Capital fungibility

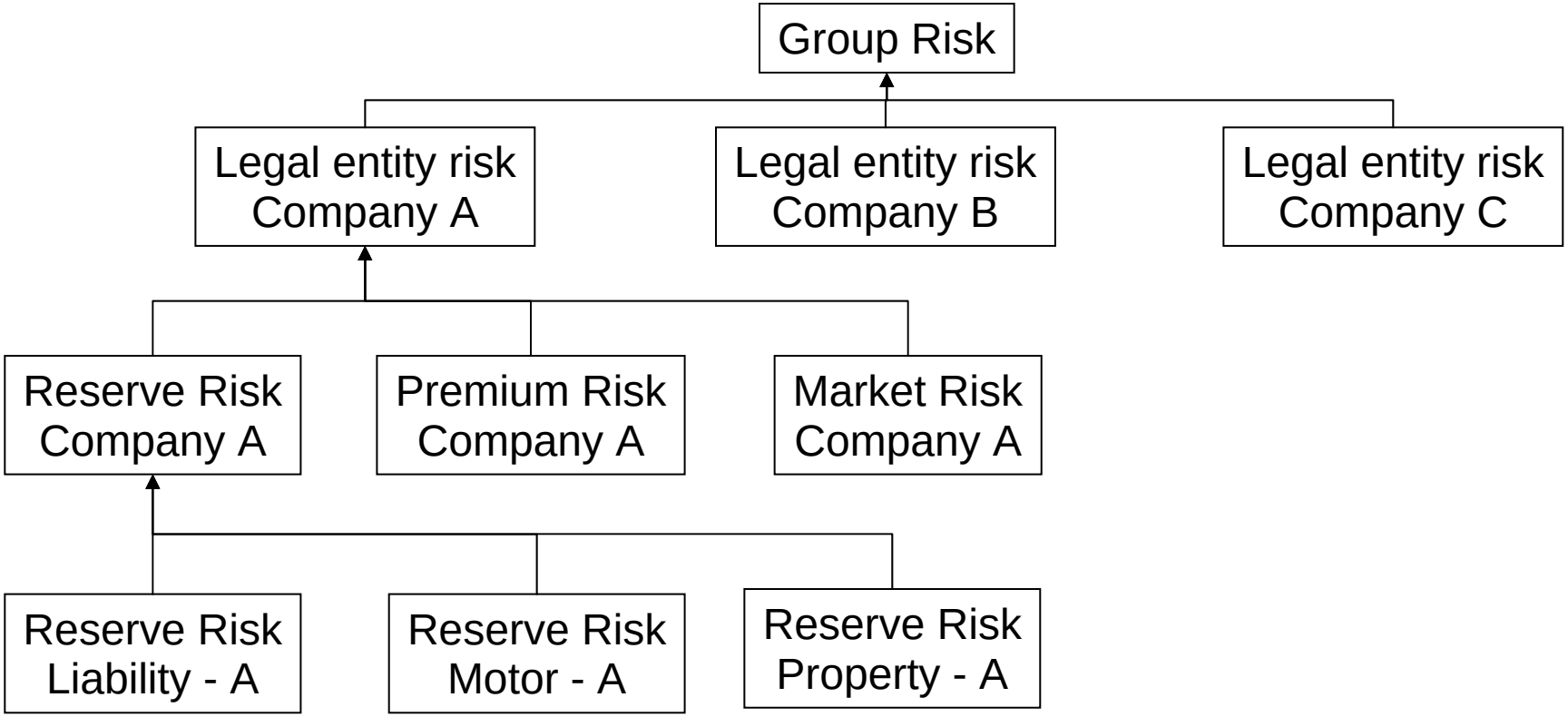
November 6, 2009

SCOR Global P&C

Contents

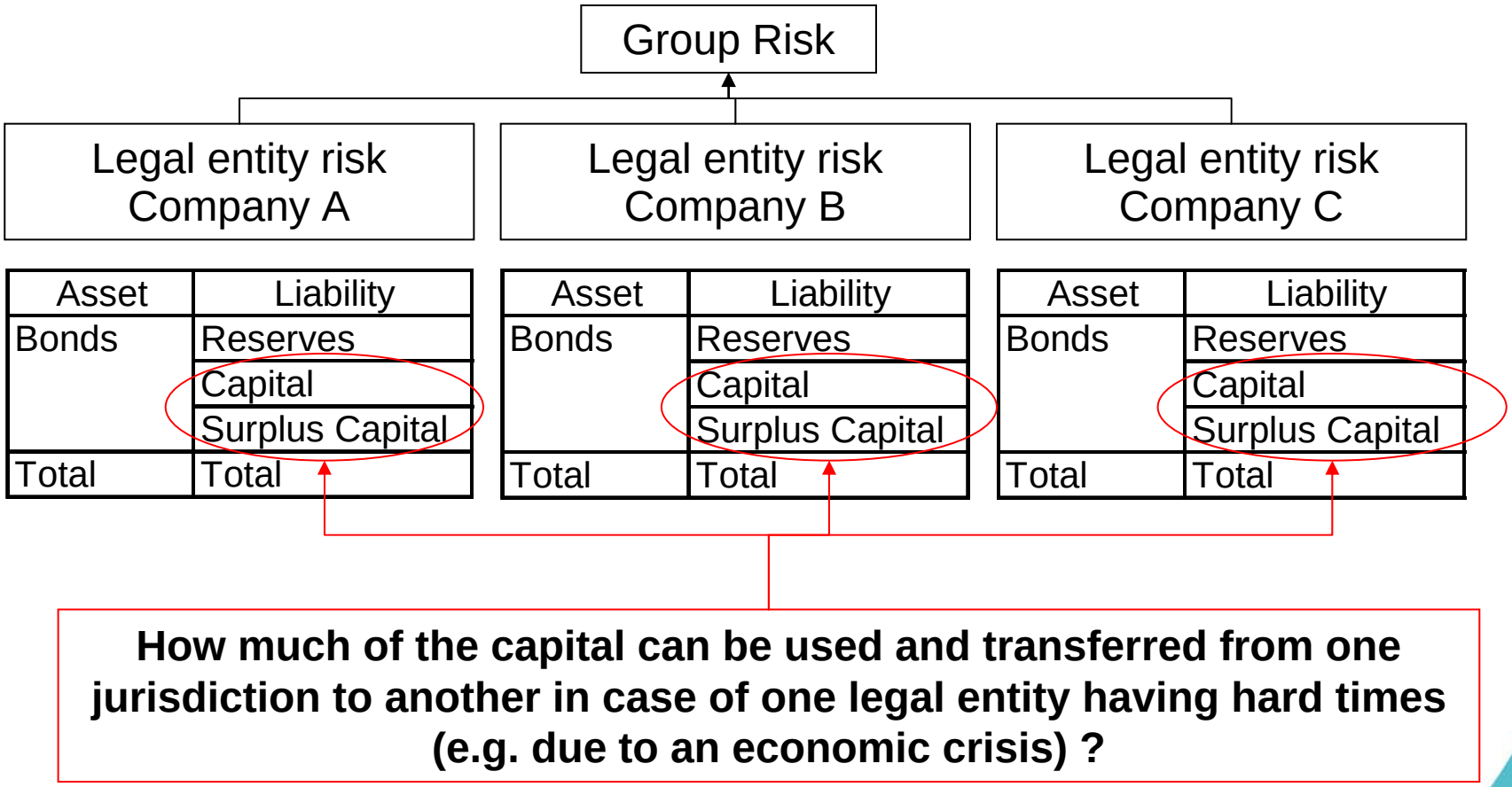
Position of the problem

Insurance Group for this presentation



Position of the problem

Capital transfer between jurisdictions



How much of the capital can be used and transferred from one jurisdiction to another in case of one legal entity having hard times (e.g. due to an economic crisis) ?

