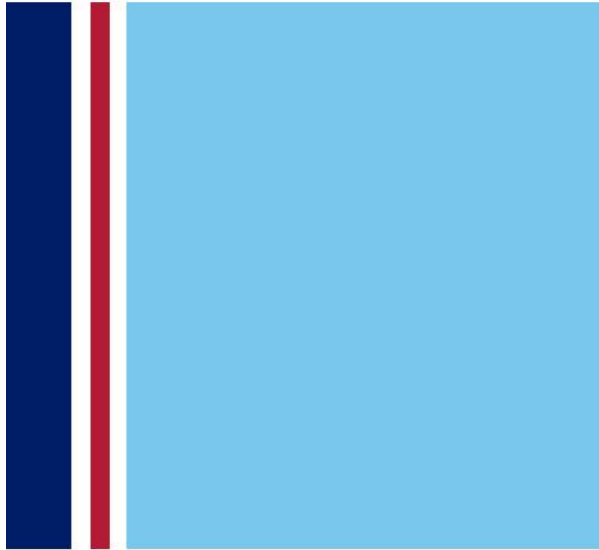


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Realising the value in your legacy
business

**Informing business decisions with
capital models**

Rob Collinson
robert.collinson@watsonwyatt.com

ARC Congress 2009



Agenda

- The ARC Capital Model Project
- Brief overview of capital modelling
 - What is a capital model
 - Differences between a capital model and a business plan
 - Stochastic models vs stress and scenario
- Realising the value in your run off business
 - Innovative applications of the capital model
 - Capital based decision support
 - Identification of reinsurance value
 - Understand the effects of commutation
- Questions

Setting strategies – business plans

- Strategy for the business usually determined by a “deterministic” business plan
 - Specific assumptions are made about all elements of the business
 - Strength of reserves
 - Commutation strategy
 - Average price of commutation
 - Investment returns
 - Reinsurance credit risk
 - Many others
 - Typically these may be “stress tested” to understand the performance of the business in difficult conditions

Setting strategies – business plans

- What is the output from such an approach?
- What are the problems with the deterministic approach?
 - Only address a few scenarios
 - Overly influenced by own expectations
 - Difficult to understand the likelihood of any scenario
- Any strategic action is based almost completely upon judgement

Setting strategies – capital models

- ...or more properly stochastic capital models
- Instead of set assumptions – each key characteristic is supplied a “probability distribution”
- All “possible” outcomes of a particular feature are supplied to the model
 - e.g. claims reserves

Probability	Reserves
25%	1,000
50%	2,000
75%	4,000
95%	6,000

- Rely on “simulations” rather than scenarios
- Each simulation “samples” from all the probability distributions and are combined to produce financial statements
- Typically the business is simulated many thousands of times (and therefore generates many thousand of financial statements)

Setting Strategies – Capital Models

■ What are the outputs....

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Simulum
Template - Profit & Loss ver 3.0.4

Workspace C:\Data\Simulum_Development\Version 3.0.15\Default_Workspace

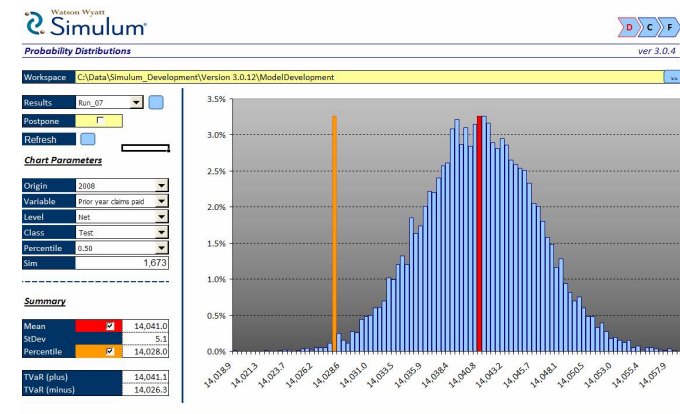
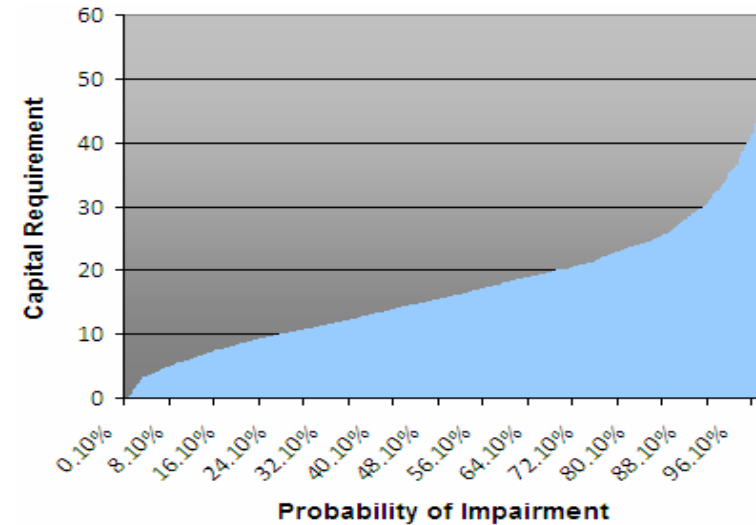
Results Run_01

Level Gross Class Auto Postpone

Basis
Mean
Percentile
Simulation

Use Sims Refresh

	2007	2008	2009	2010	2011	2012	2013
Written Premiums	130,000	136,357	153,255	173,589	190,314	208,298	0
Earned Premiums	128,500	133,179	144,806	163,422	181,951	199,306	104,149
Attritional Claims Paid	0	24,536	51,057	81,426	113,709	129,640	124,876
Attritional Claims Reserve Change	0	71,389	50,438	33,938	15,110	14,373	-38,978
Attritional Claims Incurred	0	95,925	101,495	115,363	128,818	144,013	85,898
	.00%	18.42%	35.26%	49.83%	62.49%	65.05%	119.90%
Large Claims Paid	0	6,013	12,136	18,140	23,660	25,256	18,687
Large Claims Reserve Change	0	18,038	12,942	7,371	2,792	2,443	-21,775
Large Claims Incurred	0	24,051	25,077	25,511	26,452	27,699	-3,088
	.00%	4.51%	8.38%	11.10%	13.00%	12.67%	17.94%
Catastrophe Claims Paid	0	0	0	0	0	0	0
Catastrophe Claims Reserve Change	0	0	0	0	0	0	0
Catastrophe Claims Incurred	0	0	0	0	0	0	0
	.00%	.00%	.00%	.00%	.00%	.00%	.00%
History Losses Paid	5,000	3,333	3,333	3,327	0	0	0
History Losses Reserve Change	500	6,666	-3,333	-3,333	0	0	0
History Losses Incurred	5,500	9,999	0	-6	0	0	0
	3.89%	2.50%	2.30%	2.04%	.00%	.00%	.00%
Prior Year Claims Paid	72,000	16,657	16,746	15,568	1,025	0	0
Prior Year Claims Reserve Change	9,000	-16,685	-16,613	-16,702	0	0	0
Prior Year Claims Incurred	81,000	-28	132	-1,134	1,025	0	0
Claim Handling Expenses Paid	2,200	2,022	3,331	4,738	5,536	6,196	5,743



Realising the value in your business

- Innovative applications of your model
 - **Not (directly) regulatory**
 - Objective strategy ranking
 - Identification of reinsurance value
 - Understanding the effects of commutation

Capital Based Approach to Decision Support

- The “primary” use test challenge – technical robustness versus pragmatism:
- How can we take the next step to genuinely add value to the business?
- What are the barriers?
 - Turn around in short enough timescales to be useful
 - Represent complex information in a way that is
 - Informative
 - Easy to understand
 - Includes the key features pertinent to the decision
 - Consistent approach irrespective of problem

Capital Based Approach to Decision Support

- Considering most business decisions as a series of choices:
 - Should we undertake a particular course of action?
 - To what extent should we do this?
 - Is there a “better” course of action?
 - What does “better” mean?

