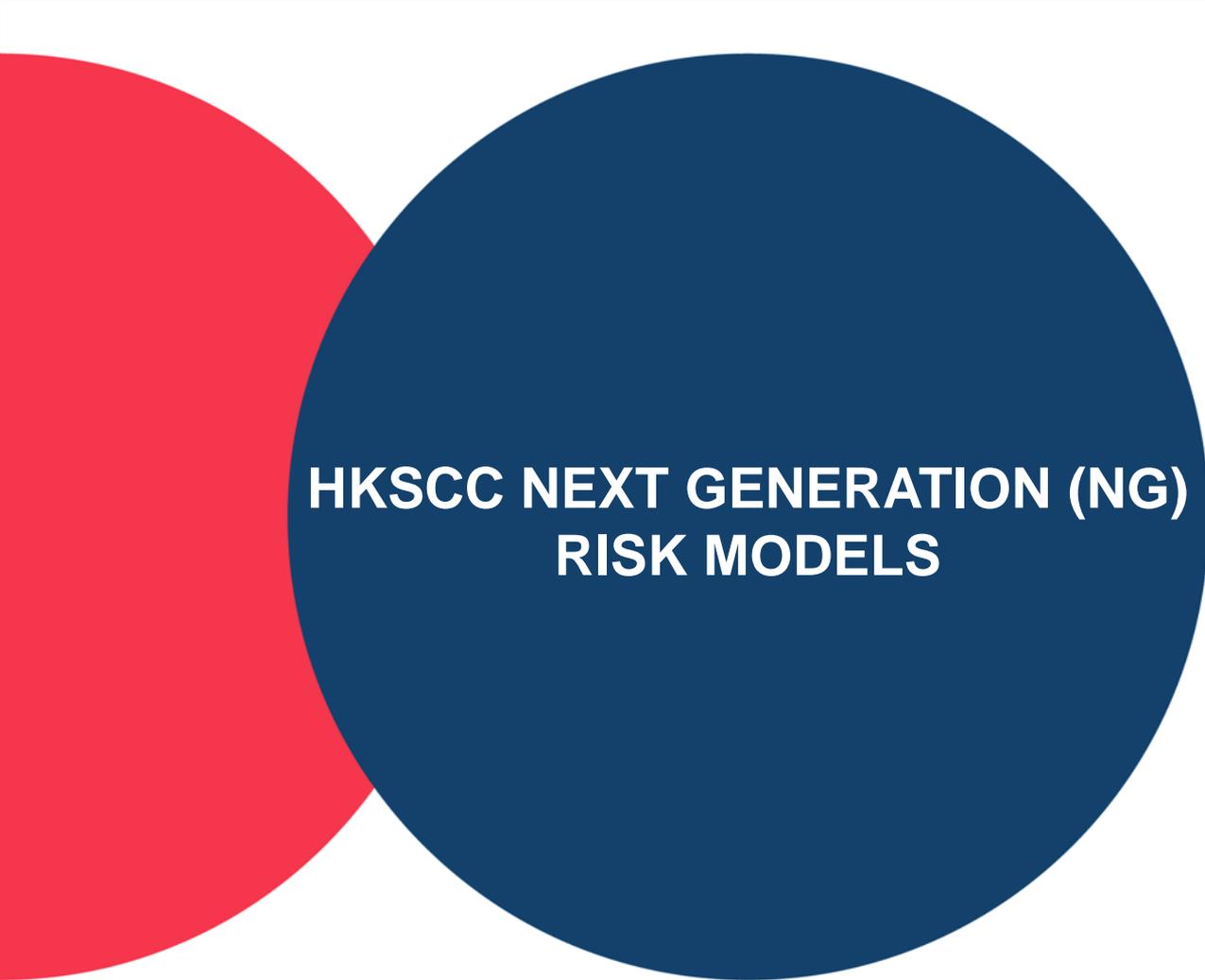


April 2018



**HKSCC NEXT GENERATION (NG)
RISK MODELS**

HKEX
香港交易所

Agenda

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Background

2

HKSCC NG Margin Model Framework

3

Market Impact (NG Margin Model)

