



An Optimal Insurer in a Post Solvency II World

Liverpool

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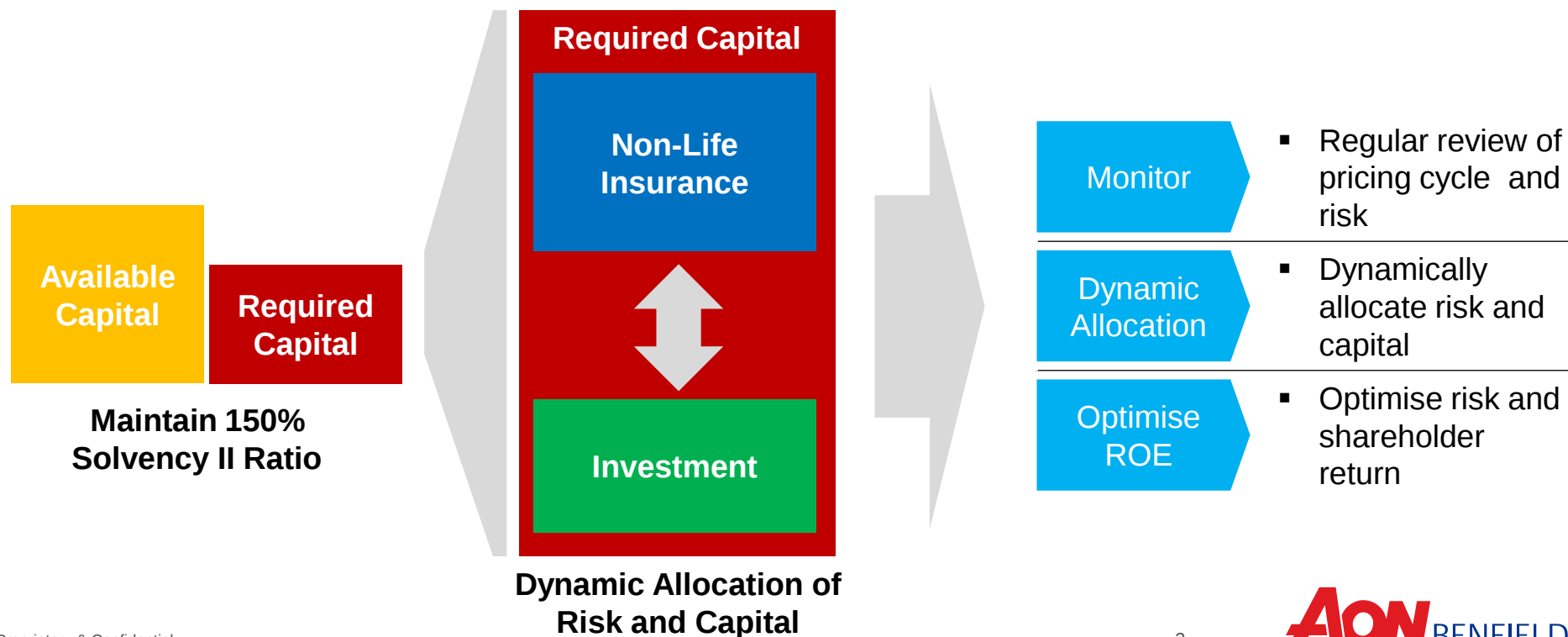


Executive Summary

- Solvency II is a risk based capital framework, requiring more capital to be held for riskier insurance and investment activities
- The risk based nature of Solvency II provides insurers with an opportunity to improve business strategy through better allocation of risk and capital
 - Optimum strategy achieves the highest return per unit of risk and capital
 - Solvency II encourages firms to view risk, capital and value from a top-down perspective, rather than from a silo based approach
- To illustrate this holistic approach, we will consider a case study based upon the average Non-Life insurer in Europe (using the EIOPA QIS 5 results)
- We consider the following questions:
 - What areas of capital inefficiency exist in the average company?
 - How can we optimise the balance sheet from both an economic and capital perspective?
- We will compare key financial metrics of the average non-life insurer pre- and post-optimisation

