Can you prove to your stakeholders that you have optimum insurance arrangements?

PUSHING THE EFFICIENT FRONTIER

Willis Global Solutions Consulting Group

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3rd June, 2014

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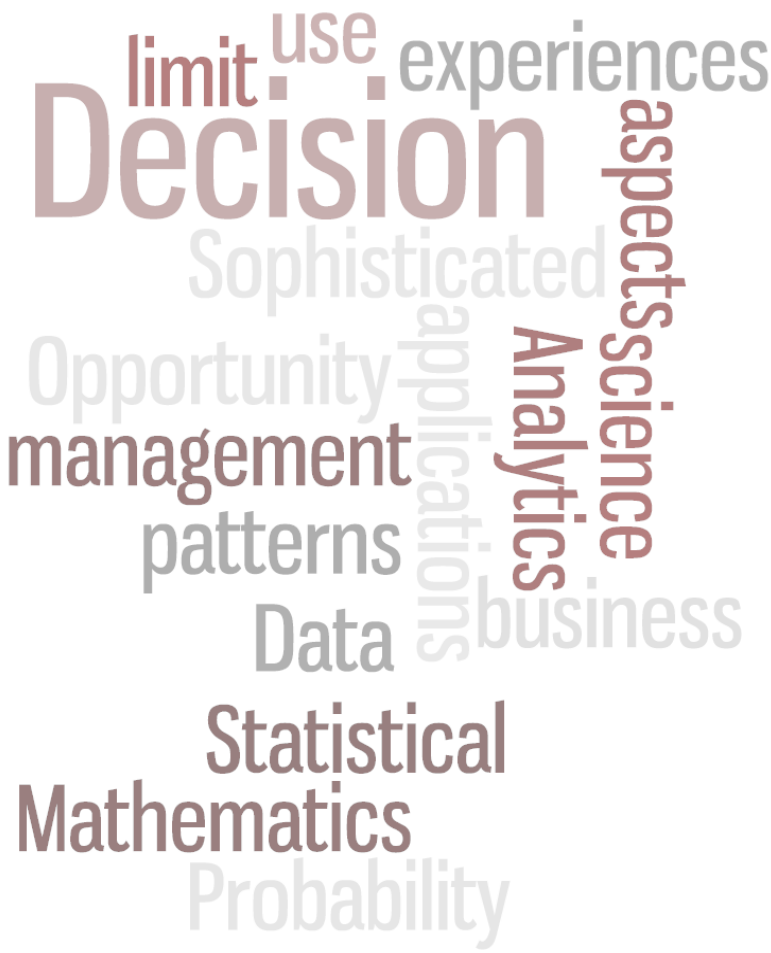
Why is analytics important to risk managers?

- To quantify and understand risk and the impact it has on your financial objectives
- Saving money by optimising insurance purchasing and ‘levelling the playing field’ with insurers
- Provide an audit trail of objective decision making



Agenda

Quality decision making driven by risk quantification

- **Introduction**
- **The analytical risk process**
- **Risk tolerance**
- **Extracting value from data**
- **Interpreting model output**
  - Break
- **Evaluating insurance arrangements**
- **Risk Portfolio Optimisation**
  - Break
- **Case studies**
- **Q&A**

The analytical risk process

Risk Insight Steps

1. Understand Client/ Industry
2. Define Risk Tolerance and Cost of Capital
3. Identify Exposures and Risks
4. Model Loss Frequency and Severity
5. Quantify Total Cost of Risk

Data gathering, preparation, and provision

Risk financing options

Risk management options

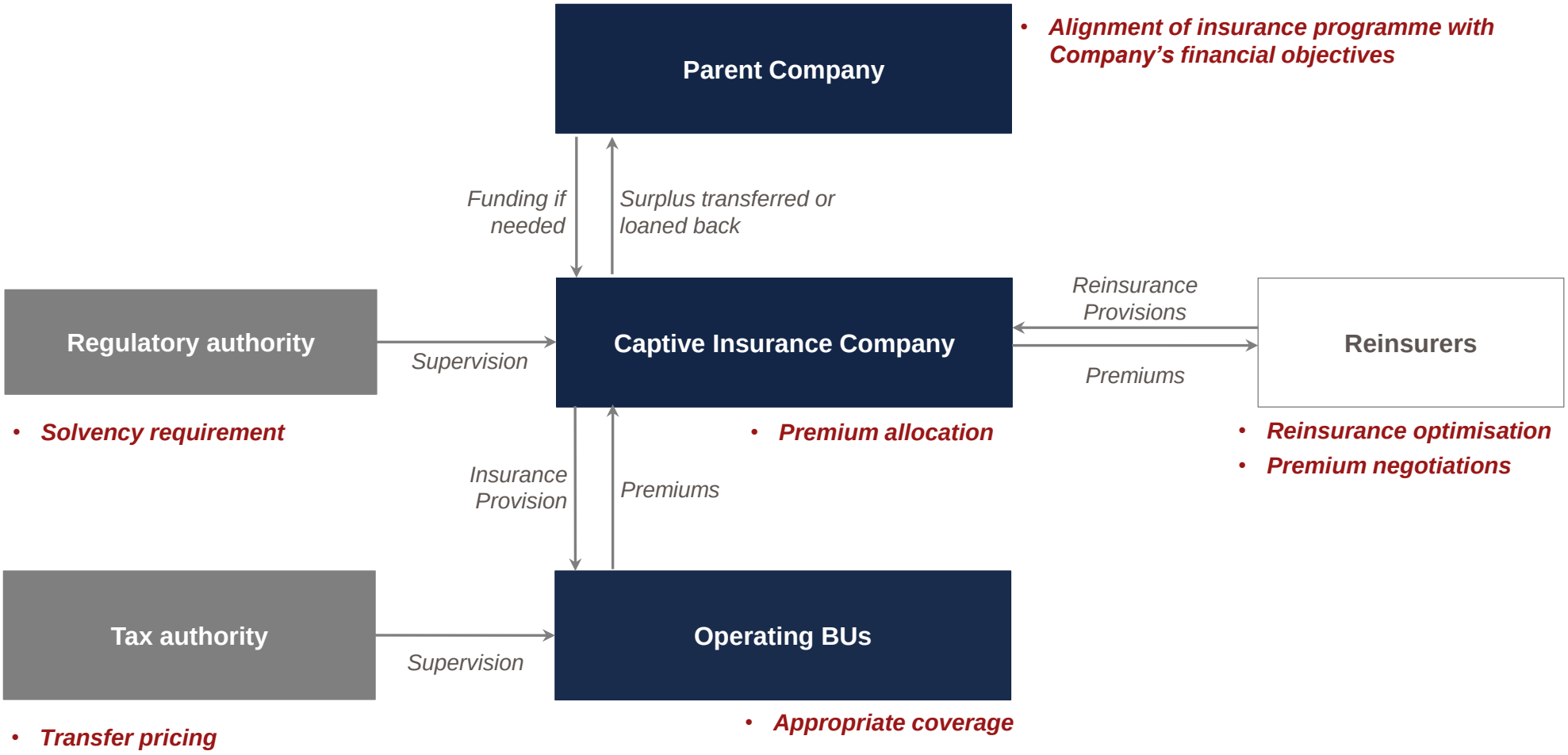
Solution Choices

6. Avoidance
7. Mitigation
8. Retention
   - Balance Sheet
   - Captive
9. Transfer
   - To Insurers
   - To Capital or other Markets

Resilience Strategy

Implementation

Key decisions should be based on quantitative analyses



RISK TOLERANCE

Defining risk tolerance

- **Defining the level of ‘downturn’ your organisation can withstand without threatening the achievement of your corporate strategy. This is your *risk tolerance*.**

- **By first defining these key boundaries, you are able to develop a risk financing strategy and solutions that make sense for your organisation**

Financial impact analysis helps to define risk tolerance

Clearly defining the risk tolerance boundary is the first step of optimising the risk financing strategy

Financial Impact Analysis

Company X's 2014 Financial Results (m)	Reported Results	Scenario A 20m		Scenario B 40m		Scenario C 50m	
		Impact	Result	Impact	Result	Impact	Result
Key financial metrics							
1. EBITDA	**550**	-0.4%	**548**	-1.1%	**544**	-2.1%	**538**
2. Operating income (EBIT)	**300**	-0.7%	**298**	-1.9%	**294**	-3.7%	**289**
3. Net Income (after tax)	**165**	-1.0%	**163**	-2.6%	**161**	**-5.1%**	**157**
4. Cash flow from operating activities	**300**	-0.5%	**298**	-1.4%	**296**	-2.7%	**292**
Ratios							
7. EBITDA margin	**10.0%**	-0.4%	**10.0%**	-1.1%	**9.9%**	-2.1%	**9.8%**
8. Operating margin (EBIT margin)	**5.7%**	-0.7%	**5.7%**	-1.9%	**5.6%**	-3.7%	**5.5%**
Balance Sheet							
9.Shareholder's equity	**2,751**	-0.1%	**2,749**	-0.2%	**2,747**	-0.3%	**2,743**

** Assuming the maximum acceptable 'downturn' is a 5% deviation from 2013 financial results*

*** Based on this threshold, the Financial Impact Analysis suggests the retention should be limited to 50m*

Any decision on what is considered to be an acceptable deviation from reported financial results will be guided by

- Trigger for stock exchange trading statement
- Breach of banking covenants
- Impact on liquidity / debt structures
- Impact on credit rating
- Auditors view on materiality
- Adverse comment from analysts (listed companies)

