CQF: Certificate in Quantitative Finance

Collateral and Margins

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9th March 2023

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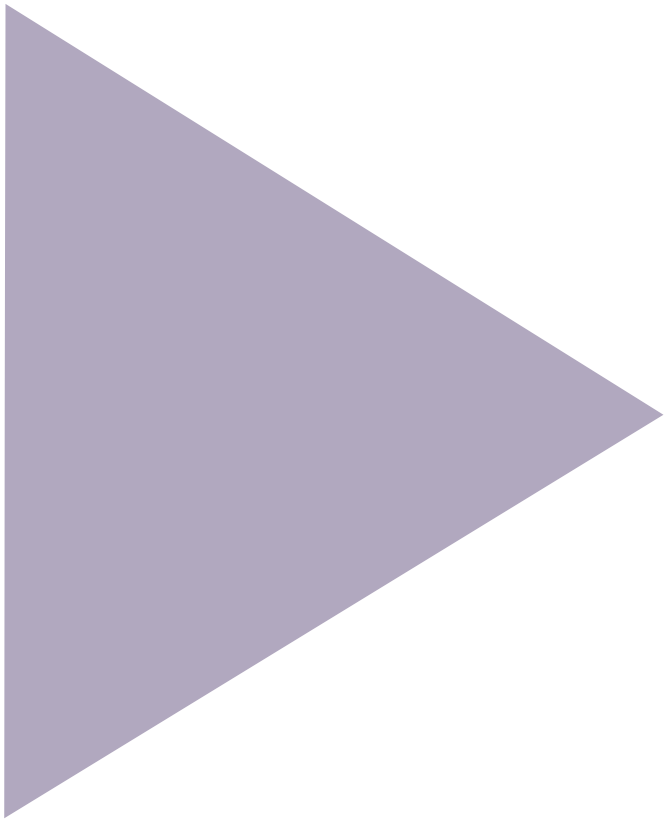

Derivatives as Financial Weapons of Mass Destruction

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First Thoughts

- In Berkshire Hathaway's 2002 annual report, Warren Buffet warns of derivatives:
  - Without collateralization their value depends on the creditworthiness of the counterpart
  - Their mark-to-market can be mark-to-myth and there are no incentives to assure otherwise
  - They often have downgrade triggers requiring greater collateralization, just at the worst time
  - They create a daisy-chain risk, thwarting prudent counterparty diversification

Regulation Related to Derivatives

BASEL III

Strengthen Capital Bases

- *Changes to Market Risk capital requirements (FRTB)*
- *Introduction of a CVA capital charge*
- *Leverage ratio*
- *Prudent valuation (EU)*

Strengthen Liquidity Standards

- *Liquidity Coverage Ratio (LCR)*
- *Net Stable Funding Ratio (NSFR)*

Banks

Clearing Mandate

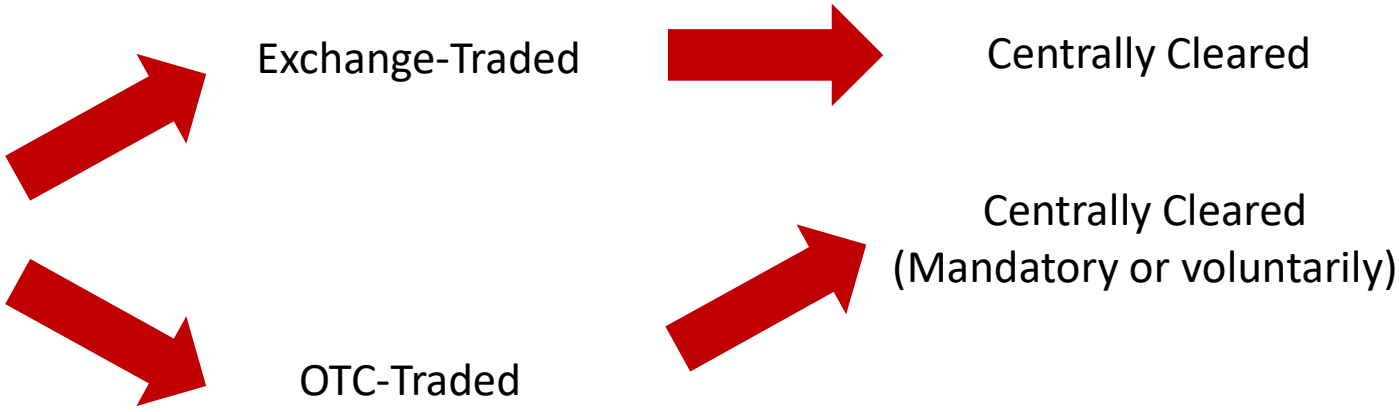
Mandatory central clearing of standardised OTC derivatives

Bilateral margin requirements for non-centrally cleared OTC derivatives

(CPSS-IOSCO)

Banks
Large Financial Counterparties

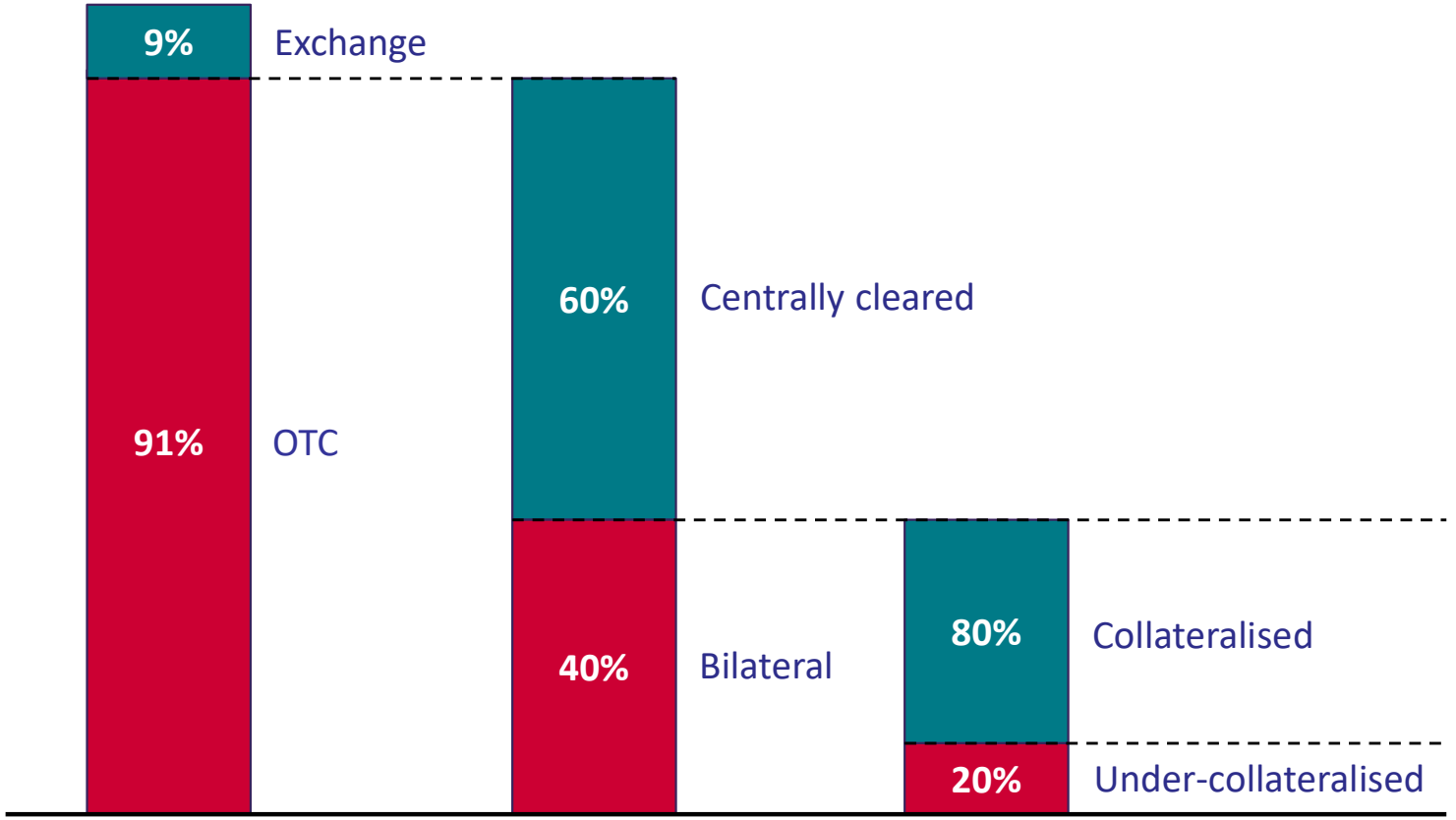
Derivatives, Clearing and Collateralisation



The terms collateral and margin are used somewhat interchangeably

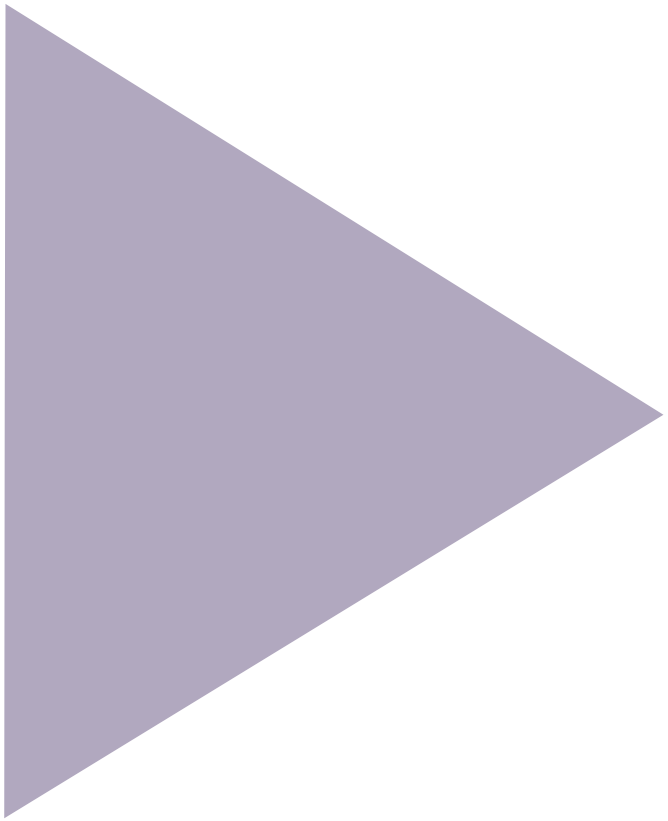
- Variation margin
  - Covers the current value of a portfolio
  - Called for frequently
  - Settlement on an exchange (cash)
  - Collateral in OTC derivatives
- Initial margin (aka independent amount)
  - Acts as a buffer on top of variation margin
  - Accounts for a high quantile move in default (e.g. 99% and 10 days)

The Derivatives Market and Collateralisation



Source: Eurex

Just less than a third of non-financial derivatives users have a CSA in place (ISDA margin survey 2014)



Risk Mitigation in Derivatives

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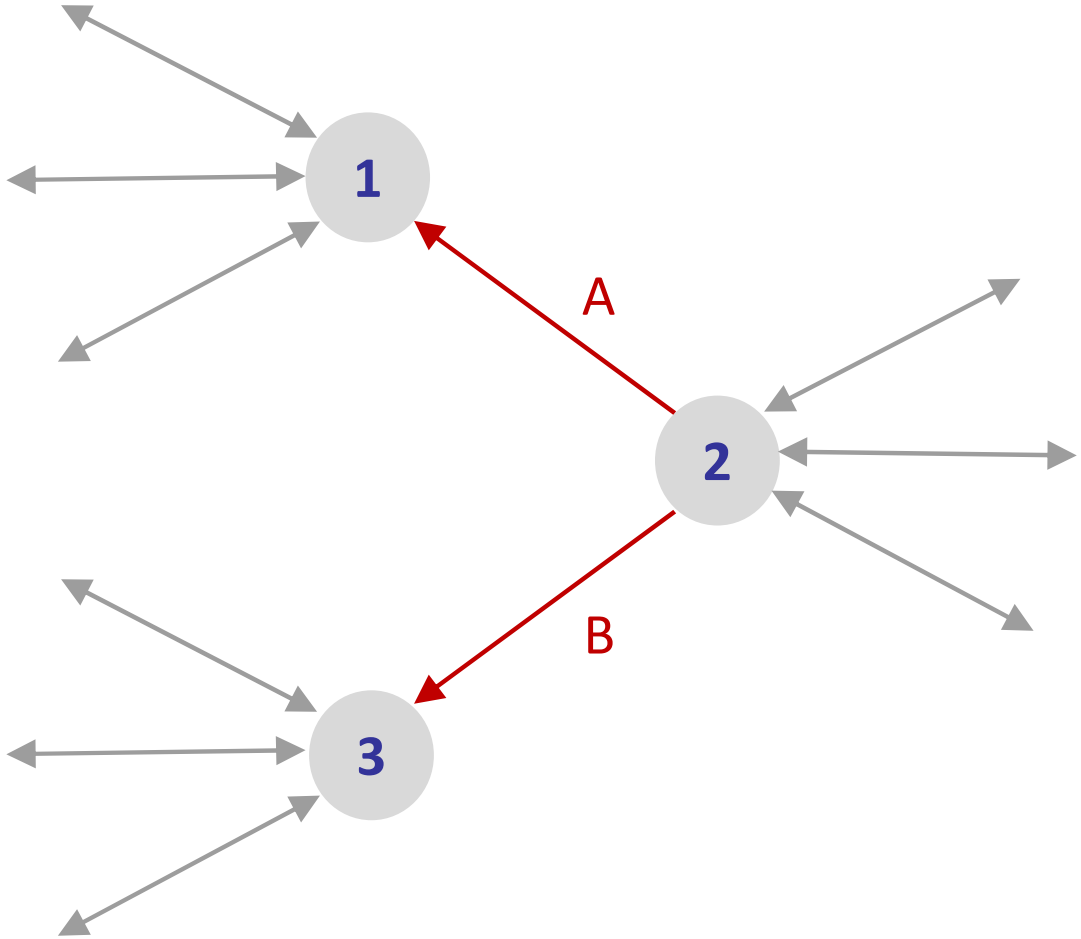
Close-out Netting

