The career of an actuary

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Quantitative Ecology and Resource Management
Agenda

• Actuarial Career Path
• Example: Me!
• Actuarial Mathematics
• Actuarial Finance
• Q&A
Preliminaries

- Quick quiz!
- What is an actuary?
  - “An actuary is a business professional who analyzes the financial consequences of risk. Actuaries use mathematics, statistics and financial theory to study uncertain future events, especially those of concern to insurance and pension programs. They evaluate the likelihood of those events, design creative ways to reduce the likelihood and decrease the impact of adverse events that actually do occur.”
Exam System

- VEEs
  - Economics (micro and macro), Corporate Finance, Applied Statistical Methods (time series, regression)

- Preliminary Exams
  - P - Probability
  - FM - Financial Mathematics
  - MFE - Actuarial Models (Financial Economics)
  - MLC - Actuarial Models (Life Contingencies)
  - C - Construction and Evaluation of Actuarial Models

- FAP Modules

- FSA Exam (CSP, DP)
  - Finance/ERM, Investment, Individual Life & Annuities, Retirement Benefits, Group & Health
Actuarial Career Path

- Internship
- "Student"
- Manager
- Officer
- Executive
Example: Me!

- Math major
- "Student"
  - Reinsurance
  - Variable and Interest Sensitive Life Projections
- Manager
  - Traditional Life Valuations, Projections, and Earnings Analysis
- Graduate school (non-traditional)
Varieties of Actuarial Careers

- Life Insurance
  - Life
  - Annuity
  - Group Life & Health
  - Finance
  - Investments
  - Retirement
  - Reinsurance
- Property & Casualty Insurance
- Consulting
Types of Actuarial Models

- **Deterministic**
  - Used for basic life insurance or annuity benefits
  - Assumptions based on extensive past experience
  - ---> Actuarial Mathematics

- **Stochastic**
  - Used for secondary guarantees (e.g. GMDB) tied to stock market indices
  - Assumptions tied to volatility
  - ---> Actuarial Finance
Actuarial Mathematics

- Example: Life insurance
  - Customer perspective
    - Benefit: Death benefit
    - Risk: Financial insecurity of beneficiaries in event of untimely death
  - Insurance company perspective
    - Benefit: Pool of life insurance policies
    - Risk: Pooling reduces risk
    - Additional requirement: Assure customers and regulators of sufficient reserves
Actuarial Mathematics (cont’d)

- **Life Table**

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- **Actuarial Present Value (APV)**
  - Discount future cash flows for interest and mortality

- **Reserves**
  - APV of future premiums - APV of future benefits
Actuarial Finance

- Example: Guaranteed Minimum Death Benefit
  - Customer perspective:
    - Benefit: Death benefit increases like an investment with no downside (ratchet provision)
    - Risk: Time value of money
  - Company perspective:
    - Benefit: Increases marketability
    - Risk: Future market performance unknown
Actuarial Finance (cont’d)

- Monte Carlo methods
  - Generate 1000s of scenarios of index returns
  - Simulate ratchet provision
  - Identify critical threshold/risk tolerance
    - (e.g. 99% 1-day VaR)
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• Actuary Club at UW
• Organizations
  • Society of Actuaries - soa.org
  • Casualty Actuary Society - casact.org
  • American Academy of Actuaries - actuary.org
• Sites of interest
  • beanactuary.org
  • imageoftheactuary.org
• burnse@u.washington.edu