Changing Role of the Reinsurance Broker

2013 Seminar on Reinsurance

Paul Lestourgeon

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Evolution of Broker Analytics

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The reinsurance placement process has become an increasingly technical exercise

The type of analytics supporting the reinsurance placement has evolved over time

I   **Contract Experience**

II   **Contract Pricing**

III   **Underwriting Distributions**

IV   **Advanced Value-Added Modeling**

"Keeping score" of contract experience has always been a part of the discussion

I	Contract Experience

Examples:

- "Reinsurance Bank": calculate cumulative contract experience
- "As-is" review: how contract would have performed based on current terms
- "As-if" review: how contract would have performed under alternative terms

Comments:

- May include some basic adjustments for loss trend, development, exposure trend, etc.
- Actuarial skillset and tools not necessarily required
- Does the bank matter anymore?

II	Contract Pricing

III	Underwriting Distributions

IV	Advanced Value-Added Modeling

The estimation of reinsurance market pricing has become a routine practice

I Contract Experience

II Contract Pricing

Objectives:
- Evaluate expected loss to contract (and its distribution)
- Convert loss cost to market price
- Evaluate impact of reinstatement structure, aggregate limits, etc.

Tools:
- Excel models
- Sophisticated stochastic models

III Underwriting Distributions

IV Advanced Value-Added Modeling

Techniques for estimating market prices include:

- **Traditional Loss Loading:** Expected ceded losses are loaded by a fixed expense and profit load factor to convert to reinsurance rate

- **Standard Deviation Loading:** Reinsurance premium estimated as the sum of the expected loss cost plus the product of the loss cost standard deviation multiplied by a load factor (30%)

- **Reinsurer Return on Capital:** Reinsurance premium calculated so that the contract provides a target return on capital to the reinsurer (e.g., 10%). A reinsurer's capital amount supporting the contract is estimated based on the downside risk (e.g., 99th percentile)

- **Minimum Capacity/Clash Charges:** Reinsurance premium is not based on technical pricing measures; reinsurers may require a minimum premium charge to support the capacity they are providing and/or compensate for the clash occurrences or other tail events that may not be properly reflected in modeling

Methodology	1,000,000 xs 1,000,000	3,000,000 xs 2,000,000	5,000,000 xs 5,000,000	9,000,000 xs 1,000,000
Expense / Profit Load	1,747,892	565,768	18,056	
Loss Cost Plus 35% SD Load	1,669,713	736,921	132,168	
10% Reinsurer Return on Capital	1,638,335	782,280	196,800	
Min Capacity/Clash Charge • Minimum Layer ROL • Minimum Layer Premium			8.0% 400,000	
Final Estimated Market Premium	**1,747,892**	**600,000**	**400,000**	**2,747,892**

Understanding the distribution of outcomes is important

Reinsurance Contract: 1M xs 1M

100% Basis

Pricing Summary	Current Review	Prior Bound
1M xs 1M Unlimited - Experience Indication	0.84%	
1M xs 1M Unlimited - Exposure Indication	1.89%	
1M xs 1M Unlimited - Selected	1.00%	
1M xs 1M - Final Selected Rate	1.00%	0.90%
1M xs 1M - Final Selected Amount	1,747,892	1,498,000

Ceded Statistics	Premium	Loss	RI UW Profit
Mean	1,498,000	1,343,135	154,865
Standard Deviation	0	933,080	933,080
Minimum	1,498,000	0	(4,902,000)
Maximum	1,498,000	6,400,000	1,498,000
0.5th percentile	1,498,000	0	1,498,000
1st percentile	1,498,000	0	1,498,000
2nd percentile	1,498,000	0	1,498,000
5th percentile	1,498,000	150,000	1,348,000
10th percentile	1,498,000	300,000	1,198,000
20th percentile	1,498,000	500,000	998,000
30th percentile	1,498,000	700,000	798,000
40th percentile	1,498,000	1,000,000	498,000
50th percentile	1,498,000	1,200,000	298,000
60th percentile	1,498,000	1,450,000	48,000
70th percentile	1,498,000	1,700,000	(202,000)
80th percentile	1,498,000	2,100,000	(602,000)
90th percentile	1,498,000	2,600,000	(1,102,000)
95th percentile	1,498,000	3,100,000	(1,602,000)
98th percentile	1,498,000	3,650,000	(2,152,000)
99th percentile	1,498,000	4,050,000	(2,552,000)
99.5th percentile	1,498,000	4,450,000	(2,952,000)

