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Policyholder Behaviour in Extreme Conditions

11 November 2013

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11 November 2013



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Agenda

- Introduction
- Evidence from the past
- Potential future scenarios
- Possible modelling approaches
- Summary
- Q+A and comments

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Introduction

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Aims/Scope

- Does policyholder behaviour significantly impact an insurance company?
- What are the drivers of such behaviour?
- Can this behaviour be analysed / modelled?

What do we mean by:

1. “Extreme Conditions”?
2. “Behaviour”?

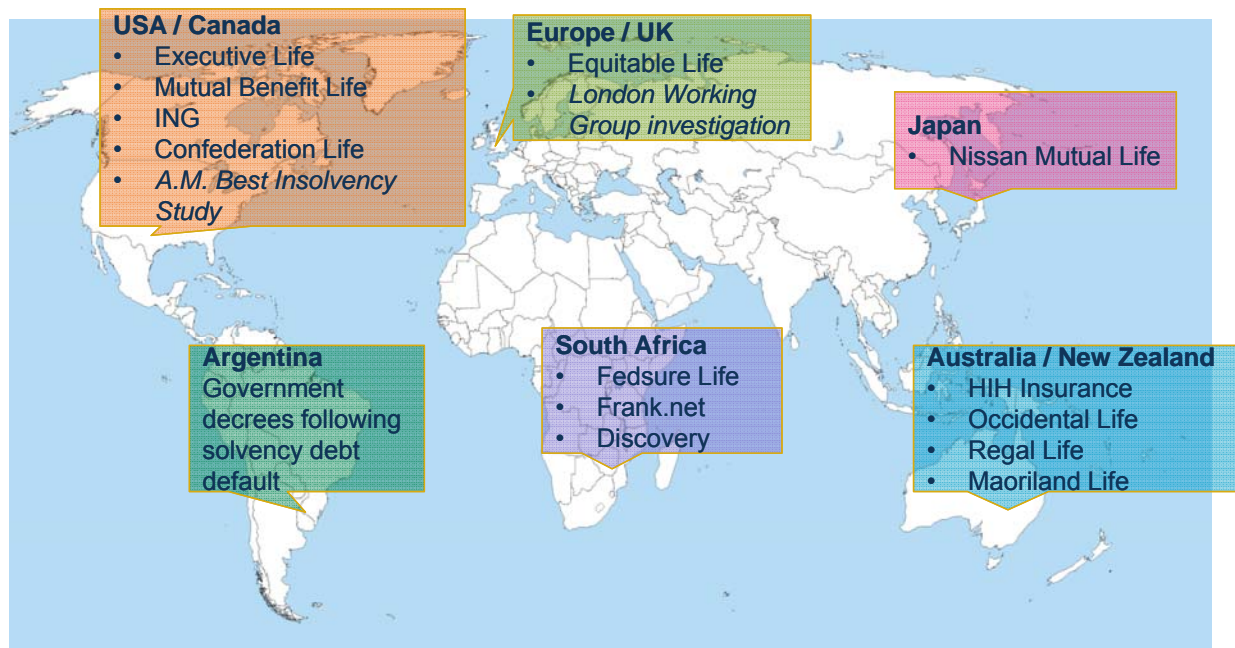




Evidence from the past

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Case studies



Overall findings

Key message:

- Policyholder behaviour did not cause failure / near-failure...
- ...but it is often a key catalyst
- Mismanagement usually root cause

Also:

- Evidence of significant impact from policyholder behaviour unrelated to company failure



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Case Study Examples

Policyholder reactions leading to failure:

- Mutual Benefit Life (USA) – lapses accelerated bankruptcy
- Maoriland Life (New Zealand) – anti-selection played part in downfall

Policyholder reactions (non-failure related):

- ING (USA) – change in lapse behaviour \approx €1.1bn
- Discovery (South Africa) – changed policyholder culture



