

Next Generation (NG) Risk Models



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AGENDA

1

Background

2

IM Model

3

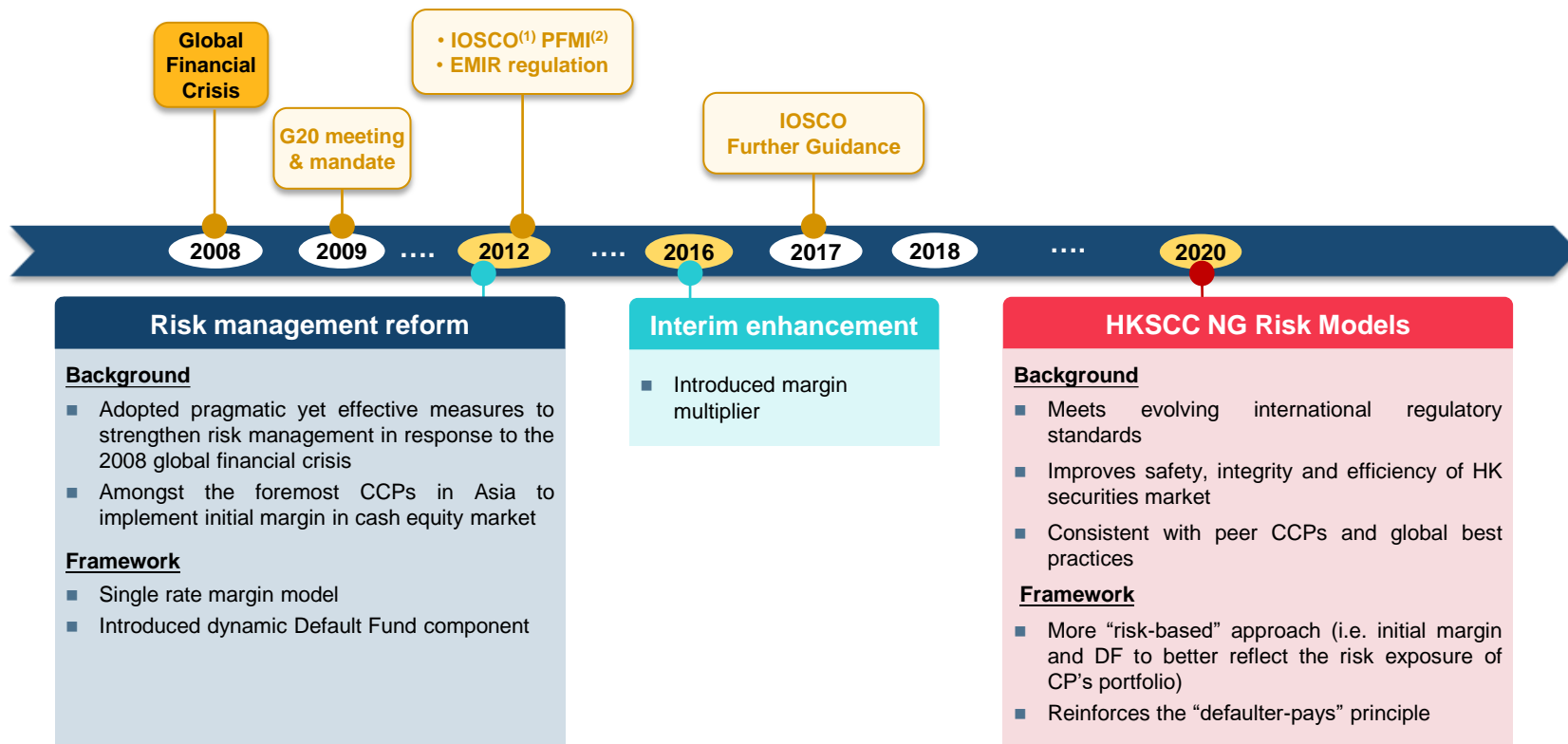
Stress Testing for Default Fund

4

Operational highlights under NG Risk Models

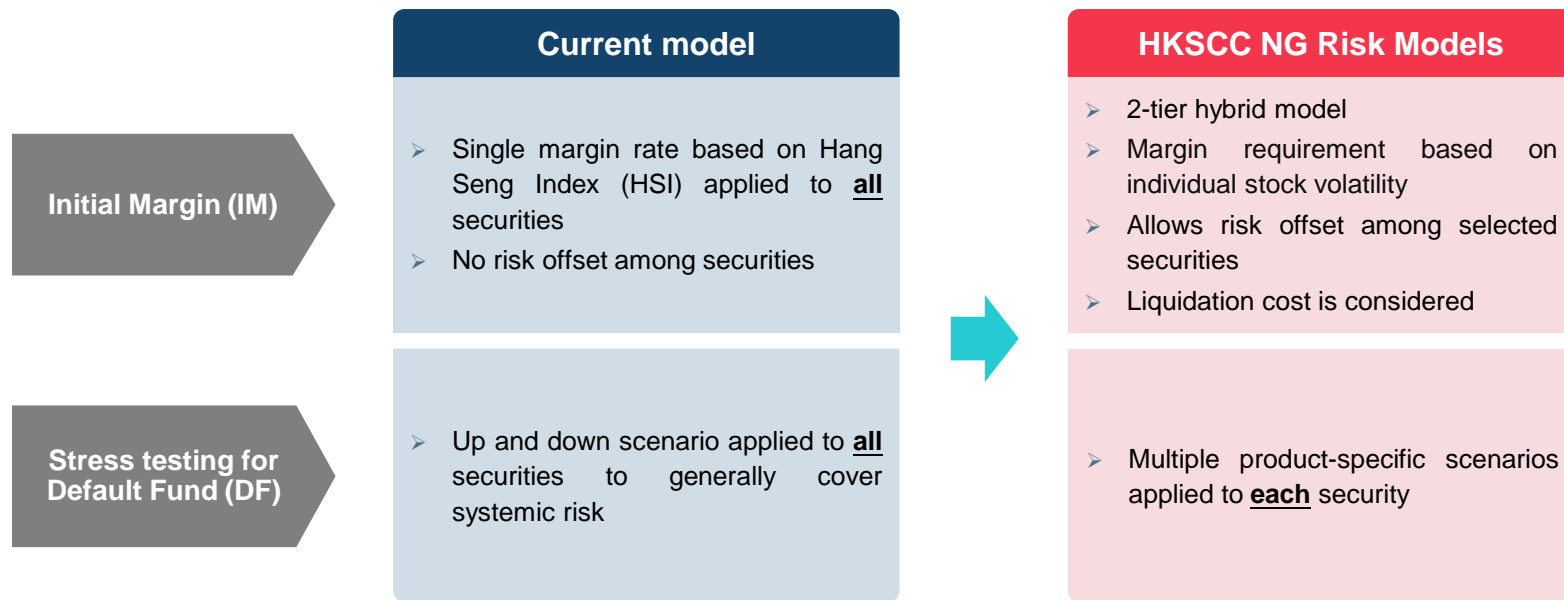
Background

Evolution of global regulation and HKSCC risk management



Continuous effort to improve compliance to international regulatory standards and protection in HK securities market