Return on Alloc. Capital*	RI UW Profit	Capital	Return
90th percentile	154,865	1,102,000	14%
95th percentile	154,865	1,602,000	10%
98th percentile	154,865	2,152,000	7%
99th percentile	154,865	2,552,000	6%
99.5th percentile	154,865	2,952,000	5%

* Capital allocated based on stand-alone percentile underwriting loss for reinsurer

Ceded Statistics
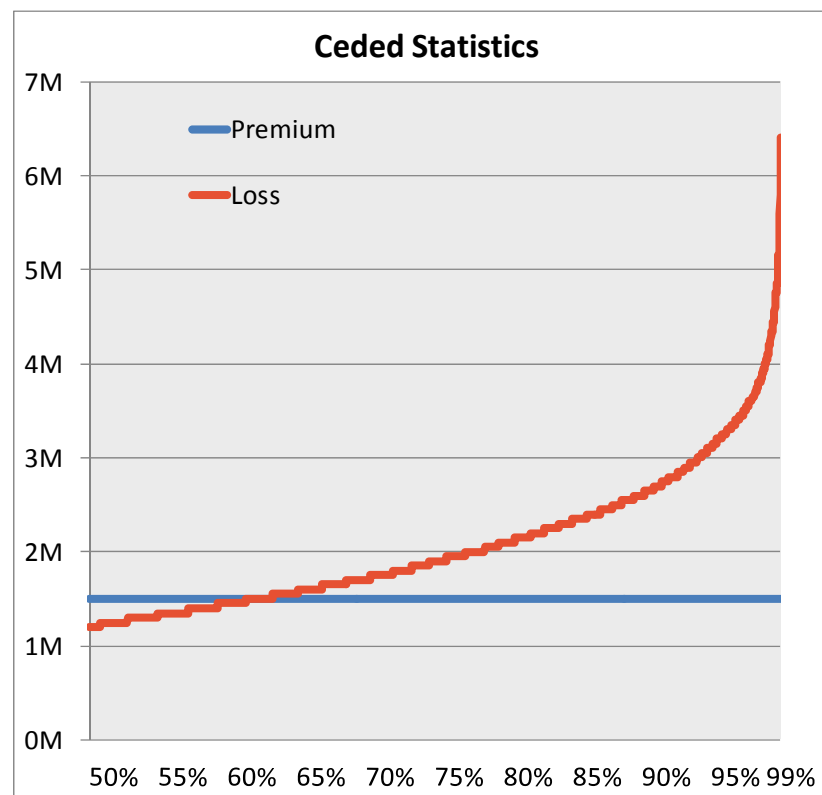
Exceedance Probabilities	Attach	Exhaust
1st Limit	97.8%	60.3%
2nd Limit	57.5%	22.8%
3rd Limit	21.4%	6.0%
4th Limit	5.7%	1.1%
5th Limit	1.0%	0.2%
6th Limit	0.2%	0.0%
7th Limit	0.0%	0.0%

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Today, reinsurance is evaluated on an underwriting portfolio basis

I   Contract Experience

II   Contract Pricing

III   **Underwriting Distributions**

Objectives:

- Incorporate attritional losses, large losses and cat losses
- Evaluate the gross, ceded and net underwriting distributions under alternative reinsurance structures
- Dynamic Reinsurance Management ("DRM") using, for example, 50,000 simulated trials
- Evaluate "trade-off" between ceded margin and gross/ceded/net risk

Comments:

- Can be presented in different ways, such as tables and graphics
- Risk can be measured in different ways
- Ideal when client provides risk tolerance or "what they want to solve for"

