Counterparty Credit Risk (CCR) and Collateral Management in the light of Basel III, Basel III.5 and EMIR

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GARP | Global Association of Risk Professionals

New Regulation of OTC Derivative Markets

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"All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements."

Dodd-Frank Wall Street Reform And Consumer Protection Act

EMIR – European Market Infrastructure Regulation

REMIT– Regulation on Energy Market Integrity and Transparency

MiFID II/MiFIR – Markets in Financial Instruments Directive

Grafik: PWC

Context

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New Regulatory Framework

- **Markets:** MIFID II, MIFIR, EMIR
- **Banks:** Basel II.5, III, III.5, SSM, SRM,etc.
- **Funds:** AIMFD, AIMFR, UCITS
- **Insurance Companies:** Solvency II
- **IFRS:** 9-13, Good Will, Leasing
- **EU-Supervisory Framework:** EBA, ESMA, EIOPA, ESRB
- **USA:** Dodd-Frank Act, Volcker Rule
- **Central Clearing**: USA. EU, Japan, Hong Kong, Australia & Canada, Singapore, etc.

CCPs, OTFs, Trade Repositories

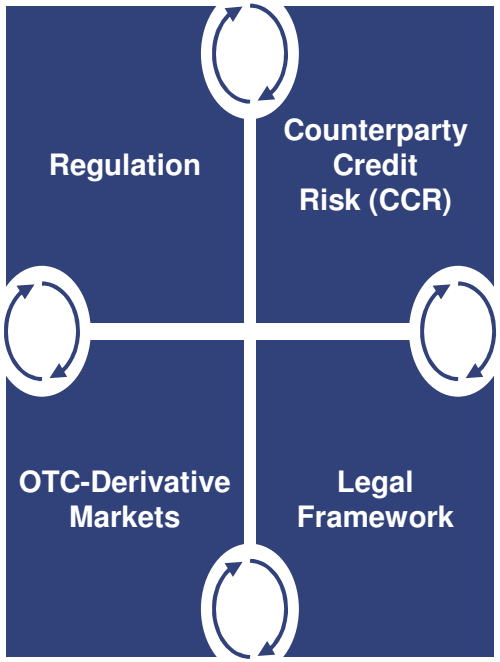
- **Mandatory clearing :** apply to

–Trades between financial institutions,
–Corporate groups which exceed usage thresholds

- **Key factors in an instrument being capable of being cleared:**

–Standardisation [product, legal, process]
–Liquidity
–Risk management/modelling

- Capital costs of bilateral trades drives down volumes for non-cleared trades
- Significant change in the business model and organisation structure for Dealers
- Clearing will absorb significant high grade collateral



Default Risk and Migration Risk

- **CCP versus OTC**
- **Default Risk:** Basel II Framework enhanced by correlation multiplier and stressed EEPE
- **Migration Risk:** Credit Valuation Adjustment (CVA)
- **Funding Cost Modelling :** DVA, FVA
- **Collateral:** Higher collateral requirements on non-cleared trades, initial margin requirements
- **Pre & post trade transparency**
- **New capital charges:** reduce bank capacity and widen spreads

ISDA

- **Credit Events** : Bankruptcy, Failure to pay, Restructuring, Repudation/ Moratorium, Obligation and Acceleration Default, Government Bail in
- **Big Bang and Small Bang Protocols**
- **ISDA 2003** versus **ISDA 2014**
- **ISDA Master Agreement and Schedule:** Single Agreement Philosophy
- **Credit Support Annex (CSA)**
- **Valuation :** Move from LIBOR Discounting to OIS Curves
- **2012 ISDA Margin Survey:** 71% of OTC derivatives trades were subject to collateral agreements, 83% of these required collateral to be posted in both directions

AACSB ACCREDITED EFMD EQUIS ACCREDITED

Counterparty Credit Risk:
CVA\ Downgrade losses substantially exceeded default losses.

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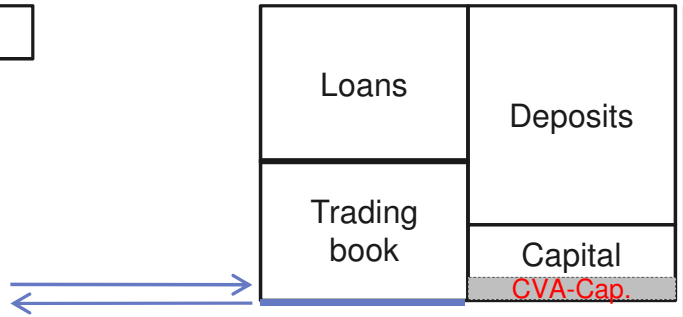
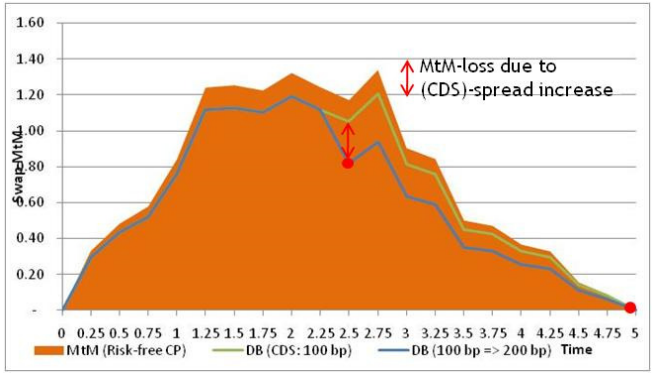
Defaultable Derivatives:

Deutsche Bank

Bank A enters into Payerswap with DB: Notional: 100m€, Maturity: 5Y CDS-spread CP: 100 bp





Total capital charge "Counterparty Credit Risk" (CCR)

1. Counterparty default risk + 2. Counterparty migration risk

Mark-to-market losses due to credit valuation adjustments (CVA) were not directly capitalised. Roughly two-thirds of CCR losses were due to CVA losses and only one-third were due to actual defaults. (BCBS, 2009)

Reforms:
(i) Mandatory central clearing of standardised OTC derivatives
(ii) Mandatory margining (IM_0 and VM_t) for OTC-derivatives if the 2 contract partners are banks and/ or systematically relevant Non-financials. IM_0 is a major challenge as new, gross and restricted re-use. Sophisticated internal margin models or (very) conservative regulatory margins
(iii) Bank capital requirements for derivatives-related exposures

- **A derivative contract can have a positive or a negative market value**
- **Derivatives with a positive value constitute a claim to the counterparty**
- **If the counterparty defaulted, the loss would be the replacement cost of the contract (i.e. the current market value)**
- **A derivative contract with a defaultable counterparty is less worthy than a contract with a risk-free counterparty**
- **The lower the creditworthiness of the counterparty, the lower the market value of the contract.**
- **The value of derivative contracts decrease, if the counterparty becomes riskier (e.g. an obvious indicator is a downgraded). Note: the value decreases even if all market parameters have not changed!**
- **Massive (unexpected) downgrades of counterparties (like the large investment banks in 2007/09) generate large migration losses in derivative trading books.**
- **These losses have not been backed with capital under Basel II, but have to be backed with capital under Basel III.**
- **The default risk of these contracts has been covered under Basel II.**

Counterparty Credit Risk:
Motivation of Basel III - amendments

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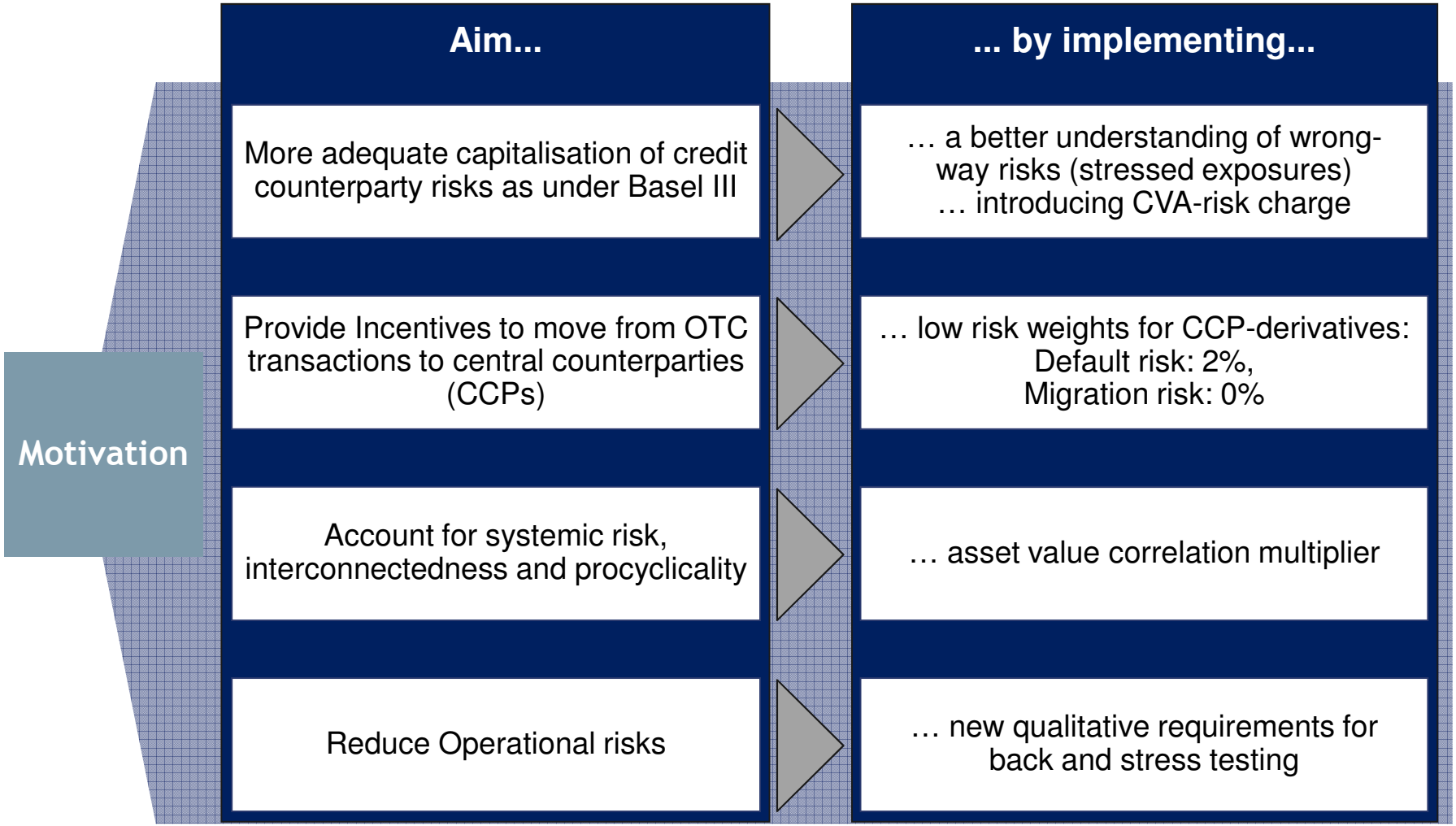

Counterparty Credit Risk:
All Basel III-amendments regarding counterparty credit risk.