	Bank A	Bank B
Derivative trade 1	+100	-100
Derivative trade 2	-50	+50
Derivative trade 3	+200	-200
Derivative trade 4	-300	+300
Derivative trade 5	+150	-150
Gross exposure	**+450**	**+350**
Net exposure	**+100**	**-100**

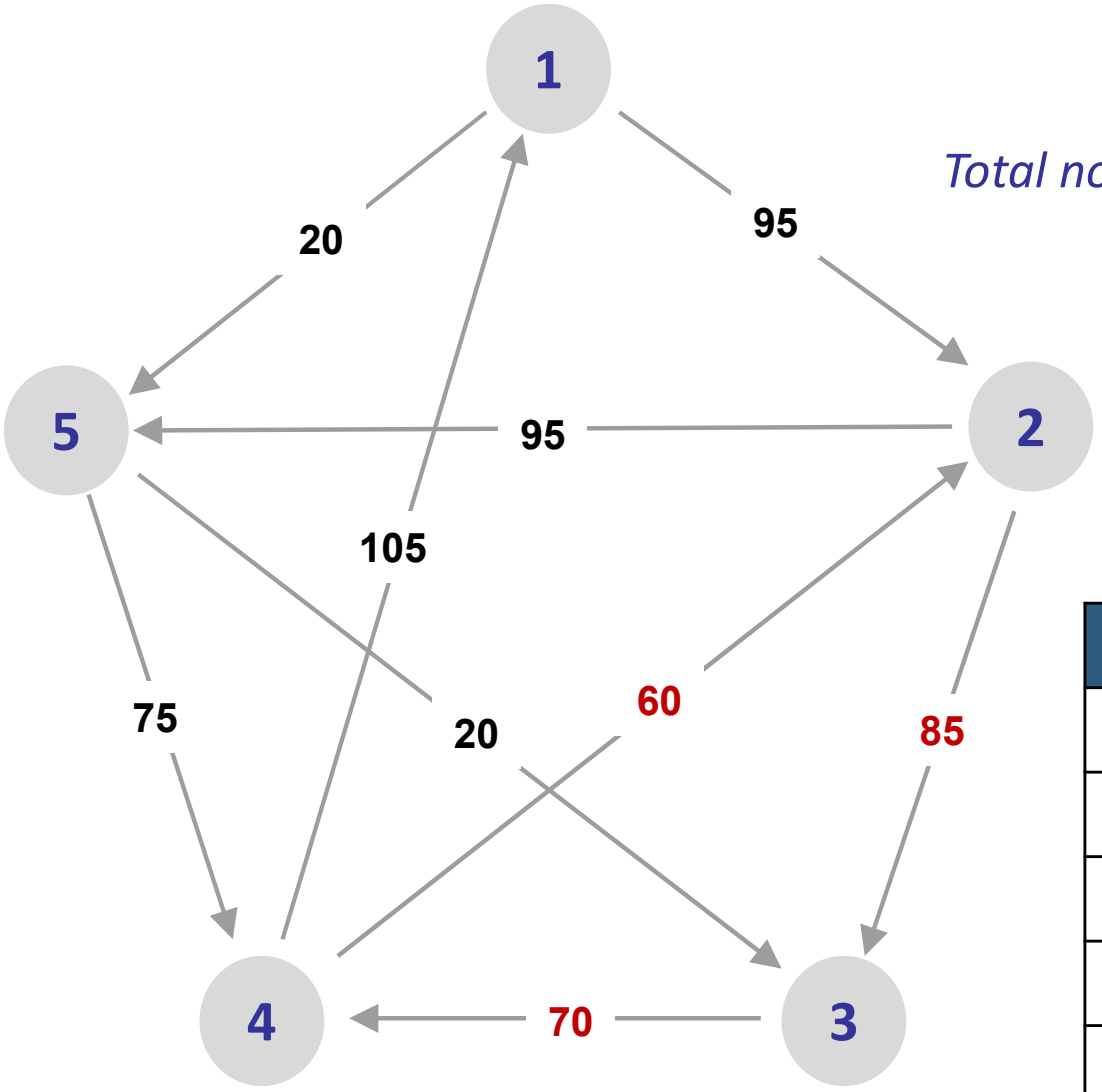
Reduced credit exposure -> reduced counterparty risk -> reduced capital

Multilateral Netting

- Suppose A and B are perfectly offsetting transactions
  - May be able to cancel them depending on the rest of the network
  - Multilateral netting



Compression Example – Initial Network



Total notional = 1250

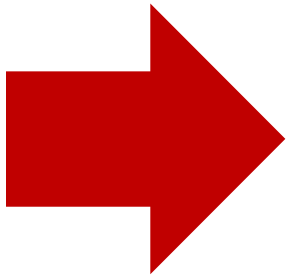
Must be held fixed

	C1	C2	C3	C4	C5	Total
C1	-	95	0	-105	20	**10**
C2	-95	-	85	-60	95	**25**
C3	0		-	70	-20	**-35**
C4	105		-70	-	-75	**20**
C5	-20		20	75	-	**-20**

Trade Compression: CDS Example

Instrument details	
Underlying	Nestle SA
Fixed coupon	100 bps
Maturity	20 September 2022
Dealer Bank's position	100 (net long), 400 (gross longs)

Counterparty	Long/(Short)
A	100
B	(50)
C	150
D	(100)
E	50
F	(150)
G	100



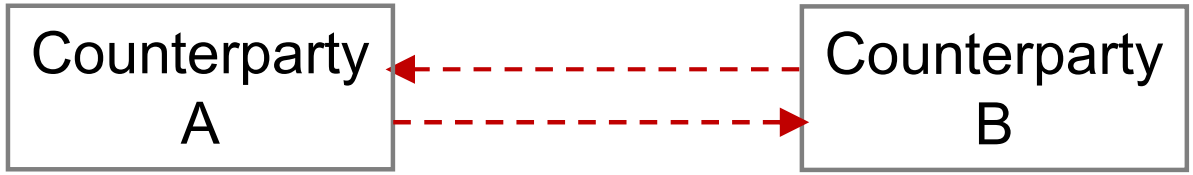
Counterparty	Long/(Short)
Any of A, C, G or combination including E	100

Cashflow Compression: Blended Rate Compression IRS Example

Trade	Pay/ Rec	Notional ($)	Fixed rate	Annualised cash flow ($)
1	Rec	100,000,000	2.34%	2,340,000
2	Rec	75,000,000	2.36%	1,770,000
3	Rec	50,000,000	2.38%	1,190,000
4	Pay	-150,000,000	2.35%	- 3,525,000
5	Rec	100,000,000	2.28%	2,280,000
6	Pay	-125,000,000	2.30%	- 2,875,000
Total (Net)		**50,000,000**		1,180,000
Total (Gross)		**600,000,000**		

Risk replacement trade				
Trade	**Pay/ Rec**	**Notional ($)**	**Fixed rate**	**Annualised cash flow ($)**
	Rec	50,000,000	2.36%	1,180,000

Bilateral OTC Markets - Overview



- Netting
  - Bilateral (potentially multilateral compression)
- Collateral
  - Bespoke agreement between counterparties (ISDA CSA)
  - BCBS-IOSCO bilateral margin requirements being introduced
- Default
  - Can declare a counterparty in default if they fail to post collateral after cure period
- Close-out
  - Surviving counterparty makes determination according to documentation
  - Potential for litigation (many examples in the case of Lehman)
- Replacement
  - Bilateral

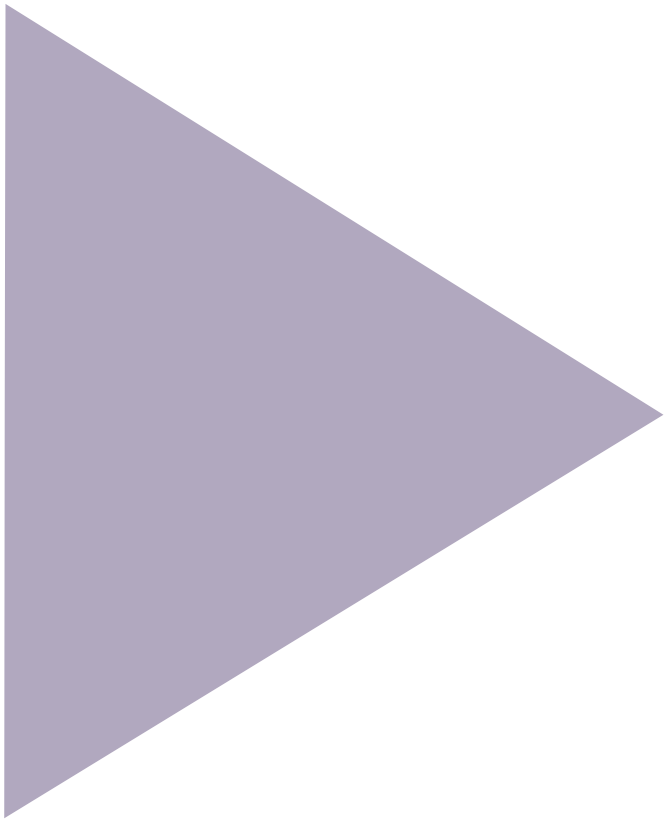
Case Study – Close-out costs

Lehman, Citi Settle $2 Billion Financial Crisis-Era Dispute

- Key Points*
  - Citigroup said it was owed $2 billion as a result of Lehman's bankruptcy
  - Lehman against this and claimed that the money in fact should go to its creditors
  - Lehman accused Citigroup using methods such as "phantom transaction costs" to try and justify its claim
  - Citigroup agreed to give back $1.74 billion to the estate of Lehman from a total of $2.1 billion

  "*Citigroup says it used its best professional judgment to determine close-out amounts on the trades. The contracts, the bank said, were governed by ISDA agreements which give the non-defaulting party -- in this case Citigroup -- the right to assess the close-out costs as long as it uses commercially reasonable procedures.*"

* Source: Bloomberg 30th September 2017



Collateral in OTC Derivatives

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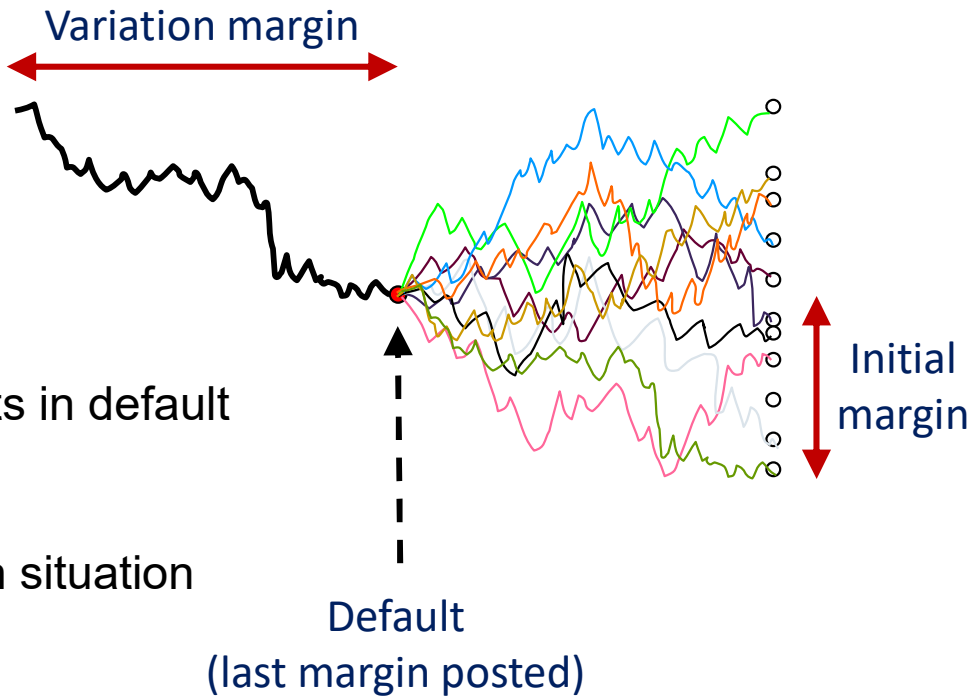
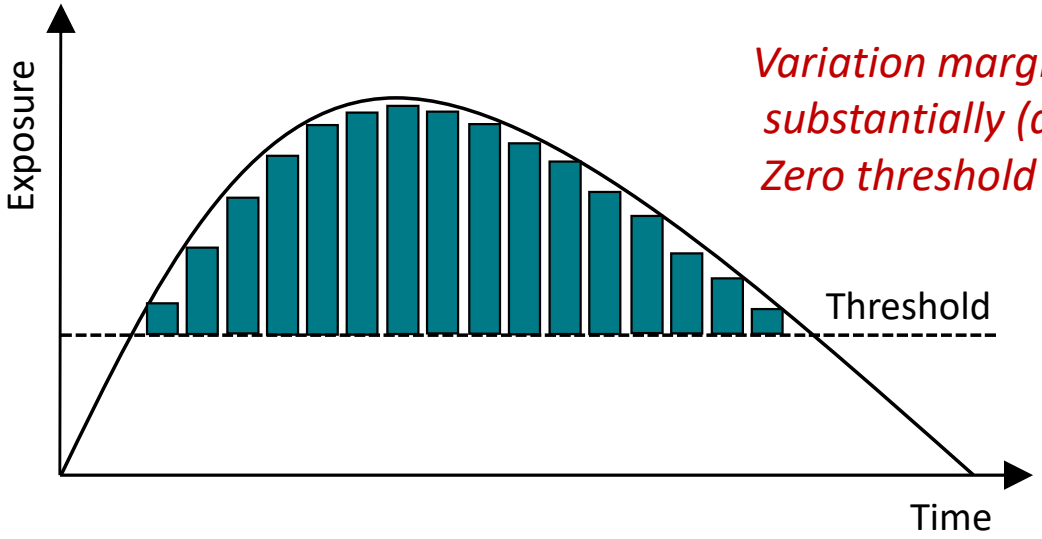
Variation and Initial Margin