- In a capital consistent framework we might evaluate a decision by considering:
 - What is our risk appetite?
 - How much capital do we have?
 - Marginal capital – how does a particular decision consume capital?
 - Marginal benefit – but how is this measured?

- Ideally we would like to be able to derive an “optimum” strategy

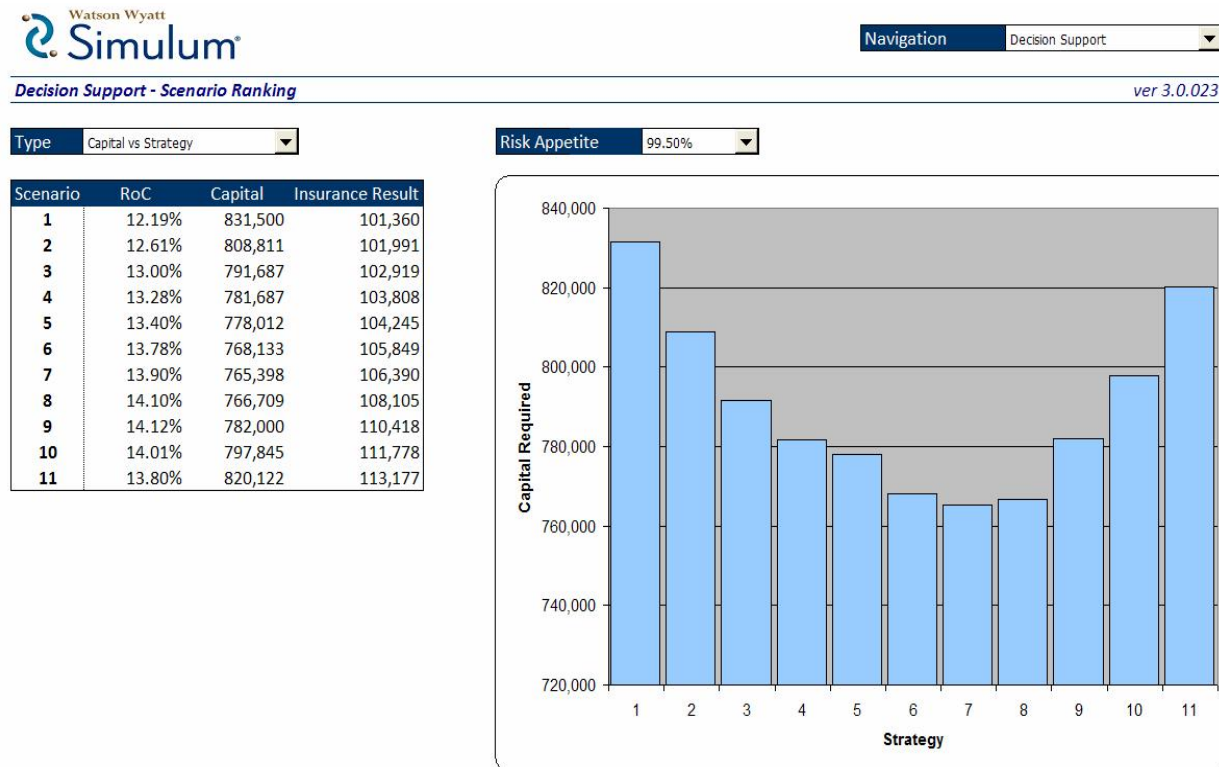
- The approach addresses the question of how to objectively rank scenarios.

Capital Based Approach to Decision Support

- The approach addresses the question of how to objectively rank alternative scenarios.
- The approach is highly general but we will consider a couple of specific examples
- A Classic Example :
 - What proportion of equities should be held in the mix of asset classes?
 - Prepare a “base” capital model in a number of scenario configurations ranging from a no equities to considerable proportion of equities. Other investment classes are cash and bonds.
 - The model in this example represents a legacy insurance entity
 - 10 lines
 - a range of business
 - three economies

Capital Based Approach to Decision Support

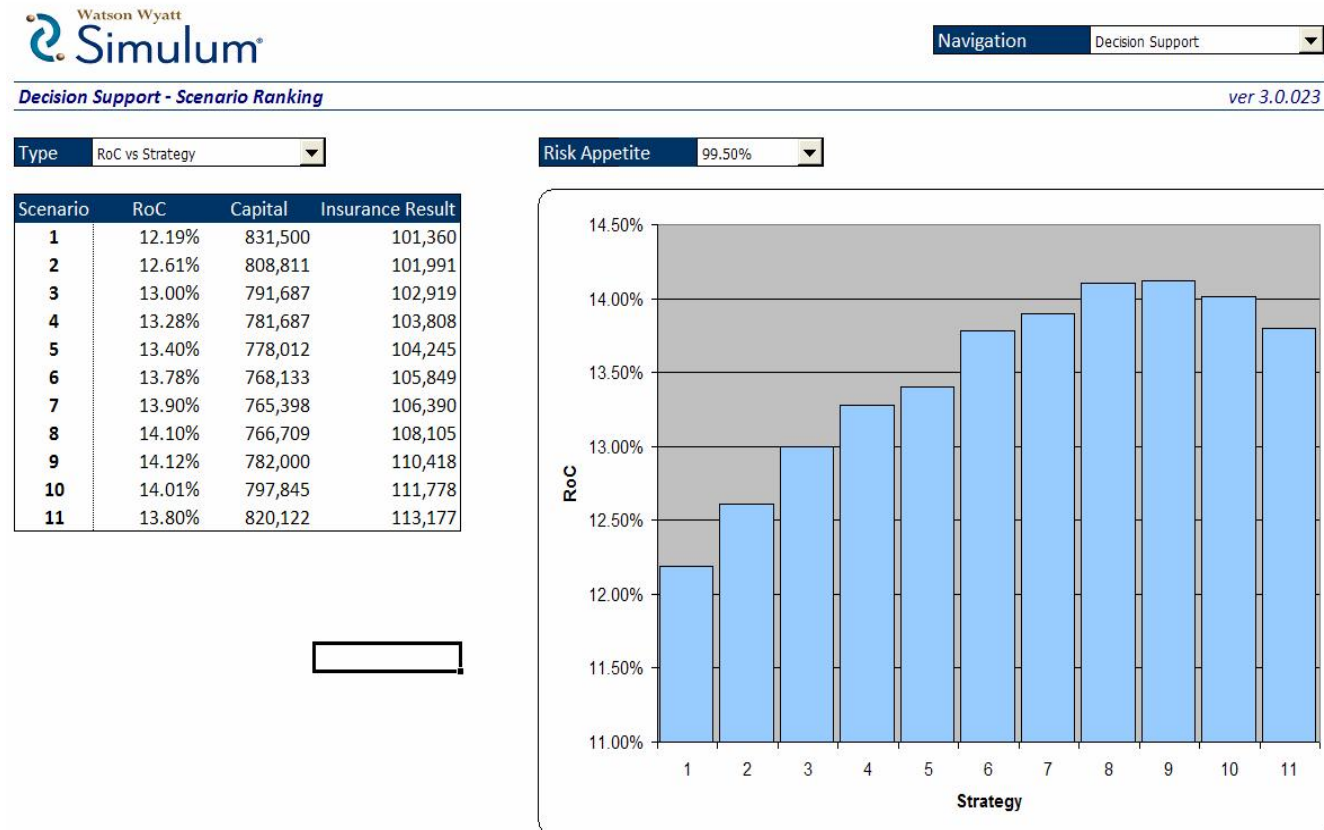
- Analysis – Consider capital requirement for each strategy:



- Suggests that strategy 7 is preferred

Capital Based Approach to Decision Support

- Analysis – Consider return on capital for each strategy:



- Suggests that strategy 9 is preferred. How is this reconciled?