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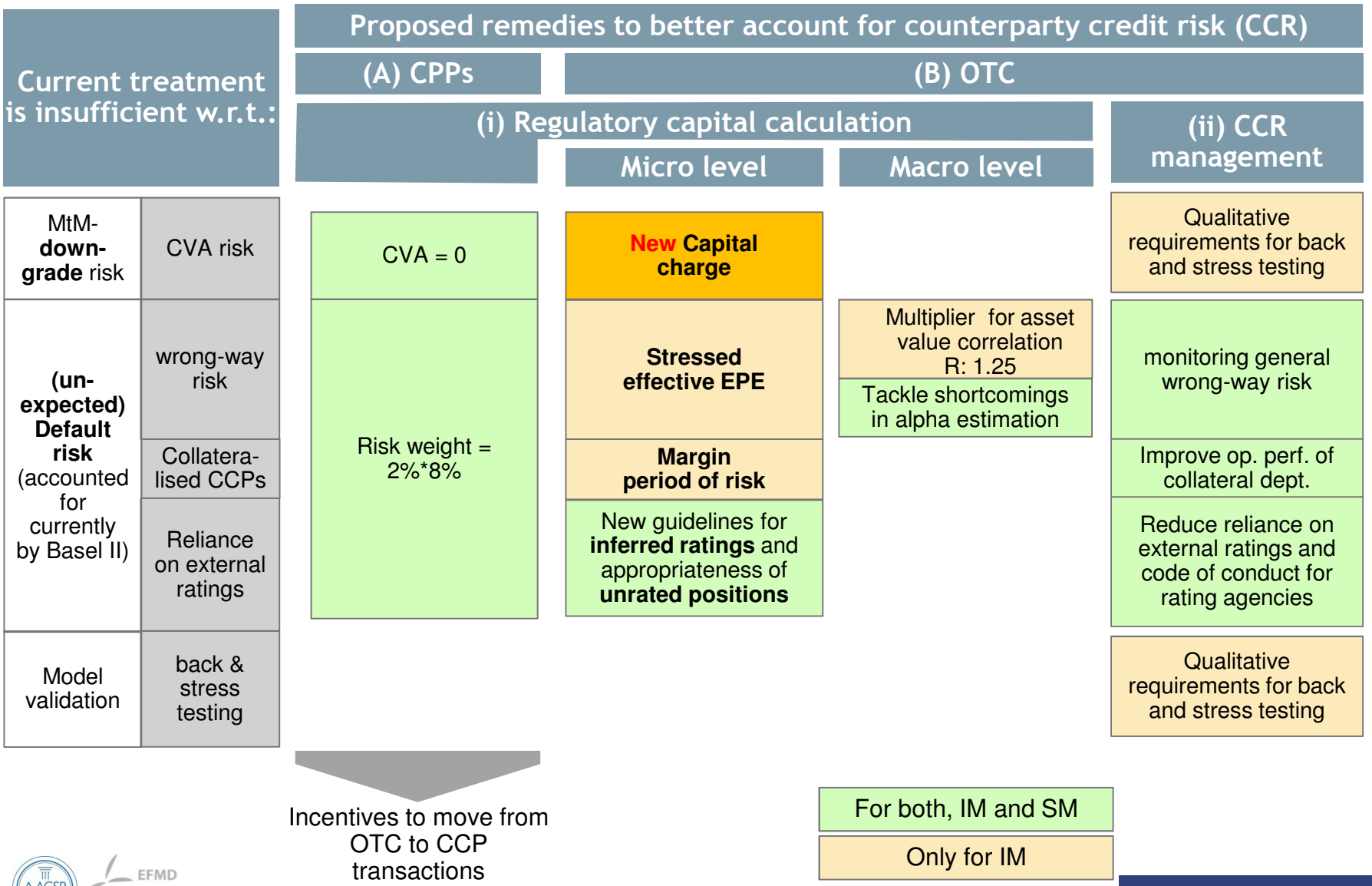
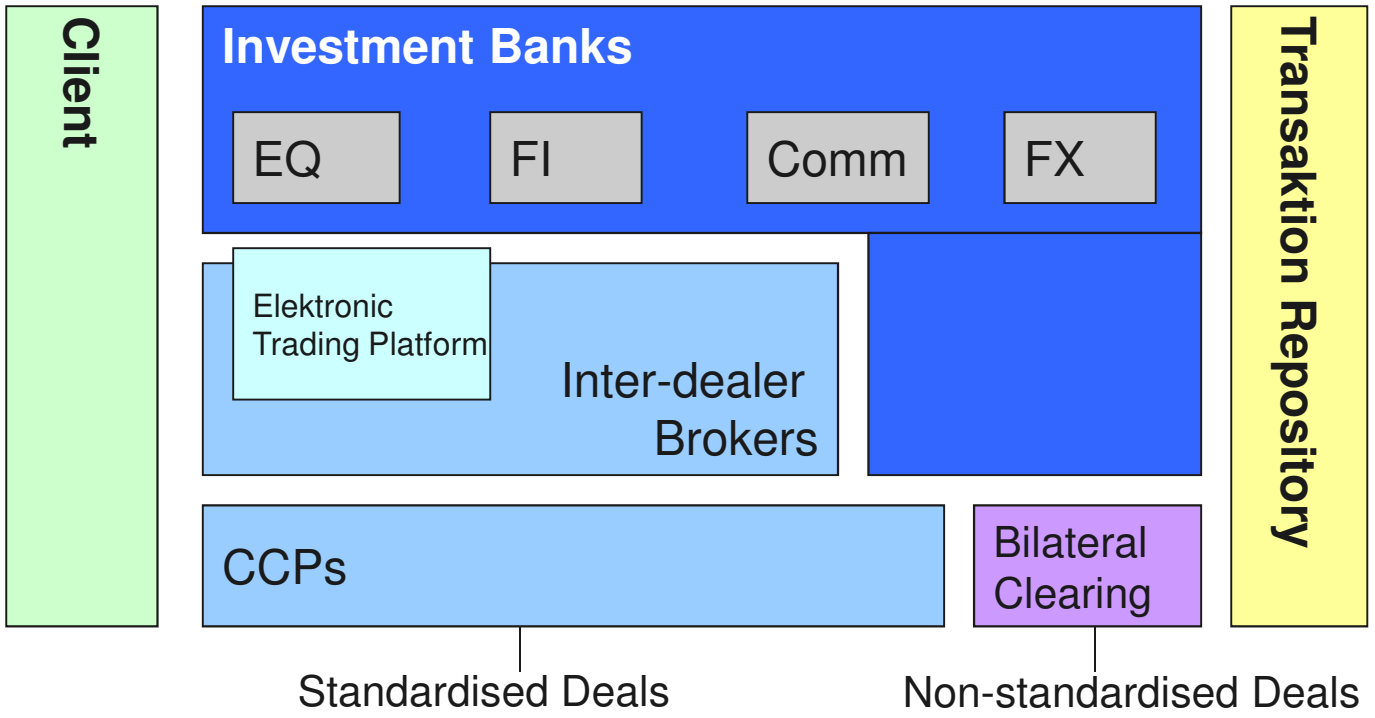


Framework for OTC-Derivatives

- Increased electronification of certain product markets continue, catalyzed by regulatory demands (e.g. IR Swaps, CDS)
- Due to illiquidity in certain asset markets, investment banks still feature as broker-dealers in market making role as an important price generation entity



Source: Oliver Wyman

Institutions in the network of OTC derivatives exposures (BIS 2013)

Macroeconomic impact assessment of OTC derivatives regulatory reforms

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G-16 dealers	Other dealers/banks
Bank of America Merrill Lynch	ANZ Banking Group
Barclays	Banca IMI SpA
BNP Paribas	Banco Santander
Citigroup	Bank of China
Crédit Agricole	Bank of New York Mellon
Credit Suisse	BBVA
Deutsche Bank	Commerzbank
Goldman Sachs	Commonwealth Bank
HSBC	Danske Bank
JP Morgan Chase	Dexia
Morgan Stanley	DZ Bank
Nomura Group	Group BPC
Royal Bank of Scotland	Intesa
Société Générale	LBBW
UBS	Lloyds Banking Group
Wells Fargo	Mitsubishi UFJ
	Mizuho
	National Australia Bank
	Nordea Bank
	Rabobank
	Standard Chartered
	State Street
	Unicredit Group

"Connectivity" assumptions:

- The G-16 dealers have exposures to one another with probability 100%.
- The G-16 dealers have exposures to other dealers with probability 50%, and vice versa.
- Other dealers have exposures to one another with probability 25%.

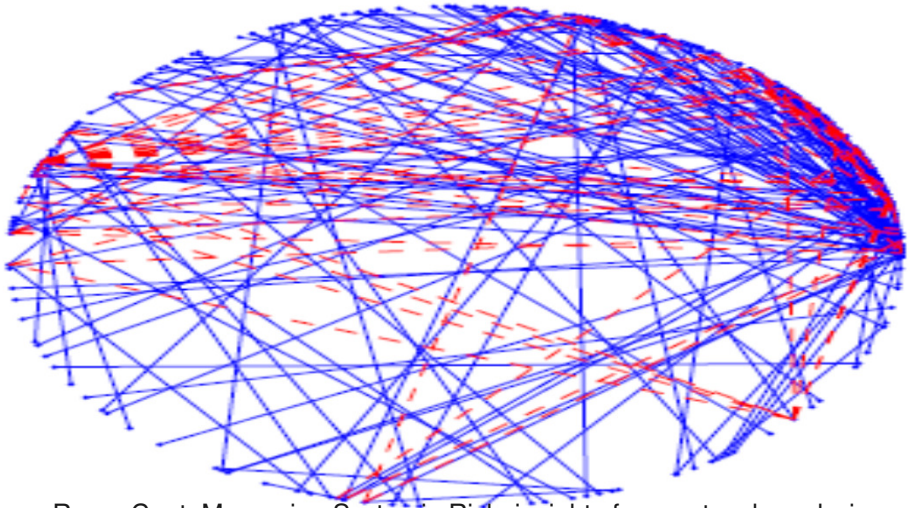
The network perspective

- **Macroeconomic impact assessment of OTC derivatives regulatory reforms (BIS, August 2013):** network study featuring 41 banks, including the 16 largest derivatives dealers (**G-16 dealer**) to mimic the structure of the OTC derivatives market: **highly interconnected "core" /less interconnected "periphery".**

- **Assumptions:** G-16 dealers are exposed to one another with 100% probability, G-16 dealers are exposed to other banks with 50% probability , other banks are exposed to one another with 25% probability.

- **Changes in the creditworthiness of the dealers:** Default probability of directly affected dealers rises, their counterparties will incur mark-to-market losses in the form of an increase to the credit valuation adjustments **(CVAs)** applied to derivatives exposures. The losses then reverberate through the network of OTC derivatives exposures as follows: rising default probabilities lead to mark-to-market-losses which drive up leverage, thereby further increasing default probabilities

- The likelihood of an event that drives up default probabilities in the first place is inferred from **CDS premia**