4

Margin Calculation Flow

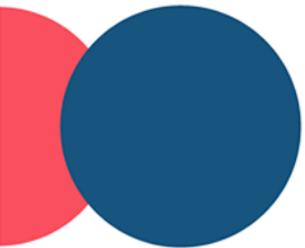
5

Margin Calculation Examples

6

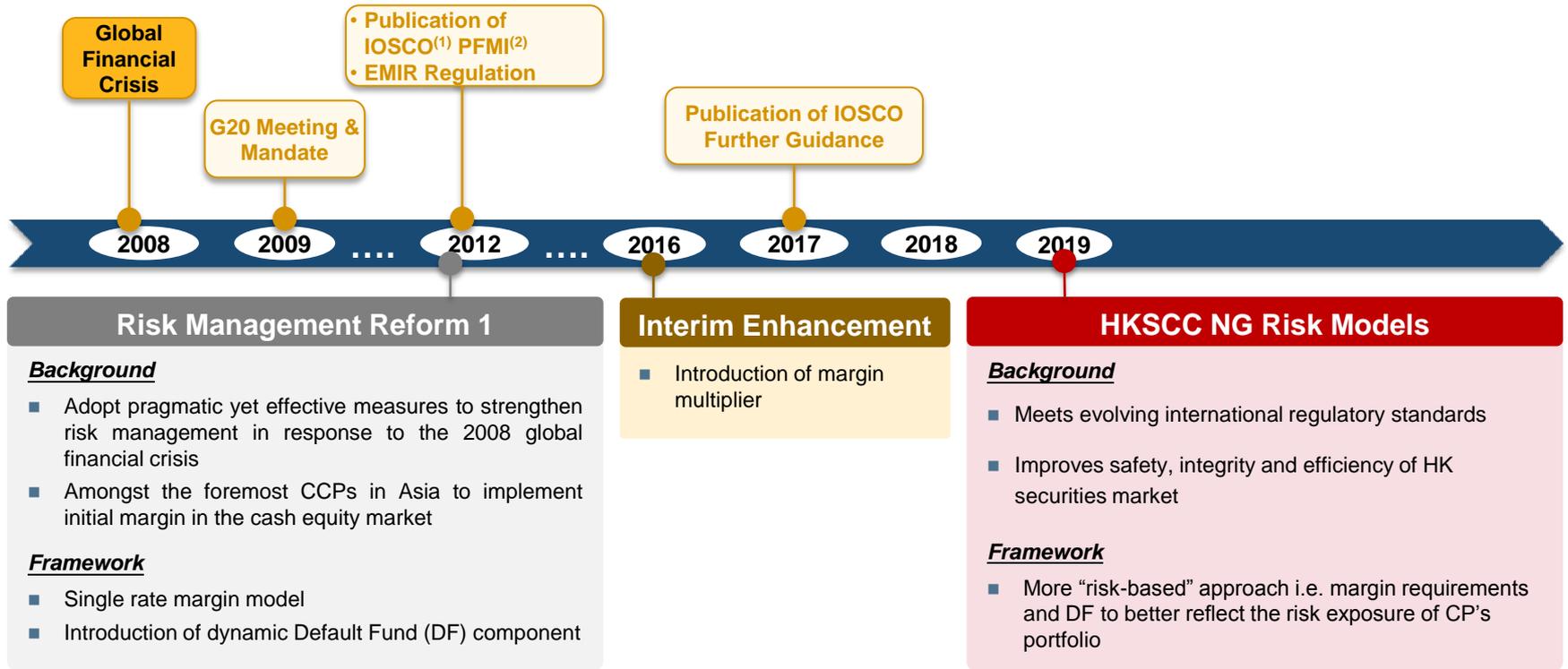
Operations under New Margin Model





BACKGROUND

Evolution of Global Regulation and HKSCC Risk Management



A continuous effort to improve compliance to international regulatory standards and the protection in HK securities market

Key Enhancements

HKSCC NG Risk Model Framework

Current HKSCC Model

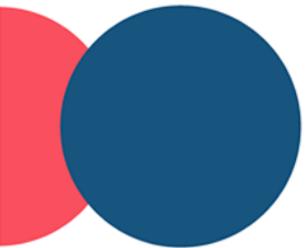
- **Initial Margin**
 - Single margin rate based on Hang Seng Index (HSI) applied to **all** securities
 - No risk offset among securities
- **Stress Testing**
 - Up and down scenario applied to **all** securities to generally cover systemic risk

HKSCC NG Risk Models

- **Initial Margin**
 - Margin requirement based on individual stocks volatility
 - Allow risk offset among selected securities (see HKSCC NG IM model framework for details)
- **Stress Testing**
 - Multiple product-specific scenarios applied to **each** security

***Enhancements are methodology-centric
and most existing settlement and operation arrangements remain unchanged***





HKSCC NG MARGIN MODEL FRAMEWORK

Two-Tier Initial Margin Model Approach

Two-tier : Hang Seng Composite Index (HSCI)-based

Primary Tier (Tier P)

- HSCI Large Cap and Mid Cap constituent stocks
 - Covers securities which rank in the top 95% of the total market capitalization
- All Equity indices ETFs
- As at Mar 2018 :
 - Includes ~450 instruments
 - Covers 74% of the total market turnover

Non- Constituent Tier (Tier N)

- Contains all instruments not in Tier P (e.g., GEM stocks, small / micro cap stocks, etc.)
- Operationally easier to adopt by CPs given the similarity to current single margin rate model
- As at Mar 2018:
 - Includes ~1,950 instruments

Cash Equities and Structured Products (SP) Handling

- Portfolio Margining and subject to minimum margin level
- Includes SP with Tier P underlying or HSI/HHI Index

- Flat rate on higher of Long / Short CNS positions (current HKSCC methodology)

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



Initial Margin Model Summary

	Tier P		Tier N
1. Scope	<ul style="list-style-type: none">Instrument specific		<ul style="list-style-type: none">One margin rate based on a reference market index for all non-Tier P instruments
2. Margin Calculation	<ul style="list-style-type: none">Results of 1,000 recent days⁽¹⁾ with the weight of 75%Results of identified stress dates with the weight of 25%	+	<ul style="list-style-type: none">Current HKSCC approach
3. Margining Position	<ul style="list-style-type: none">All long and short Continuous Net Settlement (CNS) positions		<ul style="list-style-type: none">Higher of long / short CNS positions
4. Implied Volatility Modelling	<ul style="list-style-type: none">Yes		<ul style="list-style-type: none">Nil
5. Margin Period of Risk (MPOR)	<ul style="list-style-type: none">1 day with liquidation risk add-on for illiquid / concentrated positions		<ul style="list-style-type: none">1 day with liquidation risk buffer



(1) Uses Exponential Weighted Moving Average (EWMA) for calculation
Subject to SFC's final approval

Liquidation Risk Add-On for Tier P Sub Portfolio

Rationale

- Additional margin in the margin model framework to cover the additional cost of portfolio handling in the default management process

Mechanism

Liquidation Risk Add-On for Tier P

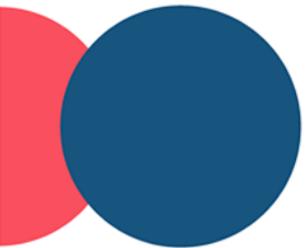
- Primarily reference the bid ask spread and daily trading volume of instruments
- Add-on will be triggered when CNS positions exceed the defined thresholds