Capital Based Approach to Decision Support

- Plot RoC vs Capital Requirement



Navigation Decision Support

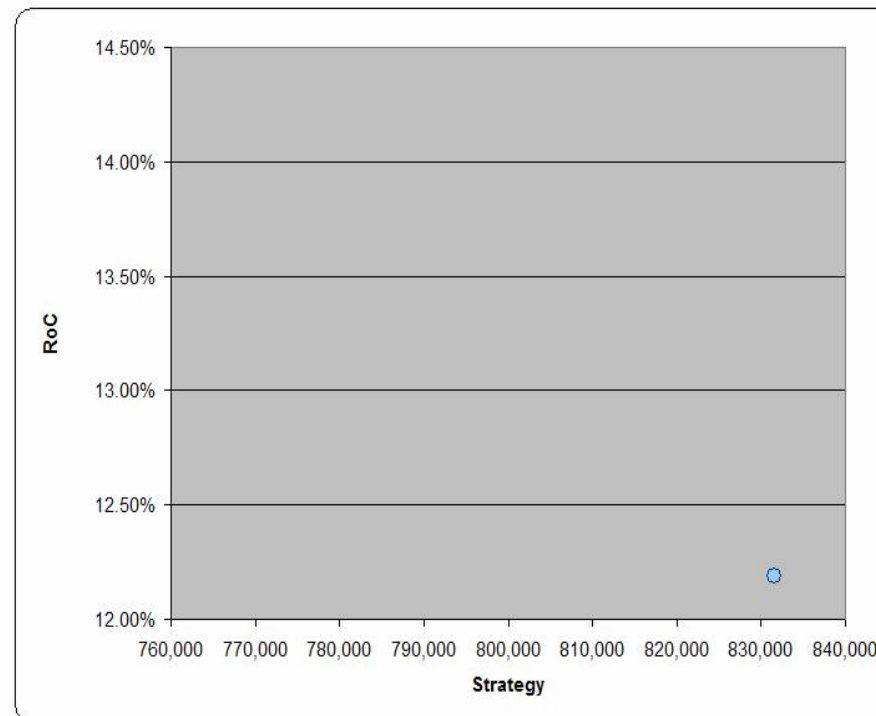
Decision Support - Scenario Ranking

ver 3.0.023

Type RoC vs Capital

Risk Appetite 99.50%

Scenario	RoC	Capital	Insurance Result
1	12.19%	831,500	101,360
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			



Capital Based Approach to Decision Support

- Clearly Scenario 2 is “superior” to Scenario 1
 - Less capital is required
 - Higher expected RoC



Navigation Decision Support

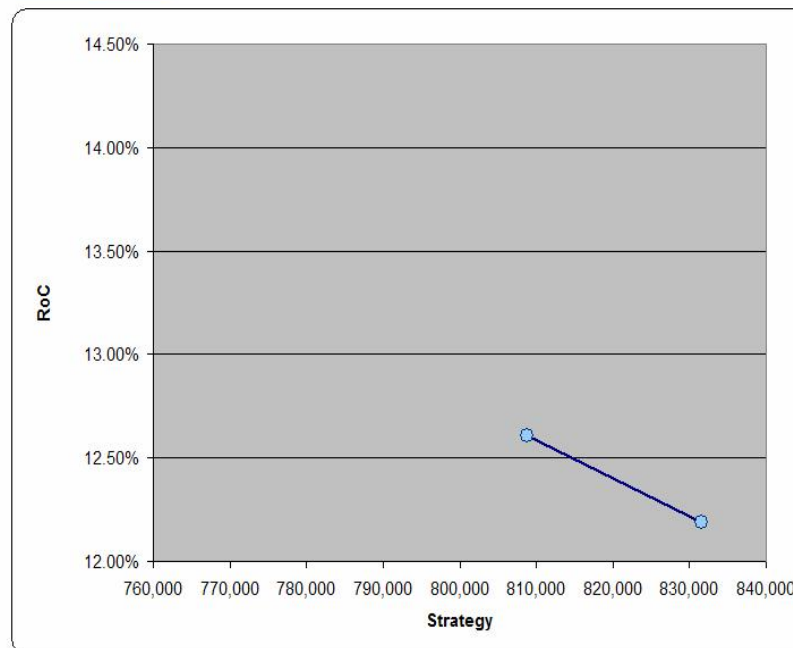
Decision Support - Scenario Ranking

ver 3.0.023

Type RoC vs Capital

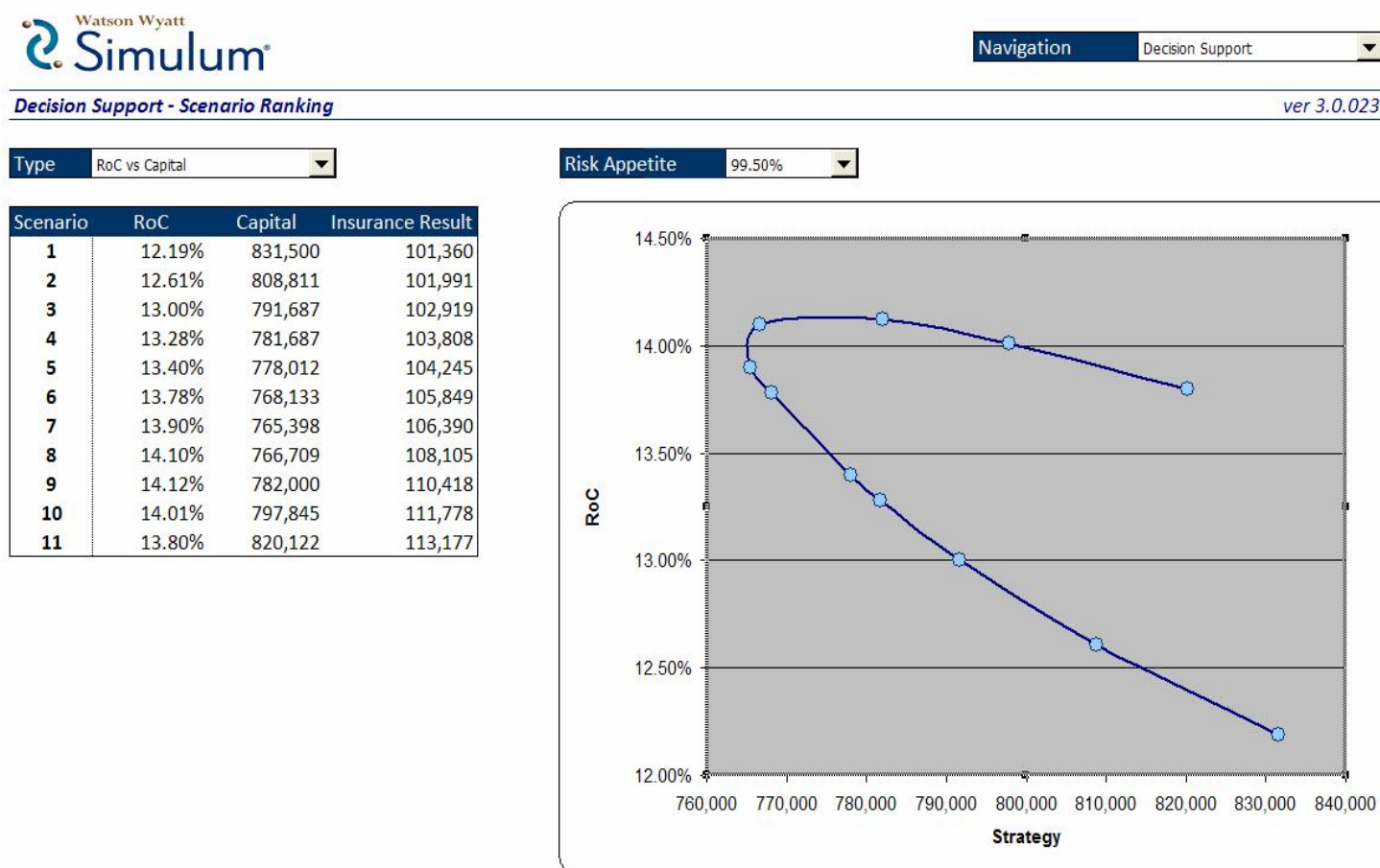
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2	12.61%	808,811	101,991
3			
4			
5			
6			
7			
8			
9			
10			
11			



Capital Based Approach to Decision Support

- Adding the remaining scenarios



Capital Based Approach to Decision Support

- Add some constraints...