Source: Rama Cont: Measuring Systemic Risk: insights from network analysis

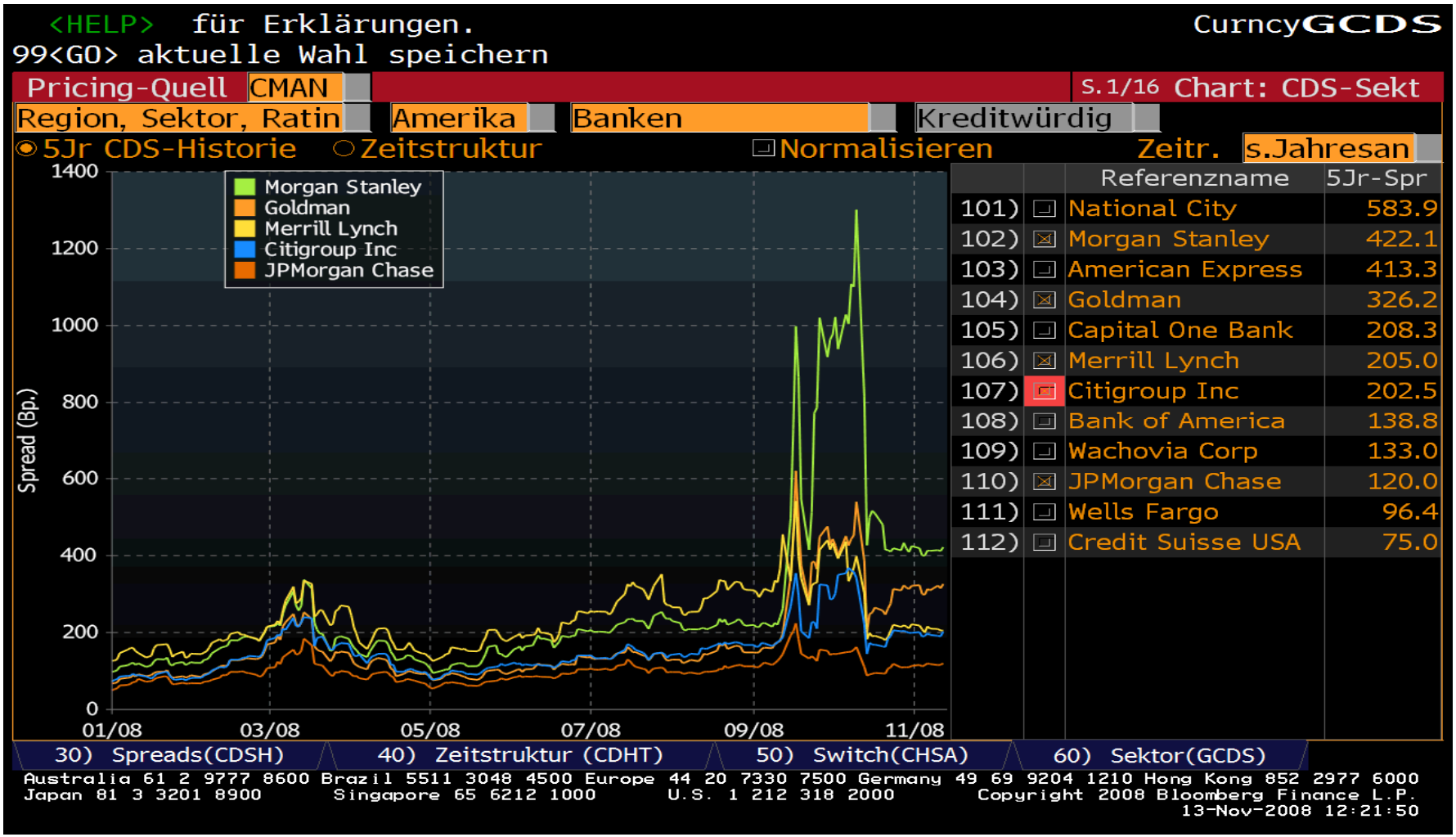
(1) construct a network of OTC derivatives exposures;

(2) quantify a relationship between counterparty credit risk, mark-to-market losses and leverage ratios;

(3) model the impact of changes in leverage ratios on default risk;

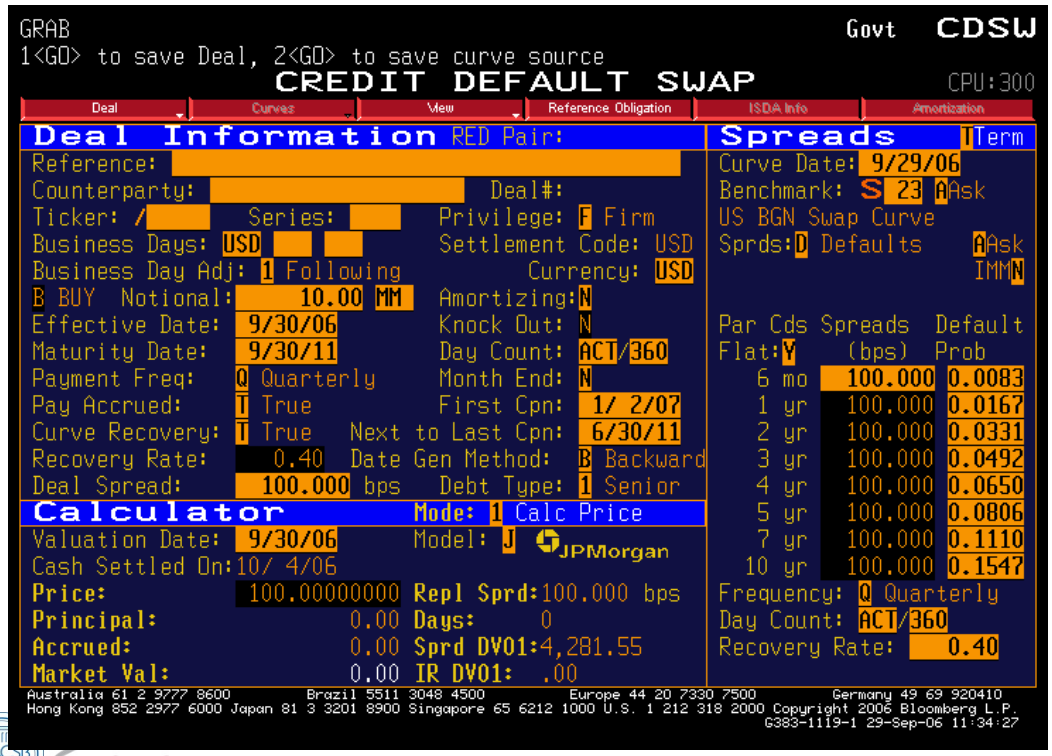
(4) calibrate the likelihood of the shock that brings the system to its "tipping point".

Credit Counterparty Risk



Key variables used in analysing the benefits of reforms (BIS 2013)

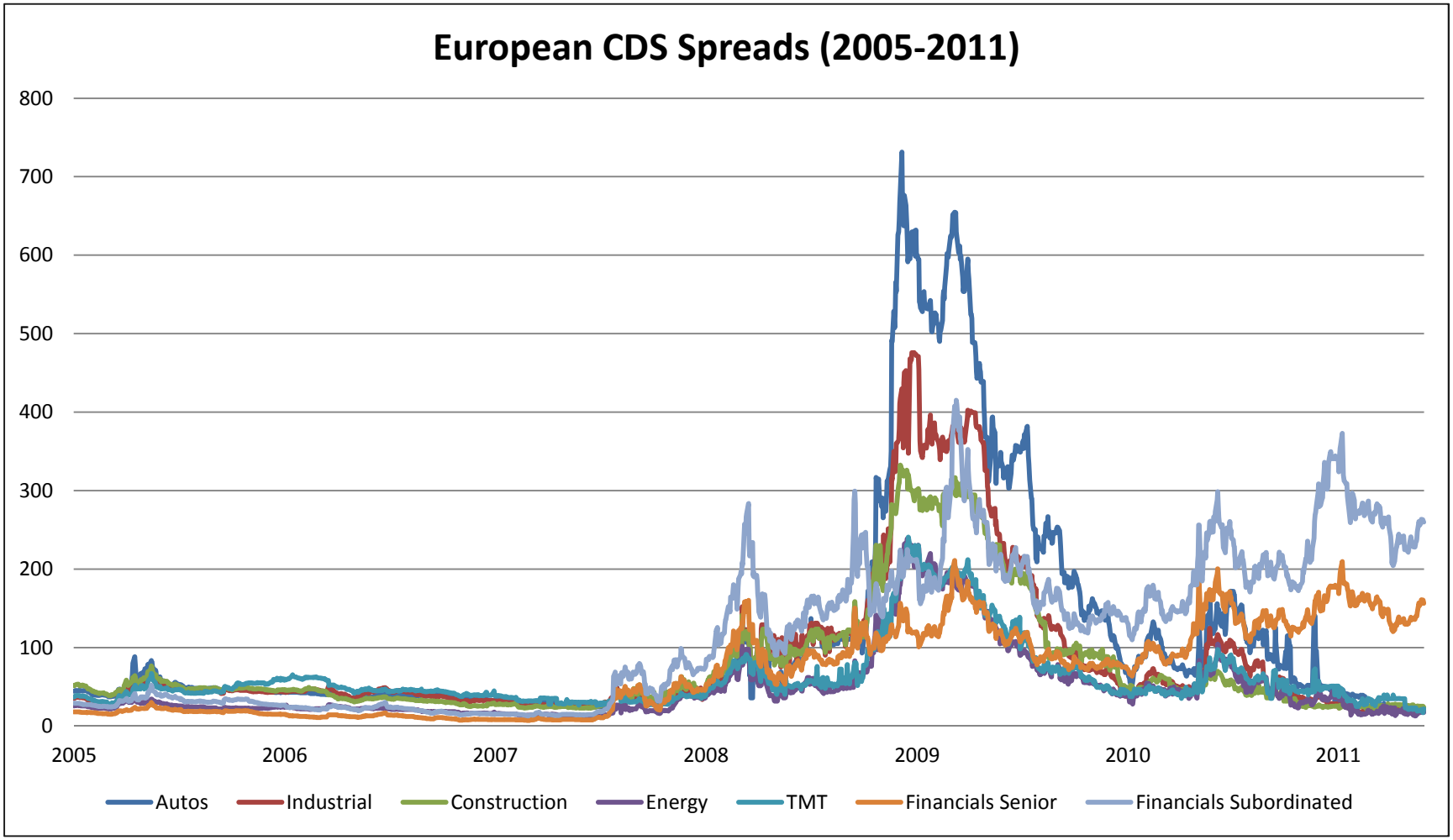
Variable	Description
Leverage ratio	Leverage is calculated as Tier 1 Capital / Total Assets. Total Assets includes derivatives exposures. For firms reporting on a US GAAP basis, these have been adjusted to include derivative assets gross of netting. Risk-weighted assets are not used due to difficulties encountered in compiling a comparable database.
Probability of default	Probability of default is inferred from CDS prices. CDS premia are a function of both probability of default and loss given default (LGD). Standard assumptions apply with LGD = 60%. But prices are also adjusted to take into account country-specific factors.[1]
Derivatives exposures	Derivatives exposures are reported as mark-to-market values (assets and liabilities) and notional amounts (total only), broken down into the following product types: interest rate, credit, equity, commodity, currency and other.



