



OTC Clearing

For Oil, Commodity, Freight & Financial Derivatives

The information presented in this document is of a confidential nature, for restricted circulation only.

While care has been taken to ensure the accuracy of the information in this document, SGX and its affiliates make no warranty as to the accuracy, completeness, merchantability or fitness for any purpose, of the information contained in this document or as to the results obtained by any person from the use of any information or investment product mentioned in this document. SGX reserves the right to make changes to such information from time to time. Any change, omission or error in such information, shall not form the basis for any claim, demand or cause of action against SGX or any of its affiliates and SGX and its affiliates expressly disclaim liability for the same.

BACKGROUND TO SGX

SGX, Asia-Pacific's first demutualised integrated securities and derivatives exchange, is a public-listed company since November 2000.

Established from the merger of the Stock Exchange of Singapore (SES) and the Singapore International Monetary Exchange (SIMEX), SGX has many years of clearing experience in securities and derivatives. Its trading and clearing activities are regulated by the Monetary Authority of Singapore (MAS).

SINGAPORE EXCHANGE DERIVATIVES CLEARING (SGX-DC)

SGX-DC, a subsidiary of SGX, is a regulated clearing house with over 20 years of proven derivatives clearing experience.

From its beginnings as a clearing house for exchange-traded interest rate derivatives, SGX-DC has expanded to clear Asian benchmark exchange-traded equity index futures and options, and OTC commodities, freight, oil, foreign exchange and interest rate derivatives under SGX AsiaClear.

SGX-DC pioneered the Mutual Offset System (MOS) in 1984 with one of the largest exchange and clearing house in US, the most successful interoperability model between exchanges and clearing houses in recent times.

OIL, COMMODITIES and FREIGHT

Enhancing Your Oil, Commodity Trading and Shipping Business in Asia-Pacific

Complementing Asia's oil, bunkering, commodity trading and shipping activities, the Singapore Exchange (SGX) offers *SGX AsiaClear*[®], an OTC clearing facility for energy and freight derivatives. As an Asian-based clearing house with more than 20 years' experience in derivatives clearing, SGX is well-positioned to work in partnership with the OTC market to provide this central counterparty clearing system to serve your growing trading and risk management activities.

Developed in co-operation with the industry, the *SGX AsiaClear*[®] facility is a clearing-only platform in which OTC voice brokers can conveniently register OTC trades of market participants for SGX clearing and netting.

No membership is required for users to clear their OTC trades. Only a single clearing agreement with an SGX OTC Clearing Member is needed in order to use this clearing and netting facility.

Some of the key benefits of leveraging on *SGX AsiaClear*[®] as an OTC clearing partner include:

Synergy with the OTC Market

While OTC market participants and Inter-Dealer Brokers continue their existing trading activities, *SGX AsiaClear*[®] plays a complementary, value-added role by providing post-trade registration, central counterparty clearing, netting and settlement.

Real-time OTC Clearing and Certainty in Asian Time

OTC trades submitted to and accepted by the *SGX AsiaClear*[®] Trade Registration System are cleared real-time without waiting for approval by Clearing Members or the Exchange later. This clearing feature provides voice brokers and market participants certainty in managing their counterparty risks real-time.

Multilateral Position Netting Efficiency

Off-setting positions cleared under the same account with an SGX OTC Clearing Member will be netted and liquidated. There is no need to manage opposite positions bilaterally with multiple counterparties. With multilateral position netting, proprietary traders can also conveniently do intra-day trading with multiple counterparties and yet have their opposite positions automatically netted at the end of the day.

OIL, COMMODITIES and FREIGHT

Using *SGX AsiaClear*[®]

The *SGX AsiaClear*[®] system for clearing involves market participants, Inter-Dealer Brokers, Clearing Members, banks and the SGX clearing house.

This is how it works:

Market Participants or Oil/Freight Users

To use *SGX AsiaClear*[®], an oil or freight user simply establishes a relationship with an SGX OTC Clearing Member by opening a clearing account. With the clearing account, the participant can call their Inter-Dealer Brokers to transact OTC deals for SGX clearing with other similar participants, without the need for bilateral agreements. Those transacting bilateral trades directly can register the trades for clearing via Clearing Members.

Inter-Dealer Brokers

In order to enable the clearing of OTC trades, SGX provides Inter-Dealer Brokers with an *SGX AsiaClear*[®] Trade Registration System (TRS). The TRS will accept trades consummated by Inter-Dealer Brokers for participants who have established clearing accounts.