EXPLOITING DATA AND UNDERSTANDING VOLATILITY

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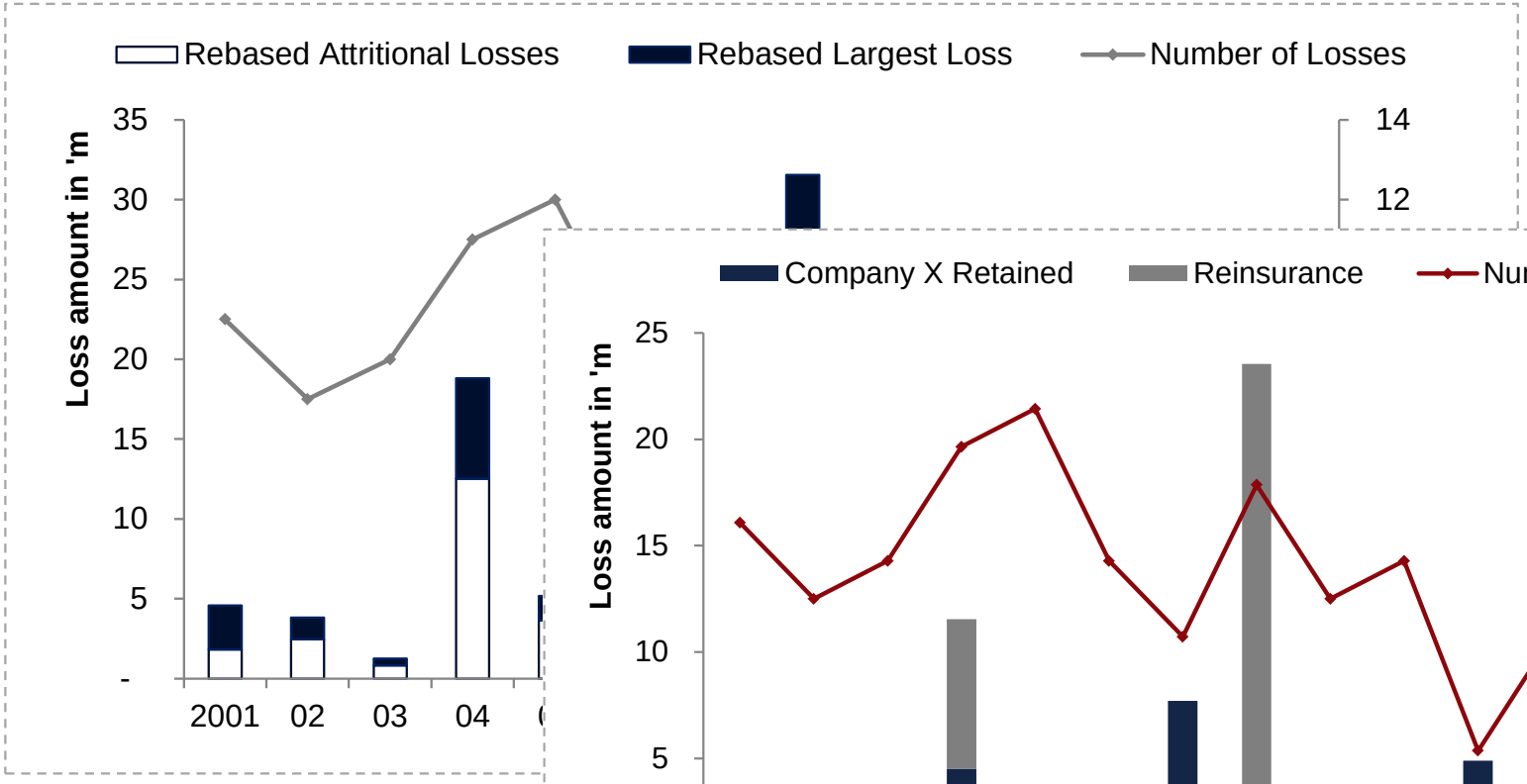
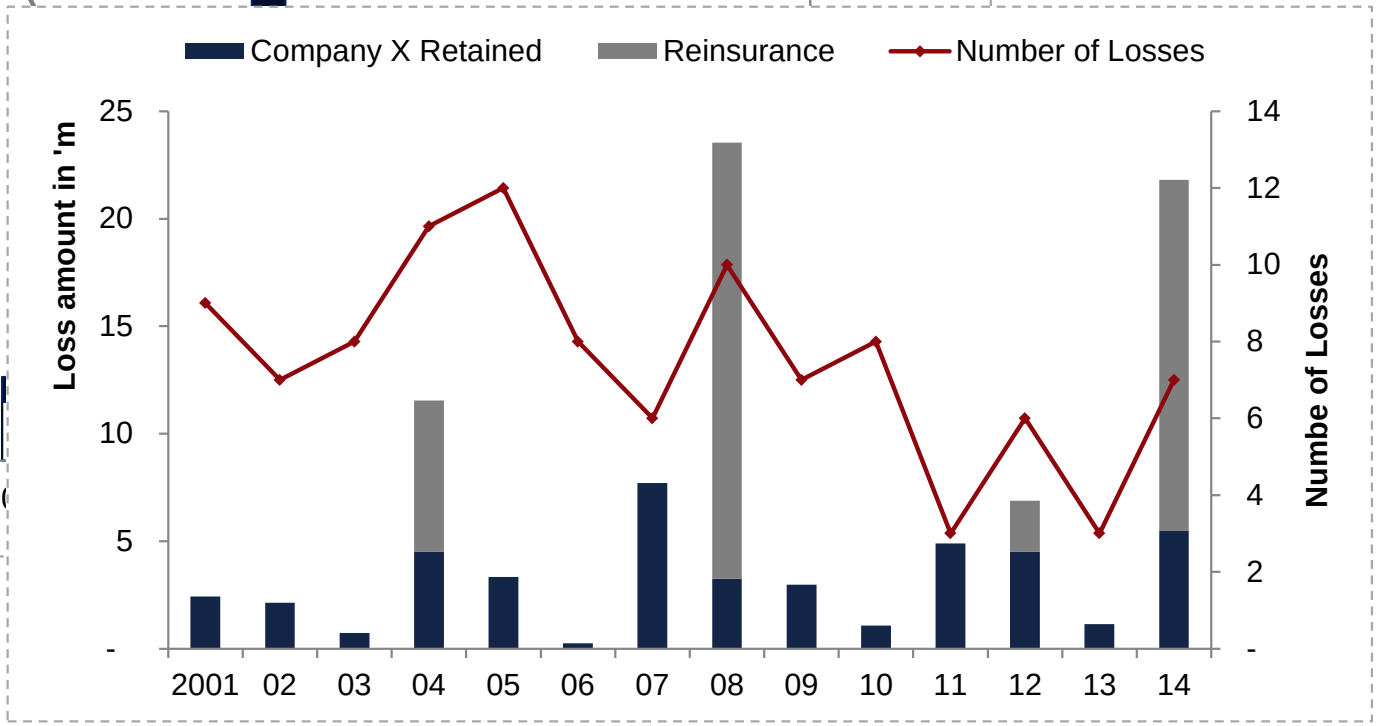
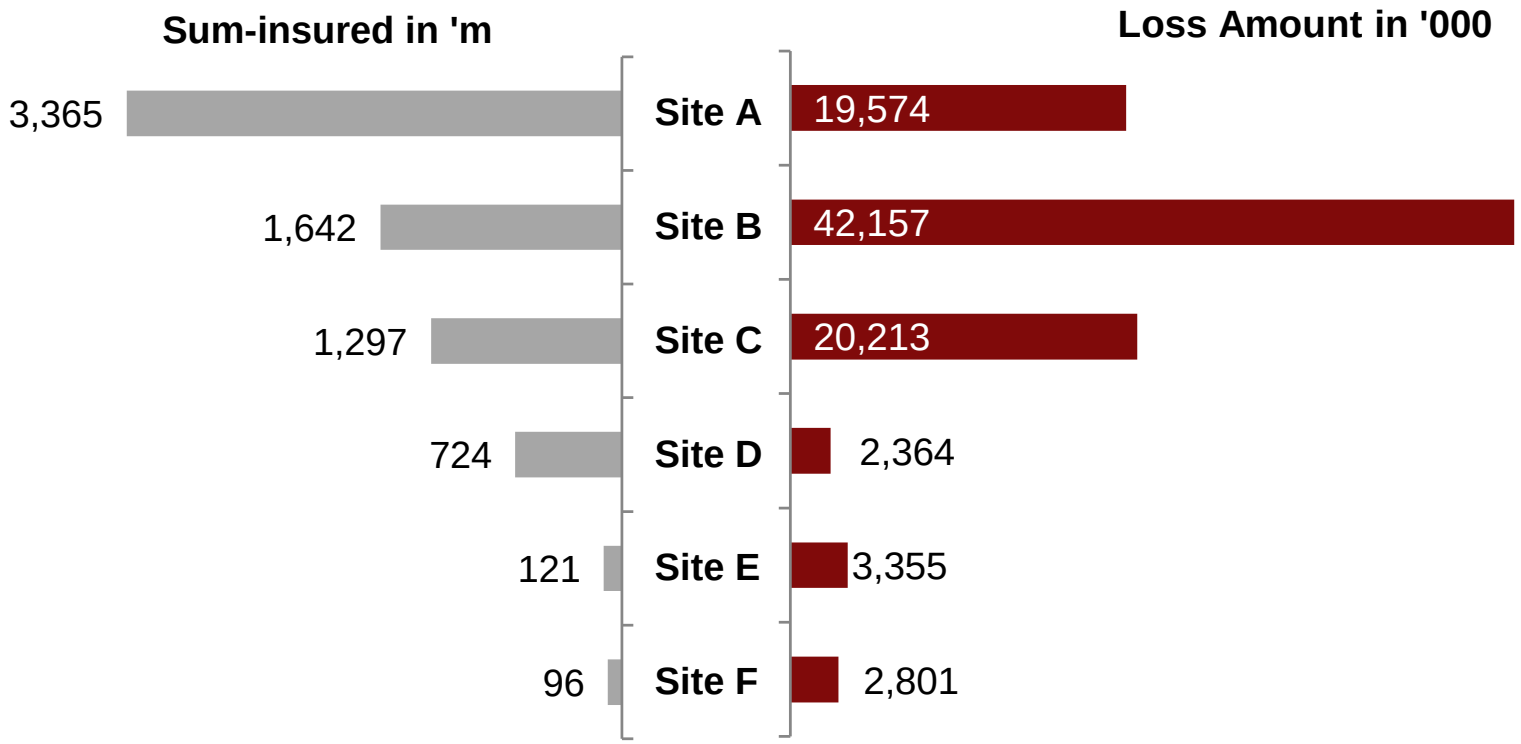
Analysis of historical data also reveals vital information





There are other ways to understand the data...

Is loss experience consistent with risk exposure?