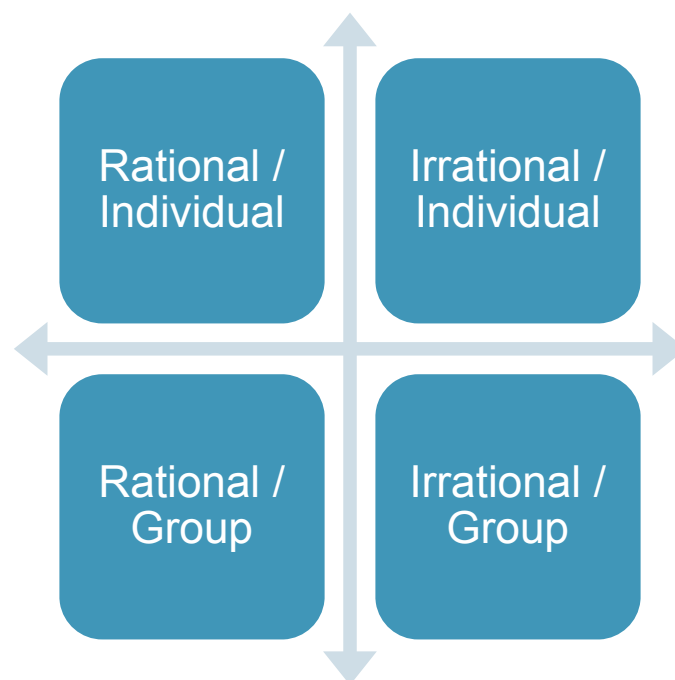
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Potential Future Scenarios

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The Behavioural quadrant



What could happen?

- Catastrophe
- Market dislocation
- Medical advances
- State intervention into markets
- Anthropological changes



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Example 1: Medical Advances

- Unexpected deviations
 - e.g. Advances in medical science – “cure for cancer”?
- Information asymmetry
- Anti-selection effects
- New strategies needed!



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Example 2: State intervention

- Changes to regulation
 - e.g. changing taxation policy
- Companies and policyholders react
- One group suffers
- Ramifications!



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Two Possible Modelling Approaches

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Modelling Approach 1

Systems Dynamics (SD)

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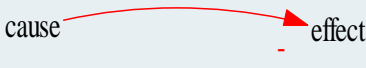


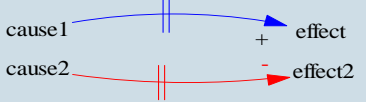
What is Systems Dynamics?

- Top-down approach
- Focus on events
- Drivers of behaviour, interactions and feedback
- Create a causal map

Example: Medical Advances Scenario



Causal Maps – symbols used

	An increase in “cause” results in an increase in “effect”
	An increase in “cause” results in a decrease in “effect”
	Reinforcing feedback loops operating in clockwise or anti-clockwise directions
	Balancing feedback loops operating in clockwise or anti-clockwise directions
	Shows a relationship with a significant time lag.

