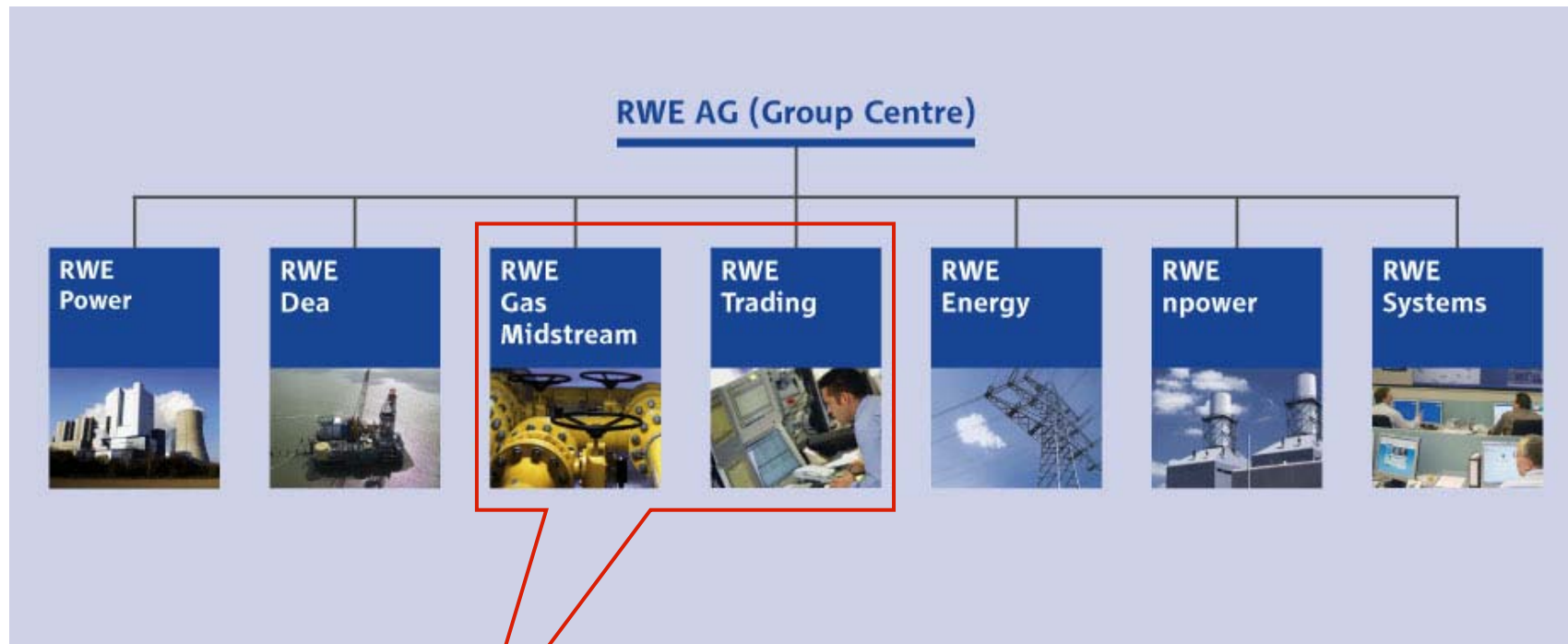


Credit Risk in Commodity Trading

***... and how RWE Supply & Trading
deals with it***



RWE Supply & Trading as an operating company within the RWE Group



Merged on 1 Apr 2008

A definition of Risk



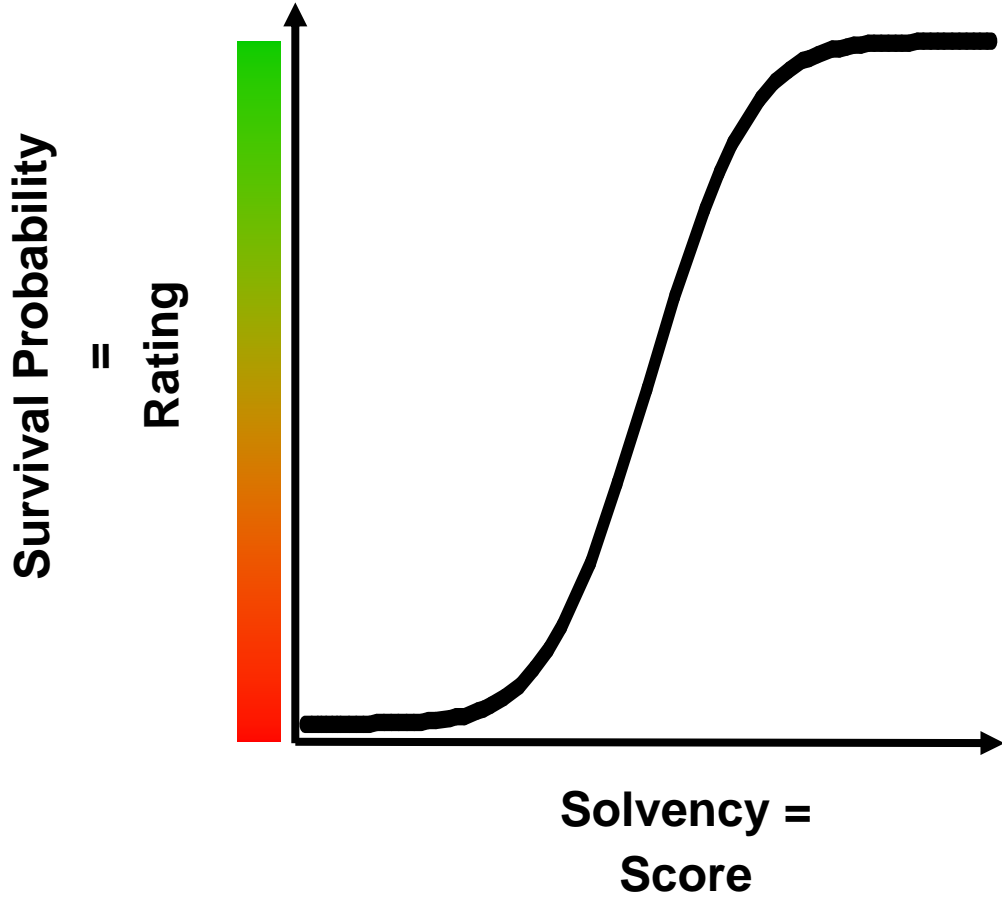
- *The combination of the probability of an event and its consequence* – The International Standards Organization
- ... and that's why we care about Credit Risk
 - If a C/P defaults we may loose money
 - Loss = $PD * LGD * EAD$
 - which requires risk mitigation
 - Limit Setting & Exposure Monitoring
 - Contractual Arrangements
 - “Credit Risk Insurance”



Risk Quantification

Risk Mitigation

Rating & Scoring



Loss Given Default = 1 – Recovery Rate



- Two different approaches
 - Default history of own portfolio
 - Sparse studies from Rating Agencies & academics
- What do we know?
 - Actual recovery depend on credit cycle
 - Recovery negatively correlated with average default probability of borrower universe
 - No stable correlation
 - Level of Recovery Rate & Correlation depends on Industry Sector