Liquidation Risk buffer for Tier N

- Covered by the flat margin rate

Achieve better compliance to international standards

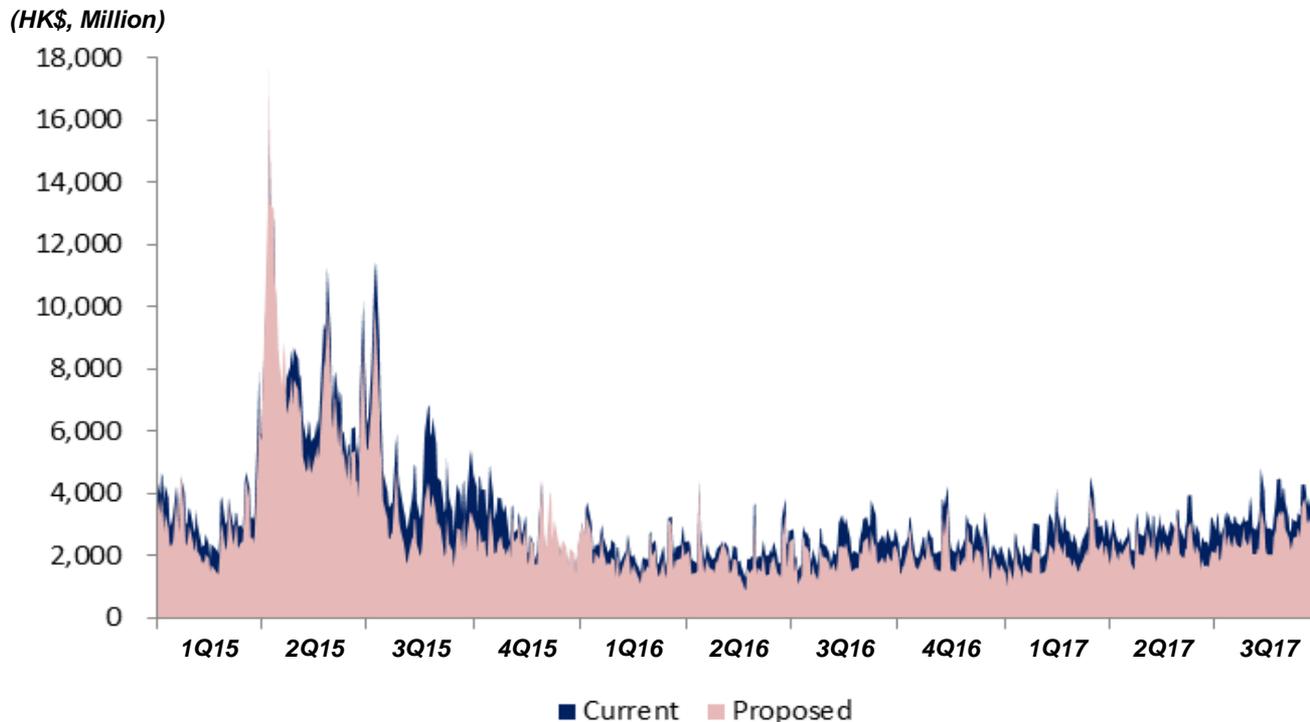




MARKET IMPACT (NG MARGIN MODEL)

