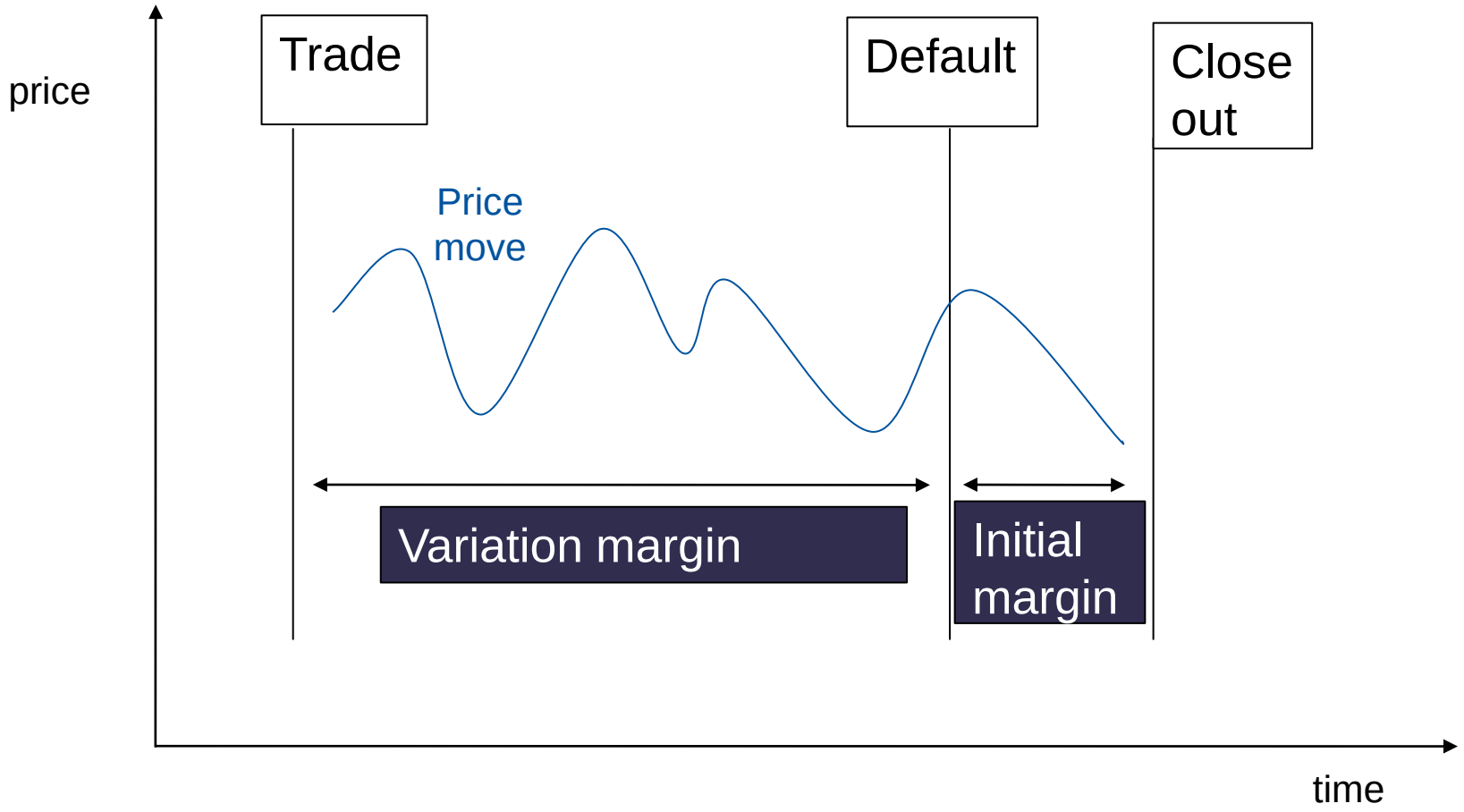
LCH.Clearnet Ltd – Initial margin

Purpose (1)

- LCH.Clearnet Ltd only faces market risk in the event of the default of one of its clearing members
- In those circumstances, it is faced with closing out, hedging or transferring the defaulter's portfolio within a short period
- In doing so, it may make a loss because of adverse price moves (i.e. the market risk may be realised)
- It is this market risk and this loss from which initial margin protects the clearing house
- It does not need to cover adverse price moves that occurred prior to the default as this is already covered by variation margin

