/faq/MarginsMargining.aspx (visited on January 2, 2014)

[12] HKSCC designates the Hong Kong Securities Clearing Company Limited.

[13] The proposed margining arrangement corresponds to a VaR approach and estimates the worst expected losses under normal market conditions using EWMA over a 90-day period at a confidence level of 99.73%.

[14] See the Special Executive Report n° S-6184 published by CME group as of April 3, 2012.

[15] See the "ASX OTC IRD Client Clearing Proposed Service Description" document published by the Australian Securities Exchange in October 2013.

[16] See amendment submitted as of May 13, 2013 by LCH Clearnet to the Commodity Futures Trading Commission regarding the SwapClear Initial Margin model.

In order to be compliant with the newly requested PFMI, CDCC needs to adjust its current Margin methodology to reduce the procyclicality effects.

IV. IMPACTS ON TECHNOLOGICAL SYSTEMS

There is no impact on technological systems since the proposed changes to the MI calculation are performed upstream in SOLA® Clearing.

V. OBJECTIVES OF THE PROPOSED MODIFICATIONS

The objective of the proposed modification is to address the procyclicality of margin requirement currently requested by CDCC from its Clearing Members.

VI. PUBLIC INTEREST

In CDCC's opinion, the proposed amendment to CDCC's Risk Manual is not contrary to the public interest.

VII. MARKET IMPACTS

Our empirical analysis of the proposed margining model on a sample of products cleared at CDCC has shown positive results in terms of backtesting, reduction of risk, collateral cost and reduction of margin volatility.

CDCC believes that this new model should not reduce the current level of market liquidity.

VIII. PROCESS

The proposed amendment is submitted for approval by the CDCC Board. Once the approval has been obtained, the proposed amendment, including this analysis, will be transmitted to the *Autorité des marchés financiers* in accordance with the self-certification process and the Ontario Securities Commission in accordance with the "Rule Change Requiring Approval in Ontario" process. The proposed amendment and analysis will also be submitted for approval to the Bank of Canada in accordance with the Oversight Regulatory Agreement.

IX. EFFECTIVE DATE

The proposed changes to address the Procyclicality of the Margins will be implemented in December 2014. This is subject to the regulatory approval.

X. ATTACHED DOCUMENTS

Appendix 1: Amended Risk Manual

TMX | CDCC

Risk Manual

INITIAL MARGIN

As fundamental inputs to calculate the Initial Margin, the Corporation uses the following parameters: 1) confidence level (to reflect normal market conditions), 2) assumed liquidation period and 3) historical volatility over a specific period.

Specifically, the Corporation uses three standard deviations to consider a confidence level over 99% under the normal distribution's assumption. The Corporation also considers a variable number of days as an acceptable liquidation period. The Initial Margin amount is calculated using the historical volatility of the daily price returns of the Underlying Interests for Options contracts, the daily price returns of the futures prices for Futures contracts and the yield-to-maturity (YTM) daily variation of the on-the-run security for Fixed Income Transactions. The historical volatility, combined with the liquidation period and the confidence level gives the Margin Interval (MI) as described below.

MARGIN INTERVAL (MI) CALCULATION

The Margin Interval calculations are re-evaluated regularly. However, the Corporation may use its discretion and update the Margin Intervals more frequently if necessary. The Margin Intervals are used to calculate the Initial Margin for each Derivative Instrument.

The Margin Interval (MI) is calculated using the following formula:

$$MI = \alpha \times \sqrt{n} \times \sigma$$

Where 'n' is the number of liquidation days (see the next section for more details). 'α' is equal to the critical value equivalent to 99.87% of the cumulative Normal distribution (applicable to all Futures products except for the BAX product) or equal to the critical value equivalent to 99% of the cumulative Student's t-distribution with 4 degrees of freedom (applicable to the BAX product). 'σ' is the volatility estimator of the contract's returns and is computed using an exponentially weighted moving average (EWMA) approach.

