

Biennial Convention 2007

# Adventures in Risk

23-26 September 2007 • Christchurch, New Zealand



Institute of Actuaries of Australia



## Making use of DFA

**Blair Nicholls and Justin Skinner**



## Topics to cover

- 1) Reasons for doing DFA/ICA/ECA
- 2) Project management
  - Plan governance
  - Plan modelling committee
- 3) Modelling structure/framework
- 4) Results
- 5) Use test
- 6) Conclusion



## Reasons for doing DFA/ICA/ECA/IMB

- Ratings agencies classify a DFA model as best practice
- Regulatory imperative eg FSA requires an DFA model
- DFA benefits:
  - Proper assessment of the capital required by the Group
  - Improved understanding of risk within the business
  - Ability to consider complicated questions, e.g. cross class and divisional reinsurance protections



## Reasons for doing DFA/ICA/ECA/IMB

- There have been a number of fringe benefits including (more later in use test):
  - Assisted in the development of Solvency II (member of FSA Non-Life Solvency II Group)
  - Help guide the UK industry (member of ABI Non-Life Capital Group)
  - Presented at a number of external conferences raising the profile of QBE in the wider industry

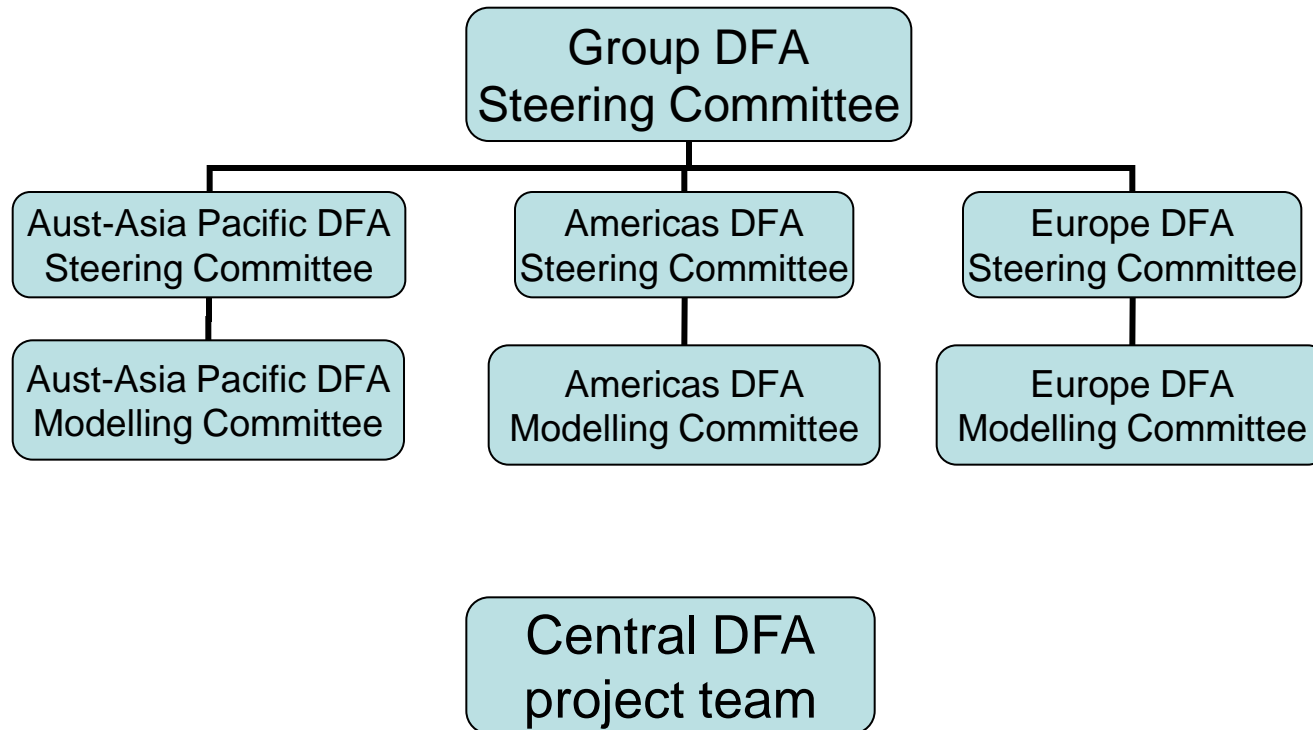


## Project management

- Project management is important for success (similar disciplines compared to other projects)
- Establish:
  - Governance roles – steering committee
  - Those who actually do the work (modelling committee)!



