So much to do… so little time …

Operationalizing Risk Appetite

Linking local risk limits to enterprise risk tolerances

Presentation at CAS InFocus Seminar

Stephen Lowe

9 June 2014

TOWERS WATSON

Elements of our risk appetite framework

What risks to take?	*How much risk to take?*
Risk Strategy Strategic expression of overall philosophy towards risk-trading necessary to achieve the mission, so that from the Board on down there is alignment regarding the risk elements of the business strategy	
Risk Preferences An element of the strategy, articulating risk as opportunity, identifying the key risks that need to be taken deliberately in the expectation of creating value, as a necessary step towards achieving the mission	**Risk Tolerances** Quantitative expression, via a few key metrics, of the amount of aggregate risk the organization will tolerate over varying time horizons as a means to achieve its mission
	
Risk Attractiveness Tactical assessment of the risks within the preference set, reflecting current external conditions and internal circumstances	**Risk Limits** Granular operational controls on specific risks; expressed in metrics that are locally relevant and convenient to monitor

Risk tolerances and risk limits

Risk tolerances are enterprise-level metrics, across the full spectrum of risks

- **Linked to adaptive buffers**
  - Resources that absorb bumps in the road
  - Capital, liquidity, performance, brand, human capital
- **Often expressed as in terms of willingness to suffer consumption of a buffer**

Risk limits are more granular, and are used to implement the risk tolerances

- **Set of specific risk sources, business units, products, etc.**
- **Expressed on more practical metrics, measurable and relevant to local managers**

Case study (amalgamation of several companies)

Fundamental problem: In implementing enterprise risk tolerances, how do I set local risk limits?

The "company"

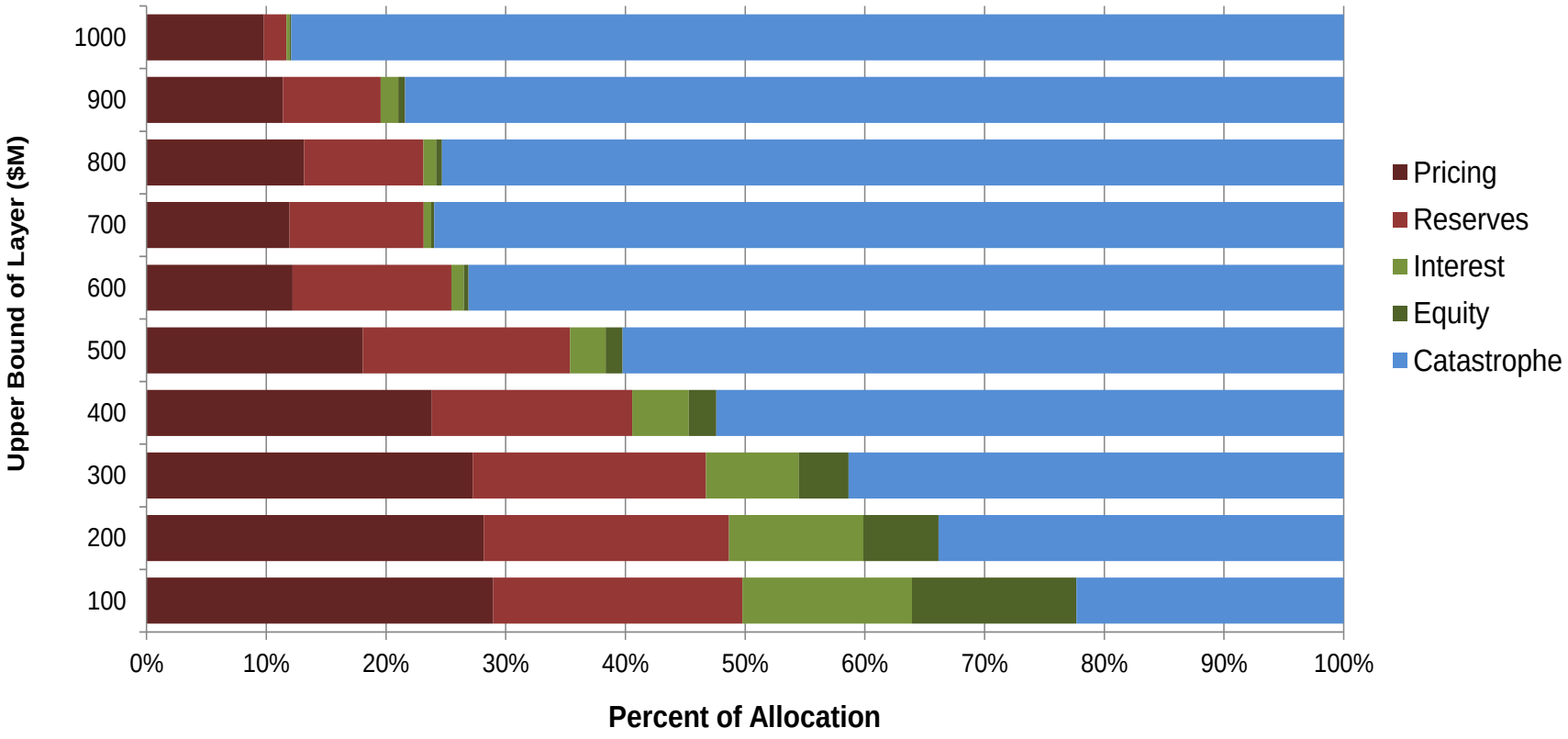
- **Property and casualty products; heavy property cat exposure**
- **Specialty niche market**
- **4 operating units: 3 regional underwriting, plus 1 investment**
- **Strategic imperative to grow**