The implemented formula for the volatility estimator at any time *t* is:

$$\sigma_t = \sqrt{(1-\lambda)\sum_{i=1}^{260} \lambda^{i-1}(R_{t-i} - \overline{R})^2 \Big/ (1-\lambda^{260})}$$

Where R is the contract one day price's return, $\overline{R}$ is the mean return over the specified period and λ is the decay factor. CDCC uses λ = 0.99.

In addition, CDCC considers a minimal floor for the EWMA volatility estimator defined above. The level of such floor is calculated as an average of daily EWMA volatility estimator observed over the last 10 years. In other words, the volatility estimator that will be used to calculate the MI can not be lower than the calculated floor.

$$MI = 3 \times \sqrt{n} \times Max\left[\sigma_{20\ days}, \sigma_{90\ days}, \sigma_{260\ days}\right]$$

Where 'n' is the number of liquidation days[1], 'σ' is the standard deviation of the daily variation over 20, 90 and 260 days, and 3 is equivalent to 99.87% for a one-tail confidence interval under the normal distribution's assumption.

Price Scan Range (PSR) Calculation

In order to calculate the most unfavourable projected liquidation value, the Risk Engine uses the MI of the above formula to calculate the Price Scan Range (PSR) and to run several scenarios through its Risk Array calculation (for a detailed description refer to the section on **Erreur ! Source du renvoi introuvable.**Risk Arrays below).

A Risk Array is a set of 16 scenarios defined for a particular contract specifying how a hypothetical single position will lose or gain value if the corresponding risk scenario occurs from the current situation to the near future (usually next day).

PSR is the maximum price movement reasonably likely to occur, for each Derivative Instrument or, for Options contracts, their Underlying Interest. The term PSR is used by the Risk Engine to represent the potential variation of the product value and it is calculated through the following formula:

PSR = Underlying Interest Price x MI x Contract Size.

[1] The Corporation uses the following number of liquidation days 'n' as follows:

- For Futures contracts and Options contracts n = 2 days;
- For OTCI options n = 5 days;
- For Fixed Income Transactions, where the Underlying Interest is issued by the Government of Canada or a federal Crown corporation n = 2 days; and
- For Fixe Income Transactions, where the Underlying Interest is issued by a provincial government or a provincial Crown corporation n = a + 2 days, where a = number of additional days.

'a' is based on a quantitative and qualitative analysis, established according to the degree of liquidity of the Underlying Interest which is derived from parameters such as but not limited to traded volume, Government of Canada/ provincial yield spreads and international guidelines. For a provincial government or provincial Crown corporation issuer 'a' is determined at least once a year and communicated to Clearing Members by written notice.

Furthermore, in anticipation of Remembrance Day (the "Banking Holiday") the Corporation will add one more day to the number of liquidation days 'n'. Hence, for Options and Futures contracts where the Underlying Interest is an Equity (i.e. Stock and ETF) or an Index the liquidation period will increase to three Business Days prior and up to the Banking Holiday, and for OTCI options, the liquidation period will increase to six Business Days prior and up to the Banking Holiday. The additional margin amount for the Banking Holiday will be released on the morning of the following Business Day.

INTRA-COMMODITY (INTER-MONTH) SPREAD CHARGE

The different Futures contracts belonging to the same Combined Commodity have generally positively correlated returns. For example, a portfolio composed of a long position and a short position of two Futures contracts that have the same Underlying Interest but different expiry dates, will be less risky than the sum of the two positions taken individually. Margins on correlated positions address this fact.

The Risk Engine automatically matches the long positions on futures maturing in one month with the short positions on futures maturing in another month. The resulting Margin Requirement on these two Futures contracts belonging to the same Combined Commodity, assumes a perfect correlation between the two Futures contracts. Thus the gain of one position is offsetted by the loss of the other position. However, the Futures contracts prices with different maturity months are not perfectly correlated. Gains on a Futures contracts with a certain expiry month should not totally offset losses on a Futures contracts whose expiry month is different. To fix this issue, the Risk Engine allows the user to calculate and to apply a margin charge relative to the Inter-Month spread risk, in order to cover the risk of these two positions. This margin is called Inter-Month Spread Charge or Intra-Commodity Spread Charge (because it is calculated within the Combined Commodity).