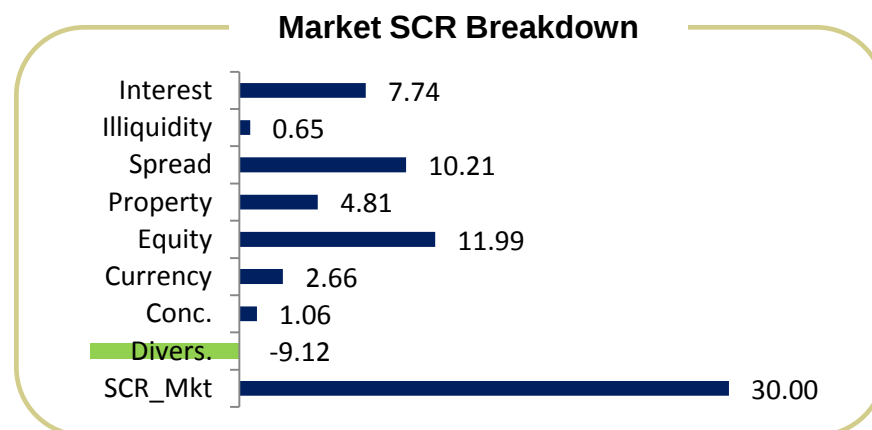
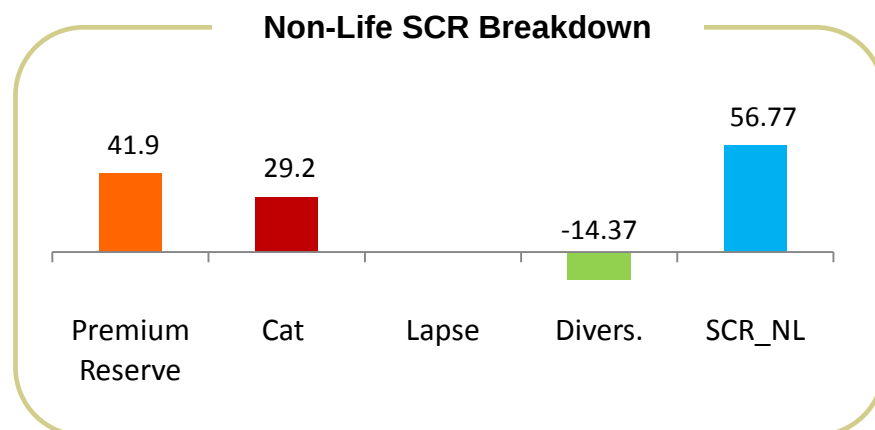
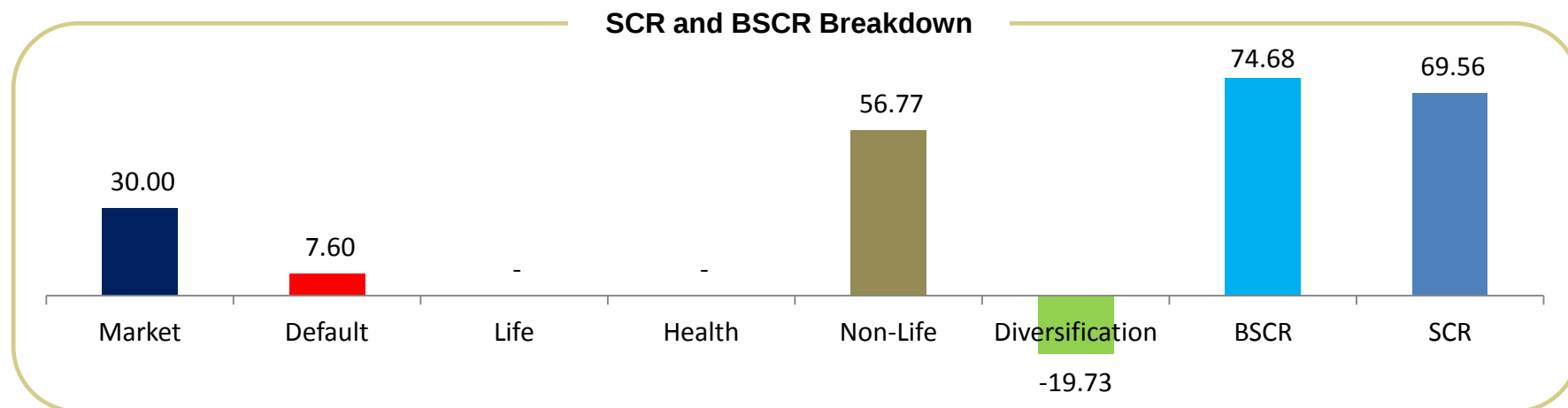
Solvency II: Holistic Risk and Capital Allocation

- Solvency II provides an opportunity to rethink the approach to risk and capital allocation across underwriting and investment
 - Shareholders reward insurers that optimise their underwriting strategy and maximise the risk-adjusted return of their insurance portfolio
 - Objective of investment strategy for non-life insurance should be to enhance the firm's return on equity within the remaining risk and capital budget



Case Study : A Notional European Non-Life Insurer Today

- Our notional non-life company writes a net premium volume of €100m, has an average Solvency Ratio of 165% and an average SCR breakdown:



Case Study : A Notional European Non-Life Insurer Today

- Our notional non-life insurer has an opening balance sheet given by:

Opening Balance Sheet

Investments	240.28	87.23	Net Asset Value
RI share of the Premium Provisions	3.35	30.90	Gross Premium Provisions
RI Share of Claims Reserve	42.86	168.43	Gross Claims Reserve
Total Assets	286.56	286.56	Total Liabilities

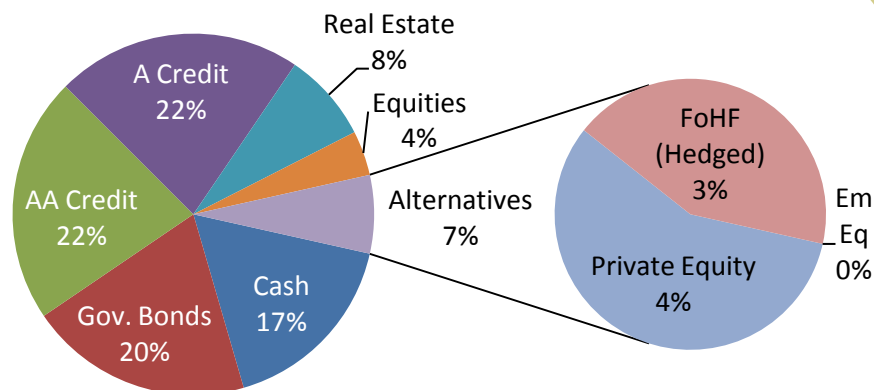
[NOTE: Total Investments are set to achieve a Solvency Ratio of **165%**]

- The breakdown of net premium and net claims reserves for our notional insurer are:

Class	Net Premium (€ m)	Net Claims Reserves (€ m)
Motor, vehicle liability	33.19	39.8
Motor, other classes	18.01	4.5
Marine, aviation and transport	3.67	7.6
Fire and other damage to property	30.09	21.3
General Liability	11.51	49.4
Credit and Suretyship	3.53	2.9
Total	100.00	125.6

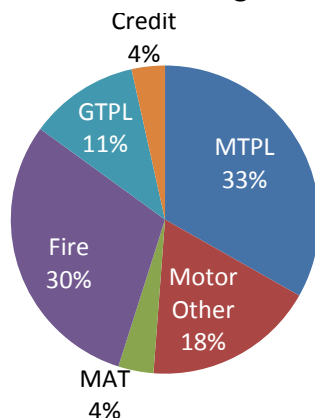
Case Study : A Notional European Non-Life Insurer Today

