R : Modelling Tool for Life Insurers

Aman Sanganeria
Ed Bujok-Stone

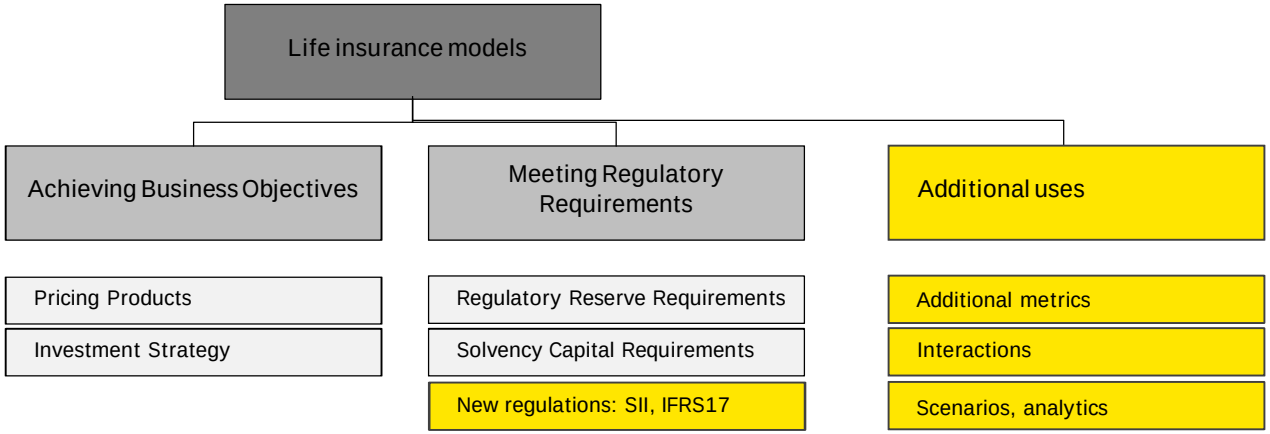
Agenda

1. Introduction
2. Background of Actuarial modelling in Life Insurance
3. Modelling Challenges for medium/small Life Insurance companies
4. R based solution
5. R Tool : Demo
6. Conclusion

1. Background : Modelling in Life Insurance

- Life insurance modelling primarily involves projecting **asset** and **liability cash flows** to facilitate the calculation of**:**
  - **Profit and loss account**
  - **Balance sheet**
  - **Pricing, supervisory reserves** and **capital**

- As life insurance business and regulations have evolved, insurance companies now use these models to:
  - Capture the **interaction** between **assets** and **liabilities**
  - Perform detailed **scenario analysis, analytics, optimisation**
  - Calculate additional **metrics**; Return of capital, cash metrics, liquidity ratios



- Overall objective of a **life insurance model** is to **enable** the Actuarial function the tools to demonstrate the company is financially sound.

2. Challenges of Modelling in Life insurance

- Increased outputs/results take time!
  - Increased metrics, scenarios and model outputs take time to produce
  - Increase impact on operations teams and Actuarial function
- Output communicating
  - Presenting additional output from models to the business and C suite
  - Tailoring to suit different stakeholders with varying interests
- Platform, Hardware, Licencing costs
  - Increase outputs require additional platforms, hardware and licencing costs
  - Margin challenge already, are the Actuarial models the most demand on IT!
- Worse for medium/small life insurers:
  - Struggle to bear the cost of the expensive life modelling platforms
  - Much smaller teams, so lack expertise and experience
  - Make do with Excel based/VBA models
- Potential solutions:
  - Low cost, efficient, formal modelling platform that already has life insurance and financial packages for valuations
  - R proves to be a great fit for this purpose

