Environmental, social and economic sustainability: implications for actuarial science

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Agenda

1. Is human activity sustainable?
2. What will be the effect on what actuaries are currently doing?
3. What should actuaries be doing in the future that we are not currently doing?
4. Framework for measuring sustainability
5. Challenges for the actuarial profession
6. Your questions
Is human activity sustainable?
Three domains of sustainability
What do we mean by ‘sustainability’?

The global economic system—that is, the sum total of human economic activity—is taken to be ‘sustainable’ if, assuming its indefinite continuance, the effects of that activity will enable the environment, human society and the economic system itself to attain and maintain a state of well-being in every region of the world.
Environmental sustainability
The earth system has become unsustainable

- Rockström et al. (op. cit.) identified nine planetary boundaries within which humanity can operate safely.

- These boundaries describe the fundamental functioning of the earth system.

- Transgression of at least one of these boundaries could lead to an abrupt and irreversible change to the global environment.

- Humanity has already transgressed three of the nine planetary boundaries:
  - Climate change
  - Rate of biodiversity loss
  - Changes to the global nitrogen cycle
The effects of climate change on the environment

- Warming of the atmosphere and oceans
- Diminishing ice levels
- Rising sea level
- Increasing ocean acidification
- Increasing concentrations of greenhouse gases

- The current rate of biodiversity loss is greater than the natural rate of extinction.

- These effects are at least to some extent the effect of anthropogenic climate change.
Social sustainability
The recent financial crisis is becoming a social crisis

- It is estimated that because of the crisis between 47 million and 84 million people fell into, or were trapped in, extreme poverty.

- As at the beginning of 2014, the World Bank estimated that nearly 75% of the world population live on less than $4 a day.
The effects of climate change on health

- Cardiovascular and respiratory diseases
- Increased deaths caused by increased air pollution
- Prevalence of malnutrition
- Increased risk of floods
- Contamination of water supplies
- Migration from low-lying coastal areas
Economic sustainability
Economic unsustainability

- Economic sustainability is inextricably linked to both environmental and social sustainability.

- In the 1972 book, “Limits to Growth”, the authors concluded that population growth coupled with increased resource consumption beyond what the Earth can sustain, will lead to the decline in or the collapse of the environment, society and economy by 2030.
Ecological Footprint versus Carrying Capacity

This graph shows the number of Earths required to provide the resources used by humanity and to absorb their emissions for each year since 1960. This human demand is compared with the available supply: our one planet Earth. Human demand exceeds nature’s supply from the 1980s onward, over-shooting it by some 20 percent in 1999. (Source: M. Wackernagel et al.)
“...there was nothing that I could find in the book which has so far been even vaguely invalidated. To the contrary, the chilling warnings of how powerful exponential growth rate can be are right on track.”
- Matthew Simmons, 2010

“There is a very clear warning bell being rung here...we are not on a sustainable trajectory.”
- Graham Turner, 2008
Is human activity sustainable?

- The evidence suggests that, in terms of our definition, the global economic system is not sustainable.
The future will not look like the past

How can we change economic activity so that the environment, society and economy can sustain it?
How does this affect what actuaries are currently doing?

- Actuarial modelling
  - Actuarial assumptions
  - Valuation of liabilities

- Quantum of liabilities

- Actuarial advice

- Institutional investors
  - Actuaries advise
  - Employed by
Resource constraints will affect actuarial assumptions…

• Resource Constraints: Sharing a Finite World by Jones et al. (unpublished)

• Economic assumptions:
  • Future economic growth will be lower
  • Returns on investments will be lower and more volatile
  • Discount rates will be lower as governments respond to a lower-growth environment
  • Real wage growth will be lower

• Demographic assumptions:
  • Life expectancies will decline

…and actuarial advice on these matters
The net result will be…

• ...a severe strain on solvency for defined-benefit pension funds,

• ...reduced levels of defined-contribution pensions

• ...and reduced viability of savings and risk-management products.
The effects of climate change

- Higher temperatures would cause increased incidence of deaths and serious illness and reduced cold-related morbidity and mortality:
  - Affect life- and health-insurance business directly

- Higher temperatures would increase the risk of death in livestock and damage to crops and reduce the risk of damage to crops due to cold weather.
  - Affect general insurance business directly

- Net liability exposures are expected to increase.
Institutional investors “own” the global economy

• Sustainability is affected by the investment choices institutional investors make:
  • Recent global financial crisis