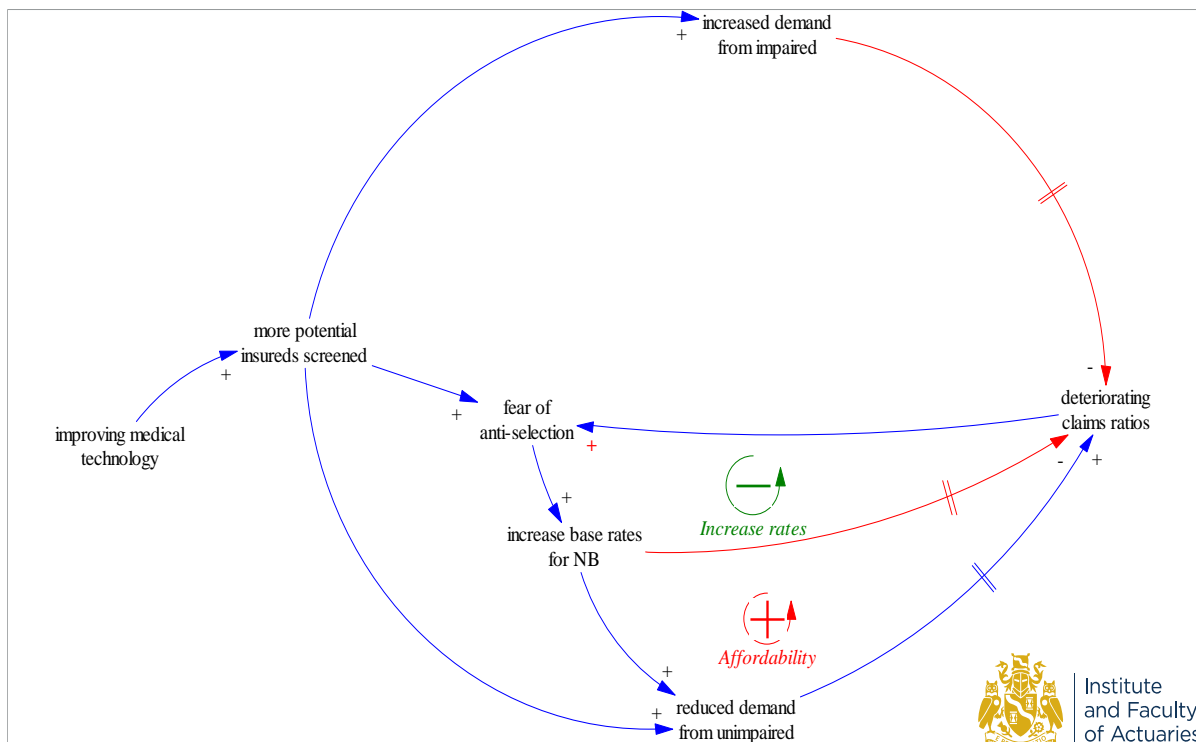


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Initial map: vary premium rates