HKSCC NG Risk Models – Key enhancements



HKSCC adopts methodology-centric enhancements in NG Risk Models

IM Model

Initial Margin Model

Portfolio margin requirement



- (1) Overall IM will round up to the nearest ten thousand dollars (e.g. 7,821,555 will be rounded up to 7,830,000)
- (2) Subject to minimum margin level
- (3) Subject to margin multiplier determined by the magnitude of a Clearing Participant's back-testing deficit

Initial Margin Model

Two-tier model and Hang Seng Composite Index (HSCI) based

Margin Methodology		
Tier P (Primary Tier)	<ul style="list-style-type: none">HSCI LargeCap and MidCap constituent stocks and related DW / CBBCCovers securities which rank in top 95% of total market capitalizationAll equity indices ETFs and related DW / CBBCCovers ~80% of total market turnover	<ul style="list-style-type: none">VaR-based Portfolio Margining and subject to minimum margin levelMargin based on individual stock volatility
Tier N (Non- Constituent Tier)	<ul style="list-style-type: none">Contains all non-Tier P instruments (e.g. GEM stocks, small- / micro-cap stocks)	<ul style="list-style-type: none">Flat rate margin similar to current single rate modelMargin multiplier where appropriate

A hybrid approach consists of portfolio margining (Tier P) and flat rate (Tier N)

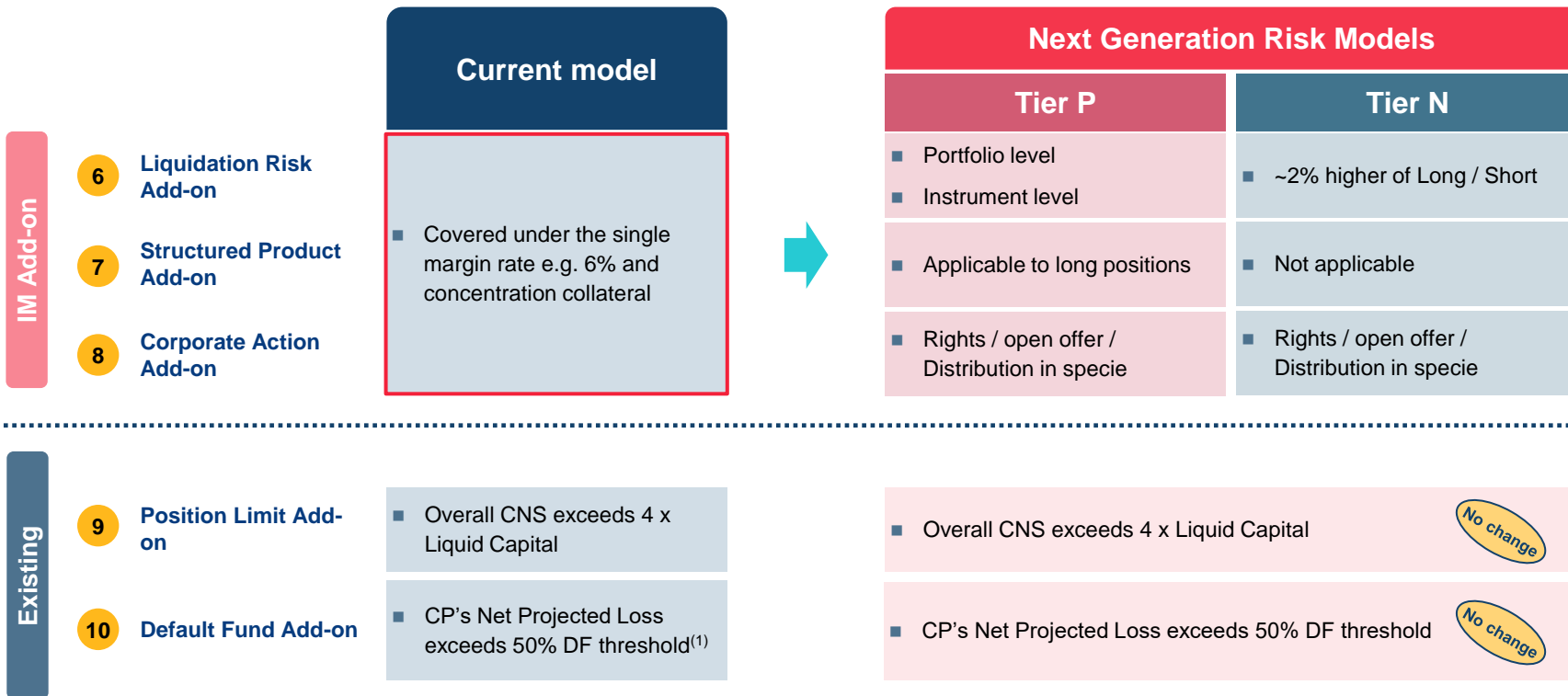
Initial Margin Model

Methodology and parameters

		Next Generation Risk Models	
		Tier P	Tier N
1	Margin methodology	<ul style="list-style-type: none">Instrument-specificVaR based1000-day lookback period with stress dates	<ul style="list-style-type: none">One margin rate based on a reference market indexMargin multiplier where appropriate
2	Portfolio margining	<ul style="list-style-type: none">Offset between long / short CNS positions	<ul style="list-style-type: none">Nil (higher of long / short CNS positions)
3	Implied volatility modelling for DW/CBBC	<ul style="list-style-type: none">DW / CBBC pricing models	<ul style="list-style-type: none">Nil
4	Margin floor	<ul style="list-style-type: none">[2.5]% x higher of long / short CNS positions	<ul style="list-style-type: none">[10]% x higher of long / short CNS positions
5	Margin period of risk (MPOR)	<ul style="list-style-type: none">1 day liquidation period <div>No change</div>	

