Regulatory CVA

Presentation TopQuants

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EUROSYSTEEM

"The bank turned down our loan, but approved the payments."

• Bio Pieter van Zwol

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• Study	Master (financial) econometrics at EUR
• ING Bank/ ING Barings, Treasury & Trading	Derivatives research (pricing & hedging), Trader interest rates derivatives
• IMC (options market maker)	quant risk management, hedging ir, statistical arbitrage trader, trader comm. markets
• PGGM (Treasury)	Execution of all derivative positions
• SourceCapital AG (Swiss based hedgefund)	Algorithmic developer & high frequency trader
• SNSREAAL/Vivat	ALM risk & counterparty risk
• DNB	supervisor specialist at OSBE-FIKA-department

- OSBE-FIKA=Financial risk & capital instruments at OSBE (Onsite and bancaire expertise) division
- My working topics include market risk, liquidity risk & CCR at banks, Market & Banking book

- DISCLAIMER: All info in this presentation is based on personal view/account

DNB-OSBE-FIKA

- DNB has 3 pillars: central bank, policy & supervision pillar
  - Supervision
    - OSBE=Onsite division within Supervision Pillar
      - FIKA=Financial risk & capital instruments (department 13 people)

- Currently we have 2 vacancies (!!)
  - 1 interest rate expert
  - 1 EMIR/Liquidity expert

- relevant Interactions: banks, SSM, JST (local and Frankfurt based), Central Onsite Inspections (COI), EBA, ECB

Timeline onsite inspections

- JST=Joint Supervisory Team (=account managers=generalists) asks onsite team to investigate a special topic at his/her bank (or several)
- JST & Onsite set the main scope of investigation
- Onsite team investigates (approx. 6-8 weeks) and delivers inspection report with findings to JST
- JST writes recommendations based on findings taking into account their priorities
- JST follows up to his/her bank with their recommendations

- Important: Onsite team delivers to JST ➔ independence is key

Main Goal of this presentation: Informative

- CCR risk, CVA (pricing, accounting and capital requirement)
- Identify the key ingredients for calculating EAD and regulatory capital (standardized)
- Describing current methods, focus on Standardized approach SA (CEM)
- Elaborate on the new proposed SA-CCR method (official 2017)
- Main differences related to example derivatives portfolio
- Take-aways

Why is CVA so important?

- The present value of a derivative does not only change due to market data changes (**exposure**), but also due to changes in the **credit-worthiness of the counterparty**. This counterparty credit risk is reflected by calculating CVA

History CVA

- To overcome current and future credit exposure to financial counterparties resulting from derivatives transactions

- 2008 During the financial crisis many banks incurred losses due to CVA moves (it was estimated that 2/3 was originated by CVA volatility)
- 2009 Basel III introduction of new capital charge against CVA volatility (calculated by standardized or advanced formula)
- 2014 Final paper of new Standardized Approach for Counterparty Credit Risk (SA-CCR):
  - 1/1/2017 Basel adoption
  - >=2017 EC approved

CVA impact

- Organisation (CVA desk)
- Pricing (external, intern=transfer pricing)
- Accounting (CVA and DVA)
- Regulatory capital requirement (CVA only, DVA not loss absorbing)