- Prudent guess: long term average published by Rating Agencies



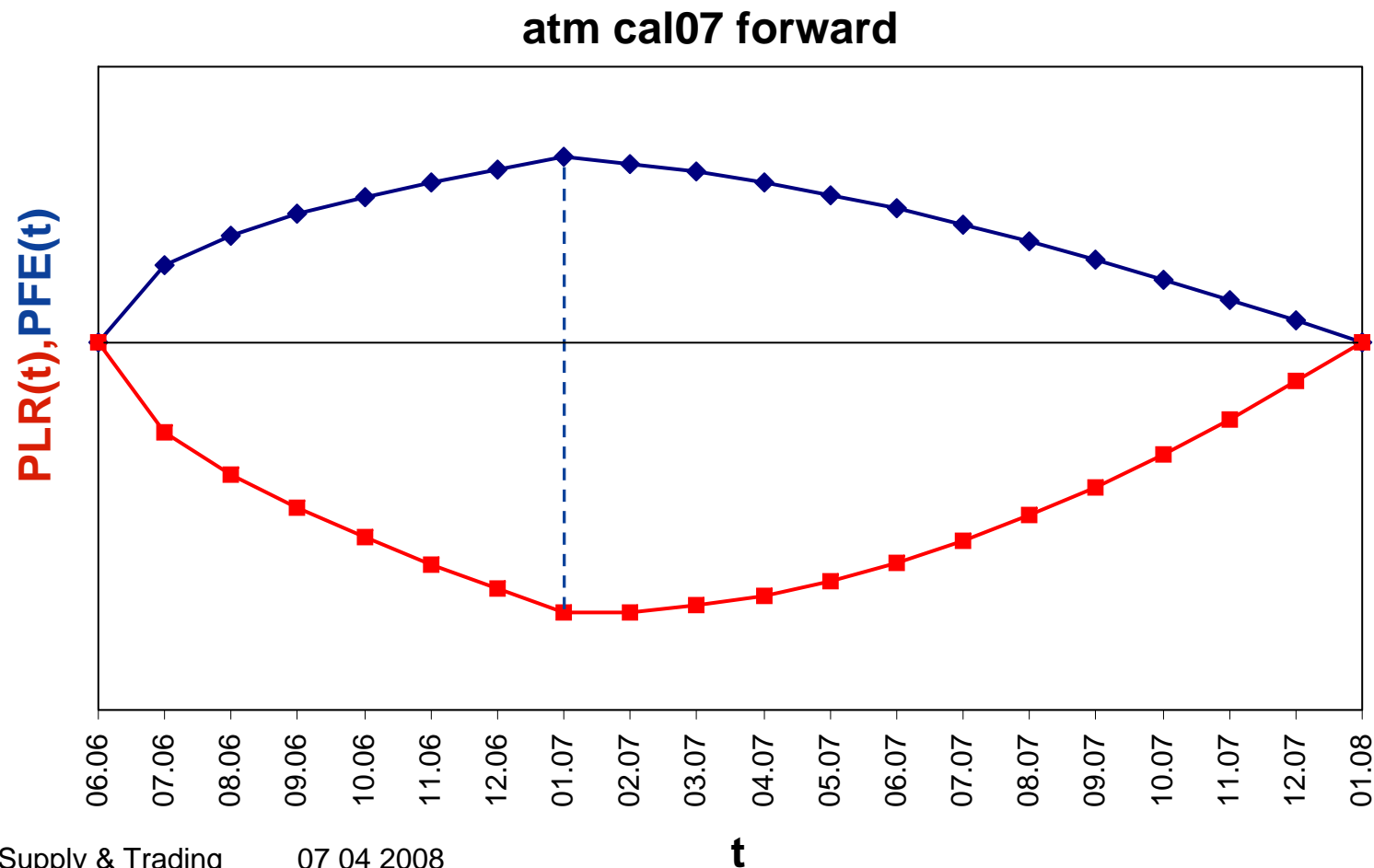
Exposure Definition

- Credit exposure
 - Economic value of the claims to the counterparty at default
- Current exposure vs future (=potential) exposure
- Instrument type defines the exposure definition
 - Bonds/ loans: notional outstanding
 - Forwards & derivatives
 - Pre-Settlement Exposure over time
 - Current exposure: MtM
 - Future exposure: PFE (Potential Future Exposure), aka CEE
 - Settlement Exposure over time
 - (financial settlement: MtM@Settlement)
 - physical settlement: price x delivered, but not yet paid, volumes (accounts receivables & accruals)
- Exposure under a CSA
 - Current exposure: MtM + AR/AP + accruals
 - “Close-out exposure”: increase in MtM and settlement exposure over the dispute/close-out period

PFE – Potential Future Exposure

PLR – Potential Liquidity Requirements

- Shape of the exposure profile is determined by the “competition” of the time dependent factors ”price uncertainty“ and remaining volume