• Sustainability affects the choices they make:
  • Unsustainability of the entities they invest in

• Short-termism
  • Asset-managers’ performance incentivised against short-term benchmarks
  • Investment holding periods are declining
Drive to address sustainability in the financial services industry

- United Nations Principles for Responsible Investment:
  - Marked an international commitment to incorporate sustainability issues

- South Africa:
  - Code for Responsible Investing in South Africa
  - Amendment to Regulation 28
  - JSE Socially Responsible Investment index
  - King Report on Corporate Governance

- IAA’s Resource and Environment Working Group
- IFoA’s Resources and Environment Board
What should actuaries be doing in the future that we are not currently doing?
Actuarial modelling

• To address the effects of unsustainability on actuarial models:
  • Model the effects of unsustainability on actuarial assumptions
  • Model the effects of unsustainability on the valuation of liabilities

• For example Jones et al. (unpublished) envisage rates of return based on four scenarios.

• The scenarios relate to the sensitivity of governments and markets to resource limitations.
What the future holds for investment returns

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<th>Optimistic</th>
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<td>Consensus driven change</td>
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- Very different to actuarial assumptions currently being made by actuaries.
- Quite subjective
- The challenge to actuaries is to model these returns.
Institutional investors

• Need for institutional investors to incorporate sustainability issues into their investment decisions is growing.

• Actuaries need to include issues of sustainability in addressing the problems our clients ask us to solve.

• This requires:
  • Measuring the sustainability of the entities our clients invest in
  • Measuring the sustainability of our client’s activities
  • Measuring the effects of unsustainability on economic returns
Actuarial advice

• Actuarial modelling
• Institutional investors
• Advise clients in the financial-services industry not only on their financial returns but also on their environmental, social and economic returns.
• Develop skills in other non-traditional areas.
Framework for measuring sustainability
Accountability for sustainability

- To achieve sustainability, each entity must be held accountable to all its stakeholders for the effects of its activities on the environment, on society and on the economy.
- Secondly, each entity must adopt a long-term view.
- Thirdly, each entity must adopt a global view.
Ultimate effects

- To achieve comparability between entities we need measures of the outcomes—i.e. the ultimate effects—of entities’ activities on the environment, on society and on the economy.
Three-fold approach based on the triple bottom line

First requirement: Reporting year
Second requirement: Reporting year
Third requirement: Future reporting years

Immediate time horizon
Future time horizon
Challenges for the actuarial profession

CHALLENGE ACCEPTED.
Why not leave the job to the accountants?

• Current measures focus on practices not on ultimate effects.
• Lack of commitment to the expert auditing of reporting that does not pertain to the financial bottom line.
• Actuaries are more orientated to modelling.
• Mr C. Gingell, a general-insurance actuary, describes the role of actuaries in modelling sustainability as follows:

  “...quantifying downside scenarios has been the realm of engineers or economists, who often rely on point estimates and worst-case scenarios. The stochastic modelling skills actuaries can deploy allow organisations a far deeper understanding by showing the relative likelihood of different scenarios occurring.”
Do we have the expertise to model the environment and society?

As Ms C. Jones, a pensions actuary and sustainability and economics manager at the Institute of Chartered Accountants in England and Wales puts it:

“Sustainability issues are too often seen as concerns for other people. Part of the problem is caused by gaps in background knowledge. For example, business and finance specialists may know little about ecology, so they often do not appreciate just how much businesses and society generally depend on the natural environment.”
Our quantitative approach will be challenged
We have a unique position in society relative to other professions
Questions?

“THE SECRET OF CHANGE IS TO FOCUS ALL OF YOUR ENERGY, NOT ON FIGHTING THE OLD, BUT ON BUILDING THE NEW.”

— Socrates
How do we determine if an entity is sustainable?

- Considered in the light of the sustainability of the entire system.

- An entity is considered sustainable if:
  - the entire global system is sustainable, or
  - the most efficient way of restoring the system to sustainability would not necessitate any change in the activities of that entity.

- Since we are considering future sustainability we must consider requirement 3.
Measurement of efficiency

• If economic bottom line is negative then, unless the entity can be nationalised or subsidised, it should be liquidated.

• Environmental efficiency to a specified time horizon:
  • Environmental bottom line
    Economic bottom line

• Social efficiency to a specified time horizon:
  • Social bottom line
    Economic bottom line
Restoring the global system

Environmentally sustainable

Cumulative environmental bottom line = 0

Environmentally unsustainable