Market Impact (1): Margin Requirement of the Market

2015 Q1 - 2017 Q3 (Proposed vs. Current)

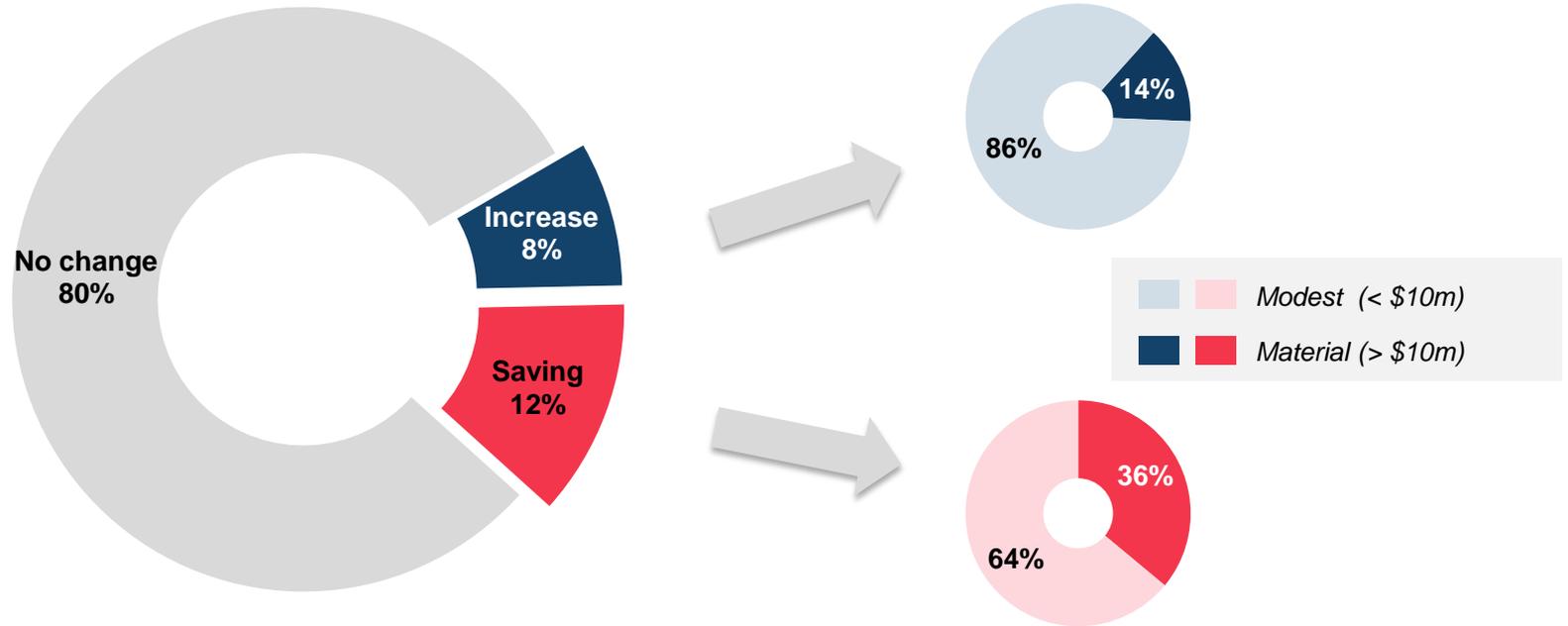


The proposed model effectively captures the risk in heightened volatility period and in general provides margin savings for the market



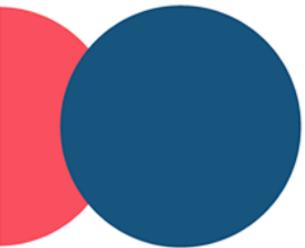
Market Impact (2): Frequency and Magnitude of IM Change

% Observations for all CPs during 2015 Q1 - 2017 Q3 (Proposed vs. Current)



In general, margin will decrease or remain unchanged; most of the margin increases are insignificant





MARGIN CALCULATION FLOW

Tier P Margin Calculation Flow

Portfolio

Tier	Stock Code	L/S	Quantity
Tier P	0003.HK	Short	21000
	0005.Hk	Short	7500
	0016.HK	Long	2200
	0388.HK	Long	2000
	0700.HK	Long	2000



Margin Calculation Methodology

- Portfolio Margining
- Risk Offset

Tier	Stock Code	L/S	Quantity
Tier N	0057.HK	Long	70000
	0709.HK	Long	5000
	8103.HK	Long	20000
	0715.HK	Short	100000
	0855.Hk	Short	23000



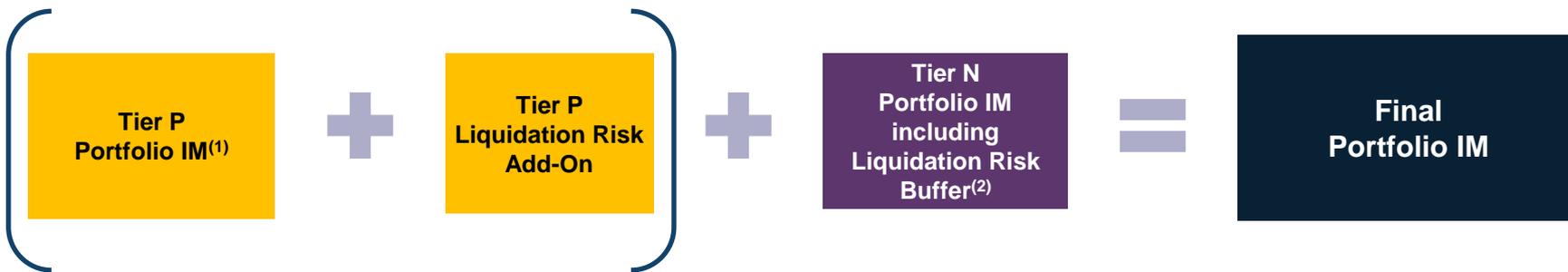
- Same as current HKSCC methodology
- Higher Flat Rate