- Variation margin
  - Broadly taken against the current value
  - Frequent posting (e.g. daily)
  - For exchange-traded derivatives, this is a settlement process
  - Inherent delay known as the margin period of risk (MPoR)



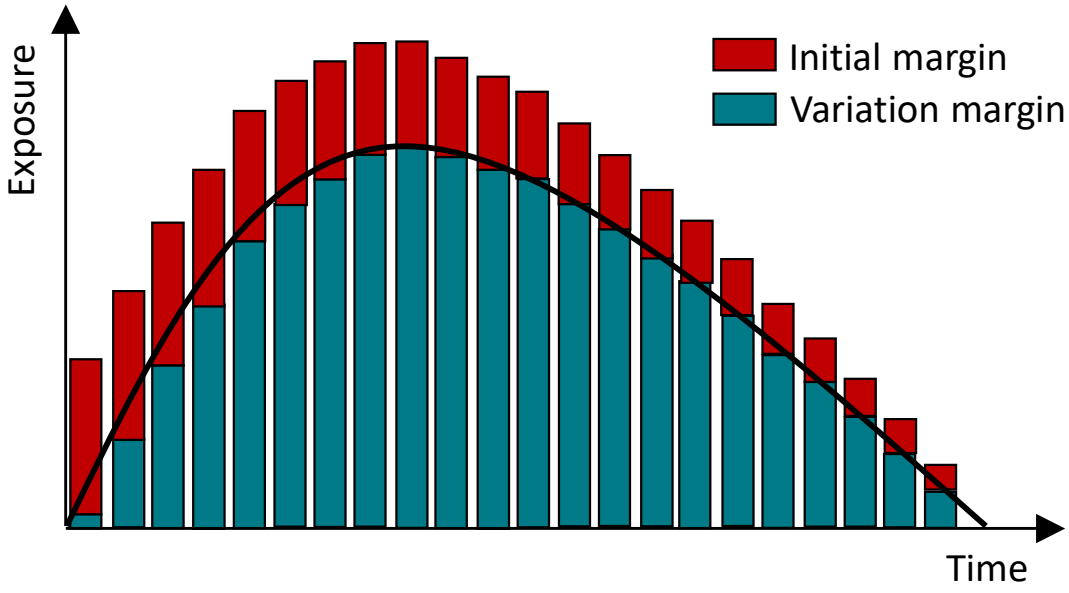
- Initial margin
  - Additional collateral to cover close-out costs in default
  - Taken to a high confidence level
  - Time horizon from 1-10 days depending on situation

Collateral Reducing Exposure

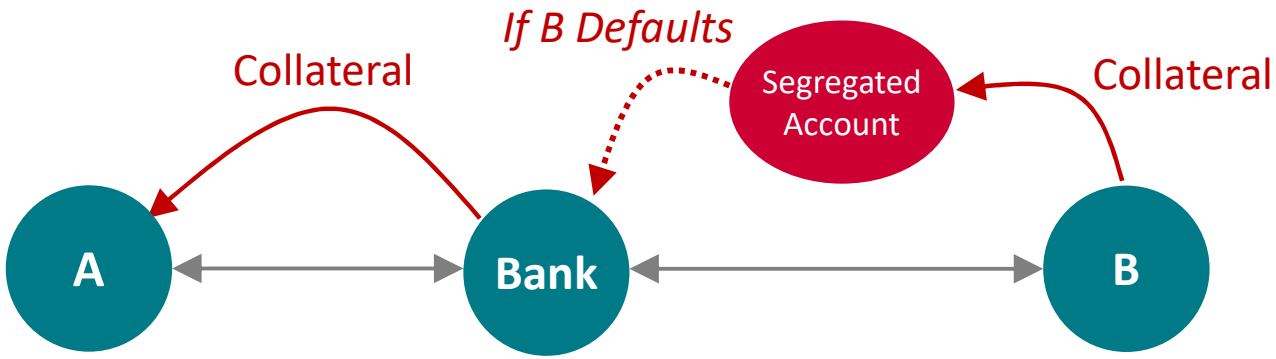


Variation margin should reduce exposure substantially (apart from any threshold)
Zero threshold = 'strongly collateralised'

Initial margin should reduce exposure even further potentially so that it is negligible ('overcollateralisation')

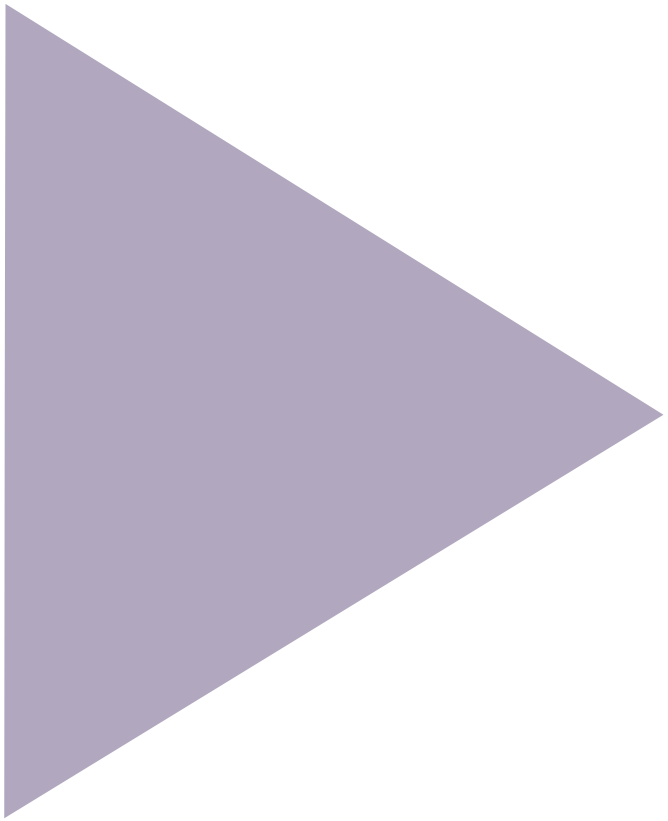


Collateralisation and Funding



In general, FVA reflects a market funding risk premium inherent in the uncollateralized portion of derivative portfolios, and in collateralized derivatives where the terms of the agreement do not permit the reuse of the collateral received.

Some borrowers also looked at trying to make CSAs more symmetric. KfW, for example, started to post collateral in the form of its own bonds. Obviously as it is using its own bonds as collateral its counterparties are not really protected from its credit risk, but banks can still repo out KfW's bonds with the ECB.



Central Clearing

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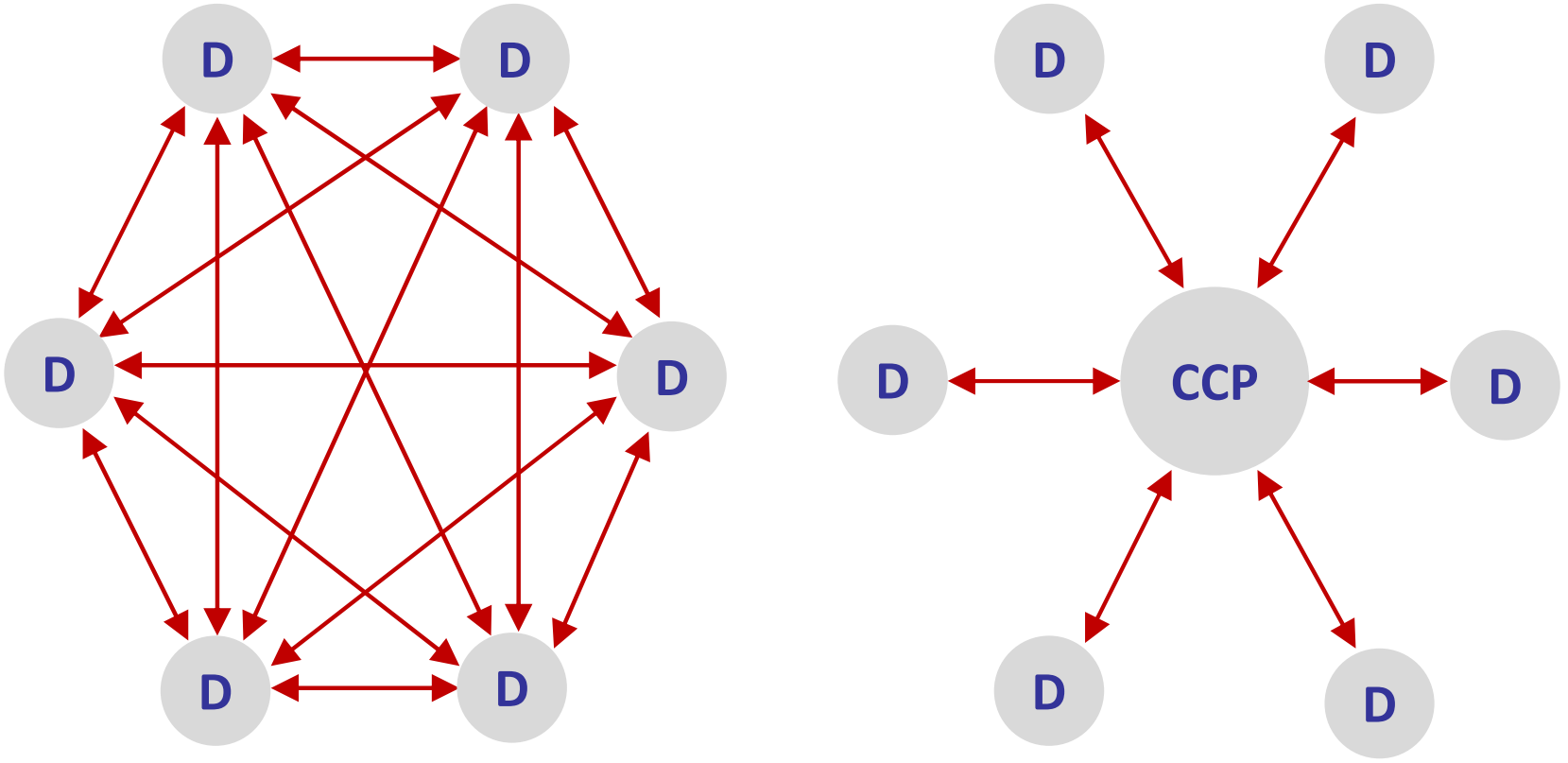
Centrally Cleared Market - Dealers



OTC Derivatives and the Crisis

- OTC derivatives were generally seen as causing / contributing to the global financial crisis (2007 onwards)
  - Lehman had millions of OTC trades which were difficult to closeout and replace
  - Fear of knock-on effects and other systemic concerns
  - Lack of transparency

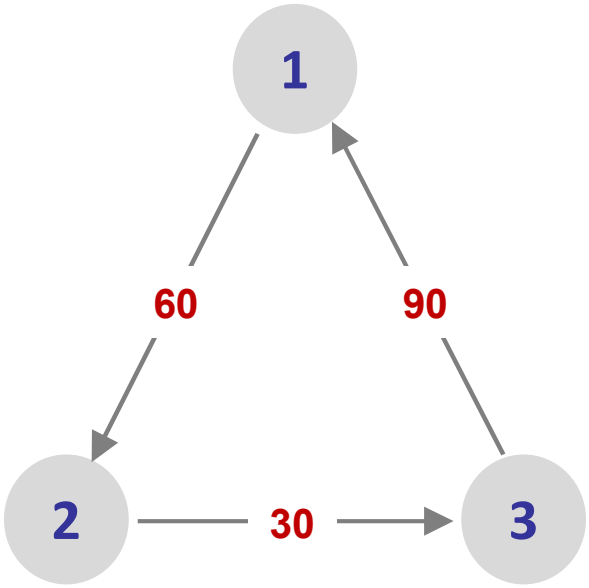
"The primary advantage of a CCP is its ability to reduce systemic risk through multilateral netting of exposures, the enforcement of robust risk management standards, and mutualization of losses resulting from clearing member failures."

