



Capital Markets Authority (Kenya) Handbook for Central Counterparty (CCP) Clearing Infrastructure for Futures and Derivative Contracts

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Getting Clear on Central Counterparty (CCP) Clearing

SECTION 1: INTRODUCTION

The basic functions of a CCP are:

- Assuming the original bilateral trade obligations (novation),
- Netting down a large number of obligations into smaller number of obligations (multilateral netting), and
- Guaranteeing the settlement of such obligations.

As the title suggests, the objective¹ of this paper is to provide complete clarity on the nuts n' bolts of CCP clearing².

IOSCO's publication 'Objectives and Principles of Securities Regulation', June 2010 lists three objectives:

- The protection of investors;
- Ensuring that markets are fair, efficient and transparent; and
- The reduction of systemic risk.

This publication also lists 38 principles of which the 38th principle is 'Securities settlement systems and central counterparties should be subject to regulatory and supervisory requirements that are designed to ensure that they are fair, effective and efficient and that they reduce systemic risk'.

The move to adopt CCPs as the post-trade market infrastructure entity of choice for clearing and settlement of derivatives contracts and securities gained momentum only after the crash of 1987. Most recently, after the global financial crisis of 2008, legislators and regulators recognized that moving over-the-counter (OTC) derivatives to CCPs will most probably avert such a crisis in the future.

The advantages of the CCP clearing is duly recognized in the financial world. Accordingly, it is deemed that **"Post-trade clearing and settlement [as provided by CCPs] are ... the central nervous system of the financial system ... [and] ... are critical for the performance of the economy³."**

Clearing as a function is performed on different levels; firstly by parties to a trade, secondly at CCP clearinghouses (hereinafter referred to as CCP) and thirdly at central security depositories (CSD) and banking institutions.

The clearing and settlement of derivatives transactions are far more complex than for securities. Rather than clearing and settling in a few days, derivatives contracts often remain outstanding for several months or years. Unlike securities where the security itself is delivered and promptly

¹ The regulatory framework – amendments in the Capital Markets Act, and Regulations for Licensing of Derivatives Exchange, Licensing of Market Intermediaries and Conduct of Derivatives Business, and Business of Derivatives Contracts will not be discussed in this paper.

² Model Business Rules for a Derivatives Exchange are presently under preparation.

³ Federal Reserve Bank, Chicago, USA; Economic Perspectives, Q4 2006

paid for in full, derivatives contracts represent the obligation to buy or sell a financial instrument at a future date, with buyer and seller posing significant financial risk to the CCP in the interim. Whereas the CCP's guarantee lasts only a few days for securities, the CCP revalues exchange traded derivatives contracts daily and requires market participants to continue to settle with the CCP every day until the derivatives contracts are liquidated, exercised, or mature.

With regard to the various different clearing levels, it has to be taken into consideration that the clearing performed by a CCP is different from that performed by a CSD. CCP clearing concentrates on:

- i. Trade Management,
- ii. Position Management,
- iii. Collateral Management,⁴
- iv. Risk Management,
- v. Delivery Management, and
- vi. Final Settlement

Due to the above activities, CCP clearing takes place prior to the clearing performed by CSDs. CSD clearing concentrates on validating and matching the delivery instructions; the result of which is forwarded to settlement.

The day-to-day operations of a CCP requires flawless execution, and exceptional technology and back-office operations to minimize the high degree of operational risk it is faced with. Hence, the design of processes and procedures of the workflow at a CCP are critical to ensure seamless progression from trade management through to final settlement. Therefore, in the ensuing discussion we will also provide the business requirements and the associated system level functional specifications, wherever possible.

Following this introduction, the paper is organized in 5 sections:

2. The 'Three Pillars' of the CCP business model of the upcoming derivatives exchange (herein after referred to as NEWEX) in Kenya,
3. Implementing the 'Three Pillars':
 - a. Integration with 3rd Parties, and
 - b. Identifying Critical Functionalities of the Clearing & Settlement System.
4. A 'Full Trade Lifecycle' – from 'Order Entry' through to 'Final Settlement',
5. The CCP Guarantee; the Financial Safeguards Waterfall, and
6. Conclusion.

Section 2: The 'Three Pillars'

CCPs acts as intermediaries in exchange-traded and over-the-counter (OTC) securities and derivatives markets. A CCP interposes itself on transactions, becoming a buyer to every seller,

⁴ Discussion on Collateral Management will be on both cash and securities with haircuts based on either statistical or dynamic estimation.

and a seller to every buyer through a process of 'novation'⁵. In doing so, the CCP takes on the counterparty risk associated with each clearing participant, and guarantees performance of the contract should one party fail to deliver on its commitment. To support this guarantee, the CCP has a range of financial resources drawn from clearing and market participants (such as initial and variation margins from all market participants, and clearing fund contributions of the CMs), its own resources (contribution to the Settlement Guarantee Fund (hereinafter referred to as 'SGF')), and third parties (such as insurance).

CCPs offers substantial benefits to markets, including:

- the ability to mitigate counterparty credit risk and increase market confidence by reducing systemic risk and uncertainty arising from a default event;
- increasing capital and balance sheet efficiency, reducing settlement obligations and systemic and liquidity risks by facilitating multilateral netting of settlements and exposures; and
- enhancing the efficiency of financial markets generally, by cutting the average costs of trading and increasing the profitability of their users and the effective capacity, volume, liquidity and product innovation of the marketplace.

Some of the terminology used herein above will be explained as we progress further in this paper.

However, prior to elaborating on the various processes in a 'Trade Lifecycle' it is important to detail what are termed as the **'three pillars' of the proposed CCP Clearing business model** which will be implemented at NEWEX and its CCP in Kenya⁶.

1. 'Ultimate Beneficiary' System^{7, 8}

After the collapse of MF Global and the 'money gone missing' scandal, where client's lost in excess of US\$ 1.2 billion, regulators from across the world began to question what went wrong and perhaps the provisions regarding 'segregation of funds' in the rules and regulations were just not sufficient for protecting clients' funds.

The answer lies in two things: first, the fact that in markets such as in the USA, payment and settlement is gigantic, so there are some features of the system that must be quickly modernized. The other tendency is to under-regulate, self-regulate, and conduct business-as-usual.

Traditionally, the clearing and settlement systems at major derivatives exchanges and CCPs were designed to make sure that financial transactions actually take place and that money flows from

⁵ The point to note here is that 'novation' is the driver of the CCP Clearing model - a trade has to take place between a seller and a buyer on a bilateral basis first, prior to it being "novated"

⁶ NEWEX and its CCP Clearinghouse in Kenya will be compliant with the relevant recommendations made in 'CPSS-IOSCO's Report, 'Recommendations for Central Counterparties' March 2004' and 'Principles of Financial Market Infrastructure' April 2012.

⁷ The National Commodities Exchange Ltd. Pakistan, (the exchange underwent a name change and now it is called 'The Pakistan Mercantile Exchange Ltd.')

was the first derivatives exchange in the world to implement a UB system in 2007.

⁸ <http://www.math.nyu.edu/faculty/avellane/MFGlobal4.pdf>

buyers to sellers via proper settlement. As derivatives are financial contracts – not stocks or bonds – the proper keeping of accounts is fundamental to the functioning of markets.

A question often asked is are the systems up to date in this regard? The answer is no, and one reason is that the regulators and the CCP where accounts are kept do not monitor the clients' accounts in real time. Real-time monitoring of accounts is only made at the Clearing Member (hereinafter referred to as 'CM') level, not at the client level. This means that CMs are monitored to make sure that their accounts and the aggregate of their clients' accounts is properly collateralized (or funded) to resist wild swings in the markets. Book-keeping of individual derivatives trading accounts is left for the CMs to do. The system works well, in the sense that the CCP is protected in case a CM defaults or cannot meet a margin call. Therefore, the system is protected but not the individual clients.

The solution lies in what is called the account-by-account monitoring or in other parts of the world, the Ultimate Beneficiary (UB) system. Under a UB system, the CCP would have to compute the margin for each account – i.e. for each farmer, grain trader, futures trader, bank, and so forth – in real time, thus knowing at all times if the accounts are kept properly.

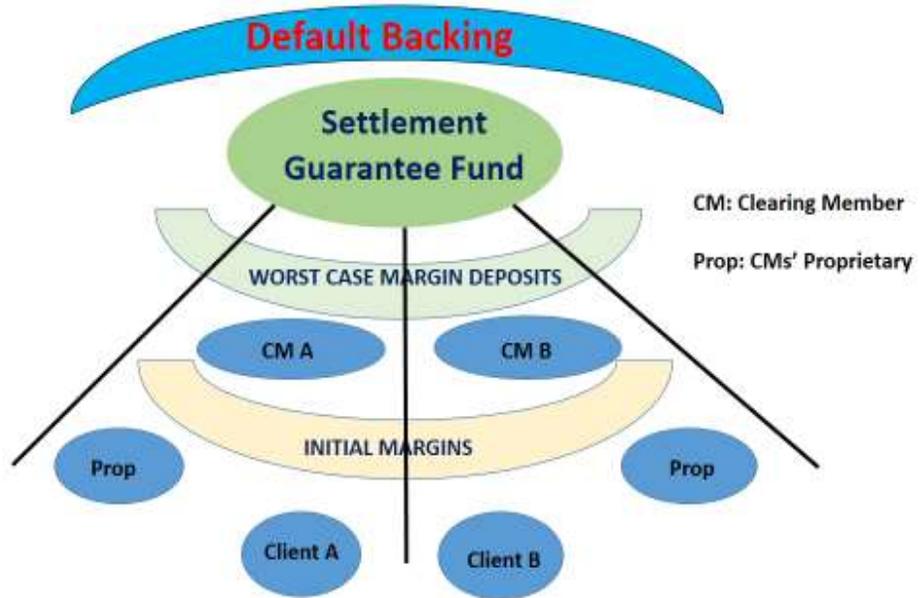
Most recently, BM&F Bovespa, the Brazilian exchange, has put in place an UB system in 2011. BM&F Bovespa is very large and clears stocks, bonds, futures and other derivatives. To ensure that integrity of all trading accounts and payments in the financial system, UB system is firmly in place.

Subsequently in December 2012, the Johannesburg Stock Exchange and its CCP, SAFCOM, also implemented a 'UB' system and portfolio margining at the individual client level. Simultaneously, SAFCOM also adopted a central counterparty (CCP) clearing model and became compliant with the CPSS-IOSCO guidelines as provided in the publication, 'Principles of Financial Markets Infrastructure' dated April 2012.

