August 2019

HKEX
香港交易所

CONSULTATION PAPER

MARKET MICROSTRUCTURE ENHANCEMENTS IN THE SECURITIES MARKET: PRE-OPENING SESSION AND VOLATILITY CONTROL MECHANISM

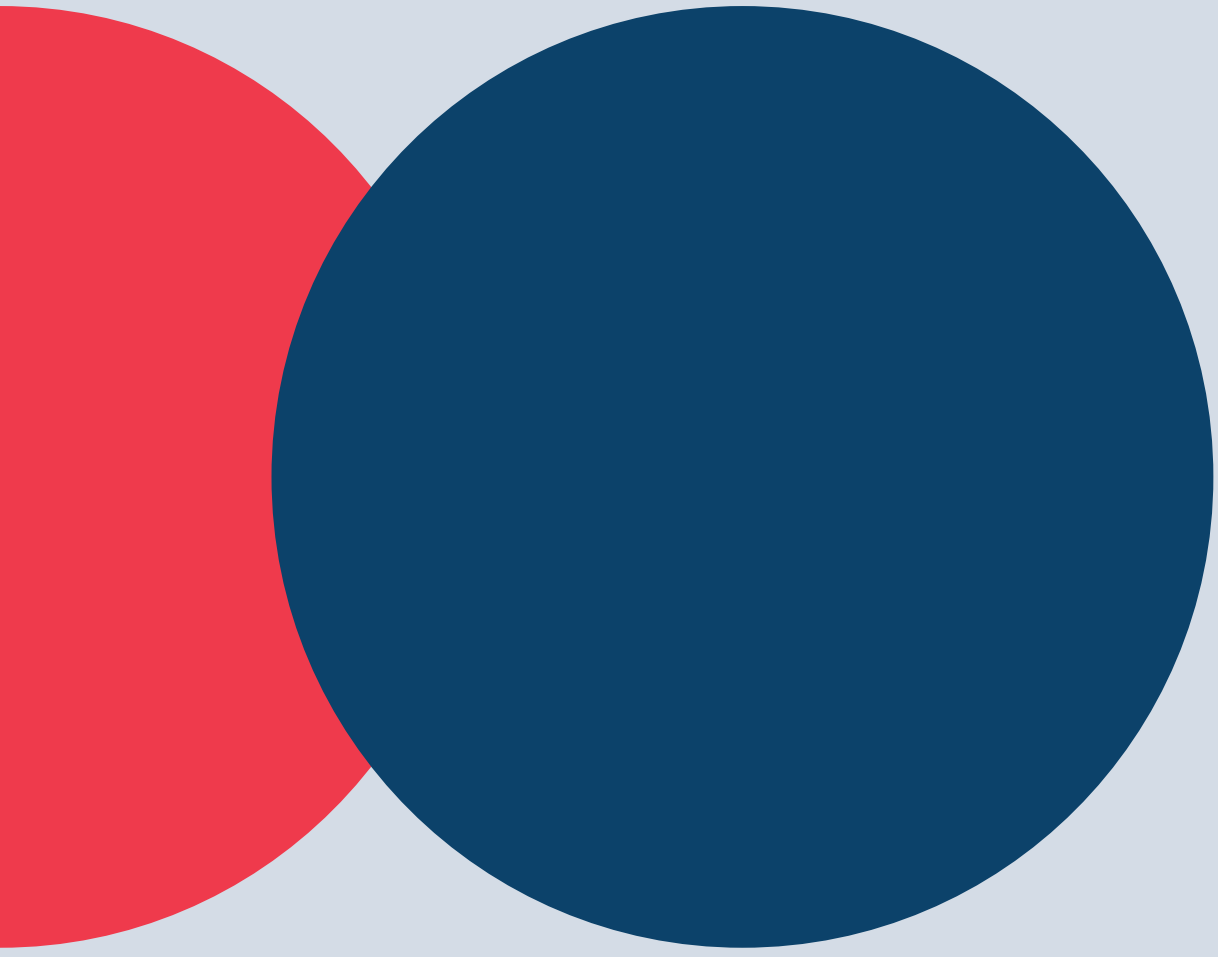

Table of Contents

HOW TO RESPOND TO THIS CONSULTATION PAPER

The Exchange, a wholly-owned subsidiary of HKEX, invites written comments on the changes proposed in this paper, or comments on related matters that might have an impact upon the changes proposed in this paper, on or before 27 September 2019. You can respond by completing the questionnaire which is available at:
http://www.hkex.com.hk/-/media/HKEX-Market/News/Market-Consultations/2016-Present/August-2019-Consultation-Paper-on-Market-Microstructure-Enhancements/Questionnaire/cp201908q.docx

Written comments may be sent:

By mail or hand delivery to
Corporate Communications Department
Hong Kong Exchanges and Clearing Limited
8/F., Two Exchange Square
8 Connaught Place
Central
Hong Kong

Re: Consultation Paper on Market Microstructure Enhancements In the Securities Market: Pre-opening Session and Volatility Control Mechanism (August 2019)

By fax to (852) 2524 0149

By e-mail to response@hkex.com.hk

Please mark in the subject line:
Re: Consultation Paper on Market Microstructure Enhancements In the Securities Market: Pre-opening Session and Volatility Control Mechanism (August 2019)

Our submission enquiry number is (852) 2840 3844.

Respondents are reminded that the Exchange will publish responses on a named basis in the intended consultation conclusions. If you do not wish your name to be disclosed to members of the public, please state so when responding to this paper. Our policy on handling personal data is set out in Appendix 7.

Submissions received by the submission deadline will be taken into account before the Exchange decides upon any appropriate further action. The Exchange will develop a consultation conclusions paper which will be published in due course.

DISCLAIMER

EXECUTIVE SUMMARY

1 This Consultation Paper seeks views and comments from all interested parties regarding the proposed enhancements to Pre-opening Session (POS) and Volatility Control Mechanism (VCM) in the Hong Kong securities market.

2 The two proposals to enhance market microstructure aim to improve market liquidity and global competitiveness of the Hong Kong market. The enhancements to POS are needed to improve price discovery and trading liquidity before the market open, while VCM enhancements are needed to contain risks caused by extreme price volatility in individual stocks, in line with international practice and regulatory guidance.

Enhancements to POS

3 In the 2015 public consultation[1] on introduction of Closing Auction Session (CAS), market participants indicated that, after the successful rollout of CAS to the securities market, they would prefer to apply some features from the enhanced CAS to POS in order to improve price discovery and trading liquidity in POS.

4 CAS in the securities market has since been successfully rolled out and currently covers constituent stocks of Hang Seng Composite LargeCap, MidCap and SmallCap indexes, all H shares which have corresponding A shares listed on the Mainland exchanges, and Exchange Traded Funds. In July 2019, HKEX further announced the plan to expand CAS to cover all remaining equities and funds in October the same year. With the completion of CAS implementation by stages in accordance with our 2015 consultation conclusions, it is now appropriate to consult the market on POS enhancements, which aim to facilitate a smooth price discovery process and thereby attract more investors and trading liquidity.

5 The proposed POS model would be enhanced in the following ways:

- Adopting relevant features used in the existing CAS model, including:
  - To adjust securities coverage to include all equity securities and funds, but to exclude structured products, debt securities, leveraged and inverse products, equity warrants and rights;
  - To add randomised auction matching;
  - To allow at-auction limit orders throughout the session;
  - To allow short selling orders with a price not lower than the reference price (previous closing price); and
  - To enhance market transparency through more market data disclosure.

- Introducing a two-stage price limit:
  - To set a price limit at ±15% with reference to the previous closing price during the period where orders may be entered, amended or cancelled, and later to within the lowest ask and highest bid prices recorded at the end of order input period during the periods where orders can only be entered but not amended or cancelled;
  - Not to apply the ±15% price limit under pre-defined scenarios, including IPO stocks, stocks on their ex-dates (e.g. stocks on their ex-entitlement date) and stocks resuming from trading suspension, so as to allow free price discovery same as today; and

[1] CAS Consultation Paper and the corresponding Conclusions Paper issued in 2015.

- Where a stock is not traded in POS due to the ±15% price limit, trading in such stock will continue as usual during the Continuous Trading Session (CTS) without a price limit.

- Adjusting the time periods in POS so as to add a new Random Matching Period of up to 2 minutes to end order inputs randomly before trade matching occurs.

6 The details of the enhanced POS model are set out in Chapter 2 and its comparison with the existing POS and CAS is shown in Appendix 1.

Enhancements to VCM

7 In view of the impact of technological changes on market integrity, as well as the regulatory guidance by International Organisation of Securities Commissions (IOSCO) and the Securities and Futures Commission (SFC), HKEX introduced a stock-level VCM mechanism in 2016, following a public consultation conducted a year before.

8 Based on feedback obtained from the consultation then, market participants preferred a light-touch and simple model as VCM was new to Hong Kong, and investors were not familiar with such mechanisms. Accordingly, the current VCM has a limited coverage to constituent stocks of Hang Seng Index (HSI) and Hang Seng China Enterprise Index (HSCEI) only (total number of stocks at 82[2]), with a fixed triggering level of ±10% to the last traded price 5 minutes ago and a maximum number of one trigger per stock per trading session.

9 No VCM trigger has occurred over the past three years, which is partially due to the light-touch approach adopted, as well as the relatively low price volatility of VCM stocks exhibited during the period.

10 In August 2018, further guidance was issued by IOSCO[3], which essentially requires regulated markets to establish suitable volatility controls, and, in addition, to review and calibrate such controls from time to time to ensure that they stay relevant with respect to the latest market development.