Initial Asset Strategy

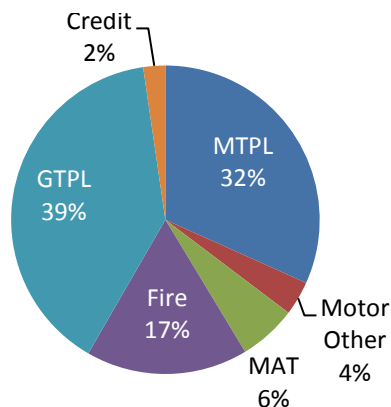


Initial Insurance Strategy

Underwriting



Reserve



Initial Results

Asset Results

Asset Results	
Profit	11.89
Volatility	3.43%
SCR_Mkt	30.00
Sharpe Ratio	32.17%
Return on Equity	35.82%

Liability Results

Liability Results	
Profit	3.34
Volatility	8.62%
SCR (Non-Life & Default)	64.37
Sharpe Ratio	24.45%
Return on Equity	2.91%

Company Results

Company Results	
Profit	15.23
Volatility	9.97%
SCR	69.56
Sharpe Ratio	29.15%
Return on Equity	13.27%
Solvency II Ratio	165.00%

Balance Sheet Optimisation: Process

- Our process for optimising the firm's overall business strategy across insurance and asset risk is shown below:

Insurance Asset Strategy Optimisation		
1 Articulate the firm's overall risk appetite, capital target and driver of shareholder value	2 Identify optimal allocation of insurance risk under selected risk and capital measure	3 Utilise remaining risk and capital budget to develop optimal investment strategy
Risk - Articulate risk appetite statement - Identify qualitative constraints	Insurance Classes - Identify universe of insurance risks - Quantify risk and return characteristics	Asset Classes & Constraints - Identify admissible assets for firm - Insurance specific asset constraints
Capital - Identify binding capital measure, e.g. 150% Solvency II ratio - Standard formula vs. Internal model	Insurance Constraints - Min / max allocations relative to current strategy - Overall premium volume	Insurance & Asset Risk Model - Full model of insurance and asset risk - Quantify overall balance sheet risk and capital requirement
Value Shareholder's reward stable earnings volatility combined with attractive ROE	Optimise Insurance Strategy - Criteria for optimisation - Economic efficiency and capital efficiency	Optimise Asset Strategy Strategic asset allocation to identify portfolios that maximise return within risk budget and capital budget

A Unified Framework for Insurance and Asset Optimisation

1 Risk, Capital and Value

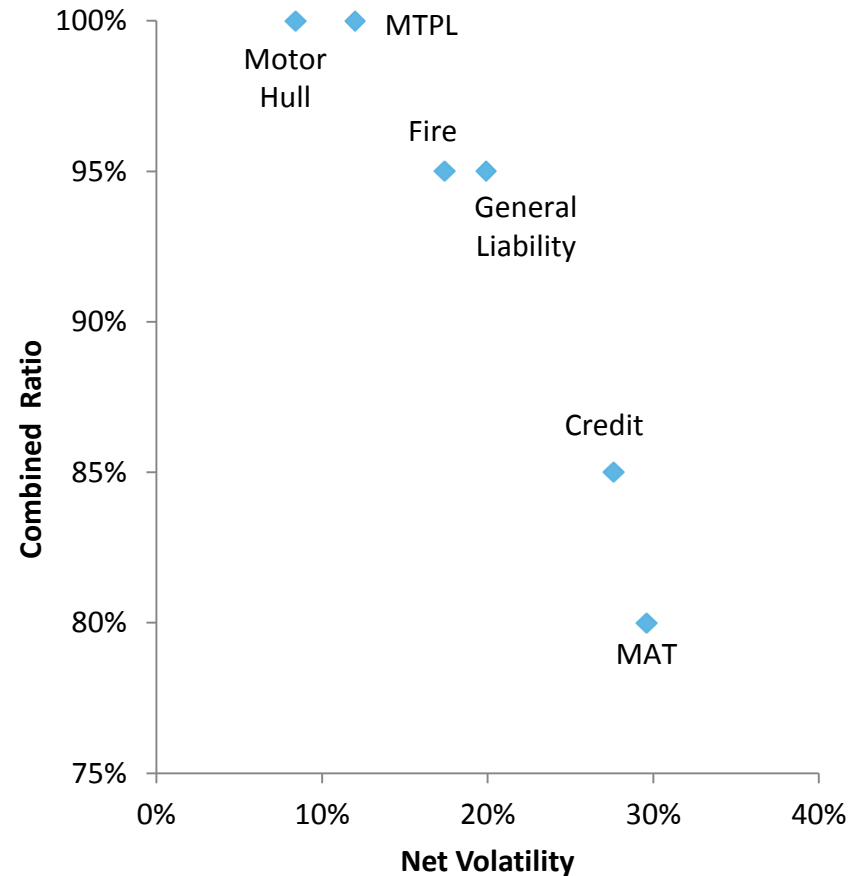
Area	Description
Risk	- Overall risk will be quantified as the volatility of surplus - This is the volatility of assets less liabilities from all sources of insurance and asset risks - An internal model of the full balance sheet will be utilised to measure surplus volatility and to consistently allocate risk between insurance and asset risks. - The overall risk appetite for the company has been articulated as 10.0% surplus volatility across both insurance and asset risk, hence maintaining the firm's existing level of overall balance sheet risk
Capital	- The binding capital metric for the company is the Solvency II capital requirement ("SCR") under the Standard Formula Their existing Solvency II ratio of 165% has been judged an appropriate long term position and the strategy review should maintain this level of capital adequacy
Value	Aon Benfield's price-to-book regression study points to a volatility measure of risk as best capturing investor risk tolerances.