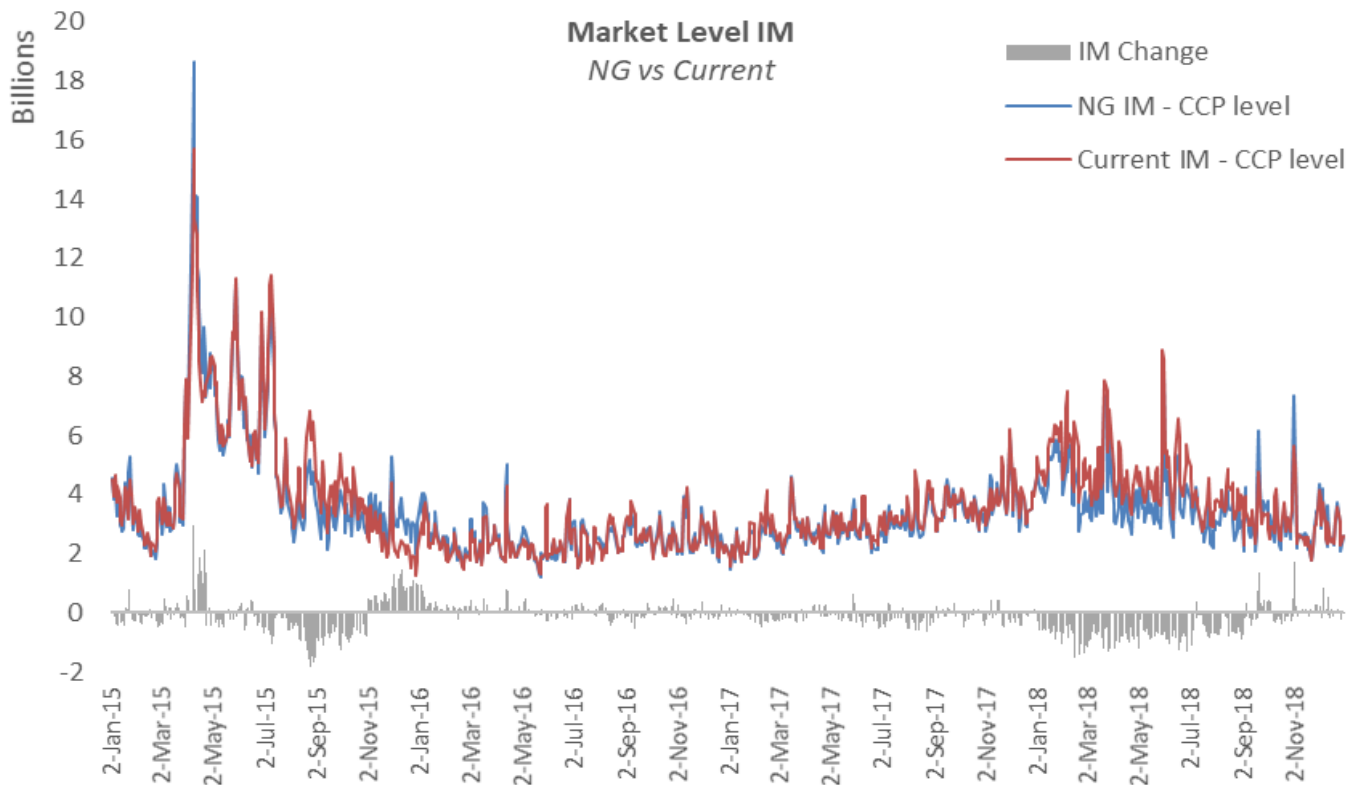
Initial Margin Model

Add-ons



(1) DF Threshold is the maximum DF size(s) prescribed by the clearing house(s) with reference to the highest DF size in the past 10 years

Initial Margin Model – Market-wide impact



~70% of the time the Market-wide IM will decrease

Initial Margin Model

Relationship between Portfolio Risk Profile and NG IM requirements

Portfolio	Diversified	Directional	Concentration in volatile stocks
Characteristics	Consists of balanced long / short positions or hedged positions (e.g. Long Structured Products vs Short underlying, Long ETPs vs Short underlying)	Inclines towards long or short positions	Concentrates in volatile stocks or Structured Products
IM requirements	Lower (Portfolio margining)	Higher (Limited netting at portfolio level)	Higher (Higher margin on high volatility instruments)

More diversified portfolios will be subject to lower IM requirements under NG IM Model

Initial Margin Model

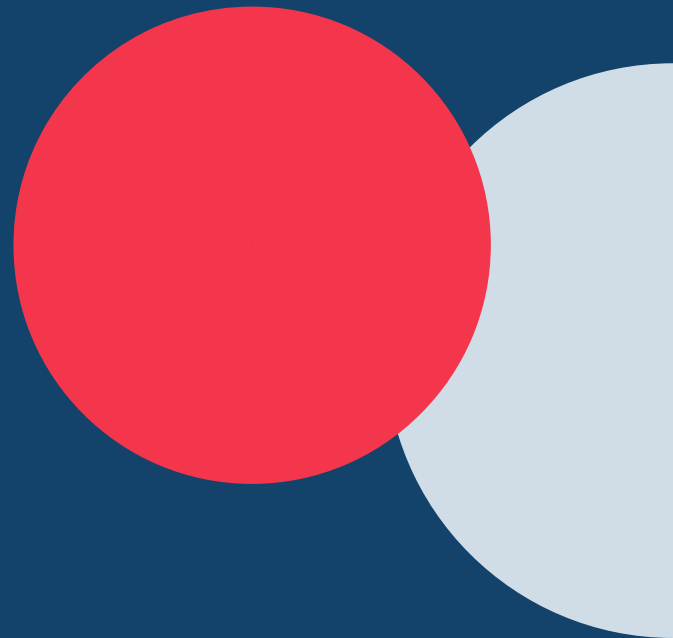
Operations-related arrangement

	Current model	Next Generation Risk Models
1 Tolerance limit (intraday)	■ HK\$5 million (applicable to Marks only)	■ HK\$5 million (available to both Marks and Margin)
2 Marks credit limit	■ Same as DF Basic Contribution	■ Not available ¹
3 IM credit	■ HK\$5 million	■ HK\$5 million <i>No change</i>
4 Favourable Marks-IM offset	■ Available	■ Available <i>No change</i>
5 Intraday Margin for Holiday	■ Applicable to holiday periods > one business day	■ Applicable to holiday periods > one business day <i>No change</i>
6 Intraday and Dayend Marks	■ ~11:00 and ~19:30	■ ~11:00 and ~19:30 <i>No change</i>
7 IM refund for offset cash prepayment	■ Available	■ Not available ²
8 Periodic Margin projection / report	■ 14:45, 15:45, 16:30, 20:00	■ 16:30, 20:00 + flexibility to simulate IM requirement intra-day

1) Enhance default capital adequacy by isolation of DF resources
 2) Advance IM refund will create potential exposure for unsettled short positions

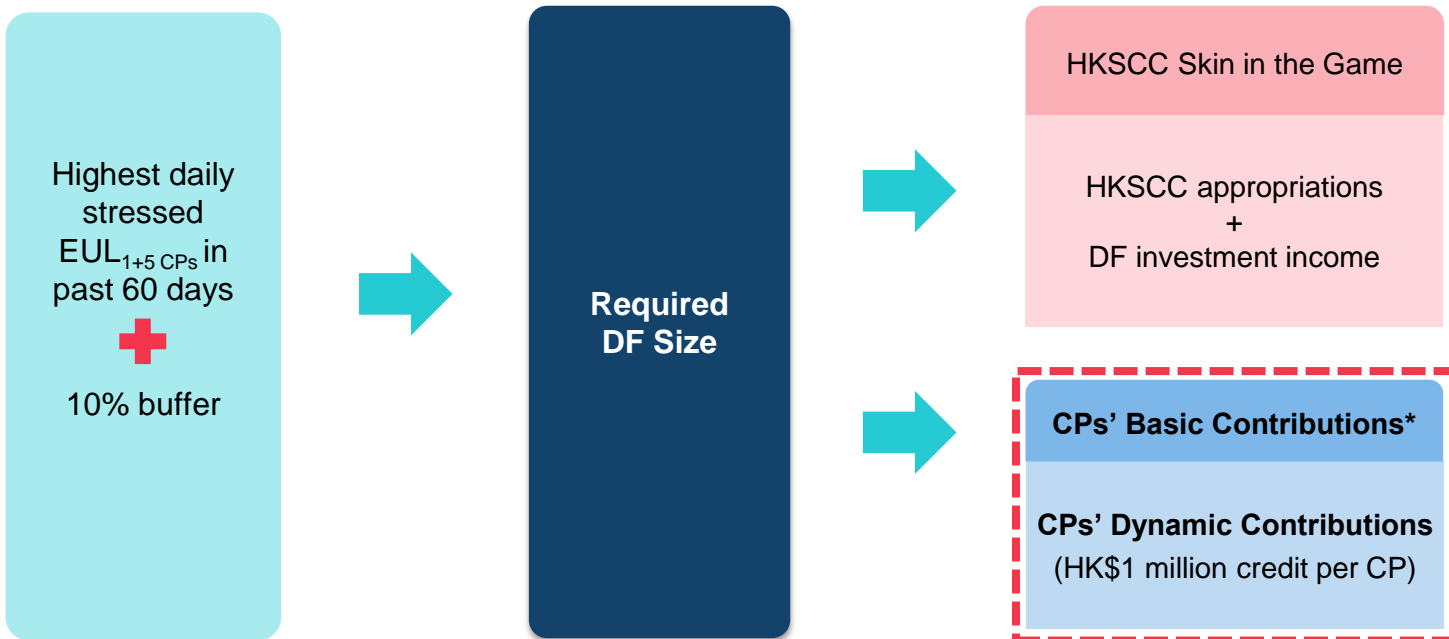


Stress Testing for Default Fund (DF)



