



Emerging Career Opportunities for Actuaries

Energy Risk Management

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Introduction to Energy Risk Management

- Energy firms face several risks arising from their normal business activities, including:
 - **Price Risk:** Energy prices are some of the most volatile prices in the markets.
 - Example: An oil producer may make a lot, or very little money depending on global oil prices
 - **Volumetric Risk:** Production volumes may be significantly higher or lower than expected due to geological, operational, storage, and transportation related uncertainties.
 - Example: A power plant shuts down due to failure of a turbine blade, costing the firm a month or more in lost profits.
 - **Credit Risk:** Energy firm's counterparties may default on long term contracts.
 - Example: An energy firm has a 5 year contract to sell natural gas to a steel manufacturer at a fixed price. If market prices have fallen since the contract signing, the energy firm will have to sell at the lower prices if the steel company defaults.

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Typical Backgrounds in Energy Risk Management

- Phds in Statistics, Economics, Econometrics, and Physics
- Engineers
- Masters in Applied Math, Financial Engineering
- Quantitative MBAs
- Why? What do these backgrounds have in common?
 1. Analytical
 2. Detail oriented
 3. Problem solving skills
 4. Usually some coding experience

These are the same skills that actuaries learn

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Applications of Quantitative Analysis

- Statistical analysis and modeling of historical market prices
- Analysis of operational risk events (probability and severity)
 - Power plant and transmission line failure
 - Likelihood of IT breakdown
 - Rogue trading
- Optimization techniques
 - Optimal trading/hedging strategies
 - Optimal asset management
- Forward looking estimation of business risks using stochastic modeling

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Why Should an Actuary be Interested?

- The de-regulation of energy markets presents a unique opportunity to work in uncharted territory.
- High volatility and significant investment in energy assets and trading has created a large need for quantitative analysts.
- Developing enterprise risk management (ERM) and regulatory capital frameworks create an additional need for risk management skills as investors, regulators and lenders demand more rigor around capital management.

These changes have created excess demand for quantitative analysts. Salaries reflect this excess demand

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Challenges Facing Actuaries

- Most energy firms complain that actuaries don't understand the business.
- Most energy firms complain that actuaries don't fit into a trading floor culture.
 - Most banks had the same complaint about finance quants in the 1980s, and now these same folks drive most of the innovation in the financial markets.
- Energy firms say that actuaries are great when data abounds, but not when data is scarce (as it is in the recently de-regulated energy markets).

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An Actuary's Next Step

- Attend a conference to learn the subject matter better and make connections!
- Pick up a book on the energy business and how it works.
- Follow leading energy stories from the major news-sources.
- Improve communications skills by seeking out presentation opportunities and writing for journals, periodicals, etc...
- Get an MBA, or attend a MFE program to sharpen your finance skills (specifically financial options valuation)

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Additional Comments

- Many firms have enterprise risk management initiatives
 - ERM combines asset risk, liability risk, operational risk, insurance/retention risk, and corporate finance
 - ERM initiatives allow actuaries to work together with business managers to estimate risk across the organization
 - Put risk into a common language (\$ at risk) to improve decision making