SGX OTC Clearing Members

SGX OTC Clearing Members will approve and set up clearing accounts and limits on the TRS. They will manage the margin requirements and settlements between the SGX clearing house and OTC participants. They can also work with financial institutions to provide third-party margin financing to clients. Clearing Members also provide end-of-day transaction recapitulation, contract statements when trades are cleared and monthly account statements.

Direct Clearing Members

In order for companies with large trades or financial institutions to clear their own and related-group's proprietary OTC trades, they may consider becoming a Direct Clearing Member.

Banks

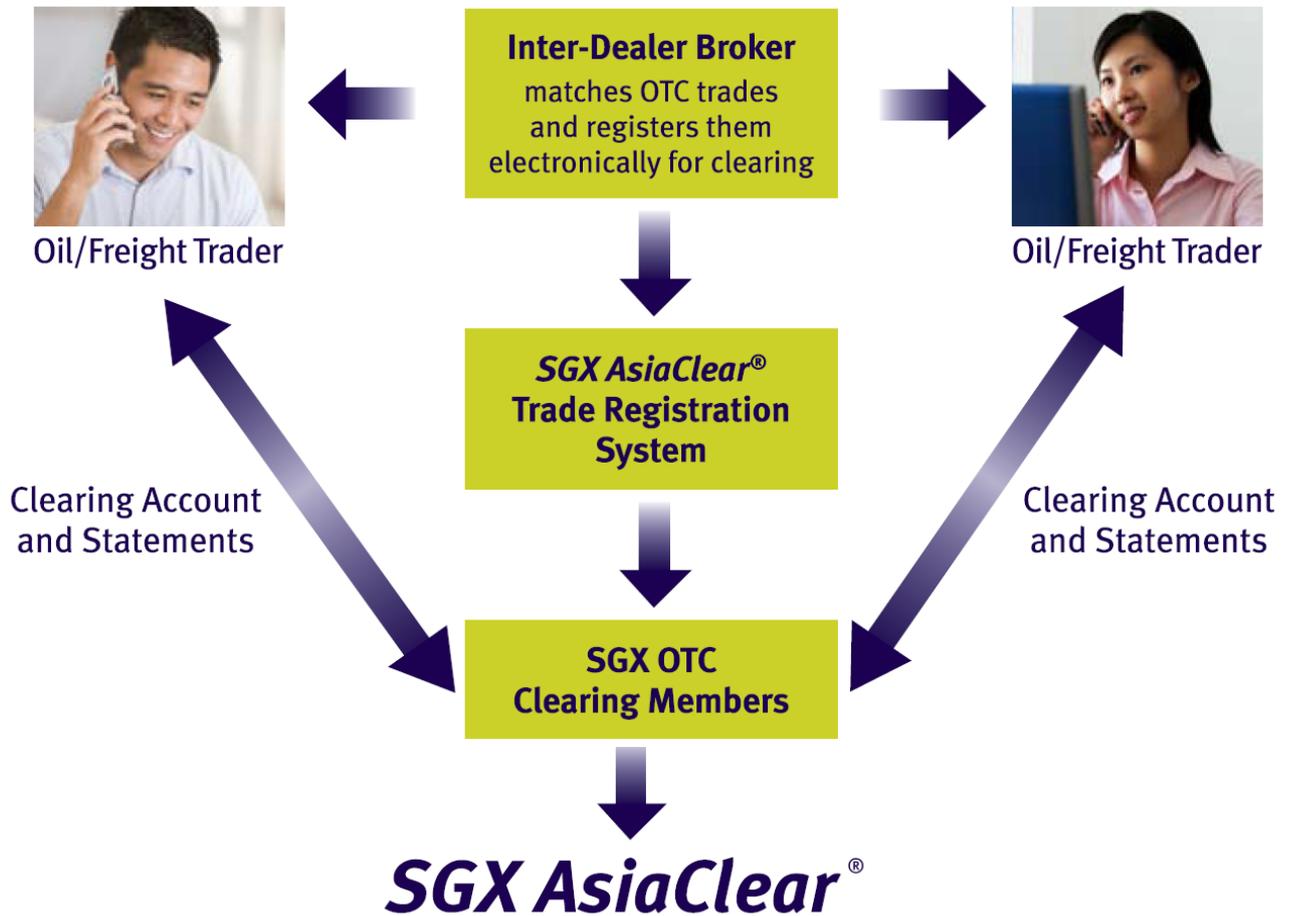
In line with international derivatives clearing convention, SGX requires the margining of outstanding contracts or positions. Banks can facilitate third-party financing of margins or letters of credit for their clients' clearing accounts with Clearing Members.