Position of the problem

Capital transfer between jurisdictions

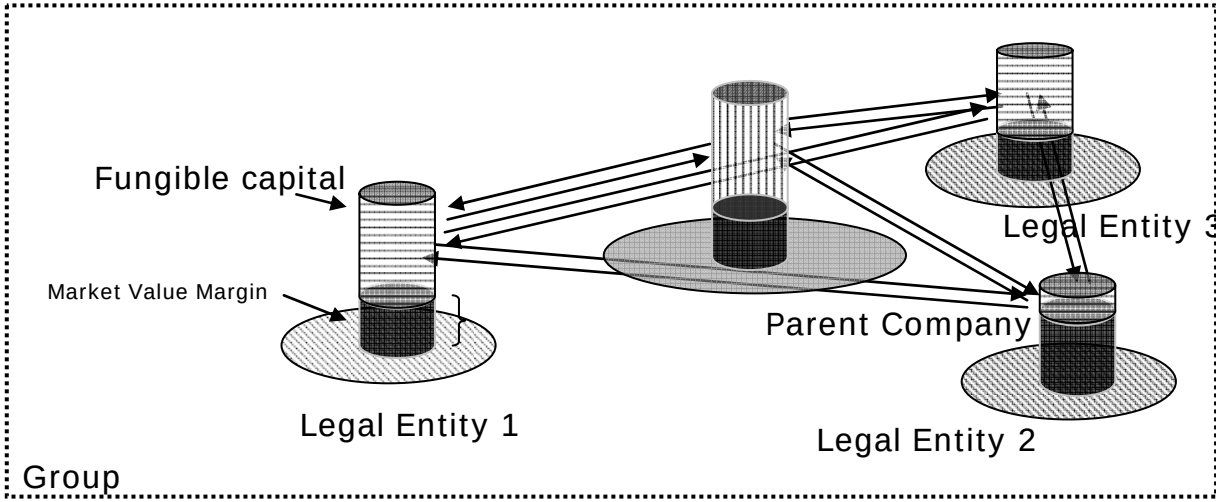
The right to transfer capital between jurisdictions depends on the legal framework of each jurisdiction. Two examples:

- In the European Union, company of the type “Societas Europaea” (SE)
- Subsidiaries in highly regulated markets

Any legal hurdle to the free flow of capital between legal entities has a cost for which a “fungibility adjustment” needs to be estimated in order to calculate the Insurance Group overall capital requirement.

Position of the problem

SST proposal to model hurdles to the free flow of capital



High-level description of fungibility issues (FOPI 2006)

FOPI (now FINMA) proposed in 2006 to consider that all the available capital above the Market Value Margin (SST definition) is fungible and can, hence, be transferred from one jurisdiction to another without any hurdles.

Position of the problem

Hurdle model in this presentation

In this presentation, we will assume that
Market Value Margin = MCR (solvency 1 minimum capital requirement)

The real hurdle should be defined as the MCR from the following sources:

- MCR required by the supervisor to let a company continue
- MCR required by the Insurance Group itself which may depend on the overall risk appetite of the Group

Note: In all of this presentation, there will be no consideration for tax issues.

Position of the problem

Why calculate the cost of lack of capital fungibility ?

- Rating Agencies request

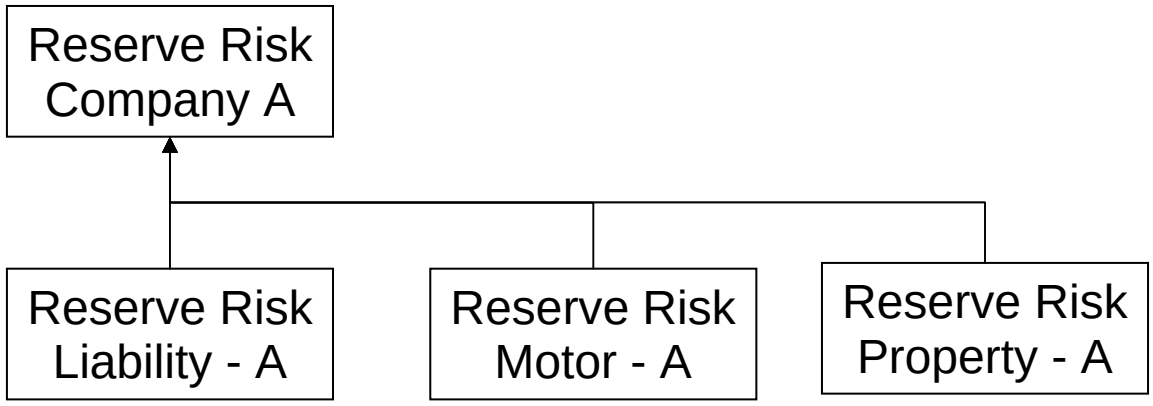
- Improve the capitalization ratio of the Group