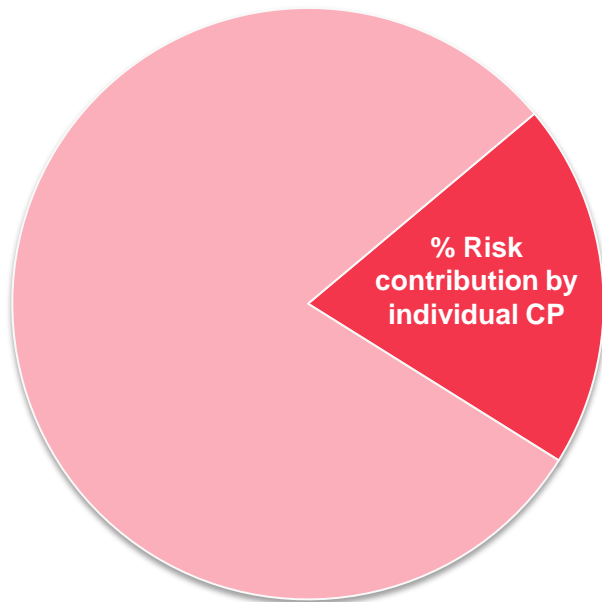
DF size determination

$$\text{Expected Uncollateralized Loss (EUL)} = \text{CP(s) Stress Testing Values} - \text{CP(s) Collateral}$$



Allocation of DF contributions

Risk-based allocation



Overall risk (EUL) of all CPs

CP Basic Contribution* =

$$\begin{aligned} &\sim \text{HK\$100 million} \\ &\quad \times \\ &\quad \% \text{ Average 60 days EUL} \\ &\quad (\% \text{ Risk contribution}) \end{aligned}$$

** Subject to minimum requirement of trading rights*

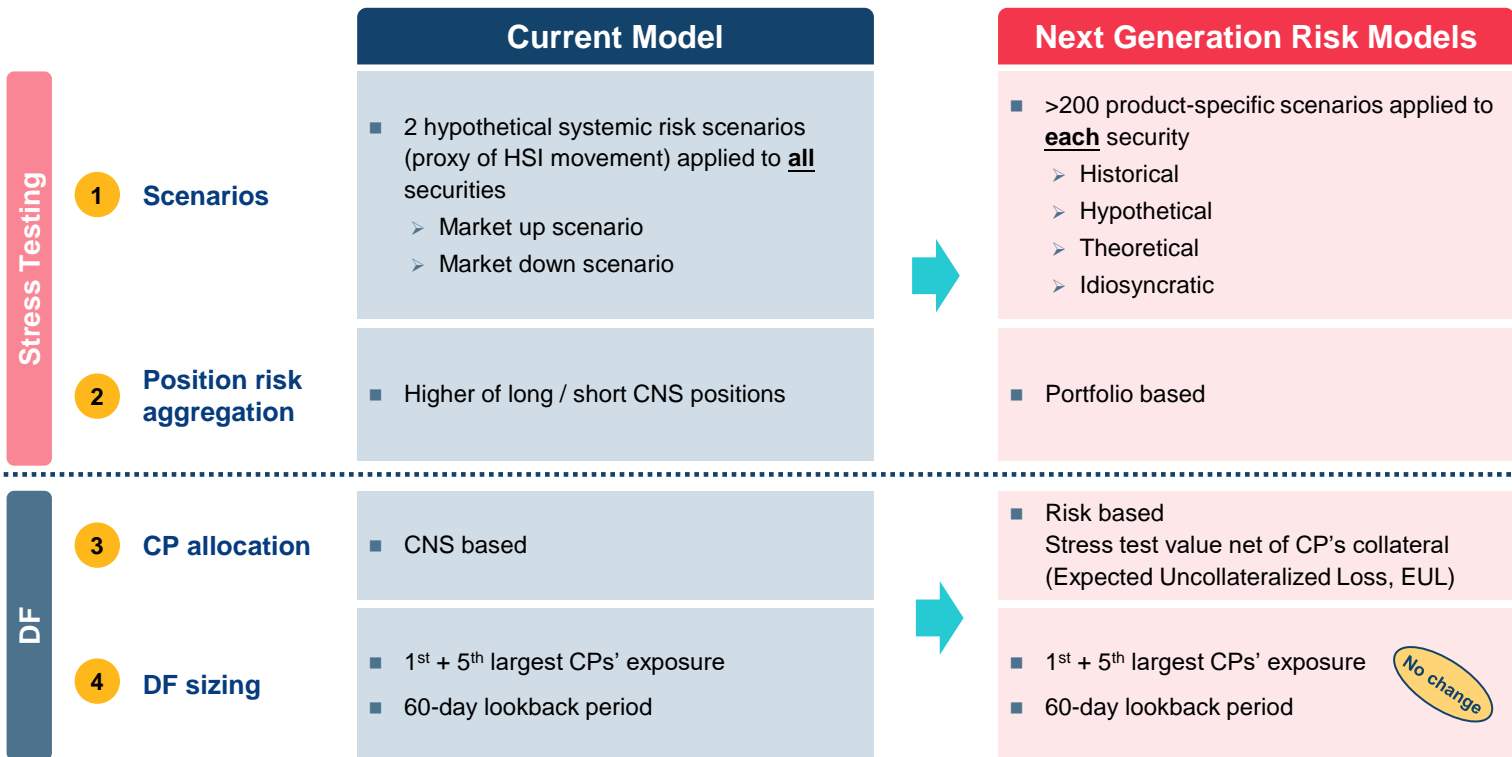
CP Dynamic Contribution# =

$$\begin{aligned} &\text{Overall Dynamic Contribution} \\ &\quad \times \\ &\quad \% \text{ Average 60 days EUL} \\ &\quad (\% \text{ Risk contribution}) \end{aligned}$$

HK\$1 million credit available for each CP

Stress testing and Default Fund (DF)

Methodology



Stress testing and Default Fund (DF)

Operations-related measures

	Current Model		Next Generation Risk Models
5 Review Frequency	<ul style="list-style-type: none">Monthly at start-of-monthAd-hoc		<ul style="list-style-type: none">Monthly at start-of-monthAd-hoc <div>No change</div>
6 Collection	<ul style="list-style-type: none">1 business day after review		<ul style="list-style-type: none">1 business day after review <div>No change</div>
7 DF credit	<ul style="list-style-type: none">HK\$1 million		<ul style="list-style-type: none">HK\$1 million <div>No change</div>
8 Report	<ul style="list-style-type: none">Available for DCP and GCP (with NCP projection) after review		<ul style="list-style-type: none">Available for DCP and GCP (with NCP projection) after review <div>No change</div>