Expected loss → Accounting

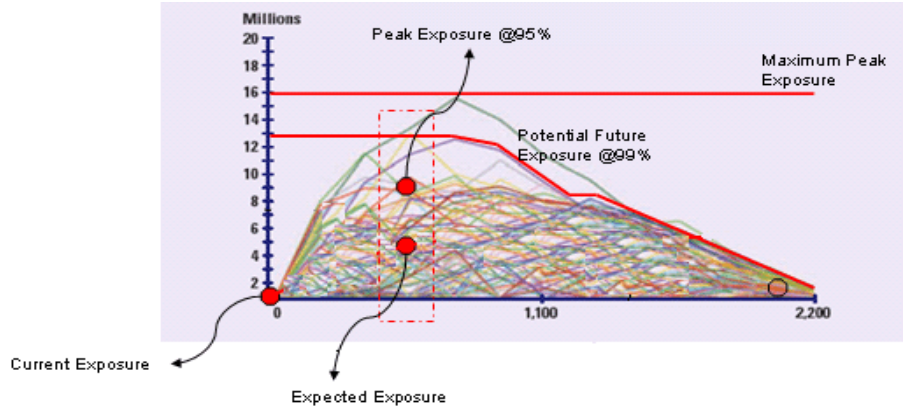
Unexpected loss → Regulatory – ACVA

- SCVA

EAD modelling

Internal Model Method (IMM) for CCR:

- Needs supervisory approval
- tailor-made approach
- scenario generator
- P and Q probability-measure
- time consuming



Standardized method

- Current Exposure Method (CEM) or Standardized method (SM)
- No supervisory approval
- Uniform approach
- Simple and quick

SA-CCR replaces CEM and SM

Standarized CVA

- Exposure (instruments, remaining maturity)
- Credit quality of counterparty
- Netting Sets
- Collateral specifics

- Now the modelling stuff!

Standarized CVA

Current Exposure Method

EAD = RC + PFE

= RC + Notional*Netting Factor*Add-On

= max(MtM-C,0) + Notional*Netting Factor*Add-On

Standarized CVA: Netting Factor

Net to Gross ratio (NGR) = RC_{net}/RC_{gross}

- Rc_{net} = sum of the RC over the transactions within the NS
- Rc_{gross} = sum of max(RC,0) over the transactions within the NS

Standarized CVA: Add-on

For each instrument in the NS, the add-on depends on:

- the trade's residual maturity
- the underlying instrument type

PFE% table	ASSETTYPE				
Residual maturity	Interest rate contracts	Contracts concerning foreign exchange rates and gold	Contracts concerning equities	Contracts concerning precious metals except gold	Contracts concerning commodities exd precious metals
1 year or less	0,0%	1,0%	6,0%	7,0%	10,0%
Over 1 year but not exceeding 5 years	0.5%	5,0%	8,0%	7,0%	12,0%
Over 5 years	1.5%	7.5%	10,0%	8,0%	15,0%