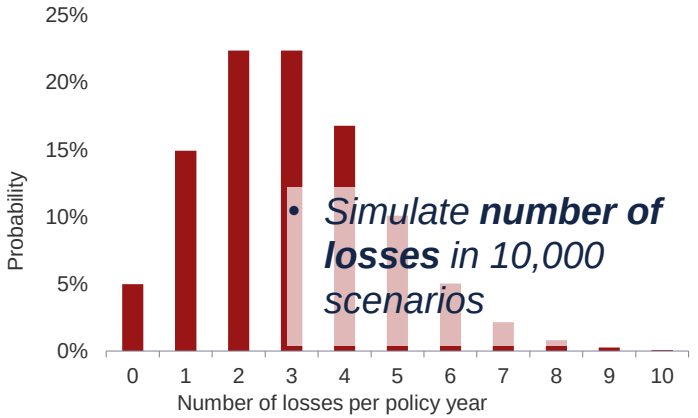


Using models to understand volatility

1. Understanding Data and Risk Profile

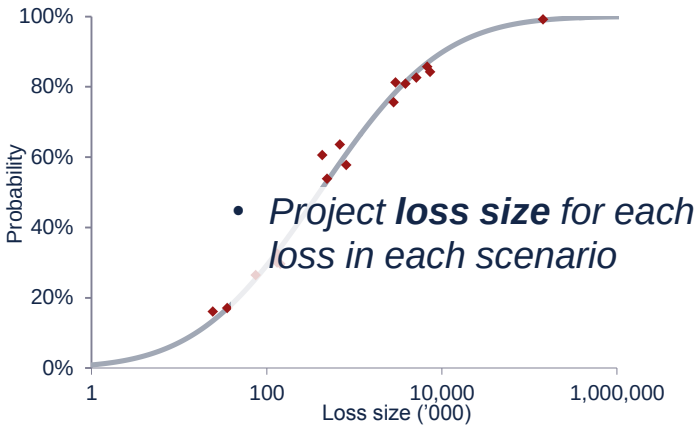
2. Fitting Robust Statistical Models

Frequency



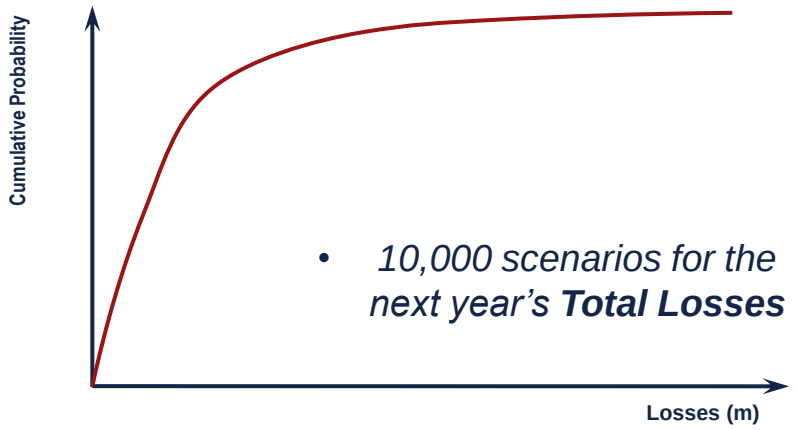
- *Simulate **number of losses** in 10,000 scenarios*

Severity



- *Project **loss size** for each loss in each scenario*

3. Combining Frequency and Severity Models…



- *10,000 scenarios for the next year's **Total Losses***

How to understand and interpret model results

Return Period

Average time in years between losses of a given size

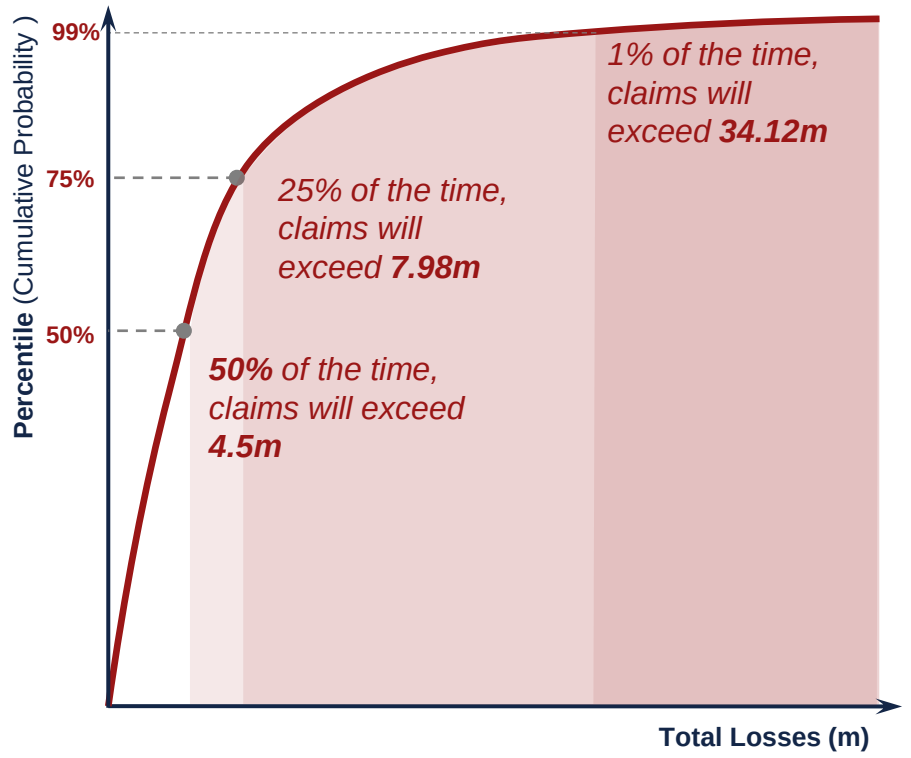
Percentile

Probability that the total losses in a year are less than a defined value

Total Loss

Annual total losses, ignoring insurance, at a defined percentile

Distribution Curve for the Ground-up Losses



Simulation Results ('000)

		Ground-up Losses
Return Period (Years)	Percentile	Total Loss ('000)
1 in 2	50.0%	4,539
1 in 4	75.0%	7,979
1 in 5	80.0%	9,200
1 in 10	90.0%	13,221
1 in 20	95.0%	18,227
1 in 50	98.0%	26,384
1 in 100	99.0%	34,124
1 in 200	99.5%	44,562
1 in 500	99.8%	57,687
1 in 1000	99.9%	72,153
	Mean	6,487
	Std Dev	7,380

FIKA!

EVALUATION AND OPTIMISATION

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Using the model to understand insurance performance

Assuming an insurance structure with a BU deductible of 100k, a Captive Each and Every Loss retention (EEL) of 4m and a Captive Annual Aggregate (AAD)of 8m…

Simulation Results ('000)

		Ground-up Losses	Losses modelled under Current Programme (EEL 4m & AAD 8m)			
Return Period (Years)	Percentile	Total Loss ('000)	*Retained by BU ('000)*	*Captive Retained ('000)*	Total Retained	Ceded to Reinsurers
1 in 2	50.0%	4,539	*628*	*3,870*	4,501	-
1 in 4	75.0%	7,979	*806*	*6,164*	6,916	408
1 in 5	80.0%	9,200	*855*	*6,791*	7,566	1,462
1 in 10	90.0%	13,221	*984*	*8,000*	8,724	5,294
1 in 20	95.0%	18,227	*1,084*	*8,000*	8,944	9,856
1 in 50	98.0%	26,384	*1,206*	*8,000*	9,104	18,277
1 in 100	99.0%	34,124	*1,300*	*8,000*	9,227	25,678
1 in 200	99.5%	44,562	*1,399*	*8,000*	9,335	37,403
1 in 500	99.8%	57,687	*1,492*	*8,000*	9,460	48,880
1 in 1000	99.9%	72,153	*1,550*	*8,000*	9,540	65,912
	Mean	6,487	*648*	*4,067*	4,715	1,772
	Std Dev	7,380	*249*	*2,503*	2,649	6,015

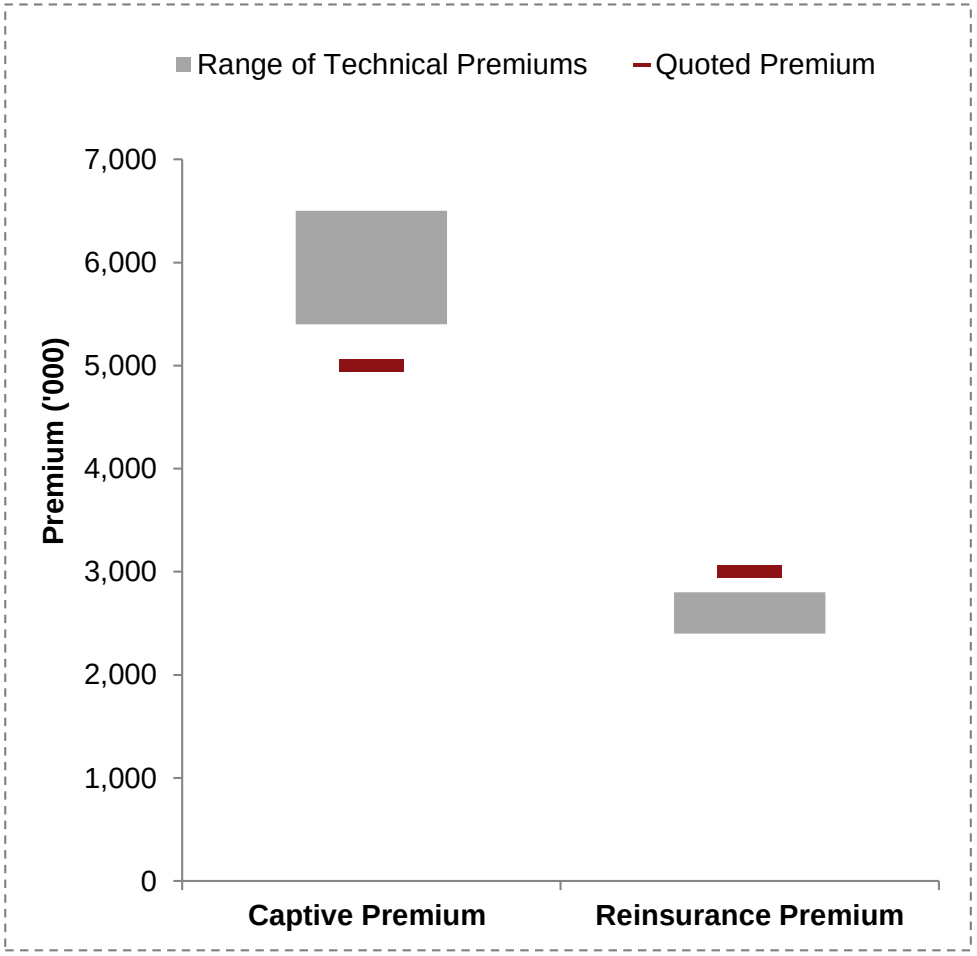
Reinsurances
(Limit 500m)

Captive
(EEL 4m & AAD 8m)

Local BU Deductibles (100k per loss)

- **Are BUs retaining too much risk?**
- **Is Captive annual aggregate retention level reasonable?**
- **Is Captive premium level sustainable?**
- **Is current reinsurance programme good value for money?**