Most existing operational arrangements remain unchanged under NG

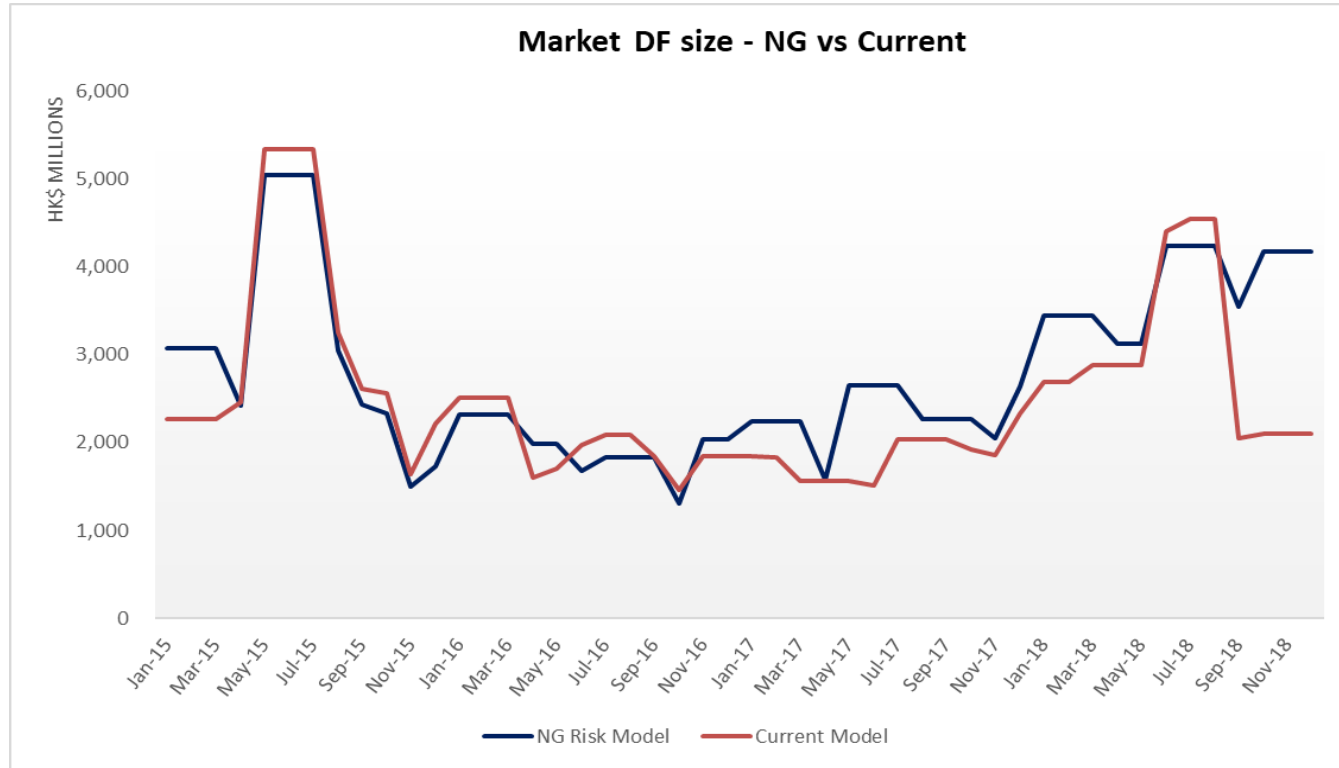


Stress testing scenarios

Scenario Types		Details
1	Historical	<ul style="list-style-type: none">Historical stress events that consist of peak historical volatilities (e.g. Lehman default)
2	Hypothetical	<ul style="list-style-type: none">Potential “extreme but plausible” Macro-economic conditions which might drive extreme price changes among sectors
3	Theoretical	<ul style="list-style-type: none">Theoretical price changes of a portfolio due to break or boost in correlation between underlying securities
4	Idiosyncratic	<ul style="list-style-type: none">Sudden price collapse (surge) of position(s) in a portfolio

Market DF size

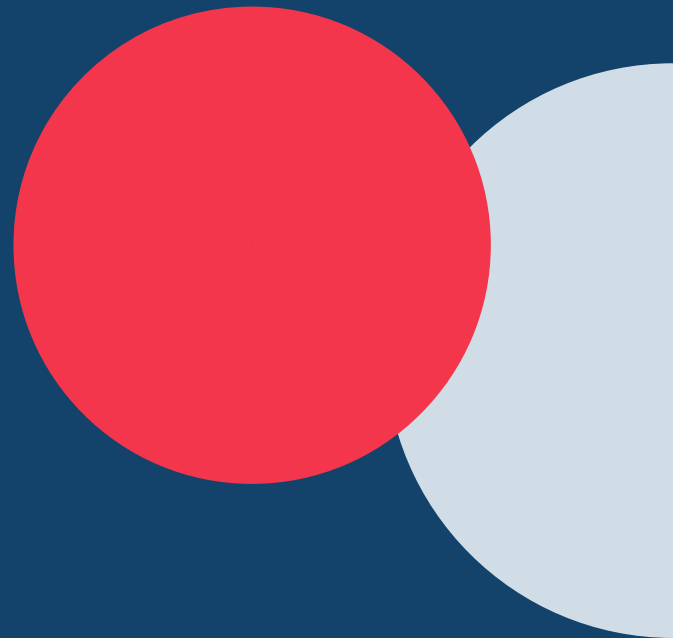
A comparison between current model and NG Models



Market DF size is more stable under NG Model



Operational Impact under NG Risk Models



Operational highlights under NG Risk Models

Funding Projection

CPs' IM and DF requirements can fluctuate as they are calculated based on the risk of CPs' portfolios

Mitigating measures provided by HKSCC

- 1 **Margin simulation tools**
(see next slides)
 - Facilitate CPs' internal processes related to risk control and margin payment / collection
 - Allow CPs to replicate and simulate margin requirement for existing portfolios and hypothetical trades
- 2 **Specific Stock Collateral (SSC) and Specific Cash Collateral (SCC)**
 - Trail period will be provided for CPs before official launch
 - CNS stock positions covered by SSC or SCC are exempted from IM calculation
- 3 **Margin and DF credit will continue**
 - No change in current HK\$5 million margin credit and HK\$1 million DF credit

Other operational processes remain the same

- Relevant settlement reports (based on new margin requirement) will still be available via existing CCASS
- Timing of most existing operations remains unchanged
- Excess margin is refunded on the following day when exposure is reduced (i.e. upon settlement)

Margin simulation tools

Purpose

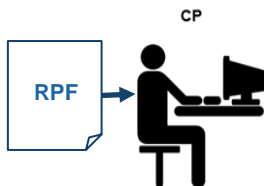
- Allow CPs to simulate / replicate margin requirement for existing portfolio and hypothetical trades
- Facilitate CPs' internal processes related to risk control and margin payment / collection under a relatively sophisticated margin model

Method 1: Margin simulator



- CPs input trades via a web-based Graphical User Interface (GUI) or spreadsheet upload for margin simulation
- Results can be downloaded from web portal for CP's internal risk control purpose

