

Volatility Control Mechanism (VCM) & Closing Auction Session (CAS)

HKEx September 2015





Why CAS?



Why CAS?	 Significant equity flow requires execution at the closing price (an investment mandate for many passive funds) ~10% of equity flow on a daily basis 30%+ on index rebalancing days Closing price is used for portfolio valuations and benchmarking
Issues without a CAS	 ★ Trades cannot be executed at closing price ★ Tracking error for index funds → Higher transaction cost, and invest return hampered ★ Exchange Participants (EPs) cannot execute at the closing price → Tension between EPs and investors

Meeting market demand for execution at closing price and index rebalancing

Phased rollout to different securities to ensure a smooth rollout



Phase	Phase I Securities: Index Constituent Stocks	Phase II Securities: Other Stocks and Funds (subject to Phase I review)
Scope	 A. Major index constituents Stocks including: Constituent stocks of Hang Seng Composite LargeCap and MidCap indexes H shares which have corresponding A shares listed on Mainland securities exchanges B. All ETFS 	 C. Include remaining stocks and REITs plus some other equity products Covers all equities and funds Excludes structured products and debt securities Auction model: No short selling in Phase 1, short selling with a tick rule will be considered in Phase 2 of the CAS Other CAS features will be same as Phase 1

CAS model in securities market



Time	9:30-12:00; 13:00-16:00	• • • • • • • • • • • • • • • • • • •	16:00 16:01		• • • • • • • • • • • • • • • • • • •			
ç	Continuous		Closing Auction Session					
Session	Trading Session (CTS)	Reference Price Fixing Period (1 min)	Order Input Period (5 mins)	No Cancellation Period (2 mins)	Random Closing Period (2 mins)			
		Calculate & publish	Price Limit:					
	Reference	reference price	a 5% of Reference Price	b Within lowest as	sk & highest bid			
Б	price based	No Input,						
Description	on the median of 5-snapshot	Cancel & Amend	Order Type Allowed:					
scr	nominal prices			At-auction Order				
De	in the last	in the last price limit		At-auction Limit Order				
	minute of CTS	will be automatically carried	Order Input, Cancellation & Am	endment:				
		forward	Allowed Input, Cancel & Amend	Input Allowed, Cancel	& Amend Not Allowed			

Other New Measures:

- 1. Better transparency by showing the IEP price limit, the 16:00 CTS closing and imbalance information (direction and quantity)
- 2. Short selling not allowed in Phase 1 ; Consider to allow short selling subject to a tick rule (reference price) in Phase 2
- 3. Allow matching of at-auction orders at the reference price when an auction price cannot be determined

Note: The day close of Stock Index Futures and Options in the derivatives market would be extended for 15 minutes. To allow sufficient time for the market to prepare for AHFT's opening, the opening time of AHFT will be changed from 17:00 to 17:15.



Reference price

The reference price is determined by taking the median of 5 nominal prices in the last minute of the CTS (same as the calculation method of current closing price)

- Reference prices are disseminated for securities in all markets (i.e. MAIN, GEM, NASD and ETS), including securities that are not covered by CAS
- For securities that are not covered by CAS, the reference price is equivalent to closing price

Applicable session	Scope of price limit
Order Input Period	± 5% from reference price
No Cancellation Period	Within the lowest ask & highest bid at the end of Order Input Period
Random Closing Period	Same as the No Cancellation Period (i.e. Within lowest ask & highest bid at the end of Order Input Period)

Price Limit

 In case only buy orders or only sell orders exist (or both do not exist) at the end of Order Input Period, the price limit of No Cancellation Period and Random Closing Period will be set at ± 5% from reference price (i.e. same as that of Order Input Period)