11 Accordingly, working in conjunction with the SFC, HKEX decides to consult the market on the following VCM enhancements in the securities market, with the objective to further strengthen our safeguards against disorderly trading caused by extreme price volatility in individual stocks:

- Expanding VCM stock coverage to constituent stocks of Hang Seng Composite LargeCap, MidCap and SmallCap Indexes (total of nearly 500[4] stocks);

- Applying a tiered structure of triggering thresholds at ±10%, ±15%, and ±20% to the last traded price 5 minutes ago respectively for the constituent stocks of the three Hang Seng Composite indexes; and

- Allowing multiple triggers per trading session for each VCM stock.

12 The details of VCM enhancements are set out in Chapter 5.

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[2] Data as of 20 June 2019.

[3] IOSCO final report on "Mechanisms Used By Trading Venues To Manage Extreme Volatility And Preserve Orderly Trading" issued on 1 August 2018.

[4] Data as of 20 June 2019.

13 HKEX would also like to take this opportunity to solicit market feedback on whether it should consider any market-level volatility controls (such as a market-wide circuit breaker) for the Hong Kong market on top of the proposed VCM enhancements.

Timeline and Responses to the Consultation Paper

14 We invite market participants and the investing public to express their view and comments on the two enhancement proposals. The consultation period is 6 weeks and respondents should reply to this Consultation Paper by completing and returning the questionnaire on or before 27 September 2019 (a softcopy of the questionnaire is available at HKEX website. A Consultation Conclusions Paper would be issued tentatively by the end of 2019 summarising the main points made by the respondents and indicating the way forward, including an implementation plan and timeline if any of these proposals were to be implemented. Consequential rule changes resulting from implementation of any of the proposals will be made in due course.

PART A

PRE-OPENING SESSION (POS) ENHANCEMENT

CHAPTER 1: BACKGROUND AND REASONS FOR ENHANCEMENTS TO POS

15 The current POS in the securities market was introduced in March 2002 with the purpose of determining a fair opening price for each security and reducing the loading of the trading system at the commencement of the Continuous Trading Session (CTS). The auction mechanism of POS has remained largely unchanged since its launch, even though there has been a sea change in trading environment, and continuous efforts in enhancing pre-opening auctions are observed in other exchanges[5]. A robust and stable POS would increase market's overall competitiveness, as smooth price discovery and high trading liquidity at open would have a positive impact on investor confidence and be conducive to attracting more liquidity.

16 During the 2015 CAS consultation, our market participants clearly indicated their preference to enhance POS auction mechanism by using some enhanced features of CAS after it was introduced to the Hong Kong securities market. Given CAS has been implemented for three years and is now well-accepted by market participants, HKEX believes the timing is right to enhance POS by adopting the relevant features in CAS, in order to further improve price discovery and trading liquidity in POS.

17 As the market is already familiar with the CAS mechanism, adopting an opening auction model that largely follows the closing auction will facilitate market participants' understanding. On the other hand, certain differences, such as duration and price limits, should be allowed in order to serve different trading objectives. Internationally, it is common practice that similar models be adopted for opening and closing auctions in a market (see Appendix 2 for international comparison).

18 Chapter 2 presents an enhanced POS model. A number of consultation questions where market participants' feedback is sought are presented in Chapter 3. Finally, Chapter 6 contains a number of questions on implementation details and timeline for us to gauge market readiness and to devise a pragmatic implementation plan based on market feedback.

[5] For example, NASDAQ enhanced its opening mechanism after the Facebook IPO in 2012, and SGX introduced random ending in 2011. Source: HKEX analysis.

CHAPTER 2: PROPOSED POS MODEL

19 HKEX believes that an enhanced POS will be able to bring benefits to market participants similar to those that have been realised with the successful CAS implementation. Based on observations of CAS trading in the past three years and market feedback, these include improvement in price discovery, market transparency, trading liquidity and efficiency, and reduction in gaming.

20 The proposed enhanced POS design would follow many of CAS' proven auction features, but it would also make adjustment in specific features to address differences in the nature of POS and CAS. Details are as follows:

a) Only equities (including depository receipts, investment companies, preference shares and staple securities) and funds (including ETFs and REITs) would be covered in POS as opposed to all securities today; debt securities, structured products, leveraged and inverse products, equity warrants and rights will be excluded going forward. Internationally, it is observed that similar consistent arrangements are followed for POS and CAS trading;

b) Follow the auction process implemented in CAS, including:

- Auction matching in POS will be randomised to deter possible gaming near the end of the auction process, and encourage earlier order input; as such a Random Matching Period of up to 2 minutes will be added after the existing Pre-order Matching Period (which will be renamed to "No-cancellation Period", aligning with CAS);

- Allow the input of at-auction limit orders throughout POS to improve liquidity and price discovery, and lower price volatility;

- A two-stage price limit to be imposed on all at-auction limit orders:

  − Apply a fixed ±15% price limit with respect to the previous closing price during the Order Input Period; a second stage price limit within the lowest ask and highest bid prices recorded at the end of order input period is applied during No-cancellation Period and Random Matching Period;

  − The fixed ±15% price limit will not be applied under certain predefined scenarios, including IPO stocks, stocks on their ex-dates (e.g. stocks on their ex-entitlement date) and stocks resuming from trading suspension, so as to allow the same free price discovery as today;

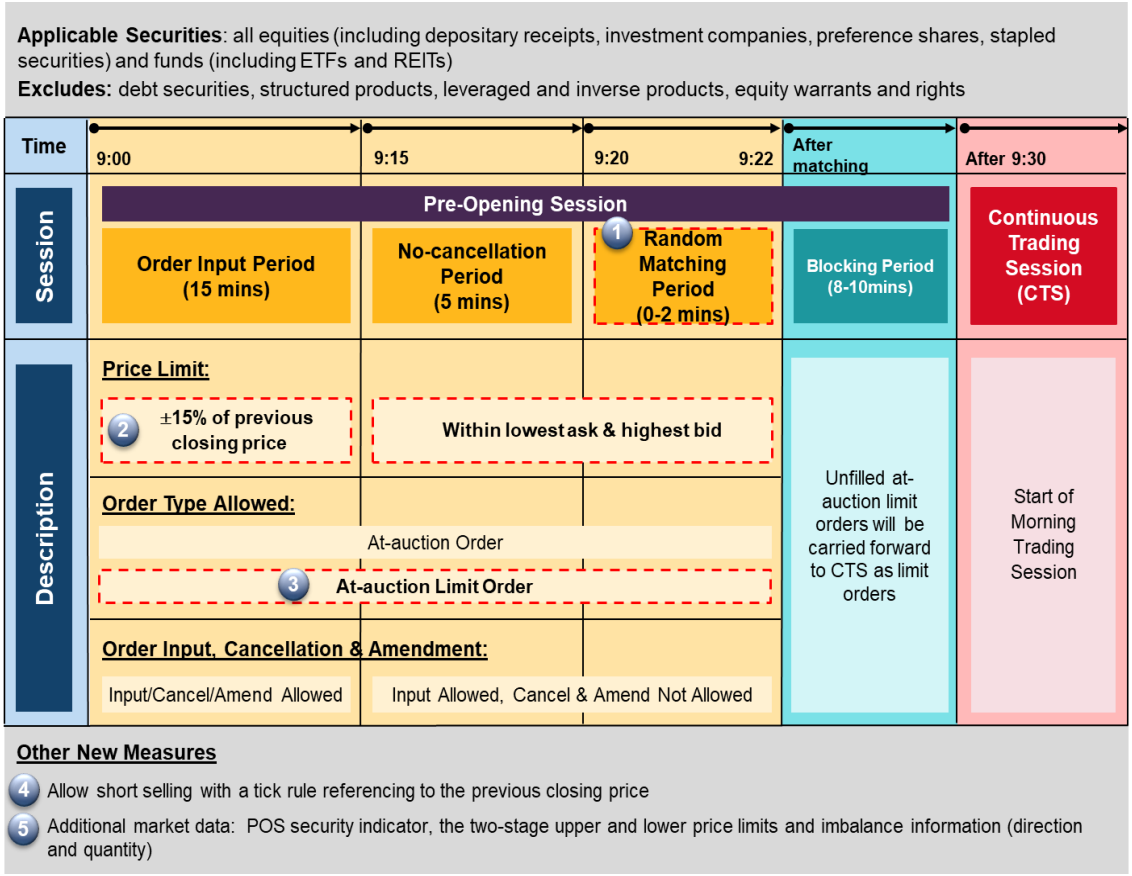
  − Where a stock is not traded in POS due to the ±15% price limit, trading in such stock will continue as usual during the CTS without price limit.

- Allow short selling at a price not lower than the previous closing price on Designated Securities eligible for short selling for better liquidity and price discovery; and

- Improve auction transparency by also disseminating POS security indicator, the two-stage upper and lower price limits, and imbalance information (direction and quantity).

c) The overall duration of POS will continue to be 30 minutes from 9:00am to 9:30am. However, a new period of up to two minutes, Random Matching Period, will be added to replace the current Order Matching Period and to randomise the auction matching time. The existing Pre-order Matching Period will also be renamed as No-cancellation Period for consistency with CAS.

21 The following diagram depicts the key characteristics of the proposed POS model.



22 Further details of each of the four time periods in the enhanced POS, including its start and end time, order handling rules, and functionalities offered are shown in Appendix 3.

CHAPTER 3: DISCUSSION AND CONSULTATION QUESTIONS

23 In this chapter, the rationales for various features in the proposed POS model are discussed and the key questions for consultation are provided for response.

Following the CAS Auction Design

24 In the 2015 CAS consultation, we obtained broad market consensus that some enhanced features of the CAS model would be beneficial for POS and should be applied after CAS is successfully rolled out in Hong Kong. Based on feedback at the time, these features should include allowing at-auction limit orders throughout the auction period, random matching and better market transparency.

25 It is therefore our design principle for the enhanced POS to follow many of the CAS' proven features where applicable, but with adjustment to address differences in the nature and the trading objectives between POS and CAS. Similar and consistent models for POS and CAS would also facilitate market participants' understanding of the trading mechanisms.