Individual risk models

Individual risk models:

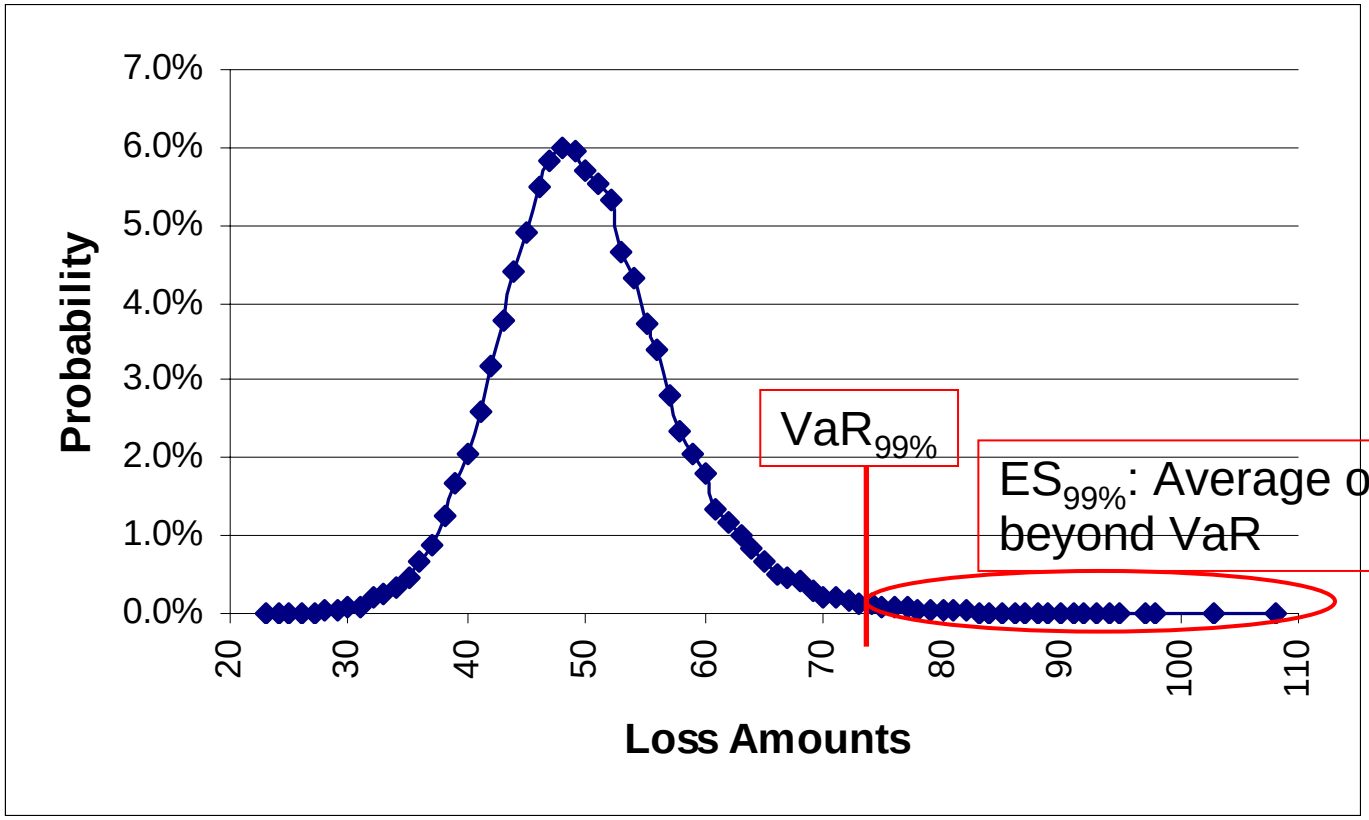
- Reserve per Line of Business,
- Premium per Line of Business,
- Market risk,