Comparing technical pricing with actual premiums



- **Gain an advantage in market negotiations**
- **Basis for transfer pricing calculation**
- **In this illustration:**
  - The captive premium is charged slightly below the technical range…
  - … Captive at risk of being under-funded in the long-term
  - The reinsurance premium is higher than the expected range…
  - …indicating there may be a potential to carry further negotiation with the market

Critical assessment of the insurance programme

** Based on Previous Example*

Current Structure
(4m EEL & 8m AAD)

Reinsurance Limit 500m

- Captive ceding 1.7m to reinsurers per year in the long-term
- Current 500m reinsurance **limit is sufficient to a 1 in 1000 confidence level**
- Current reinsurance **premium is NOT competitive**
- Reinsurers making an underwriting profit 7-in-8 years

Captive
EEL 4m & AAD 8m

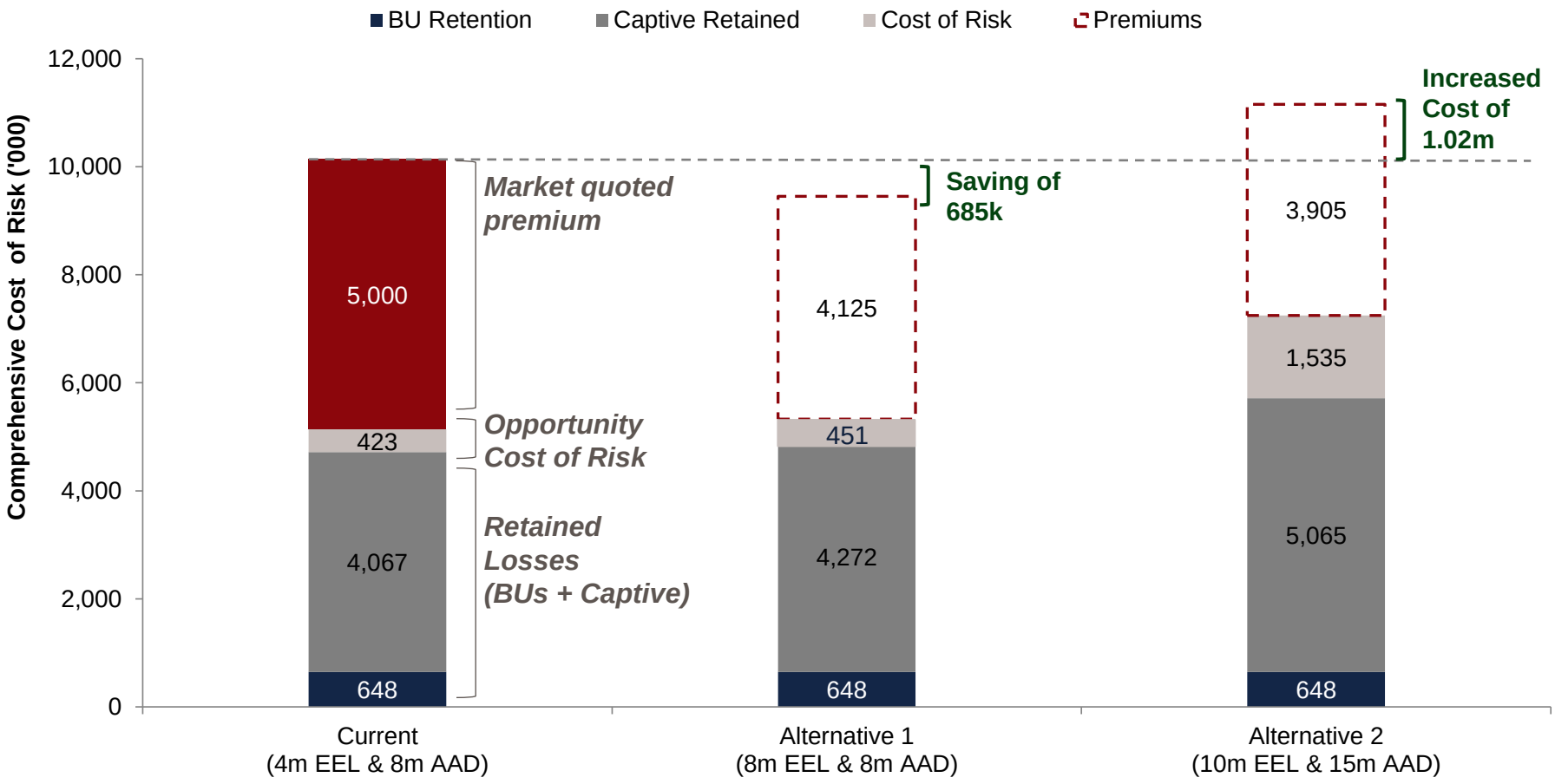
- Captive retains 4.1m per year on average (long-run mean)
- Current 8m **Aggregate** is estimated to be breached 1 year in 10, and is considered to be **reasonable**
- Premium level is lower than technical range. **Captive at risk of Underfunding**
- Captive will make Underwriting loss 1 year in 3

Local BU Deductibles
100k per loss

- BUs retaining 650k per year on average
- …But **1.4m in a downside** 1-in-200 scenario

Evaluating alternative structures

Using comprehensive cost of risks to differentiate options in the light of reinsurance pricing, retained losses and your cost of capital



Critical Assessment of alternative insurance programmes

	Current Structure *(4m EEL & 8m AAD)*	Alternative 1 *(8m EEL & 8m AAD)*	Alternative 2 *(10m EEL & 15m AAD)*
Reinsurance	• Captive ceding 1.7m to reinsurers per year in the long-term • 500m reinsurance limit is sufficient to a 1 in 1000 confidence level • Reinsurance premium NOT competitive • Underwriting profit 7-in-8 years	• Captive ceding 1.5m to reinsurers in the long-term • …	• Captive ceding 774k to reinsurers in the long-term • …
Captive	• Captive retains 4.1m per year on average (long-run mean) • Current 8m Aggregate is estimated to be breached 1 year in 10, and is considered to be reasonable • Premium level is lower than technical range. Captive at risk of Underfunding • Underwriting loss 1 year in 3	• Captive retaining 4.2m per year in the long-term • …	• Captive retaining 5.1m per year in the long-term • …
Local Deductibles (Keep at 100k)	• BUs retaining 650k per year in the long term • but 1.4m in a downside 1-in-200 scenario	• Unchanged	• Unchanged

RISK PORTFOLIO OPTIMISATION

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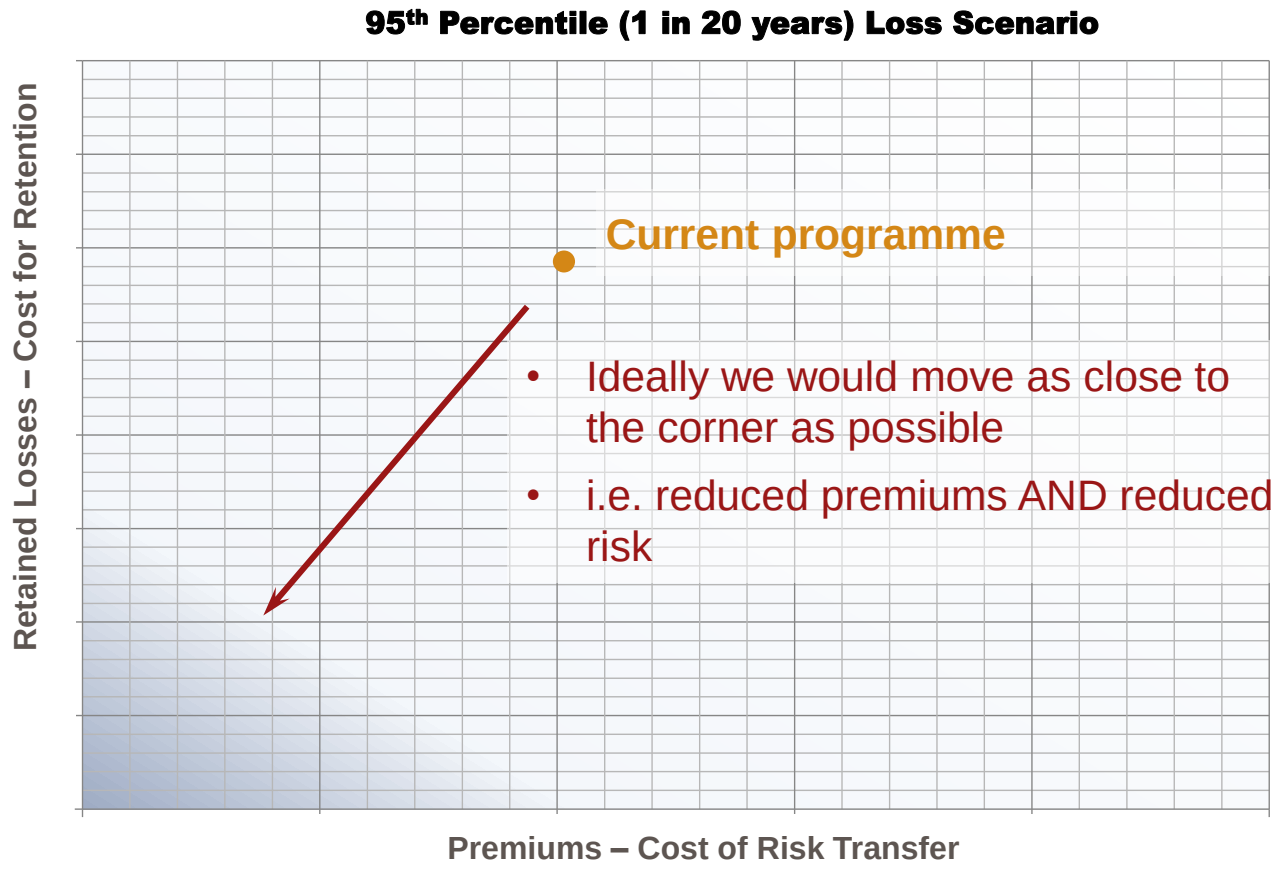
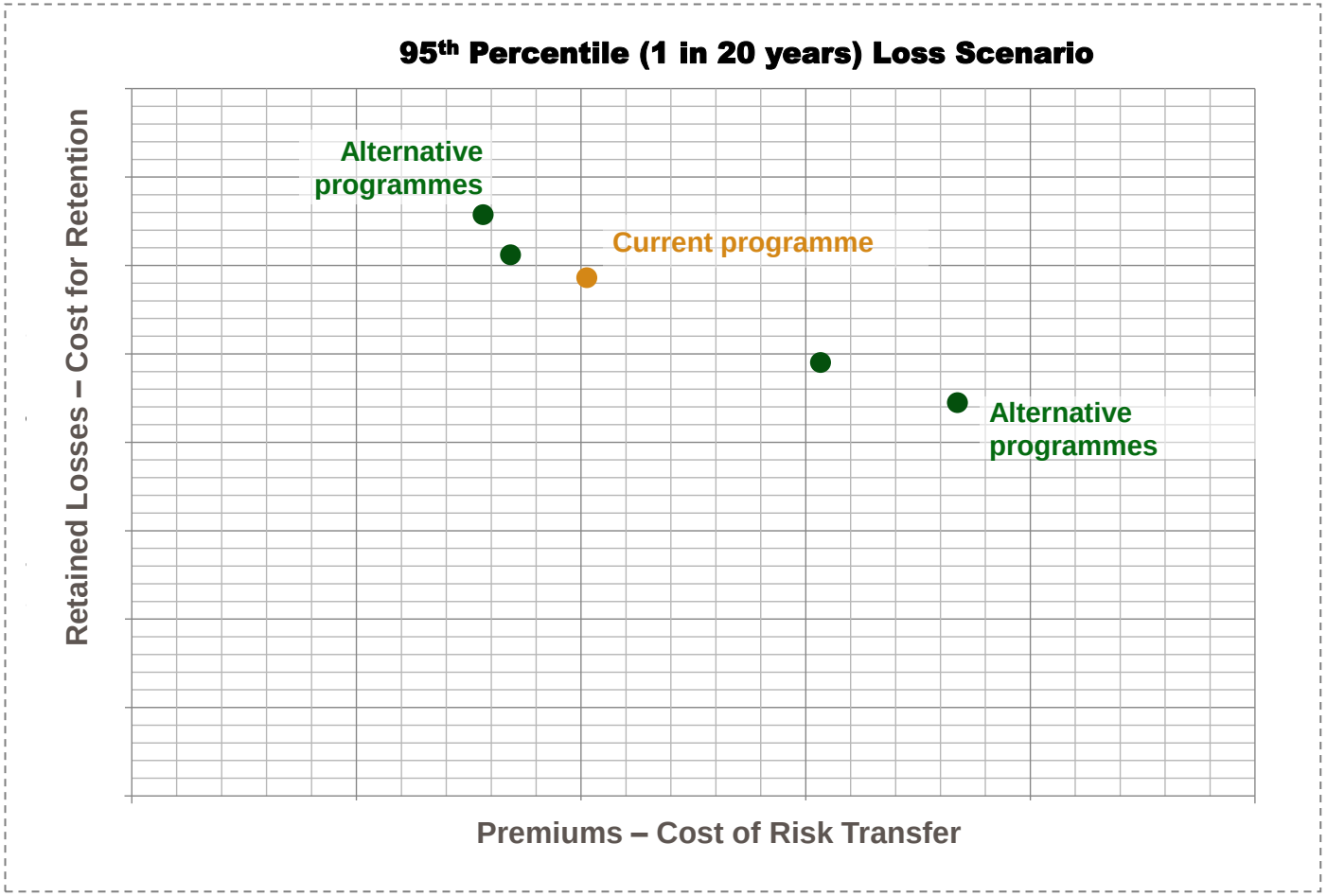
The efficient frontier