26 It is noted that almost all exchanges would adopt identical or largely similar auction mechanisms for their opening and closing auctions.

Consultation Questions

Q1: Do you support using the following **auction features** in POS, similar to CAS:

- Randomised auction matching;
- Allowing at-auction limit orders throughout the session;
- Allowing short selling orders with a price not lower than the previous closing price; and
- Enhanced market transparency.

Please give reasons for your view.

Q2: Do you agree that the enhanced POS model should **be applied to all equities and funds only** similar to CAS, with details as follows:

- Including equities (including depositary receipts, investment companies, preference shares and stapled securities) and funds (ETFs and REITs)
- Excluding debt securities, structured products, leveraged and inverse products, equity warrants and rights.

Please give reasons for your view.

Price Limits Imposed on At-auction Limit Orders during POS

27 Similar to CAS, the proposed POS model would impose a two-stage price limit on at-auction limit orders input during POS. The price limit in POS however is different to that of CAS to allow for difference in trading purpose of the two sessions.

	Applicable session	Time Period	Price limit
Stage 1	Order Input Period	9:00 - 9:15	**±15%** from previous closing price
Stage 2	No-cancellation Period	9:15 - 9:20	Within the lowest ask and highest bid prices recorded at the end of Order Input Period at 9:15
	Random Matching Period	9:20 - 9:22	

28 Based on informal market feedback, a ±15% price limit from the previous closing price would be suitable as it not only prevents excessive price movement, but also takes into account price discovery function required for an orderly and fair open. However, it should be noted that the ±15% price limit in POS will not be applicable under certain pre-defined scenarios[6] so as to allow the same free price discovery as today.

29 Internationally similar forms of controls are commonly adopted[7].

30 Based on past statistics, a minimal number of stocks on a daily basis would move more than ±15% in POS versus their previous closing prices, and they represent a very small portion of market turnover. Based on a review of trading statistics from January 2018 to April 2019, there was on average one equity security each day that moved over 15% during POS versus its previous closing price. The total turnover recorded by these stocks during POS was about 0.003% of full day turnover. Hence the potential impact to trading within the proposed price limits would be minimal. In any case, these stocks may still trade without a price limit during CTS after POS.

31 There are comments on whether different levels of price limits should be applied to POS securities of different liquidity or different price ranges, similar to some other leading exchanges. However, this is not consistent with CAS design today. Furthermore, it would increase the model's complexity and could lead to market confusion. Hence this is not considered in this consultation proposal.

[6] Pre-defined scenarios include IPO stocks, stocks on their ex-dates (e.g. stocks on their ex-entitlement date) and stocks resuming from trading suspension.

[7] Please see more details in international comparison in Appendix 2.

Consultation Questions

Q3: Do you support applying a two-stage price limit during POS similar to CAS? Please give reasons for your view.

Q4: Do you support setting the price limits to be initially ±15% from the previous closing price, and then to within the lowest ask and highest bid prices recorded at the end of order input period? Please give reason for your view.

POS Trading Hours and Periods

32 The overall duration of the enhanced POS will continue to be 30 minutes from 9:00am to 9:30am, and a new period of up to 2 minutes, Random Matching Period, would be added to replace the current Order Matching Period and to randomise the auction matching time. The duration and function of the other time periods would remain largely the same (for details please refer to Section B of Appendix 3).

33 An alternative model for POS will be further shortening the No-cancellation Period to 3 minutes, i.e. the No-cancellation Period would be 9:15am-9:18am (3 minutes) and Random Matching Period would be 9:18am-9:20am (0-2 minutes) so that auction matching will start latest by 9:20am.

Consultation Questions

Q5: Do you support the proposed time periods in the enhanced POS, or would you prefer the alternative model with the No-cancellation period shortened by 2 minutes such that auction matching may occur latest by 9:20am same as today? Please give reasons for your view.

Other Possible Enhancements in POS

34 Currently, in the price determination algorithm for POS auction, if at-auction limit orders are absent on either side of the order book, or if the highest bid price is lower than the lowest ask price, no Indicative Equilibrium Price (IEP) will be formed and no order matching would occur. In order to maximize order matching, the current CAS has been configured such that under this situation, auction matching may still occur at the reference price for the matchable at-auction orders. Following CAS model, we may use the previous closing price to match POS orders under similar circumstances. However, after discussion with market participants, it is proposed that such feature should **not** be adopted for POS for the following reasons:

- Unlike CAS where the reference price is determined right before the start of CAS, significant price-changing events could have taken place overnight rendering the previous closing price no longer representative at the market open; and

- There is little need for investors to complete trades in POS (still have a whole day to trade), as opposed to the strong need from many including passive fund managers to complete trades at day close, especially during index rebalancing events.

Consultation Questions

Q6: Do you support the proposal of **not** matching at-auction order at the previous closing price when an IEP cannot be formed in POS? Please give reasons for your view.

35 HKEX notes that in other leading exchanges, some features such as volatility extensions, imbalance order types, permitting market orders to set auction price, and allowing order cancellations throughout the auction session are adopted. While we note each of these features has its own merits, in order to balance trading efficiency with investor familiarisation and system complexity, these features are decided not to be pursued at this stage. In any case, we would welcome market feedback on other possible enhancements so that we may consider them at an appropriate time in the future.

Consultation Questions

Q7: Do you have any other comments on the POS enhancement proposal?

Impact on Trading Halts (TH)

36 The TH proposals which adopt a mid-session auction upon lifting of a trading halt is a microstructure enhancement planned in the securities market following a public consultation conducted in 2012/13[8]. In view of the proposed POS enhancement, its implications to the detailed design of the proposed mid-session auction for TH, it is suggested to keep the implementation of TH proposals in view for the time being to allow sufficient time for the market to get familiar with the enhanced POS, and for HKEX to observe the trading behaviour under the enhanced POS before deciding the way forward in respect of TH proposals.

[8] The Consultation Paper and Consultation Conclusions on Trading Halts are available at HKEX website. As mentioned in the Consultation Conclusions, the mid-session auction of Trading Halts would follow the auction mechanism applied in the POS.

PART B

VOLATILITY CONTROL MECHANISM (VCM) ENHANCEMENT

CHAPTER 4: BACKGROUND AND REASONS FOR VCM ENHANCEMENTS

37 With the prevalence of electronic/algorithmic trading and the associated risks that it brings (e.g. algorithmic error), HKEX launched VCM in its securities market in August 2016 to safeguard market integrity against disorderliness caused by extreme price volatility.

38 Based on public consultation feedback, the current VCM has adopted a simple and light-touch approach to balance between market protection and trading interruptions. For the securities market, it is applied to the constituent stocks of HSI and HSCEI (total of 82 stocks[9]) which have significant algorithmic trading and are systemically important to our market. During CTS (excluding the first 15 minutes and the last 20 minutes), a five minutes cooling-off period will be triggered if the potential transaction price of an applicable security deviates more than ±10% away from the last traded price five minutes ago and each VCM stock may have a maximum of one trigger per trading session. For the derivatives market, a similar VCM mechanism with triggering price threshold at ±5% is in place for the relevant HSI/HSCEI index futures. Since its launch, VCM has never been triggered, which is partially due to the light-touch approach adopted, as well as the relatively low price volatility of VCM instruments exhibited during the period.

39 Subsequent to the launch of VCM, the IOSCO published a report[10] in August 2018 recommending trading venues to establish and maintain appropriate volatility controls, in order to manage extreme volatility and preserve orderly trading. The report also recommends trading venues to appropriately calibrate and regularly monitor their volatility controls to ensure they are working as designed and to identify circumstances that would require the mechanisms to be re-calibrated.

40 In light of the IOSCO guidance and working in conjunction with the SFC, HKEX has reviewed the existing VCM model by referencing to international practice and regulatory guidance, as well as discussing with many different market participants on possible enhancements. HKEX is now proposing a number of enhancements to be made to VCM, so as to further increase our market integrity and competitiveness.

[9] As of 17 June 2019.

[10] IOSCO final report on "Mechanisms Used By Trading Venues To Manage Extreme Volatility And Preserve Orderly Trading" issued on 1 August 2018.

CHAPTER 5: PROPOSED VCM ENHANCEMENTS AND CONSULTATION QUESTIONS

41 HKEX believes that an enhanced VCM will strengthen our market safeguards against disorderliness caused by extreme price volatility and put us in line with other leading exchanges.

42 Three major enhancements to VCM model are proposed. Details of each enhancement, rationale and the consultation questions for market feedback are provided below.

Expansion of VCM Coverage

43 HKEX proposes to expand VCM stock coverage to all Hang Seng Composite Index (HSCI) constituent stocks (total number of 486 stocks as opposed to 82 stocks today[11]) in order to better contain the systemic risks arising from possible disorderliness in trading caused by advances in trading technology. This is because extreme price volatility may happen to not just the LargeCap stocks but also to other MidCap and SmallCap stocks, and there may be a spillover effect affecting the entire market.

44 Based on our back test statistics (see Appendix 4), the number of triggers for each of the three groups of HSCI stocks would be less than one trigger per month, if the triggering level are set at the proposed levels.

45 While a review of international practice (see Appendix 5) shows that volatility controls in major markets in the US, Europe and Asia usually cover all equities in their respective markets, and that some market participants may view VCM as a protection to them and therefore prefer the mechanism to be applied to as many securities as possible, HKEX is of the view that coverage of the ~1,900 non-HSCI stocks may not be suitable. Compared to developed markets elsewhere, our current market microstructure is much simpler with mainly retail investors trading these non-HSCI stocks. Besides, the liquidity of these non-HSCI stocks is generally thin: an average stock in this segment would only have a daily turnover of HK$3 million and a transaction recorded every three minutes. Hence a VCM on these stocks may impact their trading adversely and reduce investor interest further. Statistically the mechanism could be triggered frequently on these non-HSCI stocks (varying from about 2 to 30 triggers per day for setting triggering thresholds from 20% to 10% from the last traded price five minutes ago, unless a much higher triggering threshold such as 30% is applied then the number of triggers would be reduced to less than one trigger per day).