NETTING

- PFE Add-on = 0.6*Add-On *(RC_{net} / RC_{gross})+0.4*Add-On

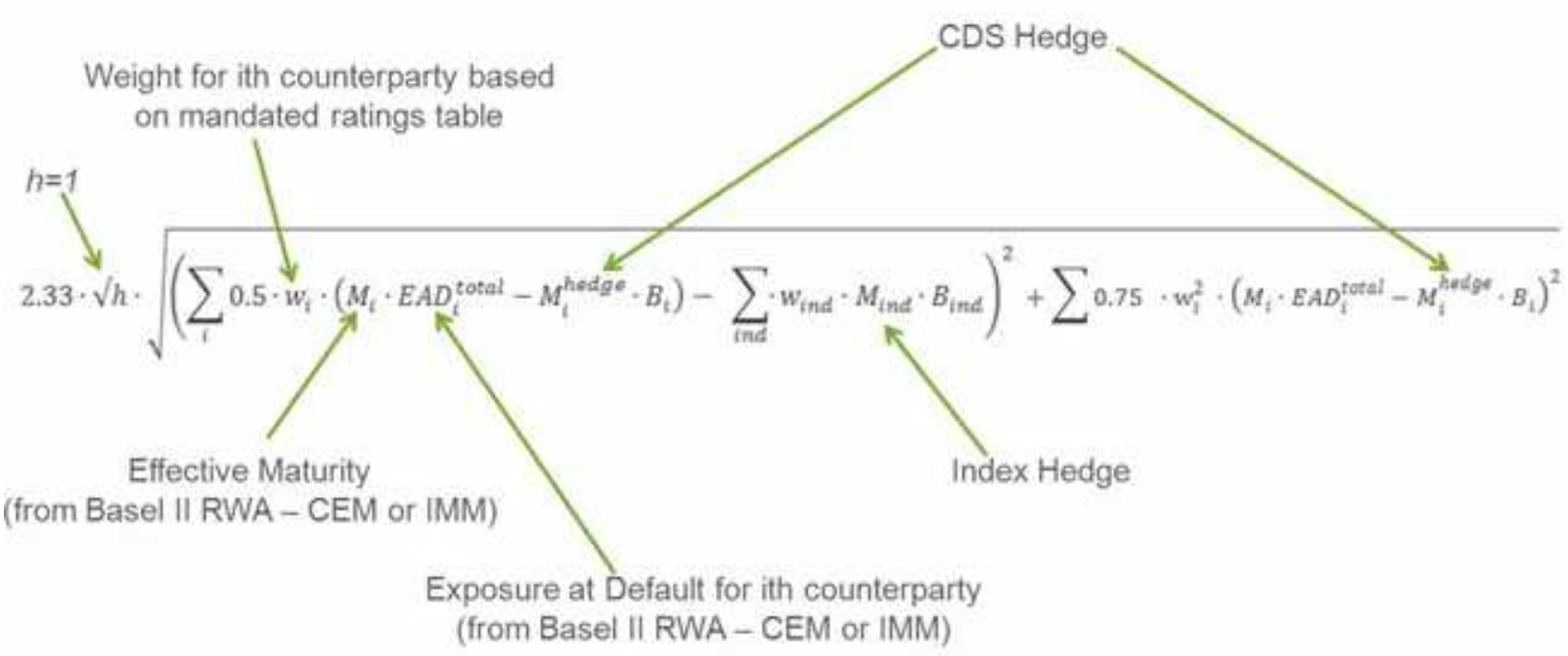
Main Idea: A perfect balanced exposure book has (RC_{net} / RC_{gross})=0

The minimal reachable PFE add-on

PFE add-on = 0.4*add-ongross

- EAD = max(0, MtM-Collateral) + PFE = RC + Notional*PFE Add On
- On NS level

Required Capital



SA-CCR

The new Standard Approach for Counterparty Credit Risk (SA-CCR) will become effective 1 January 2017

EAD = 1.4*(RC + PFE)

= 1.4*(RC + multiplier*Add-on)

RC:

- Unmargined Trades: **RC=max(MtM-C; 0)**
- Margined Trades : **RC=max(MtM-C;THA+MTA-NICA; 0)**

Add-ons:

- Based on concept of Hedging sets
- Asset classes: Interest Rate Derivatives, Foreign Exchange Derivatives, Credit - and Equity Derivatives and Commodity Derivatives
- No diversification among asset classes, but (some) diversification allowed within asset class

calculations

NS	trade	nature	residual mat	CCY	notional	payleg	rec leg	mtm (EUR)	MAPPING		FORWARD	STRIKE		DURATION	MAPPING	SD ADJ NOTIONAL	MF	ISOPTION?	DELTA(I) ADJUSTMENTS
1	1	irs		10 USD	10000	fixed	float	30	IR	0	10	5%		$7.72	IR---USD---3	78,694	1	FALSE	(1.00)
1	2	irs		4 USD	10000	float	fixed	-20	IR	0	4	5%		$3.55	IR---USD---2	36,254	1	FALSE	1.00
1	3	swaption	1 into 10	EUR	5000	float	fixed	50	IR	1	11	6%	5%	$7.89	IR---EUR---3	37,428	1	TRUE	(0.27)

EAD=ALPHA*(RC+MULTIPLIER*ADDON_AGGRAGATE)	569.47	
C	0	
RC	60	
MULTIPLIER	1.000	
TH	0	THRESHOLD COLLATERAL
MTA	0	MIN TRANSFER AMOUNT
NICA	0	NET INDEPENDENT COLLATERAL AMOUNT

