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and Faculty
of Actuaries

Finance in the Public Interest 2022

Frank Redington: The Man and His Ideas

26 January 2022

Chair

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Speaker

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Some notable dates in the life of Frank Redington

- Born 1906 (in Leeds; grew up in Liverpool)
- In 1928, graduated in mathematics with first class honours, Magdalene College, Cambridge University
- Qualified as Fellow of the Institute of Actuaries in 1934
- Chairman of the Board of Examiners of Institute of Actuaries, 1945-48
- Chief Actuary of Prudential, 1951-68
- Immunisation paper published in 1952
- President of Institute of Actuaries, 1958-60
- Chairman of CMI Bureau, 1961-68
- In 1968, received the Institute of Actuaries Gold Medal
- Paper on equitable distribution of surplus published in 1981
- Died 1984, age 78

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Finding 21st century inspiration in Redington's work

Actuarial thought-leadership

- **Technical innovation**: Immunisation theory (and financial market risk management)
- **Product innovation**: Whilst Chief Actuary, Pru was first life office to pay a with-profit terminal bonus (equitable distribution of surplus)
- **Deeply reflective on actuarial methods** and the actuarial application of models

Professional leadership in public policy debates

- Under his Presidency, Institute made **influential contribution** to National Pensions **public policy debate**

The immunisation paper (1952)

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Immunisation theory

- Immunisation theory described the characteristics of a portfolio of fixed cashflow assets that would result in the asset portfolio value not falling by more than the value of a stream of fixed liability cashflows, for any uniform change in interest rate

$$\Sigma \mathrm{tv}^t A_t = \Sigma \mathrm{tv}^t L_t$$

$$\Sigma \mathrm{t}^2 \mathrm{v}^t A_t > \Sigma \mathrm{t}^2 \mathrm{v}^t L_t$$

> *"A bolt from the blue…immunisation theory, appearing from nowhere, astonishing those present as the nearest thing to a religious revelation that could be officially experienced in one's role as an actuary."*
>
> G. Chamberlin, 1986.

- The immunisation concept was historically notable for several reasons

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Immunisation theory: towards market-consistent asset and liability valuation

- Highlighted the usefulness of consistent valuation of actuarial assets and liabilities, and valuing them consistently with market prices
- In this era, life office assets and liabilities were valued under inconsistent assumptions, with limited reference to market prices, which could obscure financial market risk exposures

> *“I have no doubt that for some offices [at end of 1946] a solvency valuation basis would have disclosed actual and serious insolvency [due to low long-term interest rates and having assets invested short relative to guaranteed liability cashflows]”.*
>
> Redington, The Flock and the Sheep (1981)

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Immunisation theory: towards dynamic hedging of non-linear guaranteed liabilities

- The immunisation equations represented an explicitly *dynamic* solution…

> *"Where the asset and liability curves might cross owing to a change in the rate of interest…the position could be converted immediately by altering the assets in such a way as to immunise the liabilities. The asset curve would then follow the liability curve."*
>
> A.T. Haynes, Staple Inn Discussion of Redington (1952)

- …a dynamic hedging argument, more than twenty years before Black-Scholes-Merton

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Immunisation theory – a post-script

- The logic of immunisation had been discussed within the profession for several years, even decades, before the Immunisation paper:

> *"Regarding the office as a closed fund, owing to the incidence of future income it will be found that assets should be made to mature at rather later dates than corresponding liabilities.*
>
> *Then should interest rates fall, the future income will be accumulated at a lower interest rate of interest, but this would be compensated by the appreciation shown by the assets at the time that the corresponding liabilities fall due (and vice versa if interest rates go the other way)."*
>
> J.D. Binns in Staple Inn Discussion of Murray (**1937**)

- Yet, the clarity provided by the presentation of Redington's equations in 1952 was like a 'thunderbolt'
- Actuarial thought leadership requires communication skills in both directions!

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National Pensions (1958-60)

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The Politics of Pensions: An Appeal to Statesmanship (1958-60)

“*It is the voice of the future which is noticeably absent from present discussions: our responsibility as actuaries is to make that voice heard*.”

National Pensions: An Appeal to Statesmanship, Institute & Faculty of Actuaries (1959)

“*It is a forthright expression of an independent view…which will have played its part in educating public opinion. I expect and hope that you will continue to play this role of **zealous and clear-tongued professional watchdog**.*”

Rt. Hon. D. Heathcoat Amory MP, Chancellor of the Exchequer, 1959.