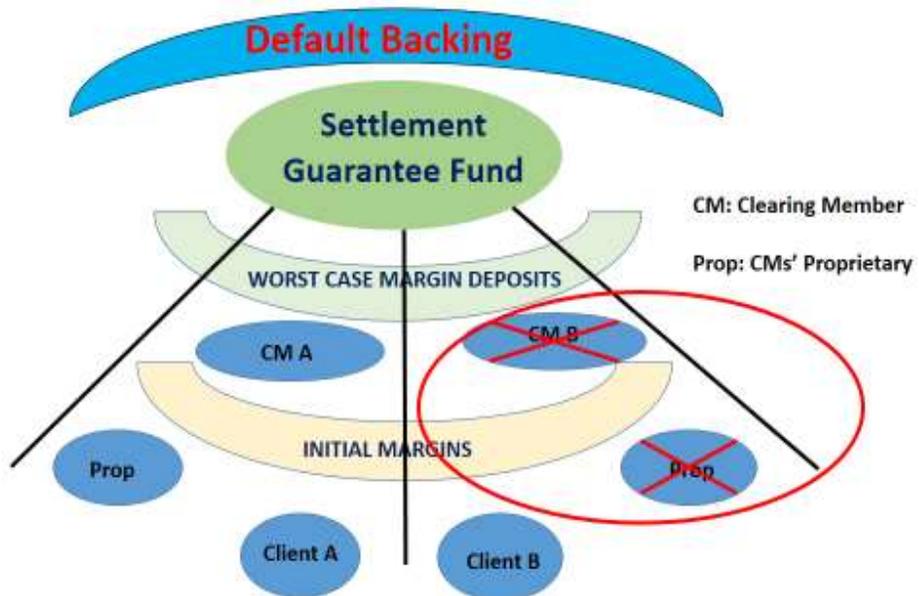
The risk of not having such a system is that CMs mix ("comingle", in the vernacular) their funds with those of their clients and use the money for other purposes, such as funding other clients or like investing in Italian or Greek debt, as it happened in the case of MF Global. This was the second reason behind the MF Global collapse: the permission due to lax regulation -- lobbied arduously by MF Global officers -- for the broker to engage in proprietary trading in unsupervised, non-centrally cleared bonds via private transactions with other Wall Street firms.

The net effect of segregation is that in an event of default of a CM, clients funds are completely isolated and protected as shown in the following two diagrams:

Default Protection & Segregation of Participant Risk



Default Protection & Segregation of Participant Risk



2. Gross Margining Regime

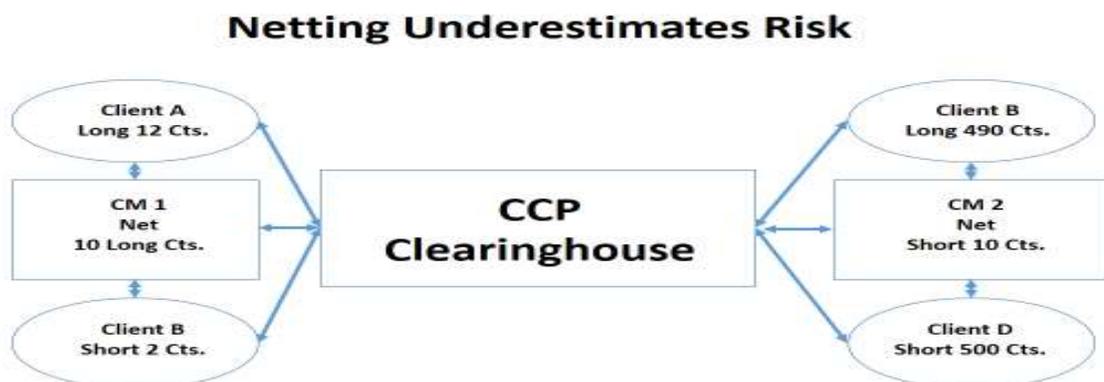
Typically, a clearinghouse collects margins on a gross or net basis.

In account structures found in many clearing systems, clients do not deal directly with a CCP. These tiered relationships have implications for the ways in which some risk management tools are implemented. A good example relates to the posting of initial margin requirements as a way to mitigate the replacement cost risk that the CCP faces when it substitutes itself for counterparties in the clearing process. The CCP establishes minimum margin requirements both for CMs and for their clients. It may also require all of the margins deposited by clients to be passed through by the CMs so that it can be held directly by the CCP.

CCPs have adopted two different approaches to this process, known as gross margining and net margining. The possibility for these two approaches arises because CCPs generally do not recognize individual clients. Thus, when a CM is passing collateral through to the CCP, one approach is to pass through the margins required to support the net clients' positions. (That is, if one client has two long positions and another client has one short position, the risk to the CCP is one long position because it does not recognize the individual clients). Alternatively, a CCP can require that margins be posted with it reflecting the gross positions carried in the clients' accounts. In either of these systems, the same amounts of collateral would be required of the clients. The key difference between them is where the margins are held: in a net margining system some of the margins deposited by clients are held by the CM carrying the accounts. In a gross margining system, all of these margins are passed through and held at the CCP. (In either a gross or a net margining system, CMs can always require margins above the minimum levels set by the CCP, and these margins would normally be held by the CM).

However, in a UB system all margins are held in completely segregated, client-wise, accounts at the CCP level.

The diagram below shows a simplified model of the contractual arrangement at a CCP employing a net margining system. The case is examined of what happens in the event of a large market fall.



There are two CMs, each with two clients. It is important to note that as seen in the diagram, the magnitude of the positions held by each CM are significantly different, with CM 2 having significantly larger aggregate positions. However the net positions to the CCP is of the same size (i.e. both net 10 contracts) therefore not accurately depicting each individual CMs holdings.

In the event of a large fall in the cash market, clients B and D (both holding short positions) would expect to profit.

Client B looks to CM 1 to receive payment that in turn will look to Client A to cover its liabilities to both Client B and the CCP. If Client A defaults, then CM 1 will have to make payments from its own reserves - although in this case the size of the positions is not large.

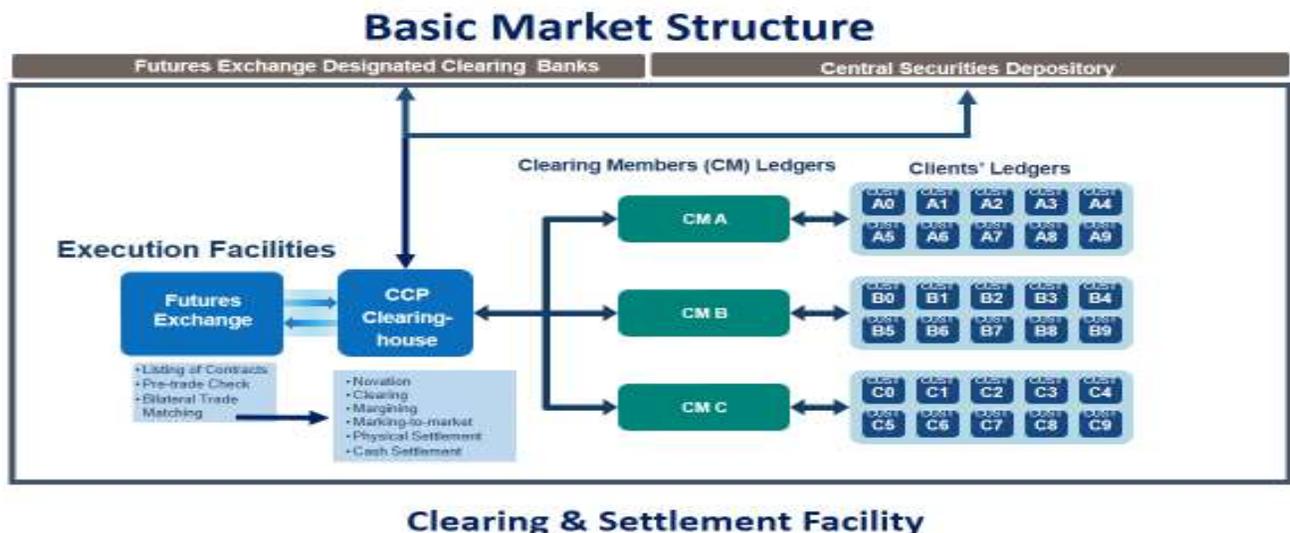
Client D looks to CM 2 to receive payment, which actually has a short position with the CCP and would expect to receive payment from it. However, CM 2 has to cover the major part of its liability (to Client D) by collecting from Client C. If the latter defaults, the CM may go bankrupt through liability to Client C, even though there is no problem with its position with the CCP.

NEWEX will implement a 'Gross Margining' regime for margining at each and every individual client level thus providing complete protection to clients' funds.

Additionally, Position Limits as well Worst Case Margin (Clearing Funds) would also be calculated and collected, respectively, on a gross basis.

3. Market Structure

NEWEX will ensure that its systems can handle the 'UB' system and a 'Gross Margining' regime prior to 'going live' and this can only be achieved if the following structure is implemented at its CCP whereby all accounts, CMs and their clients' accounts, are held at the CCP in a completely segregated manner.



The derivatives exchange and its CCP clearinghouse will be integrated with exchange designated clearing banks and CSD to facilitate the holding of collateral (cash and securities), in CMs and their segregated clients' accounts, and also for daily and final settlement of derivatives contracts.

The following diagram illustrates the accounts maintained at the exchange designated clearing bank and the CCP clearinghouse, and the flow of funds:

Completely Segregated Accounts



Book Transfers From CMs' Account @ the Clearinghouse



Section 3: Implementing the ‘Three Pillars’:

The three pillars described in the previous section are what would be termed as the ‘central nervous system’ of the NEWEX business model. Herein below, we will describe a) Integration with 3rd parties and b) identifying critical functionalities of the clearing & settlement system:

1. Integration with 3rd Parties

Typically, 3rd parties would i) exchange designated clearing bank(s) and ii) central securities depository as shown in the above diagram.

Initially, NEWEX will only list contracts which would be cash settled and therefore we will limit our discussion to i) exchange designated clearing bank(s) which will provide the ‘exchange of value settlement’, only.

The above two diagrams illustrate the accounts maintained by the CMs at the exchange designated bank(s) and the flow of funds to the CCP, which would be by way of simple book transfers.

As stated earlier, initially NEWEX will only accept cash towards its margin and worst case margin deposit requirements. Listed securities and bank guarantees will only be accepted after the corpus of the SGF reaches a certain minimum level as determined by the apex regulator.