In general, there is a trade-off between the amount of risk transferred and the premium.



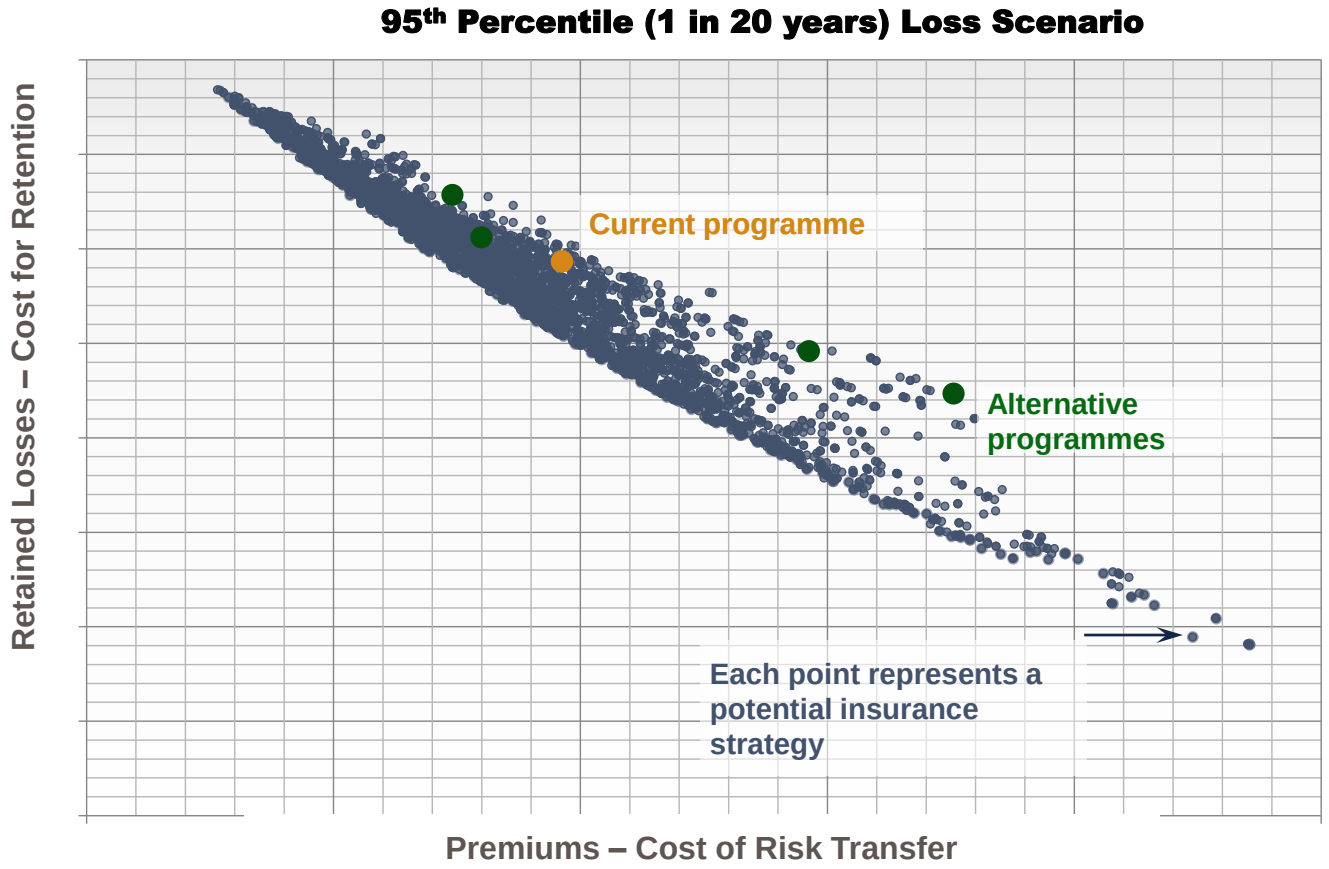
The efficient frontier (2)

Alternative strategies can also be plotted

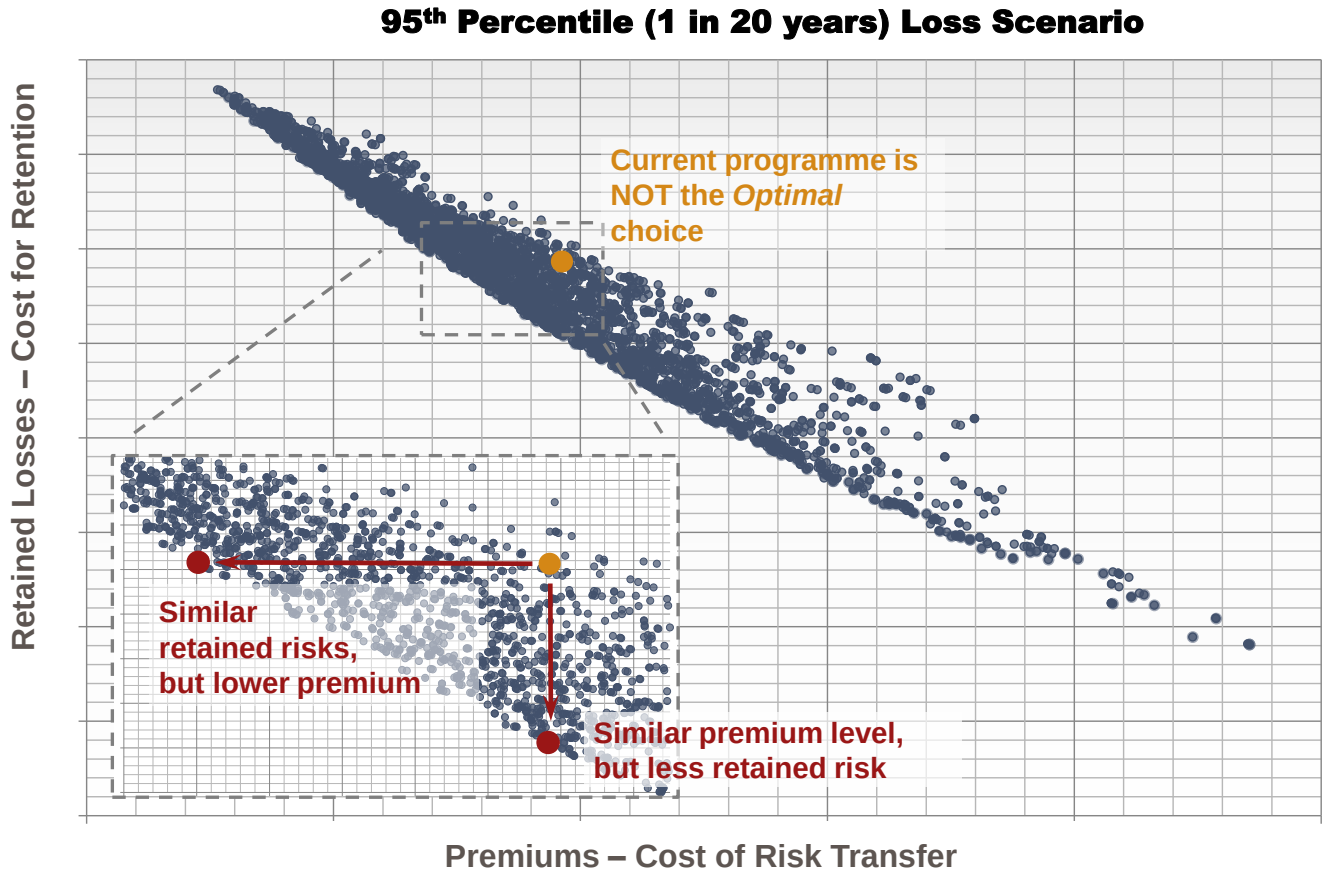


The efficient frontier (3)