Navigation Decision Support

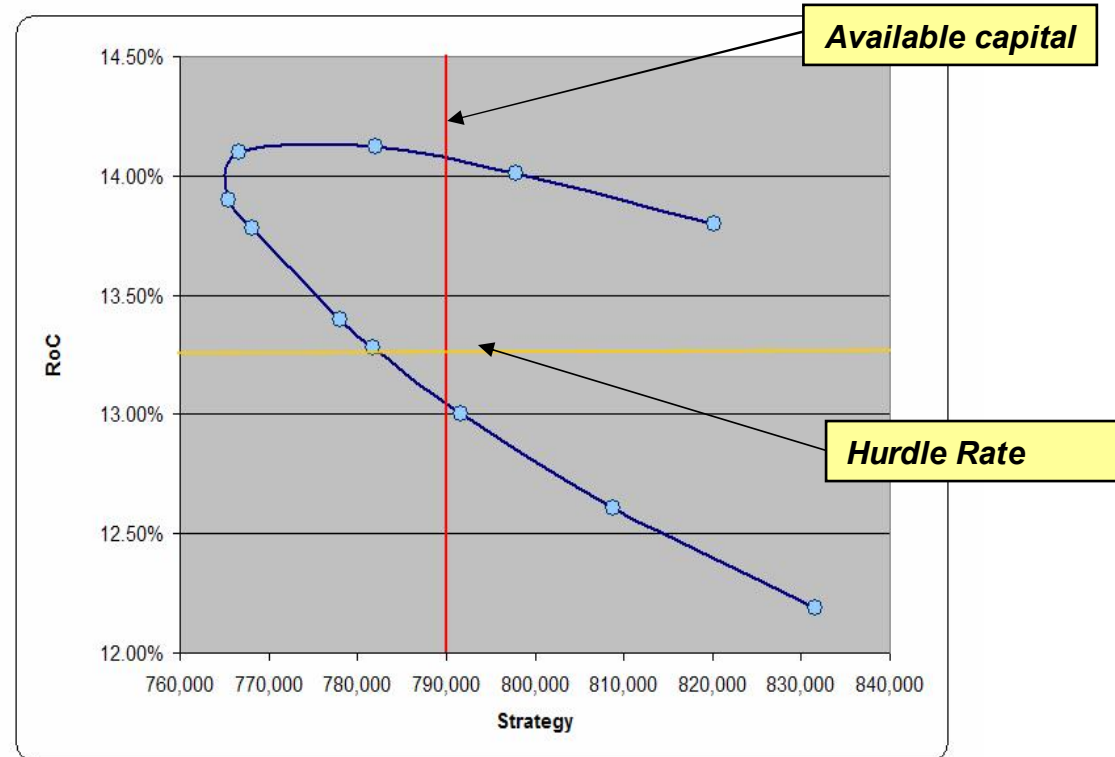
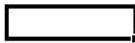
Decision Support - Scenario Ranking

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3	13.00%	791,687	102,919
4	13.28%	781,687	103,808
5	13.40%	778,012	104,245
6	13.78%	768,133	105,849
7	13.90%	765,398	106,390
8	14.10%	766,709	108,105
9	14.12%	782,000	110,418
10	14.01%	797,845	111,778
11	13.80%	820,122	113,177

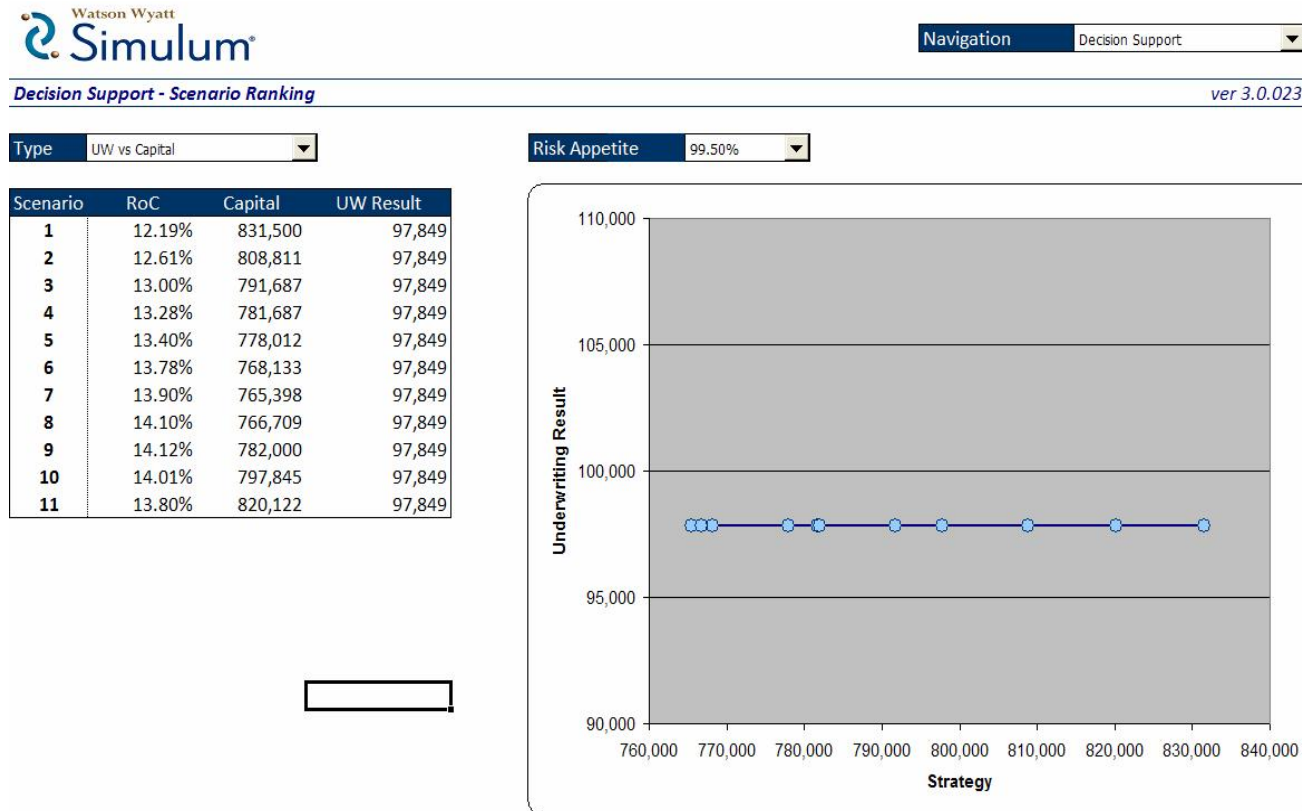


Capital Based Approach to Decision Support

- Plotting Roc vs Capital raises the following points:
 - No point in considering solutions to the right of the red line as insufficient capital to support them
 - Solutions higher and left in the chart are superior to those lower and to the right
 - This analysis identifies a range of strategies that are broadly reasonable and attainable
- But what happens if we consider underwriting result instead of RoC?

Capital Based Approach to Decision Support

- Plotting Underwriting Result against Capital



- This is clearly not the right approach as uw result does not include investments. However it is a reassuring check!

