



Institute  
and Faculty  
of Actuaries

# The Key Questions for Actuarial Science

Discussion Document

Research and Thought Leadership Committee

14 August 2015

# IFoA Research and Thought Leadership Committee

## Actuarial Science – The Key Questions

Risks in society raise many questions and issues over who bears them and how they are managed. Many of the specific questions that actuarial science needs to address today could be considered under two themes relating to:

- people ageing
- changing economic landscape and financial health

These are underpinned by the broader theme of understanding future risk and complex uncertainty.

With this in mind, the idea of bearing risk and managing uncertainty has been considered in framing questions that “set the scene”, with the other two specific themes then following on.

### 1. WHAT IS THE OPTIMAL WAY TO BEAR RISK

We could break this down to a series of key questions – **causal** and **consequential**:

#### **CAUSAL** factors

- a. What are the potential changes in risks and the emerging risks, for example, physical, environmental, economic, social and political?
- b. To what extent is there uncertainty about these risks?
- c. What could disrupt our future understanding of the world (for example, technology)?
- d. What changes are there in the desire to bear risks (for example, due to increasing wealth)?
- e. What is the impact of current and potential laws and regulations (for example, regarding liabilities)?
- f. How likely is a low or no growth world?

#### **CONSEQUENTIAL** questions

- a. How can we expect risks to be identified and measured in the future?
- b. How could we deal with extreme events?
- c. How can risks be priced? What is the optimal differentiation in pricing risk (de-pooling)?
- d. How are the above affected by the availability of data?
- e. What changes will there be in forms of risk-bearing (for example, insurance markets, hedging, investment markets or government as the risk-bearer)?
- f. To what extent are risk-bearing mechanisms secure (in particular, insurance)?
- g. What tools and models do we need to manage future uncertainty in the world (which can be applied in particular contexts, including the financial and risk management of insurance companies)?
- h. What techniques could be developed to detect, understand and manage systemic risk?
- i. What role should actuaries play in communicating risk and uncertainty?
- j. What role should actuaries play in managing uncertainty?
- k. What are the implications of lower growth on savings products?

It is suggested that this challenge might be best pursued through two directions:

- a. Generic tools and concepts for approaching the problem of characterising risk and uncertainty
- b. A number of projects to evaluate the tools in specific contexts, for example:
  - Insurance against specific classes of risk
  - Managing investment portfolios against economic uncertainties, such as inflation/deflation and currency volatility

A further outcome might then be tools to act as software environments to support dealing with risk that can be extrapolated from the specific problems evaluated to a more general approach.

## **2. WHAT ARE THE ACTUARIAL CONSEQUENCES OF CHANGES IN HOW PEOPLE AGE?**

Again, breaking this down to a series of key questions – **causal** and **consequential**:

The first **CAUSAL** set would relate to **ESTIMATING MORTALITY/LONGEVITY AND MORBIDITY**

- a. How will mortality/longevity evolve over the next 50 years?
- b. How will short term and long term morbidity evolve over this timeframe?
- c. What are the key factors affecting morbidity and mortality and, in particular, how do we factor in lifestyle choices (where we already have lots of data, for example, smoking, heavy drinking and other drug taking, and where data is more limited, for example, obesity and dementia)?
- d. To what extent can cause of death modelling help to inform future life expectancy and changes in how people age?
- e. What could disrupt the current mortality and morbidity trends? (for example, antibiotic resistance, pandemics, dementia, medical advances, climate change)
- f. Is there an upper limit to ageing?
- g. What social changes are happening that relate to an ageing society, such as changes in retirement patterns and changes in inter-generational wealth and incomes?

What is the degree of uncertainty about how these causal factors will develop (for example, decline in smoking) and about how they influence morbidity and mortality? If we know these things then do we have sufficient information to begin to ask the following

**CONSEQUENTIAL** questions:

### **On CARE COSTS**

- a. Given the above information on morbidity and mortality, how is healthy and unhealthy life expectancy expected to change over time and how can we model it?
- b. What are the requirements for care and what are the emerging patterns of care costs going to look like?
- c. How are care costs shared between the state vs the individual (or employers)?
- d. Should care cost responsibilities be differentiated by clinical problem (for example, dementia vs heart problems) or by cause (for example, dementia vs smoking related)?

- e. How do pensions and insurance products respond to the above?
- f. What models are required in this context?