IV   Advanced Value-Added Modeling

# The subject business is modeled to determine the gross underwriting distribution

Structure	
	Gross
99%	(30,222,024)
95%	(9,096,486)
75%	4,147,932
50%	9,850,633
25%	14,290,838
5%	19,315,557
1%	22,155,321
Mean	7,857,367
Std Dev	12,397,829

Net U/W Probability Distributions

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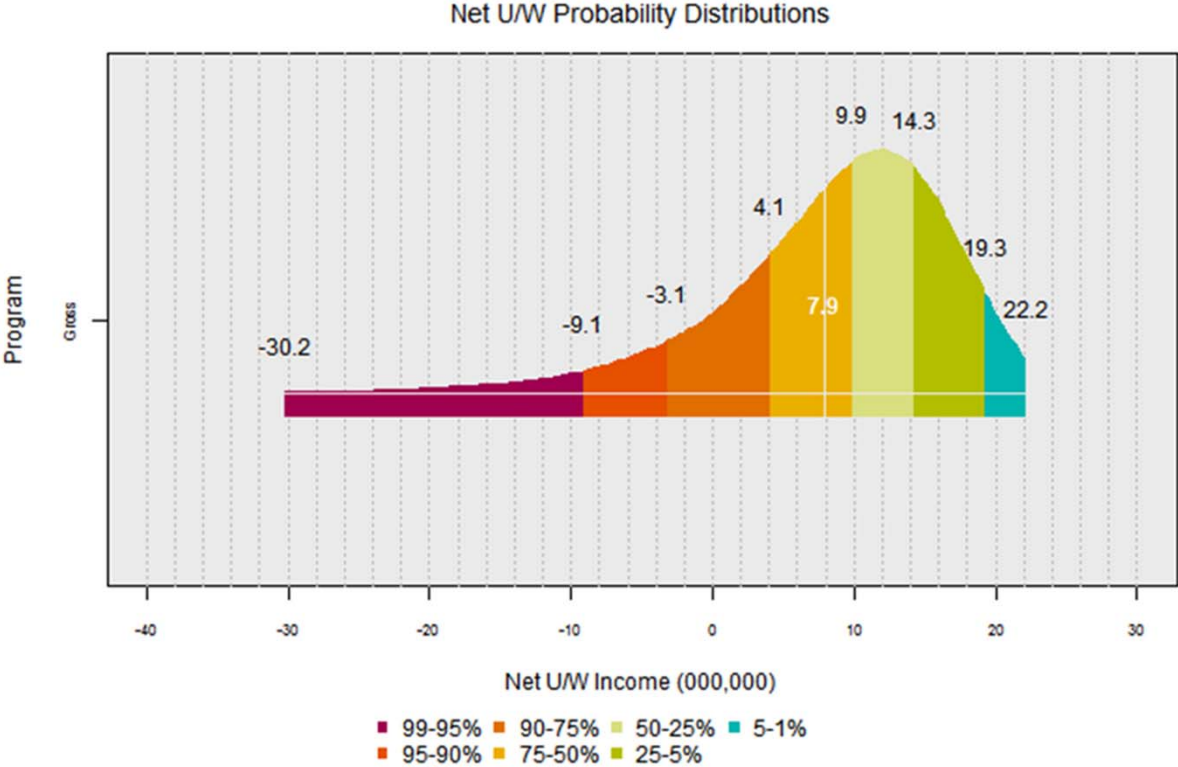
The overlay of alternative structures illustrates the costs and benefits of reinsurance
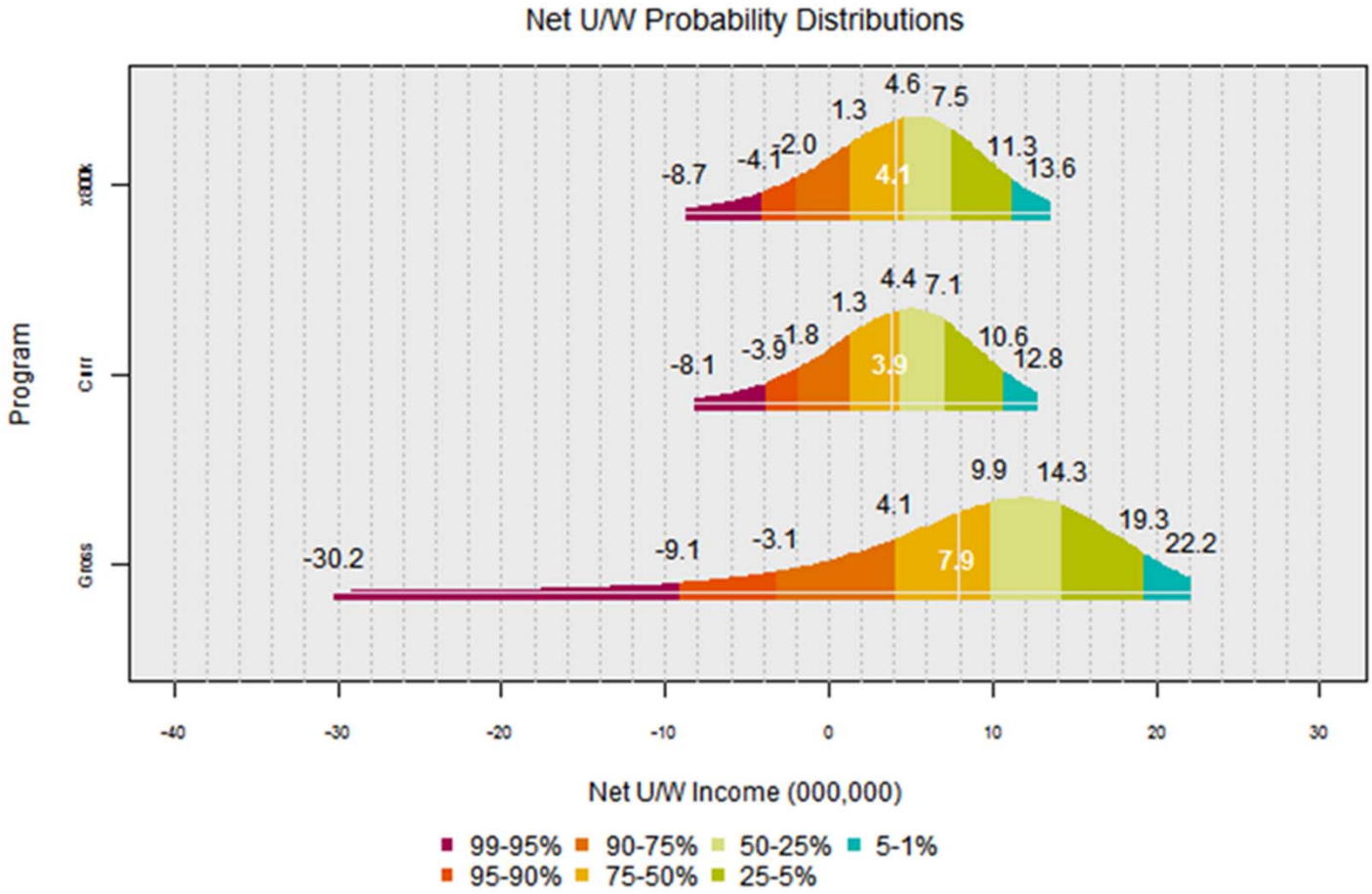
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Reinsurance structures can be compared based on the risk/reward trade-off