PFE: practical challenges & dependencies



- Aggregation (Netting)
- System resources vs. accuracy
 - Model
 - Method
 - Online-Monitoring & Pre Execution Check
- “Exotic” products
- Reporting
- Backtesting
- Limitation
- Understanding of credit exposures
- Credit Calculations depend on
 - appropriate deal modelling
 - correct deal capture
 - accurate market data

*Challenges
analogue
to Market-VaR*



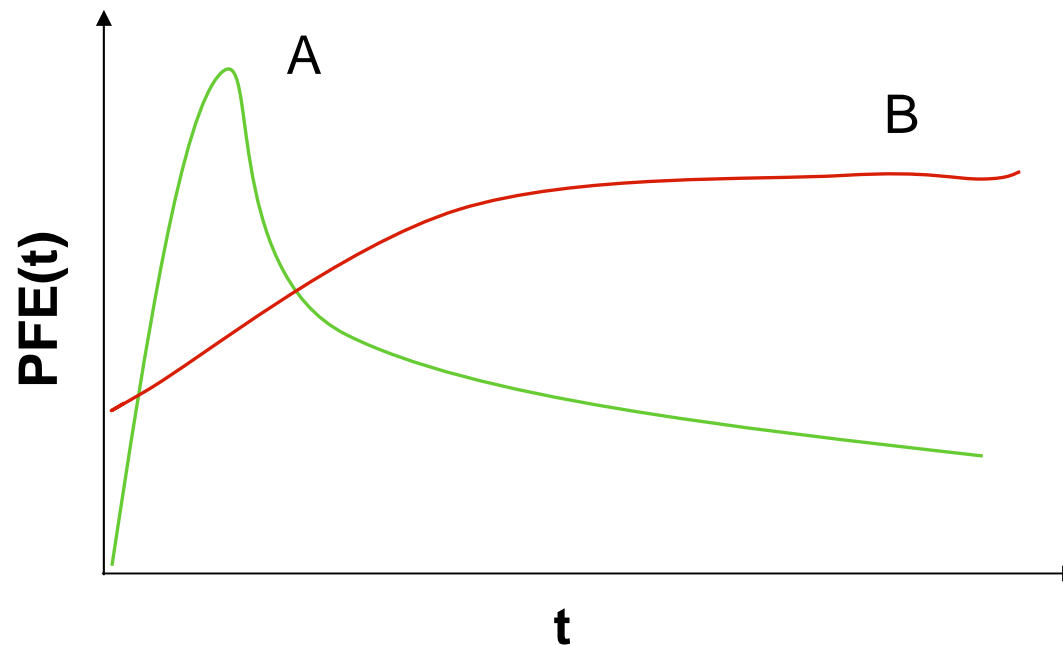
PFE – RWEST's approach



- Within the PFE Methodology all portfolio relevant market prices are shocked up (the “up scenarios”) and shocked down (the “down scenarios”) at a 95% confidence level at pre-specified future points in time according to the underlying geometric Brownian motion (GBM) model whose dynamics is described by forward curves and their corresponding volatilities and correlations. I.e. the PFE approach is a particular kind of a stress test where instead to a usual stress test the relevant prices are not shocked by fix amounts but by amounts according to the assumed market dynamics.
- *Mathematically:* $PFE(t,T) = \text{base_mtm}(t,T) + \text{creditDelta}(t,T)$

Limitation of PFE

- Loss potential is defined by „PFE-Term Structure“ (vs peak PFE)