Herein below, is a brief description of the process for the flow of funds from the exchange designated clearing banks to the CCP and vice versa;

1. CMs will be required to open a a) ‘House Account’ and b) an omnibus ‘Client Group Account’ with the exchange designated clearing bank(s);
2. At the time of acquiring a new client, as a sub-account of the ‘Client Group Account’, will be established at the CCP (Please See the Account Structure herein above),
3. The following steps will illustrate the flow of funds from the ‘Client Group Account’ at the NEWEX designated exchange clearing bank:
 - i. Client transfers funds to the ‘Client Group Account’ at the clearing bank,
 - ii. NEWEX transfers the funds to the ‘Client Group Account’ at the CCP,
 - iii. CM transfers the funds from the ‘Client Group Account’ to the individual clients sub-account at the CCP,
4. Clients will receive an SMS and/or an e-mail alert for every deposit and withdrawal from their account at the CCP, and
5. Clients will have 24/7 online access to their sub-account maintained at the CCP.
6. Additional restrictions:
 - i. Both the ‘Client Group Accounts’, at the clearing bank and CCP must have ‘zero balances’ (excluding forward value dated funds)) at the end-of-day,
 - ii. Funds can only be transferred back to the ‘Client Group Account’ from the clients’ sub-account but not to another client’s account,
 - iii. CMs can transfer funds from their ‘House Account’ to their ‘Client Group Account’ and then onto an individual clients’ sub-account and vice versa only in cases where

- iv. a CM has to meet a clients' margin call on behalf of their client's as they are the ultimate obligors, and
- v. CMs can only fund their clients' margin call for up to 72 hours and thereafter they have to liquidate their client's open position if the variation margin still remains unpaid.

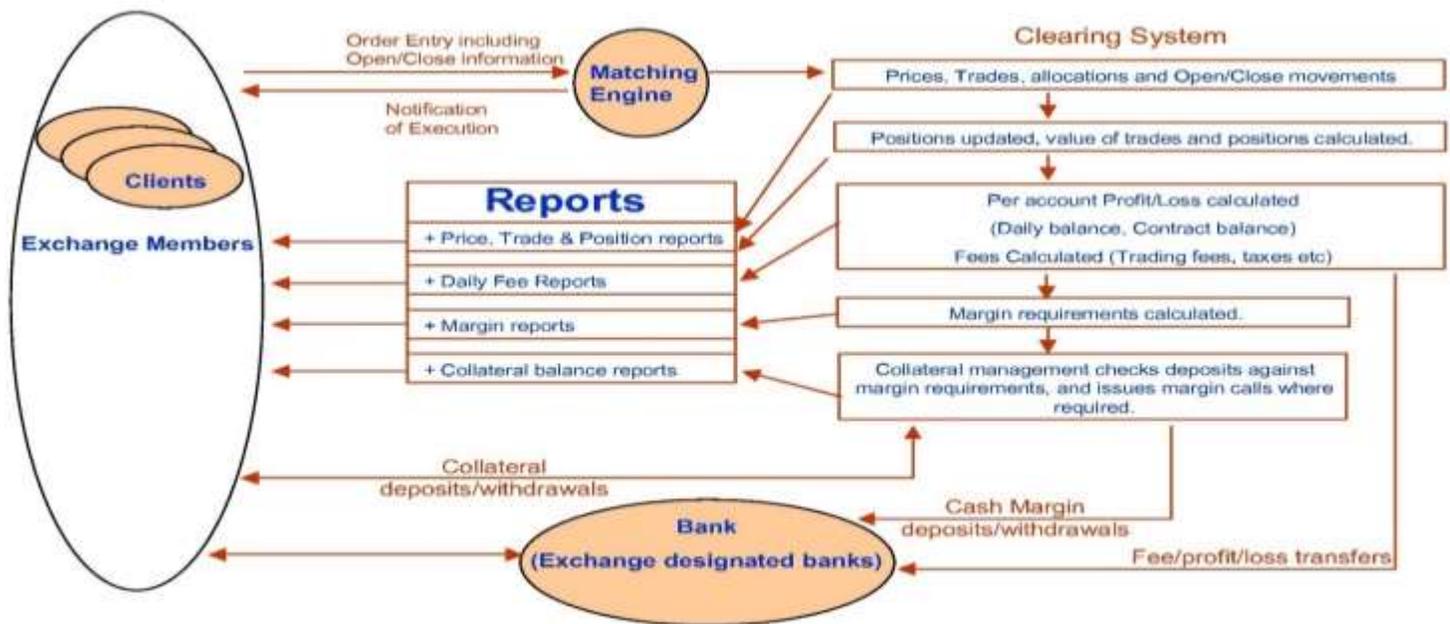
Perhaps, it can be mentioned here that the process flow between the exchange designated clearing bank and the CCP will be similar to that between a CSD and the CCP.

2. Identifying Critical Functionalities of a Clearing & Settlement System

There are numerous approaches to developing specialized systems. However, for the purposes of this section we will avoid a discussion on what would be the best approach but simply state that 'Means-End Chain Theory' has been used for identifying critical functionalities of a Clearing & Settlement System, which are discussed hereunder.

The Clearing & Settlement System must support the CCP in fulfilling its key role, which of being the central counterparty of each contract traded. The diagram below gives an overview of how this will be supported:

Proposed CCP Clearing & Settlement Framework



Typically, there are a number of inter-related functions within the Clearing & Settlement Operations of an exchange and its CCP. However since responsibility for all these tasks is rarely handled by a single department, the applications must be configurable (allow access control) so as to ensure confidentiality.

The above diagram also provides details of some of the reports which are made available, in XML format, to the CMs and their clients for online access via the web interface of their back-offices.

The CM, being the ultimate obligor of the CCP, contracts are registered in the name of the CM. The system will provide a cross-reference to the originating client account at the exchange clearing level to the client accounting module. Note that, in the future, should a CM wish to operate its own client accounting system, they will remain responsible for maintaining this cross-reference information in the exchange's client accounting module.

General Operations:

- Accept, verify and correct all trades presented to the CCP – including off-exchange transactions
- System must support full real-time bookkeeping for both CM house and client segregated accounts on a daily reconciliatory basis including CM and individual clients' assets on deposit at the CCP. Initially cash only, will be accepted but the system should be capable of accepting equities, fixed income securities, bank guarantees, etc.
- Profit/loss accounting for open and closed contracts.

Other functionalities of the system (the list is not exhaustive) are detailed hereunder:

- The system must calculate margins on a gross basis for each CM. It is assumed that the CM has a single House (Proprietary) account, as this is a single legal entity. Each position has a detailed required margin calculated at the client level. This allows for detailed, gross margining at the CM level.
- Realized profit is calculated for each offset trade.
- Unrealized profit is calculated after marking the positions to market at the end of each day. This is available at the client level and CM level.
- A ledger should be maintained, holding the net liquidity of each client and CM. This has P&L postings, cash transfers and fees applied at the end of each day, to provide the new net liquidity.
- The net liquidity of each client and CM is compared with their Maintenance and Initial margin requirements, to calculate a margin call, if required. The financial ledger is recalculated at the end of each day. The clearing system reports are generated at the end of day in a batch process.
- The client and CM positions are required to be updated in real time. The realized P&L is calculated after each trade is completed. The margin requirement is recalculated after each trade is completed.
- The client accounting module calculates the exchange to CM fees and margins and makes the relevant postings to the CMs' ledger. A client, who is not a CM, is managed as a client

of a CM. The CM can set specific client margin and fees, based on the type of customer (e.g. hedger, speculator, etc.).

- Each trade should be determined as either an opening trade, or an offset trade, using a standard FIFO mechanism.
- The CM and exchange have a cash transfer screen to input cash payments made on each account. Initially, as only cash will be taken for margin purposes, therefore valuation will not be required. However, a functionality will be available for applying haircuts in case of securities.
- The Margin Management functionality will provide an End-of-Day report detailing:
 - Ledger Balance Brought Forward
 - Realized P&L
 - Cash Transfers
 - Fees
 - New Balance
 - Total Unrealized P&L
 - Total Net Liquidity
 - Maintenance Margin Requirement
 - Excess Equity
 - Initial Margin Requirement
 - Margin Call
- CM and client account management will be done via the account management screen which will provide the following fields: Account Name, Internal Rating Class, Exchange (or parent) clearing account assignment.
- Fees can be set by rating level of each exchange account, or CM rating class and can be calculated for each trade/allocation and shall be applied to the net cash balance figure in the financial ledger.
- Accounting Policy will be gross/gross at the CM level.
- Position can only be corrected or transferred via an external entry for use by the exchange only.
- Collateral Management⁹:
 - Maintain list of instruments eligible as collateral
 - Asset types supported:
 - Cash
 - Fixed Income Securities
 - Letters of Credit
 - Equities

⁹ Discussion on Collateral Management will be limited to cash as initially all margins and deposits will be required to be paid in cash only. Listed securities or government securities, with haircuts based on either statistical or dynamic estimation, will only be accepted as collateral once the SGF reaches certain minimum corpus.

- Margin and settlement account information must be updated automatically:
 - Open Interest
 - Margin requirements:
 - Variation
 - Maintenance
 - Initial
- User Interface for CCP risk manager to update outright, spread and tier structures
- Define the assets that may be used to cover margin requirements and limitations
- Limit assets to cover only variation, initial or delivery margin, and
- Provide functions for CCP risk manager to “haircut” any asset type.

Member and customer account management:

- Maintain Banking account information and transfer funds through banking interfaces
 - Use interface for treasury to manage account information directly
 - Categories of Bank accounts
- Reports on each CM account – online:
 - Margin requirement by account
 - Assets: excess and on deposit by account
 - Profit and loss by account
 - Realized gain/losses by account
 - Assets by CM: excess and on deposit
 - Letter of credit Concentration report
 - CM Asset deposit report
 - CM Asset withdrawal report
 - Margin recap
 - Composition of collateral

Gross and/or net position accounting:

- System must support all combination of clearing and position accounting, (Gross/Gross, Net/Net, Gross/Net, Net/Gross):
 - At the account level
 - At the product level.

Settlement procedure:

- End of Day,
- Unlimited intraday runs as pay/collect or pay only,
- User interface to review settlement information,

- Settlement map details of application of assets for margin requirements, and
- CM transaction history.

Determination of final settlement price:

- Can be based on a number of mathematical formulae. Most common ones are:
 - Last Traded price of the Final Call session
 - Calculating using a volume-weighted methodology over a given period of time with pre-set parameters for:
 - Minimum aggregate number of trades
 - Minimum aggregate value of all trades
 - Minimum aggregate number of traders
 - An alternative calculation methodology with pre-set parameters, and
 - Manually inputting the daily settlement price – theoretical futures price.