Next Generation Margin Calculation Flow

Final Portfolio Margin

Margin Requirement for CP's portfolio



Tier N

Margin Calculation Methodology

Similar to current HKSCC methodology

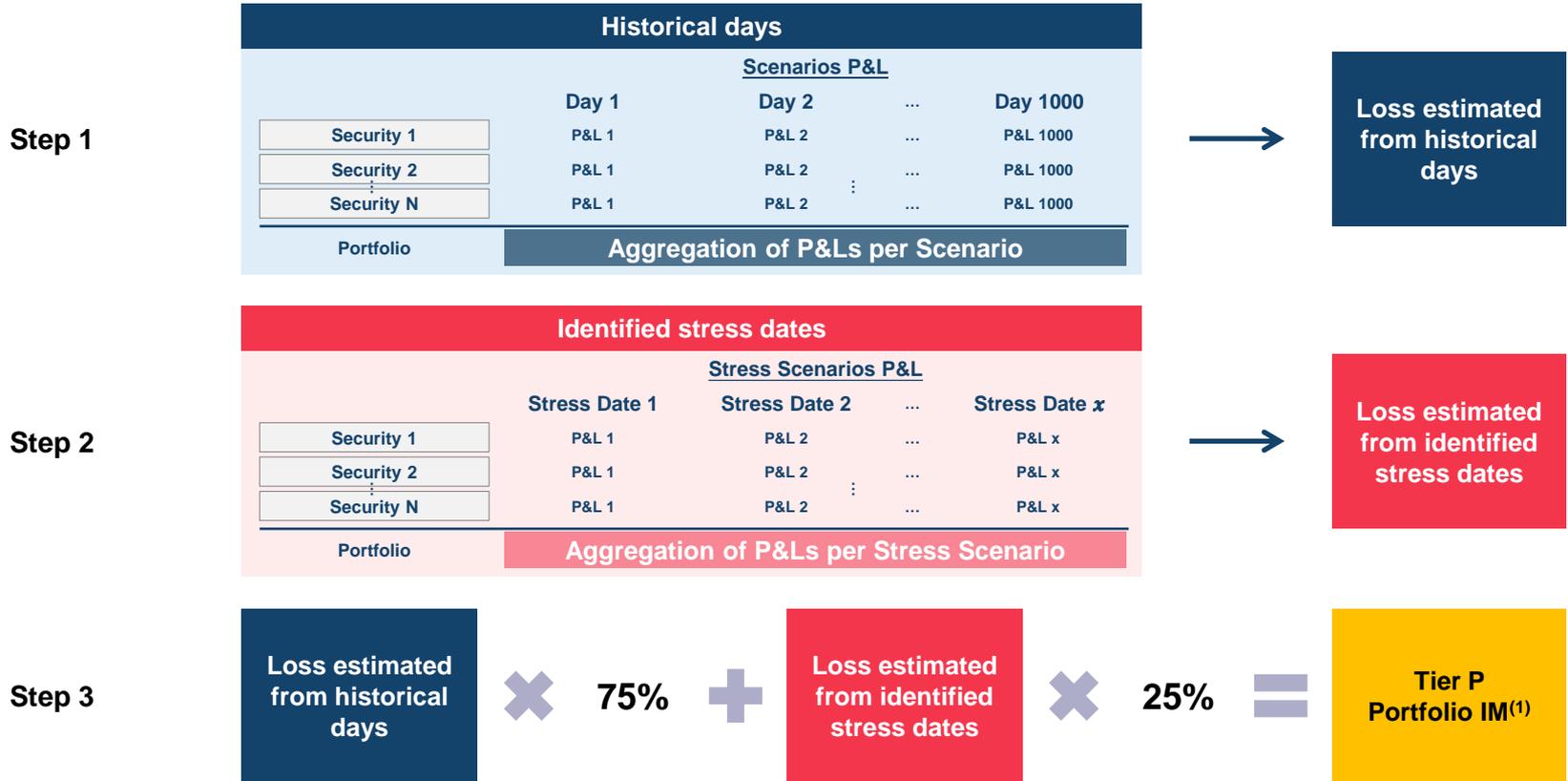


(1) Tier P margin is subject to minimum margin level

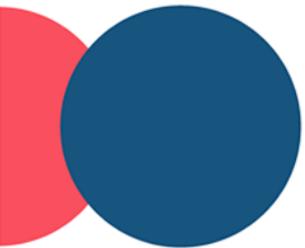
(2) Tier N portfolio IM is subject to margin multiplier and the multiplier is determined by the magnitude of a Clearing Participant's back-testing deficit

Tier P Margin Calculation Flow

Margin Calculation Methodology



(1) Tier P margin is subject to minimum margin level



MARGIN CALCULATION EXAMPLES

Numerical Examples of Calculation of IM Requirement (1)

Balanced Portfolio with 5 Tier P stocks and 5 Tier N stocks

Tier P

Margin Calculation Methodology

Step 1

Historical Days								
Stock Code	L/S	Quantity	Tier	Market Value	Day 1	Day 2	...	Day 1000
0003.HK	Short	21000	P	(364,980)	392	337	...	341
0005.HK	Short	7500	P	(503,250)	283	(5,496)	...	(6,452)
0016.HK	Long	2200	P	262,460	(3,610)	(2,367)	...	4,553
0388.HK	Long	2000	P	351,600	(3,129)	1,152	...	7,038
0700.HK	Long	2000	P	261,400	(2,404)	(108)	...	2,672
Aggregated Scenario P&L for Tier P at Portfolio Level					(8,468)	(6,482)	...	8,152

} Average loss of the worst 6 days
= HK\$ 8,125

Step 2

Identified Stress Dates								
Stock Code	L/S	Quantity	Tier	Market Value	Stress Date 1	Stress Date 2	...	Stress Date x
0003.HK	Short	21000	P	(364,980)	(19,209)	9,121	...	-
0005.HK	Short	7500	P	(503,250)	(6,894)	4,534	...	(2,794)
0016.HK	Long	2200	P	262,460	13,634	(6,480)	...	(2,716)
0388.HK	Long	2000	P	351,600	14,449	(1,157)	...	-
0700.HK	Long	2000	P	261,400	31,457	(3,528)	...	4,559
Aggregated Stress Scenario P&L for Tier P at Portfolio Level					33,437	2,490	...	(950)

} Average loss of the worst 2%
dates = HK\$ 10,000

Step 3



(1) Tier P margin is subject to minimum margin level
*All above figures are hypothetical for illustrative purpose only

Numerical Examples of Calculation of IM Requirement (2)

Portfolio with 5 Tier P stocks and 5 Tier N stocks

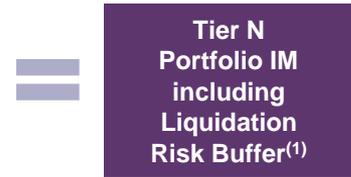
Tier N

Margin Calculation Methodology



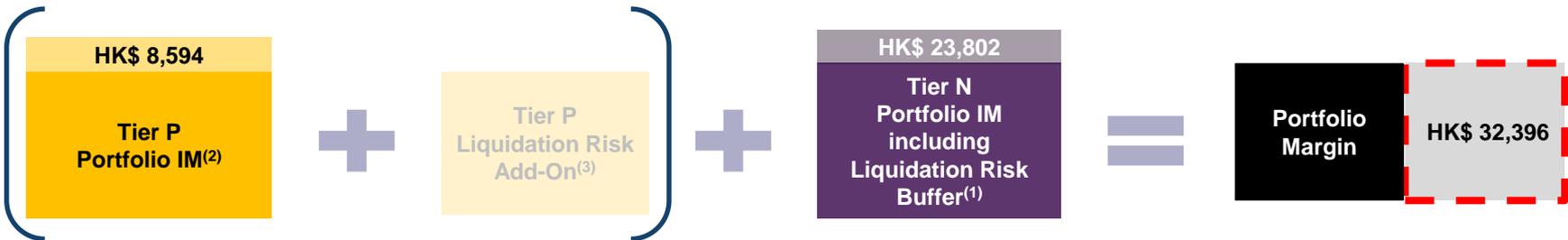
Higher of Long/ Short Tier N CNS

Stock Code	L/S	Quantity	Tier	Market Value
0057.HK	Long	70000	N	143,500
0709.HK	Long	5000	N	21,050
8103.HK	Long	20000	N	33,800
Long CNS				198,350
0715.HK	Short	100000	N	(77,000)
0855.HK	Short	23000	N	(119,600)
Short CNS				(196,600)