## Plan - Governance





## Plan – Governance

- Establishment and close involvement of a DFA steering committee
- Key requirements of the committee:
  - executive or legal entity board involvement
  - good mix of skills – finance, actuarial, business
  - ability to guide project direction, including:
    - gaining buy-in from all stakeholders (internal and external)
    - ensuring availability of dedicated resources for core DFA team
    - facilitating access to key personnel and data throughout parameterisation/validation phases
    - direction on key high-level decisions (e.g. definition of risk measure/risk tolerance)



## Plan – Central team

- Centralise model building to ensure consistency of model throughout a group
- Perform analysis of
  - Credit risk
  - Asset risk
- Monitor quality and consistency of divisional modelling





## Plan – Modelling teams

- Bring together the divisional models and develop the overall Group DFA model
- Support divisional modelling teams in all aspects of the project
- Regular liaison with divisional modelling teams



## Plan – Modelling teams

- Collect data
- Perform analysis of
  - Reserve variability
  - Large losses
- Incorporate existing reinsurance programmes
- Run pre-built models – ensures consistency of model for aggregation purposes
- Review detailed output with underwriters and actuaries



## Plan – Modelling teams

- Parameterise divisional operational risk
  - using risk registers
- Prepare high level output for divisional steering committee
- Take responsibility for making sure the work is completed to schedule
- Make recommendations for changes to the pre-built models



## Model review

- Each component is reviewed by the relevant experts
  - Reserving actuaries review reserve model
  - Underwriters/pricing actuaries review underwriting model
  - RMS team review catastrophe model
  - Investments and external parties for the asset model
  - Risk management for operational risk plus general review
- It is important that each part of the model has parameters set by the appropriate section of the business



## Model review

- Business engaged in all key parameters
  - e.g. variability of net loss ratios, including extremes
  - Ensures there is interest for the subject
  - Model gets used for other purposes (e.g. reinsurance)
  - Model will ultimately be better
- Business made aware of benefits to doing the work
  - DFA is a tool to help underwriters, not a punishment
  - Most underwriters understand link between:  
Variability → Capital allocation → Profit share



## Model review

- Internal audit of each divisions DFA model
- External review of the model should be considered