Four new features of new CAS



Features	Descriptions
1. Price Limit	 During Order Input Period: ± 5% During No Cancellation Period and Random Closing Period: between lowest ask and highest bid
2. Random Closing	 Auction matching ends randomly within the 2-minute period of 16:08 to 16:10, exact ending of the CAS determined randomly by the system
3. Auction Information Dissemination	 Showing the Indicative Equilibrium Price (IEP), Indicative Equilibrium Volume (IEV), CAS stock indicator, order imbalance information, reference price (CTS closing price), upper and lower price limit of the Order Input Period, and upper and lower price limit of the No Cancellation and Random Closing Periods
4. At-auction Limit Orders	 All investors can input At-auction Limit orders throughout the CAS

Trading hours for CAS in the securities market



Session	Time	Actions allowed (Only applicable to securities that are covered by CAS)
Reference Price Fixing Period	16:00 – 16:01 12:00 – 12:01 (Half day trading)	 Orders with price outside the permissible price limit will be cancelled by AMS/3 System Orders within the permissible price limit will be automatically carried over from CTS to CAS; AMS/3 System will treat all such orders as at-auction limit orders
Order Input Period	16:01 – 16:06 12:01 – 12:06 (Half day trading)	 Input / amend / cancel At-auction orders and At-auction Limit orders Input manual trades Reject manual trades that are inputted during CAS
No Cancellation Period	16:06 – 16:08 12:06 – 12:08 (Half day trading)	 Input At-auction orders and At-auction Limit orders Amendment / cancellation of orders is not allowed Input manual transactions Reject manual trades that are inputted during CAS
Random Closing Period	16:08 – 16:10 12:08 – 12:10 (Half day trading)	Same as No Cancellation Period
Order Matching Period	16:08 – 16:10 12:08 – 12:10 (Half day trading)	 No order input / amendment / cancellation of orders is allowed No manual trade input / rejection is allowed AMS/3 System matches order based on final Indicative Equilibrium Price (IEP), or based on the reference price in the absence of final IEP Order matching is based on order type, price and then time priority
Market Close	16:08 – 16:10 12:08 – 12:10 (Half day trading)	Market close

• The trading session information above are disseminated for securities in all markets (i.e. MAIN, GEM, NASD AND ETS). However during CAS, Exchange Participants can only trade securities that are covered by CAS.



Determination of closing price



Current mechanism

The closing price is determined by taking the median of five nominal prices in the last minute of the CTS

Example:

Snapshot	Time	Nominal price
1 st	15:59:00	\$131.50
2 nd	15:59:15	\$131.50
3 rd	15:59:30	\$131.40
4 th	15:59:45	\$131.40
5th	16:00:00	\$131.30

The five snapshot nominal prices are arranged in ascending order as follows:\$131.30 \$131.40 \$131.40 \$131.50

The median (i.e. the middle one) is \$131.40, which will then be taken as the closing price

After the implementation of CAS

Securities not covered by CAS:

 Remain unchanged (closing price determined based on the median of nominal prices)

Securities covered by CAS:

- Final Indicative Equilibrium Price (IEP) as closing price or
- Reference price as closing price if IEP cannot be determined

Change of trading hours after implementation of CAS



- For **securities market**, closing time will change from 16:00 to a random closing of anytime between 16:08 and 16:10 for normal trading day; and from 12:00 to a random closing of anytime between 12:08 and 12:10 for half day trading
- For **derivatives market**, the following closing time will be applied and start time of After Hours Futures Trading (AHFT) session will be changed from 17:00 to 17:15

	Market closing time (exclude last trading day)		Expiring contract's last trading time on last trading day		AHFT market opening time		AHFT market closing time	
	Current	After CAS	Current	After CAS	Current	After CAS	Current	After CAS
Equity Index futures and options	16:15	16:30	16:00	16:00*	17:00	17:15	23:45	23:45
Stock futures and Stock options	16:00	16:00	16:00	16:00	Not applicable	Not applicable	Not applicable	Not applicable