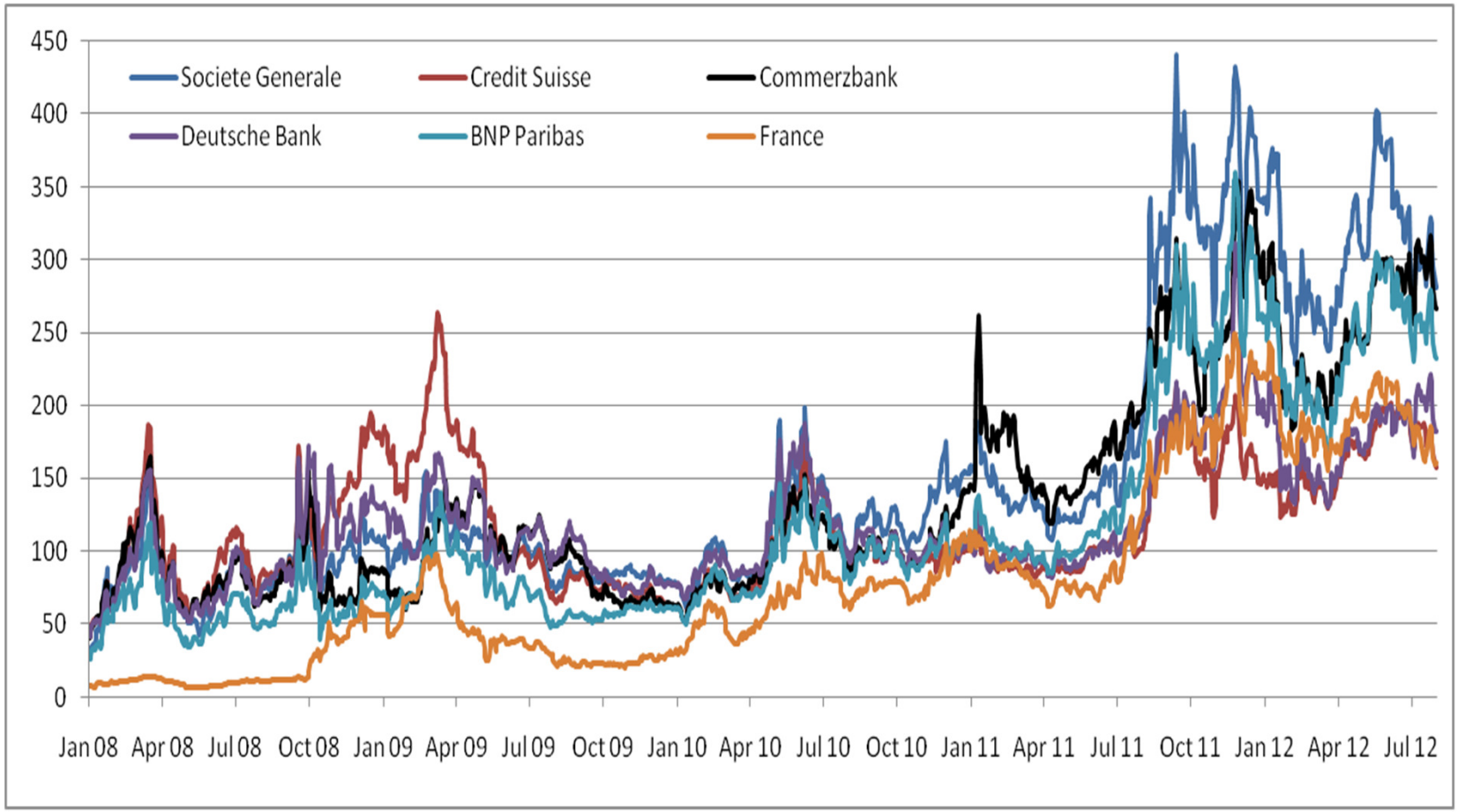
Changes in the creditworthiness of the dealers:

- Apply Shock to default probabilities of major OTC derivatives dealers
- Default probability of directly affected dealers rises
- Their counterparties will incur mark-to-market losses in the form of an increase to the credit valuation adjustments (CVAs) applied to derivatives exposures.
- The losses then reverberate through the network of OTC derivatives exposures
- Rising default probabilities lead to mark-to-market-losses which drive up leverage, thereby further increasing default probabilities

Credit Default Swaps

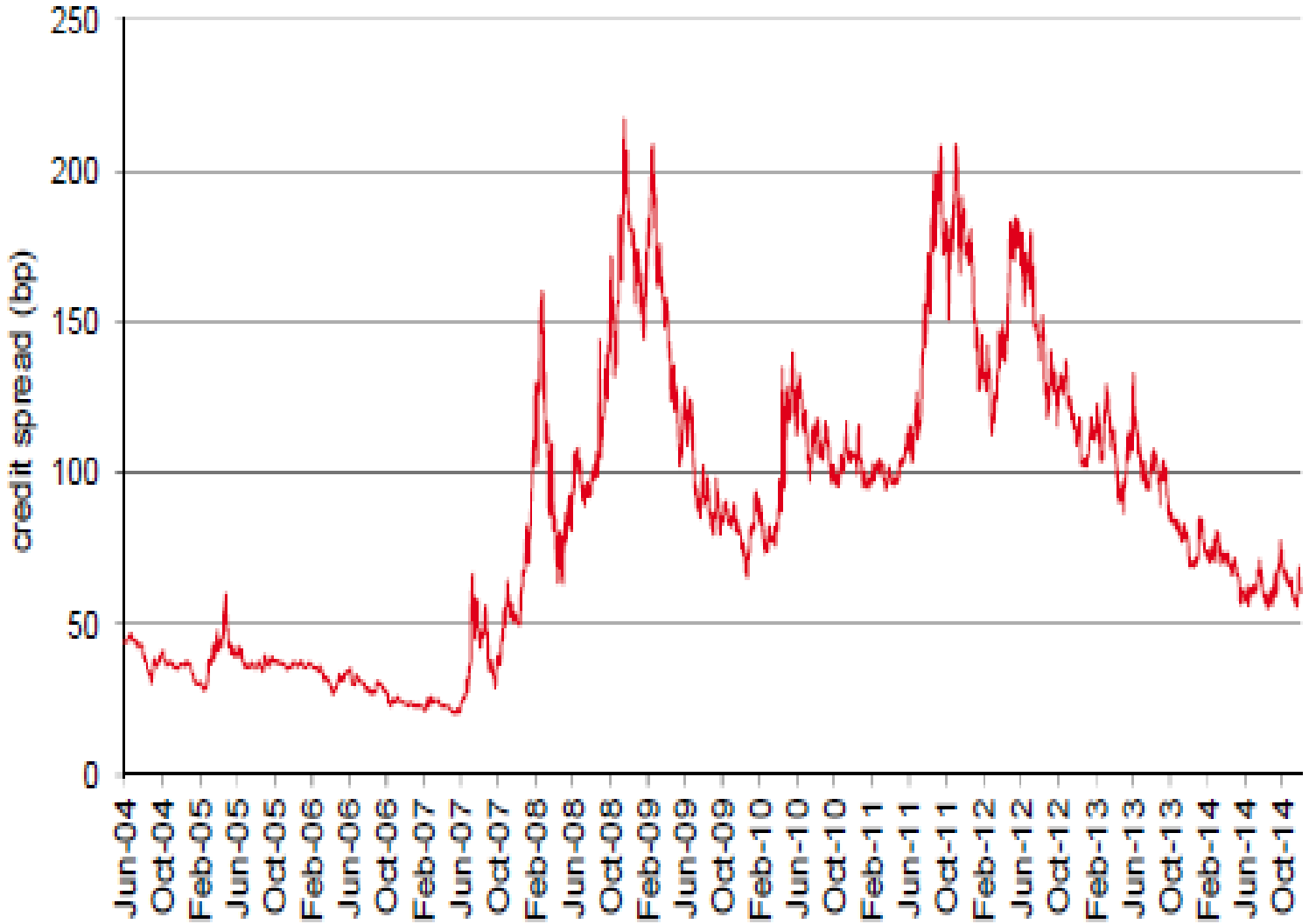


Credit Default Swaps



Quelle:
- Bloomberg

iTraxx® Europe



Counterparty Credit Risk:
New Regulation of OTC Derivative Markets

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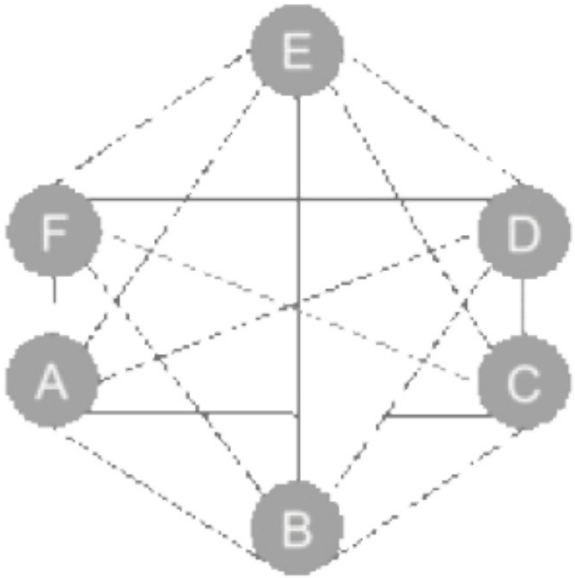
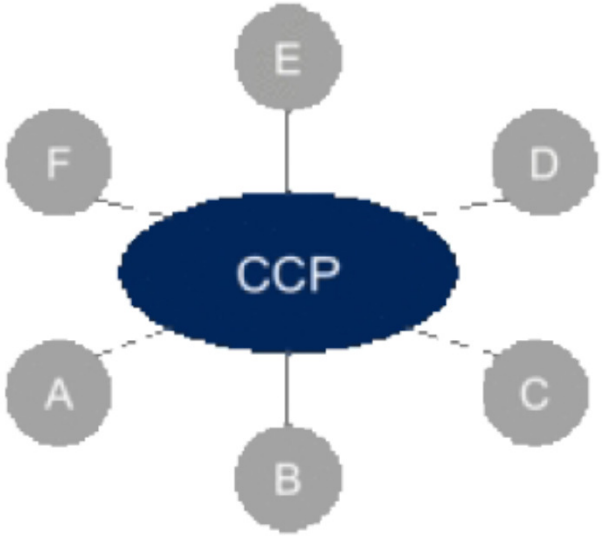
REGULATION OF DERIVATIVE MARKETS			
EMIR	**MIFIR**	**MIFID II**	**Basel 2.5/3/3.5**
• Clearing obligation for some classes of OTC derivatives/ Exemption: intragroup transactions (insofar as they do not increase systemic risk) • Clearing Obligation for Financial Counterparties/ Non-Financial Counterparties, insofar as the clearing threshold is exceeded (whereby hedging does not count into the clearing threshold) •Derivative contracts are to be reported to a transaction register ("Trade Repository") • Supervisory by/ Reporting Obligations to ESMA (European Securities and Markets Authority) • Credit Risk Reduction	• Shifting derivatives trading to organized markets (Organized Trading Facilities/ OTFs) • Transparency of trade and reporting requirements • Specific monitoring in relation to financial instruments and derivatives positions	• Increasing the competitive position of European Financial Markets/Competition among financial services providers • Strenghtening Investor Protection and Confidence of Market Participants • Organizational requirements and rules on the conduct of business of investment firms respectively trading venues • Increase of Transparency by Disclosure of Risk Positions • Credit Risk Reduction	• Basel 2.5 : Increase of Capital Requirements Trading Books: Incremental Risk Charge, Comprehensive Risk Charge, Stressed-VaR,Treatment of Securitized Products in the Trading Book • Basel III: Abolishment of Tier 3 Instruments (Short Term Subordinated Bonds) as capital to cover risk in the Trading Book. • Basel III: Introduction of CVA-Risk-Charge -Requirement to cover price volatility from Counterparty Risk with Risk Capital • Basel 3.5 (Fundamental Review of the Trading Book): Substitution of Value at Risk by Expected Shortfall to cover Extremal Risk. • Classification of Trading Book Positions by different Liquidity Horizons • Change of Standard Methods and Internal Methods
New Transparency of the Derivative Markets: Central Clearing Counterparties, Organized Trading Facilities and Transaktion Repositories		**Investor protection and confidence of market participants, Competition among financial services providers, Organizational requirements and rules on the conduct of business of investment firms respectively trading venues**	**Trading Books: Higher Requirements for Risk Capital, Specific Focus on Price Volatilities of Derivative Positions driven by Counterparty Risk, Specific Focus on Stress Scenarios and Extremal Events**

Central Clearing Counterparties

- A CCP imposes itself as the legal counterparty to every trade.
- This substitution of the counterparties by the CCP typically occurs through a process known as novation, which discharges the contracts between the original trading entities and creates two new, legally binding contracts – one between each of the original trading parties and the CCP.