are all assumed to follow lognormal distributions with parameters derived from their means and coefficients of variations (CV).



Risk measure

Risk measure = Expected Shortfall at a quantile of 99%
This is the standard SST risk measure.



Risk measure

Company A, B and C balance sheets

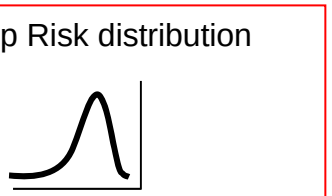
	Assets		Liabilities	
Company A	Bonds	500	Reserves	375
			Capital (ES 99%)	(a)
			Surplus capital	(b)
	Total	500	Total	500
Company B	Bonds	700	Reserves	400
			Capital (ES 99%)	(c)
			Surplus capital	(d)
	Total	700	Total	700
Company C	Bonds	800	Reserves	600
			Capital (ES 99%)	(e)
			Surplus capital	(f)
	Total	800	Total	800

- Companies A, B and C benefit from Group diversification.
- Full use of Group diversification is limited by MCR hurdles.

Aggregation scheme

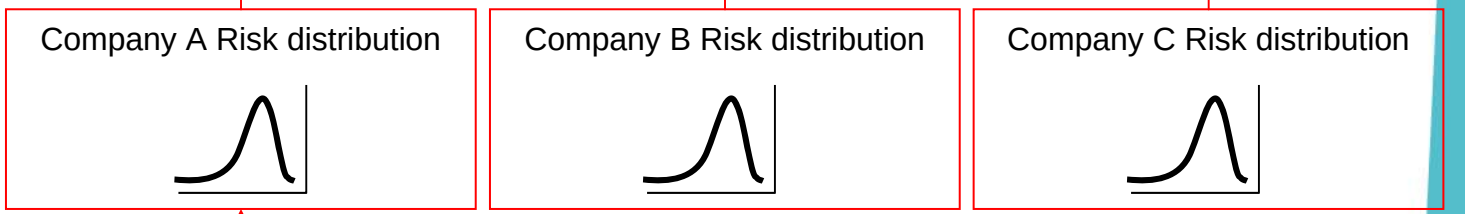
Student copula

Can derive the Group capital requirement from this risk distribution