Intra-commodity (Inter-month) Spread Charge on correlated futures positions are calculated by the Corporation's risk department and updated regularly.

For the Futures contracts, the Intra-Commodity Spread Charge (ICSC) which is an additional dollar amount charge applied to each combination of two different Futures contracts, is determined as follows:

$$ICSC = \alpha \times \sqrt{n} \times \sigma$$

Where 'n' is the number of liquidation days (see the Margin Interval (MI) Calculation section for more details). 'α' is equal to the critical value equivalent to 99.87% of the cumulative Normal distribution (applicable to all products except for the BAX product) or equal to the critical value equivalent to 99% of the cumulative Student's t-distribution with 4 degrees of freedom (applicable to the BAX product). 'σ' is the volatility estimator of the Futures combination's daily profiy and loss (P&L) over the reference period and is computed using the EWMA approach. The EWMA formula is described in the Margin Interval (MI) Calculation section.

In addition, CDCC considers a minimal floor for the EWMA volatility estimator. The level of such floor is calculated as an average of daily EWMA volatility estimator observed over the last 10 years. In other words, the volatility estimator that will be used to calculate the ICSC can not be lower than the calculated floor.

$$ICSC = 3 \times \sqrt{n} \times Max\left[\sigma_{20\ days}, \sigma_{90\ days}, \sigma_{260\ days}\right]$$

~~Where 'n' is the number of liquidation days (see footnote 3), 'σ' is the standard deviation of the Futures combination's daily profit and loss (P&L) over 20, 90 and 260 days, and 3 is equivalent to 99.87% under the normal distribution's assumption.~~

INTER-COMMODITY SPREAD CHARGE

Similarly, the Corporation considers the correlation that exists between different classes of Futures contracts when calculating the Initial Margin. For example, different interest rate Futures contracts are likely to react to the same market indicators, but at different degrees. For instance, a portfolio composed of a long position and a short position on two different interest rate Futures contracts will be likely less risky than the sum of the two positions taken individually. The Corporation will grant a margin relief according to the historical correlation of the returns of the two Futures contracts.

When calculating the Initial Margin on a portfolio with several long and short futures positions, the Corporation matches the positions in accordance with predefined steps. For example, if the first matching step consists of matching long or short positions on the front month Futures contracts with long or short positions on the second front month Futures contract, the positions of both Futures contracts might not be equal. In this case, the Corporation determines, using the hedge ratio concept the exact position (number of contracts) of a Future contract that can be offset by a position on the other Future contract. Any position that has not been matched will be available for the second matching step. This is the same spread priority process also defined for Cash Buy or Sell Trades and Repurchase Transactions.

The Corporation regularly performs an analysis to determine the margin reductions that are applied for all Futures contracts combinations.

The Corporation also considers the positive (negative) correlation that exists between the different interest rate Futures contracts and the Fixed Income Transactions, and provides a margin benefit for a combination of any Futures contracts with the opposite (same) Fixed Income Transactions.

SECURITY PRICE RISK

The price of the Purchased Security changes continuously during the life of a Repurchase Transaction. On one hand, if the price decreases and the Repo Party defaults, the Corporation, as a central counterparty, incurs market risk for the price difference. The position may be transferred to any Fixed Income Clearing Member who agrees to buy the security at the expiry date with the new market conditions (new security's market price and interest rate). In this case, the Corporation has to cover the potential decrease in the security's value (negative variation for the seller) that could arise during the next specific period. On the other hand, if the security's price increases and the Reverse Repo Party defaults, the Corporation, as a central counterparty, incurs market risk for the price difference. The position may be transferred to any Fixed Income Clearing Member who agrees to sell the same security at the expiry date with the new market conditions (new security's market price and interest rate). In that case, the Corporation has to cover the potential increase in the security's value (negative variation for the buyer) that could arise during the next specific period.