Better collateralisation of OTC derivatives exposures

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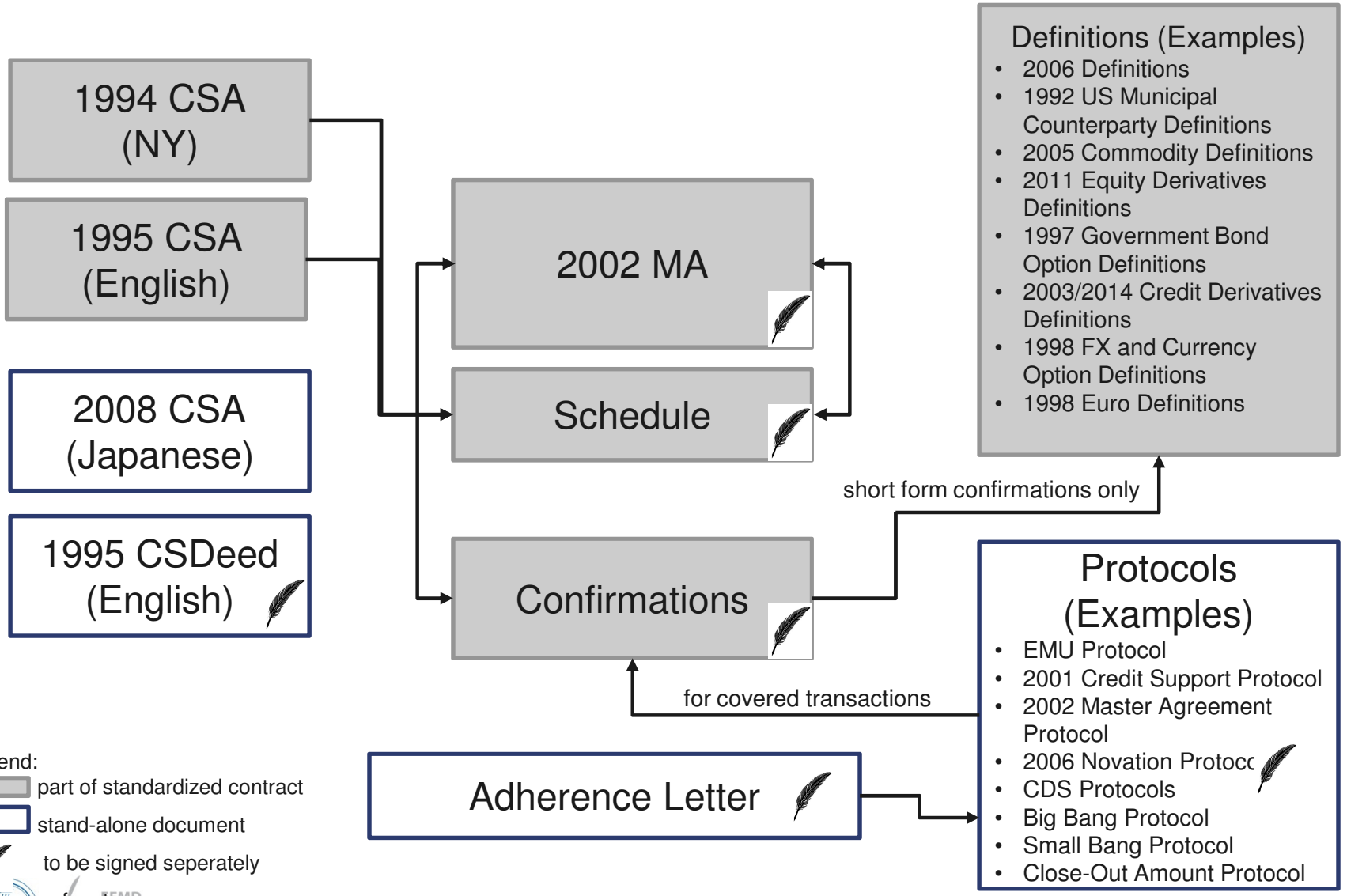
either through central clearing or through bilateral credit support agreements. “Collateral is the new capital” (Capital replaced by collateral)
Process: Enhance collateral management
Models: Develop internal margin model
Integrating liquidity- into collateral management

Collateral mechanics: regulated vs OTC markets		
	Regulated markets	Over the counter markets
Collateralisation	All trades are collateralised	Not all trades are collateralised, it depends on the agreements between the counterparties
Financial instruments	highly standardised	highly customised
Clearing House	There is a Clearing House that acts as counterparty for any trade and establish settlement and margination rules	There is no Clearing House, direct interaction between the counterparties, ad hoc contracts are used
Settlement and margination execution	Daily settlement and margination, collateral in cash of main currencies or highly rated bonds (govies)	Most used contracts are: ✓ISDA Master Agreement ✓Credit Support Annex (CSA)
Collateral interest	Overnight rate	Depend on the agreements

Source: M. Bianchetti – “Bootstrapping The Illiquidity” – Qfin Colloquia, 22 November 2012

ISDA – Document Structure



Source: Prof. Dr. Günter Reiner, ISDA Master Agreement Kommentar, 2013 C.H.Beck

Counterparty Credit Risk: Basel II vs. Basel III

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Basel II credit risk

Counterparty credit risk (CCR):
Risk that a counterparty to a transaction defaults or is downgraded before the final settlement of the transaction's cash flows.

Basel II: Credit risk for <u>OTC-derivatives</u>

α-factor accounts for wrong-way risk (PD increases with EaD) but in expected terms

$$RWA^{CCR^{BaselII}} = 12.5 * K * EaD = 12.5 * K * \alpha * EEPE$$

$$K = LGD * \left[\Theta\left(\frac{\Theta^{-1}(PD) + \sqrt{R} * \Theta^{-1}(0.999)}{\sqrt{1-R}} \right) - PD \right] * \frac{1 + (M - 2.5)b}{1 - 1.5b}$$

$$R = 0.12 * \frac{1 - e^{-50PD}}{1 - e^{-50}} + 0.24 * \left(1 - \frac{1 - e^{-50PD}}{1 - e^{-50}} \right)$$

EEPE: effective expected positive exposure, b: maturity adjustment,
R: asset value correlation (AVC)

Main **changes** in Basel III to RWA calculation

1 Add downgrade risk surcharge to account for credit valuation adjustment (CVA)

2.1 Stress EEPE

2.2 Account for higher correlation by adjusting R with multiplicative factor

Counterparty Credit Risk: Basel II vs. Basel III

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$$RWA^{CCR^{BaselII}} = 12.5 * K * EaD = 12.5 * K * \alpha * EEPE$$

$$K = LGD * \left[\Theta\left(\frac{\Theta^{-1}(PD) + \sqrt{R} * \Theta^{-1}(0.999)}{\sqrt{1-R}} \right) - PD \right] * \frac{1 + (M - 2.5)b}{1 - 1.5b}$$

$$R = 0.12 \frac{1 - e^{-50PD}}{1 - e^{-50}} + 0.24 \left(1 - \frac{1 - e^{-50PD}}{1 - e^{-50}} \right)$$

Basel II

Basel III

$$RWA^{CCR^{BaselIII}} = RWA^{CCR^{BaselII}}_{stressed} + 12{,}5 \cdot cc(CVA)$$

$$= 12{,}5 \cdot K_{stressed}(R \cdot 1.25_{banks}) \cdot \alpha \cdot EEPE_{stressed} + 12{,}5 \cdot cc(CVA)$$

2.2 Use a multiplicative factor for R in calculation of K

2.1 Stress EEPE for general wrong way risk

1 Add a charge for CVA-risk as an unexpected loss component

Counterparty Credit Risk
CVA\ CCR-capital charge covers default and migration.

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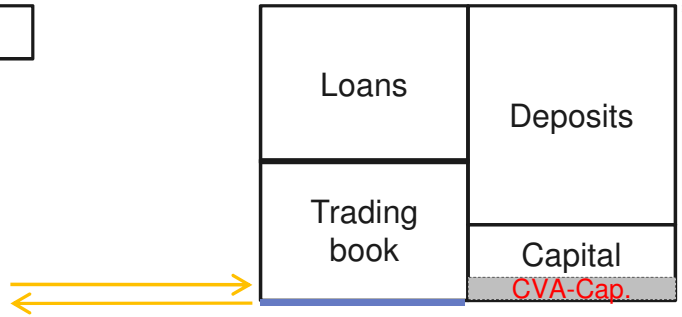
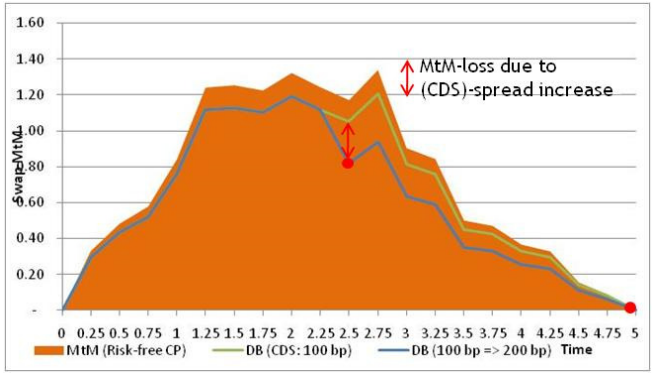
Defaultable Derivatives:

Deutsche Bank

Bank A enters into
Payerswap with DB:
Notional: 100m€,
Maturity: 5Y
CDS-spread CP: 100 bp





Basel III:Total capital charge "Counterparty Credit Risk" (CCR)

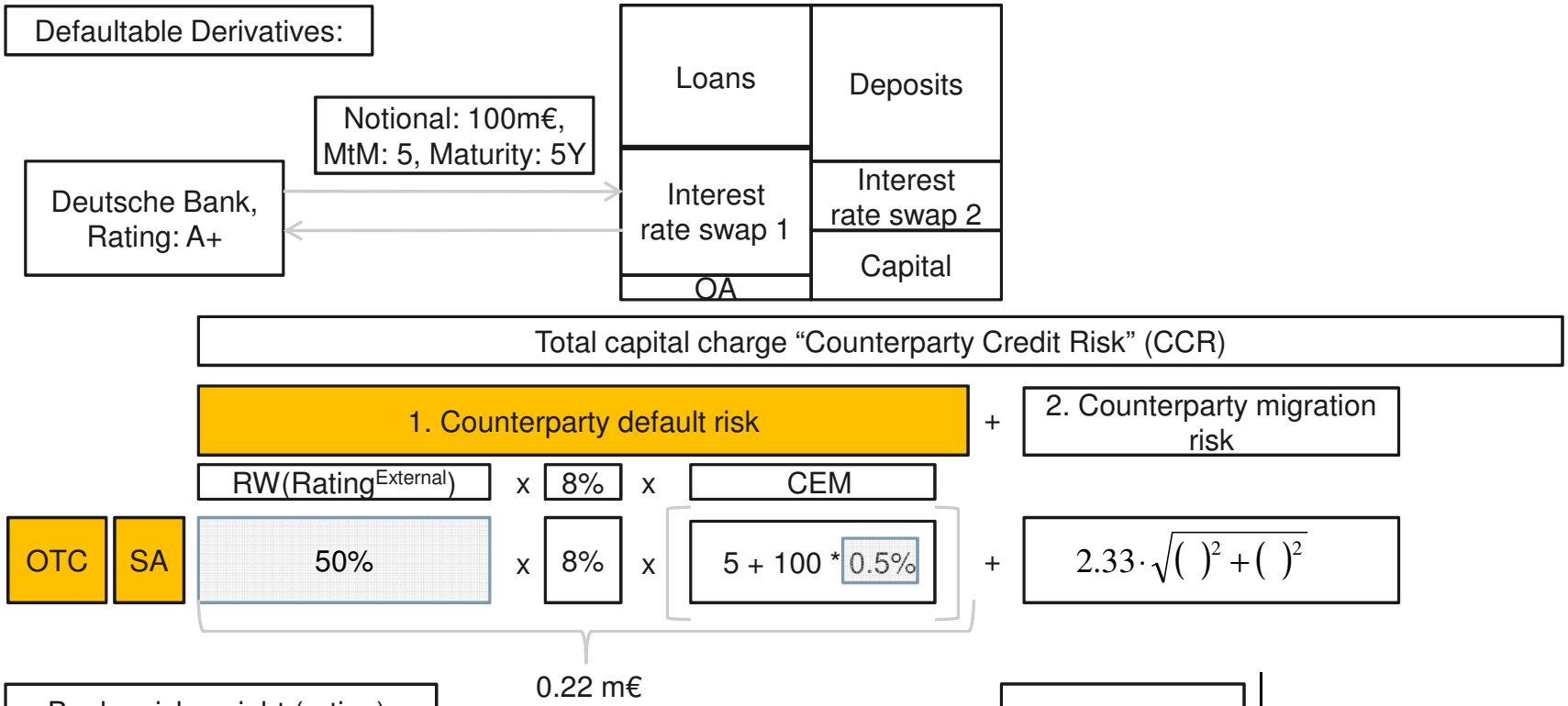
1. Counterparty default risk (already in Basel II)[2]								2. Counterparty migration risk
Unexpected loss per 1€ exposure				x	Exposure [in €]			Δ Credit Value Adjustment
OTC	SA	RW(Rating^{External})[1]	x	8%	x	CEM, SM, α*EEPE[2]	- CVA^{losses}	+ 2.1 $2.33 \cdot \sqrt{(\ )^2 + (\ )^2}$
	IMM	K(PD^{Internal}, R(PD)[2])	x	LGD	x			+ 2.2 cc$^{Market\ Risk\text{-}IRM}$(ΔCVA(Δs))
CCP		2%	x	8%	x			0

2.1 Always

2.2 Only if approved VaR^{Specific}

[1] Derivatives are usually contracted with counterparties of the regulatory segment "Corporates, Banks, Government",
2) EEPE^{Basel3}: max(EEPE^{Basel2}, EEPE^{stressed}); For large banks and all unregulated financial firms: R^{Basel3} = 1.25*R^{Basel2}.