- **Capital risk tolerance: Less than 1% chance of ratings downgrade**
- **Non-performance risk tolerance: Less than 20% chance that 5-year average ROE is below 3%**
- **Franchise risk tolerance: At least 25% growth in premium over next three years**

As a first step, the company performed a risk allocation

Risk Driver	Insurance Business Unit				Investment	Total
	Region 1	Region 2	Region 3	Total		
Credit Spread	-	-	-	-	9	9
Asset Default	-	-	-	-	6	6
Counterparty Default	3	3	2	8	-	8
Credit Risks Subtotal	3	3	2	8	15	23
Interest Rates	-	-	-	-	39	39
Equity Markets	-	-	-	-	30	30
Foreign Exchange Rates	-	-	-	-	4	4
Market Risks Subtotal	-	-	-	-	73	73
Monetary Inflation	17	21	26	64	-	64
Reserve Estimation Error	36	30	45	111	-	111
Pricing Estimation Error	40	51	55	146	-	146
Catastrophe	**86**	**162**	**331**	**579**	**-**	**579**
Insurance Risks Subtotal	179	264	457	900	-	900
Total	**182**	**267**	**459**	**908**	**88**	**996**

Risk allocation can be extended to buffer layers



Risk budgeting

Top-down exercise in which management actively deploys the total risk-taking capacity of the enterprise to business units, products, and risk drivers

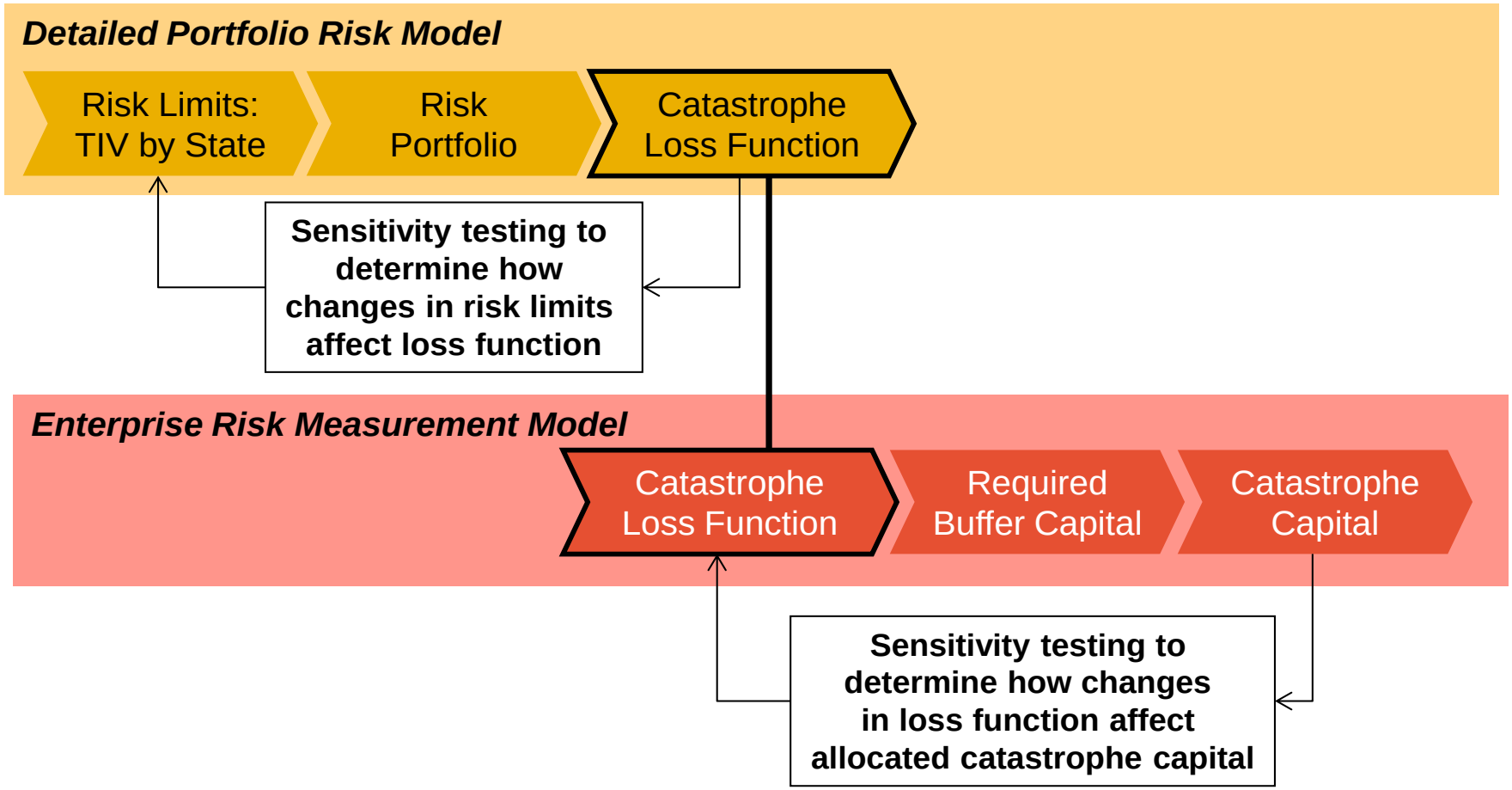
- **Risk budgets are the highest level of risk limits, providing the bridge between tolerances and lower-level limits**