Risk Quantification

Risk Mitigation

Master Agreements - from a Credit point of view RWE

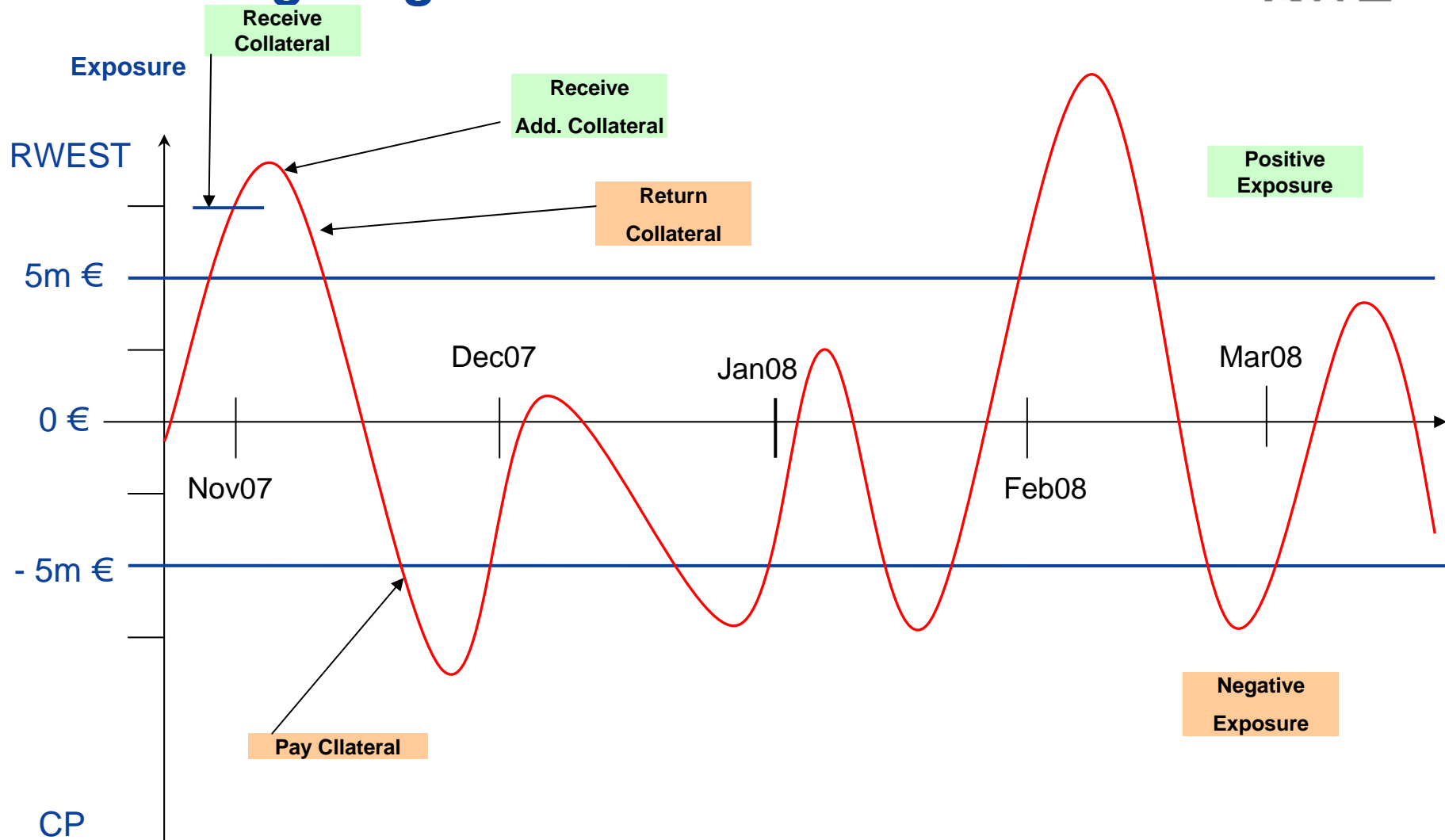
- Covered transactions
- Payment and/or Close-out netting
- Credit Support
- Performance Assurance
 - Rating Threshold
 - EFET Covenants
- CSA: Margining parameters
- ...