Counterparty Credit Risk:
CVA\ CCR^{Basel3} -Example using Standardised Approach



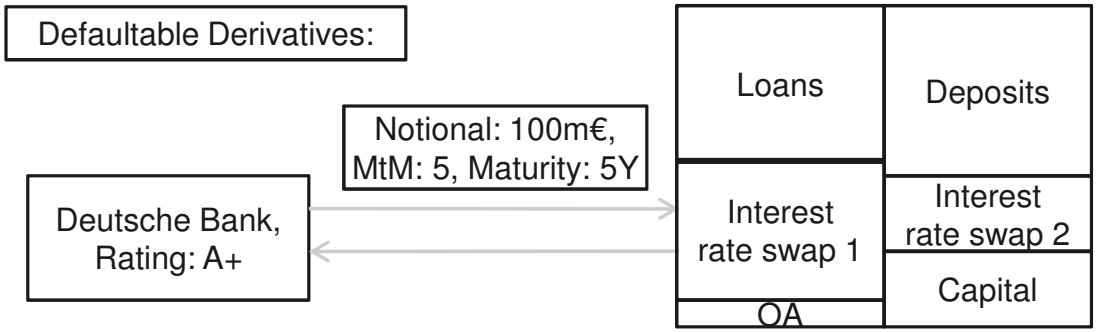
Banks, risk-weight (rating):

Credit assessment of Banks	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Risk weight under Option 2	20%	50%	50%	100%	150%	50%

Add-on	Interest Rates
Over one year to five years	0.5%
Over five years	1.5%

[1] Derivatives are usually contracted with counterparties of the regulatory segment "Corporates, Ba

Counterparty Credit Risk:
CVA\ CCR^{Basel3} -Example using Standardised Approach



Total capital charge "Counterparty Credit Risk" (CCR)

1. Counterparty default risk + 2. Counterparty migration risk

OTC | SA | 0.22 m€ + 2.1 $2.33 \cdot \sqrt{(0.5 \cdot 0.8\% \cdot 2.5 \cdot 5.5)^2 + 0.75 \cdot (0.8\% \cdot 2.5 \cdot 5.5)^2}$

0.26 m€

$$K = 2.33 \cdot \sqrt{h} \cdot \sqrt{\left(\sum_i 0.5 \cdot w_i \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right) - \sum_{ind} w_{ind} \cdot M_{ind} \cdot B_{ind} \right)^2 + \sum_i 0.75 \cdot w_i^2 \cdot \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right)^2}$$

w_i (external Rating), M_i: effective maturity, Bi : notional,
hedge: individual hedge, ind: index hedge

Rating	w_I
…	…
A	0.8%
…	…

Counterparty Credit Risk:
CVA\ CCR^{Basel3} -Example using Standardised Approach

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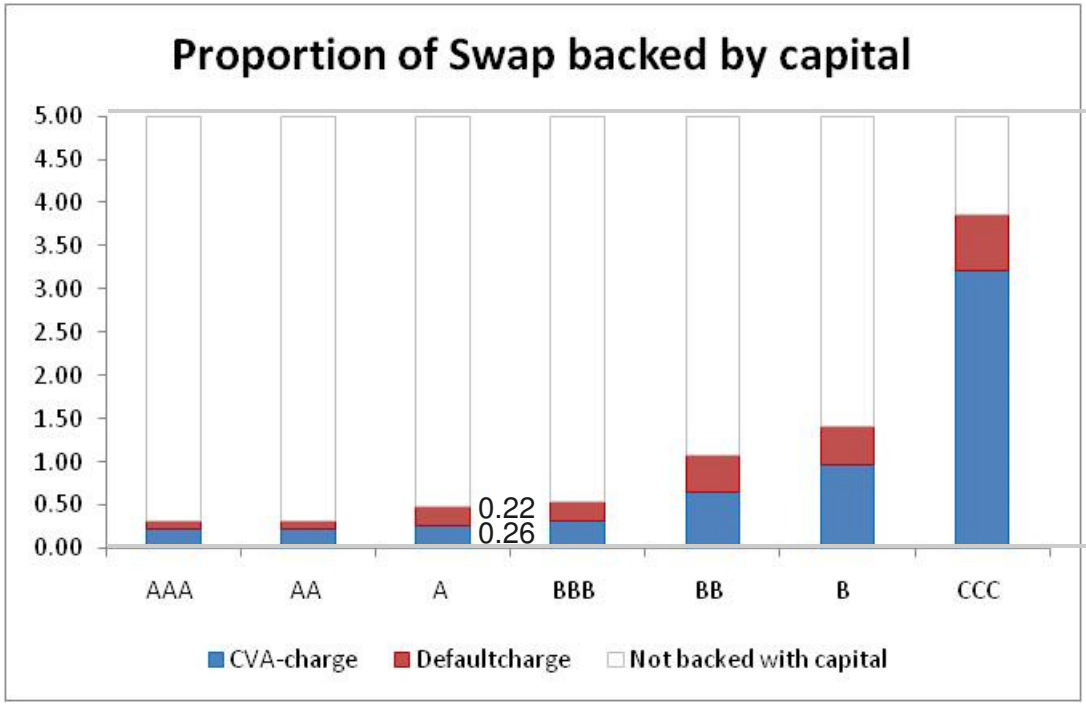
Defaultable Derivatives:

2. Counterparty migration risk	
2.1	$2.33 \cdot \sqrt{(0.5 \cdot 0.8\% \cdot 2.5 \cdot 5.5)^2 + 0.75 \cdot (0.8\% \cdot 2.5 \cdot 5.5)^2}$



Bank A

...	...
Interest rate swap 1 CP = A+ MtM = 5€	Capital

Counterparty Credit Risk:
CVA\ Standardized Approach\ Details

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Δvalue ~ N()
=>
$$\Delta CVA \sim N(0, \sqrt{\ })$$

2. Counterparty migration risk

2.1

$$2.33 \cdot \sqrt{(0.5 \cdot 0.8\% \cdot 2.5 \cdot 5.5)^2 + 0.75 \cdot (0.8\% \cdot 2.5 \cdot 5.5)^2}$$

$$K = 2.33 \cdot \sqrt{h} \cdot \sqrt{\left(\sum_i 0.5 \cdot w_i \cdot \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right) - \sum_{ind} w_{ind} \cdot M_{ind} \cdot B_{ind} \right)^2 + \sum_i 0.75 \cdot w_i^2 \cdot \left(M_i \cdot EAD_i^{total} - M_i^{hedge} B_i \right)^2}$$

1σ (CVA-changes, 84%-quantile)

2.33σ (99%-quantile)

Counterparty Credit Risk:
CVA\ Internal model\ Details

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Internal CVA-capital model only ⇔ internal model for specific market risk

2. Counterparty migration risk	
2.2	$cc^{\text{Market Risk-IRM}}(\Delta CVA(\Delta s))$

$$CVA_{econ} = (1-R)\sum_{k} e(t) * [PD(t_k) - PD(t_{k-1})]$$

$$CVA_{reg} = (LGD_{market}) * \sum_{i=1}^{T} \max\left\{0; \exp\left(-\frac{spread_{i-1} * t_{i-1}}{LGD_{market}}\right) - \exp\left(-\frac{spread_i * t_i}{LGD_{market}}\right)\right\} * \frac{EE_{i-1} * D_{i-1} + EE_i * D_i}{2}$$

t_T: longest maturity in the portfolio, t_i: ith revaluation bucket, spread_i: counterparty's credit spread at tenor t_i, LGD_market: market implied Loss Given Default, D_i: default risk free discount factor at time t_i

- VaR for zerobond with Notional = EaD, Issuer = counterparty, Maturity taken from longest unhedged derivative
- Only risk factor: spread evolution (must be taken from VaR-model)
- CVA-cc = cc($VaR^{\text{normal,general}}$ + $VaR^{\text{normal,specific}}$ +$VaR^{\text{stressed,general}}$ + $VaR^{\text{stressed,specific}}$ + 0*IRM)

Extremely high burdens for advanced CVA formula "Bundesverband Deutscher Banken" estimates that at most two banks in Germany will apply the CVA advanced formula

Counterparty Credit Risk:
CVA\ Summary: Credit AND market risk in a trading book.

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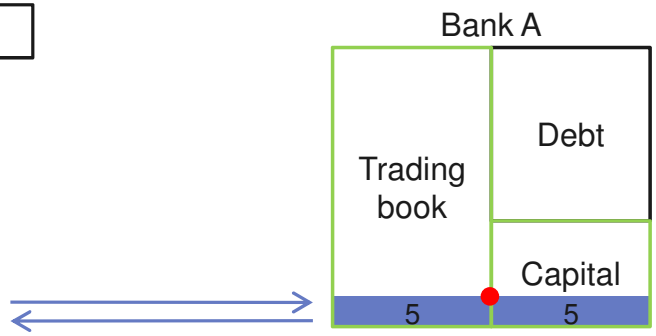
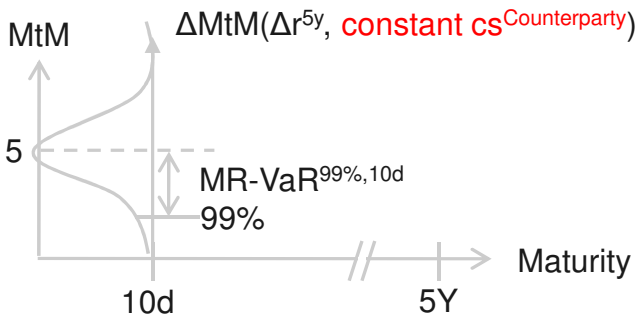
Defaultable Derivatives:

Deutsche Bank

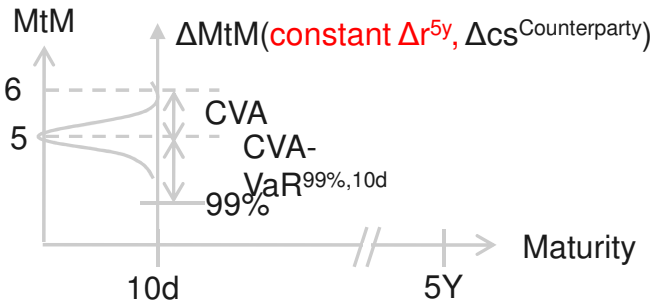
Bank A enters into Payerswap with DB: Notional: 100m€, MTM: 5y, Maturity: 5Y CDS-spread CP: 100 bp