SGX Clearing House

SGX AsiaClear[®] offers clearing under Singapore Exchange Derivatives Clearing Ltd (SGX-DC), the SGX clearing house for derivatives. Together with its Clearing Members, SGX-DC will perform the central counterparty clearing role. It will manage the risks using its daily mark-to-market and margining system. This means a minimum margin deposit is required for each outstanding position. Each position is then marked-to-market or revalued daily, and any variation profit or loss is accounted and settled daily among the Clearing Members, representing their clients. SGX will provide daily trade and position information electronically to its Clearing Members for their back-office processing and settlement.

OIL, COMMODITIES and FREIGHT

SGX AsiaClear® System of Clearing



Clearing is conducted under Singapore Exchange Derivatives Clearing Ltd,
a wholly-owned subsidiary of Singapore Exchange Limited

OIL, COMMODITIES and FREIGHT

Margining

Margins represent good faith deposits from customers to ensure the performance of the obligations associated with the OTC positions. Clearing Members may accept a variety of securities or collaterals from their customers as margin. These may include cash, banker's guarantee, certificate of deposits, letter of credits, Singapore and selected foreign Government securities, gold bars and gold certificates, and stock and shares listed on SGX and selected foreign Exchanges. After collecting the initial margin for new open positions, Clearing Members are required to collect additional margins only if the margin balance on deposit falls below the prescribed maintenance level. The margin requirement is determined by SGX based on the price volatility of the products.

Daily Mark-to-Market

SGX-DC revalues all open positions on a daily basis. This daily revaluation is called 'Mark-to-Market' (MTM). The main objective of carrying out MTM is to prevent huge losses from being accumulated without settlement.

The effect of margining and daily marking of positions to market ensures all losses due to daily price fluctuations are being accounted for and settled, preventing huge losses from being accumulated.



Initial Margin:

The amount of funds and/or collateral required in an account before a contract is opened.

Maintenance Margin:

The minimum amount of funds and/or collateral required to be maintained in an account for each outstanding contract or open position.

Margin Call:

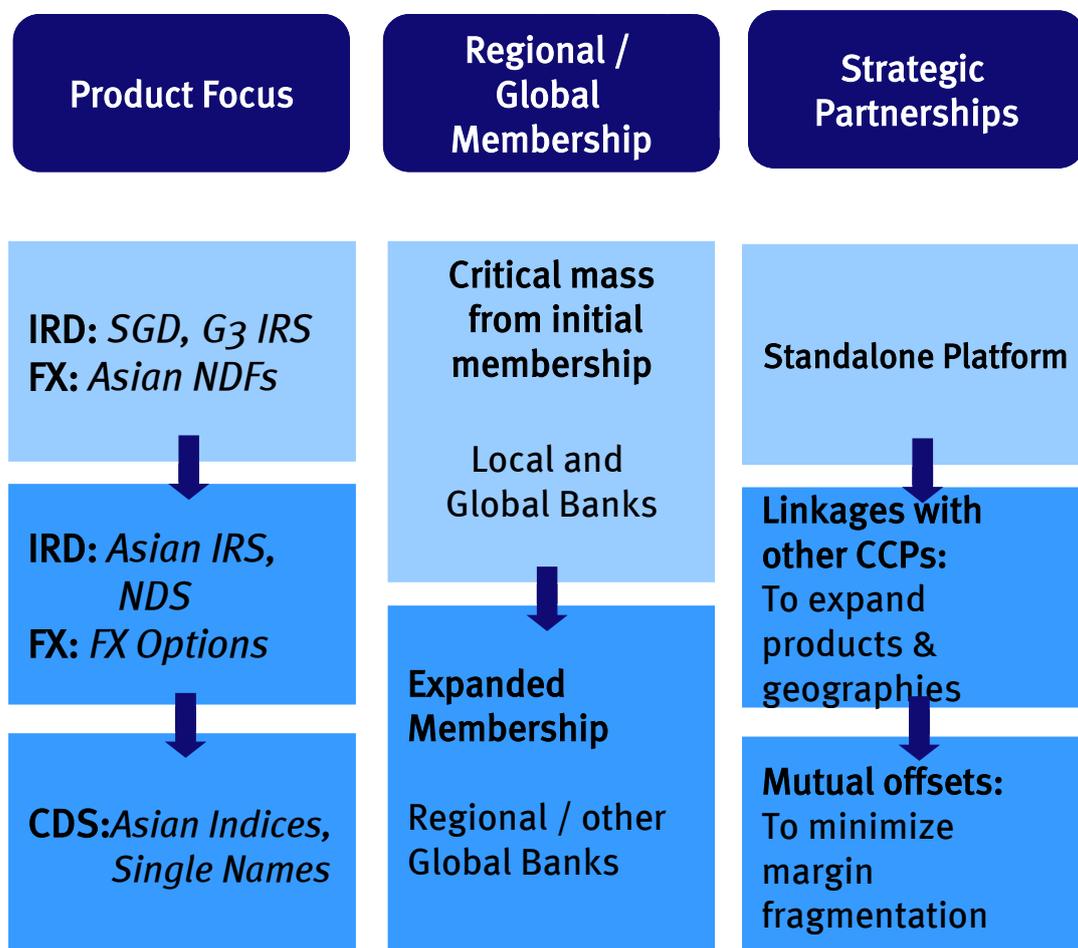
A call for additional margins if the margin balance on deposit falls below the prescribed maintenance margin level after the daily mark-to-market of positions.