Ideally we test ALL strategies - Each blue point below represents an option

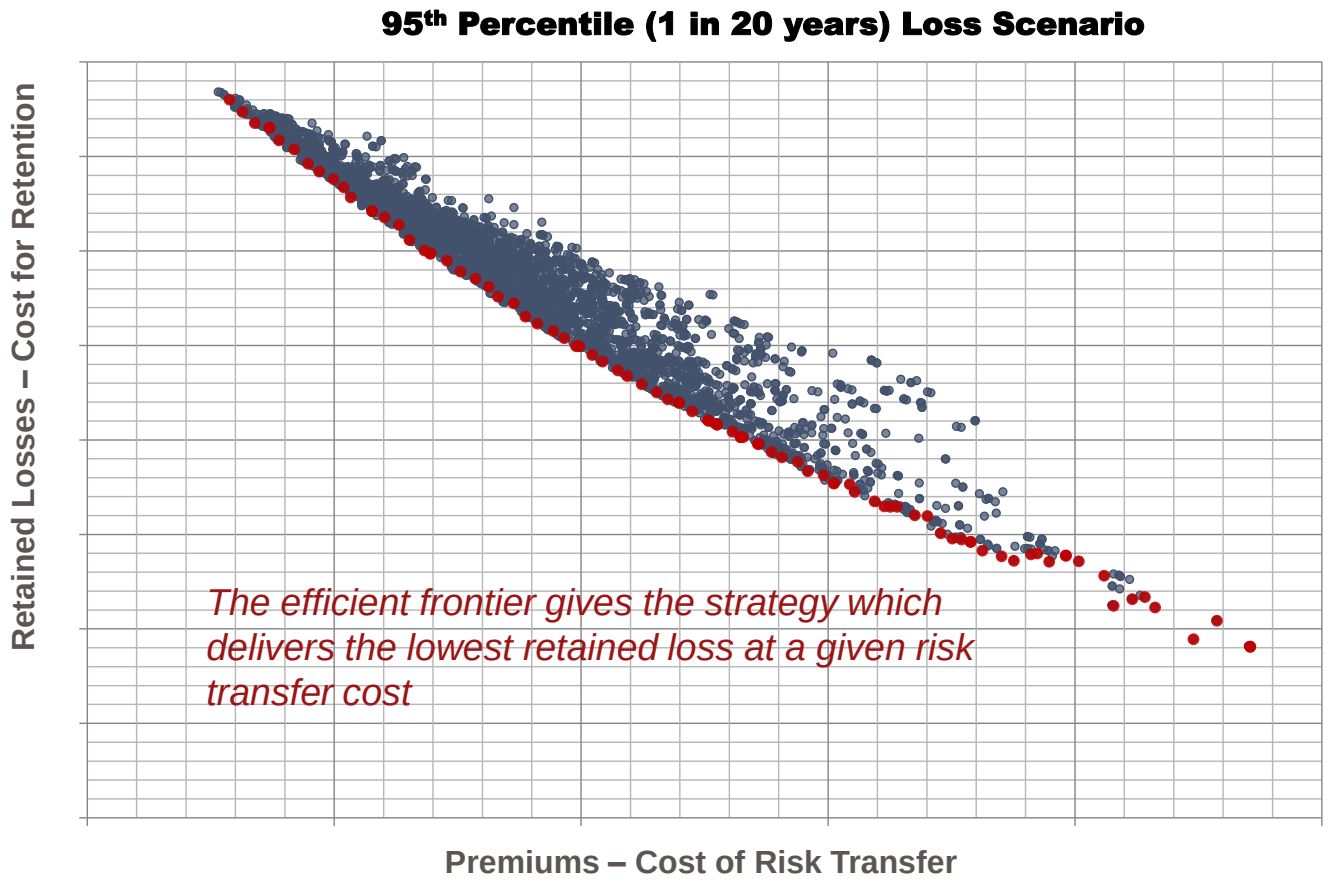


The efficient frontier (4)



- Moving downwards, Company X could achieve a strategy with similar premium level while retaining less risk…
- Moving leftwards, a strategy with similar retained risk while much lower premium…

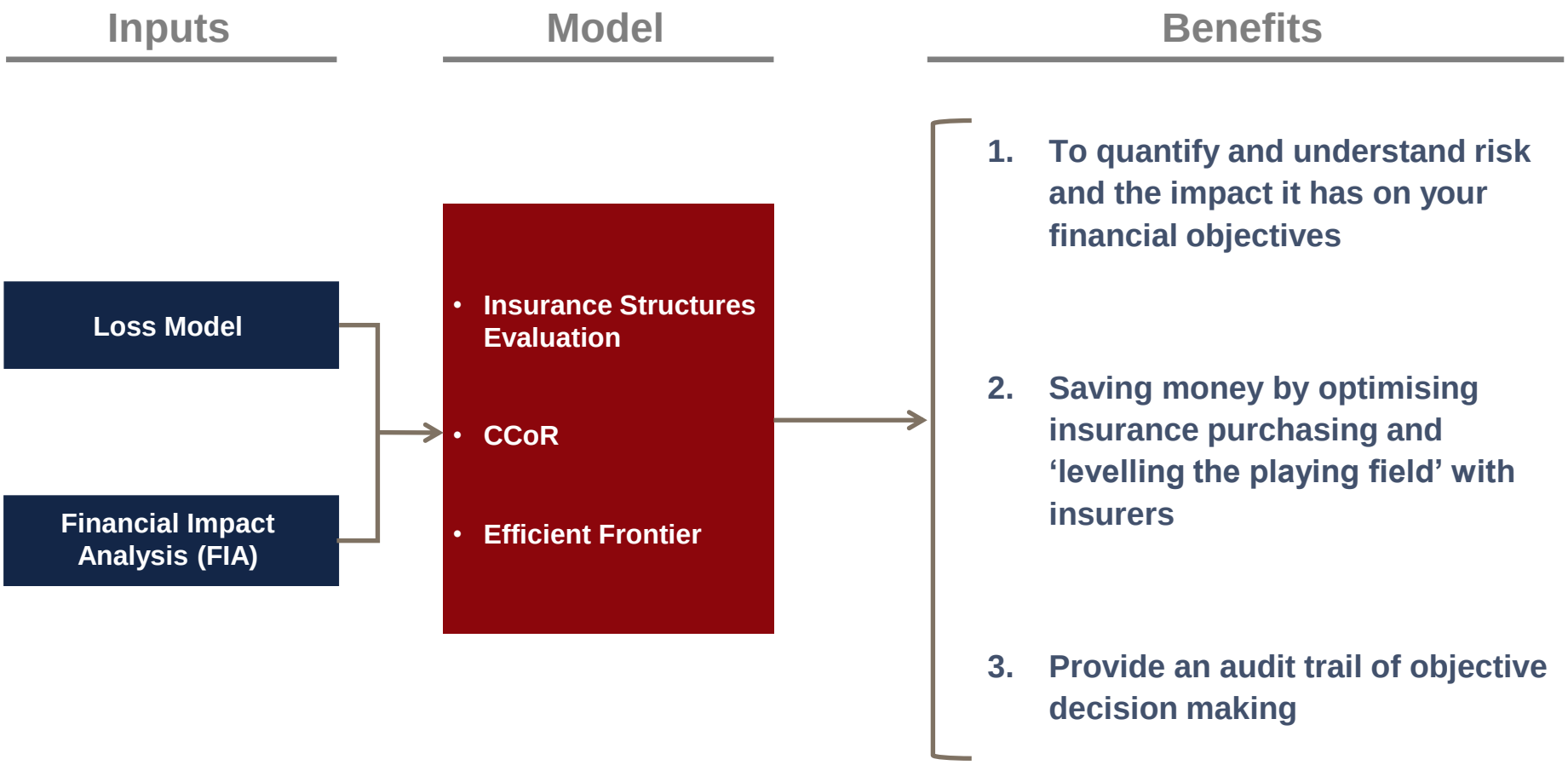
The efficient frontier (5)



- Company X could choose the optimal strategy by setting:
- Constraint the budget for risk transfer to …
- Or define their risk retention level and purchase the cheapest available insurance programme