Final Portfolio Margin

Margin Requirement for CP's portfolio

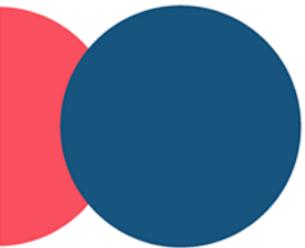


(1) Tier N portfolio IM is subject to margin multiplier
 (2) Tier P margin is subject to minimum margin level
 (3) Tier P liquidation risk add-on is not triggered in this example
 *All above figures are hypothetical for illustrative purpose only

General Relationship Between Portfolio Characteristics and IM Requirements

Characteristics	Examples
Diversified Portfolio <ul style="list-style-type: none">■ Consists of balanced long / short positions or hedged positions (e.g. Structured Products (SP) vs. underlying, ETF vs. underlying)<ul style="list-style-type: none">➢ Lower IM due to portfolio margining	Balanced Portfolio <ul style="list-style-type: none">■ IM Requirement<ul style="list-style-type: none">➢ NG Risk Models: HK\$ 32,396
Directional Portfolio <ul style="list-style-type: none">■ Consists of net long or net short positions<ul style="list-style-type: none">➢ Limited scope for risk netting at portfolio level resulting in higher margin requirement	Portfolio with SP hedged against underlying <ul style="list-style-type: none">■ IM Requirement<ul style="list-style-type: none">➢ NG Risk Models: HK\$ 2,143
Concentrated Positions with Volatile Stocks <ul style="list-style-type: none">■ Lack of diversification in portfolio and concentrated in volatile stocks (e.g. small and mid-cap stocks)<ul style="list-style-type: none">➢ Higher IM to reflect the riskier nature of high volatility stocks	Directional Portfolio <ul style="list-style-type: none">■ IM Requirement<ul style="list-style-type: none">➢ NG Risk Models: HK\$ 132,658
	Portfolio with 85% concentration in 1 volatile stock <ul style="list-style-type: none">■ IM Requirement<ul style="list-style-type: none">➢ NG Risk Models: HK\$ 40,770





OPERATIONS UNDER NEW MARGIN MODEL

Operations under New Margin Model

Operational Impact	Funding	<ul style="list-style-type: none">■ CP's internal funding requirement could fluctuate as IM of the portfolio is calculated based on the risk of the portfolio	
Mitigation of Potential Impact	Reports	<ul style="list-style-type: none">■ Reports content and frequency will be adjusted to promote transparency of new models	
	Margin Simulation Tools (see next slide for details)	<ul style="list-style-type: none">■ Facilitate CPs' internal processes related to risk control and margin payment / collection	
	Specific Stock Collateral (SSC) or Specific Cash Collateral (SCC)	<ul style="list-style-type: none">■ CNS stock positions covered by SSC or SCC are exempted from initial margin calculation	
Other Features	Margin credit of HK\$5M will continue	<ul style="list-style-type: none">■ HK\$5 million margin credit	
	Collection and refund process	<ul style="list-style-type: none">■ Relevant settlement reports will still be available via existing CCASS■ Timing of most existing operations remains unchanged■ Excess margin is refunded on the following day■ Default Fund (DF) collection/ refund period will follow current practice	