Purpose (2)


price
Trade
Default
Close out
Price move
Variation margin
Initial margin
time

Purpose (3)

- Initial margin is therefore based on the following:
- An estimate of potential future adverse price movements …
- … across the portfolio …
- … under normal market conditions …
- … over a close-out (or “holding”) period
- NB initial margin need only cover future price movements because variation margin has already covered past ones; similarly, it need only consider normal market conditions since the Default Fund is designed to cover stressed ones.

Coverage and models (1)

- The key inputs are therefore:
- data history
- assumed close-out period; and
- confidence interval (essentially a definition of “normal market conditions”).
- The actual models however, vary by product since while the aim of initial margin is the same – and strictly has to be the same since LCH.Clearnet Ltd needs to ensure that no one product exposes the Default Fund to more risk than any other – the risk characteristics of each product are different.

Coverage and models (2)

- LCH.Clearnet Ltd uses different initial margin models for different markets:
- SPAN[1] (the Standard Portfolio Analysis of Risk)
  - for exchange traded derivatives[2]; and
  - for RepoClear
- PAIRS (Portfolio Approach to Interest Rate Scenarios) for SwapClear
- ERA (Equity Risk Analysis) for EquityClear

- The rest of this package covers the models and their inputs

1 SPAN was developed by the Chicago Mercantile Exchange ("CME"); SPAN® is a registered trademark of the CME.

2 For some exchange traded derivatives LCH.Clearnet Ltd uses RIVA (Risk Valuation), but uses it in a way that makes RIVA comparable to SPAN; as a result only SPAN is covered here.

SPAN for exchange traded derivatives and ICE OTC

- In terms of key inputs, the following are used for SPAN in calculating initial margin for exchange traded derivatives:
  - A data history of two years (with more granular data on the last six months and 60 day volatility; with reviews at least every 60 days);
  - An assumed close-out period of two days (with the higher of the price movement over one or two days used as the input);
  - A confidence interval of three standard deviations (99.7%, meaning that initial margin could be breached one day in 334 days).
- SPAN is a parameter-based system which requires the above inputs to be converted into the following parameters:
  scanning ranges; inter-month spreads; inter-commodity credits; strategies; and short option minimum charge

The scanning range

- The scanning range is simply the worst case outright price move that could occur on a contract in the close-out period
- It therefore assumes a completely directional position without any offsets; and it is therefore the amount that a clearing member deposits on a single futures contract
- e.g. One futures contract (of 1,000 units):
- Scanning range = £6.5 per unit; and therefore,
- Initial margin = 1 contract x 1,000 units x £6.5 = £6,500
- Any offsets are taken into account by other SPAN parameters, as detailed on the following slides.

Tiered scanning ranges[1]

- Tiers account for the fact that volatility is often not constant across all delivery months of a contract
- Tiers involve discount factors being applied to the scanning range, with the discount factor for the most volatile delivery month set to one, so as to apply a reduced scanning range to the less volatile delivery months.
- 1 x tier 4 Future:
- Scanning range is £6,000, discount factor for tier 4 is 0.90;
- And therefore initial margin = £6,000 x 0.90 = £5,400

1 Tiers can also apply to inter-month spread charges and inter-commodity credits.

The inter-month spread charge

- The inter-month spread charge recognises that when a portfolio contains positions of different directions (e.g. one long, one short) in the same instrument in different expiries, the positions offset albeit not perfectly
- Therefore instead of initial margining those positions using the scanning range, the positions are initial margined using the inter-month spread charge
- long 10 December contracts; short 10 March contracts
- Spread charge = £95 (compared to scanning range = £1,830);
- And therefore initial margin = 10 contracts x £95 = £950;
- Compared to initial margin under scanning range = 20 x 1,830 = £36,600