OTC TRADED FINANCIAL DERIVATIVES

SGX-DC offers the clearing of OTC Interest Rate Swaps (IRS) and Asian FX Forwards¹ as it is currently traded in the OTC market.

As demand evolves, the offering would eventually include IRS in other currencies, Non-deliverable Swaps (NDS), Asian Credit Default Swaps (CDS) Indices and Asian single-name CDSs.

Our product focus, membership and strategic partnerships will develop over time as follows.



¹ The clearing of FX Forwards will be launched in the second quarter of 2011.

OTC TRADED FINANCIAL DERIVATIVES MEMBERSHIP

The membership comprise local, global and Asian domiciled banks as Bank Clearing Members (“BCMs”).

The list of current clearing members includes:

1. Barclays Bank PLC,
2. Citibank N.A.,
3. Credit Suisse AG,
4. DBS Bank Limited,
5. Deutsche Bank AG,
6. The Hongkong and Shanghai Banking Corporation Limited,
7. Oversea-Chinese Banking Corporation Limited,
8. The Royal Bank of Scotland plc,
9. Standard Chartered Bank and
10. United Overseas Bank Limited.

CLEARING RIGHTS

Clearing Members would be able to clear proprietary IRS and FX Forwards positions at launch.

As demand evolves, the clearing rights of the clearing membership would include clearing for customer positions.

OTC TRADED FINANCIAL DERIVATIVES

MEMBERSHIP CRITERIA

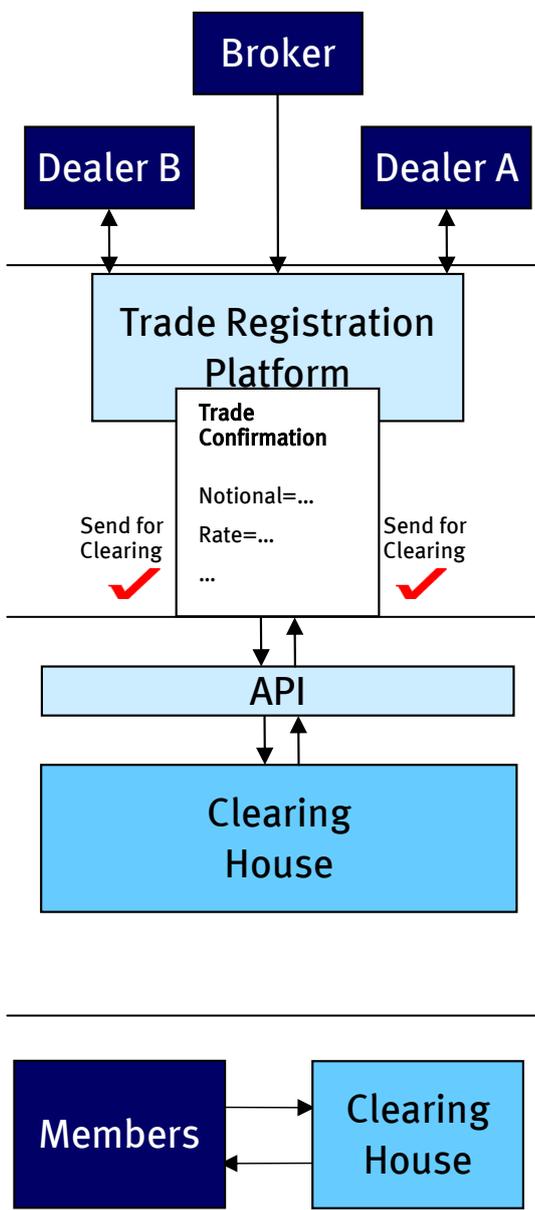
Market participants that meet the following requirements can apply for SGX membership:

