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STRESS TESTING ON OPTIONS

HKEX
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Clearing Risk Management

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AGENDA

1

Background

2

Linear Products vs Non-Linear Products

3

Stress Testing Calculation



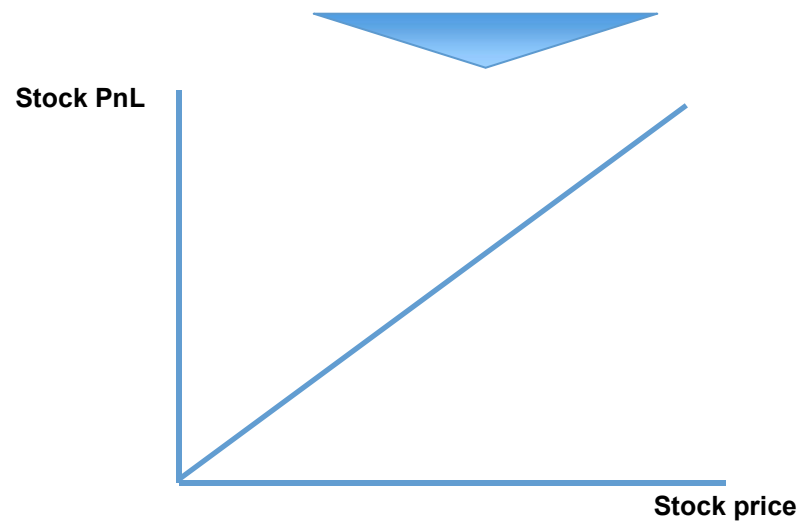
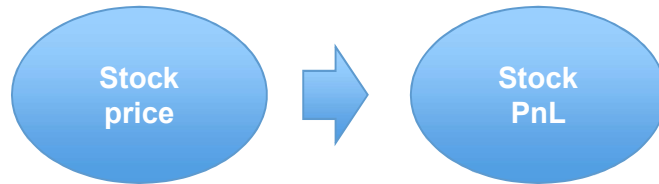
Overview

- Stress testing is the analysis / simulation technique widely used by institutions to evaluate the potential portfolio loss under extreme but plausible market condition.
- Most financial institutions use stress testing as a daily risk management tool e.g. set operational limits, allocate resources to ensure liquidity and capital adequacy for the aforesaid loss.
- Stress testing of non-linear products is crucial to Clearing Participants (CPs) as it tells CPs how the loss of non-linear products increases exponentially under extreme scenarios.
- CPs are strongly recommended to have proper stress testing in place for it's own or clients' exposure on HKEX's products, particularly on non-linear products such as option.

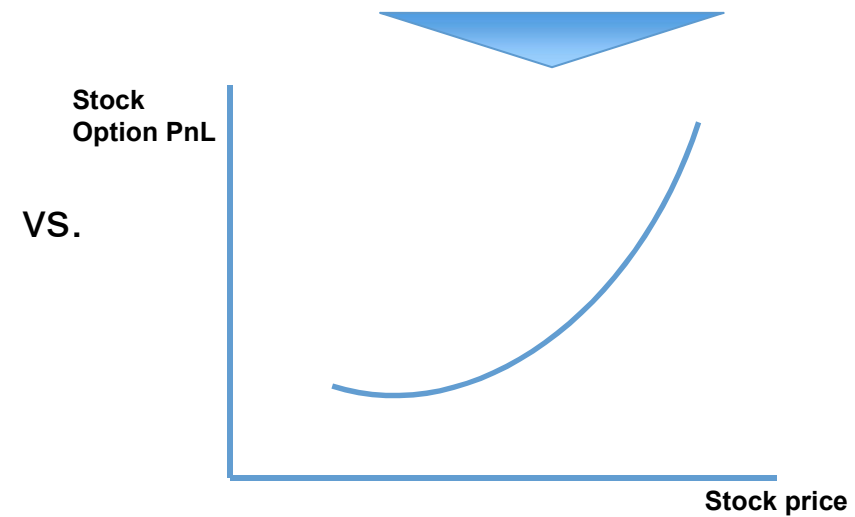
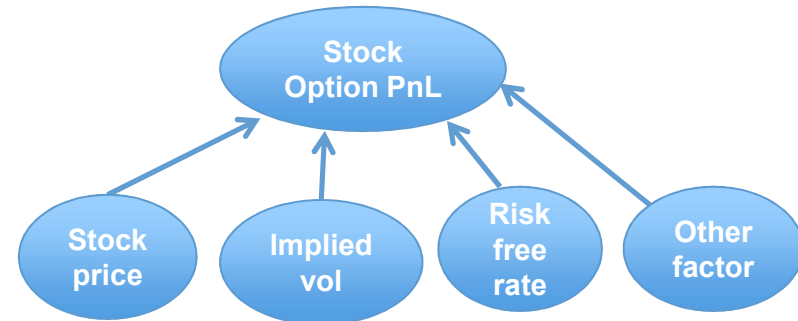