Understanding the link between risk, volatility, capital and value is key to optimising strategy

2 Optimising Insurance Strategy: Insurance Universe

Insurance Assumptions

- Capital measured for non-life under Standard Formula
- Reserve risk assumed fixed (retrospective reinsurance could be used here)
- SCR_NL computed from Premium and Reserve risk and Cat risk (Method 2)
- Expected loss ratio and underwriting volatilities shown opposite (volatilities are from the Aon Benfield Insurance Risk Study)
- Expense ratios based on European averages
- Correlations between underwriting classes from the Aon Benfield Insurance Risk Study



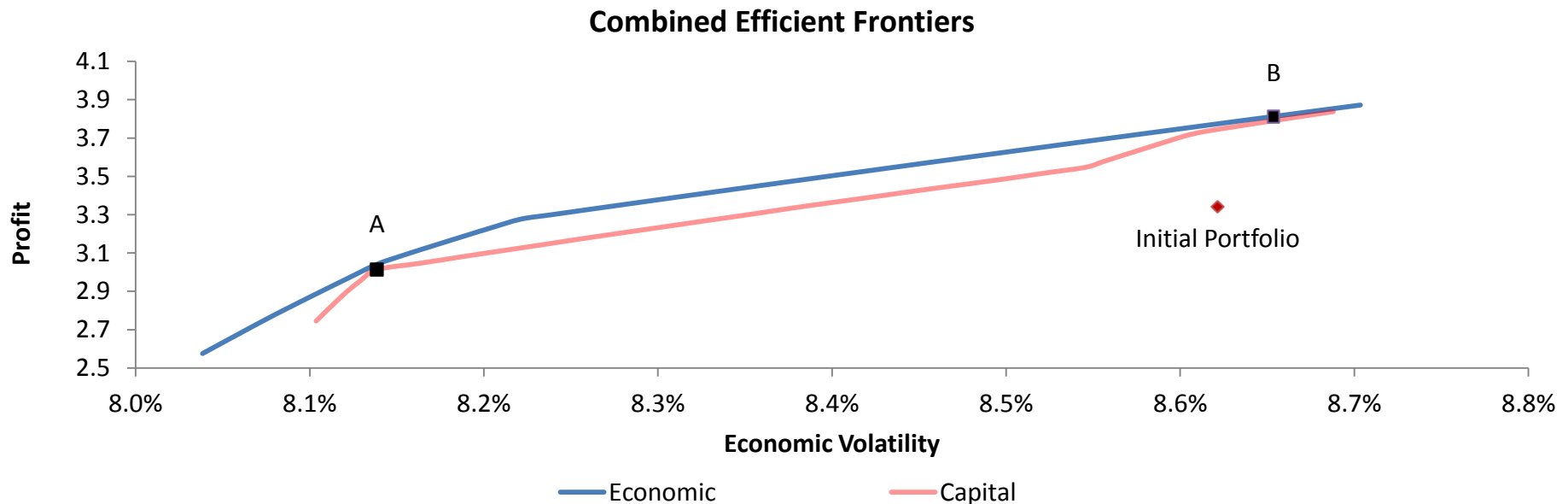
2 Optimising Insurance Strategy: Insurance Constraints

- Our notional company writes €100m of net premium, initially allocated across many classes
- The management have assessed for each class of business a potential range for premium volume growth and reduction
 - This can be achieved through use of reinsurance and business growth over longer term
- Overall limit on premium to be within 85% to 100% of current level
 - It may be possible to improve financial results by reducing premium volume and taking more targeted risk positions

LOB	Allocation		
	Initial	Min	Max
Motor, vehicle liability	33%	28.0%	38.0%
Motor, other classes	18%	15.5%	21.0%
Marine, aviation and transport	4%	2.5%	4.5%
Fire and other damage to property	30%	25.5%	34.5%
General Liability	12%	8.5%	14.5%
Credit and suretyship	4%	2.5%	4.5%
Total	100%	85%	100%

2 Optimising Insurance Strategy: Identification of Economic and Capital Efficient Portfolios

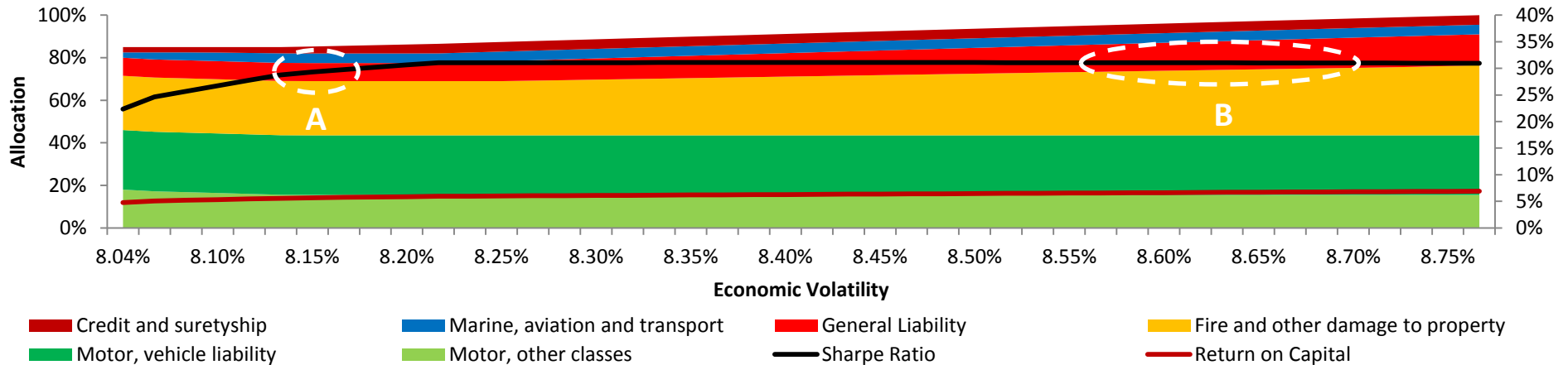
- The identification of jointly efficient portfolios is achieved by comparing the economic and capital efficient frontiers and seeking portfolios that **lie on economic frontier** at the **intersection of the two frontiers**
 - These provide maximum return for the corresponding level of risk or capital
 - In our example, the economic and capital efficient frontiers coincide in locations A and B,
 - Note the **initial portfolio is both capital and economically inefficient**
- In order to decide which mix of insurance risk is preferable, it is necessary to consider performance metrics at the two candidate portfolios



