
Pricing of CDO²

Review: **Fitch**Ratings VECTOR

Dr. Ulrich Nögel

Monte-Carlo Simulation

- Firm Value Model (Merton)
- Threshold: Rating + proprietary information („Fitch CDO Default Matrix“)
- Multi- Period Monte-Carlo Simulation (largestep, no path-dependence)
- Gauss Copula
- Multi-Period Monte-Carlo allows change in parameters through conditional thresholds

M. Neugebauer. „Analysis of Synthetic CDOs of CDOs“. Fitch Ratings, Global CDO Criteria Report 2004

Input and Simulations

Step 1 Inputs

Entity	Recovery Rate (%)	Reference Notional				
		CDO 1	CDO 2	CDO 3	CDO 4	CDO 5
Corp 1	25	100	0	0	100	0
Corp 2	30	0	0	0	0	100
Corp 3	35	100	0	100	0	0
Corp 4	25	100	0	0	50	0
Corp 5	25	0	150	0	0	100
Corp 6	25	0	150	0	100	0
Corp 7	25	0	0	100	0	100
Corp 8	25	100	0	0	0	100
Corp 9	30	0	0	100	50	0
Corp 10	15	0	0	0	100	0
Corp 11	15	0	0	100	0	100
Corp 12	15	0	0	0	100	0
Corp 13	15	0	0	200	100	0
Corp 14	20	100	0	0	0	100
Corp 15	20	0	100	0	100	0
Corp 16	20	200	0	100	0	0
Corp 17	20	0	100	0	0	100
Corp 18	20	100	0	100	0	0
Corp 19	25	0	100	0	100	0
Corp 20	25	0	100	0	0	100
Portfolio Notional		800	700	800	800	800

Step 2 Simulation

Simulation Results (1=Default/0=Survival)					
Scen 1	Scen 2	Scen 3	Scen 4	Scen 5	
0	0	1	0	1	
0	0	0	0	0	
0	0	0	0	0	
0	0	0	0	1	
0	0	0	1	0	
0	0	0	1	0	
1	0	0	1	0	
0	1	0	0	0	
1	0	0	0	1	
0	0	1	0	0	
1	0	0	0	0	
1	0	0	0	1	
0	0	0	0	0	
1	0	0	1	1	
0	0	1	0	0	
0	1	1	0	0	
0	1	0	0	0	
1	0	1	0	1	
0	0	0	0	0	
0	0	0	0	0	
6	3	5	4	6	



Simulated Losses

Step 3 Portfolio Loss

	CDO 1	CDO 2	CDO 3	CDO 4	CDO 5
AP	125	125	125	125	125
TS	100	100	100	100	100
DP	225	225	225	225	225

Total CDO Portfolio Loss for each Scenario

	CDO 1	CDO 2	CDO 3	CDO 4	CDO 5
Scen 1	160	0	310	120	240
Scen 2	235	80	80	0	155
Scen 3	315	80	160	240	0
Scen 4	80	225	75	75	230
Scen 5	310	0	150	232.5	80

Step 4 Tranche Loss

CDO Tranche Loss: $\text{Min}(TS; \text{Max}(\text{Portfolio Loss}-AP, 0))$

	CDO 1	CDO 2	CDO 3	CDO 4	CDO 5	Master Loss
Scen 1	35	0	100	0	100	235
Scen 2	100	0	0	0	30	130
Scen 3	100	0	35	100	0	235
Scen 4	0	100	0	0	100	200
Scen 5	100	0	25	100	0	225

Cross Subordination Structures

Total Remaining Subordination: $\text{Max}(AP-\text{Portfolio Loss}, 0)$

	CDO1	CDO2	CDO3	CDO4	CDO5	Total	Master Loss
Scen 1	0	125	0	5	0	130	105
Scen 2	0	45	45	125	0	215	0
Scen 3	0	45	0	0	125	170	65
Scen 4	45	0	50	50	0	145	55
Scen 5	0	125	0	0	45	170	55

TS = tranche size; AP = attachment point; DP = detachment point

*see CDO Squared Innovation "Fungible Subordination"