Calculations

DELTA(I) ADJUSTMENTS		MF UNMARGINED		IR---USD <=1	1-5	>=5		IR---EUR <=1	1-5	>=5	
				1	2	3		1	2	3	
(1.00)			1.00			(78,694)					
	1.00		1.00		36,254						
(0.27)			1.00							(10,083)	
		ir hedging set		-	36,254	(78,694)		-	-	(10,083)	
		eff notional total		59,270				10,083			
				0.50%		SF(IR) FROM TABLE		0.50%			
		ADDON_AGGREGATE		347							

Comparison

- Case study:
- Consider NS's of two ATM IRS, a payer and receiver (P/R) combination
- with maturities T = 1y; 5y; 10y; 20y.
- The two swaps in the portfolio are in the same currency
- In Fig, EAD estimates for the portfolios are shown based on CEM and SA-CCR for collateralized (MPOR=10d) and uncollateralized NS's.

2 swaps in same ccy, payer and receiver

1 currency					
EAD in units of notional for portfolios P/R ATM swaps					average
CEM uncoll	P_1y_EUR	P_5y_EUR	P_10y_EUR	P_20y_EUF	1.75%
R_1y_EUR	0.00%	0.50%	1.50%	1.50%	
R_5y_EUR	0.50%	1.00%	2.00%	2.00%	
R_10y_EUR	1.50%	2.00%	3.00%	3.00%	
R_20y_EUR	1.50%	2.00%	3.00%	3.00%	
SA-CCR uncc	P_1y_EUR	P_5y_EUR	P_10y_EUR	P_20y_EUF	3.46%
R_1y_EUR	0.00%	2.70%	5.10%	8.40%	
R_5y_EUR	2.70%	0.00%	2.40%	5.80%	
R_10y_EUR	5.10%	2.40%	0.00%	3.30%	
R_20y_EUR	8.40%	5.80%	3.30%	0.00%	
SA-CCR coll	P_1y_EUR	P_5y_EUR	P_10y_EUR	P_20y_EUF	1.03%
R_1y_EUR	0.00%	0.80%	1.50%	2.50%	
R_5y_EUR	0.80%	0.00%	0.70%	1.70%	
R_10y_EUR	1.50%	0.70%	0.00%	1.00%	
R_20y_EUR	2.50%	1.70%	1.00%	0.00%	

- The following features are noticeable
- CEM is the cheapest method for uncollateralized exposure, with the exception of the fully hedged P/R combinations (i.e. the diagonal terms in the tables of Fig).
- For collateralized exposure, CEM is the most expensive method
- (notice that RCgross = RCnet = 0 and therefore CEM does not allow any netting).

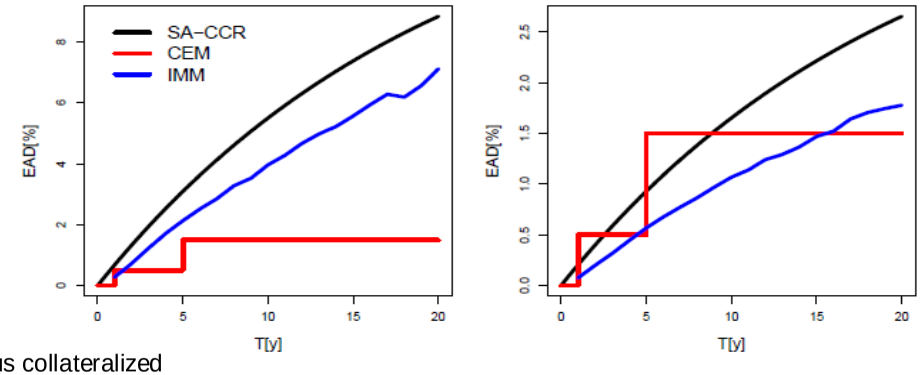
Now 2 ccy's

- market currencies are positively correlated. Hence, the worst-case correlations assumption used by SA-CCR results in a conservative estimate of the EAD. CEM and SA-CCR treat the P/R and R/P portfolios equivalently (the off-diagonal terms are symmetric)