International Monetary Fund, 2010, "Making over-the-counter derivatives safer: the role of central counterparties", Chapter 3, Global Financial Stability Report April

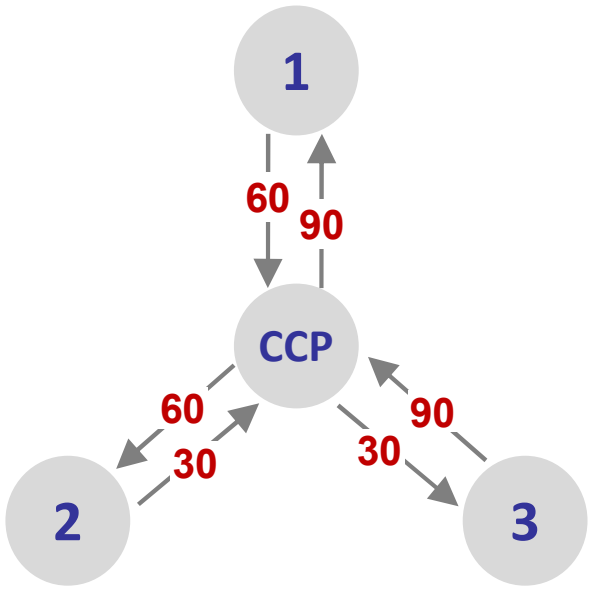
- What about CCPs?
  - SwapClear had a $9 trillion 66,000 trade interest rate portfolio to deal with
  - Closed out all positions within 3 weeks (most of the risk was hedged prior to this)
  - Held enough initial margin from Lehman to cover related losses (they returned two thirds)

Netting

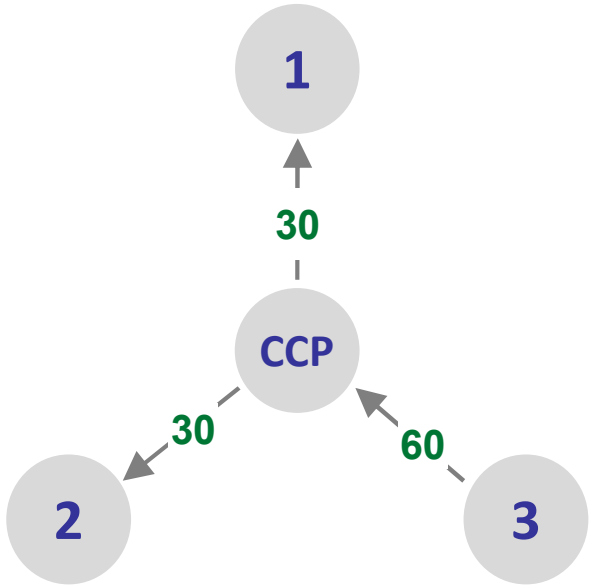
Bilateral market



Novation to CCP

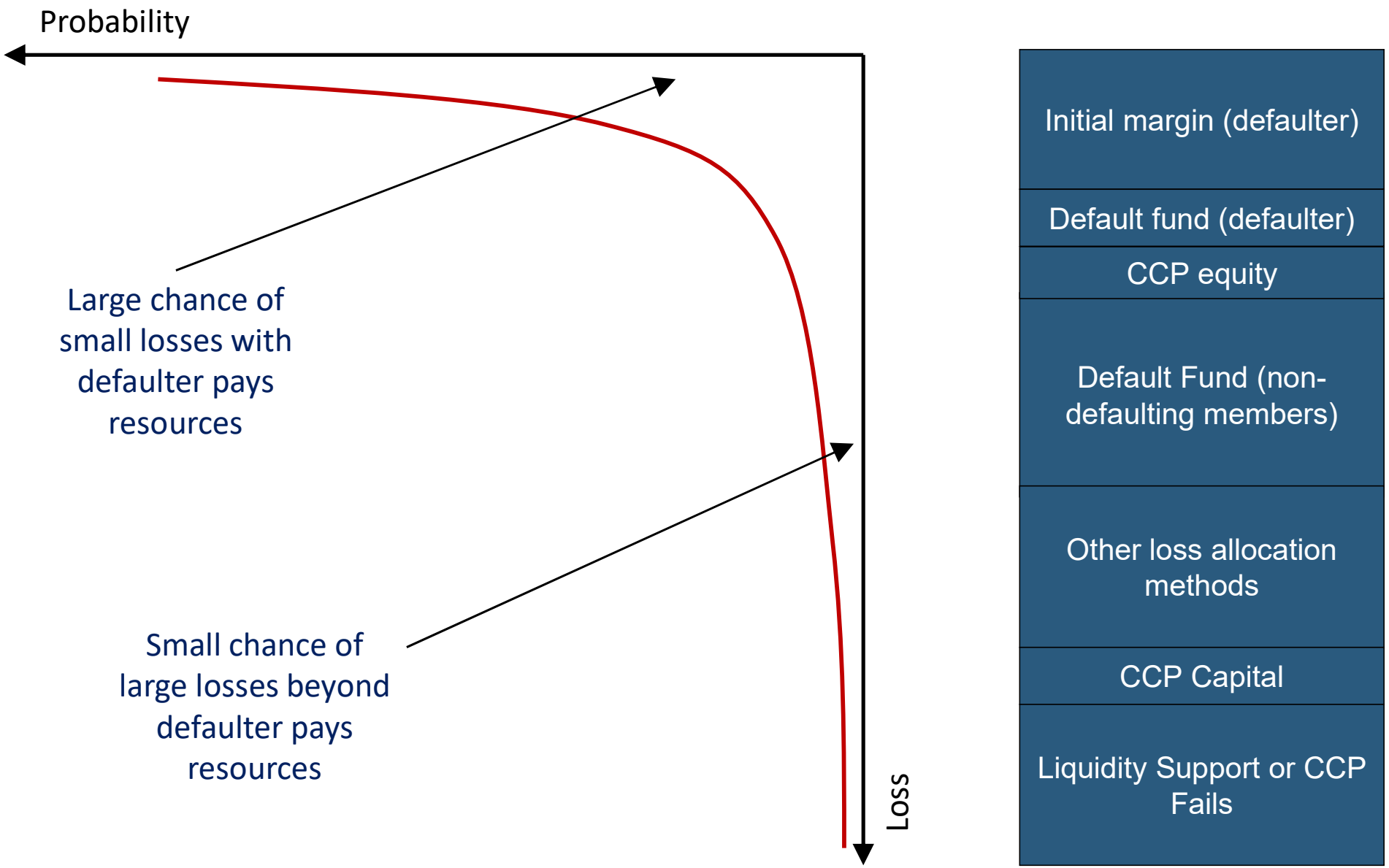


CCP Netting

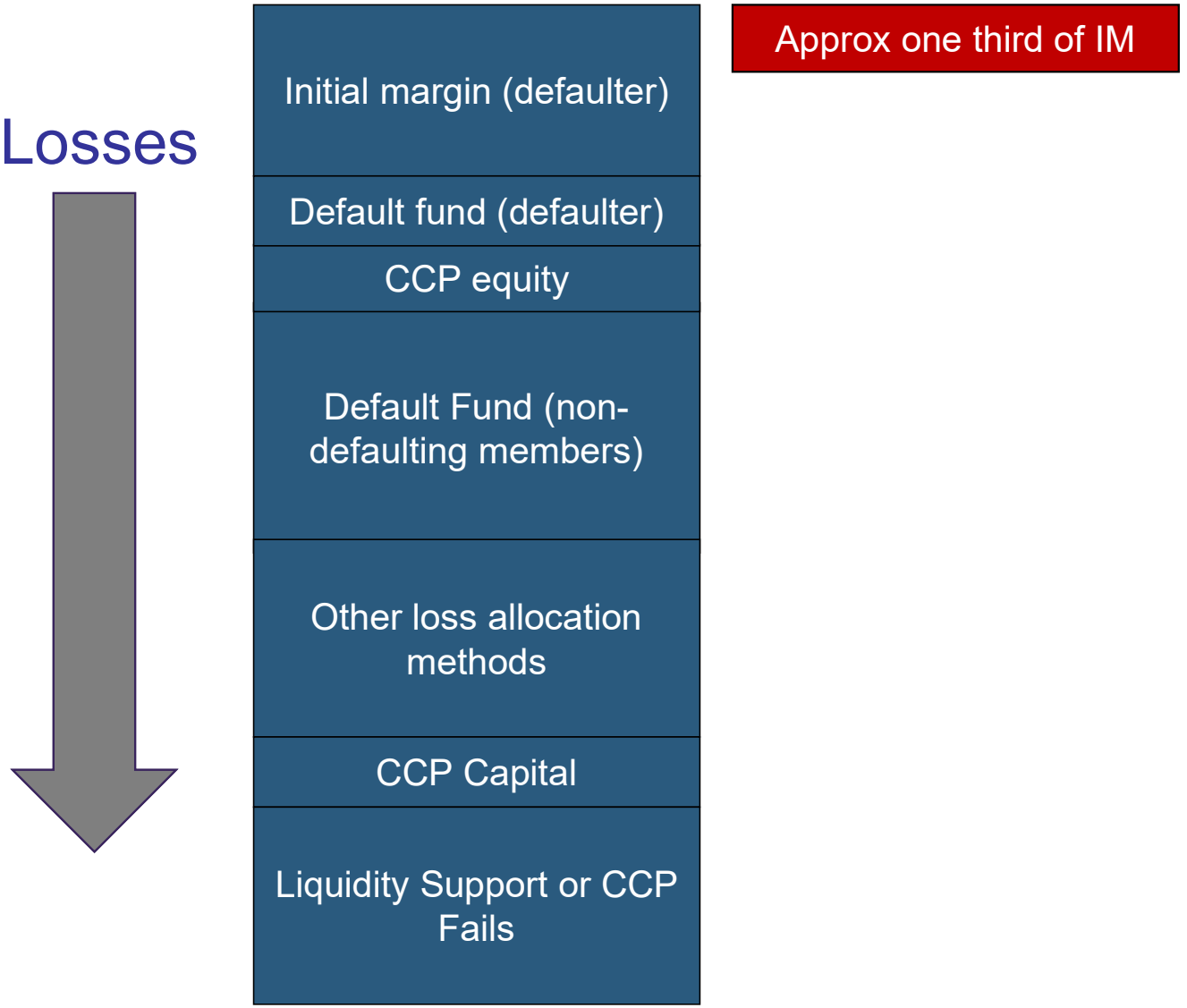


	Exposure	
	Bilateral	Centrally cleared
Cntrpty 1	90	30
Cntrpty 2	60	30
Cntrpty 3	30	0
CCP	n/a	60

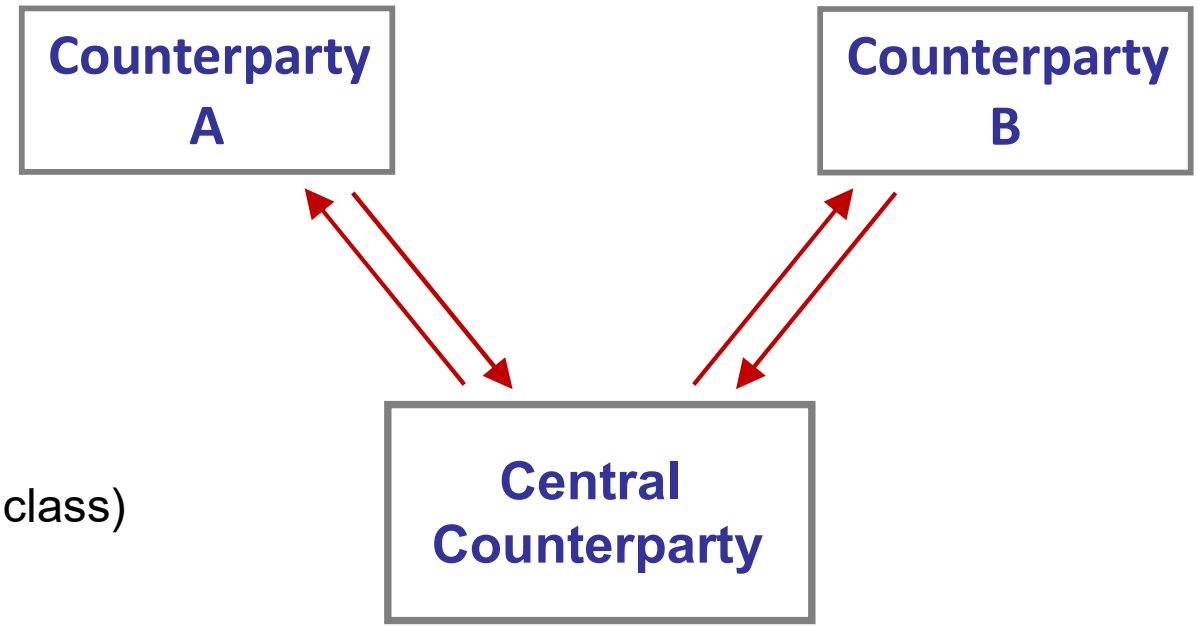
The Loss Waterfall and Loss Distribution



Default Fund – LCH and Lehman Brothers (2008)



Cleared Markets - Overview



- Netting
  - Multilateral (broadly within asset class)
- Collateral
  - Standard agreement involving variation and initial margin
- Default
  - Can declare a member in default if they fail to pay margin or there is a solvency concern
- Close-out
  - CCP macro hedging and auction
- Replacement
  - Central

Bilateral Margin Requirements

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Bilateral Margin Requirements - Motivation

Margin requirements for non-centrally cleared derivatives have two main benefits:

Reduction of systemic risk. Only standardised derivatives are suitable for central clearing. A substantial fraction of derivatives are not standardised and cannot be centrally cleared.[4] These non-centrally cleared derivatives, totalling hundreds of trillions of dollars in notional amounts,[5] pose the same type of systemic contagion and spillover risks that materialised in the recent financial crisis. Margin requirements for non-centrally cleared derivatives would be expected to reduce contagion and spillover effects by ensuring that collateral is available to offset losses caused by the default of a derivatives counterparty. Margin requirements can also have broader macroprudential benefits, by reducing the financial system's vulnerability to potentially destabilising procyclicality and limiting the build-up of uncollateralised exposures within the financial system.

Promotion of central clearing. In many jurisdictions, central clearing will be mandatory for most standardised derivatives. But clearing imposes costs, in part because CCPs require margin to be posted. Margin requirements on non-centrally cleared derivatives, by reflecting the generally higher risk associated with these derivatives, will promote central clearing, making the G20's original 2009 reform programme more effective. This could, in turn, contribute to the reduction of systemic risk.