Capital Based Approach to Decision Support

■ Plotting Insurance Result against Capital



Navigation Decision Support

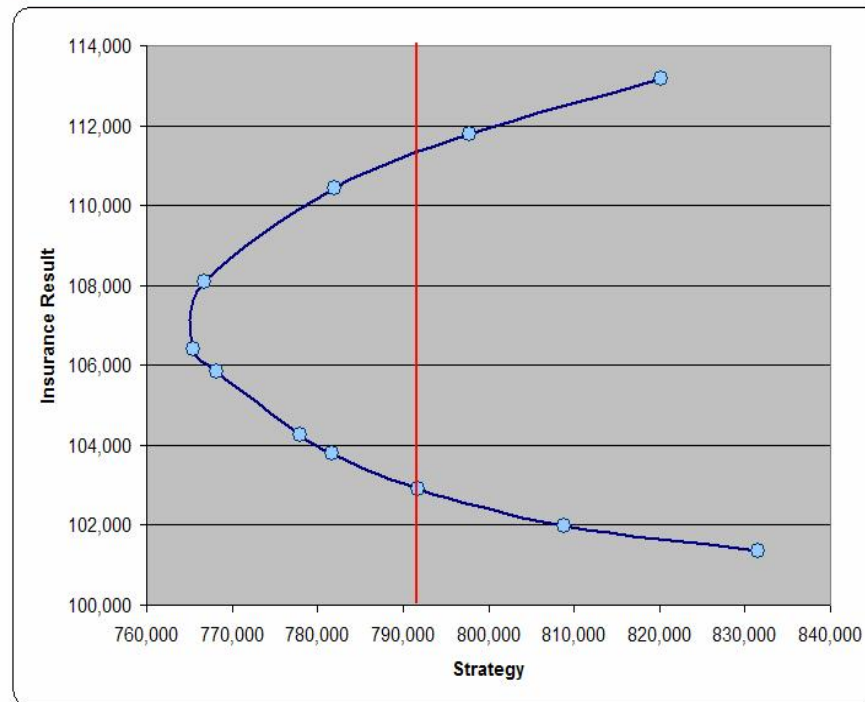
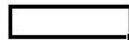
Decision Support - Scenario Ranking

ver 3.0.023

Type Ins vs Capital

Risk Appetite 99.50%

Scenario	RoC	Capital	Ins Result
1	12.19%	831,500	101,360
2	12.61%	808,811	101,991
3	13.00%	791,687	102,919
4	13.28%	781,687	103,808
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Capital Based Approach to Decision Support

- In this case we can see that expected insurance result improves each time equities are added
- But... our prior chart shows that after the inflexion point the marginal capital requirement increases faster than the marginal change in expected insurance result
- Whilst the approach helps to inform strategic decisions – it does not make them!

Capital Based Approach to Decision Support

- Many alternative problems may be addressed using this approach:

Example 2

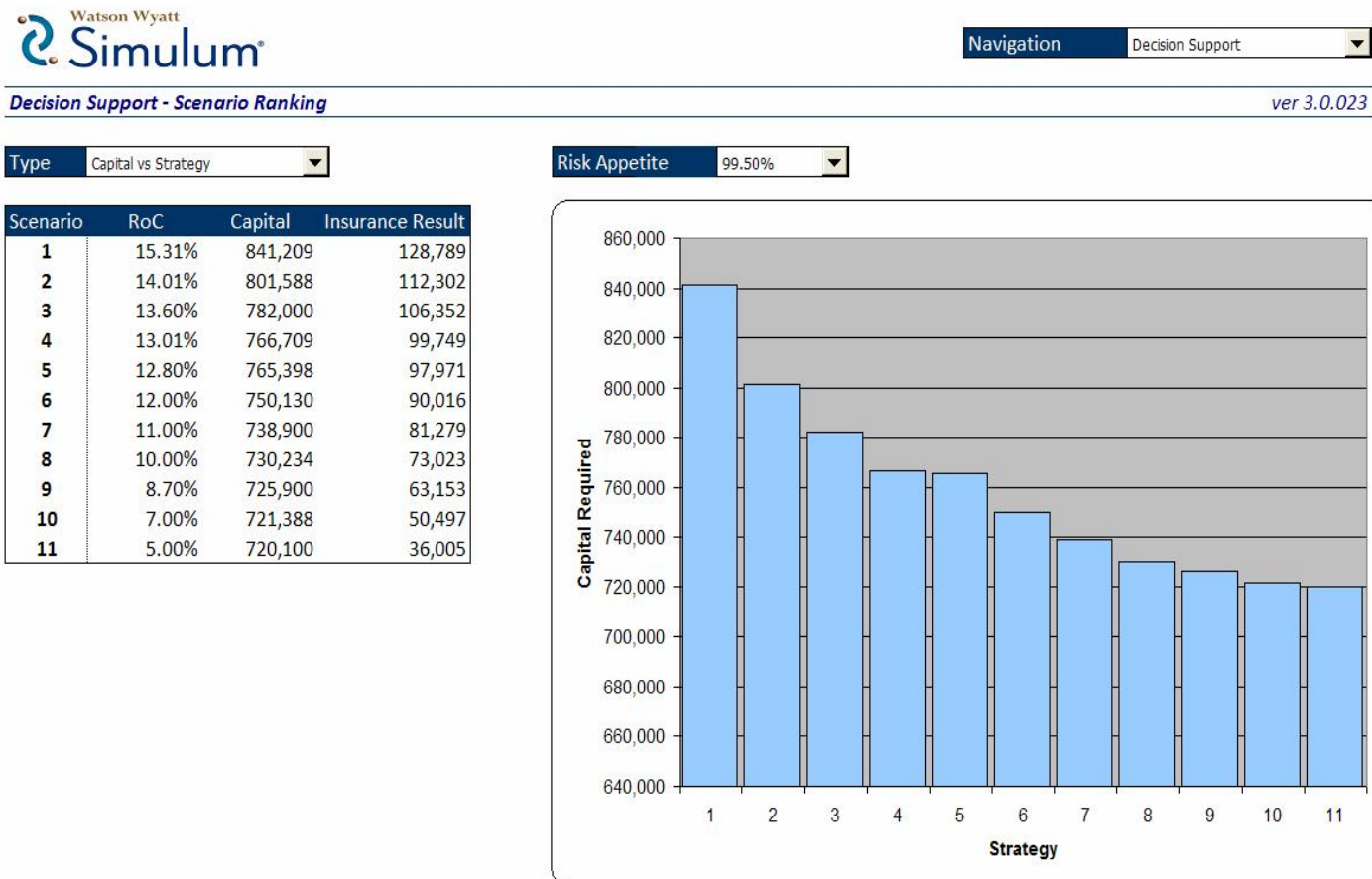
- Outwards Reinsurance structure
 - Is the current structure good value for money?
 - Who makes outwards commutation decisions?
 - What is the right price for outwards commutation?
 - Are commutations consistent with risk appetite

Capital Based Approach to Decision Support

- Is the current reinsurance structure good value for money?
- Break the current structure down into “program levels” and consider these as scenarios:
 - Scenario 11 Fully gross – no reinsurance
 - Scenario 10 Cat cover only
 - Scenario 9 Cat + high level whole account XL
 - Scenario 8...

Capital Based Approach to Decision Support

- What are the capital consequences for each scenario?



Capital Based Approach to Decision Support

■ ... and the RoC performance?



