



The Actuarial Profession
making financial sense of the future

Life Conference and Exhibition 2012
Adriaan Rowan and Chris Rogers

**An industry survey of
persistency modelling**
A case study – Standard Life

6th November 2012

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Background on the presenters

Adriaan Rowan, FIA

- Manager at Deloitte A&IS Life
- Previously worked in South Africa in Life and Pensions

Chris Rogers, FFA

- Business Planning Actuary in Standard Life
- Previously part of Standard Life's persistency team

Background to the presentation

Under SII, Own Funds reflects expected future profits

- Own funds are exposed to persistency risk
- Not possible to hedge this risk completely
- Only a fraction of analysis done compared to market risk

Goal of the presentation is to:

- Encourage discussions on persistency
- Benchmark the industry's current approach
- Identify possible future areas of development

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Approach to achieving these 3 goals

- 1) Do a review of the academic papers written on lapse modelling
- 2) Use insights from review to do a survey on the industry's current approach to lapse modelling
- 3) Get an industry expert to present a case study on how to approach lapse modelling

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Academic Paper Review – Relevant papers

Dar, A. And C. Dodds. 1989: Journal of Risk and Insurance

Kuo et al. 2003: Journal of Risk and Insurance

Kim, C. 2005: North American Actuarial Journal

Kiesenbauer, D. 2012: North American Actuarial Journal

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Academic Paper Review – Key themes

Long history of lapse studies into the causes:

- Interest rate hypothesis
- Emergency fund hypothesis

Why is it important to understand the causes of lapses?

- To set best estimate and stressed lapse rates accurately
- It may affect the duration of the portfolio, causing ALM issues

The papers identify various models and factors to consider in modelling lapses

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Academic Paper Review – Summary of results

Most common models used:

- General Linear Model – logistic model
- Auto-regressive with lags

Most significant factors identified are:

- Policyholder attributes
- Economic factors
- Product features

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Academic Paper Review – Application of results

Comprehensive sources of external data are available for use

But data applicability is questionable...

A credible multifactor model can be created

- Understand the factors driving lapses and intervene
- Predict future lapse rates with greater granularity
- Set dynamic lapse assumptions

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Survey of persistency modelling – Purpose of the survey

Investigate how insurers:

- Model best estimate lapse rates
- Model stressed lapse rates

Understand to what extent insurers rely on:

- expert judgement
- deterministic models
- statistical models

Discuss the challenges around modelling of lapses

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Survey of persistency modelling – Overview

11 companies completed the survey

- Representing an APE of over £ 3 billion

Focused on 5 product types

- Term, Whole Life, Endowment, Unit linked Saving and Unit linked Pensions
- Not every company sold every product
- Not every company answered each question

Results are presented as three combined groupings

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Persistency modelling survey – The survey questions

The survey covered the following topics

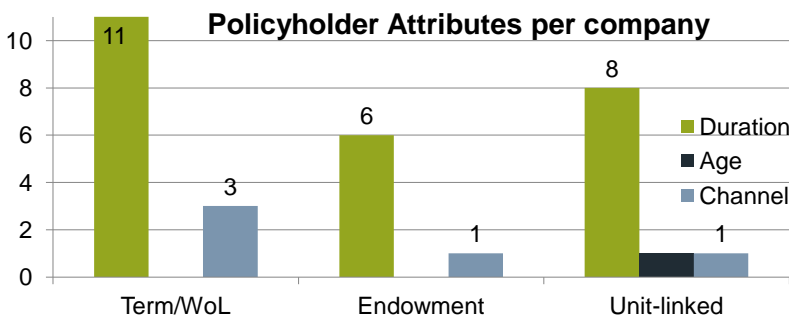
- Best estimate assumptions
- Prudence, pricing and materiality
- Data used
- Monitoring of experience
- Best estimate lapse model
- Stressed lapse rates model – both ICA and SII

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Survey of persistency modelling – Best estimate assumptions

For the three different product types, companies vary their best estimate lapse assumption by the following factors