Step 3 : Student Copula

Can derive company A stand-alone capital



Step 2 : Student Copula

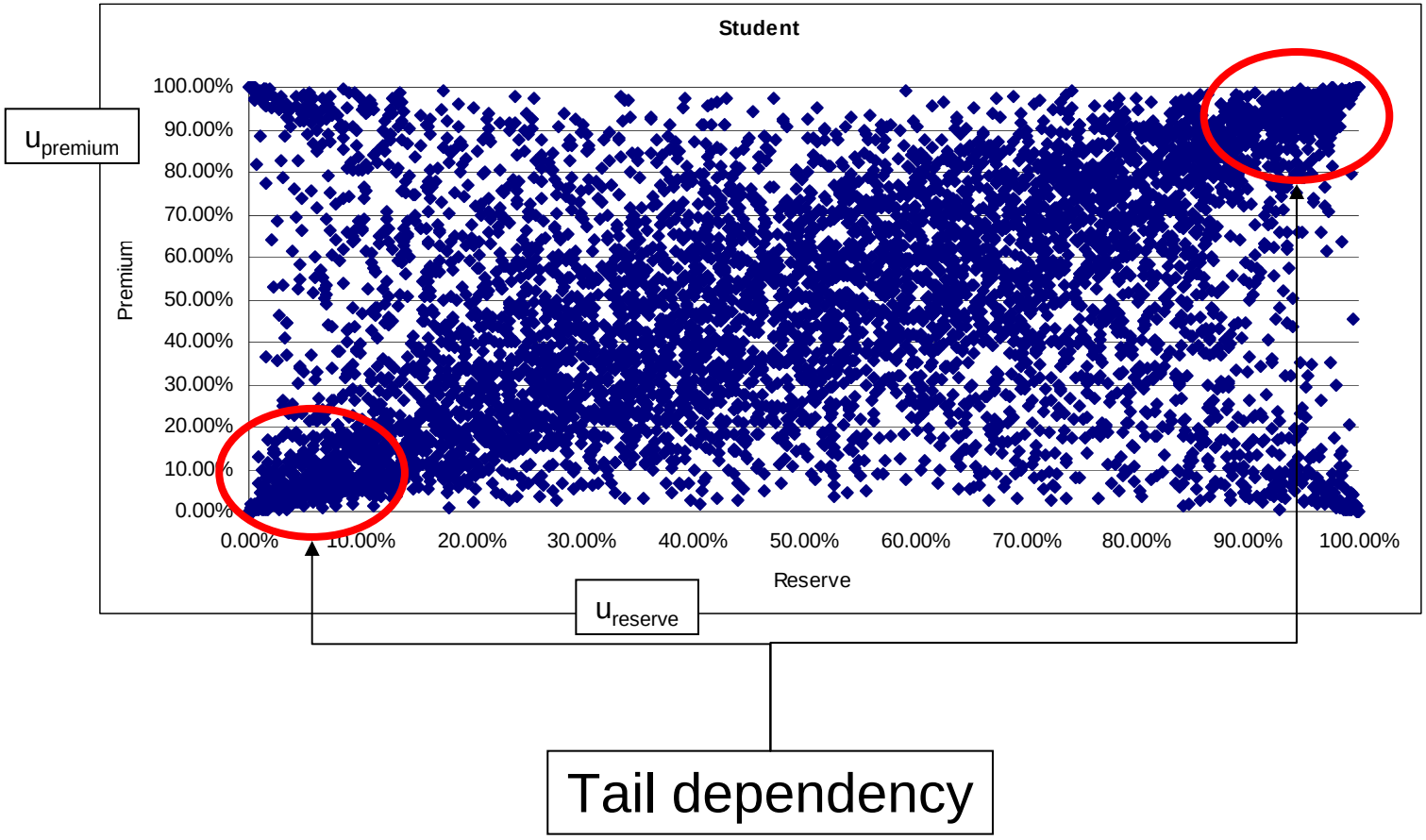
Step 1	Reserve Risk - Comp. A			
	Liability	Motor	Property	Total
Sc. 1	111	162	131	404
Sc. 2				
…				
Sc. N				

Step 1	Premium Risk Comp. A			
	Liability	Motor	Property	Total
Sc. 1				
Sc. 2				
…				
Sc. N				

Market Comp. A	
Lognormal model	
Sc. 1	Total
Sc. 2	
…	
Sc. N	

Aggregation scheme

Student copula – Tail dependency



Aggregation scheme

Calculation and allocation of the diversification benefit (DB)

Group Risk

Legal entity risk Company A	
Asset	Liability
Bonds	Reserves
	Capital
	Surplus Capital
Total	Total

Legal entity risk Company B	
Asset	Liability
Bonds	Reserves
	Capital
	Surplus Capital
Total	Total

Legal entity risk Company C	
Asset	Liability
Bonds	Reserves
	Capital
	Surplus Capital
Total	Total