Navigation Decision Support

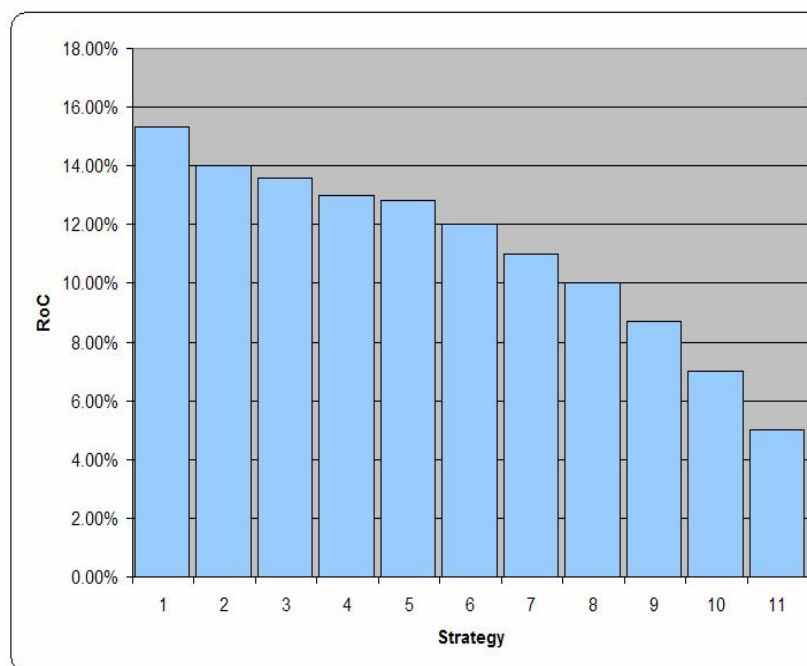
Decision Support - Scenario Ranking

ver 3.0.023

Type RoC vs Strategy

Risk Appetite 99.50%

Scenario	RoC	Capital	Insurance Result
1	15.31%	841,209	128,789
2	14.01%	801,588	112,302
3	13.60%	782,000	106,352
4	13.01%	766,709	99,749
5	12.80%	765,398	97,971
6	12.00%	750,130	90,016
7	11.00%	738,900	81,279
8	10.00%	730,234	73,023
9	8.70%	725,900	63,153
10	7.00%	721,388	50,497
11	5.00%	720,100	36,005



Capital Based Approach to Decision Support

■ Bringing it all together...



Navigation Decision Support

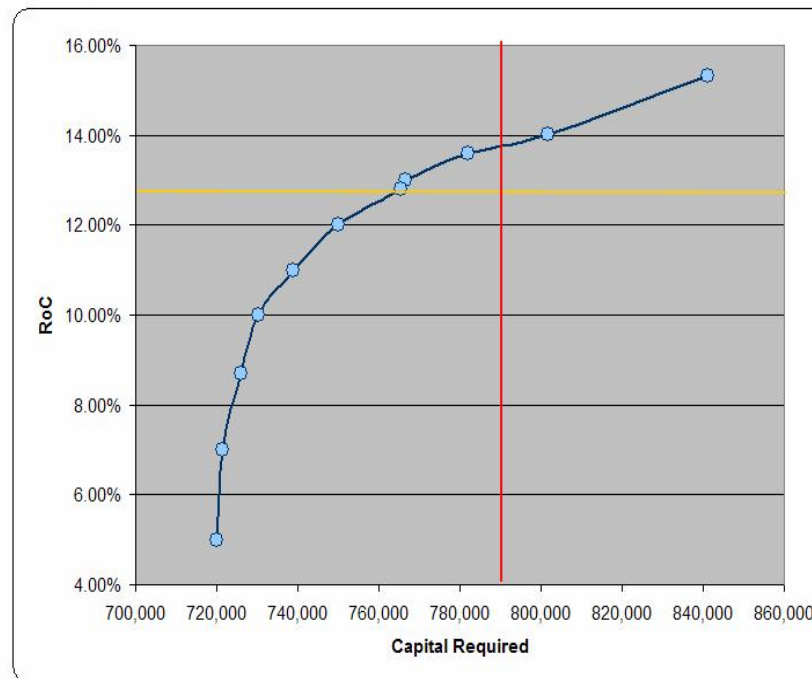
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Type RoC vs Capital

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Scenario	RoC	Capital	Insurance Result
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Capital Based Approach to Decision Support

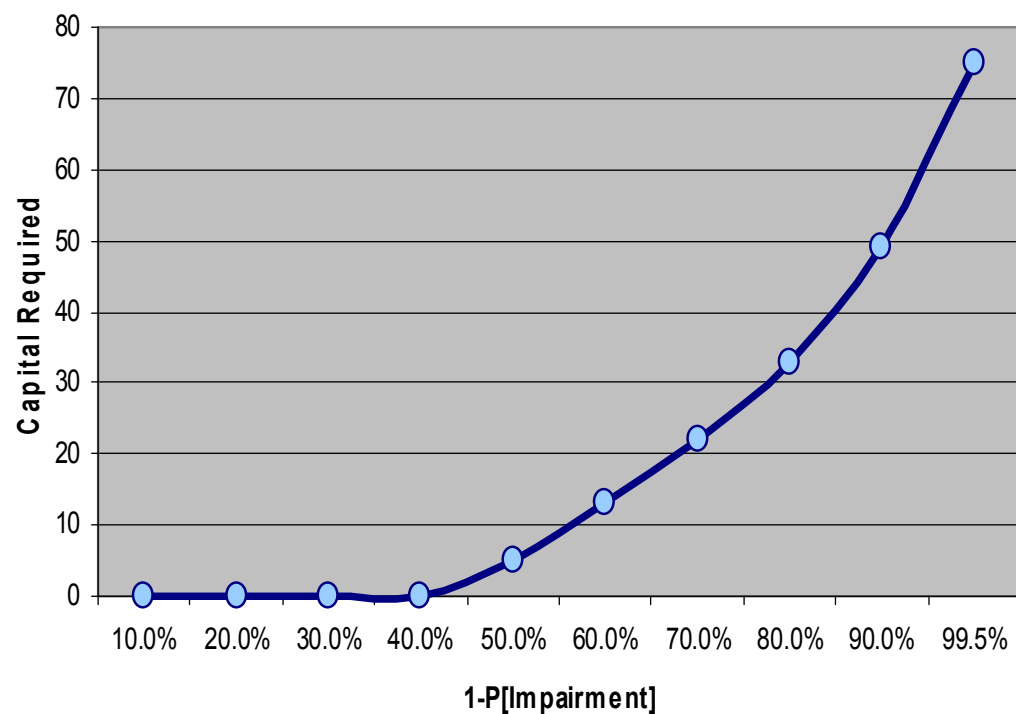
- In this case we can see that as additional reinsurance treaties are added then as capital requirement increases then return on capital increases
- This approach highlights original misalignment between reinsurance purchasing strategy and corporate risk management.
- In the most extreme cases, additional reinsurance is purchased which makes no difference to the capital required.
- Important to remember the findings from this analysis will depend crucially upon the selected risk appetite

Identification of Outwards RI Candidates

- The reinsurance asset is a key source of value
- Not all treaties add value
- Depends upon the selected risk appetite
- Many reinsurers are glad to seek to terminate ongoing liabilities
- Important to be able to identify contracts appropriate for commutation
- Once identified – what is the right price?
- Capital models can provide a framework for this analysis