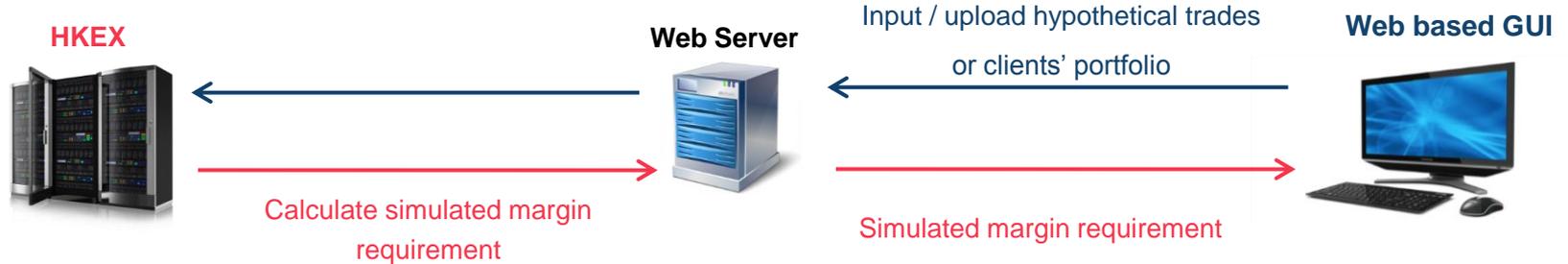


Overview of Margin Simulation Tools

Purpose

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

Option 1: Web Portal



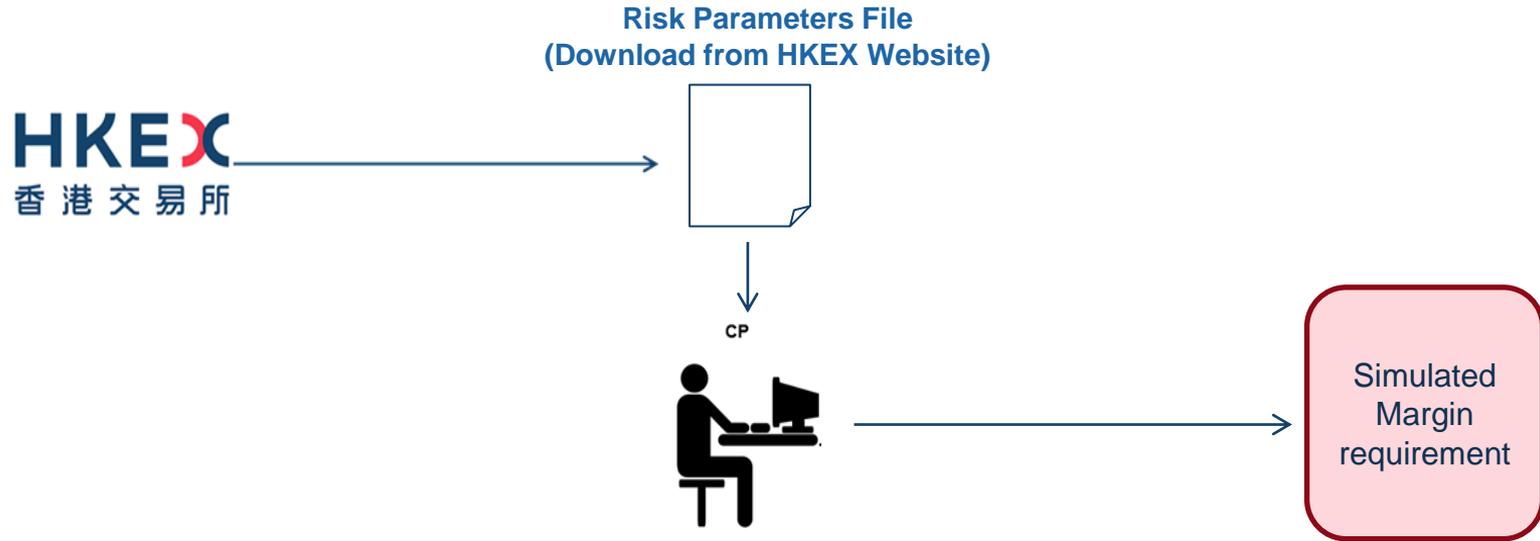
Features

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



Overview of Margin Simulation Tools

Option 2: Risk Parameters File

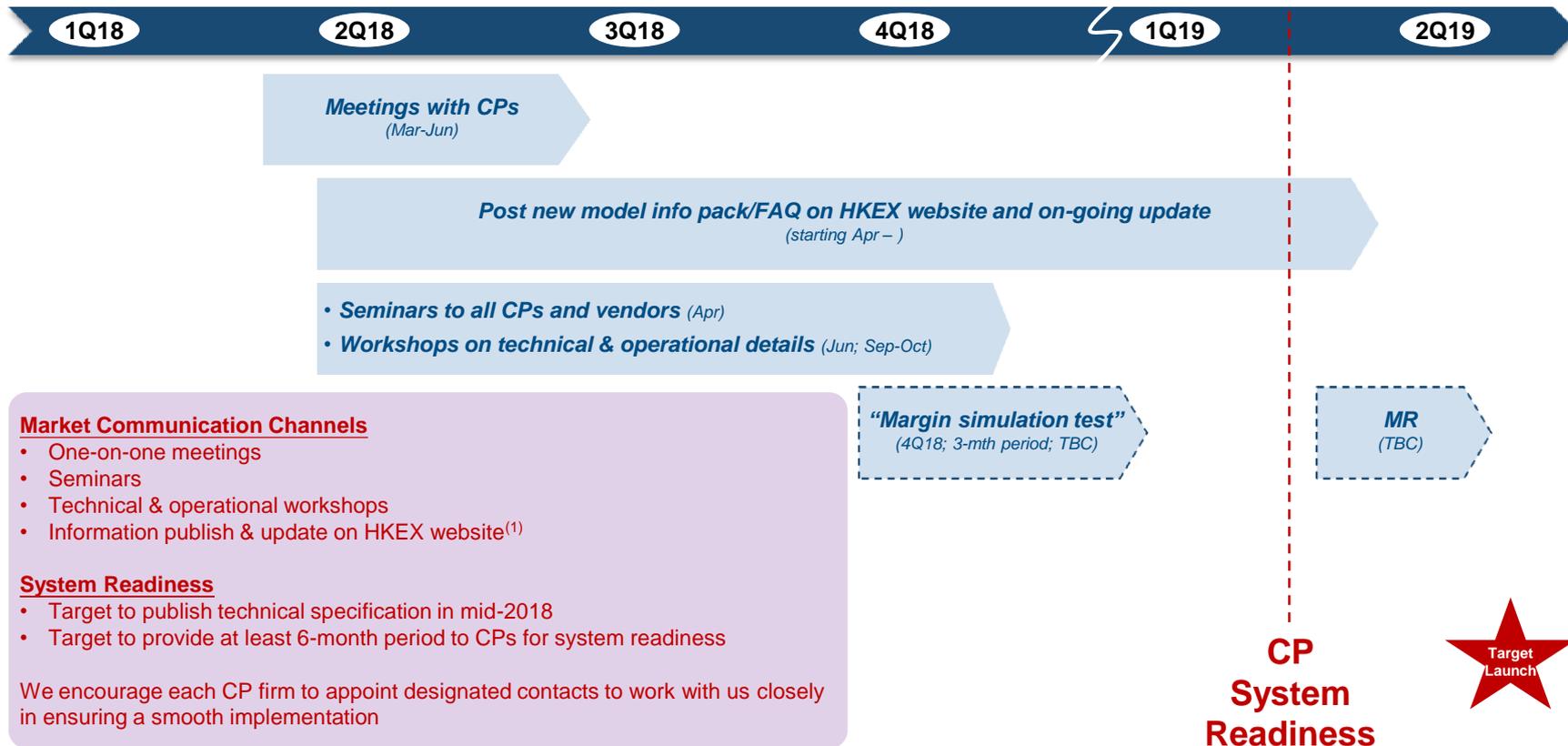


Features

- HKEX provides RPF (at granular risk parameter level) for each stock and structured product
- CPs download and use the RPF for estimating margin requirement and risk management of house, affiliate or client portfolios on the next day