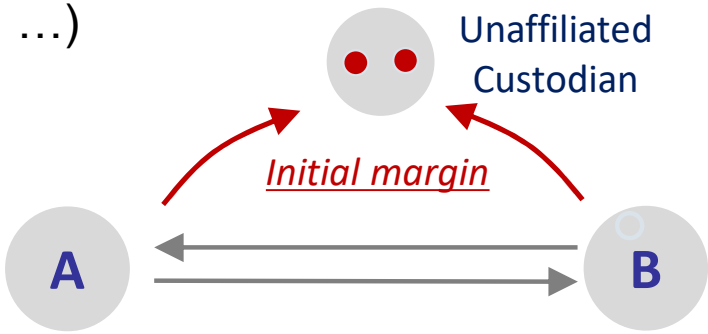
BCBS-IOSCO Requirements - Variation Margin

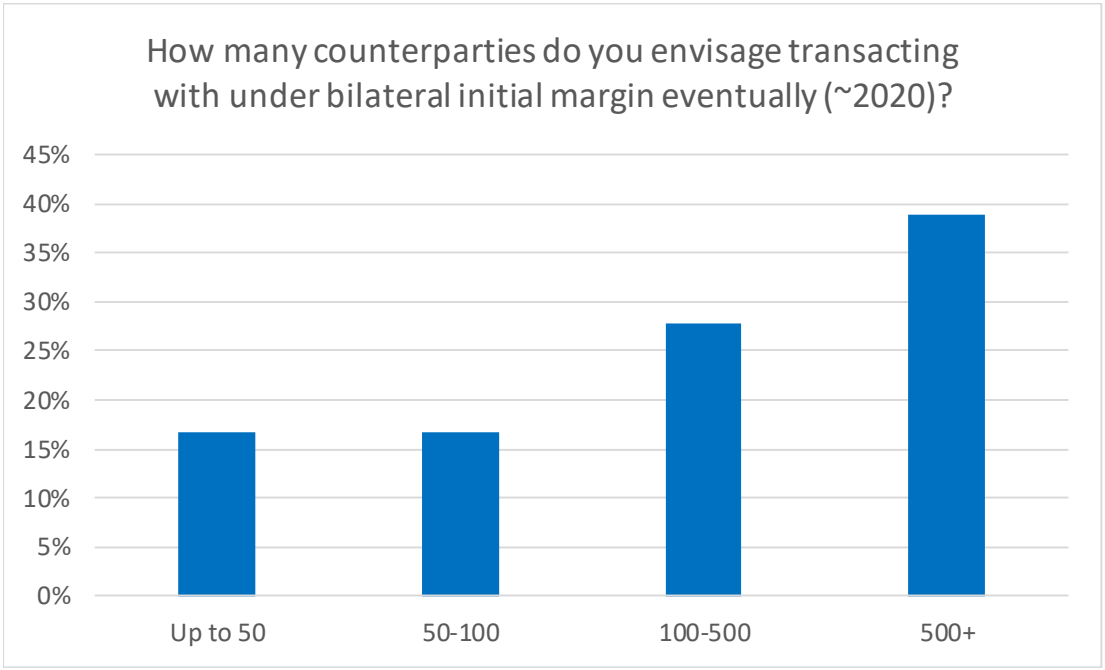
- Requirements
  - On a regular basis (e.g. daily)
  - T+1 settlement
  - Bilateral full margin (zero threshold)
  - Minimum transfer amount no more than €500,000
  - Cash is incentivised (directly of via punitive haircuts)

Requires all relationships where one party is not exempt (e.g. interdealer) to be "strongly collateralised"

BCBS-IOSCO Requirements - Initial Margin

- Overcollateralisation
  - 99% confidence level, 10-day time horizon (see later discussion on SIMM)
  - Universal IM threshold of 50m Euro below which IM doesn't have to be exchanged
  - Independent unaffiliated custodian (BNY, Euroclear, …)



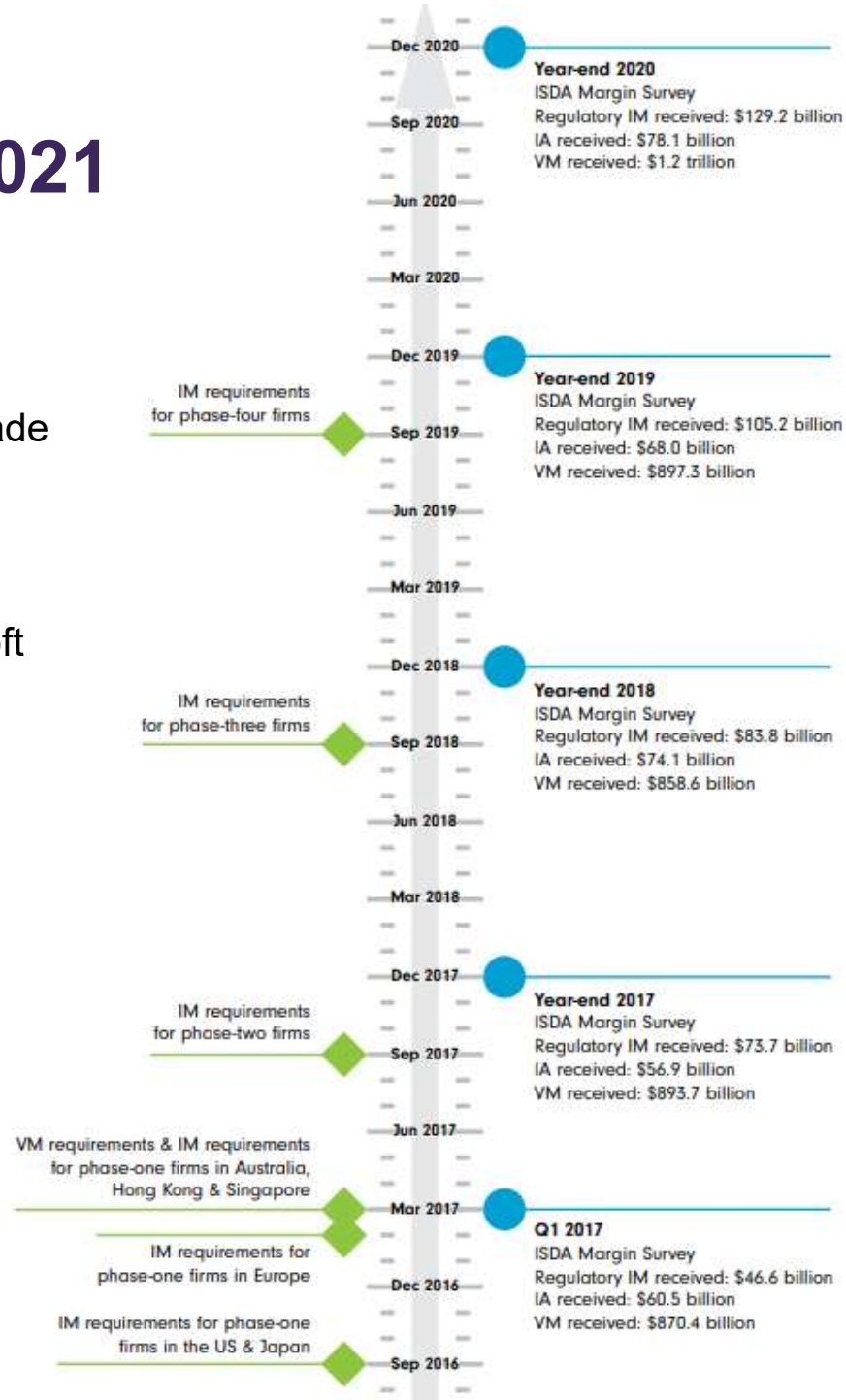


Source: McKinsey / Solum Survey 2017

Monthly non-CCP notional	From	Firms in scope
3 Trillion	1st September 2016	20
2.25 Trillion	1st September 2017	26
1.5 Trillion	1st September 2018	36
0.75 Trillion	1st September 2019	86
50 billion	1st September 2021	hundreds
8 Billion	1st September 2022	thousands

ISDA Margin Survey October 2021

- General
  - Thousands of new initial margin CSAs in place
  - Millions of new trades in scope with tens of millions of trade sensitivities calculated
  - Hundreds of IM calls per day
  - Most firms appear to be using ISDA SIMM and AcadiaSoft Exposure Manager with the potential exception of some internal trades
- 20 largest market participants
  - $129.2 billion of regulatory IM (23% increase)
  - $78.1 billion of discretionary IM (IA) (15% increase)
- 12 next largest (6 phase 2 firms + 6 phase 3)
  - $7.4 billion of regulatory IM
  - $3.1 billion of discretionary IM



ISDA Margin Survey October 2021 (II)

Chart 1: Composition of Regulatory IM Received by Phase-one Firms

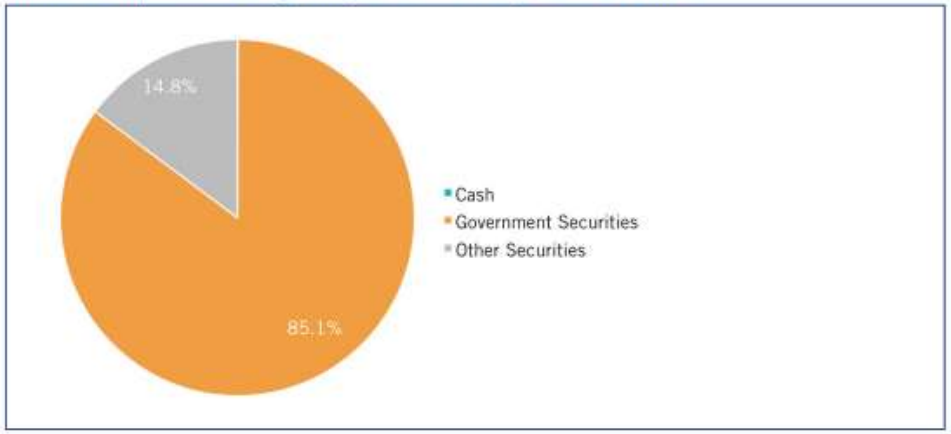
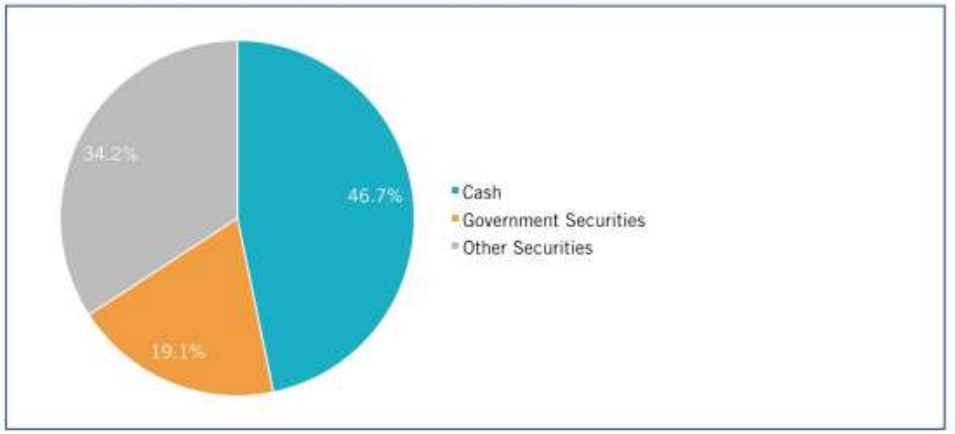
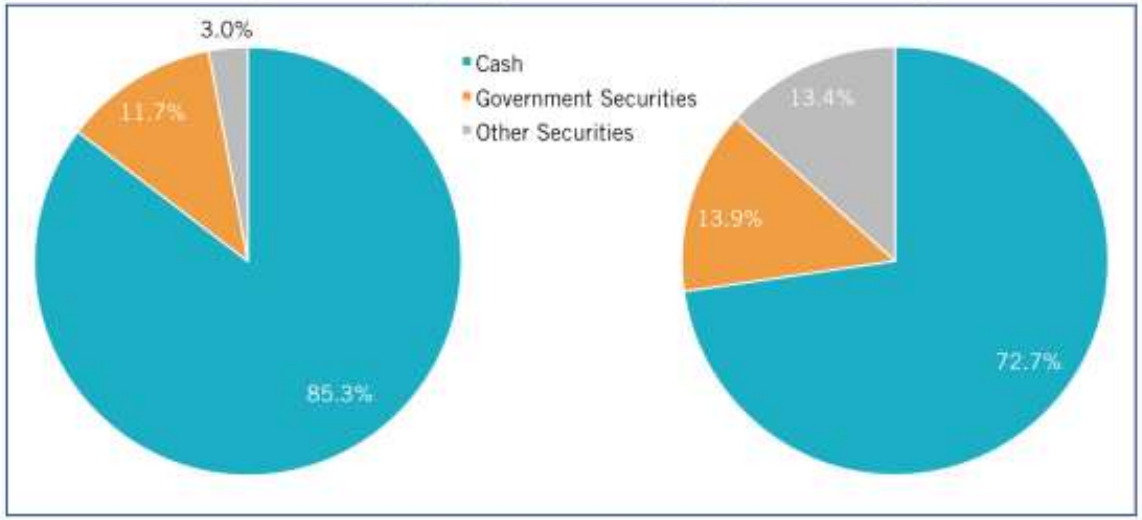