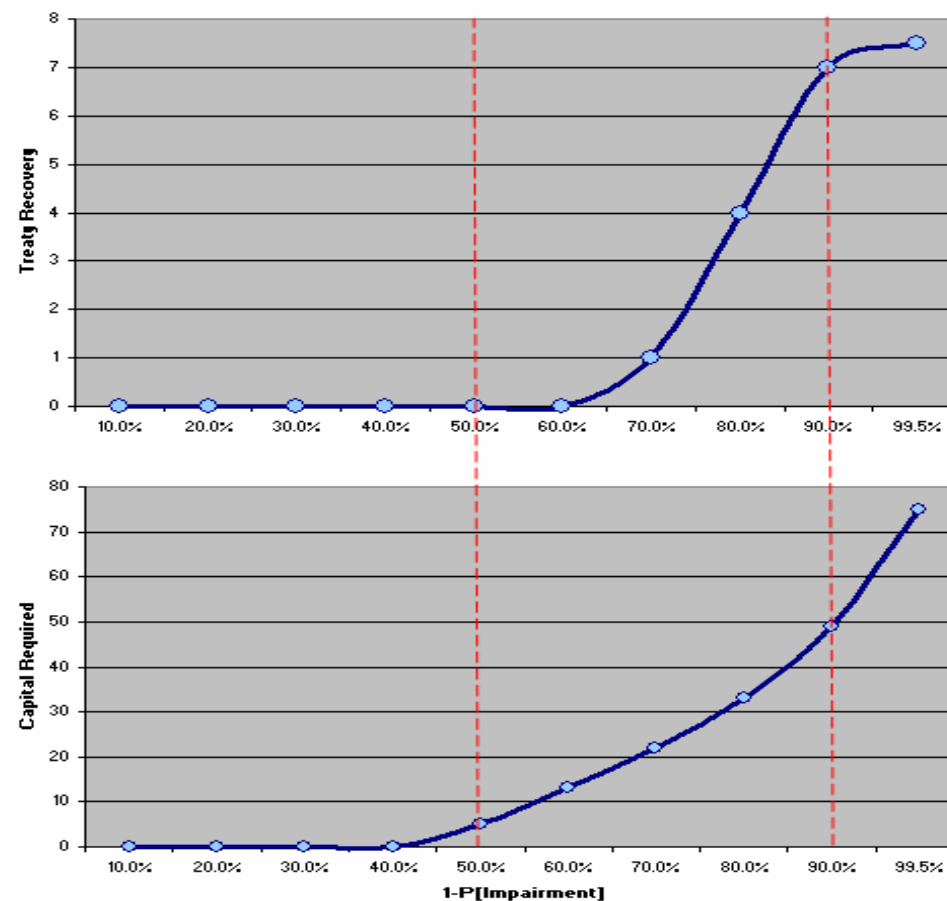
Identification of Outwards RI Candidates

- Firstly consider the relationship of risk appetite to capital requirement



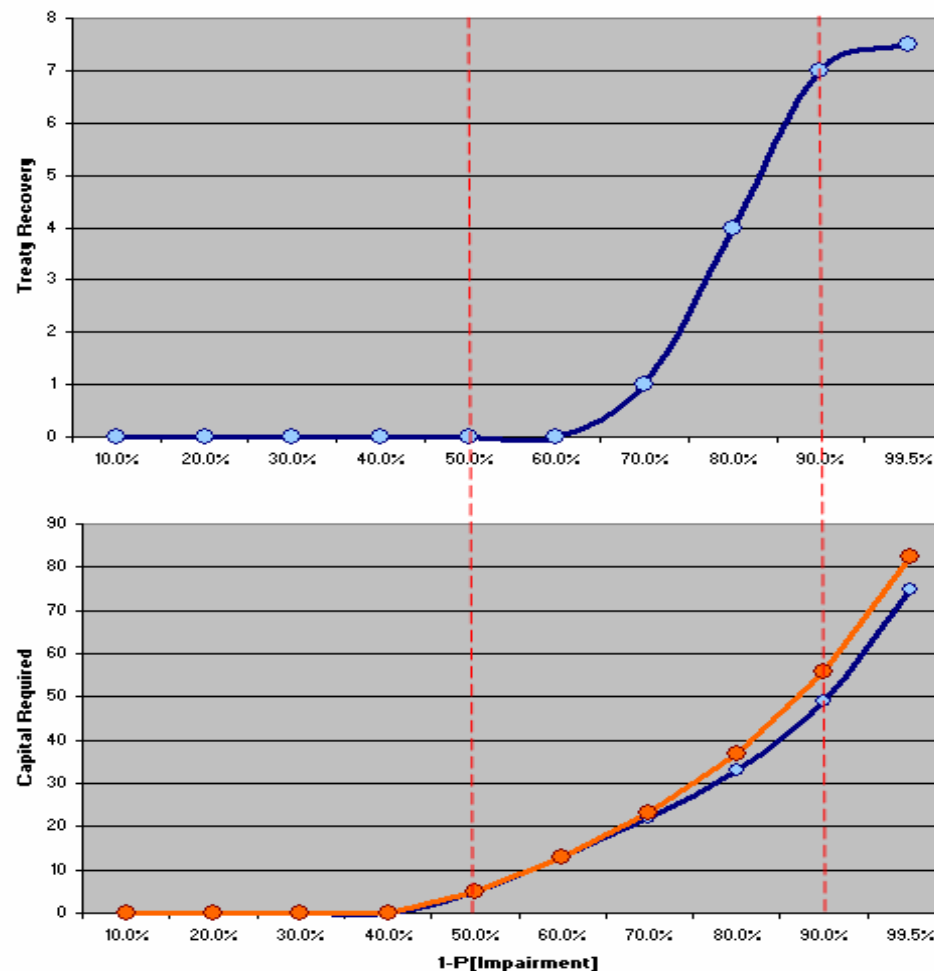
Identification of Outwards RI Candidates

- Now consider the recoveries made by the candidate treaty at various risk appetites



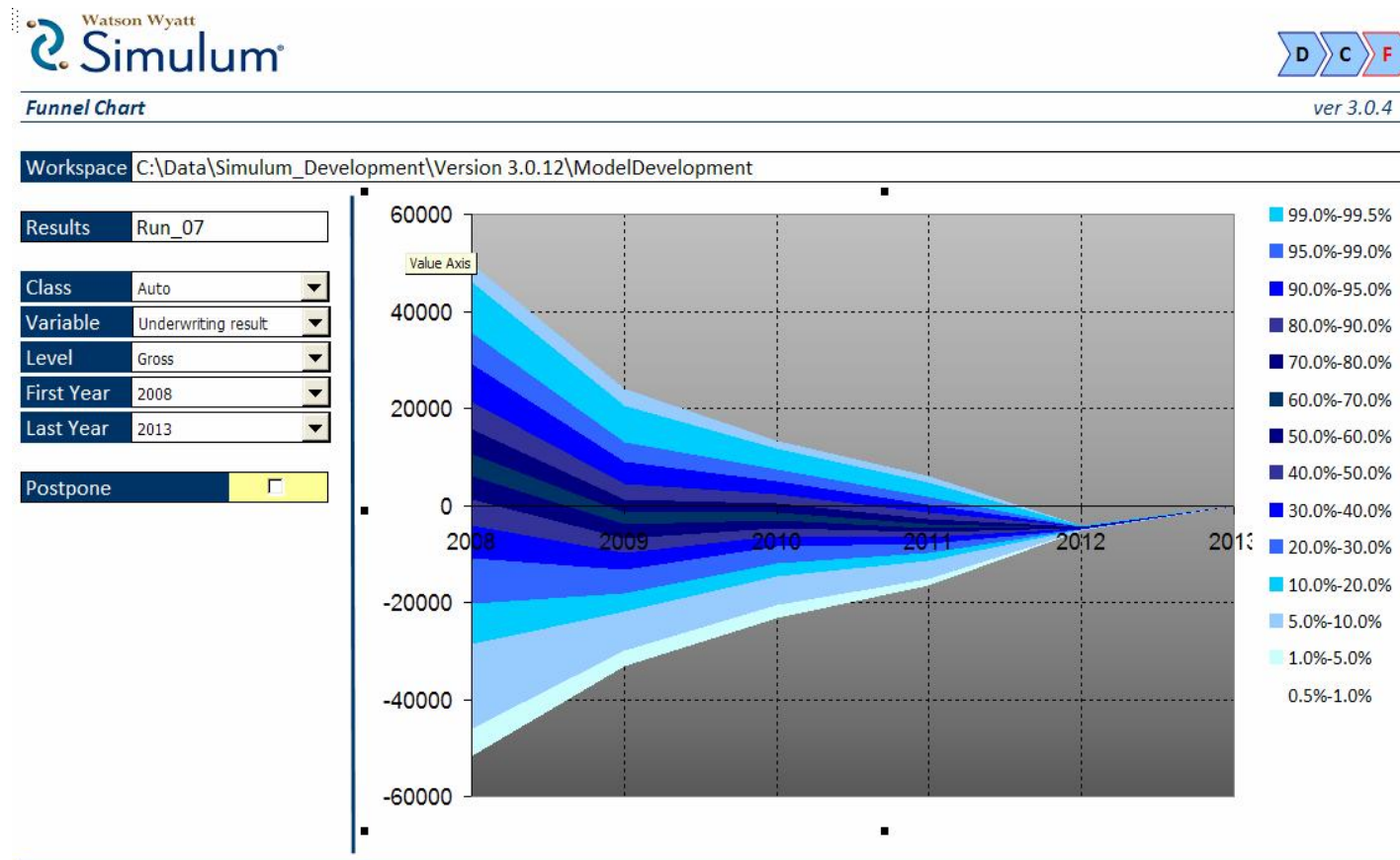
Identification of Outwards RI Candidates

What is the effect upon capital of removing the treaty?