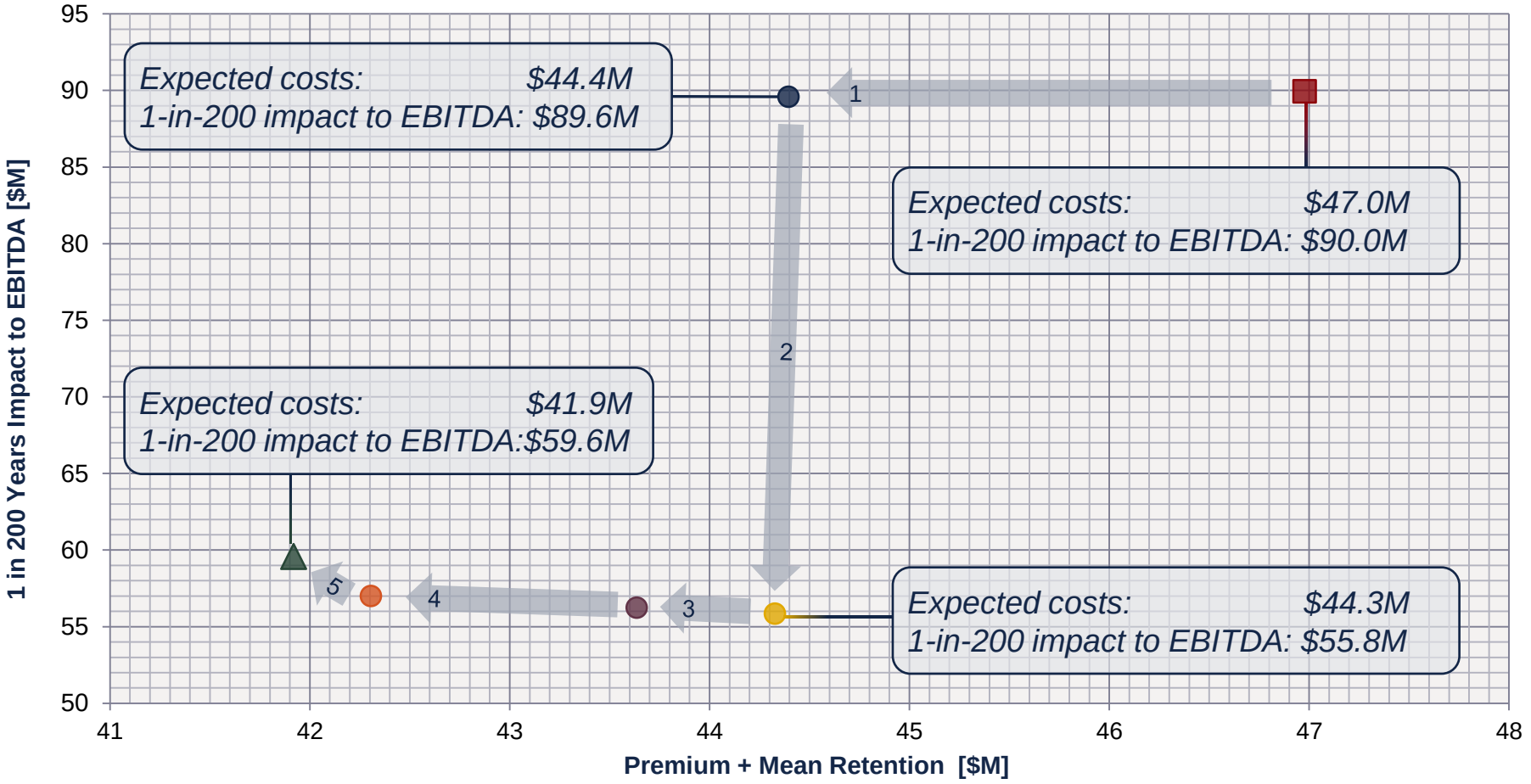
SHORT BREAK

How analytics benefits the risk financing decisions



CASE STUDIES

Case Study 1 – Insurance spend optimisation



Case Study 2 – Evaluating New Risk Exposures

- **XYZ's captive insurance company ABC engaged Willis to help it in two key areas:**
  - To better and quantify its offshore risk exposures;
  - To assess the suitability of the current insurance programme and to identify potential improvements to cover.

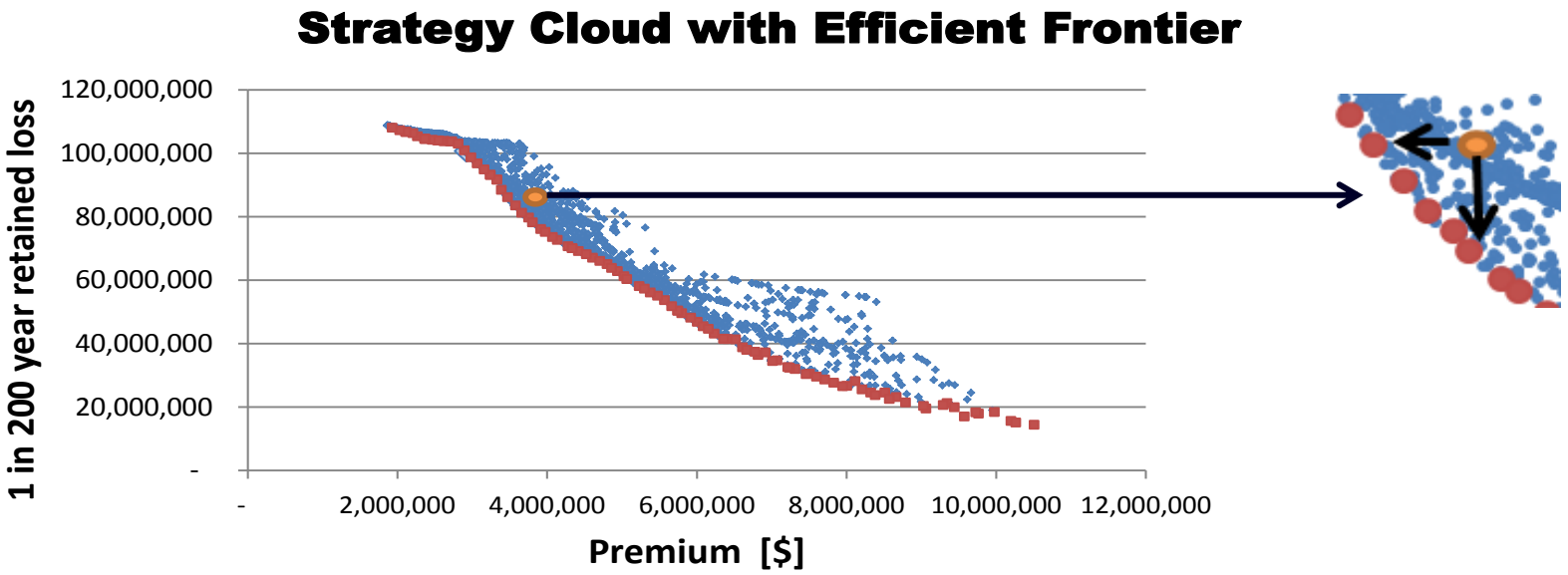
Case Study 2 - Is XYZ's existing coverage appropriate?

- XYZ's coverage appears appropriate to its offshore risks
- Insurers are significantly reducing the volatility of results for XYZ's BUs. In this regard, insurance is being used appropriately
- However, a lack of BI coverage means BUs are not protected from downside scenarios
- Desire to insure BI requires decision if XYZ wants to protect income or its balance sheet
- Insurance providers are used less than one year in 5. This means there is no excessive dollar-swapping which would be inefficient

Property Damage, PD & BI

		Gross Losses	Current Programme	
Return Period (Years)	Percentile	Total Loss	XYZ Retained	Insured
0	50%	-	-	-
1 in 4	75%	2,707,363	2,098,089	-
1 in 5	80%	4,432,629	3,333,649	131,860
1 in 10	**90%**	**13,532,740**	**8,839,643**	**1,448,189**
1 in 20	95%	29,560,406	20,246,215	6,756,374
1 in 50	98.0%	66,904,884	46,606,949	27,031,760
1 in 100	**99.0%**	**114,622,046**	**76,817,978**	**52,457,809**
1 in 200	99.5%	182,727,600	110,868,459	96,094,313
1 in 500	99.8%	348,244,757	169,942,534	211,467,535
1 in 1000	99.9%	554,897,240	247,150,501	395,344,148
	Mean	**7,341,434**	**4,492,363**	**2,849,071**
	Std Dev	**46,451,514**	**21,329,343**	**25,985,810**

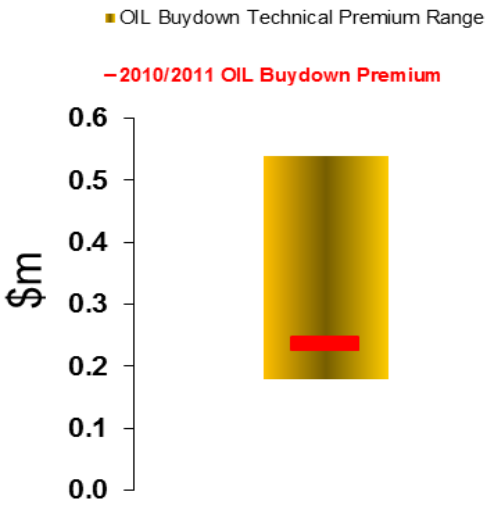
Case Study 2 - Is XYZ transferring risk in an optimal manner?



- Already very close to the efficient frontier
- Marginal improvements could be made, but to achieve this would require a significant change in philosophy regarding BI

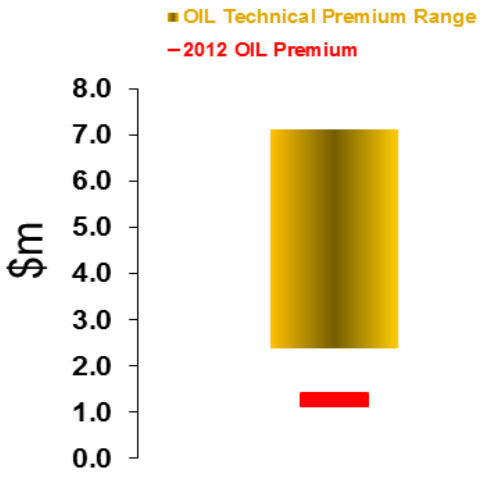
Case Study 2 - Is XYZ paying a fair premium for the insurance?

Primary Layer



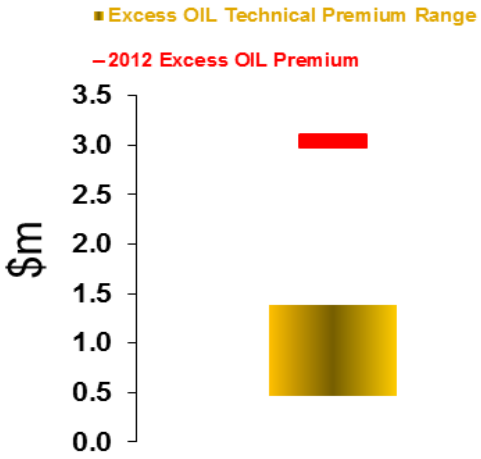
- Fair value for money
- Premium at lower end of expected range

OIL Premium



- OIL offers risk transfer at below expected pricing, hence represents good value for money
- OIL expected to make an underwriting loss, pricing unlikely to be sustainable