Chart 2: Composition of IA Received by Phase-one Firms



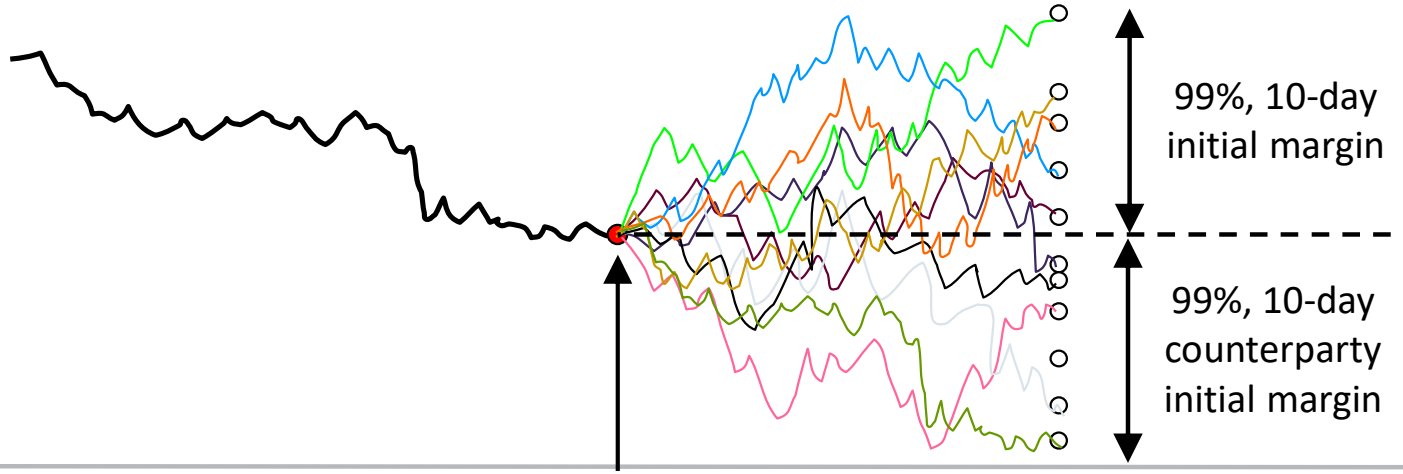
Charts 3 and 4: Composition of Regulatory and Discretionary VM Received by Phase-one Firms

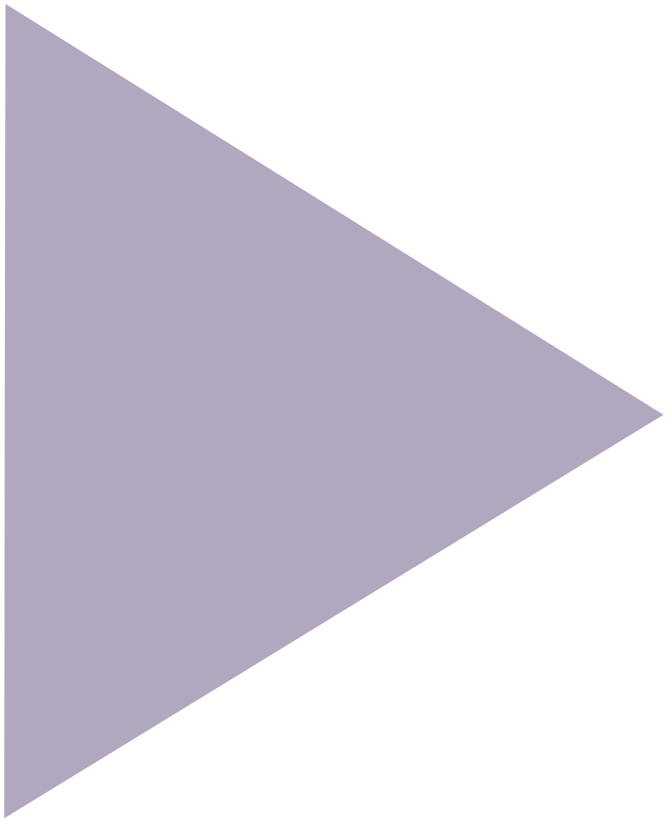


Source: ISDA

Initial Margin is a Dynamic Quantity

- Historically initial margin (independent amount) has been rare and when used is often based on very simple metrics (e.g. percentage of notional)
  - This makes calculation straightforward but it is not very risk sensitive (i.e. does not properly recognise portfolio diversification)
- In the future, initial margin will be more risk sensitive and dynamic
  - CCPs use value-at-risk (VAR) type methodologies for OTC derivatives
  - Bilateral markets will use SIMM (standardised initial margin model) which represents a simpler VAR approach based on sensitivities
  - Initial margins can therefore change significantly even in the absence of trading activity





Initial Margin Methodologies

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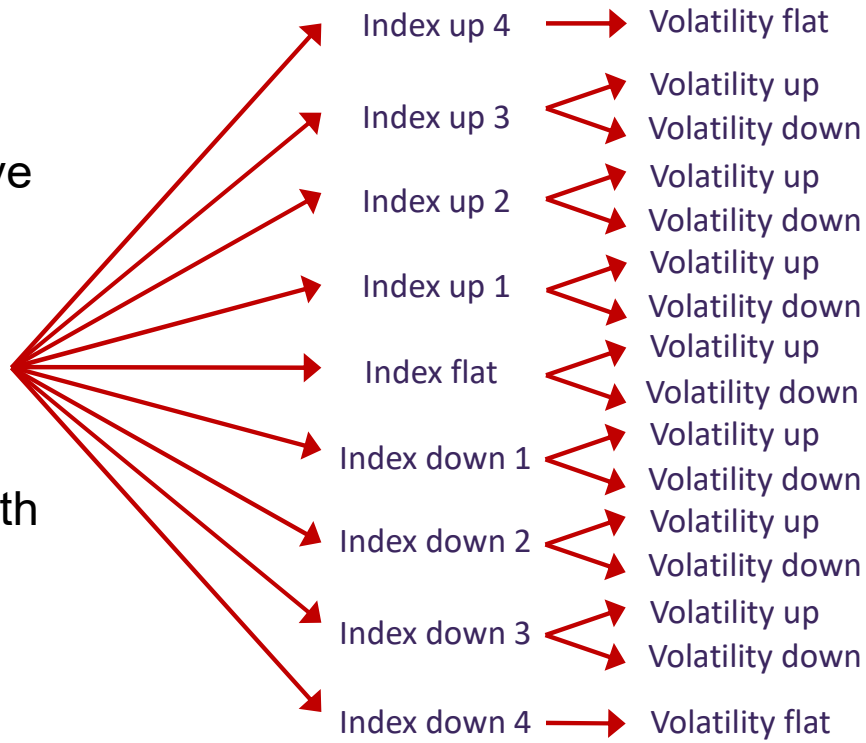
Initial Margin for Derivatives

	Exchange traded	Centrally cleared OTC	Bilateral OTC (BCBS-IOSCO)	Bilateral OTC (Independent amount)
Model	SPAN™	Historical Value-at-risk	ISDA SIMM™	Simple (e.g. add-on)
MPR	1-2 days	5-days	10-days	n/a
Recalibration	Periodic	Continuous	Annually	Rare
Threshold	-	-	€50m	n/a
Portfolio	Counterparty (asset class)	CCP (asset class)	Counterparty (asset class)	Trade level

SPAN

- Standard Portfolio Analysis of Risk (SPAN)
  - Developed by CME in the 1980s for exchange-traded products
  - By 2008 was licenced by more than 50 exchanges and CCPs globally
- Methodology
  - Evolve individual risk factors (e.g. spot price, volatility) combinatorially
  - Shift based on a potential one- or two-day move
  - Typically a total of 16 shifts are used (14 reasonable and 2 extreme)
- Advantages
  - Risk sensitive (e.g. NASDAQ position offset with S&P500 position)
  - Simple and tractable

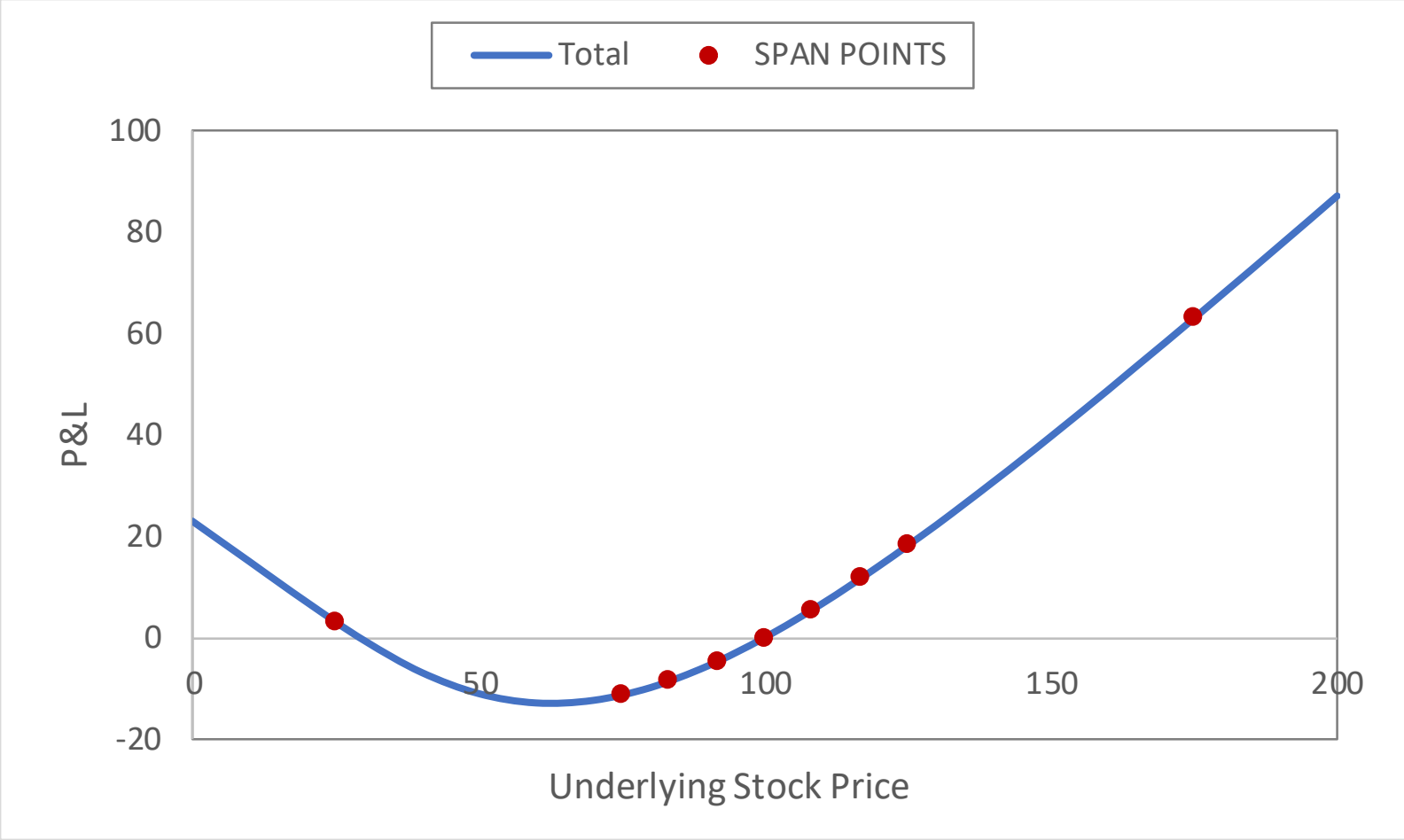


SPAN Example

Scenario	SP Underlying Price Move	Volatility Move	SP Future Gain/Loss	SP Option Gain/Loss	Portfolio Gain/Loss
1	UNCHANGED	UP	0	1,807	1807
2	UNCHANGED	DOWN	0	-1,838	-1,838
3	UP 33%	UP	-7,499	7,899	400
4	UP 33%	DOWN	-7,499	5,061	-2,438
5	DOWN 33%	UP	7,499	-3,836	3,663
6	DOWN 33%	DOWN	7,499	-8,260	-761
7	UP 67%	UP	-15,001	14,360	-641
8	UP 67%	DOWN	-15,001	12,253	-2,748
9	DOWN 67%	UP	15,001	-8,949	6,052
10	DOWN 67%	DOWN	15,001	-13,980	1,021
11	UP 100%	UP	-22,500	21,107	-1,393
12	UP 100%	DOWN	-22,500	19,604	-2,896
13	DOWN 100%	UP	22,500	-13,455	9,045
14	DOWN 100%	DOWN	22,500	-18,768	3,732
15	UP 300%	UNCHANGED	-22,275	21,288	-987
16	DOWN 300%	UNCHANGED	22,275	-9,160	13,115
				Largest Potential Loss = SPAN Risk	**13,115**

Source: CME

SPAN and Options



Historical Simulation Formula

- Procedure
  - Simulate risk factors from today (n) to tomorrow (n+1) using historical changes

$$\underbrace{v_{n+1}^{i}}_{\text{Simulation of risk factor for } i^{th} \text{ scenario}} = \underbrace{v_n}_{\text{Risk factor now}} \times \frac{v_i}{v_{i-1}} \quad \left.\right\} \text{Relative change in risk factor in the past (time i)}$$

Volatility Scaling

- Scale historical movements by the ratio of current volatility to the past volatility

$$v_{n+1}^{i} = v_n \left(1 + \frac{(v_i - v_{i-1})}{v_{i-1}} \frac{\sigma_{n+1}}{\sigma_i}\right)$$

Relative change in risk factor

Relative change in volatility estimate

  - *"A EWMA (Exponentially Weighted Moving Average) volatility model is used as the forecasting model to provide volatility forecasts 'as if' computed on each day in the time series. The percentage changes in these conditional volatility forecasts are used to adjust historical shocks to account for the change in the conditional volatility forecast between the date of the shock and 'today'" (CME)*