46 In view of the fact that the current VCM mechanism has never been triggered, and therefore a cooling-off period would still be something new to market, the proposed scope would represent a gradual yet meaningful further step in enhancing VCM. The market capitalisation coverage and equity turnover coverage of VCM stocks would also be further increased to 90% and 96% from 61% and 66% respectively.

[11] As of 17 June 2019.

Consultation Questions

Q8. Do you support the proposed expansion of VCM stocks in the securities market to all HSCI constituent stocks to safeguard market from possible disorderliness in trading caused by advances in trading technology? Please provide reasons for your view.

Q9. If you prefer other expansion options, please indicate below:

(i) Alternative Option 1: Expand to include constituents of Hang Seng LargeCap Index only
(ii) Alternative Option 2: Expand to further include all constituents of Hang Seng LargeCap and MidCap Indexes only
(iii) Alternative Option 3: Expand to all equities but with a higher triggering threshold for the non-HSCI stocks
(iv) Others, please specify

Please give reasons for your view.

Triggering Thresholds

47 A review of international practice on trigger threshold settings shows that wider thresholds are usually considered for smaller and more volatile stocks. If HKEX is to expand VCM stocks coverage as proposed in the previous section, the following triggering levels are proposed after taking into consideration various relevant factors including back test results:

Stock Group	Triggering Level	Price Bands Within Cooling-off Period
Hang Seng Composite LargeCap Index constituents	10%	10%
Hang Seng Composite MidCap Index constituents[12]	15%	15%
Hang Seng Composite SmallCap Index constituents	20%	20%

48 Based on back test results (see Appendix 4), the number of VCM triggers per month for Hang Seng Composite LargeCap, MidCap and SmallCap constituent stocks (at less than 1 trigger for each stock group) would be manageable if the triggering level were set at 10%, 15% and 20%. This would be a significant change to the model today where VCM triggering is expected to be minimal, but going forward there will be VCM triggering from time to time in the securities market. The proposed threshold settings aim to strike a good balance between the level of market protection offered, and the level of trading interruptions that is introduced to the market.

49 Alternatively, if a single threshold of 10% is applied for simplifying investor communications, the number of VCM triggers per month for Hang Seng Composite MidCap and SmallCap stocks would be increased to three times a month and once almost every two days respectively, and most of the triggers would be driven by fundamental events.

[12] It should be noted that for current VCM securities which are constituent stock of both HSCEI and Hang Seng Composite MidCap Index at the same time, the triggering level will change from the current 10% to 15% according to the proposed categorisation.

50 With the proposed trigger thresholds of ±10%, ±15%, ±20% for Hang Seng Composite LargeCap, MidCap and SmallCap stocks, the price bands during the Cooling-off Period will follow the same ±10%, ±15%, ±20% price limits of the reference price, which is the last traded price 5 minutes ago, for the respective stock groups accordingly.

Consultation Questions

Q10: Do you support the proposed trigger thresholds of 10%, 15%, 20% for Hang Seng Composite LargeCap, MidCap and SmallCap stocks respectively? Please provide reasons for your view.

Maximum Number of Triggers Per Session

51 While the current VCM design limits the number of triggers per trading session to one in order to minimise interruption, internationally it is observed that other exchanges do not limit the number of triggers allowed for their volatility controls. Besides, it would be beneficial for investors to be reminded again even if he or she would have just been alerted with a VCM trigger earlier in the same trading session.

52 In the proposed model (see paragraph 55), VCM monitoring will resume after the expiry of a cooling-off period, and the first trade in the cooling-off period will become the reference price for resuming VCM monitoring. In the case there is no trading during the cooling-off period, VCM monitoring will only be resumed after a trade is transacted.

53 Based on the back test results (Appendix 4), allowing multiple triggers would not increase the number of triggers significantly for the proposed stock coverage and thresholds.

Consultation Questions

Q11: Do you support the proposal to allow multiple triggers in the same trading session? Please give reasons for your view.

Other VCM Features

54 This chapter has covered three proposed VCM enhancements thus far. All of them, while being relatively straight forward in a technical sense, would be a significant leap forward for the current VCM regime. Firstly, VCM triggering would occur from time to time and market participants would need to get themselves familiarised with the subsequent order and trade handling. Additionally, the stock coverage would be significantly increased by some 50% by market turnover and market capitalisation. In view of the relatively simple market microstructure in Hong Kong and a large retail client base, such as investors trading through Stock Connect, other enhancement features which may complicate the design and trading behaviour (e.g. VCM to cover period near the close of CTS) have not been proposed. Nonetheless, HKEX would also like to hear feedback from market participants as to whether there are other enhancements worth considering, if not now, for review in the medium to longer term.

55 The table below summarises the current VCM model and the proposed enhancements to VCM in the securities market:

	Current Model and <u>Proposed Enhancements (changes underlined and/or struck through)</u>
Type of VCM	• Dynamic price limit model applied at the individual stock level to capture rapid price changes
Product coverage in the securities market	• ~~**HSI & HSCEI constituent stocks**~~ **<u>Constituent stocks of All Hang Seng Composite LargeCap, MidCap and SmallCap Indexes</u>**
Applicable trading session	• Only applied in CTS but not auction sessions • Excludes the first 15 minutes of morning and afternoon CTS to allow free price discovery at beginning of CTS • Excludes the last 15 minutes of the last CTS of the day to allow free price discovery at market close
Reference price and trigger level	• Reference price: last traded price 5 minutes ago • ~~**Triggering level: ±10%**~~ **<u>Triggering level: ±10%, ±15%, ±20% for Hang Seng Composite LargeCap index constituent stocks, Hang Seng Composite MidCap and SmallCap index constituent stocks respectively</u>**
No. of triggers	• ~~**Max 1 trigger per CTS**~~ **<u>No maximum number of triggers per CTS</u>** **<u>VCM monitoring in CTS will resume after the expiry of cooling-off period, and the first trade[13] in the cooling-off period will become the reference price for resuming VCM monitoring.</u>** **<u>In the exceptional case that there is no orders matched during the cooling-off period, the reference price will not be formed and there will be no dynamic price band to limit trade prices of the stock. Once the stock starts to have order matched, the reference price will be the first trade[14] after the cooling-off period and VCM monitoring will resume.</u>** **<u>See Appendix 6 for examples explaining how multiple triggers within the same trading session would work.</u>**
Cooling-off and resumption procedures	• Trading within band during 5 min cooling-off period • ~~**Resume with no VCM monitoring within the same CTS**~~
Market data dissemination	• Dissemination of additional market data when VCM triggered

[13] Same as the current arrangement, non-automatch trade will not be counted.
[14] Same as the current arrangement, non-automatch trade will not be counted.

	Current Model and Proposed Enhancements (changes underlined and/or struck through)
Inter-market/ product connectivity	• Trading of related instruments unaffected when VCM triggered for their underlying

56 For the derivatives market's VCM, the enhancement of allowing multiple triggers in the same trading session may also be considered, but it will be handled separately with their market participants and investors, and therefore it will not be discussed further in this paper.

Consultation Questions

Q12: Do you have other suggested enhancements or any other comments for VCM in the securities market?

Q13: If your answer to Q12 is "Yes", would you support implementing the three enhancement features proposed first, as they can be implemented relatively quickly, before we move on to review or implement some other more complex features?

Additional Market-level Volatility Controls

57 In addition to the VCM enhancements mentioned above, which will strengthen our stock-level volatility control and help moderate declines in single stocks to some degree, considerations have been given if any market-level volatility control in the form of a market-wide circuit breaker would also be needed to further safeguard our market from much broader and more severe market-wide shocks. Market-wide circuit breaker is a type of market-level volatility control adopted by some overseas exchanges which generally halts market trading for either a short period of time or the whole trading day during severe market declines, with an aim to provide a temporary cooling-off window for market participants to re-establish orderly trading at times of market stress. Imposition of market-wide circuit breakers also provides more certainty and higher transparency for investors over possible market suspension.

58 Internationally, market-wide circuit breakers have not been implemented in European markets which rely on comprehensive stock-level volatility controls to safeguard market trading. For other major and developed markets, only the US and Canadian markets have implemented a market-wide circuit breaker[15]. However, it is worthwhile to note that the last trigger of the US market-wide circuit breaker was more than 20 years ago in 1997, when it was still based on the number of index points dropped. The post event review conducted by the US Securities and Exchange Commission (SEC) shows that the first trigger (350-point or 4.54% drop in the then Dow Jones Industrial Average), second trigger (550-point or 7.18% drop) and the resulting market halts were not necessary. In addition, the presence of the second triggering level might have, on the contrary, accelerated the price declines[16]. The market-wide circuit breaker has since been modified but has never been triggered subsequently. Therefore, its effectiveness or impact in the new electronic trading era has not been tested or proven. In other

[15] The circuit breaker in the US market, for example, has been implemented in 1988 after 1987's market crash. After several rounds of modifications, it currently specifies three trigger levels based on the S&P 500 index. Declines of 7% and 13% during a trading day will result in a 15-minute trading suspension at the market level, whereas a 20% fall will suspend market trading for the rest of the day.

[16] Source: SEC's Trading Analysis of October 27 and 28, 1997.

markets where the market-wide circuit breaker is available, the detailed designs of their market-wide circuit breakers are different. Recent implementation shows that depending on the specific mechanism of a market-wide circuit breaker, the existence of circuit breaker triggers may lead to unintended consequences. For example, the market-wide circuit breaker may add to market exit panic and exacerbate declines when the mechanism is triggered or close to being triggered.