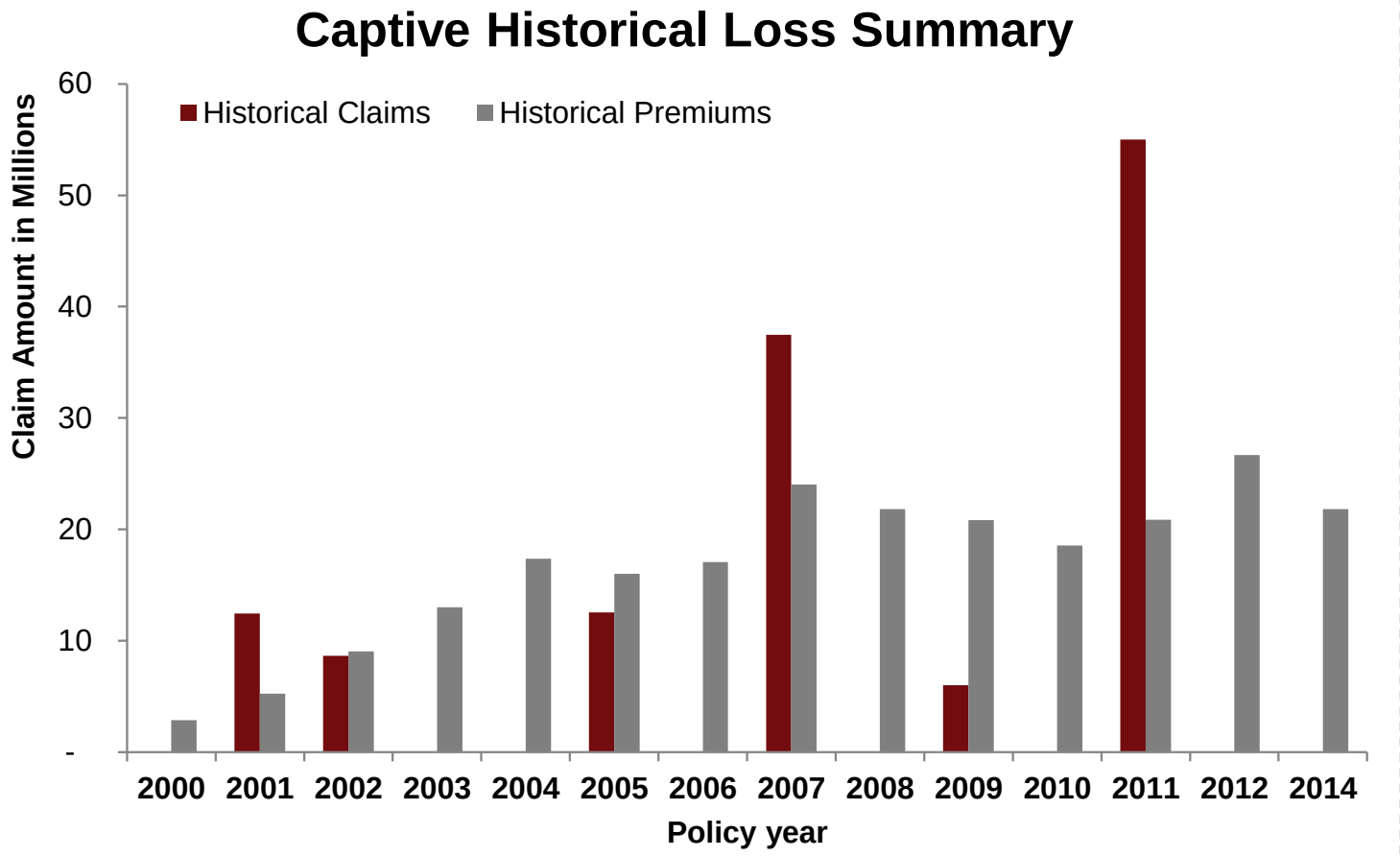
Excess Layer



- Pricing significantly higher than expected statistical range
- Pricing driven by insurers cost of capital rather than expected losses
- Purchase a commercial rather than a statistical decision

Case Study 3 – Value generated by the captive

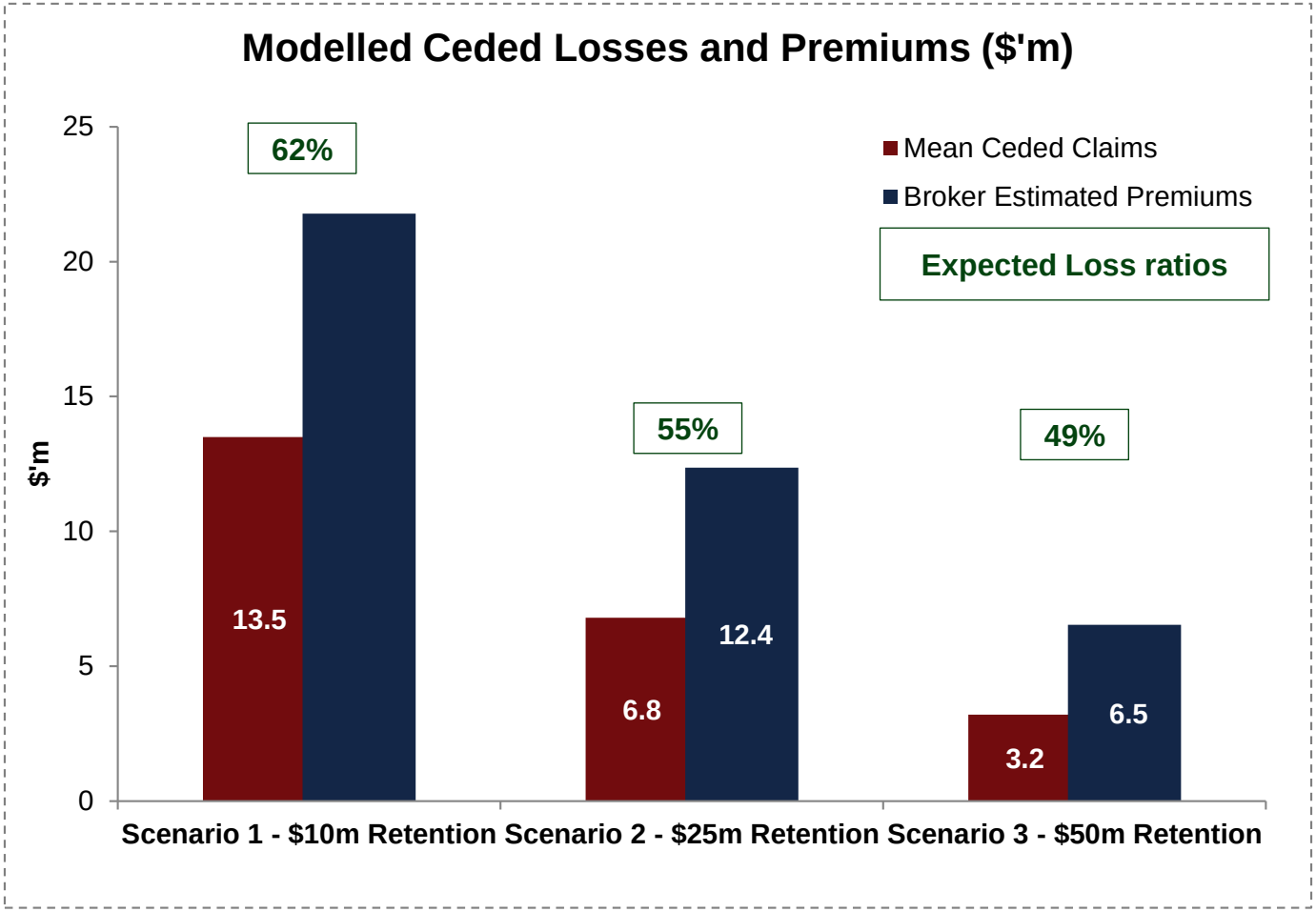
What value have been generated to-date based on the historical experience?



- Total premium of 235m and total claim of 132m means the **self insurance strategy has saved the group 104m** since 2000.
- Equivalent to a loss ratio of 56%

Case Study 3 – Value generated by the captive

Should we continue to self insure based on current market conditions?

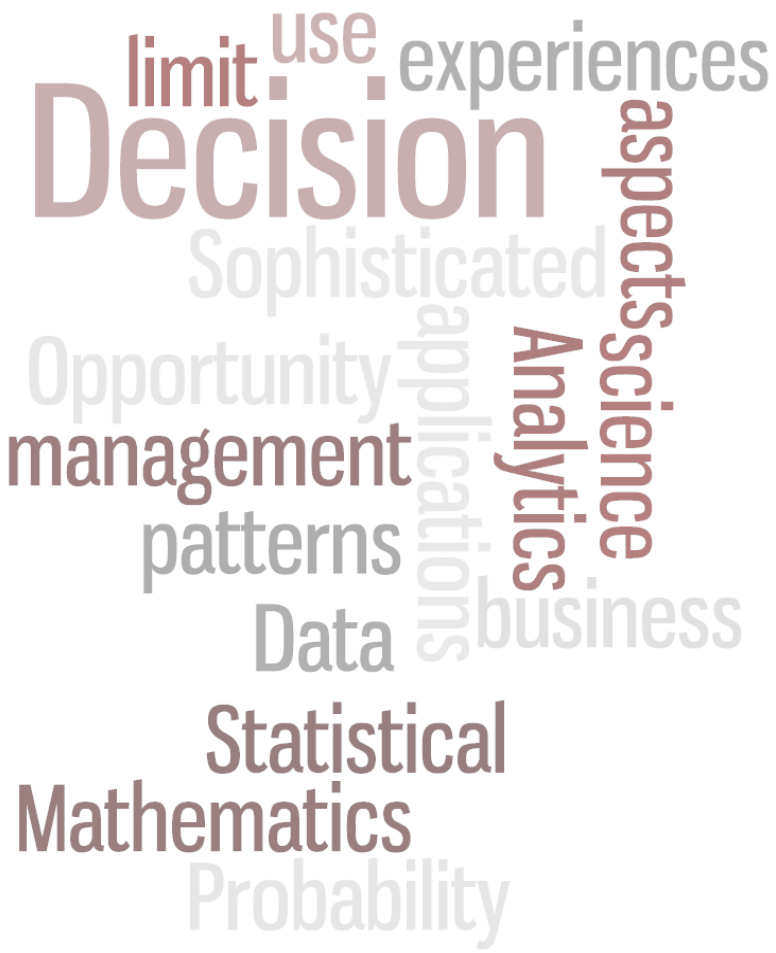


- In this case, although the highest retention option had the lowest expected loss ratio and therefore represents the lowest value for money…
- It still had the lowest value leakage in 'dollar-terms'

RECAP

Why is analytics important to risk managers?

- To quantify and understand risk and the impact it has on your financial objectives
- Saving money by optimising insurance purchasing and 'levelling the playing field' with insurers
- Provide an audit trail of objective decision making



Q&A

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Willis Global Solutions Consulting Group

- **Our vision**
  - We help CFOs, Treasurers, Risk Functions and Captives to achieve three objectives
    - Optimise the value that they obtain from their insurance
    - Increase their resilience to business shocks
    - Enhance their corporate governance
- **Who we are**
  - We are a team comprised of risk consultants, actuaries, engineers, scientists, mathematicians, database experts, cat modellers
- **Who we serve**
  - We serve clients from all majority industry sectors from all geographies
  - Typical clients are large and complex financial, commercial and industrial organisations
- **How we measure**
  - We measure our value in terms of the new, objective, actionable risk insights that we provide, and the significant financial savings that we can help our clients to achieve