Market Communication Timetable



(1) <http://www.hkex.com.hk/Services/Next-Generation-Post-Trade-Programme/>

Two-tier : Hang Seng Composite Index (HSCI)-based

1. Go to <https://www.hsi.com.hk/HSI-Net/>
2. Click on “Benchmark Indexes” tab and then click on Hang Seng Composite Size Indexes

Information For
• Institutional Investor
• Individual Investor
• Media

Highlights
• [22 March 2018] EU Benchmarks Regulation
• [15 March 2018] Hang Seng Indexes Licenses China Southern Asset Management to Use Hang Seng China Enterprises Index as Basis for ETC
• [14 March 2018] Factsheets for Hang Seng Family of Indexes (February 2018)
• [01 Mar 2018] Hang Seng Stock Connect China A5 Smart Index and Hang Seng China Enterprises Smart Index Monthly Share Class Switches Result (March 2018)
• [01 Mar 2018] Hang Seng CSI Shanghai-Hong Kong A5 Smart Index Monthly Share Class Switches Result (March 2018)
• [23 Feb 2018] Constituent Changes in Hang Seng Family of Indexes
• [23 Feb 2018] Hang Seng Indexes Launches a Daily and Daily-Hedged Index
• [20 Feb 2018] Factsheets for Hang Seng Family of Indexes (January 2018)

Wide spectrum of Stock Connect Hong Kong Indexes
New geographical and thematic benchmarks
Leads an investment opportunity with multiple perspectives

Major Indexes **Benchmark Indexes** Bond Indexes

Real-time Indexes	Current Index	Change	Change (%)
Hang Seng Composite Index	4215.37	+32.82	+0.78%

Hang Seng Composite Industry Indexes

Industry	Current Index	Change	Change (%)
Energy	6134.01	+207.74	+2.33%
Materials	7017.11	+62.14	+0.89%
Industrials	1601.88	+9.61	+0.60%
Consumer Goods	5996.35	+49.37	+0.83%
Consumer Services	4496.98	+42.12	+0.95%
Telecommunications	1500.31	-4.83	-0.32%
Utilities	7662.77	+46.92	+0.62%
Financials	4316.84	+28.15	+0.66%
Properties & Construction	4355.97	+22.41	+0.52%
Information Technology	14675.67	+198.72	+1.37%
Conglomerates	2668.90	+11.19	+0.42%

Useful Links
• Videos
• New Indexes Corner
• Daily Reports
• Top 10 Ups and Downs of Indexes
• Historical Changes of Constituents of HSI
• PE Ratio and Dividend Yield of Indexes
• Factsheets
• Hang Seng Industry Classification System
• Hang Seng Family of Indexes FAQ
• Index Dissemination Time
• Order Historical Data
• Feature Articles
• Hang Seng Composite Smart Index Constituent List and Average I/IV

Hang Seng Composite Size Indexes

Index	Current Index	Change	Change (%)
Hang Seng Composite LargeCap Index	2566.82	+19.20	+0.75%
Hang Seng Composite MidCap Index	5378.36	+46.58	+0.87%
Hang Seng Composite SmallCap Index	2420.27	+24.10	+1.01%

Last update: 25-03-2018 16:01

3. Click on Constituents tab and select the LargeCap, MidCap and SmallCap in the dropdown box

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HANG SENG INDEXES

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Indexes
New Indexes Corner
Overview of All Indexes
Total Return Index Series
Dividend Point Index Series
Customised Indexes
Index Standards
Common Formulae
Cap Factor
Freefloat Adjustment
Suspension of Stocks
High Shareholding Concentration

Hang Seng Composite Size Indexes
Home > Indexes > Overview of All Indexes > Benchmark Indexes > Hong Kong-listed

Overview **Constituents** Statistics

Current Constituents Historical Changes of Constituents

Hang Seng Composite LargeCap Index
Hang Seng Composite LargeCap Index
Hang Seng Composite LargeCap & MidCap Index
Hang Seng Composite MidCap Index
Hang Seng Composite MidCap & SmallCap Index
Hang Seng Composite SmallCap Index

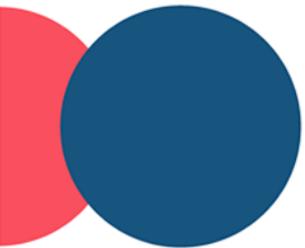
10	Hang Lung Group
11	Hang Seng Bank
12	Henderson Land
16	SHK Ppt
17	New World Dev
19	Swire Pacific A
20	Wheelock
23	Bank of E Asia
27	Galaxy Ent
28	MTR Corporation
66	Shangri-La Asia
83	Sino Land
101	Hang Lung Ppt
135	Kunmin Energy

Wide spectrum of Stock Connect Hong Kong Indexes
Hang Seng China Enterprises Index Enhancement
Hang Seng China Enterprises Smart Index
Hang Seng China A Industry Top Index

Useful Links
• Hang Seng Industry Classification System
• Hang Seng Indexes-linked ETFs
• Order Historical Data
• Freefloat Adjustment

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





Contact us at
margin_modelling@hkex.com.hk
for questions/feedback