59 While a rule-based and automatically triggered mechanism would provide transparency on the certainty of a trading suspension at the market level when extreme volatility occurs, given the market expectation set in advance meaning that there will be less flexibility to make alternative decisions that may be more suitable under some circumstances. For investors, they may also be denied access to trading liquidity when they need it the most and there would be ripple effects to other activities such as margin calls.

60 As the impact of introducing a market-wide circuit breaker could be high and wide-ranging, we believe that the pros and cons of such mechanism should be carefully evaluated before a decision is made and hence would welcome market debate and feedback.

Consultation Questions

Q14: On top of the proposed VCM enhancements, should we also consider a market-level volatility control (such as market-wide circuit breakers) for the Hong Kong market? Please give reasons for your view.

Q15: If your answer to Q14 is “Yes”, what kind of model would be suitable and when should we consider it? Please give reasons for your view.

PART C

NEXT STEPS

CHAPTER 6: IMPLEMENTATION APPROACH AND TIMELINE

61 The consultation period for this Consultation Paper will be 6 weeks and will close on 27 September 2019. HKEX will then summarise the comments received and if applicable, set out the final models for the enhanced POS and VCM.

62 Subject to market feedback, the proposals for the enhanced POS and VCM would be implemented on the current trading platform, i.e. OTP-C in the securities market, as soon as practicable. Following the roll-out of the enhanced POS, HKEX will observe the trading behavior before deciding the way forward in respect of TH proposals.

63 It is noted that the technical changes for the proposed POS and VCM would be independent and may have limited synergy if their implementation is bundled together. For example, minimal technical changes would be required for the proposed VCM enhancements. On the other hand, both trading and market data systems would need to be enhanced for the POS enhancements even though the market would already have gained experience in similar implementation on CAS.

64 In view of the above, and in order to minimise market impact and allow faster time to market, it is proposed that the rollout of the enhanced POS and VCM be conducted in phases. For example, the proposed VCM enhancements can be rolled out earlier before the technical changes for POS enhancements are developed and tested by HKEX and market participants.

65 The implementation details and timeline of the initiatives would be announced when the Consultation Conclusions Paper is issued.

Consultation Questions

Q16: How much lead time would you need for the proposed POS enhancements?

(i) Under 3 months;
(ii) 4-6 months;
(iii) 7-12 months;
(iv) Others, please specify

Please give reasons for your view.

Q17: How much lead time would you need for the proposed VCM enhancements?

(i) Under 3 months;
(ii) 4-6 months;
(iii) Others, please specify

Please give reasons for your view.

APPENDICES

APPENDIX 1: DIFFERENCES AMONGST THE PROPOSED POS, CURRENT POS AND CAS MODEL

<table>
<tr><th></th><th>Existing POS</th><th>Proposed POS</th><th>Existing CAS</th></tr>
<tr><td>Securities Coverage</td><td>All securities</td><td colspan="2">Equity Securities & Funds</td></tr>
<tr><td>Period</td><td>Total: 30 mins
<table><tr><th>Period</th><th>Time</th></tr><tr><td>Order Input</td><td>9:00 – 9:15 (15 mins)</td></tr><tr><td>Pre-order Matching</td><td>9:15 – 9:20 (5 mins)</td></tr><tr><td>Order Matching[17]</td><td>9:20 – 9:28 (8 mins)</td></tr><tr><td>Blocking</td><td>9:28 – 9:30 (2 mins)</td></tr></table></td><td>Total: 30 mins
<table><tr><th>Period</th><th>Time</th></tr><tr><td>Order Input</td><td>9:00 – 9:15 (15 mins)</td></tr><tr><td>No-cancellation</td><td>9:15 – 9:20 (5 mins)</td></tr><tr><td>Random Matching[18]</td><td>9:20 – 9:22 (0-2 mins)</td></tr><tr><td>Blocking</td><td>After matching – 9:30 (8-10 mins)</td></tr></table></td><td>Total: 8-10 mins
<table><tr><th>Period</th><th>Time</th></tr><tr><td>Reference Price Fixing</td><td>16:00 – 16:01 (1 min)</td></tr><tr><td>Order Input</td><td>16:01 – 16:06 (5 mins)</td></tr><tr><td>No-cancellation</td><td>16:06 – 16:08 (2 mins)</td></tr><tr><td>Random Closing</td><td>16:08 – 16:10 (0-2 mins)</td></tr></table></td></tr>
<tr><td>Input of Order Types Allowed
AO: At-auction; ALO: At-auction Limit Order</td><td><table><tr><th>Period</th><th>AO</th><th>ALO</th></tr><tr><td>Order Input</td><td>✓</td><td>✓</td></tr><tr><td>Pre-order Matching</td><td>✓</td><td>-</td></tr><tr><td>Order Matching</td><td>-</td><td>-</td></tr><tr><td>Blocking</td><td>-</td><td>-</td></tr></table></td><td><table><tr><th>Period</th><th>AO</th><th>ALO</th></tr><tr><td>Order Input</td><td>✓</td><td>✓</td></tr><tr><td>No-cancellation</td><td>✓</td><td>✓</td></tr><tr><td>Random Order Matching</td><td>✓</td><td>✓</td></tr><tr><td>Blocking</td><td>-</td><td>-</td></tr></table></td><td><table><tr><th>Period</th><th>AO</th><th>ALO</th></tr><tr><td>Reference Price Fixing</td><td>-</td><td>-</td></tr><tr><td>Order Input</td><td>✓</td><td>✓</td></tr><tr><td>No-cancellation</td><td>✓</td><td>✓</td></tr><tr><td>Random Closing</td><td>✓</td><td>✓</td></tr></table></td></tr>
</table>

[17] No new order input is allowed.
[18] Order input is allowed until matching starts randomly within 2 minutes.

	Existing POS	Proposed POS	Existing CAS
Price Limit	No fixed price range (except 9-times rule)	A two-stage price limit to at-auction limit orders: – 1st stage: • ±15% (for POS) • ±5% (for CAS) of reference price during the Order Input Period – 2nd stage: starting from the period when order amendment and cancellation are no longer allowed, within the lowest ask and highest bid recorded at the end of order input period	
Short Selling	Not allowed	Allowed with tick rule (i.e. price cannot be lower than the reference price of the corresponding sessions)	
Market Data dissemination	• Indicative Equilibrium Price (IEP) • Indicative Equilibrium Volume (IEV)	• IEP • IEV • POS Stock Indicator/CAS Stock Indicator • Order imbalance information (direction and quantity) • Reference Price • Stage 1 and Stage 2 price limits	
Reference Price	N/A	Previous closing price	The median of the 5 snapshot nominal prices taken from 15:59:00 at 15-second intervals
Handling of when final IEP cannot be established	No auction matching		Auction matching may still occur at the reference price for the matchable auction orders

APPENDIX 2: OVERSEAS MARKET PRACTICES FOR POS

1. The information presented is compiled on a best-effort basis and is for background and reference purposes only. While every effort has been made to ensure that the information is accurate, some of the information may be outdated or incomplete because of changes in market practices over time. Readers are advised to consult the relevant exchanges for more details or further updates if necessary.

2. Internationally, it is common that similar models are adopted for opening and closing auctions in a market, as well as consistency on the approach for price limits. The below examples are simplified model comparison across different exchanges.

Exchange	Price Limit/Extension thresholds in Opening and Closing	Similarities and Differences
NASDAQ[19]	• 10% of NASDAQ Best Bid and Offer Midpoint (with a minimum of $0.50) • Pass in one of the Opening Cross Price Tests[20]	• Similar mechanism with both the Opening and Closing period subject to a defined crossing time • Imbalance order may be submitted but not updated or cancelled 2 minutes before crossing in both periods
LSE[21]	• Price collar during both auction periods: 90% • Opening Price Monitoring Extension threshold (initial): 2%-5%[22] • Closing Price Monitoring Extension threshold: 2%-15%	• Similar mechanism with both the Opening and Closing auction call subject to random ending and any market order extension or price monitoring extension • Different maximum number of price monitoring extension in Opening (1-5, subject to sectors) and Closing auction (only 1)
DB[23]	• Auction extension applies to both periods (thresholds not published)	• Similar mechanism with both the Opening and Closing auction subject to random ending and call extension • Securities randomly open in different groups, but not for Closing

[19] Source: NASDAQ's website (Opening/Close Quick Reference Guide, FAQ).
[20] Details of the three price tests can be found in Equity Trader Alert #2016 - 16.
[21] References were made based on SETS, the electronic book covering constituents of major indexes, ETFs etc. Source: London Stock Exchange's website (Guide to the Trading System , Millennium Exchange and TRADEcho Business Parameters).
[22] Only the initial price monitoring threshold is shown. Readers should also be aware that the thresholds are different for the subsequent price monitoring extension. The monitoring thresholds vary across sectors.
[23] Source: DB's website (T7 Release 7.1 - Market Model for the Trading Venue Xetra, Trading Parameters Xetra).

Exchange	Price Limit/Extension thresholds in Opening and Closing	Similarities and Differences
JPX[24]	• Opening and Closing: Daily Price Limit from previous close by price tier	• Both Opening and Closing adopted *Itayose* methods • "Special Quote" (see Appendix 5) to avoid sudden price fluctuation • Special mechanism for Closing when orders cannot be executed under normal *Itayose* methods
ASX[25]	• Opening: No • Closing: No	• Pre-Open and Pre-Closing states largely aligned, with both Opening and Closing subject to randomized matching time • Securities randomly open in five groups according to starting letter of their ASX code but not for Closing
SGX[26]	• Opening: No (Now); 30% (Proposed) • Closing: No (Now); 10% (Proposed)	• Largely the same for its current Opening and Closing routines with randomised matching time in both periods[27]
HKEX	• Opening: No (Now); 15% (Proposed) • Closing: 5%	• See Appendix 1

[24] Source: JPX's website (Guide to TSE Trading Methodology)
[25] Source: ASX's website (ASX Operating Rules)
[26] SGX has started a market consultation on the proposed enhancements to its auctions sessions. There are three proposed options: 1. Imposing a price collar, 2. A time extension, 3. A hybrid model; Source: SGX website.
[27] References were made based on SGX-ST Rules Practice Note 8.2.1.