Method 2: Risk Parameters File (RPF)



- HKEX provides RPF (at granular risk parameter level) for each stock and structured product
- CPs download and use the RPF internally to estimate margin requirement of client portfolios

Specific Stock Collateral (SSC) & Specific Cash Collateral (SCC)

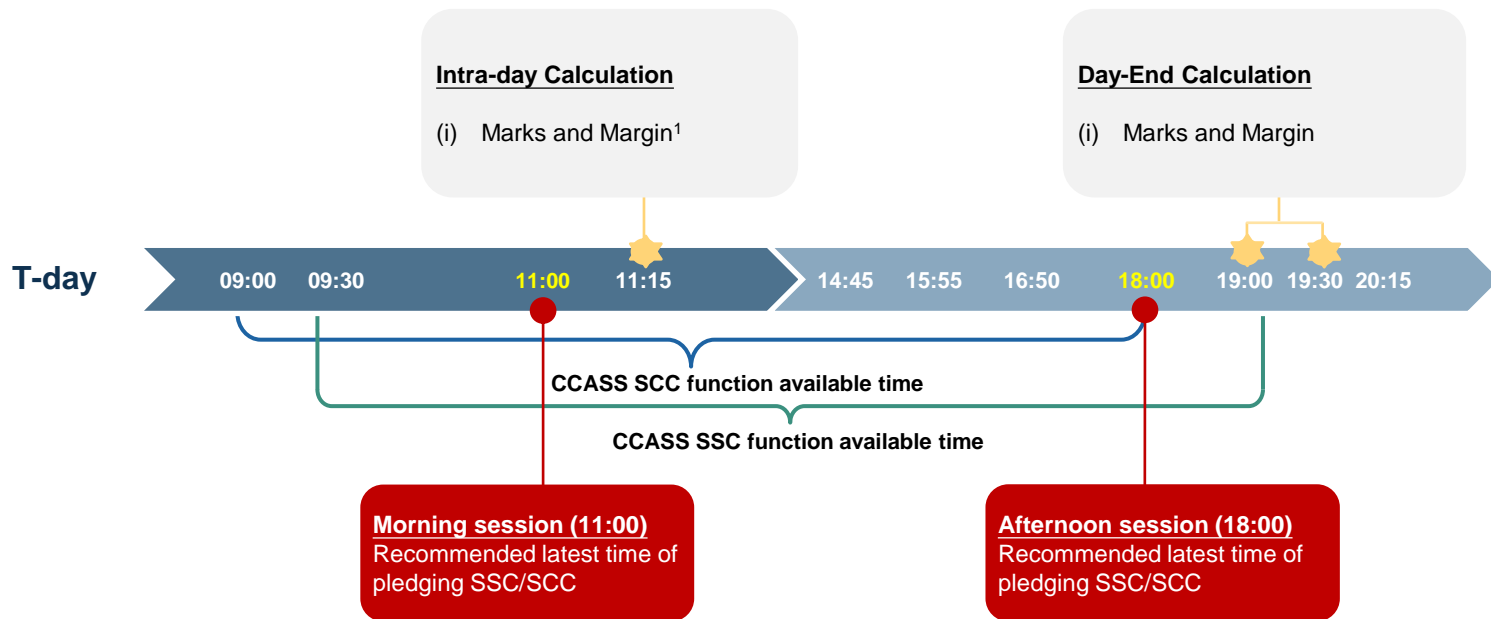
	Specific Stock Collateral (SSC) ⁽¹⁾	Specific Cash Collateral (SCC) ⁽¹⁾
Purpose	<ul style="list-style-type: none">▪ To exclude covered Short CNS position from Marks and Margin calculations	<ul style="list-style-type: none">▪ To exclude covered Long CNS position from Marks and Margin calculations
Feature	<ul style="list-style-type: none">▪ On settlement day, SSC is automatically used for stock settlement	<ul style="list-style-type: none">▪ On settlement day, SCC is automatically used for money settlement

Note: Please refer to Appendix for inputs of SSC and SCC

CNS stock positions covered by SSC or SCC are exempted from Marks and Margin calculation



Key clearing activities when placing SSC/SCC



SSC/SCC reduces margining positions and the covered CNS position is exempted from the Marks & Margin calculation if posted before the cut-off time

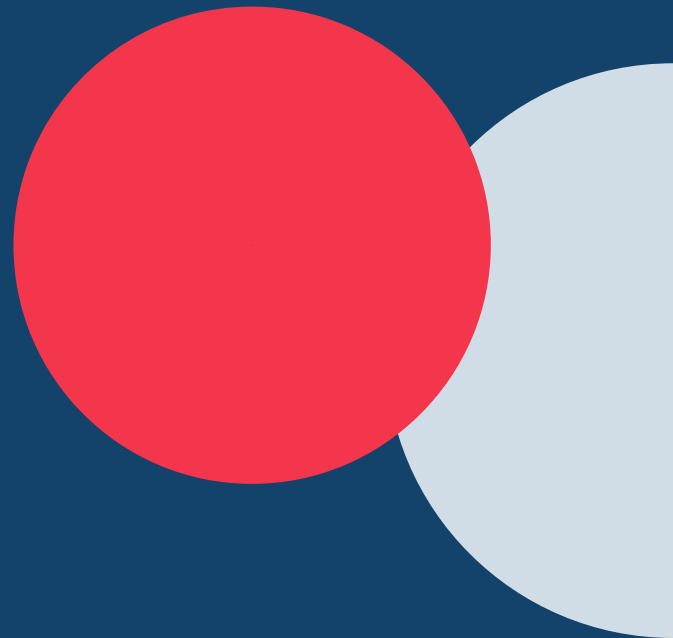
Next Generation Programme Documentation for Clearing Participants

User Manuals & Technical Specifications	Publication Dates	Location
Client Connect Familiarization Guidelines	2019 May	Client Connect Familiarization Guidelines
Client Connect User Manual Client Connect FAQ	2019 May 2019 June	Client Connect User Manual Client Connect FAQ
VaR Risk Parameter file guide	2019 Aug	To be advised
Stress testing Risk Parameter file guide	2019 Aug	To be advised
NG Phase 1 Connectivity Guide (system connectivity and setup)	2019 Sep	To be advised
Report Access Platform (Technical Guide)	2019 Sep	To be advised
NGRM User Guide for Participants (including Margin Simulator function)	2019 Dec	To be advised
Reports and Data Files Sample	2020 Jan	To be advised
NG Phase 1 Installation and Configuration Document	2020 Jan	To be advised