Strategies

- The calculation of initial margin in SPAN also recognises that some trading strategies (of options, or futures and options) are internally hedged more than the previously explained parameters may recognise
- There are therefore explicit initial margin charges for strategies (e.g.butterflies and condors), which are taken into account before the inter-month charges to minimise margin
- e.g. long condor in a quarterly contract:
- For a condor starting in Q1, strategy charge is 175;
- Compared to initial margin under two inter-month spread charges (long Q1-short Q2 and short Q3-long Q4): 205 for the Q1-Q2 spread and 80 for the Q3-Q4 spread = 205+80 = 285

The inter-commodity credit

- However, contracts can also be correlated with one another and the inter-commodity credit recognises this correlation
- It does so by reducing the outright initial margin (from the scanning range) by a percentage where, and only where, the correlation between the two contracts is based on economic fundamentals and evidenced over the long-term
- long 1 x contract a; short 1 x correlated contract b:
- Scanning ranges are £7,000 and £6,500 respectively; inter-commodity credit is 90%; and therefore,
- Initial margin = (£7,000 + £6,500) x (100% - 90%) = £1,350

The short option minimum charge

- Unlike the other parameters, the short option minimum charge recognises that SPAN may not fully account for the risk in some positions
- Specifically, it provides a floor for the initial margin on short, deeply out-of-the-money options which otherwise attract little or no margin under SPAN
- This floor covers the costs of closing out these positions (i.e. premium payments and brokerage fees)
- e.g. short one call option
- Short option minimum charge and therefore initial margin floor = £10

SPAN for RepoClear

- In terms of key inputs, the following are used for SPAN in calculating initial margin for RepoClear (cash bonds and repos including reverse repos):
  - A data history of one year (with reviews at least every 60 days);
  - An assumed close-out period of two days (with the higher of the yield movement over one or two days used as the input);
  - A confidence interval of three standard deviations (99.7%, meaning that initial margin could be breached one day in 334 days).
- The following SPAN parameters are used for RepoClear: scanning ranges; intra-band spread charges; inter-band credits (with the latter two being used to offset positions of different maturities or currencies).

The scanning range

- The scanning range is simply the worst case outright price move that could occur on a bond or cash position in the close-out period
- It therefore assumes a completely directional position without any offsets; and it is therefore the amount that a clearing member deposits on a single bond position
- e.g. one 10 year Bund position, nominal €1,000,000:
- Scanning range = €145,
- Initial margin = €1,000,000 x €145 / 10,000 = €14,500
- NB division by 10,000 converts the nominal into a basis point equivalent (the same basis as the scanning range).

The intra-band spread charge

- The intra-band spread charge recognises that when a portfolio contains positions of different directions (e.g. one long, one short) in different instruments within the same maturity band, the positions offset albeit not perfectly
- Therefore instead of initial margining those positions using the scanning range, the positions are initial margined using the (lower) intra-band spread charge
- e.g. one 4 year Gilt position long nominal of £1,000,000; and one 5 year Gilt position, short nominal of £1,000,000:
- Spread charge = £36 (compared to scanning range = £74);
- And therefore initial margin = £1,000,000 x £36 / 10,000 = £3,600;
- Compared to initial margin under scanning range = £2,000,000 x 74 / 10,000 = £14,800

The inter-band credit

- The inter-band credit recognises that when a portfolio contains positions of different directions (e.g. one long, one short) in similar instruments in different maturity bands (and even in different currencies), the positions still offset to some extent
- It does so by reducing the outright initial margin (from the scanning range) by a percentage
- e.g. one 10 year Bund position long nominal of £1,000,000; and one 4 year Gilt position, short nominal of £1,000,000:
- Scanning ranges are £74 and €145 respectively on Bund and Gilt; inter-band credit is 58%; and therefore,
- Initial margin on Gilt = (£74 x £1,000,000 / 10,000) x (100% - 58%) = £3,108, and on Bund = (€145 x €1,000,000 /10,000) x (100% - 58%) = €6,090

PAIRS for SwapClear

- In terms of key inputs, the following are used for PAIRS – a historical simulation model – in calculating initial margin for SwapClear:
  - A data history of five years;
  - An assumed close-out period of five days (or longer for certain currencies);
  - No confidence interval (the worst case of the resultant 1,250 scenarios is therefore used to calculate initial margin).
- The 1,250 scenarios (based on overlapping returns from the five year data history) are automatically updated each day so that PAIRS captures the most recent yield curve moves.