Stand-Alone Capital A (step 2) = 117

Stand-Alone Capital B (step 2) = 265

Stand-Alone Capital C (step 2) = 236

Group Capital diversif.(step 3) = 404

$$DB = \frac{\text{Group SCR}}{SCR_A + SCR_B + SCR_C}$$

$$SCR_{\text{Company after DB}} = SCR_{\text{Stand-Alone Company}} \times DB$$

Proportional allocation of the DB

Aggregation scheme

Calculation and allocation of the diversification benefit (DB)

DB = 404 / (117 + 265 + 236) = 65.5%

Stand-Alone Capital Company A = 117	Diversified Capital Company A = 77
Stand-Alone Capital Company B = 265	Diversified Capital Company B = 173
Stand-Alone Capital Company C = 236	Diversified Capital Company C = 154
Group Capital after diversification = 404	Group Capital after diversification = 404

Minimum Capital Requirement

MCR (solvency 1) for the 3 companies are given below:

	Company A	Company B	Company C
Premium	70	135	120
Reserves	375	400	600
MCR	86	92	138

MCR = Max(16% premium , 23% claim)

Aggregation results vs MCR

Comparison of MCR to Diversified capital for each legal entity is provided below:

	MCR	Capital after group diversification
Company A	86	77
Company B	92	173
Company C	138	154

Fungibility adjustment necessary for company A

Fungibility adjustment = 86 – 77 = 9

The diversified Group capital after fungibility adjustment = 404 + 9 = 413

Aggregation results vs MCR

Taking into account the fungibility adjustment, each company Balance Sheet will be:

	Assets		Liabilities			
			Before fungibility adjustment		After fungibility adjustment	
Company A	Bonds	500	Reserves	375	Reserves	375
			Capital (ES 99%)	**77**	Capital (ES 99%)	**86**
			Surplus capital	**48**	Surplus capital	**39**
	Total	500	Total	500	Total	500
Company B	Bonds	700	Reserves	400	Reserves	400
			Capital (ES 99%)	173	Capital (ES 99%)	173
			Surplus capital	127	Surplus capital	127
	Total	700	Total	700	Total	700
Company C	Bonds	800	Reserves	600	Reserves	600
			Capital (ES 99%)	154	Capital (ES 99%)	154
			Surplus capital	46	Surplus capital	46
	Total	800	Total	800	Total	800
Total		2000	Total	2000		

The fungibility adjustment impacts the surplus capital at group level as shown above.

Surplus capital at Group level = 39 (comp. A) + 127 (comp. B) + 46 (Comp. C) = 212

Group Capitalization Ratio

Consolidated Group balance sheet

Assets		Liability	
Bonds	2000	Reserves	1375
		Capital (ES 99%)	413
		Surplus Capital	212
Total	2000	Total	2000

The capitalization ratio (CR) is equal to:

$$CR = \frac{\text{Available capital}}{\text{Required capital}} = \frac{\text{Surplus capital} + \text{Capital (ES 99\%)}}{\text{Capital (ES 99\%)}} = \frac{212 + 413}{413} = 151\%$$

The fungibility adjustment has the following cost on the capitalization ratio of the Group:

$$\text{Cost of fungibility} = \frac{\text{Required capital with fungibility}}{\text{Required capital without fungibility}} - 1 = \frac{413}{413 - 9} - 1 = 2.2\%$$

The above cost can be reflected in the rating of the company: The higher the cost of fungibility adjustment, the lower the rating of the company.

Going forward

In order to estimate realistically the fungibility adjustment, the hurdles to the free flow of capital should be estimated:

- For companies operating in US, the US RBC can be a determinant of the minimum capital requirement,
- For companies operating in Europe (EU), the MCR determined under Solvency 2,
- For other jurisdictions (in particular Asia), each local MCR.

As a final remark, all assets (e.g. investment in subsidaries) are fungible within a certain time horizon. However, in case of a crisis, liquidity of the asset is crucial. Therefore, fungibility and liquidity should be reviewed together.

References

This presentation is based on the article below:

DAL MORO E., 2009 : “Assessment of insurance group capital requirements taking into account the lack of capital fungibility between legal entities“, Bulletin Français d’Actuariat

www.institutdesactuaires.com/bfa

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