



# **DFA and Risk Management in an RBC Environment**

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# Recent Events

– a sobering reminder...



## New Zealand earthquake

- No. Dead/Missing: > 170
- Total Economic Loss: \$10-15bn
- Total Insured Loss: \$6-12bn

## Australian floods

- No. Dead/Missing: 35/9
- Total Economic Loss: > \$10bn
- Total Insured Loss: > \$1.5bn

## Japanese earthquake and tsunami

- No. Dead/Missing: > 10,000/17,000
- Total Economic Loss: \$200-300bn
- Total Insured Loss: \$12-35bn



# Types of Risk (and how to measure them)...



*“There are Known Knowns. There are Things We Know We Know...”*

Historical Experience



*“There are Known Unknowns. There are some Things We Don’t Know...”*

Industry / Peer Experience



*“There are also Unknown Unknowns. The Things We Don’t Know We Don’t Know...”*

Mathematical Techniques for Estimation and Simulation

# What is DFA?

- Dynamic Financial Analysis (DFA) involves the evaluation of risks of an insurance company through the use of computer simulations
- Concept invented in late 1980's / early 1990's by specialist reinsurers, also reinsurance brokers to better analyse reinsurance programmes (primarily property catastrophe) for clients
- Application in insurance/reinsurance:
  - Portfolio risk modelling
  - Ceded reinsurance analysis
  - Evaluation of solvency / economic capital
  - Compliance with rating agencies and regulators
  - Measuring uncertainty of financial results
- Analysing degree of danger of various risks:
  - Underwriting Risk
  - Reserving Risk
  - Market Risk – Assets, Exchange Rates
  - Credit Risk – Default of Reinsurers, Bonds

# What is DFA? (2)



- Deterministic Method

We use static simulations to test individual events or scenarios:

$$\begin{array}{rccccccc} \text{No. Policies} & \times & \text{Premium} & \times & (1 - \text{Combined Ratio}) & = & \text{Operating Profit} \\ 100,000 & \times & \$ 500 & \times & (1 - 95\%) & = & \$ 2,500,000 \end{array}$$

- Stochastic Method (DFA)

$$\begin{array}{ccccccc} \boxed{\text{Graph}} & \times & \boxed{\text{Graph}} & \times & (1 - \boxed{\text{Graph}}) & = & \boxed{\text{Graph}} \\ 100,000 & & \$ 500 & & 95\% & & \$ 2,500,000 \end{array}$$

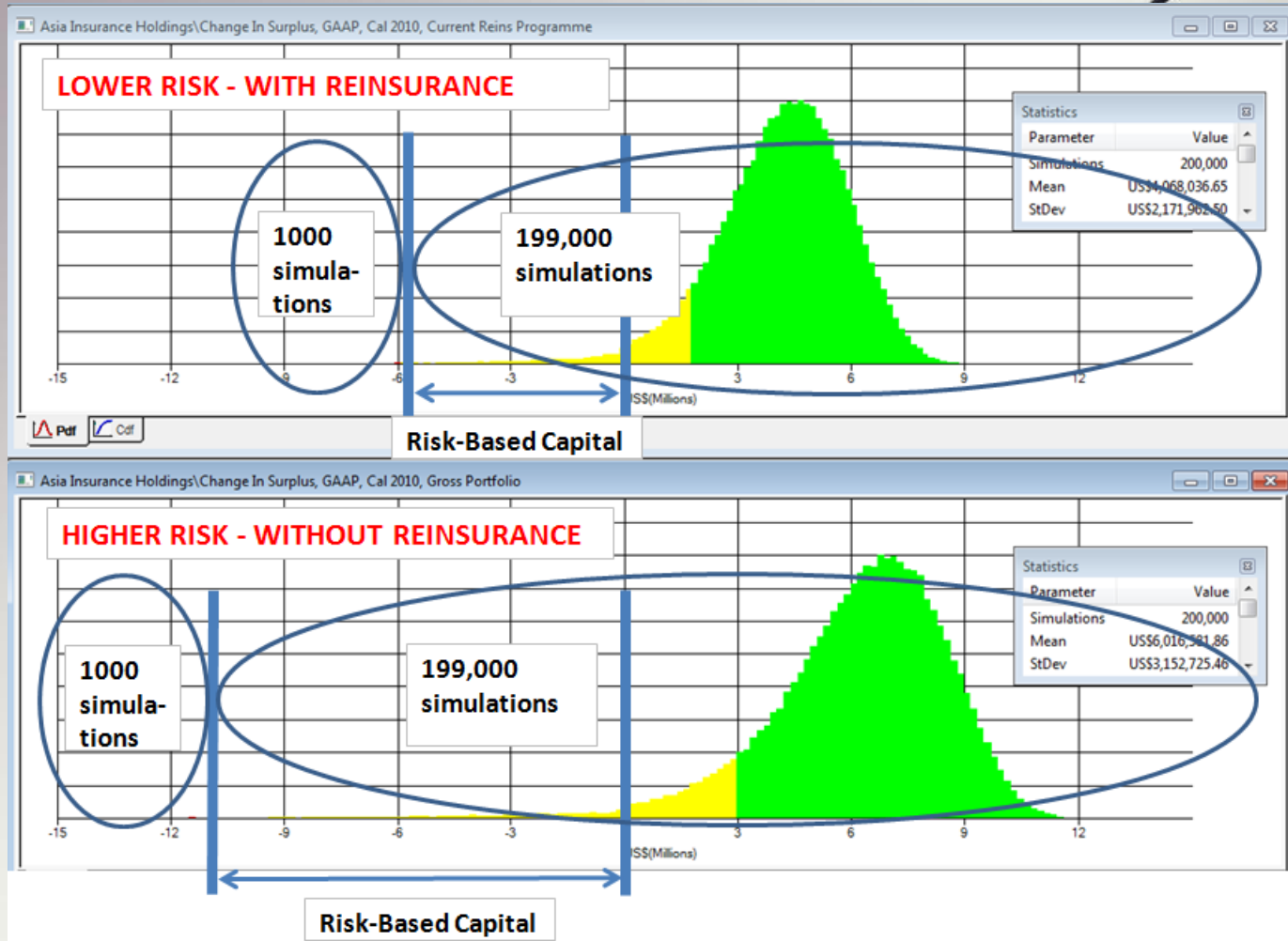
- DFA helps us to better understand the variability of results