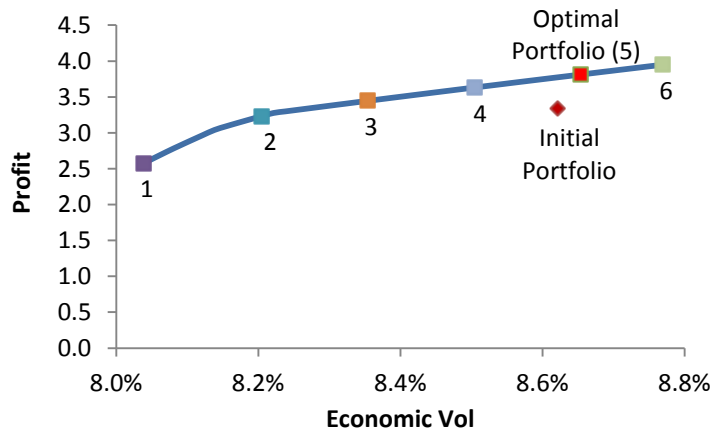
2 Optimising Insurance Strategy: Identification of Economic and Capital Efficient Portfolios

- Region B provides greater profit per unit of risk and capital than region A

Insurance Portfolio Composition Along Economic Efficient Frontier



Economic Efficient Frontier



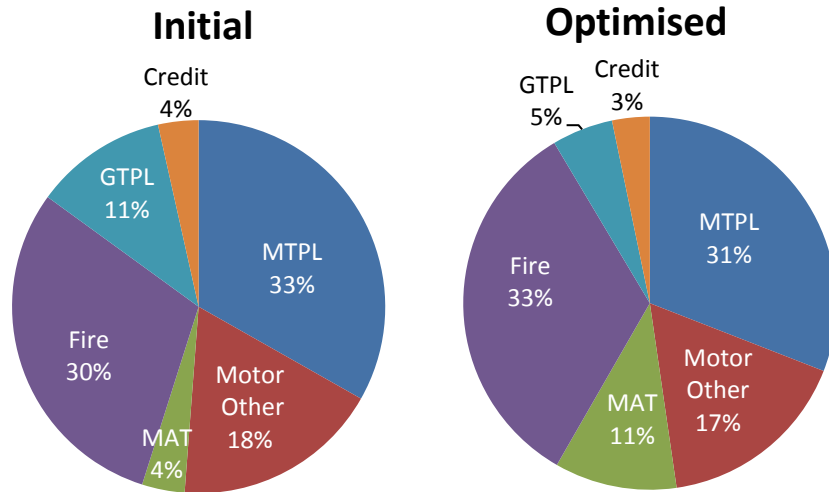
		Portfolio						
		Initial	1	2	3	4	5 (Optimal)	6
Statistics	Economic Volatility	8.62%	8.0%	8.2%	8.4%	8.5%	8.65%	8.77%
	Profit	3.3	2.6	3.2	3.4	3.6	3.8	4.0
	SCR_NL	56.8	54.1	55.0	55.7	56.3	56.86	57.3
	Sharpe Ratio	10.2%	22.3%	30.6%	31.1%	31.1%	31.0%	31.0%
	Return on Capital	5.9%	4.8%	5.9%	6.2%	6.5%	6.7%	6.9%
Allocation	Motor, vehicle liability	33.2%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
	Motor, other classes	18.0%	18.0%	15.5%	15.5%	15.5%	15.5%	15.5%
	Marine, aviation and transport	3.7%	2.5%	4.5%	4.5%	4.5%	4.5%	4.5%
	Fire and other damage to property	30.1%	25.5%	25.5%	26.9%	29.0%	31.1%	33.0%
	General Liability	11.5%	8.5%	8.5%	10.5%	12.1%	13.7%	14.5%
	Credit and suretyship	3.5%	2.5%	4.2%	4.5%	4.5%	4.5%	4.5%
	Total	100.0%	85.0%	97.3%	89.9%	93.6%	97.3%	100.0%

2 Optimising Insurance Strategy: Results

- Optimal insurance strategy has increased profitability by 14% and provides greater economic and capital efficiency than the initial strategy

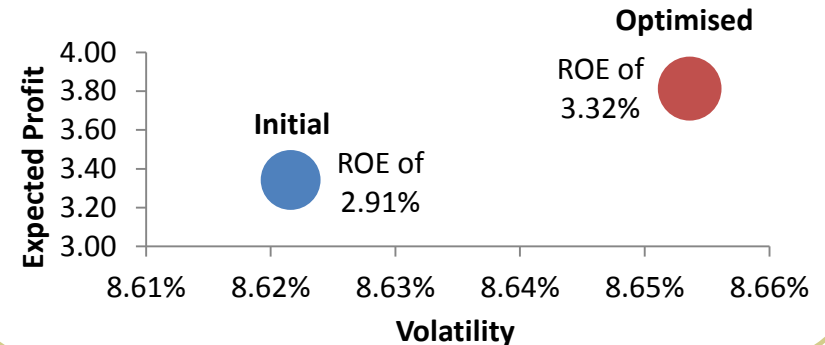
Underwriting Strategy

- Greater diversification and targeting risk on opportunities with higher return



Financial Results

Statistic	Insurance Results	
	Initial	Optimal
Profit	3.34	3.81
Volatility	8.62%	8.65%
SCR (Non-Life & Default)	64.37	64.46
Sharpe Ratio	24.45%	31.03%
Return on Equity	2.91%	3.32%