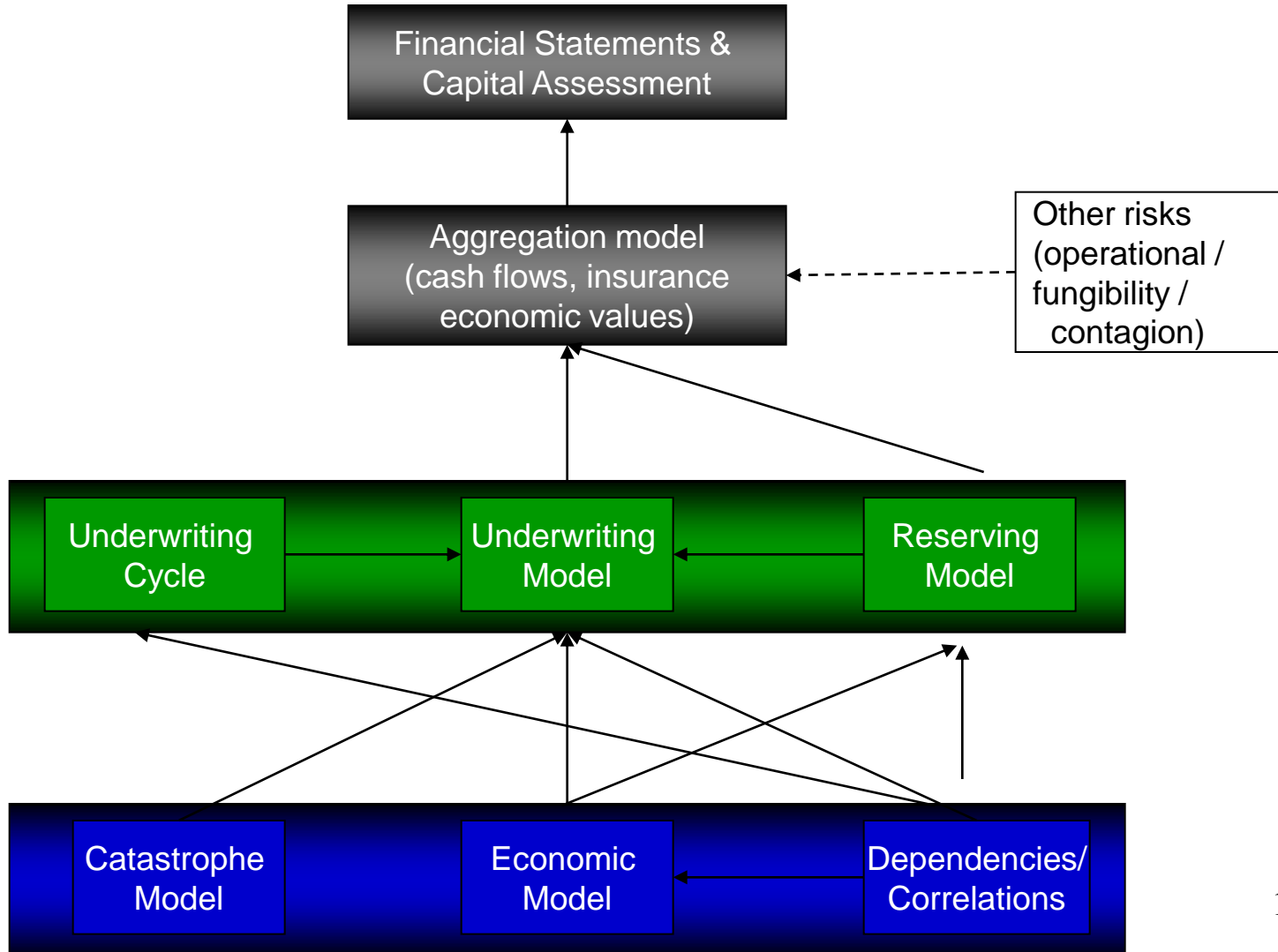


## Model structure

- Bottom-up model developed for:
  - Underwriting risk – business plans
  - Reserving risk – around central estimate
  - Credit risk – broker and reinsurer eg S&P
  - Market (asset) risk – asset model
  - Liquidity risk
  - Operational risk – risk register
  - Group risk – contagion – risk register



## Model structure







## Model structure

- Model produces stochastic future profit and loss accounts and balance sheets
- Capital is assessed based on the probability of insolvency (0.5% for regulatory assessment)
- Although TVaR and other risk measures have also been considered to check sensitivities



## Model structure

- Dependencies are applied throughout the model
  - Reserve variability between classes
  - Rate movements between classes
  - Attritional loss variability between classes
  - Large loss frequency between classes
  - Natural catastrophe losses between classes
  - Between reserve variability and attritional variability
  - Inflationary link between reserves and loss volatility



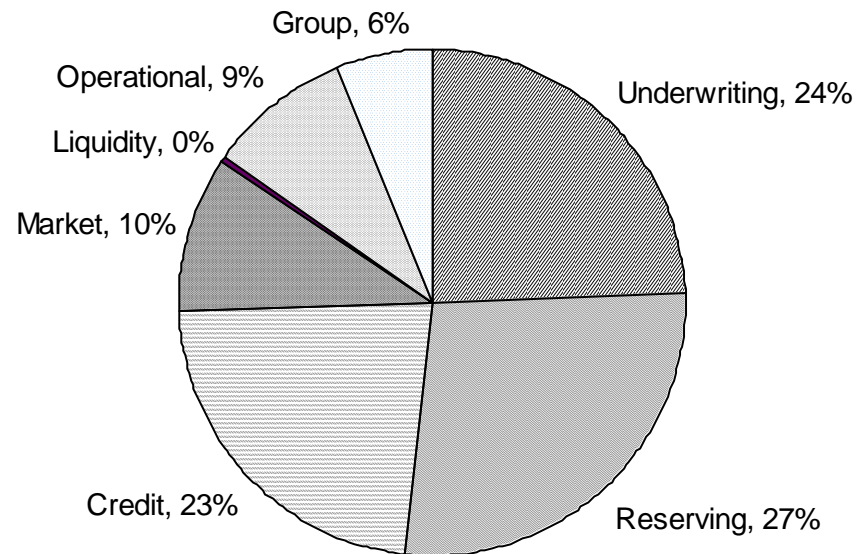
## Model structure

- Dependencies are applied throughout the model (continued)
  - Default risk between reinsurers
  - Overall default risk of reinsurers and natural catastrophe losses
  - All asset returns, inflation and exchange rates