APPENDIX 3: DETAILED FEATURES OF THE PROPOSED POS MECHANISM

The follow section outlines the details of the proposed POS mechanism:

A. Types of Products Included in POS and New POS Stock Indicator

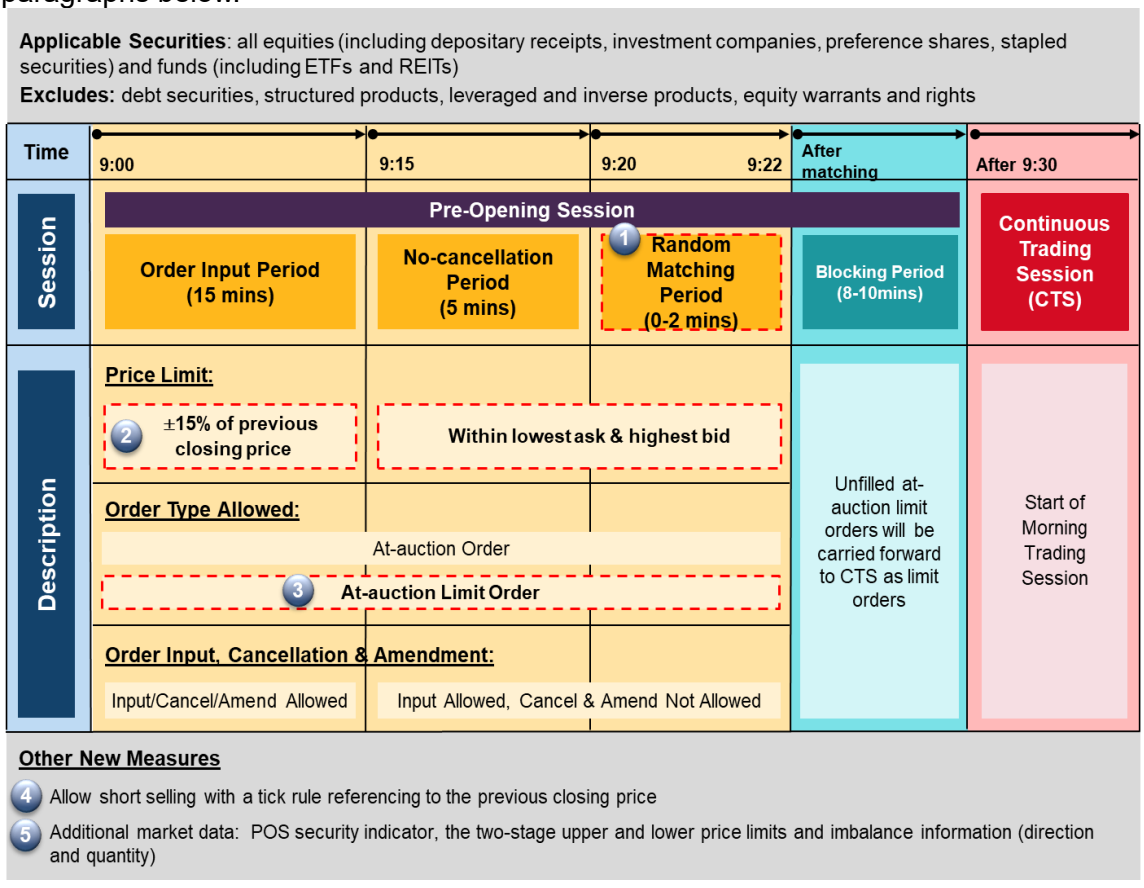
1. Instead of including all securities, only equities (including depository receipts, investment companies, preference shares and staple securities) and funds (including ETFs and REITs) will be **INCLUDED** in the proposed POS (POS Securities).

2. The following product types will be **EXCLUDED** from POS (Non-POS Securities). Order input for Non-POS Securities during POS will be rejected. Trading of Non-POS Securities will only commence in CTS.
    - Debt Securities
    - Structured Products
    - Leverage and Inverse Products
    - Equity Warrants
    - Rights

3. A POS stock indicator for each security will be disseminated.

B. POS Trading Hours and Periods

4. The proposed POS auction model and periods are shown in the figure and explained in paragraphs below.



5. The overall duration of POS will continue to be a total of 30 minutes from 9:00am to 9:30am. Differences in the time periods between the existing POS and proposed POS model are outlined in the table below:

Existing		**Proposed**	
Order Input	9:00 – 9:15 (15 mins)	Order Input	9:00 – 9:15 (15 mins)
Pre-order Matching	9:15 – 9:20 (5 mins)	No-cancellation	9:15 – 9:20 (5 mins)
Order Matching *(no new order* input)	9:20 – 9:28 (8 mins)	Random Matching *(allow new order input until order matching starts randomly within 2 mins)*	9:20 – 9:22 (0-2 mins)
Blocking	9:28 – 9:30 (2 mins)	Blocking	After matching starts – 9:30 (8-10 mins)

The order handling and the functionalities of the proposed POS are outlined below:

Before Start of POS

6. Before POS is started, the previous closing price of each POS Security will be used to set the upper and lower price limits ±15% of each POS Security. The price limits will then be disseminated to the market. Under certain scenarios such as IPO stocks, the ±15% price limits will not be applicable.

Order Input Period

7. In the Order Input Period, at-auction orders and at-auction limit orders within the ±15% price limits can be entered, amended or cancelled for POS Securities.

No-cancellation Period

8. Starting from the No-cancellation Period, at-auction orders and at-auction limit orders can be entered but cannot be amended or cancelled. The prices of new at-auction limit orders must be between the lowest ask and highest bid recorded at the end of Order Input Period.

Random Matching Period

9. In the Random Matching Period, the order rules from the No-cancellation Period will continue to apply until the start of order matching (which is also the end of Random Matching Period) that will begin randomly anytime between 9:20am and 9:22am. When order matching is started, order entry will be rejected. All matchable orders will be matched at the final IEP according to the existing IEP price determination algorithm. Order matching will continue to be based on order type (at-auction first, at-auction limit later), price and then time priority.

10. When final IEP cannot be established in POS, no order matching will be conducted[28], unlike the current CAS which allows auction matching at the reference price[29].

Blocking Period

11. The Blocking Period will commence immediately after the end of Random Matching Period and will end at 9:30am. No order input, amendment and cancellation will be allowed.

12. A comparison of order handling rules during different time periods under current POS and the proposed POS is shown below:

Existing POS	**Order Input Period**	**Pre-order Matching Period**	**Order Matching Period**	**Blocking Period**
At-auction order	✓	✓	-	-
At-auction limit order	✓	-	-	-
Proposed POS	**Order Input Period**	**No-cancellation Period**	**Random Matching Period**	**Blocking Period**
At-auction order	✓	✓	✓	-
At-auction limit order	✓	✓	✓	-

C. Price Limits for POS

13. Similar to CAS, the proposed POS model would impose a two-stage price limit to control the price of at-auction limit orders that are inputted during POS.

	Applicable session	**Time Period**	**Price limit**
Stage 1	Order Input Period	9:00 - 9:15	±15% from previous closing price
Stage 2	No-cancellation Period	9:15 - 9:20	Within the lowest ask and highest bid prices recorded at the end of Order Input Period at 9:15
	Random Matching Period	9:20 - 9:22	

14. The following are further details on the price validation rules applicable in POS:

[28] Similar to the current POS model when IEP is not available due to the absence of at-auction limit orders on one or both sides of the order book, or non-overlapping of the prices of the lowest ask and highest bid, no auction matching for the orders (including the at-auction orders) would take place.

[29] Applicable for those at-auction orders and at-auction limit orders with prices at or better than the Reference Price, where the Reference Price is determined by taking the median of the 5 snapshot prices of the last minute of CTS.

- The Stage 1 price limits will not be applicable to some pre-defined scenarios, including:
  - IPO stocks that just commenced trading;
  - Stocks on their ex-entitlement day (e.g. cash dividend, bonus issues, right issues, etc.); and
  - Stocks resuming trading after suspension.
- If at the end of the Order Input Period, the lowest ask and/or highest bid prices of a POS Security are not available (e.g. only buy orders or only sell orders exist, or both do not exist), the Stage 2 price limits will remain unchanged as Stage 1.
- Only 9-times rule but not the 24-spread rule will apply.
- The existing price warnings will still apply, which will allow the display of the optional warning message requiring broker reconfirmation when the price of a new order is more than 20 spreads away from the nominal price.

At-auction Order

15. An at-auction order is an order with no specified price for execution at the auction price determined at the end of the auction session. It enjoys a higher order matching priority than an at-auction limit order, and will be matched in time priority at final IEP in POS.

At-auction Limit Order

16. An at-auction limit order is an order with a specified price, which can be matched at a price at or better than the specified price (in case of buying, the specified price is equal to or higher than the final IEP, or in case of selling, the specified price is equal to or lower than the final IEP). An at-auction limit order has a lower matching priority than at-auction orders, and follows price and time priority. No at-auction limit order may be matched at a price worse than its specified price.

D. Short Sale Order

17. Short selling at-auction limit ask orders of a POS Security, which is also a Designated Security eligible for short selling, may be inputted during POS. However, on top of the other price rules in POS, the price of the short sale order must not be lower than the reference price (i.e. previous closing price) in POS. In addition, these orders must be tagged as “short sales” upon order input. The order priority and other features of these short selling orders would be identical to all other at-auction limit ask orders. At-auction order cannot be used for short selling during POS.

18. Short selling of a POS Security that does not have a POS reference price (e.g. stocks without a previous closing price) is not allowed.