In this case the risk budget was the proportion of risk allocated to catastrophe, which needed to be reduced over time – despite the plans for premium growth – from 52% to 40%

Local risk limits consisted of maximum levels of growth in TIV by state over the next five years

- **More granular controls within states were already part of plans**
- **How to set the maximums?**

Testing of local risk limits against global risk tolerances



Catastrophe loss distribution as a function of growth

Input Section

Enter Desired Growth Rates in the Pink Area

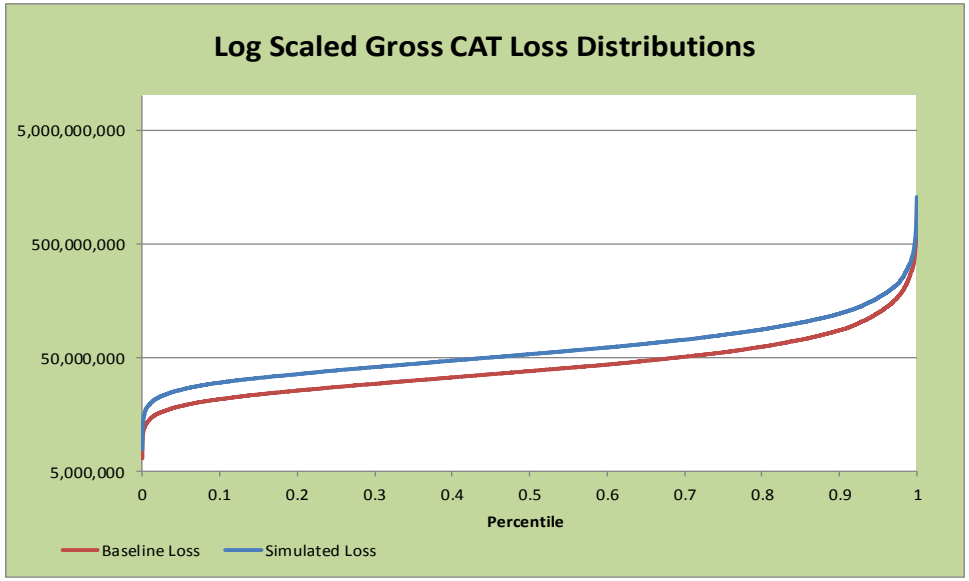
State	Exposure	Growth Rate
Florida	5,966,042,155	9.30%
Georgia	3,148,863,241	26.90%
Iowa	4,066,482,616	18.00%
Illinois	6,186,191,563	53.00%
Lousiana	5,019,570,594	10.00%
Minnesota	7,291,796,171	72.60%
Missouri	5,672,760,133	67.00%
Mississipi	2,410,024,321	21.00%
North Carolina	2,519,488,268	22.00%
Oklohama	2,042,374,895	40.00%
Pensylvania	5,960,842,432	29.00%
Texas	6,696,531,301	44.00%
All Other States	60,950,918,004	35.00%
Weighted Exposure Growth		**36.4%**