Membership Category	Bank Clearing Members (“BCM”) (Singapore Licensed Banks)
Participation	IRS & FX Forwards Clearing
License Requirements	<p>Authorised to conduct banking business in Singapore pursuant to Section 4 of the Banking Act (Chapter 19)</p> <p>Banks licensed to operate in Singapore are exempted from CMS license from MAS</p>
Minimum Financial Requirements	Holding company must have group shareholders’ funds of at least S\$1 billion
Minimum clearing fund contribution	US\$10M for IRS & FX Forwards participation
Credit/Financial Strength Rating²	Member or its parent has a Long Term Credit Rating of at least A and a Financial Strength Rating of at least C
Other ongoing requirements	<i>Please refer to SGX-DC Rules.</i>

² Moody’s Investors Service, Standard & Poor’s Corporation, Fitch, or any equivalent international rating agency deemed acceptable by the Clearing House.

OTC TRADED FINANCIAL DERIVATIVES CLEARING PROCESS

The high level operational flow below illustrates how a typical OTC trade between 2 counterparties would be sent to SGX DC for clearing.



Trade Execution

- ❖ An OTC trade is executed, either direct or via an inter-dealer broker(IDB).
- ❖ The trade is fed to trade registration platforms (e.g. MarkitWire for IRS, Thomson Reuters for FX Forwards) for electronic confirmation by the dealers or IDBs.

Trade Registration & Confirmation

- ❖ The dealers confirm the trade details on the respective trade registration platform and indicate to send this trade for clearing.
- ❖ The trade registration platform would perform an eligible check on the contract specifications and the members before submitting to the clearing house.

Daily Margining & Novation

- ❖ The Clearing House receives trade details of the trades submitted for clearing via the trade registration platforms.
- ❖ Subject to collateral availability, the trade would be novated to the Clearing House
- ❖ The clearing status (i.e. cleared / pending) is communicated to the members after Clearing House accepts the trade

Post Trade Life Cycle Processing

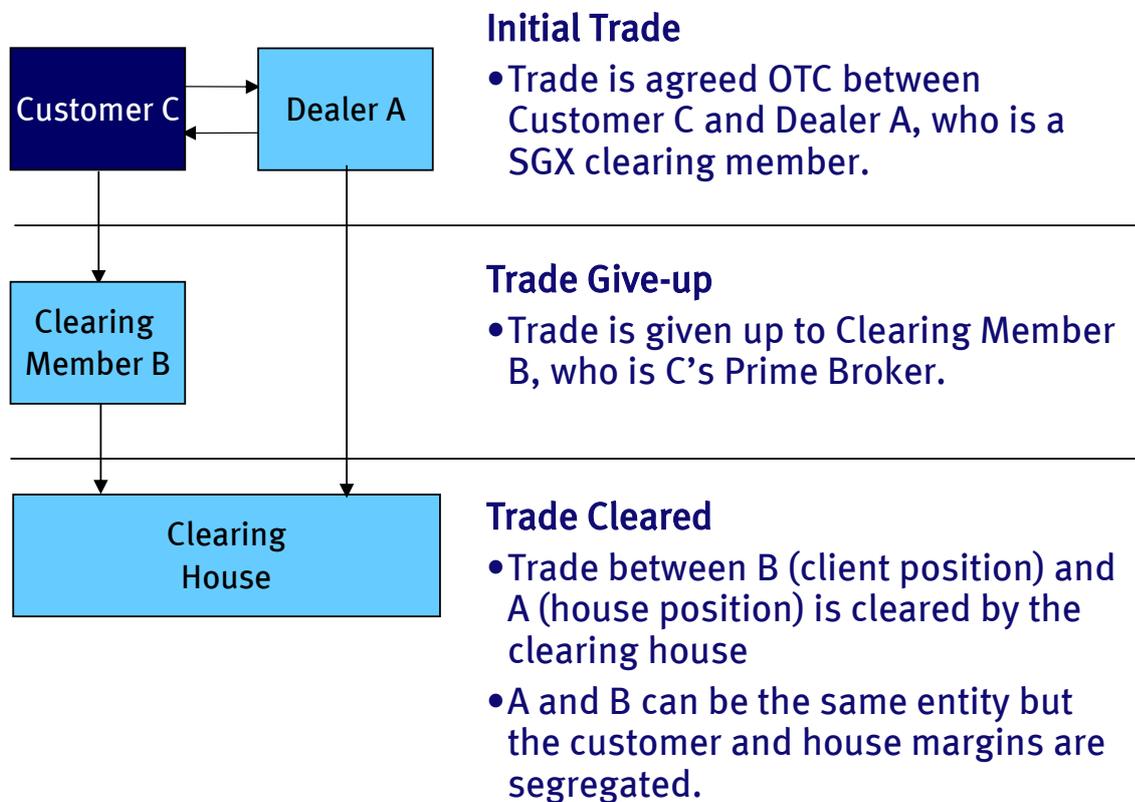
- ❖ The Clearing House would provide daily pricing data, resets, and reports on positions, margins, collateral and payments to members.