The methodology to calculate the Initial Margin for Fixed Income Transactions is slightly different from the Options contracts and Futures contracts. Indeed, the different types of securities that are accepted by the Corporation for clearing of a Repurchase Transaction are separated in different Buckets depending on their remaining time to maturities and issuers. In addition, in its risk model, the Corporation assumes that all securities belonging to the same Bucket have the same yield volatility expressed in terms of Margin Interval (same concept of Margin Interval ~~as~~ described before) which is calculated using the YyYield-Tto-MmMaturity (YTM) of the on-the-run security of the Bucket. The Margin Interval is calculated as follows:

$$MI = \alpha \times \sqrt{n} \times \sigma$$

Where 'n' is the number of liquidation days (see the Margin Interval (MI) Calculation section for more details). 'α' is equal to the critical value equivalent to 99.87% of the cumulative Normal distribution. 'σ' is the volatility estimator of the YTM's daily variation of the on-the-run security over the reference period and is computed using the EWMA approach. The EWMA formula is described in the Margin Interval (MI) Calculation section.

In addition, CDCC considers a minimal floor for the EWMA volatility estimator. The level of such floor is calculated as an average of daily EWMA volatility estimator observed over the last 10 years. In other words, the volatility estimator that will be used to calculate the MI can not be lower than the calculated floor.

$$MI = 3 \times \sqrt{n} \times Max\left[\sigma_{20\,days}, \sigma_{90\,days}, \sigma_{260\,days}\right]$$

~~Where 'n' is the number of liquidation days (see footnote 3), σ is the standard deviation of the YTM's daily variation of the on-the-run security over the reference~~

~~period and 3 is to allow a confidence level over 99% under the normal distribution's assumption.~~

It's important to note that for some particular Buckets, there may not be any on-the-run security. In this particular situation, a linear interpolation between the MIs of the two closest Buckets is performed to determine the MI of the particular bucket.

Each Bucket is considered as a Combined Commodity. Since the bond's convexity effect is very small with respect to its duration, the Initial Margin is calculated for a physical cash trade exactly the same way as for Futures contracts. The first part of the example # 2 of the section on **Erreur ! Source du renvoi introuvable.**~~Risk Arrays~~ shows how the Scanning Risk is calculated for a Futures contract. As for a Futures contract, the Initial Margin for a physical security can also be obtained straightforwardly by calculating its Price Scan Range (PSR).

Therefore, the Initial Margin amount related to the security's price of a Repurchase Transaction on one security belonging to a Bucket is calculated as follows:

Initial Margin 1 = Security's Price x *MI* x *D* x *Contract Size*

Where D is the duration of the security and the contract size is the transaction's Nominal Value divided by 100. However, for all securities that belong to the 3-month, 6-month and 1-year buckets, CDCC uses a fixed duration which is set at 1.

Thus, all Repo related Fixed Income Securities belonging to the same Bucket have the same Margin Interval but each specific Repo related security of the same Bucket has a different Initial Margin driven by its own price and its own duration.

In the above formula of the Price Scan Range, only the first part of the Initial Margin of a Repurchase Transaction is calculated, namely, the Initial Margin 1. As mentioned above, there are two sources of risk for a Repurchase Transaction. This is the Initial Margin of the first source of risk, the security's price. In the next section, the second part of the Initial Margin of a Repurchase Transaction which covers the second source of risk, the Floating Price Rate, is described. Finally, both Initial Margins are added up to get the total Initial Margin of a Repurchase Transaction. However, the Initial Margin 1 corresponds to the total Initial Margin for a Cash Buy or Sell Trade.