# Results

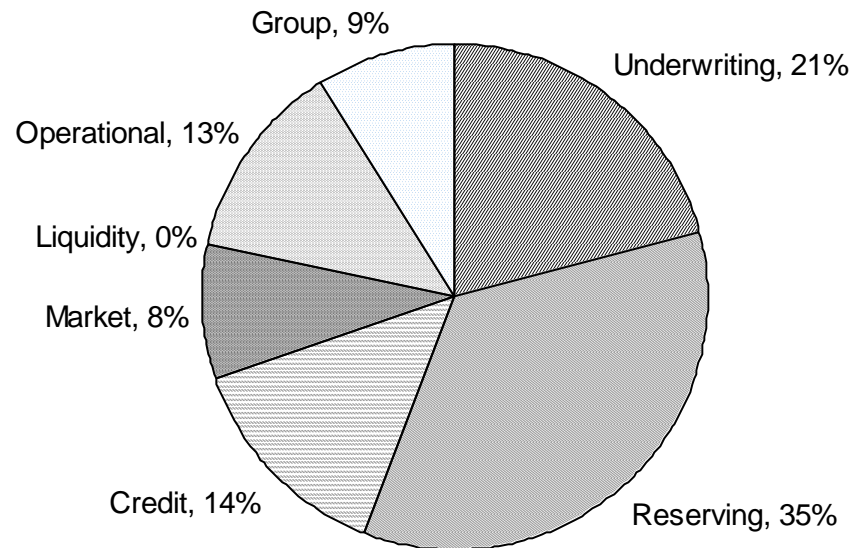
## Diversified portfolio





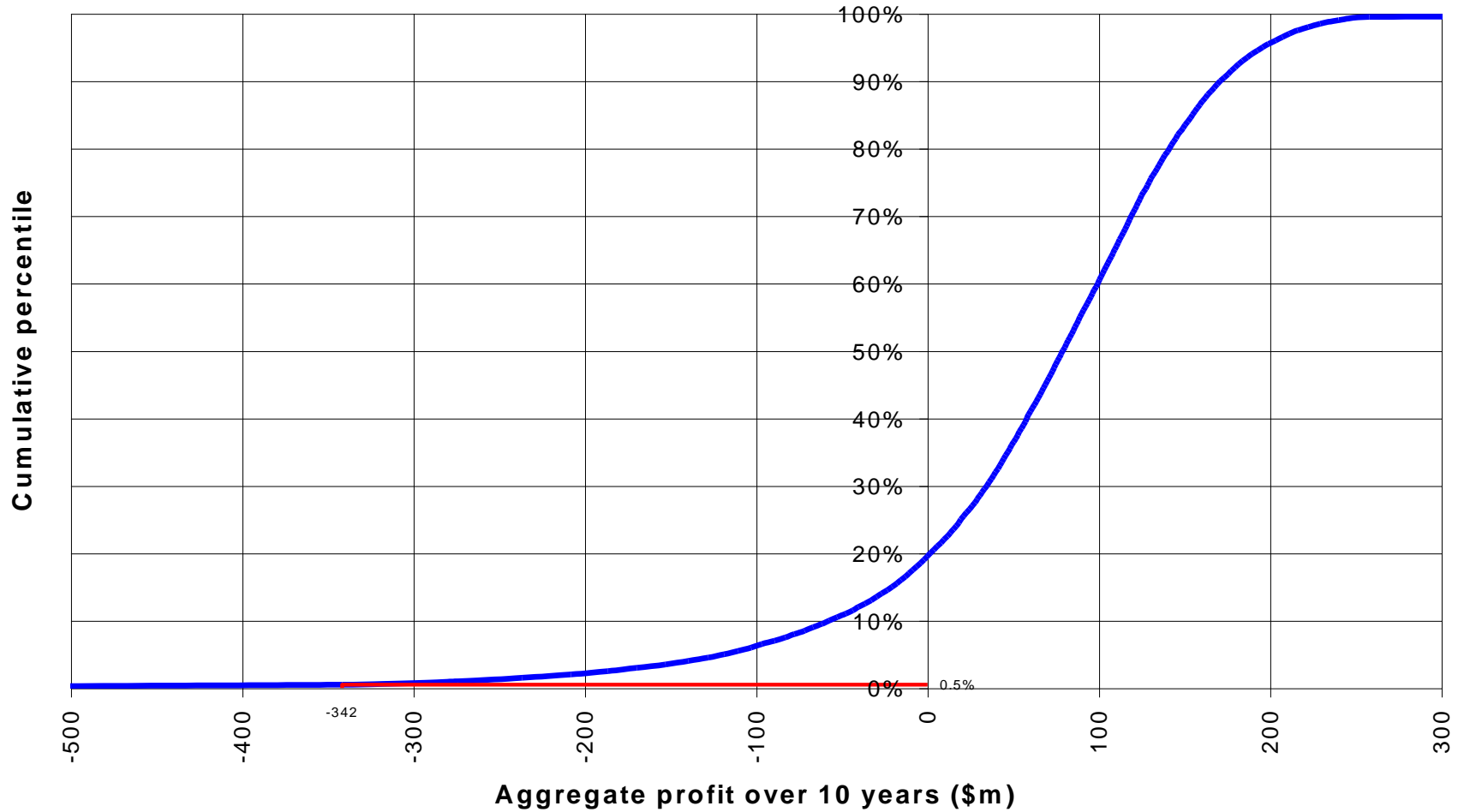
# Results

## Liability portfolio





## Results





## Use test

1. Fundamental is the overall capital required for a company being based on DFA model
2. Court consideration won the merger of the two business
  - Cost savings from running a single legal entity



## Use test

3. The capital allocations feeds into:
  - Strategic business planning – Make decisions based on expected return on allocated capital
  - Underwriter remuneration – Bonus linked to actual return on allocated capital
  - Pricing – Business uses actual capital allocation for pricing deals
  - Reinsurance – Alternative reinsurance strategies consider change in return on capital





## Use test

- Capital allocation
  - Capital allocated not based on very extreme (99.5% Value at Risk), but a mixture of Value at Risk (VaR) and Tail Value at Risk (TVaR) at lower percentile
    - A combination gives stability and allows for risk characteristics of the business
    - More akin to a “not achieving budget” basis



## Use test

### 4. Business planning

- more rigour in setting assumptions, particularly
  - moving towards central estimate loss ratios
  - split of claims into attritional, large and catastrophe
  - loss ratios for 2<sup>nd</sup> & 3<sup>rd</sup> years of plan



## Use test

5. Underwriters are increasing their focus on capital
  - Link to bonuses may help...
6. DFA team regularly asked: What are the capital implications of ...
  - Writing this new line of business