Company XYZ
Mean Net UW Income vs. TVaR 99.0%

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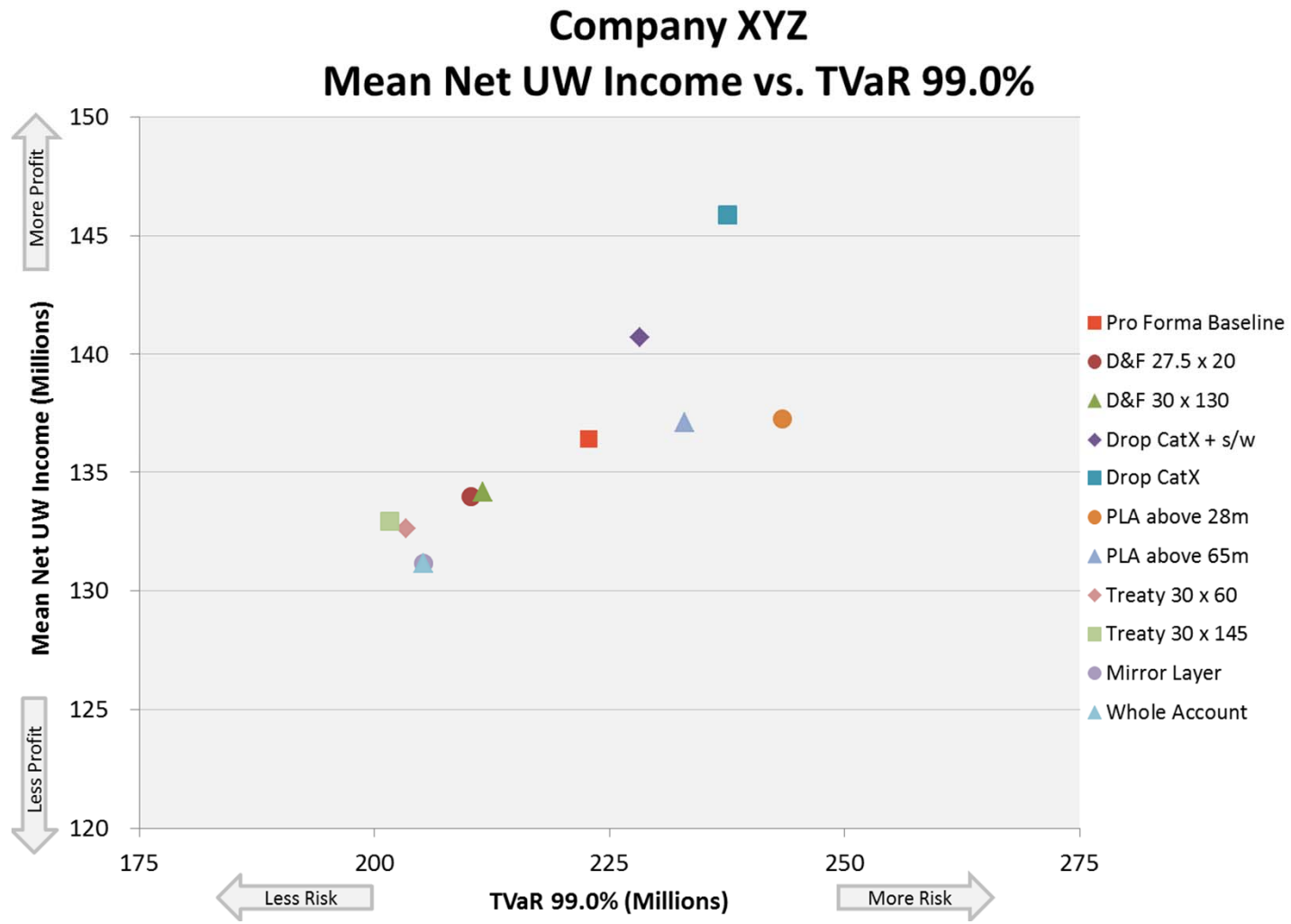