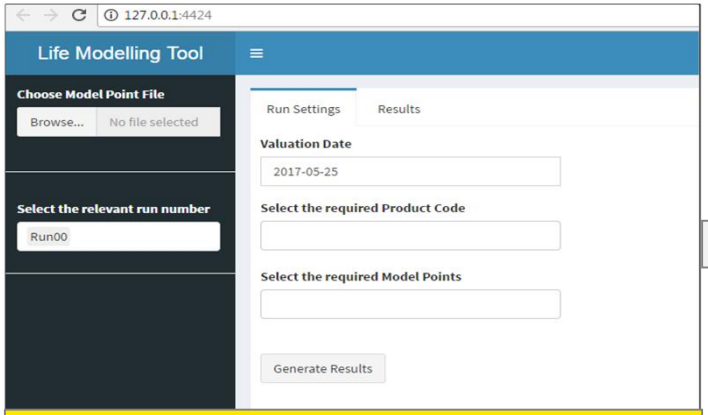
3. R based Solution

Counter to Challenges

- Flexibility
- Availability of Skill set
- Cost Effective

R Package : shinydashboard

1 Shiny User Interface



Data and Assumptions are input here

R Package : FinCal,lubridate

2 Shiny User Interface/Excel/Database

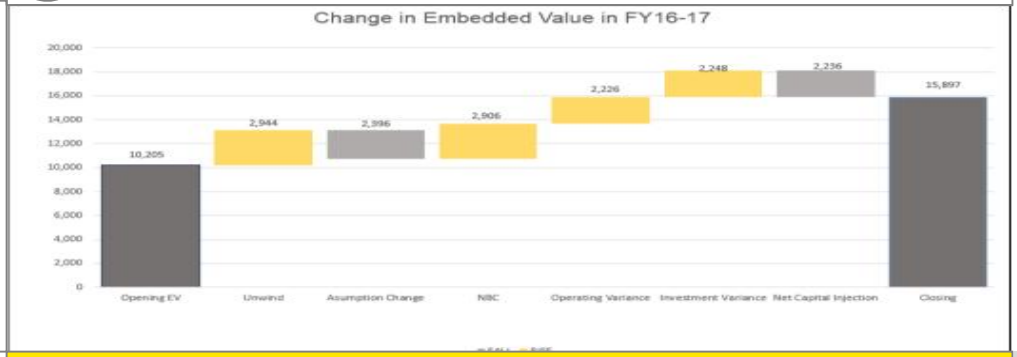
Duration	MTP000007CO1.Age	MTP000007CO1.Dates	MTP000007CO1.PolicyYear	MTP000007CO1.Annualqx
145	49	2017-02-28	13	0.002925
146	49	2017-03-31	13	0.002925
147	49	2017-04-30	13	0.002925
148	49	2017-05-31	13	0.002925
149	49	2017-06-30	13	0.002925
150	49	2017-07-31	13	0.002925
151	49	2017-08-31	13	0.002925
152	50	2017-09-30	13	0.0032445

Cash Flow Projections from the model

Visualization Analysis:-

- Business Planning
- Analysis of Movement
- Sensitivity Testing
- Reserve Analysis