Risk Management:

- Determine threshold for real time intraday risk management alerts,
 - Real time credit checking
 - Real time margin calculation
- Check account balances on events such as:
 - Posting new position
 - Change in margin rate
 - Increased market volatility
 - Withdrawal of collateral
 - Notification of these events.

Delivery Management:

- Basic Mechanisms are offered
- Manage the different requirements for cash settled and physically delivery contracts. Delivery parameters specified at contract creation
- Some Automatic delivery management features are offered
- Allow for prior input of all date tracking including:
 - Last Trading Day
 - First Notice Day
 - First Delivery Day
 - Last Notice Day
 - Last Delivery Day
- Determine when a “short” position holder tenders a notice of intent to deliver
 - Automatic Tracking of notice tender periods
 - User interface for “shorts” to tender notices during tender periods

- Match “Long” position holder to receive notice
 - Configurable matching methods by commodity
 - Notification to long position member of delivery match
- Monitor delivery process with user interfaces for
 - Delivery status
 - Delivery recap
 - Daily Market report

Settlement procedure:

- End of Day,
- Unlimited intraday runs as pay/collect or pay only,
- User interface to review settlement information,
- Settlement map details of application of assets for margin requirements, and CM transaction history.

The above required list is by no means exhaustive but indicates that the ‘must have’ functionalities of a Clearing & Settlement System to ensure timely and prompt decision making.

From the foregoing one can easily deduce that IT systems play a major role in all three pillars of a CCP. IT systems are essential to the calculation of exposure in real-time against critical risk limits based on deposited collateral.

A dedicated collateral-management system will also help the CCP to avoid concentration risk (too much collateral from companies in the same industry or geography). Moreover, it is vital that the IT architecture is flexible enough to support the increasingly complex requirements of clearing and settlement processes and the move to intra-day margin calls, in addition to end-of-day processing.

Section 4: A Full Trade Lifecycle

Having described the ‘three pillars’ of the CCP clearing business model to be implemented at NEWEX and its CCP, we will now describe the workflow in a ‘full trade lifecycle’ as shown hereunder:



Hereunder we will discuss each of the activities performed in trading, clearing and settlement starting from 'Order Entry' through to 'Final Settlement':

1. Order Management:

Most systems have the capability to undertake multiple checks to ensure that an order is valid before it arrives at the exchange. An example of the validation checks conducted are given below:

- Upon entering an order, it will be transmitted to the application servers; The application servers will validate and credit check the order then route it to the matching engine;
- Orders can only be entered by registered users in possession of a valid order ID and password;
- A user can only view/trade those contracts assigned to him/her by the exchange for the CM and by the CM for his clients. It is impossible to trade any other contracts;
- All traders can also set their own 'order validation checks' through the trading 'front end' to confirm that the price of the order satisfies a 'price reasonability check' and that the quantity of the order satisfies a 'quantity reasonability check' before the order will be sent thus also ensuring any error trades (fat finger);
- The 'front-end' can also be configured to prevent 'wash sales'
- When the order is received by the transaction server it will be checked in real time to ensure that the order does not breach any of the predefined limits which have been set (position limits, loss limits, order size limits, buying power limits);
- Any order that does not pass these checks is rejected immediately **before they get sent to the Exchange**. The user is notified in real-time that his/her order has been rejected, so is the risk manager at the Exchange or at the CM; and These checks are carried out in milliseconds, ensuring that speed of execution is not negatively impacted for the trader.'

2. Trade Management:

- The matching engine will process the order trying to find a match using the pre-defined algorithm according to the Rules & Regulations set out by the exchange;
- The order could be totally or partially filled in which case the fill confirmation will be sent back to the originating CM and the client, as the case maybe, via the application servers;
- Other market participants will see the activity though the market data feed;
- In the event of a fill, it will be updated in real time in the risk management database;
- If the order cannot be filled, it will be added to the order book (in the database) and the market will be informed through the market data feed (depth of market);
- Clearing information from the fill will pass to the clearing engine and then to the CMs and clients back offices.

replaces the complex web of relationships between unknown counterparties with a single known counterparty.

5. Risk Management¹⁰

1. Background

When it comes to financial markets, risk management is thought of as using only quantitative techniques to manage risk. In the process, simple yet quite effective non-quantitative measures to manage risk are often ignored.

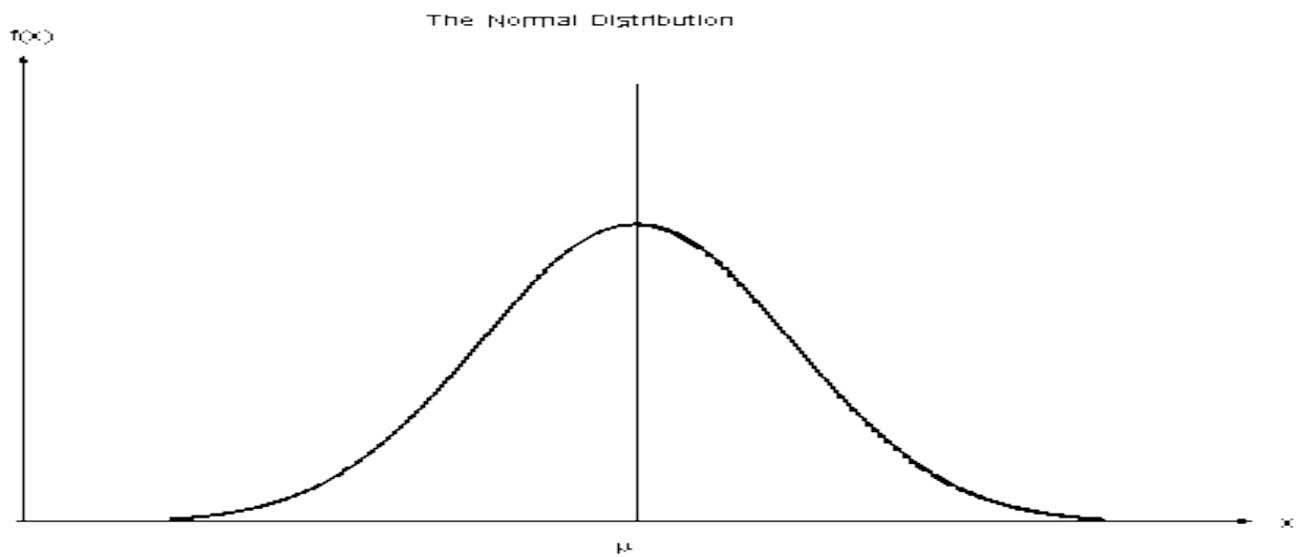
In this regard, two examples from the recent past come to mind;

- a) Long Term Capital Management (LTCM), a firm which assembled an all-star team of traders and academics, including a Nobel Laureate, in an attempt to create a fund that would profit from the combination of the academics' quantitative models, and the traders' market judgment and execution capabilities. At the end of September 1998, the fund had lost substantial amounts of the investors' equity capital and was teetering on the brink of default. To avoid the threat of a systemic crisis in the world financial system, the Federal Reserve orchestrated a US\$3.5 billion rescue package from leading U.S. investment and commercial banks.
- b) The crash of 2008 which in some ways is attributed to 'marking of portfolios to myth (quantitative models)' instead of marking-to-market. Each firm involved in trading of OTC derivatives were using their proprietary quantitative models for marking-to-market purposes where markers were based on their own models instead of realistic market prices. This led to a global financial crisis.

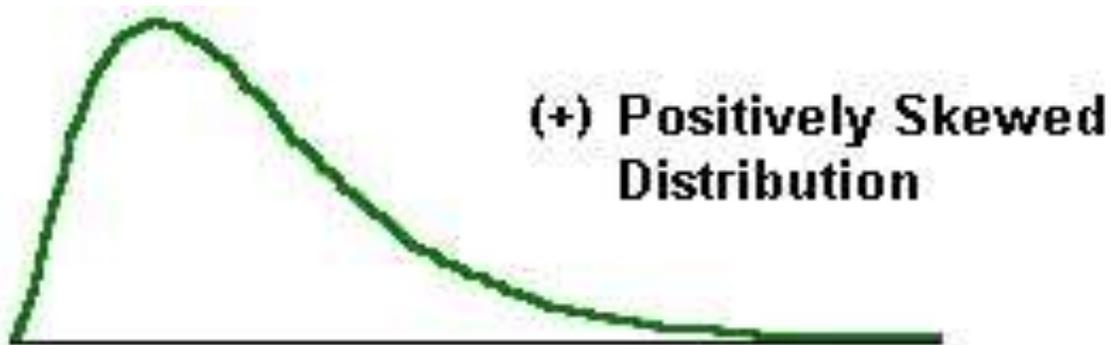
The mostly commonly used methodology in financial markets for measuring risk is Value-at-Risk¹¹ (VaR) models where the underlying assumption is that asset prices follow a 'normal distribution' or the classical bell curve as shown hereunder:

¹⁰ **CARE:** The methodology outlined for calculating Initial Margin and Worst Case Margin has been developed using ICE' New York "C" Coffee Futures Contract. It was also backtested over the last 12 years actual data to check its adequacy. Please also read the sections on stress-testing and backtesting herein below.

¹¹ For a comprehensive overview of Value at Risk and its measures, look at the Jorion, P., 2001, Value at Risk: The New Benchmark for Managing Financial Risk, McGraw Hill. For a listing of every possible reference to the measure, try www.GloriaMundi.org.