OTC TRADED FINANCIAL DERIVATIVES CLEARING SERVICES FOR THIRD-PARTY CLIENTS

As demand evolves, clearing members will have the ability to clear customer positions in IRS and FX Forwards. Existing SGX Derivatives Clearing Members will be able to clear FX Forwards on behalf of their customers.

Customers who do not meet the membership criteria may establish client relationships with clearing members

House and Customer margins are required to be segregated. No offsets are allowed for house and customer positions belonging to the same clearing member. SGX DC will look to the clearing member for the collection of customer margins.



OTC TRADED FINANCIAL DERIVATIVES GLOBAL INTEROPERABILITY

The global landscape for CCP clearing for OTC derivatives is evolving, with multiple clearing houses focusing on differing geographies and asset classes. No single dominant clearing house has emerged across geographies or asset classes.

Financial institutions operating across geographies and in multiple asset classes, are keen to avoid margin fragmentation from clearing with different CCPs.

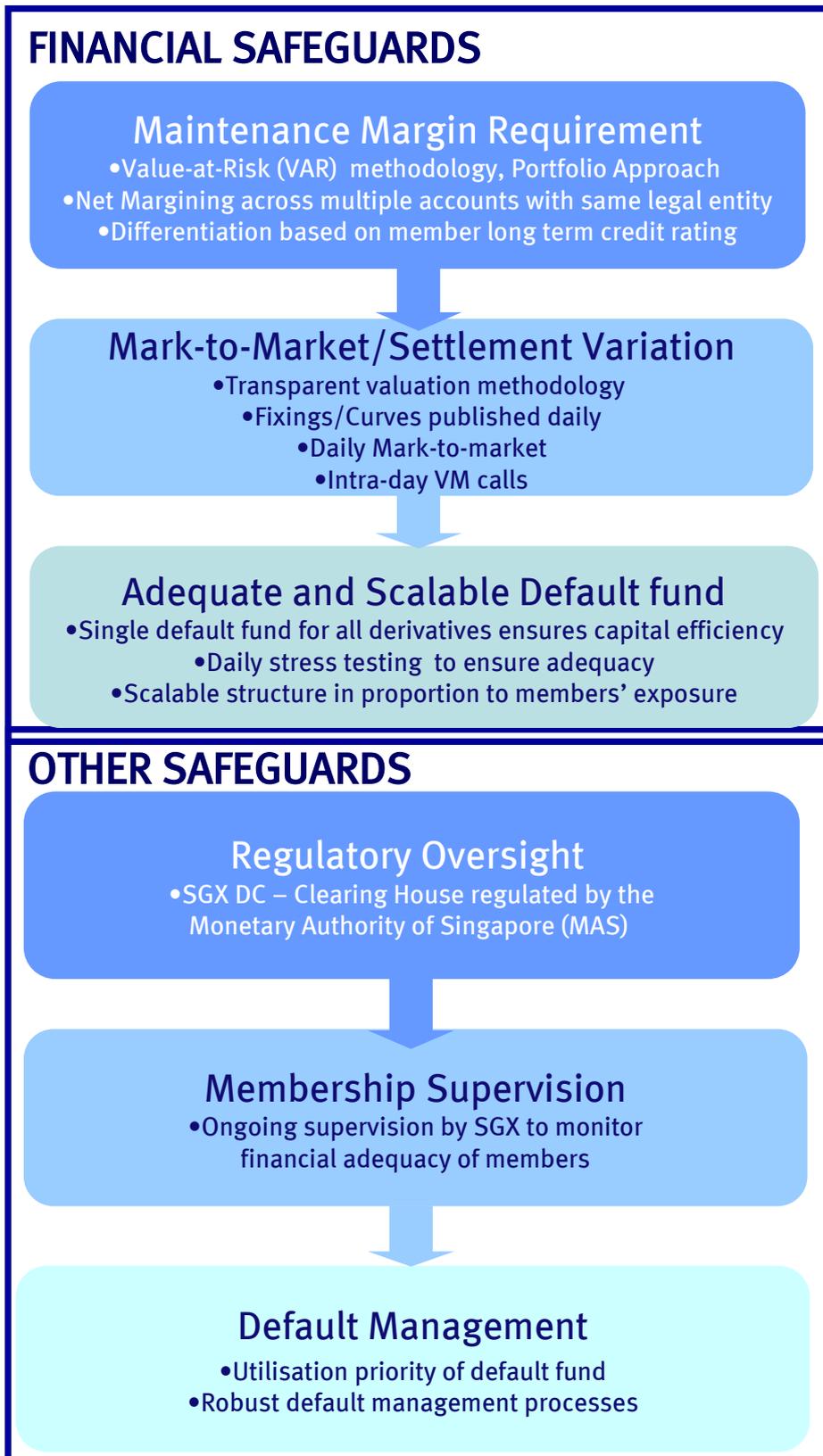
SGX will actively explore linkages with other clearinghouses to develop clearing arrangements for the benefit of our membership.