  - Writing more of this line of business
  - Buying this reinsurance programme



## Use test

### 7. Reinsurance

- Aid in pricing proposed reinsurance programmes
- Input to commutation of past stop-loss programmes
- Input to the internal reinsurance structure assessments
- DFA sub-models used to consolidate reinsurance programs and look at overall effect



## Use test

### 8. Aggregate management

- DFA sub-models used to consolidate net aggregate catastrophe exposures
- “Fair” allocation of reinsurance spend between business units
- Greater understanding of where exposures are too high
  - More focused underwriting
- Requirement for APRA - MER



## Use test

### 9. Regulatory and rating agencies

- DFA is considered as best practice in most countries
  - having a DFA model fosters a more positive image for QBE
  - assisting in assessing risk (ICA/ECA/MCR)
- DFA model used as a voluntary submission to the European regulators regarding the impact of discounting and percentiles of reserve distributions (Solvency II)



## Use test

### 10. Risk management

- DFA and risk management are becoming increasingly aligned
- Direct link between risk register and DFA parameterisation
- Risk management validate parts of the model through scenario testing
- Closer links in the future (e.g. KRAs), help in setting risk appetite



## Conclusion

- DFA is a useful tool for:
  - capital management
    - allocation and hence portfolio profitability
  - reinsurance modelling
  - risk and accumulation management
  - improved understanding of the business
  - business planning
- ..... and for assessing capital requirements