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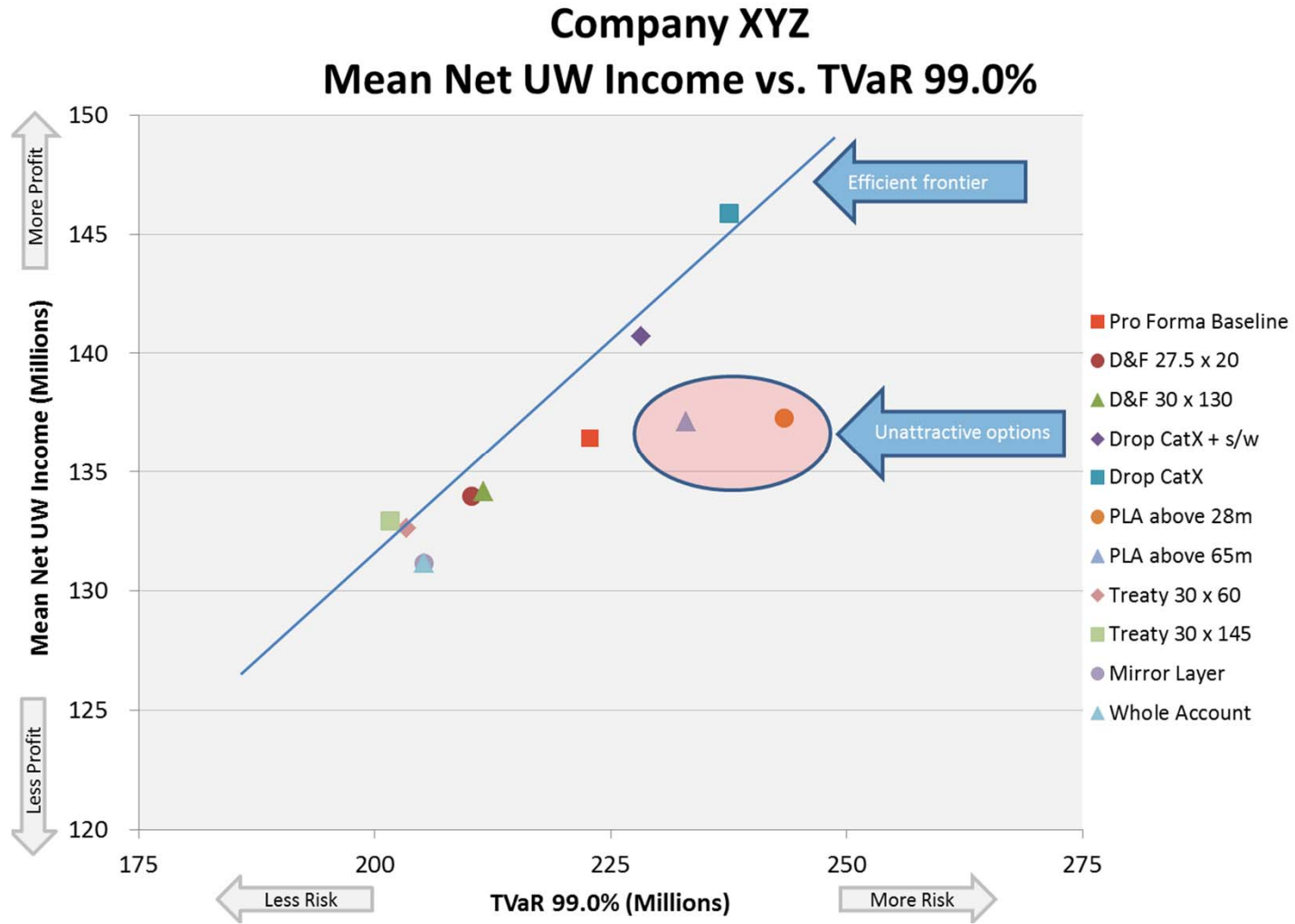
Evolution of broker analytics — Value-Added Modeling