Results Section

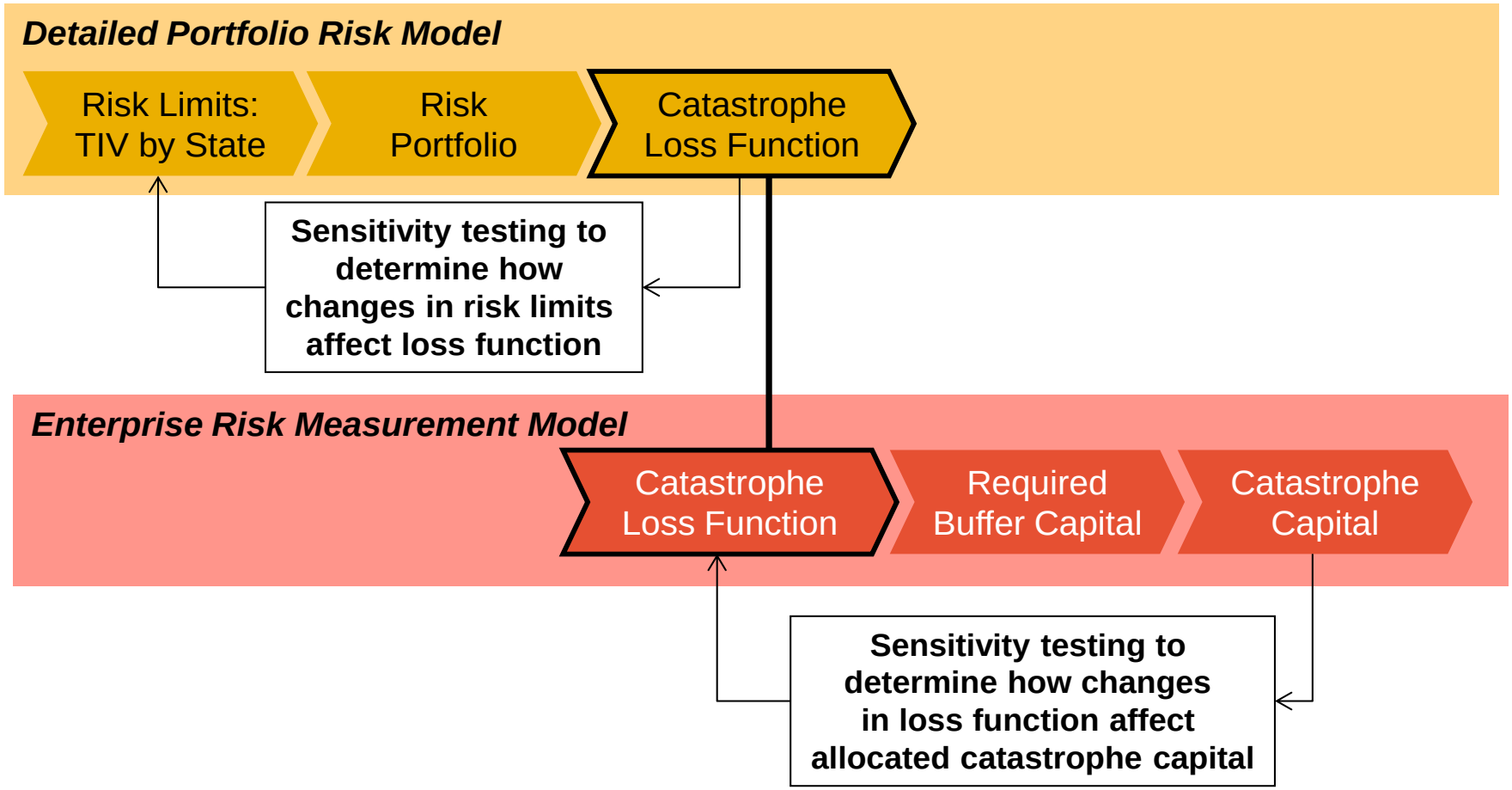
	Value at Risk				
	90th	95th	99th	99.5th	99.9th
Baseline	86,770,535	122,997,783	250,917,982	317,561,173	557,335,970
Simulated	121,113,274	167,315,042	323,210,371	400,156,279	684,148,585
Growth %	39.6%	36.0%	28.8%	26.0%	22.8%

* Value at Risk calculation is based of empirical percentiles.

	Tail Value at Risk				
	90th	95th	99th	99.5th	99.9th
Baseline	153,593,617	205,739,904	371,871,990	463,540,581	720,852,813
Simulated	203,721,473	267,173,555	465,157,421	573,908,683	860,675,119
Growth %	32.6%	29.9%	25.1%	23.8%	19.4%



Testing of local risk limits against global risk tolerances



A proper division of labor allowed the company to leverage our work without 'abdicating to the consultant'

- **The approach was developed collaboratively**
  - Series of management workshops
- **We developed the tools and did the initial analysis**
  - Catastrophe model runs
  - Spreadsheet tools
  - GLMs
- **Tools and knowledge transfer at the end**
  - Populated tools
  - Training and support