OTC Margining I

- To reduce/limit Credit Risk
- To extend trading opportunities
- Starts with the conclusion of a Credit Support Annex to a Master Agreement (ISDA, EFET, NBP, IETA, CPMA, etc...)
- To secure counterparty exposure exceeding the Credit Limit by cash, LC or other types of securities
- Covers Marked to Market (MtM) and Settlement Exposure



OTC Margining II



OTC Margining III



■ OpRisks

- missing trades
- market prices used
- agreement set up
- late information on late payments

■ ...leading to Disputes

- comparing credit support information, such as collateral positions, thresholds... verifying that there is no issue with our prices
- exchanging exposure breakdowns
- comparing the total number of outstanding transactions which should be included in the calculation
- comparing detailed transactions lists including MTM and SE figures

Credit Insurance

- Basket of names
- Covered: Settlement Exposure (and MtM)
- Protection amount & max loss p.a.
- Premiums
 - upfront
 - usage fee
- Varieties

Excess of Loss (a)
5 Insurer Loss
10 RWE Loss

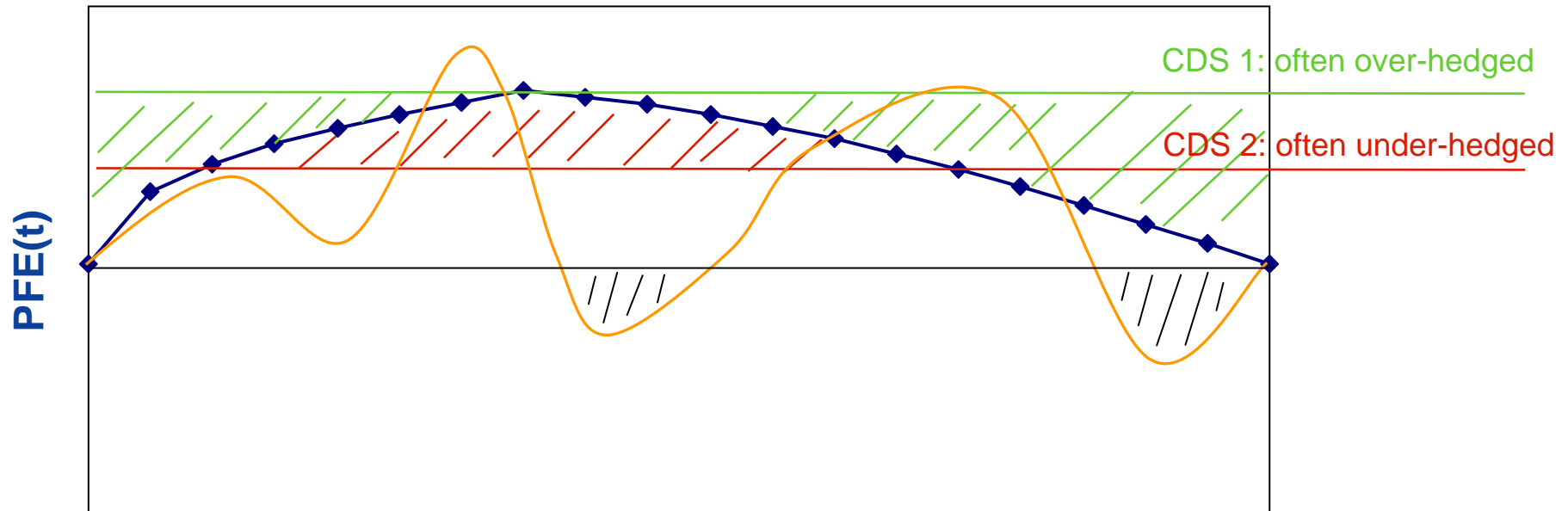
Aggregate First Loss
10 Insurer Loss
3 RWE Loss

Excess of Loss (b)
5 RWE Loss
5 Insurer Loss
5 RWE Loss

Loss Sharing	
RWE Loss 50%	Insurer Loss 50%
Deductable	

...

Contingent Credit Default Swap (CCDS)



■ Plain vanilla CDS

- single name, single contract “credit insurance”
- protection amount?
- reference instrument/entity!
- physical settlement quite common
- easy to price

■ Contingent CDS

- single name “credit insurance”
- protection amount – reference to underlying deal(s)
- reference entity – obvious
- bespoke transaction
- pricing: expected credit costs