Whole day trading

Half day trading

	Market closing time (exclude last trading day)		Expiring contract's last trading time on last trading day		AHFT market opening time		AHFT market closing time	
	Current	After CAS	Current	After CAS	Current	After CAS	Current	After CAS
Equity Index futures and options	12:00	12:30	12:00	12:00	Not applicable	Not applicable	Not applicable	Not applicable
Stock futures and Stock options	12:00	12:00	12:00	12:00	Not applicable	Not applicable	Not applicable	Not applicable

*CES 120 China Futures will be 15:00 (unchanged), Dividend Futures will be 16:30 (changed)

Securities Market Makers obligations



- Obligations for Securities Market Makers (SMM) are not applicable in CAS and trades conducted by SMMs during CAS are not eligible for SMM incentives
- Market making orders of SMMs will be automatically carried forward to CAS and processed by AMS/3 as at-auction limit orders
- If necessary, SMMs can cancel their market making orders during or before the Order Input Period



Open Gateway

Open Gateway will be retired before the end of June 2016 and thus will not support CAS

Orion Central Gateway

No change in system interface is needed due to the implementation of CAS

Market data

The following additional market data will be disseminated through Orion Market Data Platform – Securities Market (OMD-C)

- (i) CAS stock indicator
- (ii) Reference price
- (iii) Upper and lower price limit
- (iv) Order imbalance information and direction (i.e. buy or sell) of IEP
- (v) Trading periods (i.e. Reference Price Fixing, Order Input, No Cancellation, Random Closing and Order Matching)



Implementation timeline



VCM is NOT a	VCM is intended to …
 Trading halt to suspend trading 	 Prevent drastic events such as algo errors/flash crash which may cause systemic risks
 Limit price movement of individual stocks and futures contracts 	 Offer temporary cooling-off period and allow trading within a band during the cooling-off; normal trading to resume afterwards

A simple and light-touch approach to balance market protection and trading interruption:

- VCM triggered if a stock (futures contract) is ±10%(±5%) away from the last traded price 5-min ago; 5-min cooling-off period will start to allow trading within the band only; normal trading will resume afterwards
- Only applicable to key HSI & HSCEI constituent stocks (81) and related index futures contracts (8)
- Apply to continuous trading sessions (CTS), excluding the first 15 min of the Morning and Afternoon sessions, the last 15 min of the Afternoon Session and After Hours Futures Trading (AHFT) session of the derivatives market

HK has been able to learn from the VCM experience of other markets; A simple and lighttouch model should be most suitable for HK



VCM design highlights



Monitoring Phase	 Reference to a dynamic price (last trade 5-minute ago) to capture rapid and large price movements Monitoring stops in the first 15 minutes of Morning and Afternoon Sessions to allow free price discovery No cooling-off period in the last 15 minutes*# of the Afternoon Session to allow free price discovery and avoid causing overnight risk Maximum of one trigger in each trading session for each instrument (i.e. 1 in the Morning Session and 1 in the Afternoon Session) to minimize market interruption No VCM monitoring for the triggered instrument after one trigger in the rest of the trading session
Cooling-off Period	 The cooling-off period would last for 5 minutes, and trading would resume to normal afterwards The triggered instrument would only be allowed to trade within price limit (±10% for stocks and ±5% for futures contracts)
Market Data Dissemination	 All VCM securities have an indicator for identification The following will be disseminated when a cooling-off period is triggered: VCM start time, VCM end time, reference price, upper and lower price limit

* Since a VCM trigger will last for 5 minutes, the monitoring will stop 20 minutes before end of the Afternoon Session. # There is no cooling-off period 15 minutes before the market close at noon in the case of half day trading





Scope of securities / derivatives products	 Securities: HSI & HSCEI constituent stocks (currently 81 stocks) Derivatives: HSI Futures (HSI), Mini-HSI Futures (MHI), H-shares Index Futures (HHI) and Mini H-shares Index Futures (MCH) spot month and the next calendar month contracts (currently 8 contracts) 		
Triggering	Triggering level: ±10% from the reference price for securities market ±5% from the reference price for derivatives market		
Point	Reference price: Last trade 5 minutes ago		

Illustrative example by using the trading of an applicable VCM stock during CTS (excluding first 15 minutes of Morning and Afternoon Sessions and last 15 minutes of the Afternoon Session)



Applicable period for VCM[#]





Auction Session Continuous Trading Session

POS = Pre-opening Session in the securities market or Pre-Market Opening Period in the derivatives market

[#]Time shown above is not drawn to scale.