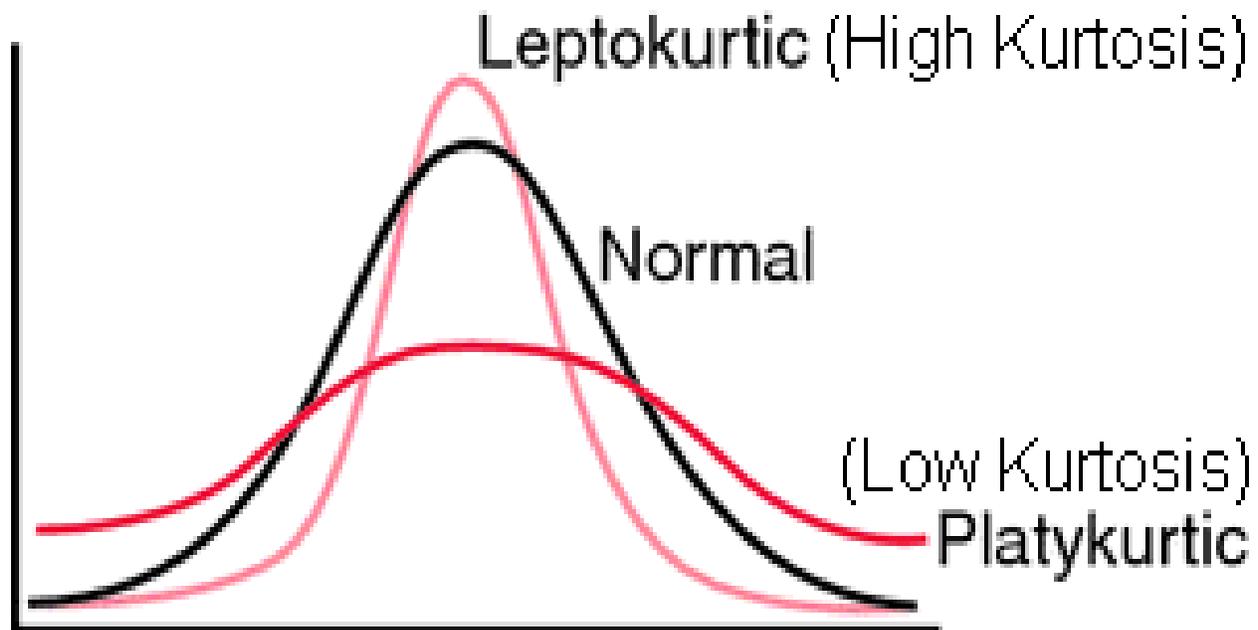


It is a well-known fact that financial assets do not exhibit normality. The distribution of prices in financial markets exhibit 'skewness' and 'kurtosis'. Skewness means that the distributions are not symmetrical around the mean as shown hereunder:



Stocks and bonds are subject to negative skewness (longer tails of negative outcomes) while commodities exhibit positive skewness (and that factor, in addition to their low correlation with financial asset returns, makes them a useful addition to a model portfolio).

Kurtosis is also known informally as 'fat tails'. That means that events far away from the mean (average) are more likely to happen than a normal distribution would suggest. Below (in black) is a normal distribution, the further below (in red), a so-called Cauchy distribution, which has fat tails:



The point of the above discussion is that excessive use of quantitative models such as VaR gives a 'false sense of security' or 'false comfort' by relying on a single number (VaR) which may understate or overstate the probable loss. This is particularly important if one has little or no understanding of the underlying issues and techniques involved in quantitative modeling.

Secondly, if one were to collect margins on the basis of a methodology which overstates the level of maximum probable loss then not only it would constrain the liquidity in the market unnecessarily but in times of stress it may even lead to forcing participants to default.

Thirdly, say we had determined that the initial margins should be calculated on the basis of 99%¹² confidence level with a 1-day look ahead period. 99% confidence level means that the probability of a breach would be 1 in 100 days. However, the processes and procedures for collection of funds, in case of a margin call, are designed whereby it takes over 1-day for participants to transfer funds for settling their margin calls. This timing mis-match between generation of a margin call and its settlement could lead to an unforced default.

¹² Majority of CCPs a minimum of 99% confidence levels to signify 'normal market conditions' for computing Initial Margin using Value-at-Risk. Initial Margin is designed to cover all but extreme market movements.

Based on the above discussion it is recommended:

- Market infrastructure entities must take a holistic view of risk management. Measures such as price limits, position limits, clearing limits, scaling up of initial margins for liquidity risk (measured by Impact Cost¹³), etc., must also be used in tandem with quantitative models,
- The look-ahead period used for computing VaR should be in synch with the processes and procedures of the CCP, the operational capabilities of 3rd party entities and liquidity risk (measured by Impact Cost of contracts/assets). For futures contracts, it is recommended to use 1 day for the look ahead period or liquidation period as NEWEX and its CCO will be integrated with its clearing banks for online transfer of funds,
- For purposes of VaR computation, log-normal returns¹⁴ as well as different rolling sample periods for 20, 90 and 260 days should be used, and
- Peaks over threshold methodology, based on at least six months historic price data, should be used for risk mitigation against extreme market moves (low frequency but high intensity market moves) as VaR measures only percentiles of profit-loss distributions, and thus disregards any loss beyond the VaR level ('tail risk')¹⁵.

2. Introduction

CCPs have played a pivotal role with regard to the resilience of the derivatives market in financial crisis. CCPs have effectively reduced and managed counterparty risks, created transparency on risk positions, and helped to ensure the operational efficiency of the market. CCPs have proven to be resilient even under stressed market conditions and showed their ability to ensure normal market functioning in case of failure of a major market player as in the case Lehman Brothers, in September 2008, when near resolution of all open positions were achieved within 15 days. This was primarily due to the fact that the collateral that CCPs had from Lehman was fully sufficient to cover its obligations.

In this section we will discuss a) risks in clearing and settlement, and techniques for measuring b) market risk (initial margin)¹⁶ and c) credit risk (worst case margin).

i. Risks in Clearing and Settlement:

Risks in clearing and settlement of exchange traded derivatives contracts are shown in the following diagram:

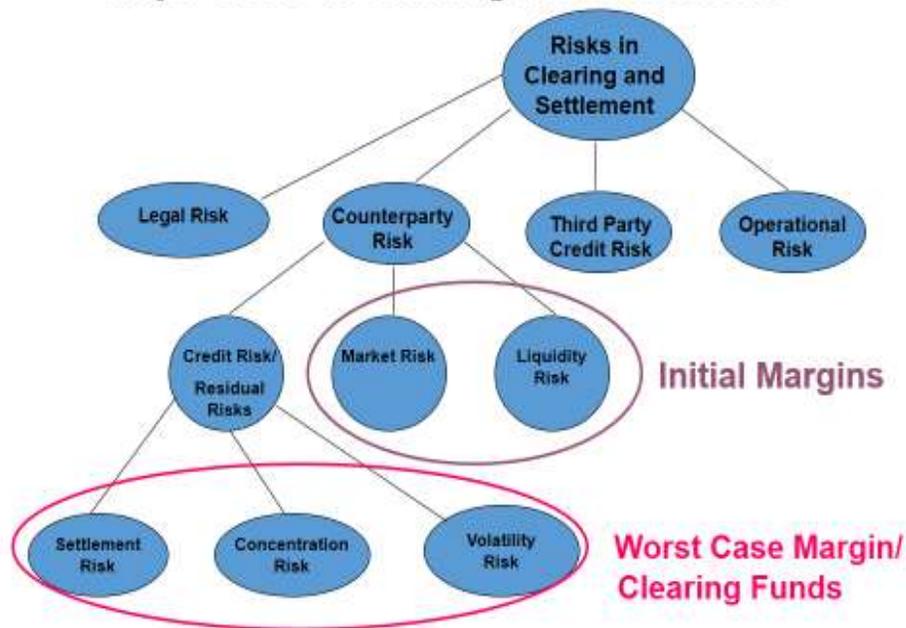
¹³ Impact Cost, as a measure of liquidity risk, is measured by the breadth & depth of an electronic limit order book.

¹⁴ A method to introduce symmetry in the data.

¹⁵ A form of risk that arises due to a market move of more three standard deviations from the mean and is greater than what is shown by a normal distribution.

¹⁶ For calculating initial margins levels, CCPs use the following inputs as parameters: 1) confidence level (to reflect normal market conditions), 2) assumed liquidation period and 3) historical daily price data over a specific period.

Major Risks in Clearing and Settlement



ii. Types of Risks and Management thereof:

In the above diagram Market Risk, Liquidity Risk, and credit risk and its constituents have been highlighted.

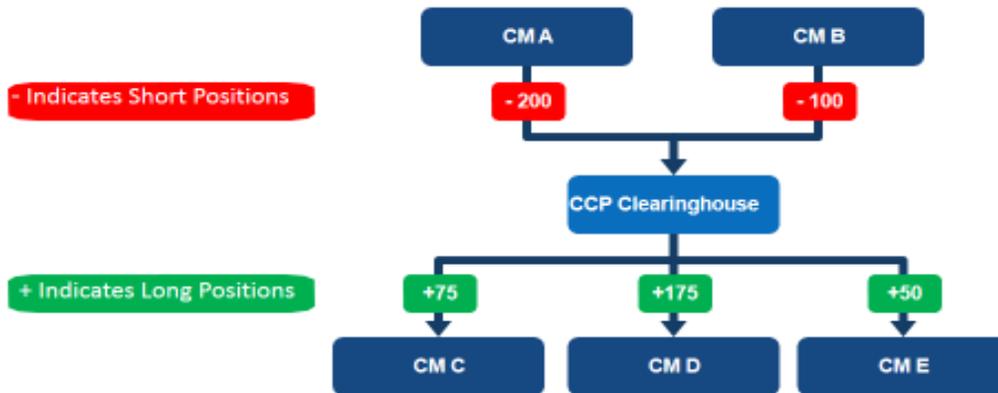
Risk management activities undertaken at a CCP are designed to ensure that the interests of its CMs and their clients are protected and that the integrity of the marketplace is maintained at all times. For the purposes of this section we will initially focus on a) market risk, b) liquidity risk and c) credit risk and then go on to discuss measures for mitigating d) legal risk, e) 3rd party credit risk and finally f) operational risk:

1. **Market Risk:**

Market risk is the risk of losses in positions arising from movements in market prices. The points to note here are:

- Trading in exchange traded derivatives is a 'zero-sum-game' – see the below diagram,
- Prices in markets move both ways; can go up or come down,
- Longs make money when prices go up and shorts make money when prices come down; and
- Therefore, CCP runs a 'balanced book' (outstanding short positions are exactly equal to long positions as illustrated in the chart herein below) and is only exposed to market risk if one of the participants default and the outstanding open

position gives rise to market risk. Hence, this risk has to be collateralized by way of an 'initial margin' deposit.



CM: Clearing Member

In light of the foregoing and to protect the integrity of the CCP, all market participants in a derivatives market are required to deposit an 'initial margin', with the CCP. The question is how is the initial margin determined to mitigate market risk?

Readers will recall that in the 'Background' Section it was mentioned that financial assets do not exhibit normality. Whilst most commonly used methodologies for calculating VaR such as including Variance-Covariance and Exponentially Weighted Moving Averages rely on the assumption of normality, whereas Historical Simulation methodology simply uses historical time series with an underlying assumption that history repeats itself, from a risk perspective. Historical Simulation methodology is very simple to use and can be used for all types of instruments traded in financial markets.