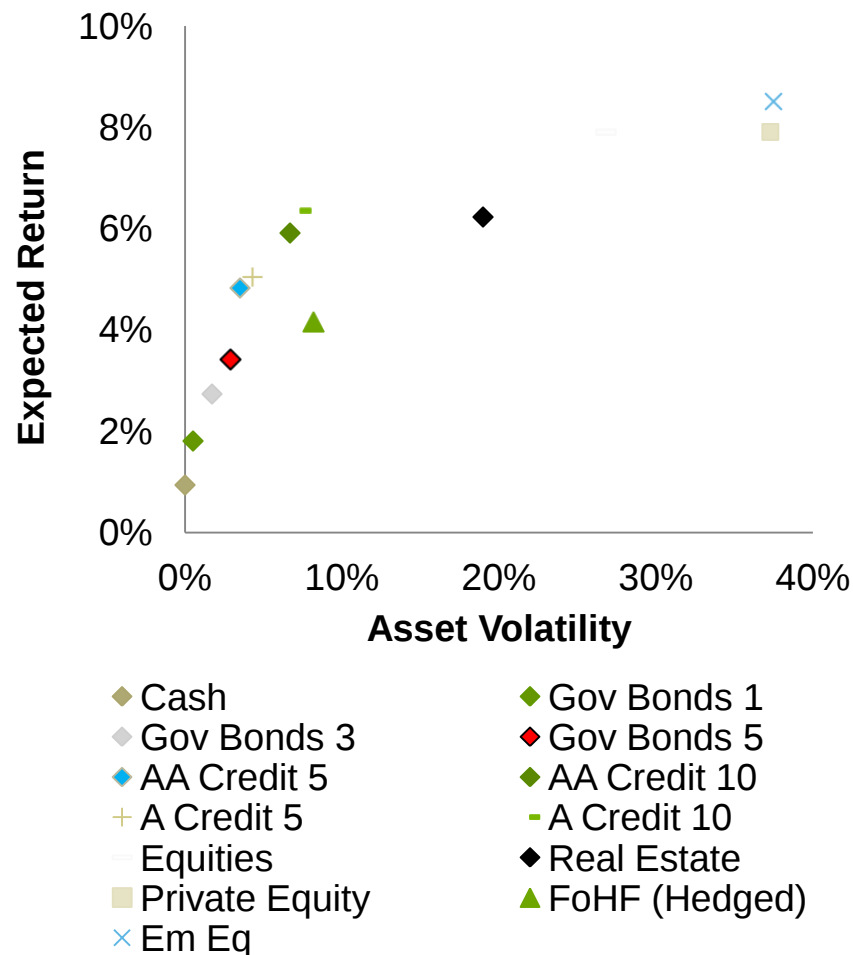


- The optimised portfolio is higher risk than the original insurance allocation but provides **greater economic and capital efficiency**
 - To maintain the same Solvency II Ratio, market risk will need to be reduced

3 Optimising Asset Strategy: Asset Universe

Asset Assumptions

- Aon Hewitt economic assumptions
- All major asset classes included for consideration
 - Non-admissible assets excluded: commodities
 - Returns exclude active management
- Swaps excluded from investment universe
 - Not necessary to meet duration characteristics of non-life liabilities
- Currency forwards are allowed for hedging purposes, e.g. accessing US corporates



3 Optimising Asset Strategy: Asset Constraints

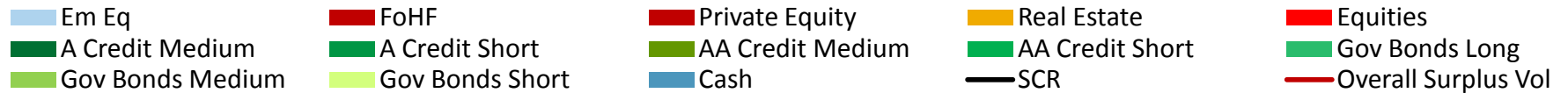
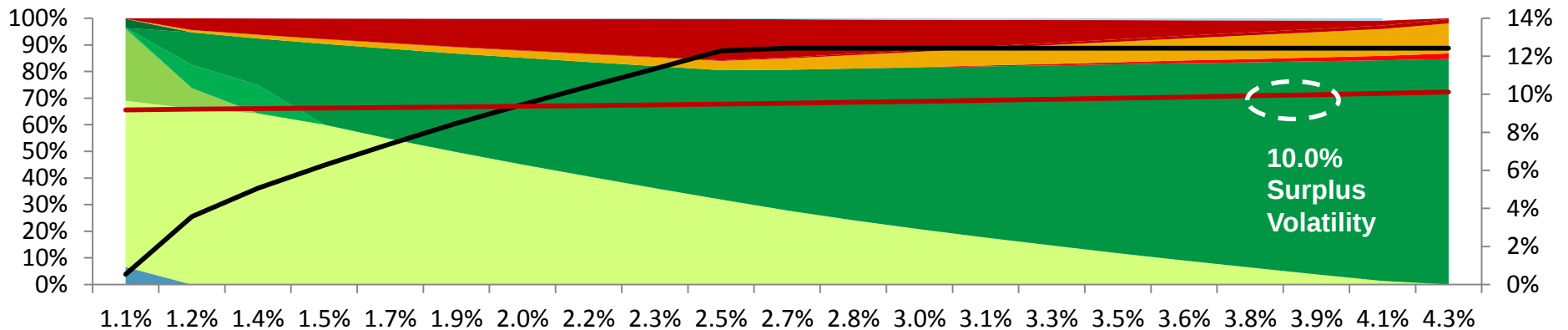
- The SCR_Mkt for the original portfolio is € 30.00m
- In order to maintain the overall Solvency Ratio, the SCR_Mkt for the optimised insurer must be € 29.86m
- In addition the contribution of market risk should be such that overall surplus volatility does not exceed 10.0%
- We refine the asset strategy by overlaying qualitative constraints for insurance, e.g.:
 - Minimum cash equivalent assets of 20% for liquidity purposes (e.g. cat events)
 - Maximum assets / liabilities mismatch of ± 0.5 years at each key rate duration
 - Maximum allocation to real estate and return generating assets of 10%
- This will provide better asset liability characteristics for non-life insurance and protect against interest rate movements (level, slope, curvature)

		Insurance Portfolio	
		Initial	Optimal
Profit		3.34	3.81
SCR	Non-life Insurance	56.77	56.86
	Default	7.60	7.60
	Market	30.00	29.86
	BSCR	74.68	74.68
	SCR	69.56	69.56
Surplus Vol.	Insurance	8.62%	8.65%
	Market	3.43%	?
	Total	9.97%	9.97%