1. Market risk (instrument pricing with risk-free counterparty/ no credit spread of counterparty !!)



2.2 CVA-risk (no credit spread of counterparty !!, CVA-VaR: stand.&stress $VaR^{gen\&spec,\ 0*IRM}$)



2.1 Counterparty default risk

$K = N(0,PD^{CP}) *LGD *\alpha*EEPE$

3. Pillar1 - Capital Ratio

$$= \frac{\text{Capital}^{T1+T2}}{12.5*(VaR^{CVA} + K + VaR^{MR} + VaR^{OpR})}$$

Counterparty Credit Risk: Wrong-way risk (PD(EaD))

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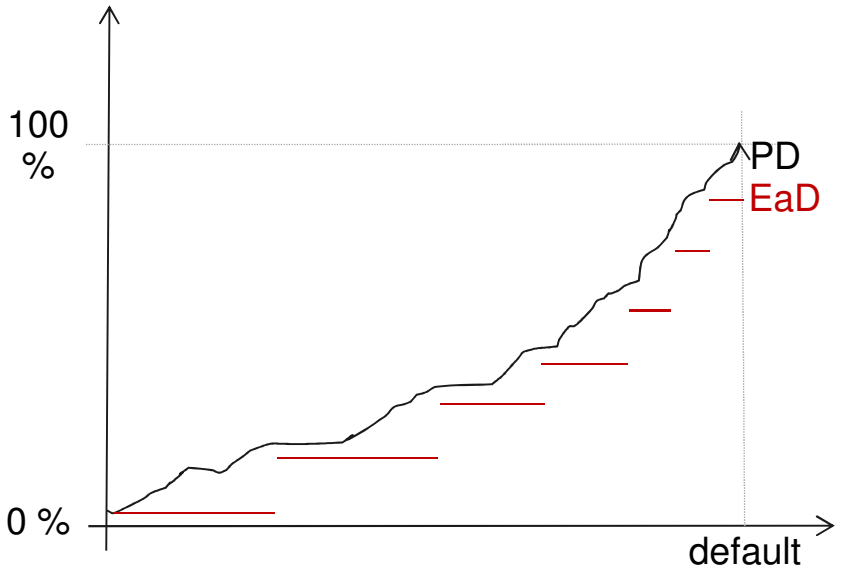
Wrong-way risk

Positive correlation between EaD and PD to a given counterparty.

- **specific**: Typically arises from poorly constructed transactions.
  E.g.: bank holds long a put option on shares of a counterparty that provides own shares as collateral.
- **general**: PD of counterparty is positively correlated with market risk factors.



Current Basel II approach to wrong-way risk

$$CCR^{\text{BaselII}} = K * EaD = K * \alpha * EEPE$$

α-factor to account for wrong-way risk

Counterparty Credit Risk:
Stressed correlation (R) multiplier for critical counterparties.

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2.2

Basel II correlation

Basel II correlation calculation:

$$R = 0.12\frac{1-e^{-50PD}}{1-e^{-50}} + 0.24\left(1-\frac{1-e^{-50PD}}{1-e^{-50}}\right)$$

Correlation (R) ranges from 12% to 24%

Observation:

R(financial firms) = 1.25 × **R**

Proposed changes

Multiplicative factor of 1.25 to R for exposures to financial intermediaries that are

- regulated banks, brokers/dealers, insurance companies with assets of at least USD25 billion
- unregulated generating majority of revenues from financial activities (e.g. hedge funds)

Comment

- If a counterparty has **low PD** and, hence, high R, capital requirements can increases by about 35%
- Interbank lending becomes quite expensive, **punishing „good" intermediaries**

Counterparty Credit Risk:
Example: Stressed correlation (R) for critical counterparties.

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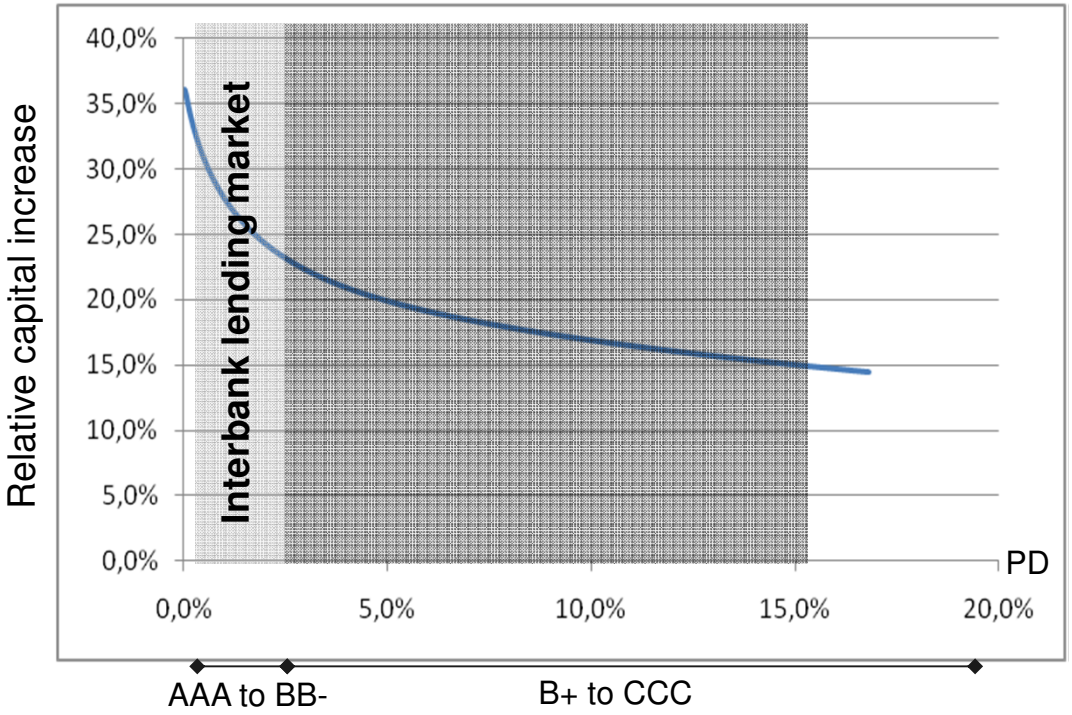
$$RWA^{CCR^{BaselII}} = 12{,}5 * LGD * \left[\Theta\left(R(PD)\right) - PD\right] * \frac{1+(M-2.5)b}{1-1.5b} * \alpha * EEPE$$

$$RWA^{CCR^{BaselII}}_{new} = 12{,}5 * LGD * \left[\Theta\left(1.25 * R(PD)\right) - PD\right] * \frac{1+(M-2.5)b}{1-1.5b} * \alpha * EEPE_{stressed}$$



PD	R	1,25*R	Relative capital increase
0,01%	23,9%	29,9%	35,714%
0,02%	23,9%	29,9%	36,074%
0,03%	23,8%	29,8%	36,088%
0,04%	23,8%	29,7%	36,001%
...	...	...	...
16,71%	12,0%	15,0%	14,444%
16,72%	12,0%	15,0%	14,441%
16,73%	12,0%	15,0%	14,438%
16,74%	12,0%	15,0%	14,435%

Counterparty Credit Risk: What exactly is EEPE?

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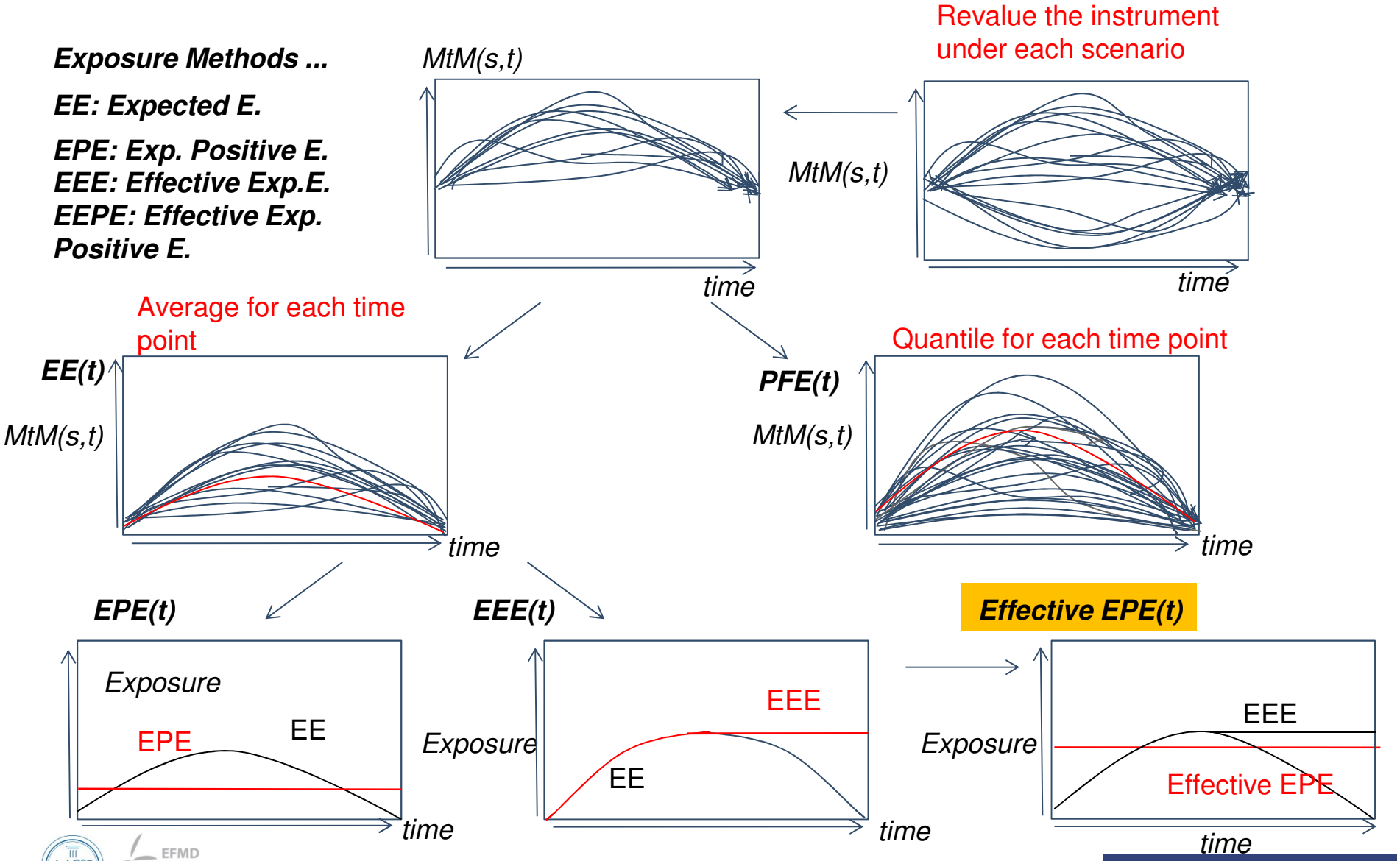
Exposure Methods ...

EE: Expected E.

EPE: Exp. Positive E.
EEE: Effective Exp.E.
EEPE: Effective Exp. Positive E.