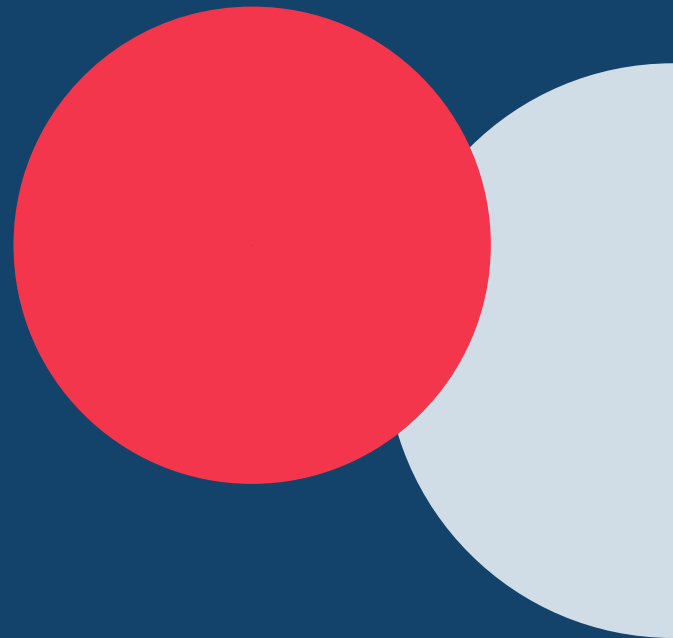


**The above timeline serves for indicative purpose and is subject to changes at HKEX discretion. Clearing Participants shall always refer to the latest announcements from HKEX.*

Q&A

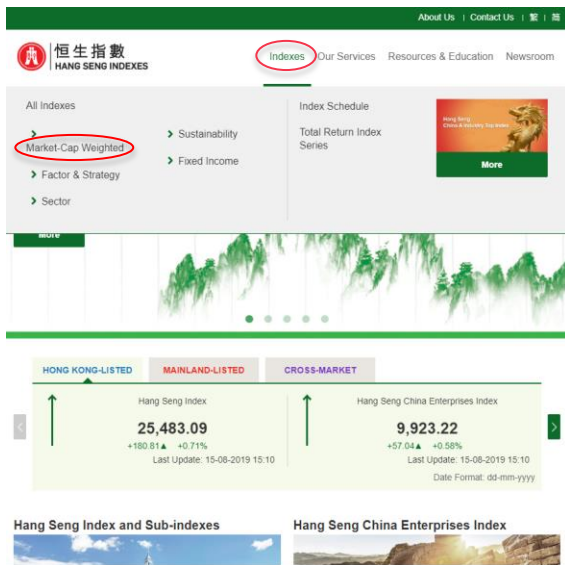


Appendix

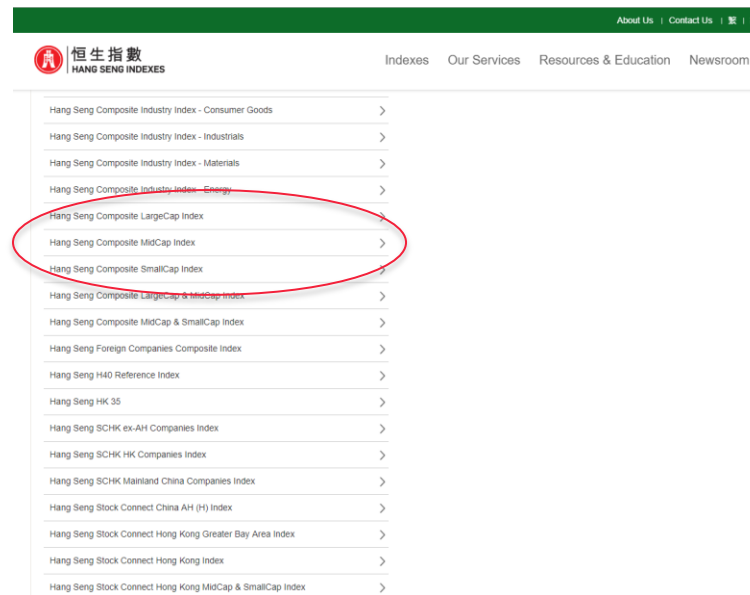


Tier P: Hang Seng Composite Index (HSCI)-based

1. Go to <https://www.hsi.com.hk/HSI-Net/>
2. Click on “Indexes” tab and then click on “Market-Cap Weighted”



3. Select the LargeCap, MidCap and SmallCap Indexes from the list



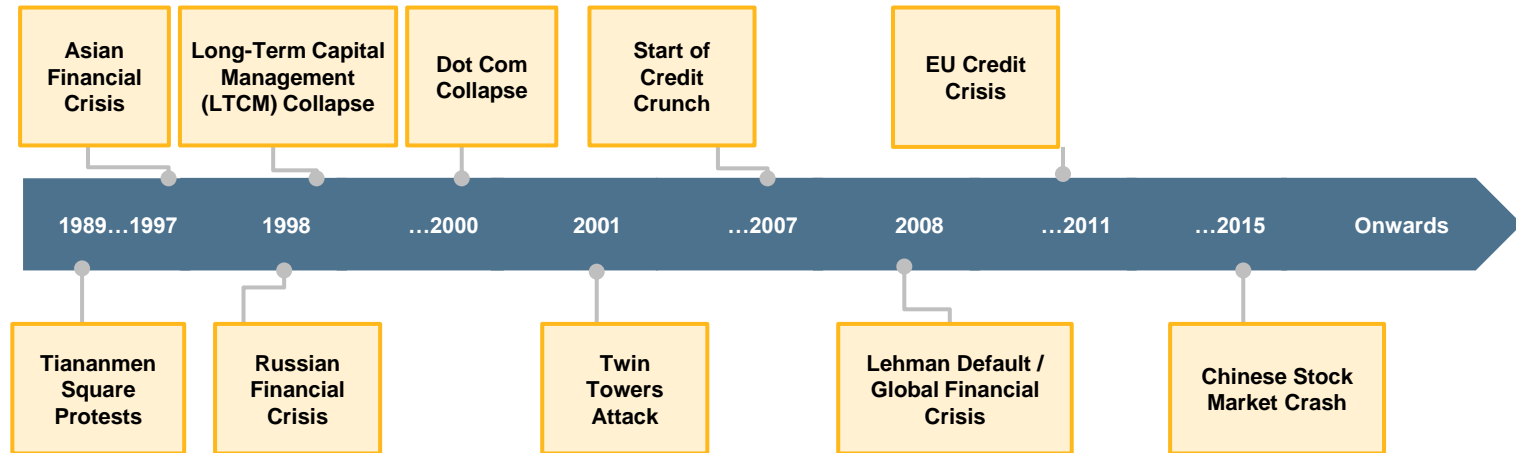
HKEX will update Tier P stocks list for margining on a regular basis and notify CPs the change(s) beforehand

Add-ons

1	Liquidation Risk Add-on	■ Tackles the liquidity risk arising from bid-ask spread and concentration positions
2	Structured Product Add-on	■ Handles the huge percentage loss resulting from downward price movement approaching the minimum security prices of HK\$0.01 for long SP positions
3	Corporate Action Add-on	■ Additional margin to reduce potential risk exposures arising from Corporate Action related entitlements (Rights / open offer; Distribution in specie)
4	Position Limit Add-on	■ Manages the settlement counterparty risk arising from excessive CNS exposure against CPs' financial strength
5	Default Fund Add-on	■ Mitigates excessive risk exposures of individual CPs on Default Fund

Historical stress events

Global and regional events that have major impacts on the Hong Kong stock market



Hypothetical stress events

Simulate extreme but plausible events



Financial Sector Shock

Depend heavily on real economy performance and sentiment

- Financials
- Properties & Construction



Telecom Sector Shock

Dominated by a few players with complex business models

- Telecommunication & IT



Energy Sector Shock

Energy crisis leads to price rise of resources

- Energy, Industrials and Utilities
- Transportation
- International Trading



Consumer Sector Shock

Political and economical factors impact consumer expenditure

- Consumer goods and services



Chinese Manufacturing Sector Shock

Shift from industrial to service sector in China

- Manufacturing, material and industrials
- Shanghai Composite Index (SCI)