E. Additional Market Data Dissemination

19. The enhanced POS will offer better auction transparency by providing market participants with additional market information in addition to the IEP, the IEV currently available. Additional market information includes POS stock indicator, order imbalance information (direction and quantity), Reference Price, the Stage 1 and Stage 2 price limits (upper and lower price limits).

F. The Indicative Equilibrium Price (IEP) and the Indicative Equilibrium Volume (IEV)

20. No change to the determination and dissemination of IEP and IEV is proposed.

APPENDIX 4: VCM BACK TEST DATA

1. In view of enhancing the current VCM model, a back test based on the historical data from January 2011 to December 2018 was conducted to simulate the number of VCM triggers under the following four scenarios for single trigger and multiple triggers per trading session respectively:

Back Test Period	January 2011 – December 2018 (total of 8 years)
Applicable Securities	Group 1: Hang Seng Composite LargeCap Index constituent stocks Group 2: Hang Seng Composite MidCap Index constituent stocks Group 3: Hang Seng Composite SmallCap Index constituent stocks Group 4: Non Hang Seng Composite Index constituent stocks
Reference Price	<u>For single and multiple triggers</u> - last traded price 5 minutes ago <u>For multiple triggers (immediate after cooling off period)</u> - 1st traded price within cooling off period - No reference price if no trading during cooling off period; the price of the first trade afterwards would be the reference price
Triggering Thresholds (applicable to all stock groups)	Scenario 1: > ±10% of reference price Scenario 2: > ±15% of reference price Scenario 3: > ±20% of reference price Scenario 4: > ±30% of reference price
Monitoring Period	9:45 – 12:00 and 13:15 – 15:40
Max. No. of Triggers	For Single Trigger : limit to one per trading session (AM and PM) For Multiple Triggers: no limit

2. In order to simulate VCM monitoring, the following methodology has been adopted:

   Data source: Historical trade data of the Morning and Afternoon CTS (excluding the first 15 minutes of the Morning and Afternoon session and the last 20 minutes of the Afternoon Session) were used in the back test.

   Algorithm: A VCM trigger would be counted if the historical trade price of a stock deviates more than the predefined triggering threshold (i.e., ±10%, ±15%, ±20% or ±30%) from its last traded price 5 minutes ago.

   - For the model of one trigger per trading session, if a VCM has been triggered already, there would be no subsequent VCM monitoring in the same trading session.

   - For the model allowing multiple triggers, VCM triggers would be counted if the trade price of a stock was deviated more than ±10%,±15%, ±20% or ±30% from its last traded price 5 minutes ago. In order to simulate the cooling-off period, after a VCM is

triggered, no VCM monitoring would be applied to the trades recorded in the subsequent 5 minutes (i.e. Cooling-off period). VCM monitoring would be resumed after the end of cooling-off period by comparing the trade price of each trade with the last traded price 5 minutes ago. Readers are advised that this is slightly different to the proposed VCM model, as the first trade in the cooling-off period will be used as the new reference price. Besides, it is likely that trading behaviour will be impacted after a VCM trigger and such scenario cannot be mimicked in a back test.

3. **Only one trigger per session is allowed:**

Number of VCM triggers per month across different stock groups and thresholds				
Thresholds / Stock Group	10%	15%	20%	30%
1. Hang Seng Composite LargeCap Index constituents	~ 0			
2. Hang Seng Composite MidCap Index constituents	~ 3	~ 0	~ 0	~ 0
3. Hang Seng Composite SmallCap Index constituents	~ 9	~ 1	~ 0	~ 0
4. Non Hang Seng Composite Index stocks	~ 541	~ 86	~ 30	~ 7

4. **Multiple triggers per session are allowed:**

Number of VCM triggers per month across different stock groups and thresholds				
Thresholds / Stock Group	10%	15%	20%	30%
1. Hang Seng Composite LargeCap Index constituents	~ 0			
2. Hang Seng Composite MidCap Index constituents	~ 4	~ 1	~0	~ 0
3. Hang Seng Composite SmallCap Index constituents	~ 12	~ 1	~0	~ 0
4. Non Hang Seng Composite Index stocks	~ 757	~ 108	~ 37	~ 9

APPENDIX 5: OVERSEAS MARKET PRACTICES FOR VCM

1. **Securities Coverage**: As shown in the table below, while Hong Kong only includes HSI and HSCEI index constituent stocks in its current model, most exchanges researched cover all equities in their VCM, and a few also exclude some illiquid or penny stocks.

Exchange	Equities
NYSE/NASDAQ	✓ All equities
LSE	✓ All index stocks + some other more liquid stocks ✖ Exclude some illiquid stocks (e.g. certain SETSqx stocks and AIM stocks)
DB	✓ All equities on Xetra
JPX	✓ All domestic equities
ASX	✓ All equities
SGX	✓ Most domestic equities ✖ Exclude equities with price < S$0.5
HKEX	✓ 80+ HSI and HSCEI stocks only ✖ Does not cover remaining 2,100+ equities and 160+ ETFs

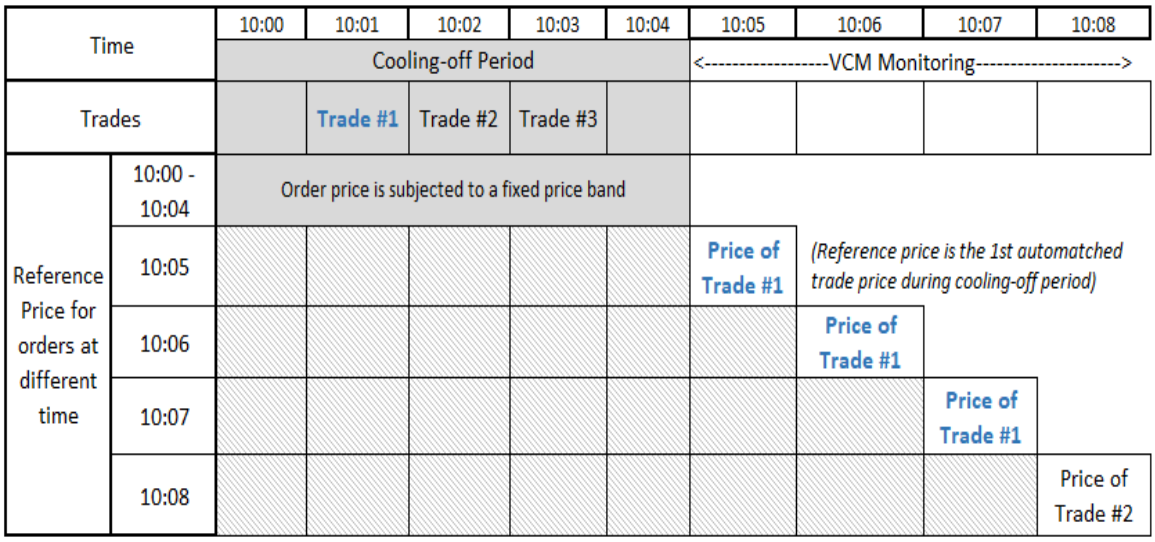
2. **Trigger Threshold and Maximum Number of Triggers:** The table below shows the triggering thresholds for different exchanges and as well as the arrangement for maximum number of triggers. It can be seen most exchanges adopt a tiered structure based on liquidity/prices, and there is no maximum number of triggers imposed for each trading session.

Exchange	**Reference price (Dynamic/Static)**	**Triggering level**		**Past triggering frequency**
NYSE/ NASDAQ	D: Average traded price in last 5 mins	Tiered structure by type and price: Index stocks/ index :5%; Others: >=$3:10 %; <$3: 20%-75%+	Price band doubles during first 15 and last 15 mins	Multiple times per day
LSE (DB: similar but thresholds not disclosed)	D: Last trade *(to prevent error trade)* S: Last auction trade *(to prevent large price movement)*	Tiered structure by liquidity: • Key index (FTSE) stocks: last trade – 3%-25%; last auction trade: 8% - 25% • Other equities– wider thresholds or do not apply		Multiple times per month
JPX	D: Last trade S: Daily price limit from previous day's closing price	• "Special quote" to slow down discontinuous trades (~1.4%-2.5% from the last trade) • Daily Price Limit from previous close by price tier		NA
ASX	D: Weighted average price in last 2 mins; S: Last auction price	2-min auction triggered when the dynamic price range (±10% around the dynamic reference) reaches the Extreme Trade Range (>20% to >50% from last auction price based on stock price)		Multiple times per month
SGX	D: Price traded 5 mins ago	10% for stocks >$0.5 (do not apply otherwise)		Multiple times per month
HKEX	D: Price traded 5 mins ago	10% for HSI/HSCEI stocks		No trigger in the past 2 years

APPENDIX 6: EXAMPLES OF VCM MULTIPLE TRIGGERS PER SESSION

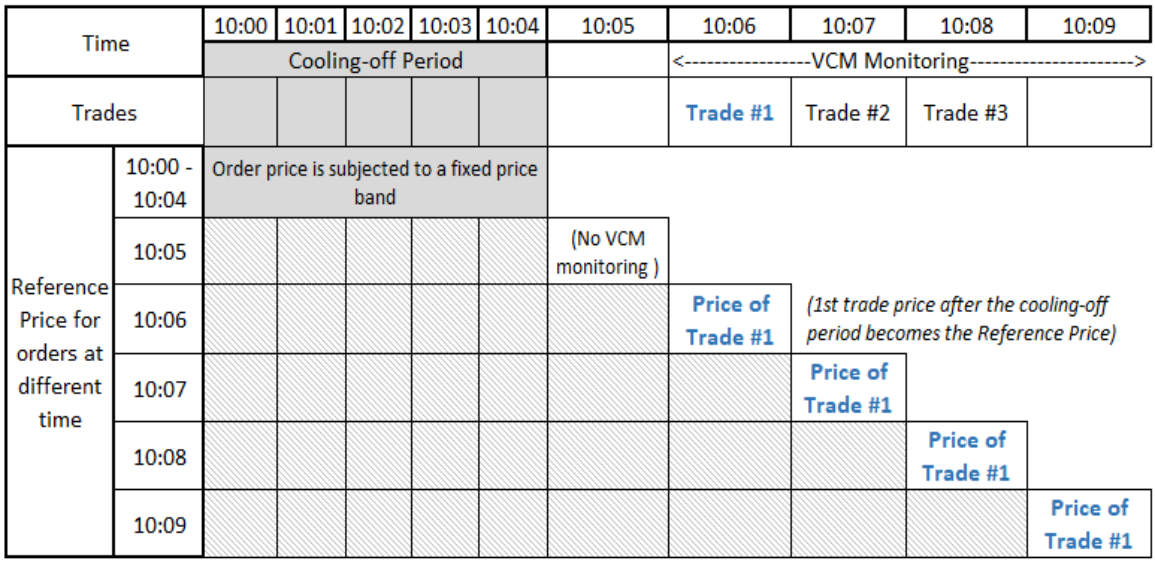
1 The below examples illustrate different scenarios after a cooling-off period is triggered.

a) When there is trading during the cooling-off period, the price of the first automatched trade in the cooling-off period will become the reference price for resuming VCM monitoring.