Counterparty Credit Risk: Stressed effective expected positive exposure (EEPE)

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Shortcomings of EEPE

- Does not account for wrong-way risk
- Is not appropriately estimated in periods of stress

2.1

Stressed EEPE ($EEPE_{stressed}$)

effective expected positive exposure (EEPE):

$$EEPE := \sum_{t_k \le 1\,yr} \Delta_{t_k} EEE_{t_k}$$

where effective expected exposure (EEE):

$$EEE_{t_k} := MAX_{t \le t_k}(EE_t)$$

where EE denotes the expected exposure.

stressed EEPE:

Define 3yr period including 1yr stress period used for stressed VaR (Market Risk Revisions) → EEPE: Calibrate EEPE parameters to this period

Revised EaD calculation:

$$EaD = \alpha * MAX(\text{EEPE}_{\text{stressed}}; \text{EEPE}_{\text{currentdata}})$$

Counterparty Credit Risk: Wrong-way risk (PD(EaD))

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Basel III approach to wrong-way risk

general wrong-way risk: NO EXPLICIT CAPITAL CHARGE but

Micro level

2.1 **Stressed** effective expected positive exposure

$$EEPE \xrightarrow{\text{Stress scenario}} EEPE_{stressed}$$

Macro level

2.2 Asset value **correlation multiplier**

$$R \in [0.12;0.24] \xrightarrow{*1.25} R \in [0.15;0.30]$$

CCR management / Op risk

tackle shortcomings in α-factor estimation

$$\alpha$$

specific wrong-way risk:

Implement **methodology** to identify specific wrong-way risks

Identify specific wrong-way risk for a transaction

- no spec. wrong-way risk: $EaD = \alpha * EEPE$
- spec. wrong-way risk: $EaD = \begin{cases} \text{Notional} & \text{if CDS} \\ \text{MtM}_{\text{default}} & \text{if EQ-deriv.} \end{cases}$

Counterparty Credit Risk: Collateralized CPs – fundamentals of margin period of risk.

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Basic definitions

- **Margin agreement:** Contractual agreement that a counterparty posts collateral when its exposure exceeds a specified level
- **Margin threshold:** largest amount of exposure that remains outstanding until one party has the right to call for collateral
- **Margin period of risk:** delay between a margin call that a counterparty does not respond to and the start of closing out that counterparty (default procedures)

Observations

- **Margin agreements reduce CCR** but pose significant challenges to modelers as future collateral amounts and margin calls ought to be modeled
- Low margin periods of risk according to Basel II caused **precipitated defaults** and EaD might be underestimated

Counterparty Credit Risk: Collateralized CPs – fundamentals of margin period of risk.

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Basel II correlation

Proposed floors for margin period of risk (MPR)

floor

New

MPR^{Min}	Transaction type	Condition
5 days	Repo-style	Daily remargining
10 days	Other CM-transactions	
20 days	Secured lending,	Daily revaluation
20 days	Large netting setts[1] Illiquid positions[2]	
2*floor		If more than 2 margin call disputes in that netting set in last quarter

How does MPR enter the capital calculation?

$$RWA^{CCR^{BaselIII}} = 12{,}5 \cdot K_{stressed}(R \cdot 1.25_{banks}) \cdot \alpha \cdot EEPE_{stressed} + 12{,}5 \cdot cc(CVA)$$

Should be calculated with margining

Banks that can calculate EEPE without margining, but not with margining, need to proxy EEPE with margining:[3]

$$EEPE_{stressed}^{With\,margining} = \max(Marginthreshold + \Delta PE(0,MPR); EEPE_{stressed}^{Withoutmarginagreement})$$

1) Large netting sets ⇔ ≥ 5,000 trades at any point during a quarter
2) Illiquid positions ⇔ one or more trades with either (i) illiquid collateral or (ii) illiquid OTC-derivate (that cannot be easily replaced)
3) ΔPE: expected increase in the netting set's exposure beginning from current exposure of zero over the margin period of risk.

Macroeconomic impact assessment of OTC derivatives regulatory reforms (BIS, August 2013)

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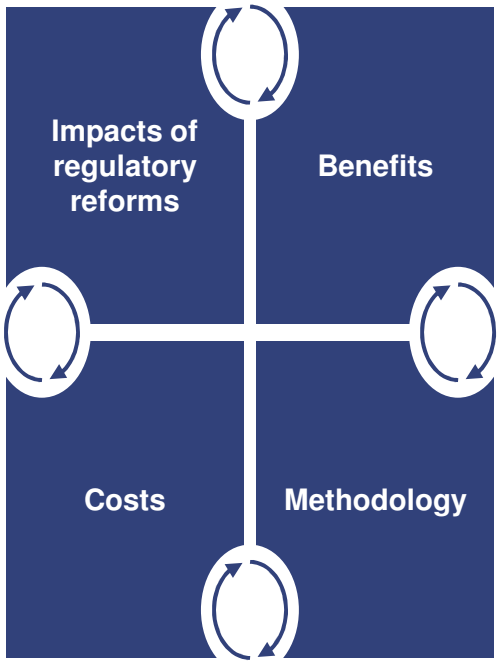
Requirements and Consequences

- **standardised OTC derivatives:** to be cleared through central counterparties (CCPs),
- **Collateral and Capital**: requirements for collateral to be posted against both **current and potential future counterparty exposures**, whether centrally cleared or non-centrally cleared, and requirements that banks hold additional capital against their uncollateralised derivative exposures

Increase in the price of risk transfer

- **Collateral:** Requiring OTC derivatives users to hold more high-quality, low-yielding assets as collateral lowers their income.
- **Capital:** Holding more capital means switching from lower-cost debt to higher-cost equity financing.
- **Balance sheet changes**: reduce risk to debt and equity investors but risk-adjusted returns may still fall.
- Institutions may pass on higher costs to the broader economy in the form of **increased prices.**
- **Reduction in economic activity** resulting from higher prices of risk transfer and other financial services.
- Base Case Estimation**: -0.04% of GDP p.a.**



Lower frequency of financial crises

- **Reduction in forgone output** resulting from a lower frequency of financial crises propagated by OTC derivatives exposures
- Reduction of **counterparty exposures**
- Estimation: In the central scenario lowering of the annual probability of a financial crisis propagated by OTC derivatives by **0.26 percentage points**.
- Present value of a typical crisis estimated to cost **60% of one year's GDP**
- Reforms help avoid losses equal to **(0.26 x 60% =) 0.16%** of GDP per year

Network Modeling as described on p. 3

- For each network link**: bilateral exposure** are spread proportionally across linked counterparties such that the total OTC derivatives exposures of each institution are as reported in their financial accounts or regulatory filings.
- The larger the initial change in G-16 dealer default probability, the more financial institutions end up with **leverage ratios above 40**.
- When a sufficient proportion of institutions in the network have leverage ratios at or above this level, the financial system is assumed to tip into crisis.

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Further potential impacts

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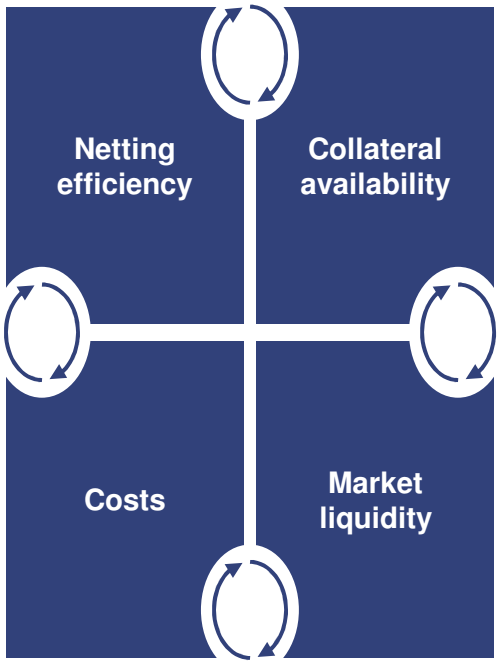
Multilateral netting of exposures

- Multilateral netting is maximised when entire portfolios are cleared in a **single location**
- **Portfolio fragmentation**: splitting portfolios between centrally cleared and non-centrally cleared transactions or between multiple CCPs, will reduce netting and increase collateral costs.
- Links or **interoperability** between CCPs could increase the scope for multilateral netting,
- Introduction of **interconnection risks** transmits a participant's failure across CCPs

Cost of indirect clearing

- Indirect clearing can allow access to CCPs for **smaller market participants** who are unable to meet CCP direct membership criteria
- Although clients could avoid the **large fixed costs** involved in direct clearing, they may face higher margin requirements and clearing fees imposed by the direct clearing member compared to those imposed by the CCP on the direct clearers themselves



Shortages of collateral

- As the OTC derivatives market reforms are gradually being implemented globally, the imposition of central clearing requirements for standardised OTC derivatives and margin requirements for non-centrally cleared derivatives is expected to increase the **demand for high-quality collateral** for margining purposes.
- Any shortages of collateral during times of stress may put pressure on the **pricing of high-quality assets** and increase the costs of engaging in these transactions

Fragmentation of exposures

- **Different regulatory requirements** in different jurisdictions may lead to **structural changes in the OTC derivatives activities** of dealers, particularly in less liquid markets.
- Given the **high concentration** of the market, any changes in market-making practices precipitated by the requirements could have a significant impact on the pricing and liquidity of OTC derivatives markets.
- This could have particularly important effects in regional or local markets where fewer liquidity providers are present.

Further potential impacts

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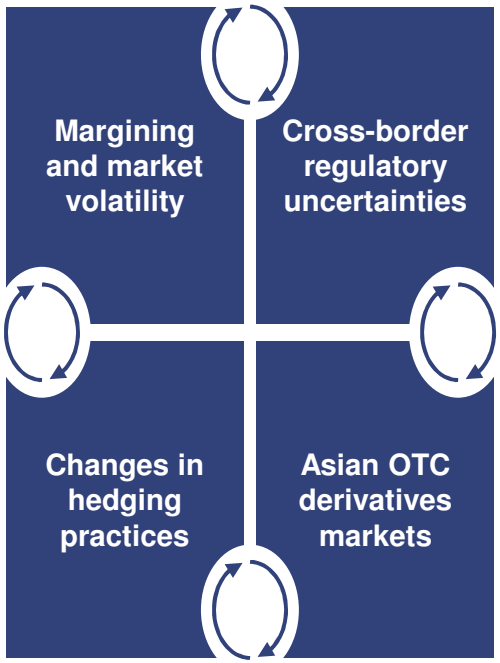
Price volatility and margining

- More comprehensive posting of collateral will strengthen the link between **market price volatility and margining requirements**.
- When market volatility is low, margin requirements will also be low, making it less costly to take risk using derivatives.
- As volatility rises (or is expected to rise) collateral requirements will increase. This may reduce the ability of some market participants to trade or maintain existing positions.
- This may further increase market volatility

Business models

- These include the ability of dealer banks to **alter their business models** and practices in response to the new regulatory environment by
- reducing involvement in OTC derivatives market-making,
- lowering their use of OTC derivatives for hedging,
- choosing alternative hedging instruments (such as exchange-traded derivatives)
- changing their asset-liability composition, or increasing their reliance on other fee-based income.



Regulatory arbitrage

- There is a risk that overlaps, gaps or conflicts in the frameworks, if not properly addressed, could create the potential for regulatory arbitrage:
- migration of trading to certain jurisdictions,
- increase systemic risk
- and also lead to market fragmentation.
- Among the cross-border issues in this category is the regulatory treatment of CCPs

Third-country CCPs

- The potential **non-recognition** of third-country CCPs could negatively affect Asian OTC derivatives markets: **market liquidity, restrict participation , undermine price discovery.**
- Non-recognition could imply that some CCPs would be treated as **non-qualifying,** thereby attracting a much higher regulatory capital requirement for trade exposures and default fund contributions.
- The resulting impact on the price discovery process could also influence hedging decisions, which would adversely affect banks and corporates' ability to manage interest rate and other risks, thereby potentially **increasing systemic risk**..

Thanks a lot for your time and attention!

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