Source: Fitch Ratings



Fraunhofer
Institut
Techno- und
Wirtschaftsmathematik

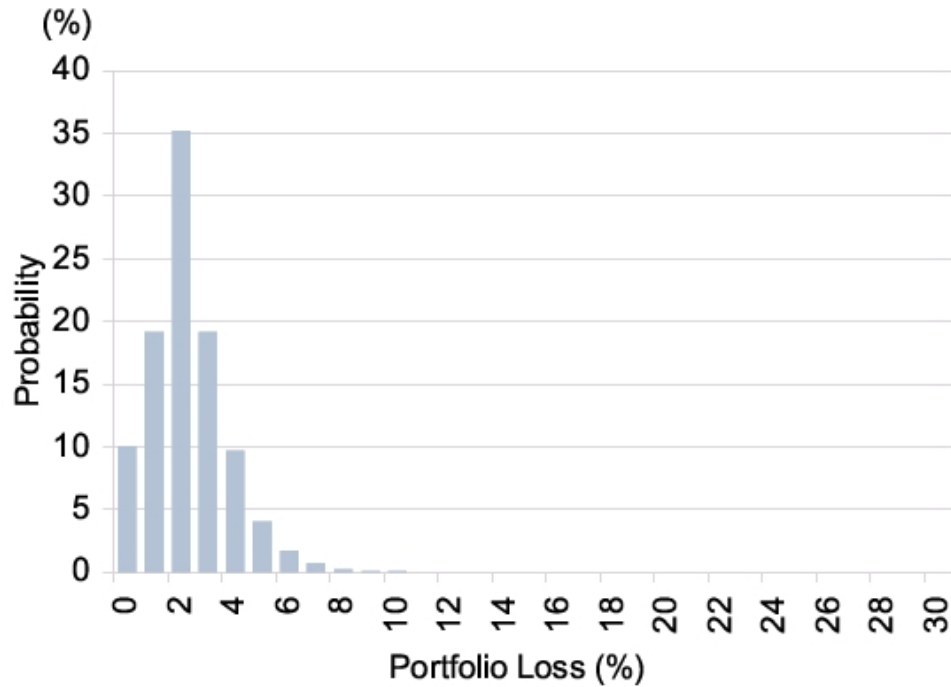


Financial Integrity Research Network

Portfolio Loss Distribution

Portfolio Loss Distribution

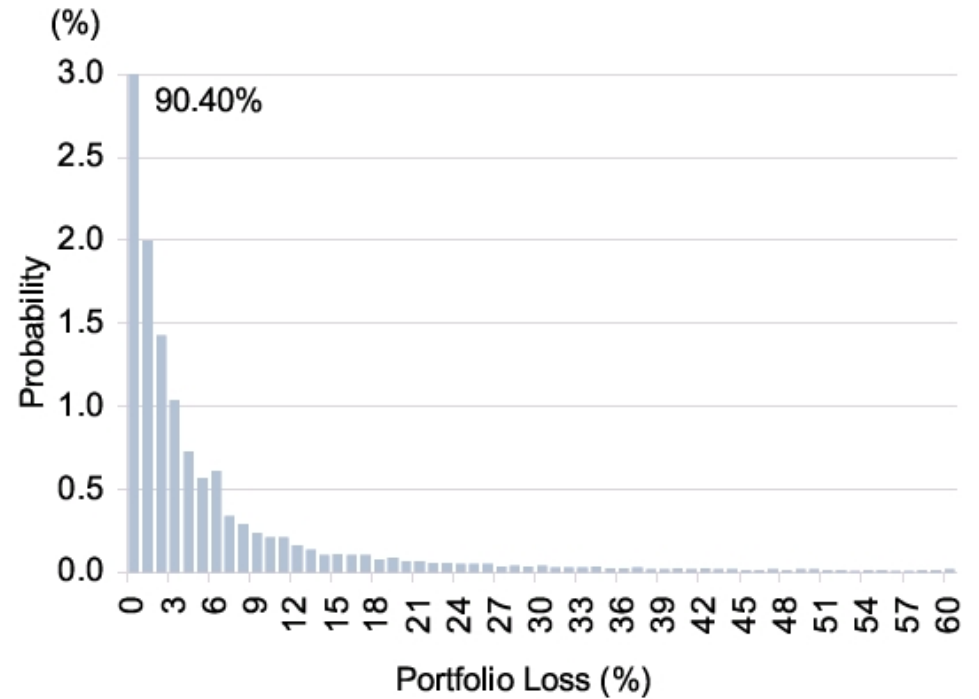
(100 IG Corporates)



Source: Fitch Ratings

Portfolio Loss Distribution

(CDO of 20 CDOs)



Further Analysis

- **Rating of the Master CDO**
- **Correlation and LGD**
Inner CDO LGD, Correlation between CDO Tranches (Asset Corr., Overlap, Diversity)
- **Sensitivity Analysis**
Inner vs. outer Subordination, High Grade ABS, Number Of inner CDOs, Term (time evolution)

No Pricing!

But: May be included based on time dependent Loss distribution!