The following steps are required for computing VaR using Historical Simulation methodology:

1. Calculate the lognormal returns of historic daily prices for 20, 90 and 260 days;
2. Use a 99.865%¹⁷ for 1-tailed confidence interval (equivalent to 3 Standard Deviations) as the cut-off point for determining the worst (negative market move) to the best (positive market move) daily returns (viewing the Histogram from left to right);

¹⁷ The 99.865% confidence interval is suggested for new markets/listing of new contracts to mitigate against 'noise trader risk'. This confidence interval should be reviewed at least after the first 3-6 months.

3. Apply the PERCENTILE function in MS EXCEL on the three daily time-series obtained in Step 1 with the cut-off value being 0.135% = (100% - 99.865%);
4. Convert the time series using the ABSOLUTE (ABS) function in MS EXCEL (ranking the data from the lowest to the highest market move irrespective of the direction);
5. Multiply today's asset/contract price with the highest value of the three time-series to obtain today's 1-day VaR with a 99.865% being a 1-tailed confidence interval,
6. Multiply the value obtained in step 6 with $\sqrt{2}$ (look ahead period for futures contracts assuming it takes two days to liquidate a contract¹⁸);
7. The result obtained will set the initial margin rate.

2. Mark-to-Market Margin (Variation Margin):

Mark-to-Market Margin or variation margin is the difference between the required maintenance margin¹⁹ and the account balance after adjusting losses arising due to the daily settlement. It will be obligatory to bring an account balance up to the initial margin level if it falls below the minimum required maintenance margin level due to market fluctuations which undermine the value of the margin held on behalf of the CMs and their clients. It is therefore crucial that the value of the initial margin is restored to the required level so that it is of sufficient quantum to provide coverage for the daily price volatility.

The essential effect of marking positions to market daily is the 'extraction of credit risk' from the market. In a derivatives market, the net effect of doing so would be that the risks associated with the final settlement are no different from daily mark-to-market settlement.

Marking-to-market of positions ensures that the initial margin is restored by way of collection of losses against across all open positions and;

- a. CMs are protected from individual clients' defaults; and
- b. Viability of each open position is checked on a daily basis.

Also, non-payment of variation margin is an 'early warning signal' of an impending default.

At NEWEX, the mark-to-market margin shall be collected on the gross open positions of CMs and all of his clients in all contracts without any netting between CMs and its clients open positions. All mark-to-market losses will be collected on a T+1 basis, but prior to the opening of trading the next day. However, mark-to-market profits will not be automatically paid out but only upon receipt of a request from the CM. These requests made via the system will be processed with a lag of 24 hours thus ensuring that the CCP will always have a positive cash flow.

¹⁸ VaR is not additive. To convert 1-day VaR into 2-day VaR, it is simply multiplied by $\sqrt{2}$.

¹⁹ Maintenance margin is normally set at 75% of the initial margin level.

Apart from the correct calculation of initial margin, timely collection of variation margin is of utmost importance. NEWEX will ensure that its CCP lays down operational guidelines for collection of variation margin and back-office accounting, both at the individual client level as well as the CM level, to facilitate detection of non-compliance. In case of non-payment of variation margin by the cut-off time, client's system access will be immediately disabled. In case of a CM, CMs access as well as all of his client's access will be disabled and a penalty is imposed based on a percentage of the shortfall and default proceeding could be initiated as per the CCP's Business Rules²⁰, if required.

3. Correlations & Calendar Spreads:

In developed markets, offsetting positions in derivatives contracts with different expiry dates attract a reduced level of initial margins. For example, a short position in the six month contract coupled with a long position in the nine month contract. The justification for low margins is that a calendar spread is not exposed to the market risk in the underlying at all. If the underlying rises, one leg of the spread loses money while the other gains money resulting in a hedged position.

Standard futures pricing models state that the futures price is equal to the cash price plus a net cost of carry (interest cost reduced by dividend yield on the underlying). This means that the only risk in a calendar spread is the risk that the cost of carry might change; this is essentially an interest rate risk in a money market position. In fact, a calendar spread can be viewed as a synthetic money market position. The above example of a short position in the six month contract matched by a long position in the nine month contract can be regarded as a six month future on a three month T-bill. In developed financial markets, the cost of carry is driven by a money market interest rate and the risk in calendar spreads is very low.

Although methodologies that identify and offset opposite exposures related to positively correlated risks - or, conversely, directional exposures related to negatively correlated risks – have the potential to reduce the required levels of margins, such methodologies are generally based upon a simplified view of the actual market dynamics. Since the main principal concerning CCP risk management is connected to the assessment of the potential losses related to the close out of a position under adverse market conditions, friction factors such as correlation misalignments during high volatility periods, different liquidity profiles related to different assets and markets and different settlement structures, must be considered. Therefore, the offset mechanisms should ensure a minimum level of sophistication in order to incorporate the friction factors, otherwise, it is likely that the client's risk of outstanding contracts could be underestimated.

Therefore it is recommended that calendar spreads should be gradually phased in.

²⁰ Business Rules of a CCP must clearly specify actions to be taken if a CM is in financial difficulty, potentially in default or in default of its obligations. Default Management Processes Manual of a CCP must include a) Objectives of Default Management b) Definition of Default c) Implications of Default d) Forms of Default e) Default Mitigation Process, and f) Financial Remedies to cover Default-Induced Losses.

4. Liquidity Risk²¹:

Liquidity risk represents the risk, in the case of default or non-performance of a CM, that a CM must fulfil its obligations to non-defaulting CMs without delay. In the event of default, the CCP would look to the assets of the defaulting CM to meet any obligations however these assets may not all be in cash. Non-cash assets must be liquidated before the CCP can meet its obligations and this may be time consuming and costly. Therefore, for this very reason NEWEX will initially be accepting margins and deposits in cash only, as stated earlier.

However, for the sake of completeness we will briefly discuss hereunder how CCPs manage and apply haircuts on securities placed as collateral for initial margin purposes.

i. Collateral Management²²:

Below are some of the additional variables that may be used in calculating haircuts:

- pricing update frequency
- age of prices obtained
- longest time between collateral valuations
- frequency of marking-to-market
- period to post margin (factor in settlement delays)
- time to discover the CM has not posted margin
- time to contact CM and notify them that they have missed a margin call
- grace period before declaring non-performance
- time to decide to liquidate (depends on relationship considerations) and
- time to actually dispose of the assets (size of the position relative to market)

We will briefly discuss the steps involved in evaluating collateral for margin purposes:

Firstly, the board of the exchange or the CCP clearinghouse must decide the acceptable ratio between cash and securities for initial margin purposes and obtain regulatory approval thereof.

Secondly, the CCP must calculate the 1-day VaR at 99.865% one-tailed confidence interval of all the listed securities as marking to market at NEWEX will be on a daily basis for both the outstanding positions as well as of the securities placed for initial margin purposes.

Thirdly, a criteria such as shown below should be established:

²¹ For more details, see Bangia, A., Diebold, F. X., Shuermann, T. & Strughair, J. D. (1998) & Iosco's publication 'Principles of Financial Market Infrastructures', April 2012.

²² Committee on the Global Financial Systems, 'The Role of Margin Payments and Haircuts in Procyclicality' 2010.

| Category | Look Ahead Period | % of Trading Days |
|---------------|-------------------|----------------------------|
| Highly liquid | 1 day | > 80% in past 260 days |
| Liquid | 3 days | > 70% in past 260 days |
| Less liquid | 5 days | > 60% in past 260 days |
| Illiquid | N/A | Does not meet any of above |

Fourthly, only securities which have traded over 50% of the days should be acceptable as collateral.

Fifthly, 1-day percentage VaR number obtained in step 2 for (i) and (ii) above should be multiplied with Square Root of the corresponding look ahead period to obtain the scaled up VaR level and,

Finally, another important consideration is the size of the position relative to the total daily trading volume in the underlying security as shown hereunder:

Example 1: Outstanding position of 100,000 shares and average daily trading volume of 75,000 shares in security.

- Position size divided by average daily trading volume = 100,000 shares / 75,000 share per day = 1.33 days
- Required liquidation period = 1.33 days rounded to nearest full day plus 1 day = 2 days
- Therefore, the VaR number obtained in step is further multiplied by square root of 2.

Example 2: Outstanding position of 750,000 shares and average daily trading volume of 100,000 shares.

- Position size divided by average daily trading volume = 750,000 shares / 100,000 shares per day = 7.5 days
- Required liquidation period = 7.5 rounded to nearest full day plus 1 day = 9 days
- Therefore, the VaR number obtained in step is further multiplied by square root of 9.

Generally, payment for securities tends to require greater liquidity funding in the event of default by a client or a CM than for that required for derivatives, which do not involve principal payments. In addition, the amount tends to be greater when payments are netted per security issue, compared with when they are netted across securities²³.

²³ The methodology outlined herein above can also be used for screening highly liquid constituents for a liquidity screened stock index particularly as an underlying stock index futures contract.

5. Credit Risk:

Credit risk represents the CCP exposure to a loss arising from actions undertaken by an individual CM. Such factors may include; a deterioration of the capitalization of a CM, a CM holding positions, both proprietary and individual clients, that are beyond its financial capacity to absorb a loss arising due to extreme price movements or beyond what are termed as normal market conditions. Alternatively, one can say that in situations that go beyond those envisaged in the VaR estimated initial margin.

Many researchers claim that VaR has several conceptual problems as it only measures the percentiles of profit-loss distributions, and thus disregards any loss that goes beyond 3 standard deviations which is referred to as the 'tail risk' level. To mitigate against such extreme market moves, CCPs collect from CMs²⁴ 'worst case margins' ('WCM') or 'extreme loss margins' against all open positions, proprietary as well as individual clients, and in doing so effectively CMs have their 'skin in the game'.

For calculating the 'worst case margin' level, the most preferred technique is to simply multiply the previous 6 months standard deviation of the daily lognormal price data with 1.65 standard deviations (1.65 is equivalent to 95% 1-tailed confidence interval). Please note that:

1. The WCM shall be collected/ adjusted on an online real time basis against the CMs total liquid assets/deposits with the CCP,
2. WCM is collected on the basis of gross/gross (gross against all individual clients and CMs own proprietary positions),
3. The worst case margin level should be reviewed and revised, if required, on a monthly basis and the resultant level should be applied next month.

6. Legal Risk²⁵:

Legal risk is the risk of the unexpected application of a law or regulation, usually resulting in a loss. Legal risk can also arise if the application of relevant laws and regulations is uncertain.

The role of a CCP starts from 'novation' of a bilaterally executed trade between two counterparties and the stepping in of a CCP through to final settlement. During the life of a derivatives trade various processes are undertaken at a CCP which require legal cover and one must ensure that these processes do not run afoul of other laws in the country.