*If there is no trading in the POS and after market open, the first trade will become the first reference price.

^ Time arrangement after CAS has been implemented in the securities market.

When VCM is triggered



When VCM triggered due to upper price limit being reached

- AMS/3 and HKATS systems will cancel the following orders:
 - High price buy orders in buy order queue (i.e. those with buy price > upper price limit)
 - Buy/sell order that triggered the VCM (no matter whether the price of the buy/sell order is high or low)
- Within the 5-minute cooling-off period, Exchange Participants:
 - Can still input sell orders that are higher than upper price limit / buy orders that are lower than lower price limit
 - Cannot input buy orders that are higher than upper price limit / sell orders that are lower than lower price limit

When VCM triggered due to lower price limit being reached

- AMS/3 and HKATS systems will cancel the following orders:
 - Low price sell orders in sell order queues (i.e. those with sell price < lower price limit)
 - Buy/sell order that triggered the VCM (no matter whether the price of the buy/sell order is high or low)
- Within the 5-minute cooling-off period, Exchange Participants:
 - Can input buy orders that are lower than lower price limit / sell orders that are higher than upper price limit
 - Cannot input sell orders that are lower than lower price limit / buy orders that are higher than upper price limit

Changes in securities market trading system



Open Gateway

Open Gateway will be retired before the end of June 2016 and thus will not support VCM

Orion Central Gateway

No change in system interface, but slight change in content of some system messages

Cancel on Trading Halt/VCM

Market data

The following additional market data will be disseminated through Orion Market Data Platform – Securities Market (OMD-C)

(i) VCM stock indicator

(ii) When VCM is triggered :

- VCM start and end time
- Reference price
- Upper and lower price limit



HKATS Trading System

No change in OAPI interface. New return codes for order completion status will be introduced due to introduction of VCM

Market Data

- 1. When cooling-off period is triggered, Market Message will be disseminated through Market Messages window in HKATS. Contents include:
 - Instrument name
 - Start and end time of cooling-off period
 - Reference price
 - Upper and lower price limits
- 2. New session states
 - To indicate start and end of VCM monitoring for applicable derivatives market (Trading Session State)
 - To indicate the cooling-off period of specific instrument (Instrument Session State)







Changes in OMD-C for the introduction of VCM and CAS:

OMD Message	Existing / Newly added	Changes and Usage	VCM	CAS	OMD Channel
Securities Definition (11)	Existing message	New data field "CAS Indicator" added to indicate whether CAS is applicable to the security		~	ALL : 1
		New data field "VCM Indicator" added to indicate whether VCM is applicable to the security	\checkmark		
Trading Session Status (20)	Existing message	New values available in two data fields, namely, TradingSessionSubID and TradingSesStatus to differentiate different stages in CAS.		√	ALL : 2
Reference Price (43)	Newly added message	Added to provide the reference price (equivalent to closing price of Continuous Trading Session), the updates of lower and upper price limits for order input during CAS for eligible securities		√	SS: 10
Indicative Equilibrium Price (41)	Existing message	Also to provide Indicative Equilibrium Price (IEP) or Indicative Equilibrium Volume (IEV) duirng CAS		~	SP: 20 – 28 SF: 30 – 38
Order Imbalance (56)	Newly added message	Added to provide order imbalance information at the IEP during CAS		~	
VCM Trigger (23)	Newly added message	Added to signal a cooling off period being triggered by VCM and to provide the reference price, higher and lower limits in the price band allowed, as well as the start and end times of the cooling off period	✓		SS: 10 SP: 20 – 28 SF: 30 – 38