# DFA and Risk Management

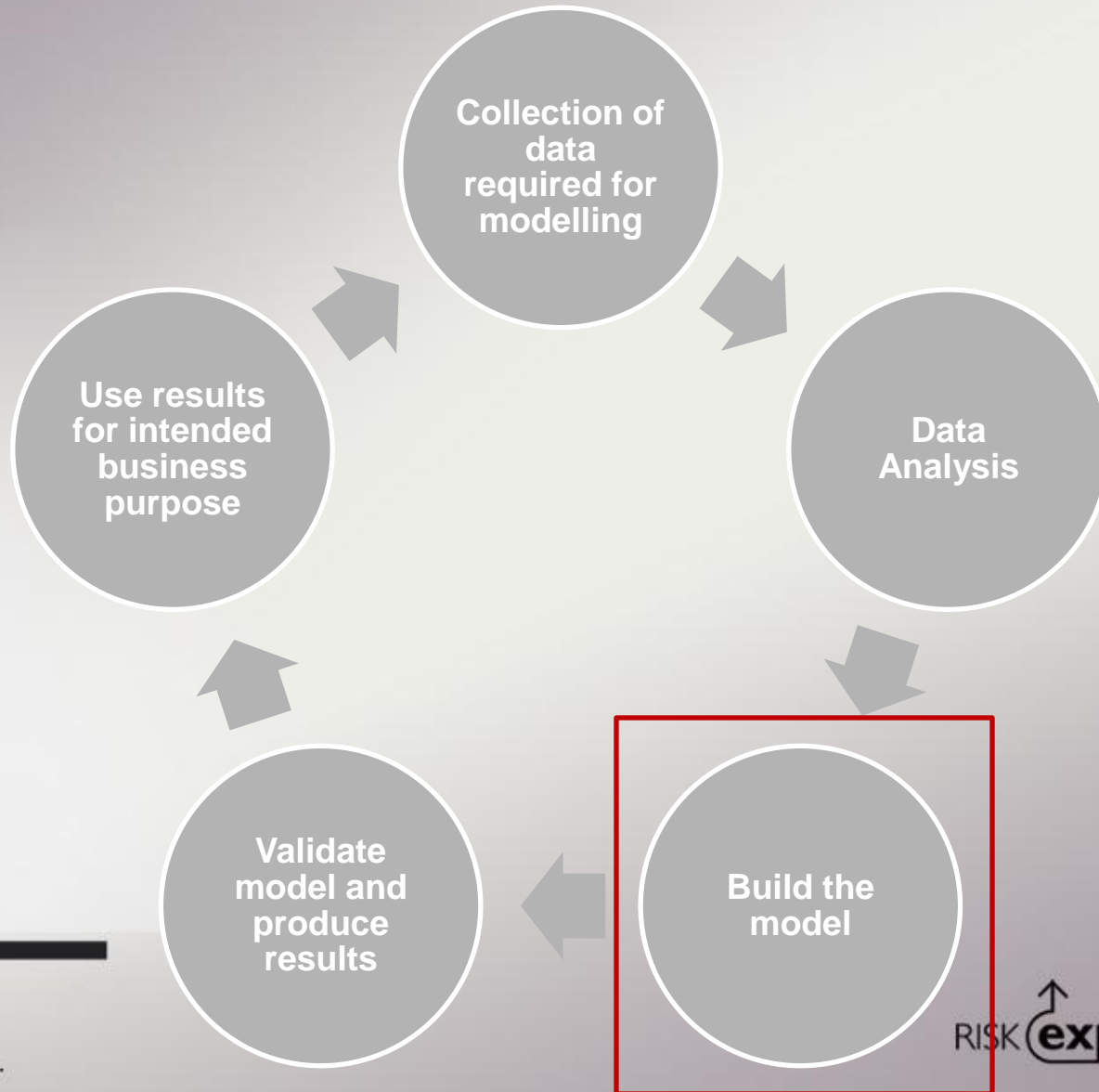


- DFA is used today within both mutual and corporate insurance companies and reinsurance companies globally to enable them to better understand their risks and hence be in a better position with which to mitigate that risk.
- It also forms an integral part of Enterprise Risk Management and subsequently plays a major role for companies seeking internal model approval under Risk Based Capital (RBC) regimes such as the Individual Capital Assessment (UK) and Solvency II (Europe).