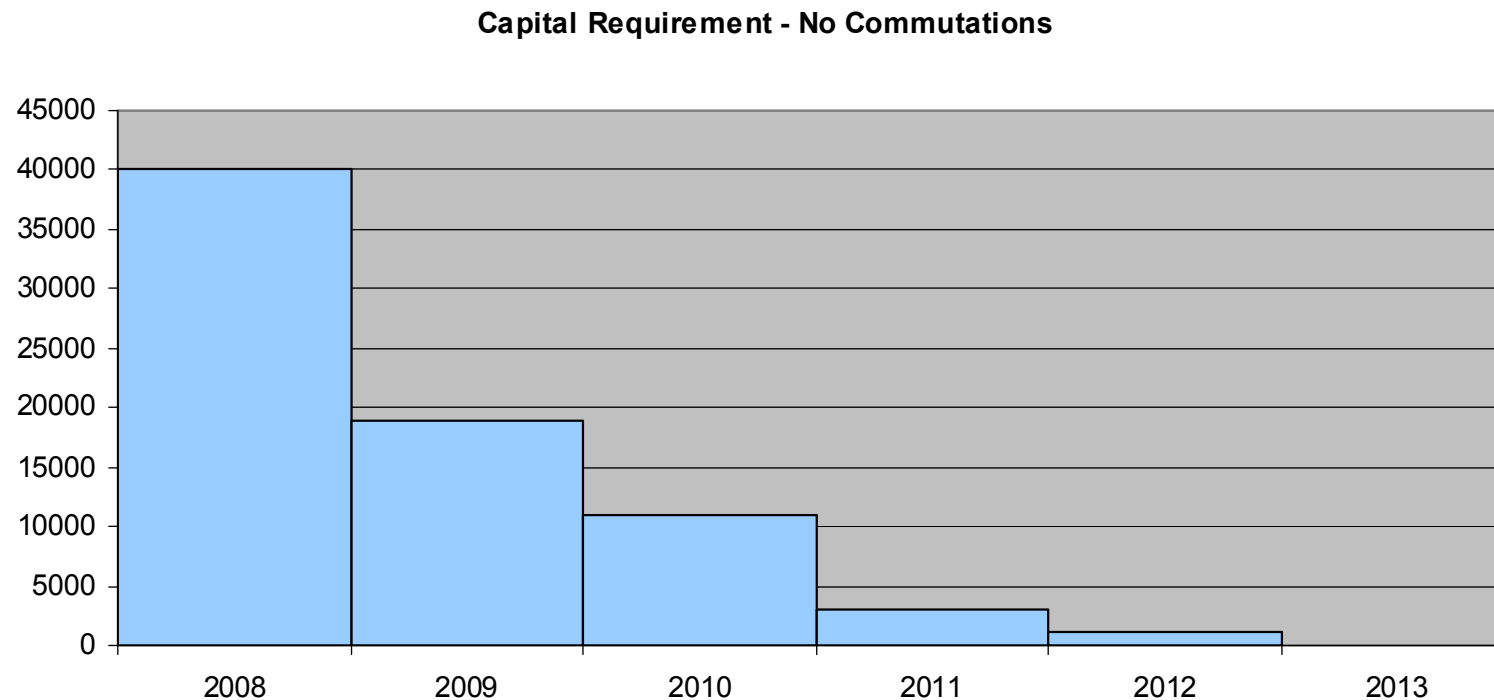
Example - Capital Release

- The expected variability of profit decreases into the future:



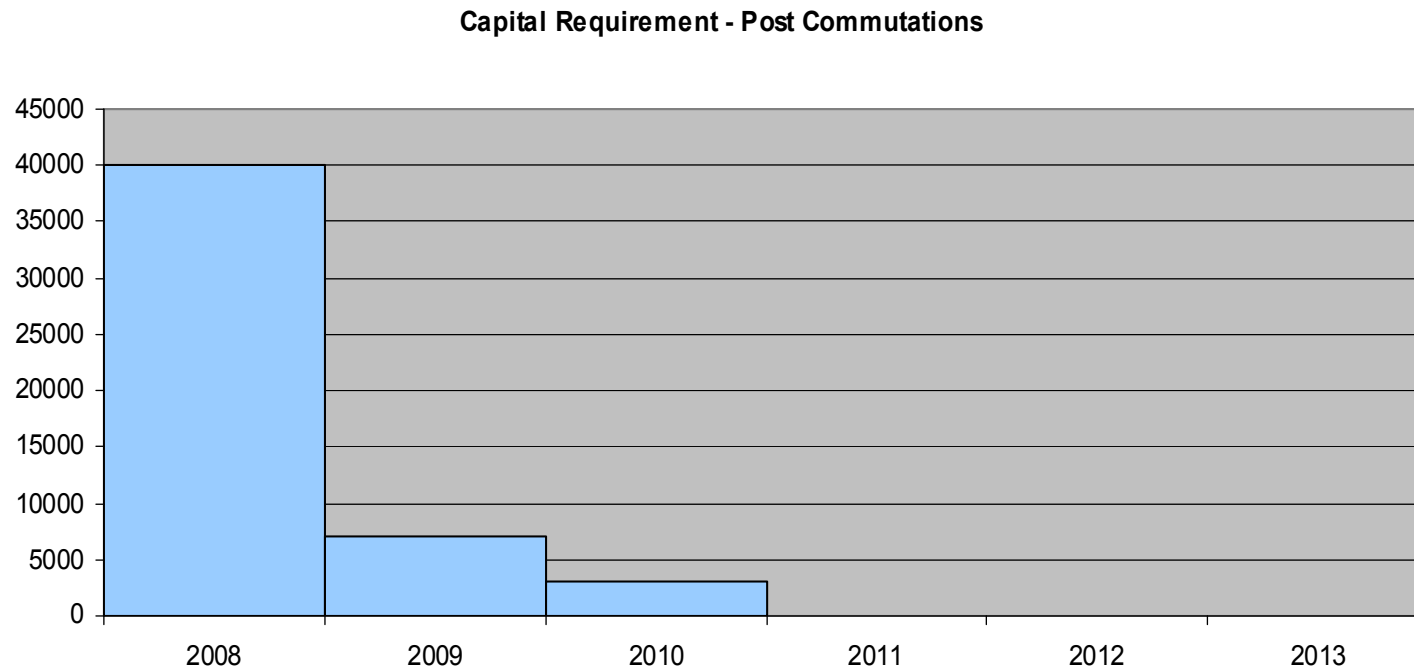
Example - Capital Release

- The expected amount of capital required in each future year can be estimated from the “decreasing funnel”



Example - Capital Release

- Following a commutation (or other deal) we can check the effect on the capital schedule:



Example - Capital Release

- We can hence understand the capital position before and after the deal.
- Given this one can derive a minimum/maximum price for the deal

Capital Requirement		
Year	Pre Commutation	Post Commutation
2008	40,000	40,000
2009	19,000	7,000
2010	11,000	3,000
2011	3,000	0
2012	1,200	0
2013	0	

Summary

- Briefly considered the place of capital models for legacy business
- A few examples considered – very many other applications
- Whilst regulation touches existing runoffs lightly future runoffs will certainly need to consider these approaches
- Finally crucial to remember a model is just there to “inform” decisions not to make them!
- Questions