2 ccy's					
EAD in units of notional for portfolios P/R ATM swaps					average
CEM uncoll	P_1y_EUR	P_5y_EUR	P_10y_EUI	P_20y_EUI	1.75%
R_1y_USD	0.00%	0.50%	1.50%	1.50%	
R_5y_USD	0.50%	1.00%	2.00%	2.00%	
R_10y_USD	1.50%	2.00%	3.00%	3.00%	
R_20y_USD	1.50%	2.00%	3.00%	3.00%	
SA-CCR unco	P_1y_EUR	P_5y_EUR	P_10y_EUI	P_20y_EUI	9.07%
R_1y_USD	1.40%	3.80%	6.20%	9.50%	
R_5y_USD	3.80%	6.20%	8.60%	11.90%	
R_10y_USD	6.20%	8.60%	11.00%	14.40%	
R_20y_USD	9.50%	11.90%	14.40%	17.70%	
SA-CCR coll	P_1y_EUR	P_5y_EUR	P_10y_EUI	P_20y_EUI	2.78%
R_1y_USD	0.40%	1.20%	1.90%	2.90%	
R_5y_USD	1.20%	1.90%	2.60%	3.70%	
R_10y_USD	1.90%	2.60%	3.40%	4.40%	
R_20y_USD	2.90%	3.70%	4.40%	5.40%	

NEXT COMPARISON

- Different asset types IRS & FX and 3 methods (CEM, IMM simplistic (1 factor), SA-CCR) using both collateralized as well as uncollateralized
- First IR



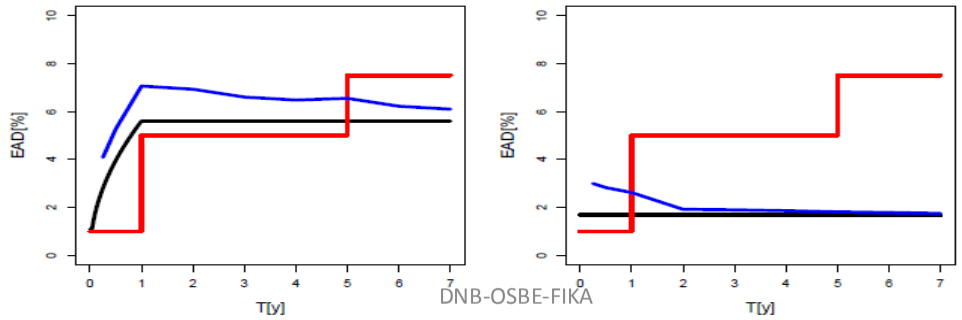
Right and left: Uncollateralized versus collateralized (MPOR=10d) EAD for a EUR ATM IRS for different maturities using SA-CCR, CEM and IMM.

Conclusion:
The red lines are a reflection of the stepwise table weights (PFE%) of the CEM
SA-CCR gives higher EAD to Longer dated IR compared to CEM
SA-CCR is more close to IMM (although IMM is a simplistic version)

fx

Right and left panels: Uncollateralised and collateralised (MPOR=10d) EAD for a combined EUR and USD FX-FWD ATM for different maturities using SA-CCR, CEM and IMM.

The red lines are a reflection of the stepwise table weights (PFE%) of the CEM
SA-CCR gives lower EAD to Longer dated FX-FWD compared to CEM, especially for collateralized FX-FWD
SA-CCR is more close to IMM (although IMM is a simplistic version)



takeaways

- Increase in exposure for single transactions or non-diversified, uncollateralized portfolios
- Almost perfectly hedged portfolios lower exposure by offsetting add ons
- Margined transactions usually have lower exposure
- The actual outcome depends very much on the derivatives portfolio of an institution

- Questions?