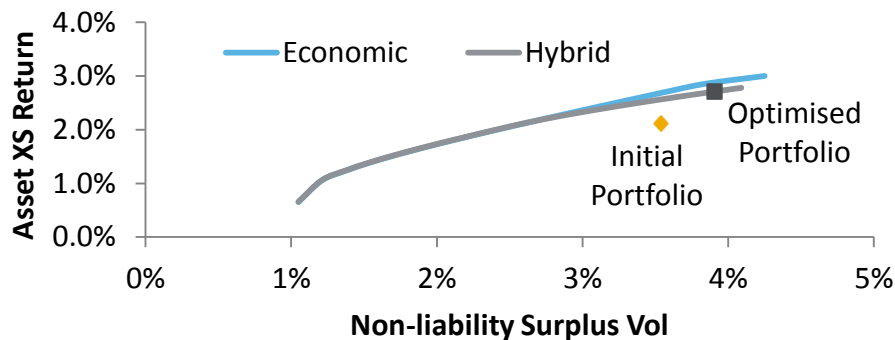
3 Optimising Asset Strategy: Identification of Optimal Strategy

- Using hybrid capital / economic optimisation, the efficient frontier is identified:

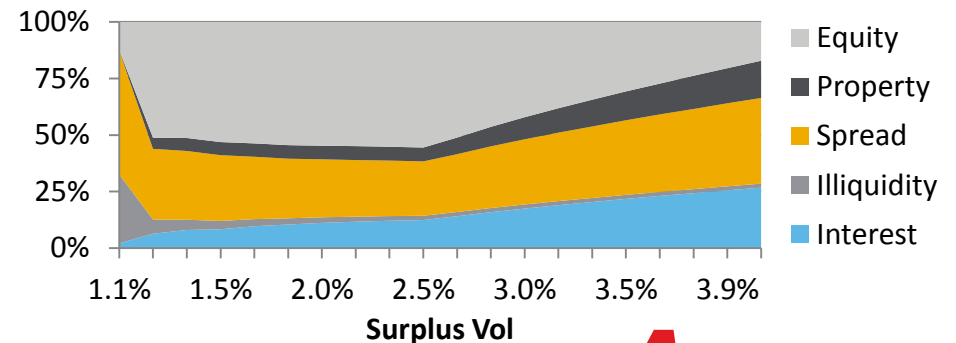
Portfolio Composition Along Hybrid Efficient Frontier (Unconstrained)



Efficient Frontier (Unconstrained)



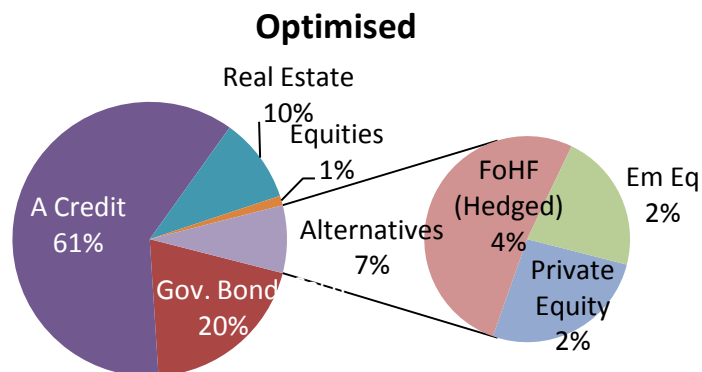
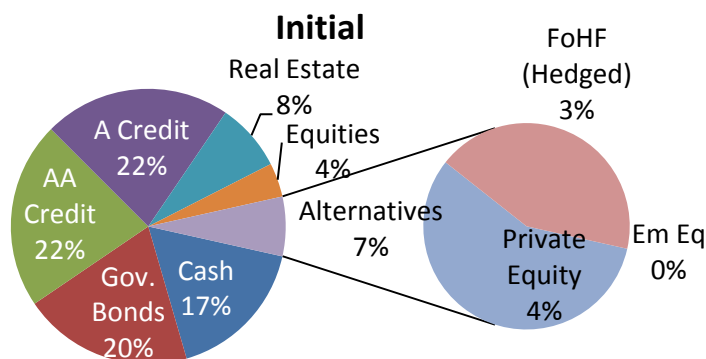
SCR_Mkt on Hybrid Efficient Frontier



3 Optimising Asset Strategy: Results

- Optimal asset strategy has increased expected economic profit by 7% and meets qualitative constraints for insurance and quantitative constraints for risk and capital

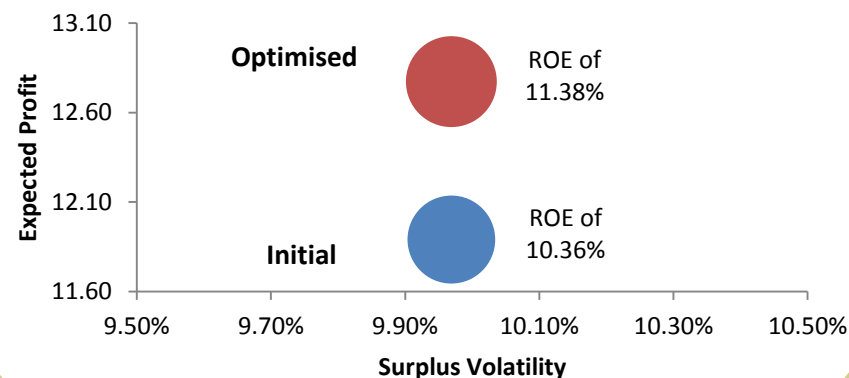
Asset Strategy



Financial Results

Statistic	Asset Results	
	Initial	Optimal
Profit	11.89	12.77
Economic Surplus Volatility	3.43%	3.46%
Surplus Volatility	10.0%	10.0%
SCR Market	30.00	29.86
Surplus Sharpe Ratio	32.17%	43.06%
Return on Equity	10.36%	11.13%