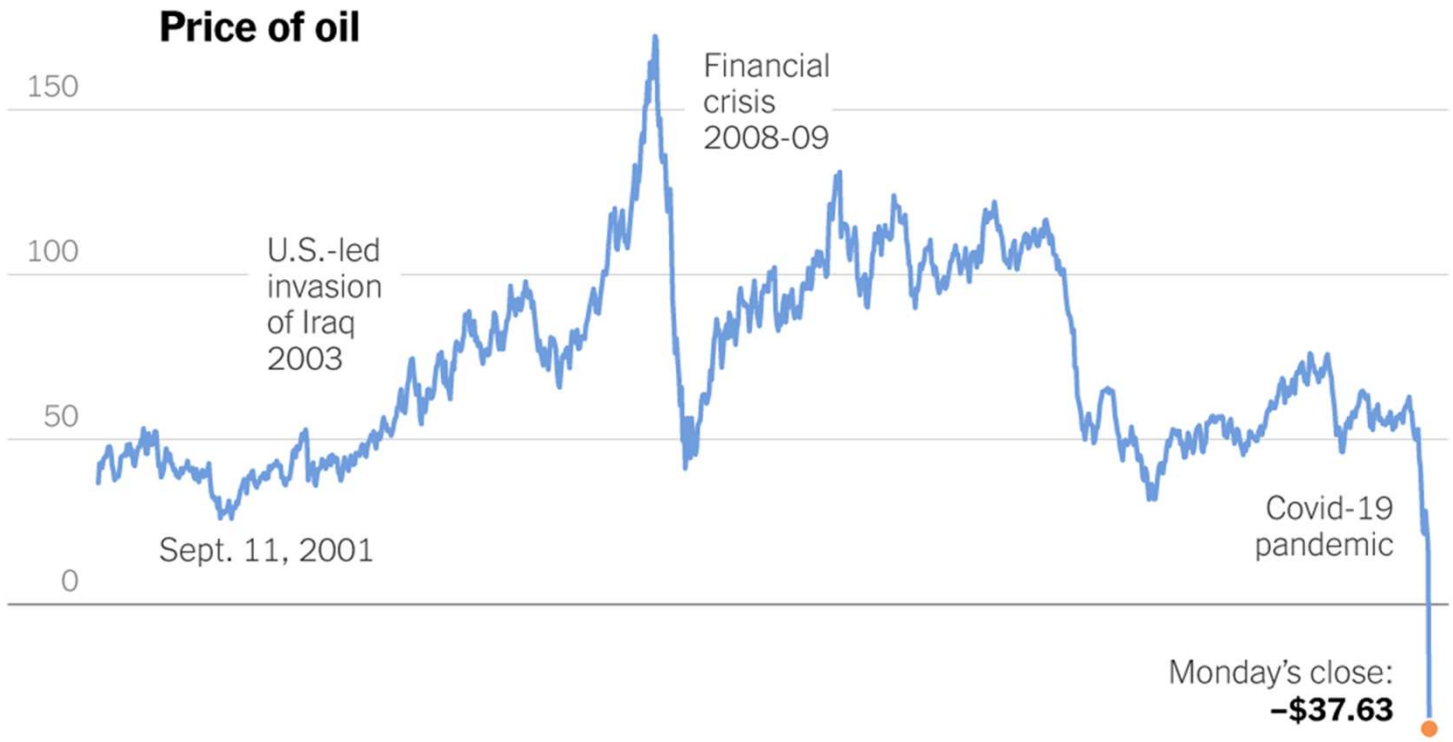
Challenges for OTC Initial Margin Calculations

- Data window
  - A long time horizon may be irrelevant but short time horizons may lead to procyclicality as events “drop out” of the data set
  - Scaling methods such as EWMA (more weight to most recent observations) are procyclical
- Relative or absolute returns?
  - One or the other may be conservative depending on if rates are low or high
- Risk measure
  - A more extreme scenario will give rise to greater procyclicality
  - VAR has some unpleasant features (e.g. subadditivity is not guaranteed)
- Portfolio size
  - A bigger portfolio should be penalized?
- Linkage to credit quality
  - A weaker clearing member should pay more
  - But this can lead to cliff edge effects

Oil Price Example

CME was ill-prepared for negative oil prices, FCMs say

Bourse draws criticism over timing of options model change; delay in sending key margin file

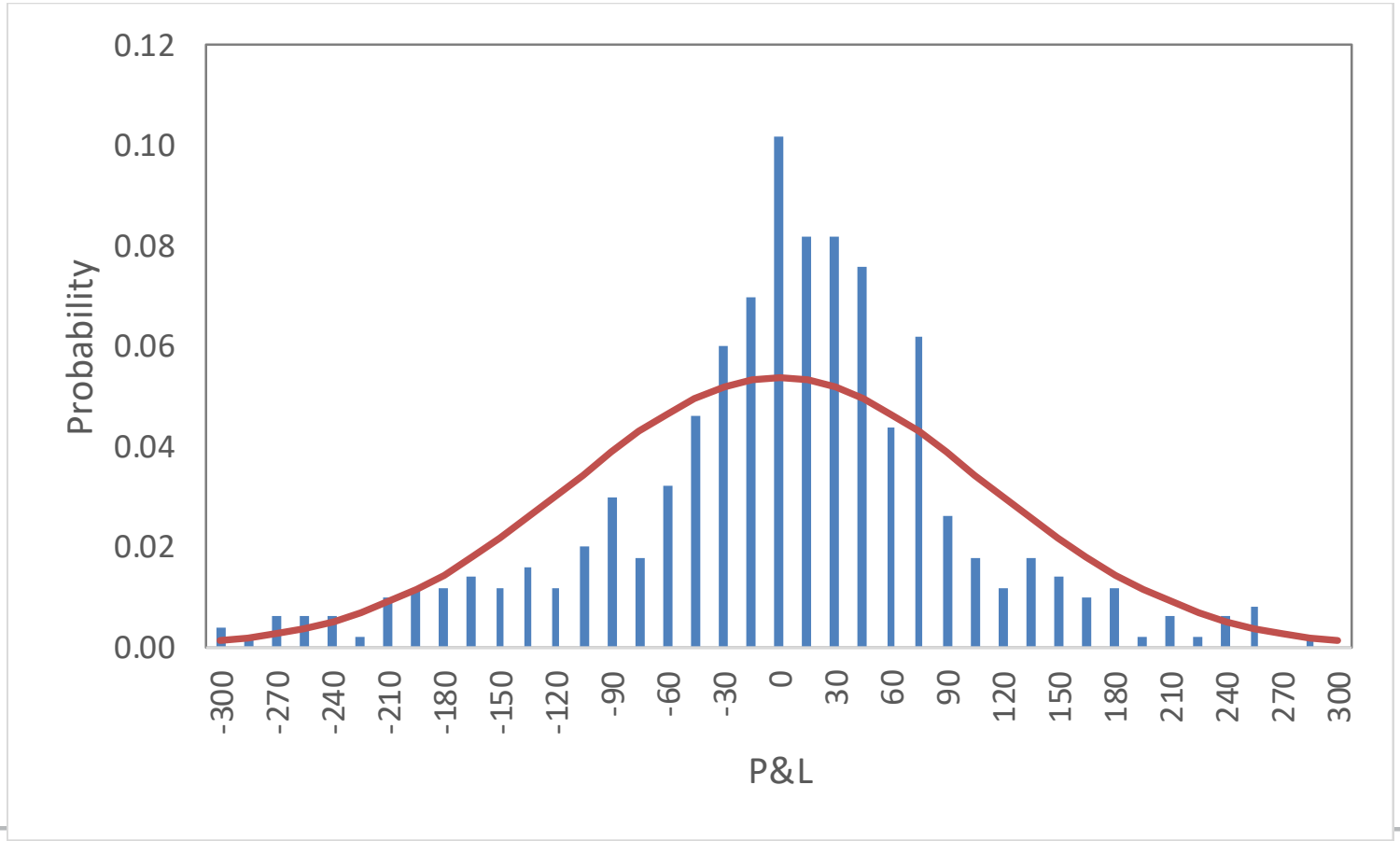


Features of SIMM

- Historical simulations are very complex due to:
  - Data set being used (time period, period of stress)
  - Valuation of transactions in the future
  - Methodology (relative/absolute returns)
  - Calculation (VAR/ES, confidence level, time horizon)
- In CCP situations this is not problematic (the CCP is in charge) but could lead to many disagreements/disputes in bilateral markets
- Hence SIMM simplifies the IM calculation and avoids historical simulation
  - Can be seen as a variance-covariance style approach using delta-gamma-vega approximations for valuation
  - The only thing countparties will need to agree on is the sensitivities (quite a big deal in itself) and trade population

Example (Long Position on S&P 500 Index)

$$VAR_\alpha = \underbrace{\Phi^{-1}(\alpha)}_{\text{Confidence level}} \times \underbrace{\sqrt{10/250}}_{\text{Time horizon}} \times \sigma_P$$



Calculating the Portfolio Standard Deviation

- We can calculate the portfolio standard deviation by:

$$\sigma_P = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j = \sum_{i=1}^{n} w_i^2 \sigma_i^2 + 2\sum_{i=1}^{n}\sum_{j=i+1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j$$

- In matrix form:

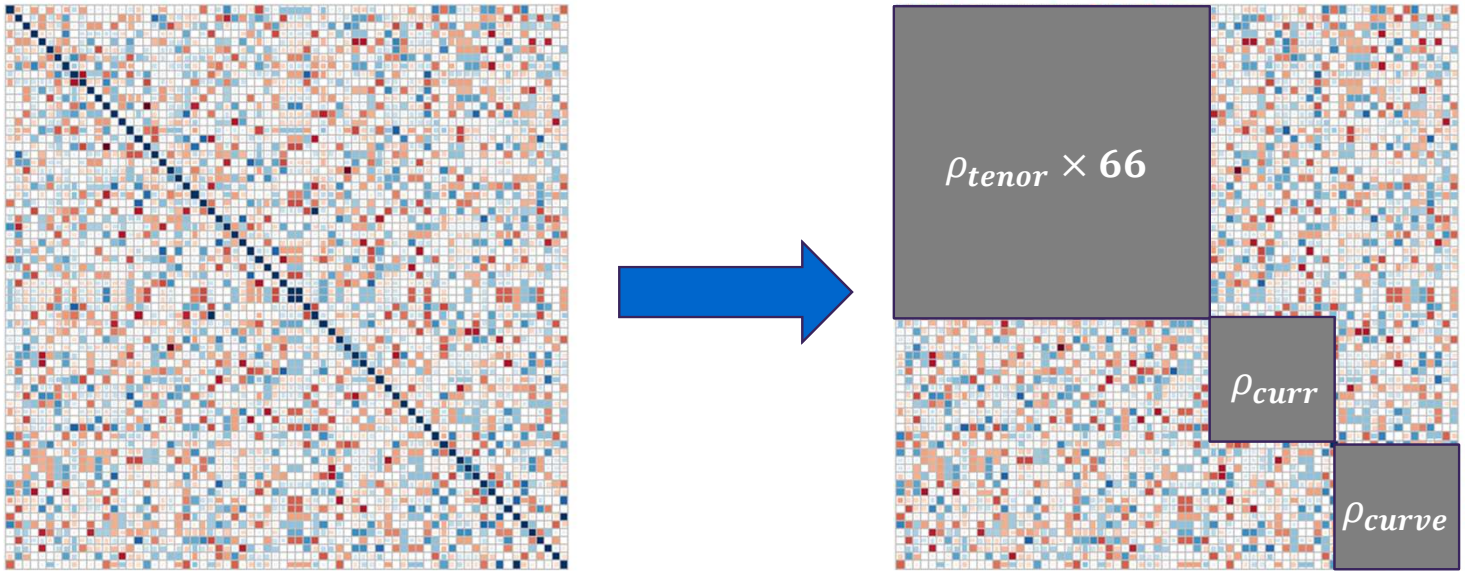
$$\begin{pmatrix} w_1 & \dots & w_n \end{pmatrix} \begin{pmatrix} \sigma_1^2 & \dots & \rho_{1n}\sigma_1\sigma_n \\ \dots & \dots & \dots \\ \rho_{1n}\sigma_n\sigma_1 & \dots & \sigma_n^2 \end{pmatrix} \begin{pmatrix} w_1 \\ \\ w_n \end{pmatrix} = \mathbf{w^T \Sigma w}$$

Variance-Covariance Approach – Valuation

- The term w_i represents the sensitivity to the i^{th} risk factor
- These sensitivities are most obviously approximated by Greeks
  - Delta
  - Gamma (curvature)
  - Vega
- Avoids counterparties needing to perform full revaluation and also agree on these valuations
- The second two are more important for balanced portfolios and option positions
  - Note that a lot of the 'delta' can be cleared (e.g. interest rate swaps) but the Curvature and Vega cannot (e.g. interest rate swaptions)

SIMM – Nested Variance-Covariance

- Example for interest rate risk



- A given correlation is given by:

$$\rho^{ij} = \rho^{ij}_{tenor} \times \rho_{sub-curve} \times \rho_{currency}$$

SIMM Hierarchy (interest rate delta as example)