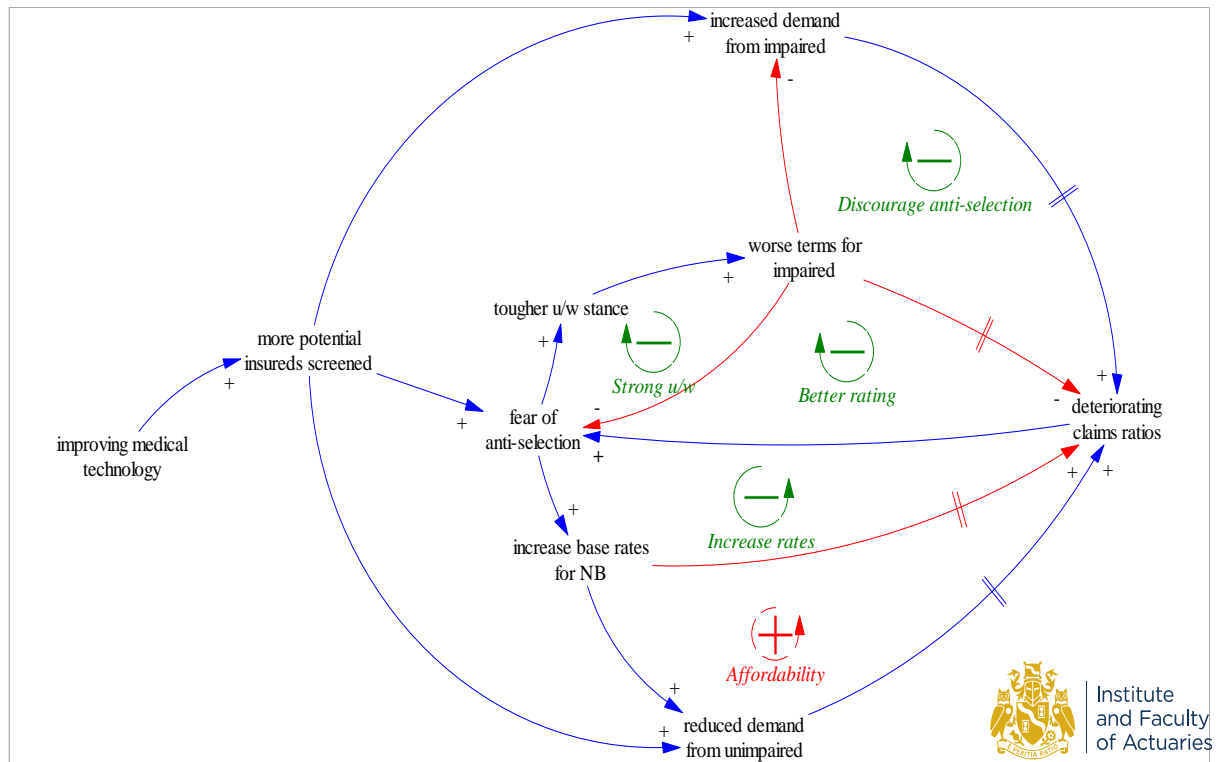


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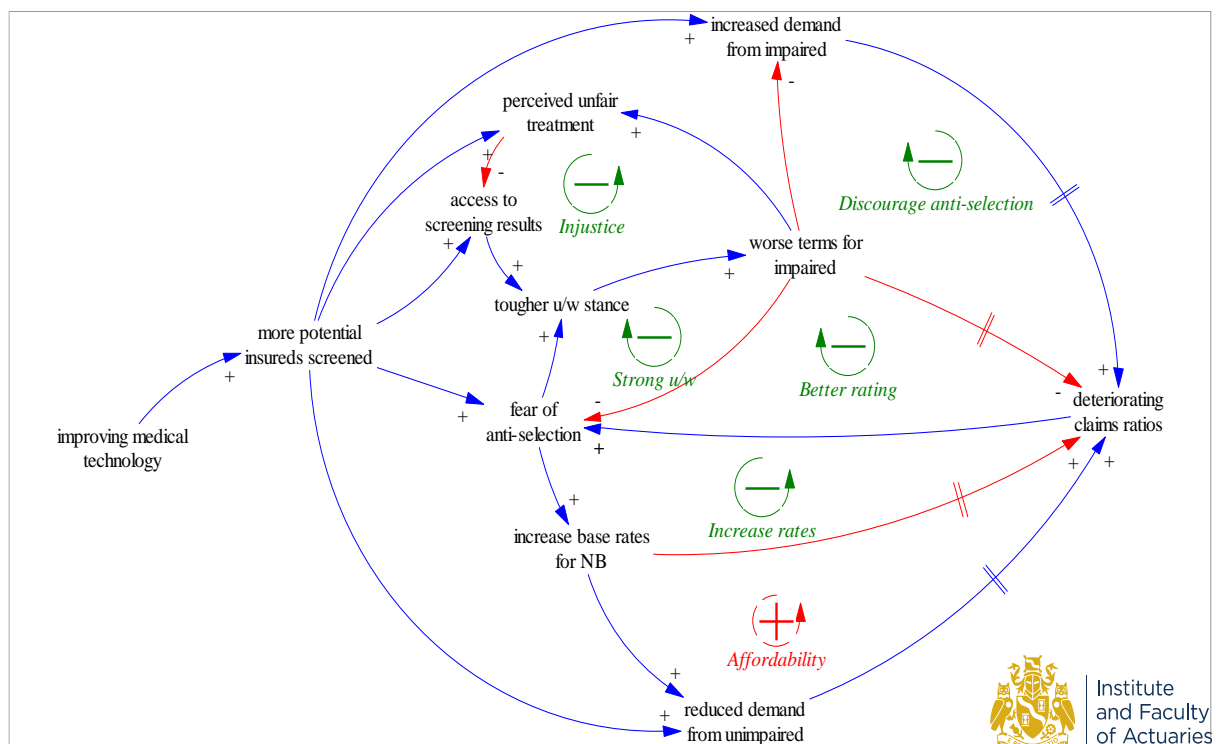
Use new information for underwriting



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Reaction to perceived “injustice”



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SD vs Statistical approach

	Statistical Modelling	System Dynamics
Scope	Not clear when historical evidence breaks down	Boundaries and causal mechanisms explicit
Understanding	Many technical parameters, doubtful reliability in extreme conditions	Relatively few parameters, intuitively meaningful, but values may not be evidence-based
Usefulness	Model approach intuitive, output depends on model continuing to apply in extreme conditions	Causal maps aid understanding of scenario, allow tracing of what drives the extreme results
Credibility	Testing well understood. Genuine extreme behaviour can be confused with statistical “noise” / outliers.	“Reverse-engineer” parameters to fit reality. Limited formulae used, often in “plain language”.



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Modelling Approach 2

Agent-based modelling (ABM)

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What is Agent-based modelling?

- Bottom-up approach
- Start with the “agents”
- Model individual interactions
- Look at overall effect

Practical Example: Tax Advantaged Product



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ABM vs Statistical approach

	Statistical Modelling	ABM
Scope	Not clear when historical evidence breaks down	Clear at Agent level, hidden constraints on aggregate
Understanding	Many technical parameters, doubtful reliability in extreme conditions	Many parameters, easy to understand but not evidence-based
Usefulness	Model approach intuitive, output depends on model continuing to apply in extreme conditions	Helps to understand overall behaviour of groups of interacting individuals
Credibility	Testing well understood. Genuine extreme behaviour can be confused with statistical “noise” / outliers.	Lots of formulae to specify interactions. Could be spreadsheet-based so relatively familiar.



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Modelling Summary

Statistical Model

Key driver: Data

- Very familiar to actuaries
- Focus on stochastic behaviour as time series, correlations and lags between variables

Systems Dynamics

Key driver: Event

- Top-down approach
- Focus on drivers of behaviours, their interactions and feedback effects

Agent-Based Model

Key driver: Agent

- Bottom-up approach
- Focus on behaviour of each “agent”, with aggregate behaviour allowed to emerge



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Summary / Next Steps

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Progress to date

- Looked at past events for pointers
- Possible future impacts
- Two modelling approaches

What next?

- Comments / suggestions / questions?



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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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