I	Contract Experience

II	Contract Pricing

III	Underwriting Distributions

IV	Advanced Value-Added Modeling

Objectives:

- Expand beyond underwriting distributions to larger operational/capital context

Answer Questions:

- What is the impact on rating agency capital (A.M. Best BCAR)?
- What is the impact on regulatory capital (ORSA)?
- What is the impact on economic capital?

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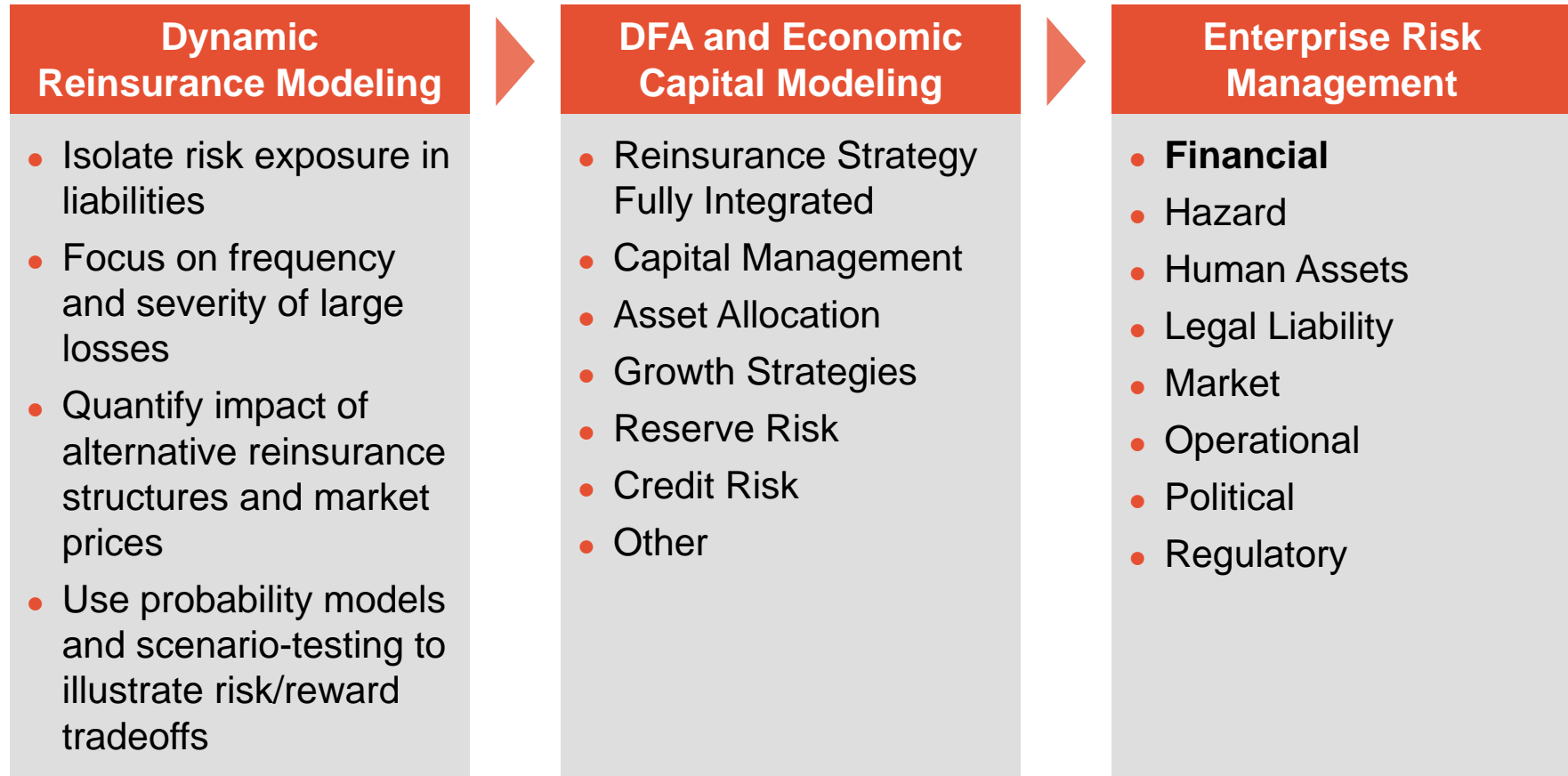# A.M. Best announced plans to update its BCAR capital adequacy model

- Incorporate stochastic simulations into the calculation of BCAR risk factors

- Incorporate company-specific risk profile into the calculation of BCAR risk factors

- Consistently tie insurers' probability of default to the determination of capital required to support individual rating levels within the assessment of balance sheet strength