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Survey of persistency modelling – Best estimate assumptions

Economic factors per company

- Only 3 companies vary lapse rates by economic factors
- Impacts on value of guarantees and MVA free dates
- No consistent pattern on effect of inflation or stock market increases

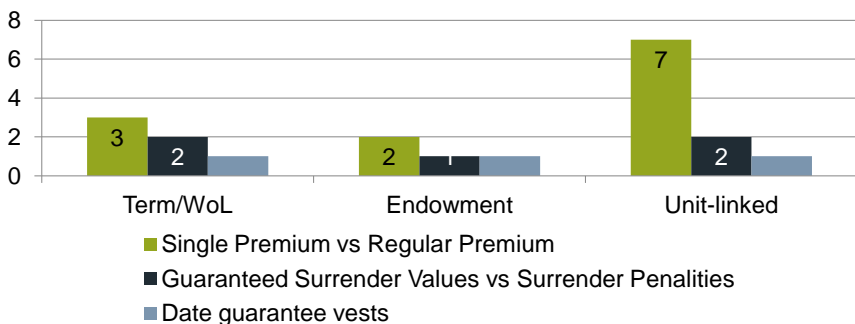
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Survey of persistency modelling – Best estimate assumptions

For the three different product types, companies vary their best estimate lapse assumption by the following factors

Product features per company



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Survey of persistency modelling – Prudence, pricing and materiality

Survey companies determine prudent valuation lapse assumption in different ways

- Using 90th percentile
- Adjusting best estimate lapse assumption depending either on reserve size or most onerous impact

Pricing lapse assumption

- More granular than valuation assumption
- Takes account of recent or expected developments

Materiality of assumption

- Significant impact on reserves and profitability
- In general, it has a greater impact on pricing

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Survey of persistency modelling – Data used by companies

Internal data

- Best estimate assumption: All (except one) use 2 - 3 years
- Mostly annual data, but also quarterly, monthly, half-yearly
- Stressed assumption: 7+ years (except once annually)
- Limited by the availability of quality data, few 10+ yrs

External data

- Used for mass lapse assumption (by 2 companies)
- Lapse stress assumptions (by 2 companies)

FSA persistency survey data

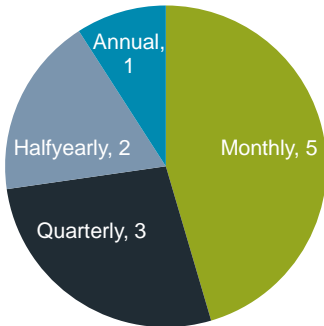
- Only 3 companies use this for benchmarking

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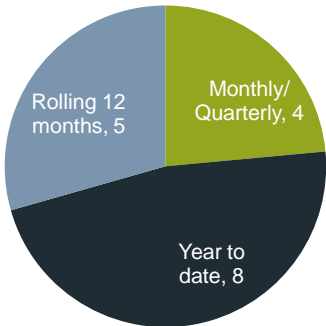
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Survey of persistency modelling – Monitoring of experience

Frequency Monitored



Measure of experience



Reason for lapses

- Only two companies record the reasons
- Used for MI, not for assumption setting

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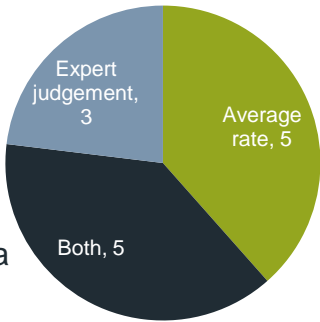
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Survey of persistency modelling – Best estimate lapse models

Assumptions are set using expert judgement or average rates

- Nobody uses a regression model
- Expert judgement to smooth results and remove one-offs