- In the above example, the cooling-off period is triggered from10:00am to 10:04am.
- During the cooling-off period, orders submitted are subject to a fixed price band validation. The first automatched trade during cooling-off period (Trade #1) happens at 10:01am.
- VCM monitoring resumes at 10:05am after the expiry of the cooling-off period. The reference price is reset using the price of Trade #1. Subsequently, the reference price will be taking the last trade price 5 minutes ago as normal VCM monitoring.

b) When there is no trading during the cooling-off period, the reference price cannot be formed and there will be no dynamic price band to limit the trade prices of the stock. Once an automatched trade is executed subsequently, the price of this first automatched trade will become the reference price and VCM monitoring will resume.



- In the above example, the cooling-off period is triggered from 10:00am to 10:04am. During the cooling-off period, no trades are executed.
- At the expiry of the cooling-off period, as no reference price is formed, there is no VCM monitoring at 10:05am.
- The first automatch trade (Trade #1) after cooling-off period happens at 10:06am. Its price becomes VCM reference price and VCM price monitoring resumes. Subsequently, the reference price will be taking the last trade price 5 minutes ago as normal VCM monitoring.

APPENDIX 7: PRIVACY POLICY STATEMENT

Hong Kong Exchanges and Clearing Limited, and from time to time, its subsidiaries (together the "**Group**") (and each being "**HKEX**", "**we**", "**us**" or "**member of the Group**" for the purposes of this Privacy Policy Statement as appropriate) recognise their responsibilities in relation to the collection, holding, processing, use and/or transfer of personal data under the Personal Data (Privacy) Ordinance (Cap. 486) ("**PDPO**"). Personal data will be collected only for lawful and relevant purposes and all practicable steps will be taken to ensure that personal data held by us is accurate. We will use your personal data which we may from time to time collect in accordance with this Privacy Policy Statement.

We regularly review this Privacy Policy Statement and may from time to time revise it or add specific instructions, policies and terms. Where any changes to this Privacy Policy Statement are material, we will notify you using the contact details you have provided us with and, where required by the PDPO, give you the opportunity to opt out of these changes by means notified to you at that time. Otherwise, in relation to personal data supplied to us through the HKEX website or otherwise, continued use by you of the HKEX website or your continued relationship with us shall be deemed to be your acceptance of and consent to this Privacy Policy Statement, as amended from time to time.

If you have any questions about this Privacy Policy Statement or how we use your personal data, please contact us through one of the communication channels set out in the "Contact Us" section below.

We will take all practicable steps to ensure the security of the personal data and to avoid unauthorised or accidental access, erasure or other use. This includes physical, technical and procedural security methods, where appropriate, to ensure that the personal data may only be accessed by authorised personnel.

Please note that if you do not provide us with your personal data (or relevant personal data relating to persons appointed by you to act on your behalf) we may not be able to provide the information, products or services you have asked for or process your requests, applications, subscriptions or registrations, and may not be able to perform or discharge the Regulatory Functions (defined below).

Purpose

From time to time we may collect your personal data including but not limited to your name, mailing address, telephone number, email address, date of birth and login name for the following purposes:

1. to process your applications, subscriptions and registration for our products and services;

2. to perform or discharge the functions of HKEX and any company of which HKEX is the recognised exchange controller (as defined in the Securities and Futures Ordinance (Cap. 571)) ("Regulatory Functions");

3. to provide you with our products and services and administer your account in relation to such products and services;

4. to conduct research and statistical analysis;

5. to process your application for employment or engagement within HKEX to assess your suitability as a candidate for such position and to conduct reference checks with your previous employers; and

6. other purposes directly relating to any of the above.

Direct marketing

Where you have given your consent and have not subsequently opted out, we may also use your name, mailing address, telephone number and email address to send promotional materials to you and conduct direct marketing activities in relation to HKEX financial services and information services, and financial services and information services offered by other members of the Group.

If you do not wish to receive any promotional and direct marketing materials from us or do not wish to receive particular types of promotional and direct marketing materials or do not wish to receive such materials through any particular means of communication, please contact us through one of the communication channels set out in the "Contact Us" section below. To ensure that your request can be processed quickly please provide your full name, email address, log in name and details of the product and/or service you have subscribed.

Identity Card Number

We may also collect your identity card number and process this as required under applicable law or regulation, as required by any regulator having authority over us and, subject to the PDPO, for the purpose of identifying you where it is reasonable for your identity card number to be used for this purpose.

Transfers of personal data for direct marketing purposes

Except to the extent you have already opted out we may transfer your name, mailing address, telephone number and email address to other members of the Group for the purpose of enabling those members of the Group to send promotional materials to you and conduct direct marketing activities in relation to their financial services and information services.

Other transfers of your personal data

For one or more of the purposes specified above, your personal data may be:

1. transferred to other members of the Group and made available to appropriate persons in the Group, in Hong Kong or elsewhere and in this regard you consent to the transfer of your data outside of Hong Kong;

2. supplied to any agent, contractor or third party who provides administrative, telecommunications, computer, payment, debt collection, data processing or other services to HKEX and/or any of other member of the Group in Hong Kong or elsewhere; and

3. other parties as notified to you at the time of collection.

How we use cookies

If you access our information or services through the HKEX website, you should be aware that cookies are used. Cookies are data files stored on your browser. The HKEX website automatically installs and uses cookies on your browser when you access it. Two kinds of cookies are used on the HKEX website:

Session Cookies: temporary cookies that only remain in your browser until the time you leave the HKEX website, which are used to obtain and store configuration information and administer the HKEX website, including carrying information from one page to another as you browse the site so as to, for example, avoid you having to re-enter information on each page that you visit Session cookies are also used to compile anonymous statistics about the use of the HKEX website.

Persistent Cookies: cookies that remain in your browser for a longer period of time for the purpose of compiling anonymous statistics about the use of the HKEX website or to track and record user preferences.

The cookies used in connection with the HKEX website do not contain personal data. You may refuse to accept cookies on your browser by modifying the settings in your browser or internet security software. However, if you do so you may not be able to utilise or activate certain functions available on the HKEX website.

Compliance with laws and regulations

HKEX and other members of the Group may be required to retain, process and/or disclose your personal data in order to comply with applicable laws and regulations or in order to comply with a court order, subpoena or other legal process (whether in Hong Kong or elsewhere), or to comply

with a request by a government authority, law enforcement agency or similar body (whether situated in Hong Kong or elsewhere) or to perform or discharge the Regulatory Functions. HKEX and other members of the Group may need to disclose your personal data in order to enforce any agreement with you, protect our rights, property or safety, or the rights, property or safety of our employees, or to perform or discharge the Regulatory Functions.

Corporate reorganisation

As we continue to develop our business, we may reorganise our group structure, undergo a change of control or business combination. In these circumstances it may be the case that your personal data is transferred to a third party who will continue to operate our business or a similar service under either this Privacy Policy Statement or a different privacy policy statement which will be notified to you. Such a third party may be located, and use of your personal data may be made, outside of Hong Kong in connection with such acquisition or reorganisation.

Access and correction of personal data

Under the PDPO, you have the right to ascertain whether we hold your personal data, to obtain a copy of the data, and to correct any data that is inaccurate. You may also request us to inform you of the type of personal data held by us. All data access requests shall be made using the form prescribed by the Privacy Commissioner for Personal Data ("**Privacy Commissioner**") which may be found on the official website of the Office of the Privacy Commissioner or via this link:

https://www.pcpd.org.hk/english/publications/files/Dforme.pdf

Requests for access and correction of personal data or for information regarding policies and practices and kinds of data held by us should be addressed in writing and sent by post to us (see the "Contact Us" section below).

A reasonable fee may be charged to offset our administrative and actual costs incurred in complying with your data access requests.

Termination or cancellation

Should your account or relationship with us be cancelled or terminated at any time, we shall cease processing your personal data as soon as reasonably practicable following such cancellation or termination, provided that we may keep copies of your data as is reasonably required for archival purposes, for use in relation to any actual or potential dispute, for the purpose of compliance with applicable laws and regulations and for the purpose of enforcing any agreement we have with you, for protecting our rights, property or safety, or the rights, property or safety of our employees, and for performing or discharging our functions, obligations and responsibilities.

General

If there is any inconsistency or conflict between the English and Chinese versions of this Privacy Policy Statement, the English version shall prevail.

Contact us

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Personal Data Privacy Officer
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8/F., Two Exchange Square
8 Connaught Place
Central
Hong Kong

By Email:
DataPrivacy@HKEX.COM.HK

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