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Equitable distribution of surplus (with-profits)

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Equitable distribution of surplus

- In 1955, with Redington as Chief Actuary, the Pru were the first life office to use terminal bonus as a form of surplus distribution to with-profit policyholders
  - Additional degree of freedom to facilitate equitable distribution of gains from equities and real estate investments

- Equitable distribution of surplus perhaps the most vexing and constant topic of deliberation for Redington and the UK life actuarial profession more generally between 1950-1980
  - A major topic of the 1952 'immunisation' paper
  - Munich International Congress of Actuaries paper of 1968
  - 'The Flock and the Sheep' paper of 1981

Lessons for long-term pooling of investment returns?

- By second half of 20th century, equitable distribution of surplus was fundamentally about the long-term inter-generational pooling of risky investment returns
- Some potential objectives for a with-profit bonus policy might include:
  - Fairness to different generations of policyholders
    - How much cross-subsidy between policyholder generations?...
    - …in (hopefully) short-term market dislocations and stresses
    - …when there are changes in long-term conditions (inflation expectations and long-term interest rates)
  - Consistent with policyholders' reasonable expectations (historical precedent; how product was sold, illustrations)
  - Adequately transparent
  - Not prudentially unsound
  - Does not distort incentives for prospective new policyholders
- Could a study of the actuarial debates on the equitable distribution of with-profit surplus be informative for Collective DC design and testing?

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Scepticism: Redington on the limits of models and the implications for actuarial practice

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Redington's epistemic scepticism…

"Few of the chances awaiting us when we issue a policy are quantifiable. We are braving, not the spin of the roulette wheel, but the vagaries of economic weather."

Redington, The Flock and the Sheep (1981)

"The continued instabilities we observe in our experience are not the regular instabilities of probability theory but the fitful outcomes of politics and economics, human fears and whims. The conditions never repeat themselves; there are no parameters; there are no foundations even for probability theory [in context of forecasting future actuarial cashflows]."

Redington, Prescience and Nescience (1983)

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…and wariness of predictive quantitative modelling

"I am critical of the increasingly elaborate study of statistical trees which is obscuring our view of this most attractive wood."

Redington, Ideas & Statistics (1952)

"There comes a point at which I ought to say to myself, "Here I am at the limit of pure reason. Beyond this point lies the universe. I cannot pass, but nor can a computer."

Redington, Sessional meeting remarks (1967)

"We cannot foresee forty days let alone forty years."

"If we cannot foresee the future then we cannot! No proliferation of polysyllables or multivariate analysis will succeed (other than in deceiving ourselves)."

Redington, Prescience & Nescience (1983)

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Models as instruments of professional insight

> *"Such an instrument, though it does not help us to foresee the future, does the next best thing: it enables us to familiarise ourselves with what the future may have in store."*
>
> Redington, Presience and Nescience (1983)

- This perspective can be characterised as a form of scepticism about methodological positivism in social sciences
- It is a philosophical perspective that has many distinguished and varied historical proponents
  - Weber, Venn, Knight, Popper, Hayek, Taleb, etc.
- This perspective does not imply long-term probabilistic models are useless. Redington did not believe probabilistic models were useless.
- From Redington's perspective, models are tools that can deliver otherwise unavailable insight to the expert who can interpret their output.
  - Actuary as craftsman not merely the toolmaker

A Final Thought

Redington's example of life in a learned profession: the ethical application of critical thinking

- Across all of these varied topics, Redington's attitude to professional life is a constant presence
- Always urging actuaries to examine, to think harder, to question, to go back to first principles, to resist group-think, to be alive to the dangers of wishful thinking, to be reluctant to accept something that sounds too good to be true, to speak truth to power
- More than his many technical insights, his example of what a learned profession should strive to be is his most powerful and lasting legacy to the actuarial profession

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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Next Event - A Cure for Short-sightedness: Using Systems Thinking to Improve Finance

Tuesday 15 February, 8.30 -10am

Chair: Ashok Gupta, Chair of the IFoA FinSTIC Management committee

Confirmed Speakers: Nicola Ranger - Deputy Director, Centre for Greening Finance and Investment and Neil Cantle - Principal and Consulting Actuary, Milliman

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