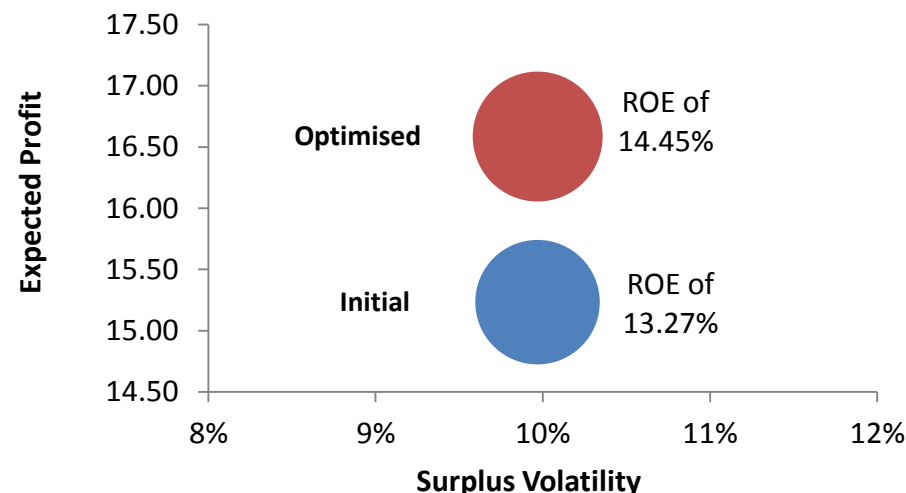
Assets



Overall Optimisation Results

- Under our proprietary optimisation framework we have transformed the firm's economic and financial characteristics:
 - Underwriting performance has been enhanced under realistic constraints to limit significant deviation from the initial underwriting strategy
 - Asset strategy fully utilises the remaining risk and capital budget and provides optimal return whilst meeting bespoke qualitative constraints specific to insurance
- Increase to expected profit of €1.4m
- Improvement of shareholder return from 13.3% to 14.5%
- No increase in surplus volatility or capital requirement under Solvency II**

		Profit	Vol.	SCR	Sharpe Ratio	ROE
Liabilities	Initial	3.34	8.62%	64.37	24.45%	2.91%
	Optimal	3.81	8.65%	64.46	31.03%	3.32%
Assets	Initial	11.89	3.43%	30.00	32.17%	10.36%
	Optimal	12.77	3.46%	29.86	43.06%	11.13%
Company	Initial	15.23	9.97%	69.56	29.15%	13.27%
	Optimal	16.59			36.07%	14.45%



Concluding Comments

- Solvency II is driving more non-life insurers to think holistically about risk, capital, volatility and value generation
- Business strategy should be fluid and adjust with the pricing cycle in order to maximise shareholder return
- Optimal underwriting strategy can be found by looking for portfolios of risk which are jointly optimal from an economic and capital perspective
 - This will either release or consume more capital than existing strategy
 - Remaining capital can be deployed for investment (or released to investors if preferable)
- Investment strategy is optimised by identifying the economic efficient frontier constrained to maintain capital consumption within the remaining capital budget
- **By leveraging the Solvency II investment, insurers can optimise business strategy, to improve both shareholder return and economic efficiency**

Appendix: Insurance Assumptions

- Aon Benfield Insurance Risk Study 2010 underwriting risk assumptions

Class	Net Loss Ratio	Net Volatility		Motor, vehicle liability	Motor, other classes	Marine, aviation and transport	Fire and other damage to property	General Liability	Credit and suretyship
Motor, vehicle liability	71%	12.0%							
Motor, other classes	71%	8.4%	Motor, vehicle liability	100%	50%	50%	8%	42%	25%
Marine, aviation and transport	70%	29.6%	Motor, other classes	50%	100%	20%	8%	42%	25%
Fire and other damage to property	56%	17.4%	Marine, aviation and transport	50%	20%	100%	22%	25%	25%
General Liability	64%	19.9%	Fire and other damage to property	8%	8%	22%	100%	-2%	25%
Credit and suretyship	45%	27.6%	General Liability	42%	42%	25%	-2%	100%	50%
			Credit and suretyship	25%	25%	25%	25%	50%	100%

Appendix: Investment Assumptions

- Aon Hewitt investment assumptions April 2011 (1 year time horizon)

Asset Class	Expected Return	Volatility	Correlation											
			Gov Bonds Short	Gov Bonds Medium	Gov Bonds Long	AA Credit Medium	AA Credit Long	A Credit Medium	A Credit Long	Equities	Real Estate	Private Equity	FoHF	High Yield
Gov Bonds Short	3.3%	1.3%	100%	80%	60%	40%	30%	30%	20%	0%	0%	0%	0%	10%
Gov Bonds Medium	3.5%	2.5%	80%	100%	90%	40%	30%	30%	30%	-10%	0%	-10%	0%	10%
Gov Bonds Long	3.8%	4.0%	60%	90%	100%	40%	40%	30%	30%	-10%	0%	-10%	0%	10%
AA Credit Medium	4.8%	5.0%	40%	40%	40%	100%	90%	90%	90%	10%	10%	10%	0%	50%
AA Credit Long	5.6%	9.0%	30%	30%	40%	90%	100%	90%	90%	10%	10%	10%	0%	50%
A Credit Medium	4.9%	6.0%	30%	30%	30%	90%	90%	100%	90%	20%	10%	20%	10%	60%
A Credit Long	5.7%	10.0%	20%	30%	30%	90%	90%	90%	100%	20%	10%	10%	10%	60%
Equities	8.1%	22.5%	0%	-10%	-10%	10%	10%	20%	20%	100%	40%	60%	60%	50%
Real Estate	6.0%	16.0%	0%	0%	0%	10%	10%	10%	10%	40%	100%	30%	30%	30%
Private Equity	9.5%	29.0%	0%	-10%	-10%	10%	10%	20%	10%	60%	30%	100%	40%	30%
FoHF	6.5%	8.0%	0%	0%	0%	0%	0%	10%	10%	60%	30%	40%	100%	30%
High Yield	5.0%	16.0%	10%	10%	10%	50%	50%	60%	60%	50%	30%	30%	30%	100%

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