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Relevant market information disseminated by OMD-C

Securities Definition (11)

New data field "CAS Indicator" added to indicate whether CAS is applicable to the security New data field "VCM Indicator" added to indicate whether VCM is applicable to the security

HKEx Orion Market Data Platform (OMD-C) - Binary Protocol

Message Formats

Offset	Field	Format	Len	Description	Values
30	SecurityShortName	String	40	Security short name	
70	CurrencyCode	String	3	Security currency code of the market.	See Currency Values in section 3.1.2 for full details.
73	SecurityNameGCCS	Binary	60	Security name in Traditional Chinese using Unicode	Unicode UTF-16LE encoded
133	SecurityNameGB	Binary	60	Security name in Simplified Chinese using Unicode	Unicode UTF-16LE encoded
193	LotSize	Uint32	4	Board lot size for the security	
197	PreviousClosingPrice	Int32	4	Previous closing price of the security	3 implied decimal places
201	VCMFlag	String	1	Indicates whether Volatility Control Mechanism (VCM) is applicable to the security	Y VCM applicableN VCM not applicable
202	ShortSellFlag	String	1	Indicator for short-sell authorization.	Y Short-sell allowed N Short-sell not allowed
203	CASFlag	String	1	Indicates whether Closing Auction Session (CAS) is applicable to the security	Y CAS applicableN CAS not applicable
204	CCASSFlag	String	1	Indicates whether or not the security is a CCASS security	CCASS security Non CCASS security





Relevant market information disseminated by OMD-C



Trading Session Status (20)

New values available in two data fields, namely, TradingSessionSubID and TradingSesStatus to differentiate different stages in CAS

9	TradingSessionSubID	Uint8	1	Trading session sub-identifier.	 Day Close (DC) Pre-trading [Pre-Opening Session (POS)] Order Input (OI) Opening or Opening Auction [POS] Matching (MA) Continuous trading (CT) Closing or Closing Auction [Closing Auction Session (CAS)] Matching (MA) Post-trading [CAS] Order Input (OI) Quiescent (i.e. Blocking) (BL) Not Yet Open (NO) No Cancel/Modification [POS] (NC) Exchange Intervention (EI) Close (CL) Order Cancel (OC) Reference Price Fixing [CAS] (RP) No Cancellation [CAS] (NW) Random Close [CAS] (RC)
10	<u>TradingSesStatus</u>	Uint8	1	Status of the current trading session.	 Unknown (for NO) Halted (for BL, EI) Open (for [POS] OI, [POS] NC, [POS] MA, CT, OC) Closed (for CL) Pre-Close (for [CAS] RP, [CAS] NW, [CAS] RC, [CAS] MA, [CAS] OI) Day Closed (for DC)





Reference Price (43)

Added to provide the reference price (equivalent to closing price of Continuous Trading Session), the updates of lower and upper price limits for order input during CAS for eligible securities

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	43 Reference Price
4	<u>SecurityCode</u>	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	ReferencePrice	Int32	4	Reference price of the security for order input	3 implied decimal places Value is 0 if the reference price is not available
12	LowerPrice	Int32	4	Lower price of the allowed price band for order input	3 implied decimal places 0 means N/A
16	UpperPrice	Int32	4	Upper price of the allowed price band for order input	3 implied decimal places 0 means N/A





Order Imbalance (56)