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Stochastic modeling may become a key component to the NAIC Own Risk and Solvency Assessment (ORSA)

- ORSA is an internal assessment of the risks associated with an insurer's current business plan and the sufficiency of capital resources to support those risks
  - Section 1 — Description of the Insurer's Risk Management Framework
  - Section 2 — Insurer's Assessment of Risk Exposure
  - Section 3 — Group Risk Capital and Prospective Solvency Assessment
- From NAIC Own Risk and Solvency Assessment (ORSA) Guidance Manual
  - "…should consider a range of outcomes…"
  - "…should document the quantitative and/or qualitative assessments of risk exposure in both normal and stressed environments…"
  - "Methods for determining the impact on future financial position may include simple stress tests or more complex stochastic analyses"

Reinsurance modeling is a key component of economic capital modeling and ERM

Dynamic Reinsurance Modeling	DFA and Economic Capital Modeling	Enterprise Risk Management
• Isolate risk exposure in liabilities • Focus on frequency and severity of large losses • Quantify impact of alternative reinsurance structures and market prices • Use probability models and scenario-testing to illustrate risk/reward tradeoffs	• Reinsurance Strategy Fully Integrated • Capital Management • Asset Allocation • Growth Strategies • Reserve Risk • Credit Risk • Other	• **Financial** • Hazard • Human Assets • Legal Liability • Market • Operational • Political • Regulatory

Measuring the "capital" benefit of reinsurance

- Reinsurance is increasingly viewed in the context of a company's overall capital strategy
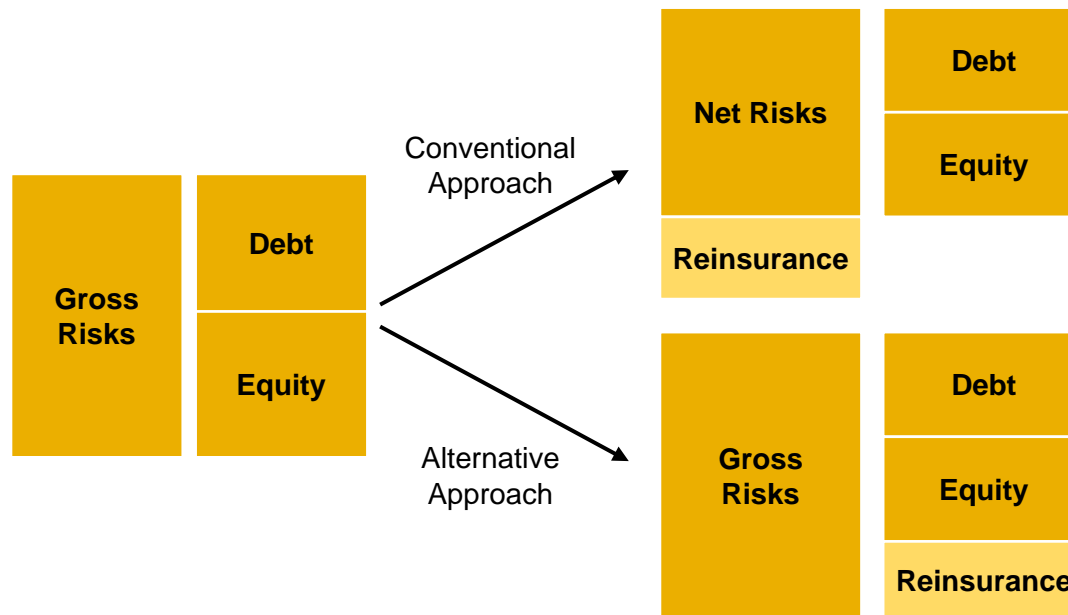
Reinsurance optimization modeling is becoming increasingly common

Description:

- Stochastic model that will "optimize" a reinsurance structure

Required:

- Subject loss model
- Alternative reinsurance contracts with indicative pricing
- Objective function (this is the value you want to optimize)
- Constraints
- A strong optimization tool

Result:

- Model will identify the reinsurance structure that optimizes (3) subject to (4)