The following are some of the key processes that should be given legal cover and must be addressed in the regulatory framework (Act, Regulations, Rules or Bylaws):

²⁴ CMs are the ultimate obligors of a CCP. Therefore, the Worst Case Margin is the obligation of CMs and not their clients. The higher the share of the risk they bring to the CCP, the higher will be the CM's contribution to the SGF by way of WCM. This would be discussed in greater detail in the next section.

²⁵ Iosco's publication 'Principles of Financial Market Infrastructures', April 2012.

1. Novation,
2. Multilateral Netting,
3. Primary Legislation, Regulations and Rules governing the operations of a CCP takes precedence over the insolvency laws (there is an abundance of case law where courts have ruled that the internal rules and regulations of public interest entities, such as CCPs, take precedence over insolvency laws),
4. First and paramount charge/lien of the CCP over the deposited collateral; cash and other securities,
5. Derivatives trading does not constitute gaming and wagering contracts under the Betting, Lotteries and Gaming Act.
6. A precise definition of derivatives & futures contract
7. Modes of settlement of derivatives & futures contract which can be by way of:
 - i. Physical delivery,
 - ii. Constructive delivery (by way of an agreement and understanding), and
 - iii. Symbolic delivery (by way of a warehouse receipt, bills of lading, etc.).
8. Settlement finality,
9. Segregation
10. Portability of client accounts in case of a CM default (an appropriate provision should be included in a CM-Client account opening agreement)
11. CM-Client account opening agreement must have suitable provisions for liquidation of positions in case of non-payment of Mark-to-Market Margin or Variation Margin,
12. Clearly define what constitutes an event 'Default' and the processes to follow in such an event,
13. Unambiguous provisions for topping up by CMs of the SGF (an undertaking must be obtained from all CMs),
14. Emergency powers of the Management and the Board, and
15. Capital structure of the entity, restriction on maximum shareholding and the constitution of the Board (appointment of public interest directors).

The above list is not exhaustive, but only highlights some of the critical provisions which are required in the regulatory framework for CCPs so as to avoid unnecessary interpretation by the Courts of Law.

To summarize, mitigation of a CCP's legal risk requires a solid legal framework comprising primary legislation, rules, regulations and contracts to support its activities irrefutably.

7. 3rd Party Credit Risk:

In the case of NEWEX, 3rd party credit risk refers to risk which may arise due to the failure of the Clearing Bank.

NEWEX' appointment of Clearing Bank(s) would be dependent on:

- The minimum short term and long term credit rating, and minimum networth approved by the Board of NEWEX;

- Technological sophistication of the bank to meet NEWEX' unique requirements for maintaining CMs and their clients' accounts to meet the requirements of NEWEX; and
- Availability of online access to is accounts on a 24/7 basis together with full customer support.

8. Operational Risk:

Operational risk is the risk of credit losses or liquidity pressures as a result of inadequate systems, processes, and controls, human error or management failure. The result would be that a CCP is unable to monitor and control its market exposures or in the case of human error or management failure, the efficacy of its risk management approaches can be compromised.

NEWEX will develop its processes and procedures using process management and process mapping techniques to ensure that there are:

- No activities taking place that don't need to
- No activities being repeated
- No control gaps

Additionally, NEWEX must maintain a "Hot Backup Site", the most effective safeguard to minimise operational risk. This site replicates all trading data in real time with backup facilities for processing, communication and power supply. NEWEX business recovery site must be geographically distanced from its main operations where processing can be transferred within a very short period of time. This will be the ultimate in disaster preparation.

Data security to prevent fraud and unauthorised use of information must also be implemented in order to minimize operational risk.

Appropriately trained staff and effective supervision will also minimize operational risk. The establishment of a Compliance Department to review processes and procedures, and segregation of duties and other internal controls should also be in place.

Other important sources of operational risk for CCPs include insufficient staffing, weak internal controls, a lack of clearly defined procedures and an inappropriate governance structure.²⁶

6. Delivery Management & Final Settlement:

As stated earlier, initially only cash settled contracts will be listed at NEWEX which will be settled by way of 'exchange of value settlement'.

²⁶ See IOSCO's 'Committee on Payment and Settlement Systems (2004)', p. 33

Section 5: The CCP Guarantee; the Financial Safeguards Waterfall

NEWEX and its CCP's risk profile is determined by its role as CCP to all CMs and the guarantee it provides in that process. The CCP's principal risk is an event of CM default and the potential market risk from any open positions of such CM.

As a CCP it provides clearing services for financial transactions at NEWEX. When a market participant places an order that is filled on NEWEX, it matches the two sides of the order and reports back to its executing CM's confirming matched trades or highlighting unmatched trades. The matched order is sent to CCP, which issues a novated contract to the CM's that represent each side of the contract. By issuing a novated contract, CCP becomes the buyer for every seller and the seller for every buyer.

CCP's principal risk is an event of CM default. Only then does CCP become exposed to market risk. At the time a CM defaults, CCP's mandate is to act quickly and limit the length of time it is exposed to market risk. To that end, the CCP tries to transfer all the positions and all deposited collateral of the defaulting CM to other solvent CMs.²⁷ If a transfer is not feasible, CCP closes out the defaulted CM's positions in open market transactions using the margin collateral as the source of funds. In the case of MF Global, CCP's were able to quickly liquidate and transfer nearly all of MF Global's positions without incurring any losses or having to tap the SGF.

There is no direct contractual relationship between the CCP and the CMs clients. The CCP guarantee, therefore, does not extend directly to the clients of CMs but the CCP guarantee mechanism does, as it ensures that a default of a CMs counterparty (i.e. another CM) will not affect the non-defaulting CMs ability to meet its own and its client obligations. In this way, the CCP ensures that CMs (and therefore, indirectly, their clients) are protected from other CMs defaults.

1. Settlement Guarantee Fund (SGF):

It is often stated that the quality of the membership is the first line of defense for the Exchange and its CCP. NEWEX must specify the financial criteria, minimum networth and minimum net capital balance (solvency), for all CMs of the exchange and it's CCP, as required under the licensing Regulations with the approval of the Authority. Further quarterly networth and solvency statements must be submitted to the exchange²⁸.

The SGF is a reserve fund put in place to respond to the deficit that may occur when the initial margin and the worst case margins of a defaulting CM no longer covers his market exposure. The SGF is an obligation shared by all the CMs and this Fund is structured to mitigate the Uncovered Residual Risk ('URR'). The URR accounts for the fact that extreme market conditions could generate a major loss for certain CMs, causing the potential default of a CM. The SGF will be made up of:

²⁷ Appropriate provisions for segregation and portability of accounts are required in the Regulatory Framework to facilitate this process.

²⁸ Please see 'The Capital Markets (Licensing Requirements for Derivatives Brokers and Conduct of Derivatives Business) Regulations'.

- i. NEWEX seed capital of Ksh 100 million. This Ksh 100 million seed capital will be as ring-fenced in the financials of NEWEX.
- ii. Required contribution of each CM composed of:
 - a. Minimum base deposit, and
 - b. Variable deposit specific to each CM.

Each CM has to contribute a minimum deposit, as determined by the Board of NEWEX and approved by the Apex Regulator, to the SGF at the time of their admittance. This is deemed as the fixed portion of the SGF. Worst case margins requirement is adjusted against the base deposit.

The variable portion which is made up of additional deposits to meet worst case margins requirement, in excess of the minimum deposit. The base deposit and the variable deposit will be commensurate with the risk CM brings to the CCP.

Worst case margins will be adjusted in real-time against the base deposit. CMs will require additional deposits (variable deposits) to be placed with the CCP if it falls below a certain threshold limit due to increase in activity and exposure.

- iii. Investment income earned on the liquid resources of the SGF.

The return on investments made by the CCP will become part of the SGF and will constitute another layer of protection. Investments of the liquid resources of the SGF can only be made either by placing short term deposits with Board approved and rated commercial banks or in short dated highly liquid Government securities.

2. Default Pay-out & Financial Safeguards:

To protect itself against the default of CM due to extreme market moves, NEWEX and its CCP will establish a number of financial safeguards, which will take effect in the following order²⁹:

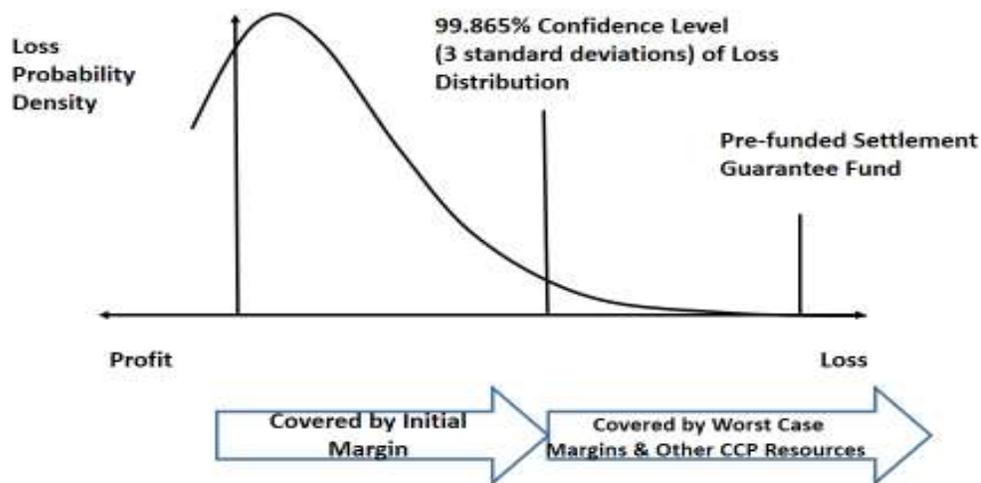
- I. The first level of control of the credit risk faced by NEWEX and its CCP, is accomplished by admitting only creditworthy counterparties as CM's. NEWEX will establish minimum financial requirements and standards³⁰ that its CM's must meet continuously,
- II. As a second level of control, NEWEX' CCP will impose position limits on its CMs and their client's to limit the potential losses to which a CM may be exposed,
- III. The third level of control will be exercised by utilising the initial margins of the defaulting CM, and not their clients,

²⁹ The order may vary from one CCP to another.

³⁰ Minimum Liquid Networth (creditworthiness) & Minimum Net Capital balance (solvency). Fixed assets, overdue receivables, loans to subsidiaries & directors, etc. will be excluded from the computation thereof.