ERA for EquityClear

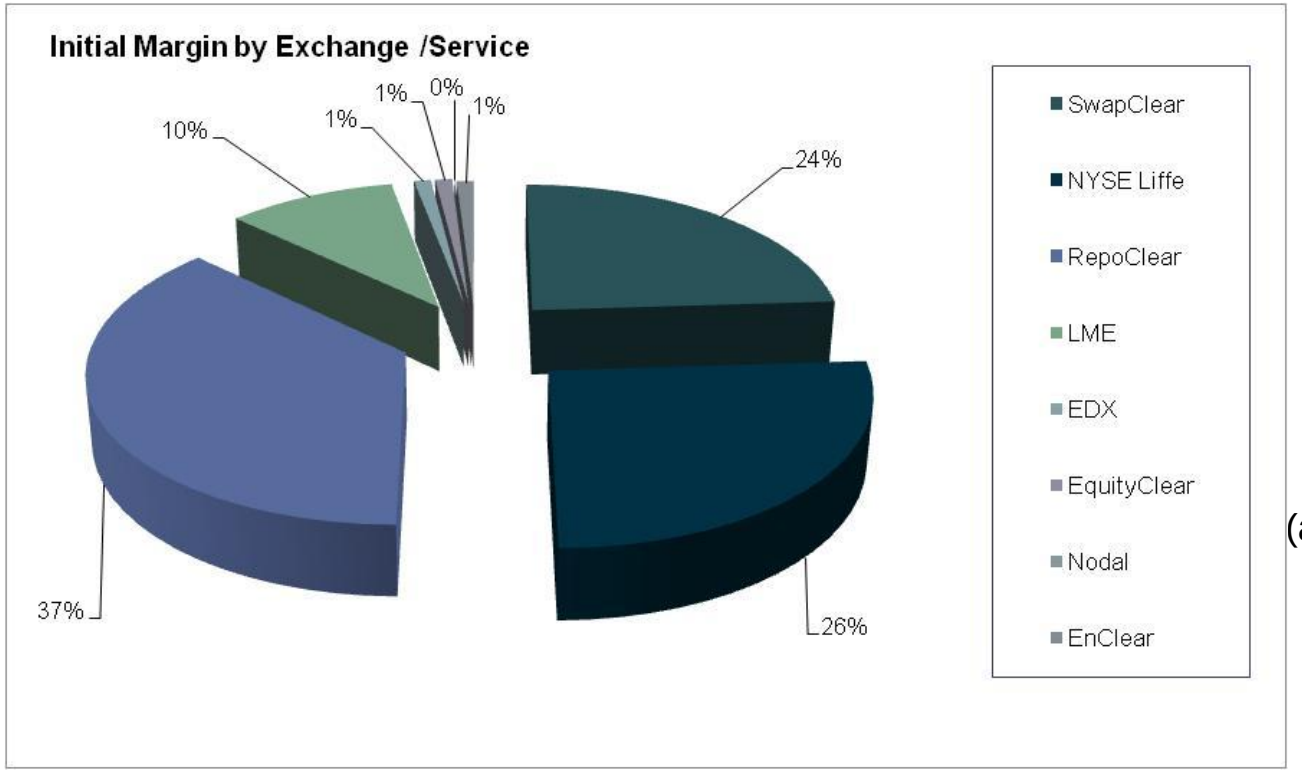
- In terms of key inputs, the following are used for ERA – a historical simulation model – in calculating initial margin for EquityClear:

- A data history of one year;
- A standard assumed close-out period of two days;
- A confidence interval equivalent to three standard deviations, set by discarding the two worst case scenarios and averaging the next four.
- NB the resultant average is multiplied by 140% to allow for potential position volatility over the close-out period

- The 252 scenarios (based on overlapping returns from the one year data history) are automatically updated each day so that ERA captures the most recent price moves.

Scale

- The following shows the amount of initial margin held by LCH.Clearnet Limited by market:



Total initial margin: £31 billion

(as at end – January 2010)

More information, and contact points at LCH.Clearnet Ltd

For further information on LCH.Clearnet Ltd's initial margining please follow this link:

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