Linear vs. Non-Linear Products

Linear



Non-Linear



- *The change in risk exposure of option is exponential and subject to multiple risk factors, which is different from stock.*



Stress Testing Calculation - SEOCH

Example 1: Bullish view on China Life (2628) on 25 Oct 2018

- Short 1 China Life Oct18 put option at HK\$15.5 strike price (x1000 shares)
- China Life closed at HK\$ 17.1
- Margin Requirement is HK\$ 316

Profit and Loss in HK\$		
Stock price movement assumption	Short 1 put options at HK\$15.5 strike price	Margin deficit per contract
-9%	HK\$ -320	HK\$ -4
-15%	HK\$ -1,010	HK\$ -694
-22%	HK\$ -2,140	HK\$ -1,824

- Additional loss incurred during the positions close-out (3%* or more in normal condition, see below)
- Bid-ask spread will further widen in the stress condition

Bid Orders				Ask Orders			
	Type	BQty	Bid	Ask	AQty	Type	
	LMT	50	0.55	0.58	106	LMT	HKGS
	LMT	200	0.55	0.58	200	LMT	HKOF
	LMT	200	0.55	0.59	50	LMT	HKIM
	LMT	115	0.54	0.59	101	LMT	HKCT
	LMT	1	0.53	0.59	40	LMT	HKYH
	LMT	30	0.53	0.60	200	LMT	HKNH
	LMT	68	0.53	0.60	30	LMT	HKBN
	LMT	25	0.51	0.60	68	LMT	HKIB
	LMT	25	0.41				

- **Stress loss of short option is massively understated if treated like stock in stress calculation (Leverage effect)**



* $[(0.58-0.55)/2]/0.55=3\%$

Stress Testing Calculation - HKCC

Example 2: Bullish view on Hang Seng Index

- Short 1 Hang Seng Index Mar19 put option at 26,400 strike price
- Hang Seng Index closed at 26,227.7
- Margin Requirement is HK\$ 132,210

Profit and Loss in HK\$		
Stock price movement assumption	Short 1 put options at 26,400 strike price	Margin deficit per contract
-5%	HK\$ -37,350	HK\$ 0
-10%	HK\$ -84,800	HK\$ 0
-20%	HK\$ -201,800	HK\$ -69,590

- Additional loss incurred during the positions close-out (0.7%* or more in normal condition, see below)
- Bid-ask spread will further widen in the stress condition

Bid Orders				Ask Orders			
	Type	BQty	Bid	Ask	AQty	Type	
	LMT	8	735	745	8	LMT	HKOPT
	LMT	7	732	745	7	LMT	HKNH1
	LMT	5	732	751	7	LMT	HKYKI
	LMT	7	731	759	7	LMT	HKMPH
	LMT	7	729	763	5	LMT	HKLQI
	LMT	5	723	773	5	LMT	HKJPM
	LMT	5	720	774	5	LMT	HKMIV
	LMT	5	704	775	5	LMT	HKSG:
	LMT	5	703	780	5	LMT	HKSG:
				792	5	LMT	HKIBG

- **Stress loss of short option is massively understated if treated like stock in stress calculation (Leverage effect)**



* $[(745-735)/2]/735=0.7\%$