- IV. The fourth level of protection is set by the level of a worst case margin deposits with the CCP to cover the risk from extreme events or residual risks,
- V. The fifth is to establish default procedures in the event that a CM does default. While these procedures may differ from one CCP to another, they typically involve an attempt to isolate the house account (proprietary) positions of the defaulting CM while transferring the accounts of its non-defaulting clients to other solvent CMs,
- VI. The sixth level of protection is to establish supplemental resources to cover situations in which the worst case margin deposits of all the CMs are insufficient to cover losses or the complete erosion of the SGF. In the case of NEWEX, this will be in the form of seed capital to be deposited prior to 'go live'. This seed capital will be ring-fenced in the financials of NEWEX.
- VII. The seventh level is, in case of a pay-out from the SGF, NEWEX' regulations allows it to make a cash call to the CMs for topping up of the SGF (power of assessment) based on their outstanding positions at the time of default. An undertaking to this affect is provided by the CMs upon admittance, and

Coverage of Loss Distribution



The above chart assumes the peak of the loss distributions shifts to the right because price developments in the liquidation of a defaulter's position tend to move adversely and asymmetrically for a CCP due to potential market impacts.

Backtesting:

Backtesting is performed on a daily basis. Backtesting helps the CCP to assess the robustness of the existing models and measures the actual credit exposures. In order to have an efficient coverage, even at the introduction of new products, the CCP performs a complete theoretical backtesting to calibrate the liquidation period and the volatility assumptions.

The NEWEX' CCP will put in place appropriate internal procedures if the backtesting results are not sufficient to cover minimum coverage at the product level and at the portfolio level.

If the results of the backtesting fail to reach the desired minimum coverage, the situation is investigated. If necessary, the results will be escalated to upper management. At this level, a decision is made to adjust the current risk parameters and/or ultimately to change the risk methodology. Under the NEWEX' Business Rules, its CCP will have the discretion to adjust the initial margin and worst case margin. This can be done at the product level by increasing the margin interval, or by asking CM's for additional worst case margin deposit.

The results will be communicated to the Risk Management Committee (RMC) on a regular basis.

3. Stress-testing:

Stress-testing is also conducted on a daily basis. CCPs uses different stress scenarios, each of them designed to test different key parameters. The results of the stress tests will help the CCP to quantify the size of SGF. The SGF measures the capacity of the CCP to address extreme, but plausible market conditions. Another goal of the stress-test is to better understand the different relationships among the different positions of the CMs. The various results may contribute to enhance the risk methodology of the CCP. If it is concluded that these changes in the market are permanent, the CCP may integrate the new dynamics in the initial margin and/or worst case margin.

The scenarios are historical and theoretical. The historical stress scenarios aim to simulate the biggest historical events that would affect CMs. The historical stress scenarios are used to determine the size of the SGF. Moreover, in the case of the stress testing monitoring program, the stress scenarios help the CCP to have a complete view of the risk profile of the current positions undertaken by each CM, and by all of them simultaneously (the portfolio-level coverage assessment).

The SGF is designed to protect the CCP from the larger of the amounts required to cover the potential draw resulting from:

- i. The default by the largest CM, at the 99% coverage level;
- ii. A minor systemic event involving the near-simultaneous default of the second and third largest CMs, at the 99.865% coverage level.

The stress-test results will be communicated to the Risk Management Committee (RMC) on a regular basis.

4. CMs SGF Contribution & Margin Call:

As stated earlier, the SGF is a reserve fund set aside to cover a potential defaulting CM's deficit. Such deficit occurs when all the assets held as initial margin by the CCP, outside the SGF, doesn't suffice to cover a defaulting CM's market exposure.

The SGF is a shared obligation of all CMs, and provides coverage for residual risks, which are risks not covered by the CMs' initial margin deposits. Residual risks account for the fact that extreme market conditions may cause a major loss for specific CM, potentially causing a CM to default.

CCP issues a SGF Margin Call to each CM on the basis of a monthly re-evaluation of the following elements:

Each CM's contribution is determined by subjecting the CM's portfolio to a market-based financial soundness test and calculating the difference between the CM's uncovered residual risk (URR) and the average of his margin requirements over 60 business days.

CCP calculates daily the URR of each CM, i , then uses the average, μ , of the 60 past days URR values for each CM i .

$$\mu_{URR}^{60} = \frac{\sum_{t=1}^{60} URR_t^i}{60}$$

CCP determines the size of the SGF, Ω , based on the maximum average uncovered residual risk amongst the n CMs.

$$\Omega = \max_{i=1}^n (\mu_{URR}^{60})$$

Every CM's contribution to the SGF, C^i , is determined according to the weight of the CM's, i , respective average uncovered residual risk in relation to the sum of the average uncovered residual risk of all n CMs.

$$C^i = \Omega \times \frac{\mu_{URR}^{60}}{\sum_{i=1}^n \mu_{URR}^{60}}$$

Section 6: Conclusion

In this section we will simply provide a summary of the international best practices recommended for CCPs by IOSCO³¹:

³¹ IOSCO's publication 'Principles of Financial Markets Infrastructure', May 2012.

1. Membership Standards

CCPs must have express minimum standards for CMs access to its core services. The standards must include financial criteria based minimum liquid networth and net capital balance.

Both the CCP and its CMs have a legitimate need to restrict the membership to protect their own creditworthiness and solvency. Important criteria for membership include financial integrity, proven operational skills, and high ethical standards. By adopting objective standards to evaluate potential CMs, CCPs can strike a balance between protecting their existing CMs and permitting fair and open access to their services.

CMs should be subject to supervision by the CMA. Such supervision will provide periodic monitoring of the CM's financial condition.

2. Financial & Operational Capacity

CCPs should have sufficient financial and operational capacities.

CCPs that have adequate financial capacity can limit liquidity pressures that result from CM defaults and ensure that even if defaults occur, settlement will be completed on schedule. Likewise, adequate operational capacity can prevent liquidity problems and reduce credit risks resulting from delayed settlement of transactions.

CCPs should have sufficient capital or liquidity resources (CM funds, margins, retained earnings, and/or CM assessment powers) to meet their ordinary and contingent liabilities. Minimum capital levels may differ among CCPs based on the level of exposure to CM default (e.g., in general, net capital levels for securities clearinghouses are lower than those for futures clearinghouses). The capital resources should be in cash or highly liquid securities and should be limited in the purposes for which they may be used. CM contributions should be based on a non-discriminatory formula universally applied.

CCPs also should have an affirmative obligation to safeguard funds and securities in their possession or control. CCPs should protect against the possibility of theft, destruction, or loss of securities or funds and the unauthorized modification, disclosure, or destruction of data.

CCPs should have systems for monitoring CMs' financial condition and obligations to the CCP. Such monitoring should be increased for any firm whose ratings decline. Monitoring a CM's financial condition can provide early notice of concentration risks and the effects of high volatility on individual CMs. Monitoring also will enable the CCP to take early corrective action.

3. Regulatory Framework

Each CCP should be subject to direct governmental oversight or self-regulation subject to governmental oversight, including periodic examinations (depending on the stage of market development).

CCPs should be obligated to monitor information about the financial and operational condition of CMs in multiple markets and to share that information with entities in those markets. Linked entities should notify each other when a common participant's financial or operational condition

is impaired. Monitoring participants' positions in all markets will provide CCPs with more information with which to assess liquidity, systemic and credit risks. There may be resistance, however, to sharing certain types of information and, therefore, confidentiality must be assured. Information sharing also may require more advanced technology to make use of the information provided.

An efficient clearance and settlement system also requires coordination among the stock and derivative markets. The lack of integrated clearance and settlement among derivative and cash market products increases systemic risk. The regulatory framework must ensure that the regulations and rules are CCP specific and references to other 3rd party subsidiary legislations must be avoided.

4. Issuance of Guidance

CCPs should issue clear guidelines, rules, and procedures.

The terms on which CMs can obtain access to its services and the circumstances under which a CM's access to those services can or will be revoked should be publicly disclosed. The CCP's rules should avoid unfairly discriminating among CMs in the admission to or use of the system.

The CCP should establish measures designed to assure that its CMs can meet their financial obligations on a timely basis (e.g., margin or collateral deposit requirements, or secure bank credit lines).

The CCP should establish measures to reduce the risk of non-settlement. The longer the time period between the execution and settlement of a trade, the greater the risk of default. Also, settlement by book-entry between financial intermediaries and between financial intermediaries and their institutional clients increases the efficiency of the settlement process.

5. System Capacity

CCPs must maintain adequate systems capacity to process reasonably anticipated volume, including projected peak volume demands and must be capable of protecting against reasonably anticipated internal or external threats to the integrity of their operations.

CCPs should use automated systems that permit electronic processing of data, payments and deliveries. During times of high trading volume, technology often is essential for efficient clearing and settlement. The risk of automated system down-time may be reduced by duplication of power supplies and other essential components. Back-up precautions must be taken so that participants have confidence in the integrity of the systems.

CCPs should establish formal current and future capacity estimates for their automated systems to ensure that they have the capacity to accommodate adequately both current and anticipated processing levels. Future capacity estimates should be based on projected volume figures and possible increased message traffic resulting from planned modifications to existing systems or the introduction of new systems.

CCPs should conduct periodic capacity stress tests to determine the behaviour of automated systems under a variety of simulated conditions. The periodic test of system capacities will help

identify potential weak points and reduce the risk of operational failure. The tests should be based on generally accepted standards, subject to regulatory approval.

CCPs should conduct independent annual reviews to assess whether their automated systems can perform adequately at their current and future estimated capacity levels and whether these systems have adequate protection against physical threats. Appropriate areas for independent review include whether: (1) current and future capacity estimates are accurate; (2) the automated systems can perform at estimated capacity levels; (3) planned system enhancements realistically will accommodate future capacity requirements; (4) contingency protocols are well designed and likely to be effective; and (5) automated systems are vulnerable to systems integrity failure. In addition, the independent reviews should make recommendations to address any deficiencies found in the areas listed above.

6. Stress testing

A CCP should determine the amount and regularly test the sufficiency of its total financial resources available in the event of a default or multiple defaults in extreme but plausible market conditions through rigorous stress testing. A CCP should have clear procedures to report the results of its stress tests to appropriate decision makers at the CCP and to use these results to evaluate the adequacy of and adjust its total financial resources. Stress tests should be performed daily using standard and predetermined parameters and assumptions.

On at least a monthly basis, a CCP should perform a comprehensive and thorough analysis of stress testing scenarios, models, and underlying parameters and assumptions used to ensure they are appropriate for determining the CCP's required level of default protection in light of current and evolving market conditions.