- Due to its requirement by rating agencies such as AM Best, S&P and Fitch it is also a critical function for those companies seeking such approval and in demonstrating their solvency and credibility within the insurance industry.

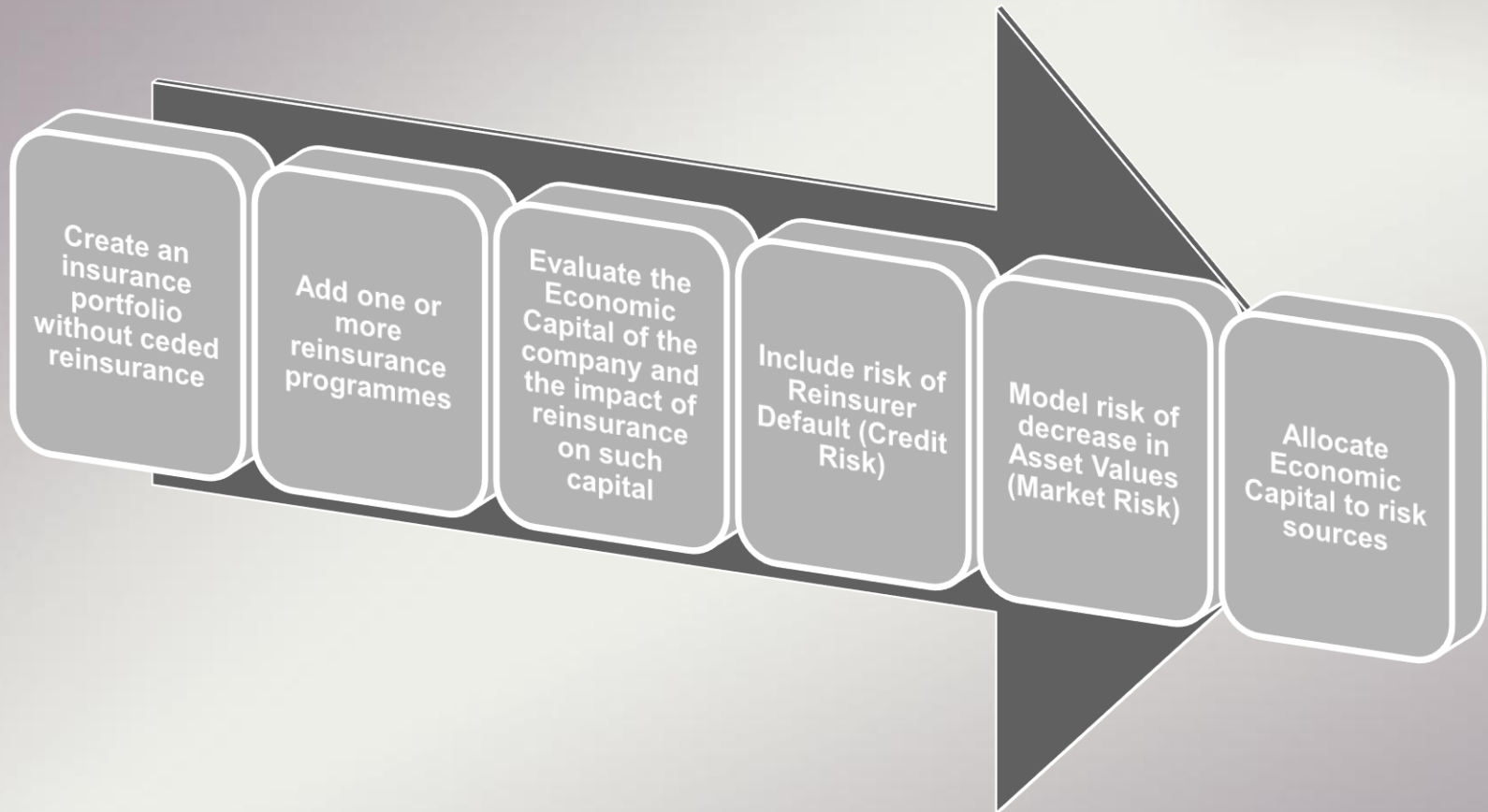
# DFA and Risk Management (2)



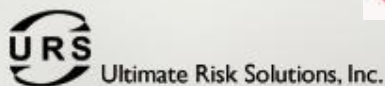
# DFA as a Business Process



# Building a DFA model



# Why Risk Explorer?



# Thank you for your attention!

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