### **On PENSIONS AND RETIREMENT**

- a. Given the above information on longevity/morbidity and care requirements, what are the future retirement income needs? How well defined are they? Or how much uncertainty is inherent in them? How will they change in future, both for an individual and for society as a whole? What are the options for providing the required income? Issues include the amount of pension, when it starts and the flexibility an individual might have in choosing when to draw a retirement income, the pattern of pension income over the time from commencement to death, and the level of guarantees (including annuity provision).
- b. How do individuals manage the risk of longevity?
- c. How does government best manage the risk of longevity of a nation?
- d. What is the function and purpose of the State Pension? What are the options?
- e. Hence what is the balance of the state vs individual pension requirements? To what extent will/should employers be involved?
- f. In the new consumer-led 'pension' environment, what are good value workplace schemes, including strategic options (for example, the value of risk pooling, strategies for accumulation and decumulation, balance between simplicity/complexity, and clarity for consumer)
- g. What do we understand about consumers' risk appetite in balancing risk and reward with providing a predictable income?
- h. Where nations have driven pension saving through the workplace (for example, UK automatic enrolment), what are the consequences for workers who are currently out of scope (for example, 4 million self-employed workers in the UK)? How do they best provide for a retirement income?
- i. How can a secondary market for selling annuities in the UK evolve and develop? How is this affected by the availability of personal data (for example, health records)? Use of genetic data?)

### **On HEALTH AND LIFE INSURANCE**

- a. How are health insurance and life insurance (pre-retirement) affected by the trends in morbidity and mortality?
- b. How are health insurance and life insurance (pre-retirement) affected by the increased availability of personal data, including that arising from genetic testing?
- c. What health, life and pensions data and techniques can be used to inform the general insurance (non-life) issues that are now experiencing longer term liabilities (for example, Periodic Payment Orders)? What gaps are exposed in these data and techniques when we consider the nature of the longer term liabilities?

### 3. HOW DO WE MANAGE INVESTMENT STRATEGIES IN A CHANGING ENVIRONMENT?

These are broken down into **causal** factors and **consequential** questions:

The **CAUSAL** factors relate to those features that are affecting the investment environment:

- a. Changing central bank policy
- b. Changing regulation, legislation and political landscape
- c. Changes in economic theory
- d. Changes in long term demographics and socio-economic structure
- e. Geopolitics and changing trade landscape
- f. European insurance industry and Solvency II
- g. Globalisation from various angles
- h. Innovation in financial products and markets
- i. Changing productivity and technology
- j. Climate change, resource scarcity and environmental degradation

If we had quality information on the above issues some key **CONSEQUENTIAL** questions would be:

- a. What will be the investment strategy in a world with lower interest rates?
- b. Do we expect a longer term change in the distribution of interest rates?
- c. What is the implication of population change, resource constraints, productivity, technology and environmental factors on long term investment returns? What level of investment in the economy's capital stock is appropriate in these circumstances?
- d. What will our investment strategies look like to deliver actuarial obligations, particularly in respect of guarantees?
- e. What are the limitations of using market prices? For example, when do markets fail to price things "correctly"? What are the alternatives to using market prices and when is it appropriate to use them?
- f. What is the relative importance of sustainable investment income, such as dividends, when considering long term returns?
- g. What are the drivers of short-termism in investment markets and how do they interact with the work of actuaries? How can actuaries help to achieve better alignment between the time horizons of their clients/employers and investment markets? Are there implications for corporate and investment governance?
- h. What are the consequences of so-called "stranded assets" and the implications for long term investment markets?
- i. What are the implications for actuarial work of the limitations of GDP and moves to use broader measures of economic success? How can investment decisions incorporate both financial and non-financial indicators of success?
- j. What are the implications of environmental sustainability on the way discount rates are currently used when allocating capital and making investment decisions? How can any harmful implications be addressed?
- k. What is the impact of pro-cyclicality and the impact of traditional actuarial methods?
- l. What is the impact of economic uncertainty on modelling liabilities?
- m. Are there more efficient models of saving which improve upon the traditional pensions saving model?

- n. How do investment behaviours impact future wealth? How can understanding of investor psychology and decision making be used to improve outcomes in the retirement market?
- o. How have fees developed historically and what are the expected trends in fees for the retirement and multi-asset market?
- p. What is the case for aggregation on legacy Defined Benefit Pensions, and what models could be used?