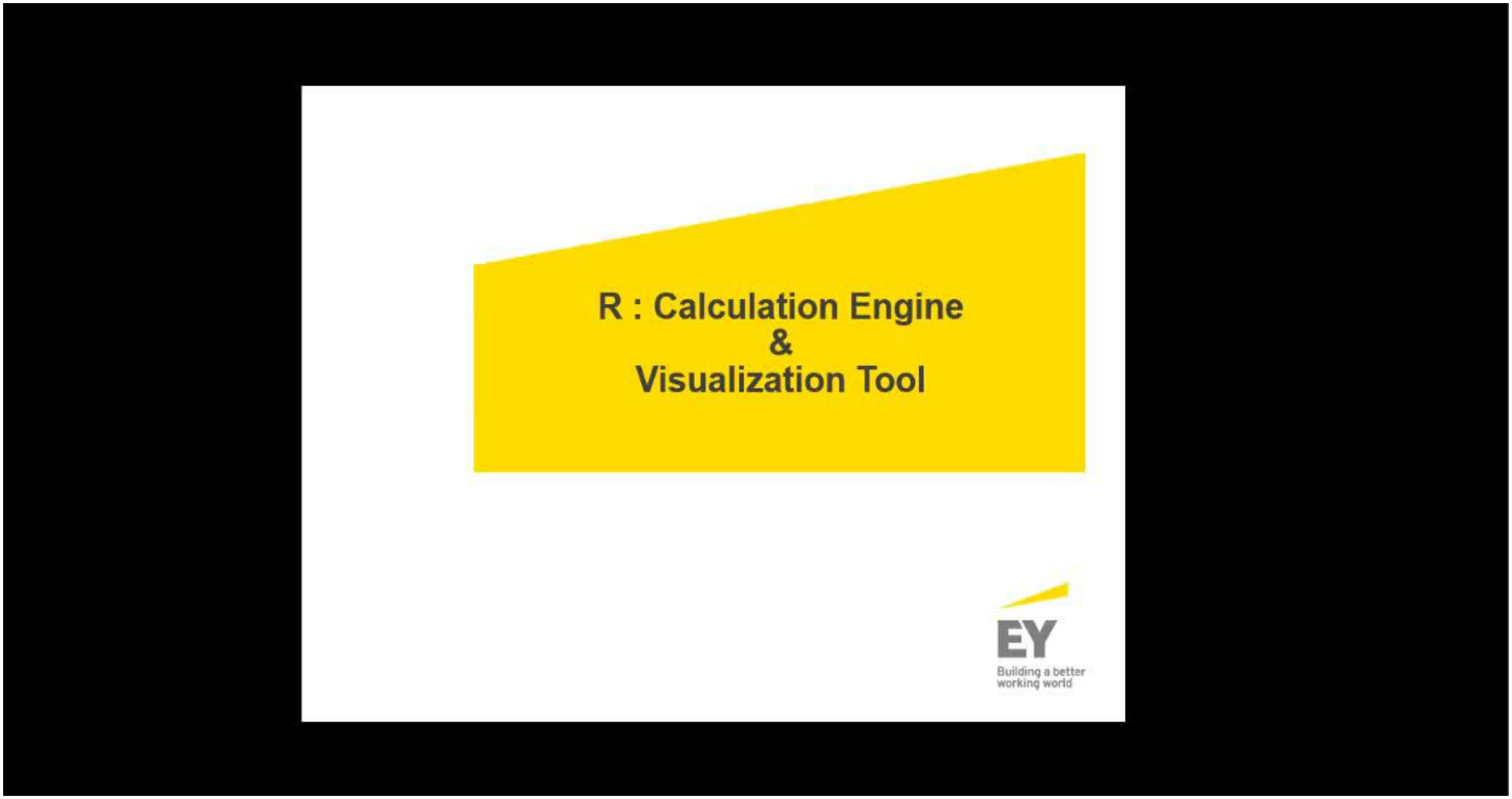
3 Shiny User Interface/SpotFire



Visualization Results from the model

R Package : plotly,Dygraphs,QoLR

4. R Tool : Demo


R : Calculation Engine
&
Visualization Tool
EY
Building a better working world

5. Conclusion

- Evolving insurance landscape
- Increased demands from the regulators
- Increased reporting requirements
- More and more output, faster!
- Complexity of products = complexity of analysis
- Costs rising

- **Summary**: Management and analysts are increasingly bombarded with vast amounts of numeric results and other qualitative, intricate and caveated information – it takes time, costs a fortune to produce, and difficult to understand!

- **So, what could the future modelling landscape look like?**
  - Analytics led life insurance modelling is the future
  - Graphical presentation of results:
    - Useful in showing large amounts of complex information in a structured format
    - Figure out any trends or pinch points that might need further investigation – e.g. A vs L mismatch, data errors
  - Flexibility of the tools to communicate with various data systems and modelling platforms to read-in data and results for performing analytics and visualizations.
  - Lower cost platforms, open source packages, further cloud usage (serverless computing), revisit outsourcing
  - Instant results: Why not provide the management direct access to results so they get **what** they need, **when** they want it, **cheaper**?

Thank You !