INTEREST RATE RISK (REPURCHASE TRANSACTIONS)

The Floating Price Rate changes continuously during the life of a Repurchase Transaction. On one hand, if the Floating Price Rate decreases and the Repo Party defaults, the Corporation, as a central counterparty, incurs market risk. The position may be transferred to any Fixed Income Clearing Member who agrees to buy the Fixed Income Security at the expiry date with the new market conditions. In this case, the Corporation has to cover the potential decrease in the Floating Price Rate (negative variation for the seller) that could arise during the next specific period. On the other hand, if the Floating Price Rate increases and the Reverse Repo Party defaults, the Corporation, as a central counterparty, incurs market risk. The position may be transferred to any Fixed Income Clearing Member who agrees to sell the same Fixed Income Security at the expiry date with the new market conditions. In that case, the Corporation has to cover the potential increase in the Floating Price Rate (negative variation for the buyer) that could arise during the next specific period.

In order to properly quantify the risk related to the Floating Price Rate using the Risk Engine, it is necessary to model the Floating Price Rate into a Virtual Futures Contract (VFC) with a price equal to: VFC's price = 100 – Floating Price Rate. For an overnight Repurchase Transaction the Initial Margin is straightforwardly calculated by sending to the Risk Engine the determined VFC. However, in order to calculate the VFC's price for longer term Repurchase Transactions, the Corporation determines the appropriate interest rate using the overnight index swap (OIS) term structure.

The portion of the Initial Margin that covers the Floating Price Rate related risk is then added to the portion of Initial Margin that covers the security price related risk to get the total Initial Margin for a Repurchase Transaction.

It's important to note that the portion of Initial Margin that covers the Floating Price Rate related risk is very small with respect to the portion of Initial Margin that covers the security price related risk.

INTRA-COMMODITY (INTER-MONTH) SPREAD CHARGE

For Fixed Income Transactions, a portfolio composed of a short position and a long position on two different Acceptable Securities belonging to the same Bucket, will generate a lower margin requirement than if they were margined independently without considering their correlation.

The Risk Engine automatically matches the Seller and the Buyer of two different securities belonging to the same Bucket. The resulted Margin requirement on these two Repurchase Transactions assumes a perfect correlation between the two Fixed Income Securities, thus the gain of one Fixed Income Security is offsetted by the loss of the other Fixed Income Security. However, the Acceptable Securities' prices are not perfectly correlated. Gains on one position should not totally offset losses of the other Fixed Income Security. To fix this issue, the Risk Engine allows the user to calculate and to apply a margin charge relative to the Inter-Month spread risk in order to cover the risk of these two Fixed Income Transactions. This margin is called the Inter-Month Spread Charge or Intra-Commodity Spread Charge (because it is calculated within the Combined Commodity).

The Intra-Commodity (Inter-Month) Spread Charge on correlated Acceptable Securities of each Bucket is calculated by the Corporation's risk department and updated regularly.

For Fixed Income Transactions, the Intra-Commodity Spread Charge (ICSC) which is an additional dollar amount charge applied to each combination of two different transactions on two different securities that belong to a same Bucket, is determined as follows:

$$ICSC = \alpha \times \sqrt{n} \times \sigma$$

Where 'n' is the number of liquidation days (see the Margin Interval (MI) Calculation section for more details). 'α' is equal to the critical value equivalent to 99.87% of the cumulative Normal distribution. 'σ' is the volatility estimator of the fixed income transaction combination's daily profit and loss (P&L) over the reference period and is computed using the EWMA approach. The EWMA formula is described in the Margin Interval (MI) Calculation section.

In addition, CDCC considers a minimal floor for the EWMA volatility estimator. The level of such floor is calculated as an average of daily EWMA volatility estimator observed over the last 10 years. In other words, the volatility estimator that will be used to calculate the ICSC can not be lower than the calculated floor.

$$ICSC = 3 \times \sqrt{n} \times Max\left[\sigma_{20\ days}, \sigma_{90\ days}, \sigma_{260\ days}\right]$$

Where 'n' is the number of liquidation days (see footnote 3), 'σ' is the standard deviation of the securities combination's daily profit and loss (P&L) over 20, 90 and 260 days, and 3 is equivalent to 99.87% under the normal distribution's assumption.