Added to provide order imbalance information at the IEP during CAS

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	56 Order Imbalance
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	OrderImbalanceDirection	String	1	Indicates the imbalance direction when the <u>matchable</u> buy quantity and sell quantity at IEP are not equal	 N Buy = Sell B Buy Surplus S Sell Surplus <space> Not applicable, i.e. when IEP is not available</space>
9	Filler	String	1		
10	OrderImbalanceQuantity	Uint64	8	The absolute difference between the matchable buy quantity and the sell quantity at IEP Value should be ignored if Order Imbalance Direction is <space></space>	
18	Filler	String	2		
Total Length		20			



Related Market Information disseminates through OMD-C



VCM Trigger (23)

Added to signal a cooling off period being triggered by VCM and to provide the reference price, higher and lower limits in the price band allowed, as well as the start and end times of the cooling off period

Offset	Field	Format	Len	Description	Values
0	MsgSize	Uint16	2	Size of the message	
2	MsgType	Uint16	2	Type of message.	23 VCM Trigger
4	SecurityCode	Uint32	4	Uniquely identifies a security available for trading	5 digit security codes with possible values 1 – 99999
8	CoolingOffStartTime	Uint64	8	Time when the cooling off period starts	The data is provided as number of nanoseconds since Unix epoch Jan 1st 1970, precision is provided to the nearest second.
16	CoolingOffEndTime	Uint64	8	Time when the cooling off period ends	The data is provided as number of nanoseconds since Unix epoch Jan 1st 1970, precision is provided to the nearest second.
24	VCMReferencePrice	Int32	4	Reference Price for the cooling	3 implied decimal places
28	VCMLowerPrice	Int32	4	Lower price in the price band allowed during the cooling off period	3 implied decimal places
32	VCMUpperPrice	Int32	4	Upper price in the price band allowed during the cooling off period	3 implied decimal places
Total Len	Total Length		36		-



Implementation schedule and scope of securities of the two initiatives



Tentative	Q3 2016	Q4 2016	1H 2017
Schedule	CAS – Phase 1	VCM – Securities VCM – Derivatives	CAS – Phase 2 (subject to review)
Scope of securities / derivatives products	 (List of securities subject to confirmation before rollout) Hang Seng Composite LargeCap & Composite MidCap Index constituent stocks H shares which have corresponding A shares listed on Mainland securities exchanges All ETFs 	Securities: HSI & HSCEI constituent stocks (currently 81 stocks) Derivatives: HSI Futures (HSI), Mini-HSI Futures (MHI), H-shares Index Futures (HHI) and Mini H- shares Index Futures (MCH) spot month and the next calendar month contracts (currently 8 contracts) Excludes: Far month contracts, options and all other derivatives products	All equity securities and funds

The schedule is subject to rule amendment approval by the SFC and market readiness

Tentative implementation timeline – Securities Market





The schedule is subject to rule amendment approval by the SFC and market readiness

Tentative implementation timeline – Derivatives Market





The schedule is subject to rule amendment approval by the SFC and market readiness

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VCM and CAS web corner



- The web corner will be updated from time to time and provides the following information related to VCM and CAS:
 - Operating mechanism of the two initiatives
 - Consultation conclusions
 - Technical specification document
 - Frequently Asked Questions

• Website

Securities Market	Derivatives market
Home > Market Operations > Securities Trading Infrastructure > Volatility Control Mechanism (VCM) and Closing Auction Session (CAS)	Home > Market Operations > Derivatives Trading Infrastructure > Volatility Control Mechanism (VCM)
https://www.hkex.com.hk/eng/market/sec_tradinfr a/vcm_cas/vcm_cas.htm	http://www.hkex.com.hk/eng/market/dv_tradinfra/v cm.htm



Enquiry for VCM and CAS – Securities Market General hotline for participants : 2840 3626 Email : <u>trd@hkex.com.hk</u>

Enquiry for VCM – Derivatives Market HKATS hotline : 2211 6360 E-mail : <u>ClickSupport@hkex.com.hk</u>

Enquiry for market information disseminated by OMD-C Vendor support hotline : 2211 6558 Email : <u>IVSupport@hkex.com.hk</u>





Any questions?