These arrangements would allow members to trade across geographies and hold collateral at a single CCP of their choice.

This will help avoid margin fragmentation and ensure cost effective clearing capabilities.

SGX SAFEGUARDS

A robust risk management framework for OTC Traded Financial Derivatives



SGX SAFEGUARDS MARGINING

Margins represent good faith deposits from clearing members and their customers to ensure the performance of the obligations associated with the OTC traded positions.

MAINTENANCE MARGIN (MM)

Maintenance Margin ensures the adequate collateralisation of potential clearing member portfolio loss under normal market movements based on historical simulation.

Value-at-Risk (VaR) is used for calculating MM. VaR looks at the portfolio as a whole and calculates the portfolio risk using the historical volatility of each position as a basis. Maintenance margin will be set on a single-asset portfolio basis e.g. an MM is calculated on a portfolio of SGD IRS, and will be based on prevailing market conditions and expected liquidation period. Net margining will be applied for multiple accounts with the same legal entity.

The acceptable collateral for MM would be cash and/or Singapore Government Securities, limited to on-the-run securities.

Margins would be differentiated based on Members' financial standing through Margin Multipliers. Portfolio concentration multipliers and product specific risk multipliers may be imposed on the MM.

MARK-TO-MARKET (MTM) AND SETTLEMENT VARIATION (SV)

IRS positions will be marked-to-market using SGX's zero-coupon yield curve, which will be published to Clearing Members. FX Forward positions will be marked-to-market based on forward points which will be published to Clearing Members.

The settlement variation requirement would be the summation of the daily change in valuation for each trade for the CM's house and customer portfolios.

For SV, only cash in the currency of the underlying trade is accepted as collateral.

Regulatory Capital Treatment

Members may engage with regulators in their home jurisdictions to seek guidance on applicability of regulatory capital relief for collateral placed with SGX-DC.

SGX SAFEGUARDS

CLEARING FUND & DEFAULT MANAGEMENT

The Clearing Fund is designed to cover potential market risk, over and above MM, in stressed conditions following a clearing member default.

SGX-DC will maintain a single default fund across the following market segments:

1. Exchange traded derivatives
2. OTC commodities and freight forwards
3. OTC financial derivatives including IRS and FX Forwards.

In the event of default, members of defaulting market segment will be assessed prior to other members.

The Clearing Fund will have a scalable structure in proportion to growth of business, members' exposure, and number of asset classes. Fund contribution is proportionate to the risk exposures of members' cleared trades.

Daily monitoring on the adequacy of the Clearing Fund will be conducted based on the rolling average 3 months' historical margin requirements.

The following diagram illustrates the sequence of utilisation of the Margins and Clearing Fund in the event of default of a Clearing Member:



Please refer to page 14 for an illustration on a Clearing Member's obligations to the Clearing Fund and page 15 on the components of the Clearing Fund.

Default Management Group

A Default Management Group comprising SGX-DC risk managers and default managers (appointed members) will be established.

Management of defaulting member's OTC positions

SGX will leverage on the OTC market expertise of the default managers to manage the defaulting member's OTC positions in the event of default.