Brexit

'Hard' or 'soft' Brexit, no agreement on trades, borders and travels yet

- Multinational corporations (especially conglomerates and financial institutions) with operations in the UK



China Debt Crisis

Risky and poorly collateralised shadow banking sector and high local government debt

- Financials
- Properties and construction



Decoupling of China-Hong Kong equity market

HSI and SCI move independently due to Chinese regulatory changes

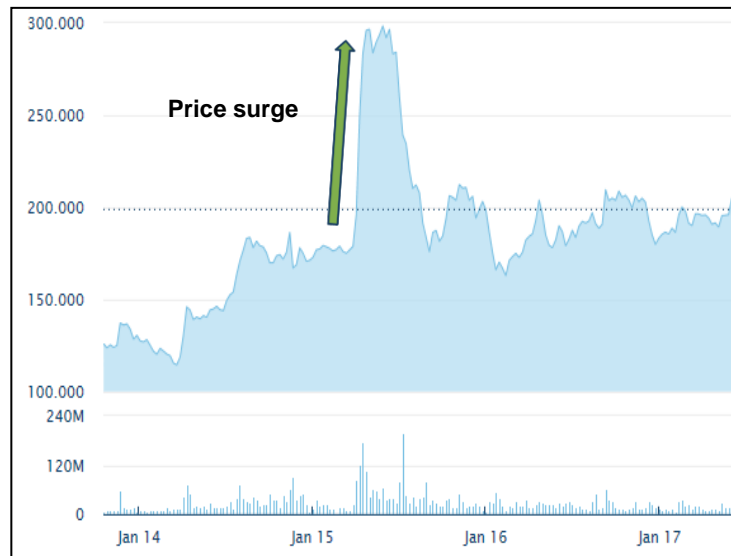
- Hang Seng Index

Theoretical stress events



Idiosyncratic stress events

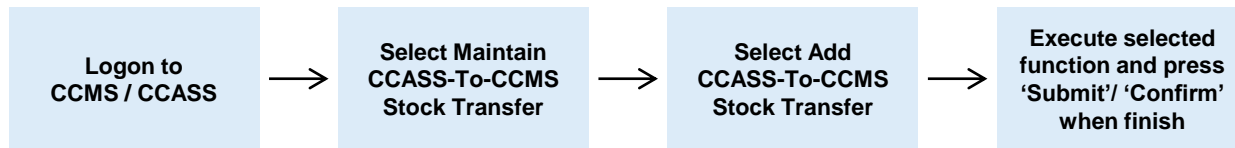
Potential price collapse / surge of individual position(s) in a portfolio



Specific Stock Collateral (SSC) in CCASS

Step 1

Transfer CCASS stock from CCASS stock account to CCMS collateral account



CCASS Files Authorization

Maintain Firm

Maintain Participant

Maintain Collateral Account

Mtn Tran A/C to Collateral A/C Mapping

Maintain Static Data Master

Maintain Collateral Master

Maintain Sec Type Master

Maintain Global Parameters

Maintain Eligible Instrument Group

Maintain Haircut Group Rate

Maintain Clearing House Payment Info

Maintain Calendar

Maintain Function Time

Mtn Cash Collateral Deposit Order

Mtn Non-Cash Collateral Deposit Order

Mtn Cash Collateral Withdrawal Order

Mtn Non-Cash Collateral Withdrawal Order

Enquiry

Order

Mtn (C) Stock Transfer

Transfer

Maintain CCASS-To-CCMS Stock Transfer

Site Map

Announcement Information

Broadcast Message

Change Password

Report Download

Print

Logout

B0108901

KMJA 04

25-May-07 10:13

Add CCASS-To-CCMS Stock Transfer Execution

Transfer ID : 10965

CCASS Participant ID : B01089

ISIN or Stock Code : BMG7774W1010 / 192

CCASS Stock Collateral Control Account : 20

CCASS Stock Collateral Control Account Quantity : 1,000

CCASS Source Stock Account : 1

CCASS Source Stock Account Quantity : 1,000

Firm ID : BF01089

Participant ID : B01089

Account Type : HOUSE

Account Number : 0001

Transfer Quantity : 1,000

Remark : TUG

Add Another Record

Help

-2003 RECORD ADDED SUCCESSFULLY

For more information, please refer to CCASS terminal user guide⁽¹⁾ Chapter 8.3.1 CCASS-To-CCMS Stock Transfer Maintenance

Specific Stock Collateral (SSC) in CCASS

Step 2

Change the stocks in CCMS collateral account from general collateral to specific collateral

Select Maintain
General to Specific
Stock Collateral



Select Add General
to Specific Stock
Collateral



Execute selected
function and press
'Submit'/'Confirm'
when finish

Maintain General To Specific Stock Collateral	
Tran Ref :	4621
Firm ID :	BF06520 BF06520
Participant ID :	B06520 B06520
Account Type :	HOUSE
Account Number :	0001
Account Name :	B06520
Account Status :	ACTIVE
ISIN or Stock Code :	6501 / LN-ISIN06501
Total Available Quantity :	9,800
Quantity :	200
Settlement Date :	01-NOV-02
Remark :	TUG

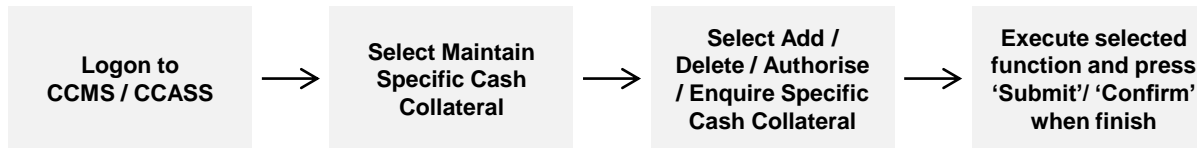
-2003 RECORD ADDED SUCCESSFULLY

For more information, please refer to CCASS terminal user guide⁽¹⁾ Chapter 8.3.3 General to Specific Stock Collateral Maintenance.

(1) Please visit http://www.hkex.com.hk/-/media/HKEX-Market/Services/Clearing/Securities/Infrastructure/CCASS-3-Terminal/CCASS-Terminal-User-Guide-for-Participants/ccms7_1_3.pdf?la=en

Specific Cash Collateral (SCC) in CCASS

Input instruction for paying the Specific Cash Collateral



Maintain Specific Cash Collateral

Add Pending Specific Cash Collateral Detail

Order ID :	29174
Firm ID :	BF00473
Participant ID :	B00473 WINLAND COMPANY
Account Type :	HOUSE
Account Number :	0001
Account Name :	
ISIN or Stock Code :	HK0001000014 / 1 CHEUNG KONG
Status of Order :	PENDING
Currency :	HKD
Payment Method :	<input checked="" type="radio"/> CPI <input type="radio"/> DOI
Amount :	10000
Trade Date :	020113
Remark :	

[Add Another Record](#) [Help](#)

for more information, please refer to CCASS terminal user guide⁽¹⁾ Chapter 8.3.6 Specific Cash Collateral Maintenance.