Netting set	$SIMM_{rates/FX} + SIMM_{credit} + SIMM_{equity} + SIMM_{commodity}$	Additive product classes
Product class	$SIMM_{product} = \sqrt{\sum_r IM_r^2 + \sum_r \sum_{s \neq r} \psi_{rs} IM_r IM_s}$	Aggregation of risk types within a product class
Risk class	$IM = Delta\ Margin + Vega\ Margin + Curv\ Margin + BC\ Margin$	Additive delta, vega, curvature (gamma) and base correlation margin
Risk type	$Delta\ Margin = \sqrt{\sum_b K_b^2 + \sum_b \sum_{c \neq b} \gamma_{bc} g_{bc} S_b S_c}$	Aggregation of buckets in risk class
Risk Bucket	$K_b^{IR\ delta} = \sqrt{\sum_{i,k} WS_{k,i}^2 + \sum_{(j,l) \neq (i,k)} \phi_{i,j} \rho_{k,l} WS_{k,i} WS_{l,j}}$	Aggregation of risk factors within each currency
Risk factor	$WS_{k,i} = RW_k \times s_{k,i} \times CR_b$	Net weighted sensitivities for each risk factor

The Dangers of Clearing and Overcollateralisation

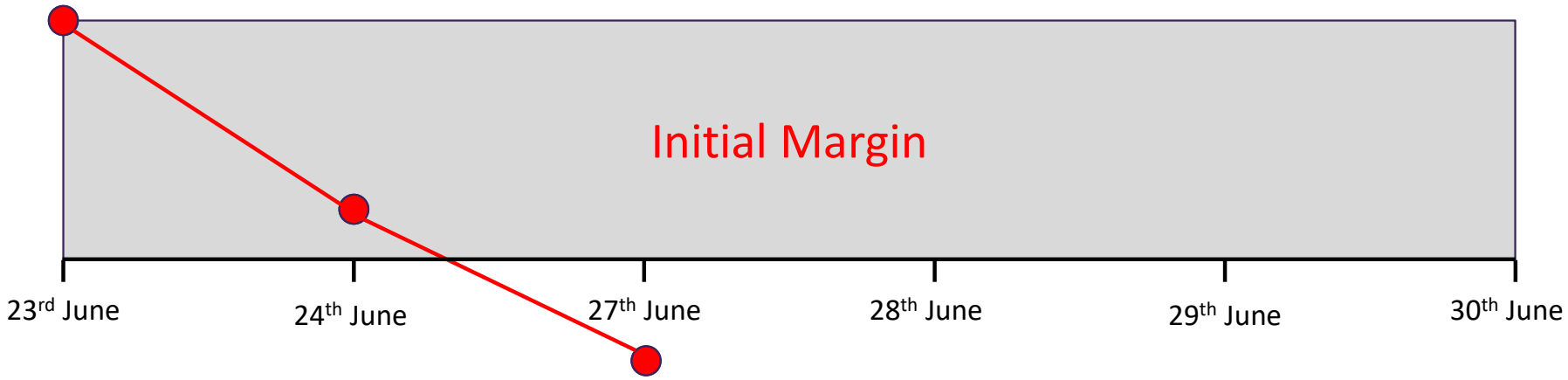
FitchLearning

Initial Margin Models and Procyclicality

- CCP initial margins are potentially procyclical due to:
  - Use of rolling historical data window
  - High confidence levels
  - Volatility scaling
- For example, LCH.Clearnet's PAIRS
  - "PAIRS is an expected shortfall value-at-risk (VaR) model based on filtered historical simulation incorporating volatility scaling. The model uses either ten (OTC) or five (Exchange Traded) years of historical market data to simulate changes in portfolio value from which an estimate of the potential loss distribution is calculated."
  - Initial margin is the average of the six worst scenarios out of 2,500
  - This is the expected shortfall with a confidence level of $\left(1 - \frac{6}{2500}\right) = 99.76\%$

Initial Margin Changes – Example (I)

- Initial margin is taken by CCPs to cover at least a 99% worst case scenario over a 5-day period
  - What happened to a GBP swap after the Brexit vote?



  - It didn't even seem as if there was enough initial margin to cover a 2-day move
  - This does not consider the possible costs of closing out this position (luckily no-one defaulted)
  - Initial margin requirements then quickly increased by around 25% (within a week) as a result of the Brexit vote

Initial Margin Changes – Example (II)

- Changes in initial margin for interest rate swaps in different currencies

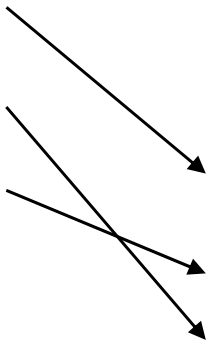
IRS 10Y 100m	Par	DV01 (k)	LCH IM	CME IM
EUR Pay	-0.21%	1	4%	0%
EUR Rec	-0.21%	-1	3%	0%
GBP Pay	-0.49%	2	21%	52%
GBP Rec	-0.49%	-2	9%	25%
USD Pay	-0.23%	3	5%	3%
USD Rec	-0.23%	-3	2%	0%

Source: Clarus Financial Technology

Understanding the Impact (I)

- PAIRS (LCH) (in 2016) looked at the six worst scenarios from the last ten years
- For a pay fixed 10-year GBP swap, these were:

	Date	P&L
1st worst	26th November 2008	(3.49%)
2nd worst	25th November 2008	(3.40%)
3rd worst	31st October 2008	(3.39%)
4th worst	27th October 2008	(3.09%)
5th worst	3rd November 2008	(2.92%)
6th worst	8th October 2014	(2.78%)
Initial margin		3.18%

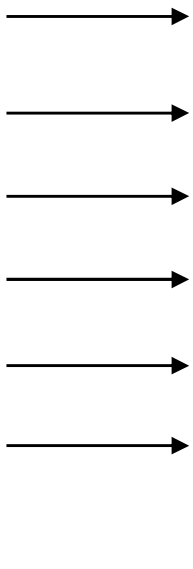


	Date	P&L
1st worst	23rd June 2016	(4.74%)
2nd worst	22nd June 2016	(3.97%)
3rd worst	26th November 2008	(3.94%)
4th worst	31st October 2008	(3.86%)
5th worst	25th November 2008	(3.84%)
6th worst	21st June 2016	(3.69%)
Initial margin		4.01%

Understanding the Impact (II)

- What about receive fixed?

	Date	P&L
Scenario 1	17th June 2013	(4.48%)
Scenario 2	14th June 2013	(3.44%)
Scenario 3	18th June 2013	(3.35%)
Scenario 4	27th December 2012	(2.72%)
Scenario 5	30th January 2015	(2.70%)
Scenario 6	30th April 2009	(2.58%)
Initial margin		3.21%



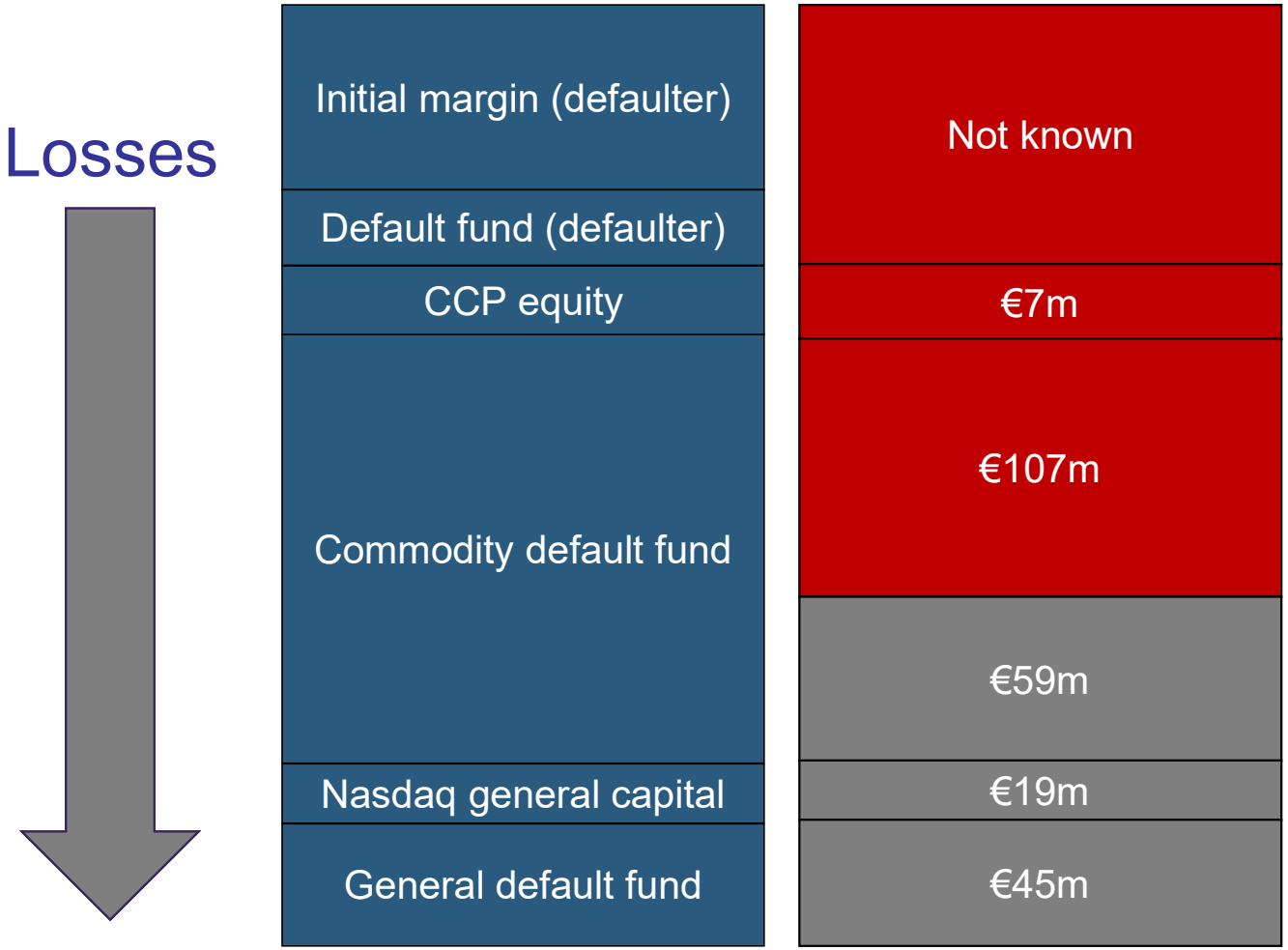
	Date	P&L
Scenario 1	17th June 2013	(5.01%)
Scenario 2	14th June 2013	(3.94%)
Scenario 3	18th June 2013	(3.81%)
Scenario 4	27th December 2012	(3.13%)
Scenario 5	30th January 2015	(3.10%)
Scenario 6	30th April 2009	(2.90%)
Initial margin		3.65%

- Question: why does the IM still increase?

Two CCP Defaults Compared

	SwapClear / Lehman	Nasdaq / Einar Aas
Who?	Lehman Brothers	Einar Aas
What?	Large investment bank	Norwegian proprietary trader
When?	September 2008	September 2018
CCP?	LCH (London Clearing House) SwapClear (UK)	Nasdaq Clearing AB (Sweden)
Portfolio?	About 66,000 OTC derivatives trades (interest rate) with $9 trillion total notional	Exchange traded commodities
Loss to CCP?	Zero	€7 million
Loss to CCP members?	Zero	€107 million

Default Fund – Nasdaq and Einar Aas (2018)



Nasdaq Case Study (I)

- Einar Aas and the portfolio
  - A person and not a legal entity ☺
  - Was a clearing member responsible for clearing his own trades
  - Portfolio of proprietary positions included a large spread position between Nordic and German power markets
  - The positions did not trigger a concentration risk margin add-on
  - The initial margin was set at a level representing more than twice the worst ever two day movement observed by Nasdaq Clearing

Nasdaq Case Study (II)

- Market move
  - In September 2018, there was a large movement in the Nordic and German power markets (the spread increased)
  - Market move 17 times that of a 'normal' day
  - But only 39% larger than initial margin held (no concentration add-on)
  - Mr Aas failed to make the intraday margin call and was declared in default
- Auction
  - The portfolio was closed-out two days later after a second auction (the first did not produce adequate bids)
  - Four members (out of over a hundred) were considered suitable to bid in a closed auction
  - Two-thirds of default fund wiped out (€166 million total)

Nasdaq Case Study (III)

- Default fund loss of €107 million (after €7 skin-in-the-game)
- Nasdaq asked members for € 100 million to replenish the default fund

Nordic power trader's loss costs Nasdaq and members 114 million euros

- Lessons (e.g. FIA 2018)
  - Membership criteria (a self-clearing member does not have the buffer of a financial intermediary carry out risk monitoring)
  - Margin requirements for illiquid and concentrated portfolios
  - Portfolio margin offsets for 'non-convertible products'

Nasdaq Clearing fined $36 million in Sweden over 2018 trader default

Client Clearing Losses

ABN Amro takes $285m loss on single client felled by coronavirus-linked market volatility

AMSTERDAM (BLOOMBERG) - ABN Amro Bank became the first European lender hurt by a major trading loss stemming from the coronavirus crisis, booking a US$200 million (S$285 million) net loss after a single US client of the Dutch lender's clearing division could not meet a margin call on a loan.

The Ducth lender said the US client was responsible for a US$250 million pretax hit to its clearing business after the client failed to meet risk and margin requirements amid market volatility caused by the pandemic, it said in a statement on Thursday (March 26).

Summary

- Collateralisation resolves some of the issues with Derivatives being “Financial Weapons of Mass Destruction”
  - Agreement on valuation for variation margin purposes
  - Multilateral netting (reduces “daisy-chain risk”?)
  - Reduction of credit risk losses (especially with initial margin) that is intended to reduce systemic risk
- This is a major reason why regulation is enforcing increased collateralisation via central clearing and bilateral margin requirements
- However,
  - Some users of OTC derivatives cannot easily post (cash) collateral which leads to a large bifurcation problem for banks (very relevant for xVA)
  - Collateral also creates other risks (e.g. liquidity risk)
  - Central clearing is by no means a panacea