This will include transfer of clients' positions to non-defaulting members, hedging of the defaulting member's portfolio by appointed traders, and processes to facilitate liquidation of the hedged portfolio.

ILLUSTRATION: Clearing Fund

Question: What is the maximum liability of a clearing member at any point in time?

In the event of a default, the total liability of each surviving Clearing Member is the sum of the Security Deposit and the Further Assessment. The apportionment of the liability would be proportionate to the member's margin requirements.

- (a) Security Deposit is set at 3% of the Margin Requirement for a Clearing Member, subject to a minimum of US\$5M. This will increase proportionate to the member's size of exposure. This amount is placed with the Clearing House.
- (b) Further Assessment is up to 3 times the Security Deposit. Only a portion of this amount needs to be funded (1 time SD) and placed with the Clearing House.

The Security Deposit and Further Assessment will be applied in direct proportion of each member's security deposit requirement relative to other non-defaulting members' security deposit requirement.

Please note that all of the above are subject to approval from MAS.

Example 1:

Maximum liability of a Clearing Member A

Assuming that a Clearing Member A has a total Margin Requirement of USD 200 million for its exposure to the clearing house, the required contribution to the clearing fund and its maximum liability in the event of another member's default is calculated as follows:-

Security Deposit	= 3% x Margin Requirement	= US\$ 6 M
Further Assessment	= 3 x Security Deposit	= US\$ 18 M
Maximum liability	= Security Deposit + Further Assessment	= US\$ 24 M

Example 2:

Application in direct proportion of member's requirement relative to other non-defaulting members' requirement

Assume that in the event of a default of Clearing Member B, the losses to the clearing house amounted to US\$ 300 M. The losses after applying the defaulting member's margins, excess collateral, and security deposit and SGX capital is **US\$ 20 M**.

Assume further that Clearing Member A's margin requirements is 10% of the total margin requirements of all non-defaulting members.

In this case, the liability of Clearing Member A will be US\$2 M [10% of US\$20 M].

GLOSSARY

MARGINING

Maintenance Margin ("MM")

The maintenance margin is the minimum amount to be collateralized by the Clearing Member to the Clearing House to protect the Clearing House from future normal market movements against a Clearing Member's open positions (based on historical simulation) in the event of the member's default. This amount is calculated by the Clearing House and has to be funded fully with cash and/or acceptable collateral. This is referred to as "initial margin" at LCH.Clearnet SwapClear.

Settlement Variation ("SV")

The settlement variation is the calculated profit or loss arising from a comparison between the (mark-to-market) values of the open positions with reference to the previous day's value. The Clearing House shall receive payment from, or pay to, Clearing Members the SV at least once a day. This is to ensure the adequacy of the MM to buffer for Profit-and-Loss swings under normal market conditions and to prevent the accumulation of losses. This is referred to as "variation margin" at LCH.Clearnet SwapClear.

CLEARING FUND

Security Deposit ("SD")

The Security Deposit is the contribution by Clearing Members to the Clearing Fund. The amount is calculated as the higher of (a) 3% of Margin Requirements, and (b) US\$5 million. This has to be fully funded with the Clearing House.

Further Assessment ("FA")

This is the further obligation on non-defaulting Clearing Members in the event of a default by a clearing member. The amount is calculated and capped up to a multiple of the Clearing Member's Security Deposit. A portion of the Further Assessment has to be funded partially with the Clearing House.

Clearing Fund ("CF")

The Clearing Fund is designed to cover potential market risk, over and above MM, in stressed conditions following a clearing member default. The components of the clearing fund are detailed in the table below:-

SGX-DC capital & reserves, financial guarantee and/or default insurance	SGX's contribution to the clearing fund
Security Deposits of non-defaulting Clearing members	<p>For Exchange Traded Derivatives & OTC Commodities: Minimum of US\$500,000</p> <p>For OTC Financial Derivatives: Minimum of US\$5 million</p> <p>Based on 3% of members' average risk margin' amounts over a 3-month period applied to in direct proportion of each member's security deposit requirement relative to other non-defaulting members' security deposit requirement</p>
Further Assessment by SGX-DC on non-defaulting Clearing Members	<p>Limited to up to 3 times of respective member's security deposit requirement</p> <p>Members will be required to fund a proportion of this FA, based on member's historical margin</p>
SGX-DC second tier capital	SGX's additional contribution to the clearing fund

Singapore Exchange Limited
2 Shenton Way #19-00 SGX Centre 1
Singapore 068804
Tel: (65) 6236 8888
Fax: (65) 6236 6495
Website: www.sgx.com