Setting assumptions



No complex models are used

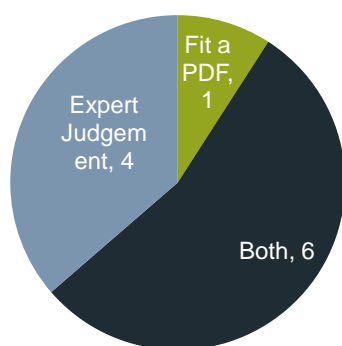
- Method used fits the available data
- Too many conflicting variables or lack of appropriate data

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Survey of persistency modelling – Stressed lapse models: ICA models

ICA stress calibration



Capital Calculation methods:

For those fitting a PDF

- 5 use Normal,
- 2 use Log-Normal

Stress size

- Most stresses set at 50%
- Unit linked has a wider range

Correlation with stresses

- Interest rate, equity, mortality
- 3 use dynamic assumptions

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Survey of persistency modelling – Stressed lapse models: Solvency II models

Capital Calculation methods:

How do you use your internal model

- 6 use a Univariate approach
- 4 use a Monte Carlo approach

When fitting a PDF

- 5 use Normal,
- 3 use Log-Normal
- 1 is still considering a range of possible PDFs

Calibration of PDF

- Use either Actual rates or Actual / Expected rates

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Survey of persistency modelling

– Stressed lapse models: Solvency II models

Issues the insurers are facing

- Need for expert judgement due to lack of data
- Justification of distribution used due to lack of data
- Balance granularity needed to reflect risk vs data and effort required to meet requirements
- Double counting of the mass lapse assumption and normal lapses.

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Survey of persistency modelling

– Conclusions

Industry's approach to modelling is very consistent

- Duration is used as a catch-all variable
- Are the methods used sophisticated enough going forward?

Data seen as insufficient to capture complex factors

- Regular experience monitoring is taking place
- Need for more accurate and detailed data is growing

Capital models are becoming more complex

- Very few data points are being used
- Moving to calibration to actual data and Log-Normal PDF

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Standard Life case study

Chris Rogers

Content

- Best estimate - assumption setting and modelling
- Available data
- Monitoring of experience
- Stressed lapse modelling.

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Standard Life case study - Various decrements

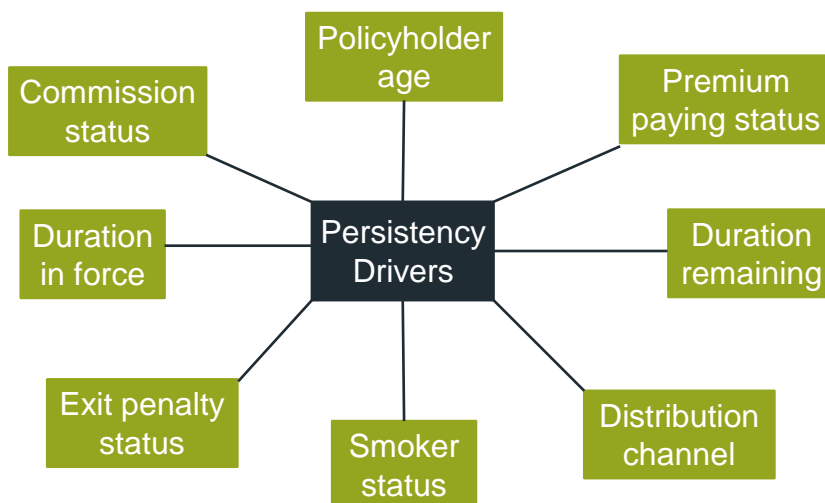
- Full 'offs'
 - Surrenders
 - Lapses
- Partial withdrawals
- Part surrenders
- Drawdown
- PUPs
 - Full cessation of regular premiums
 - Partial reduction of regular premiums

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Standard Life case study

- Drivers of persistency experience



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Standard Life case study

- Process for best estimate assumption setting

- Understand the key drivers of a products persistency
- How much data is available?
 - Length of data
 - Sample size of data
- Analyse historic experience
 - Identify trends
 - Identify one-offs
- Analyse expected future changes to the environment
 - e.g. regulatory, economy, distribution
- Use of short term provisions where necessary

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Standard Life case study - Available data

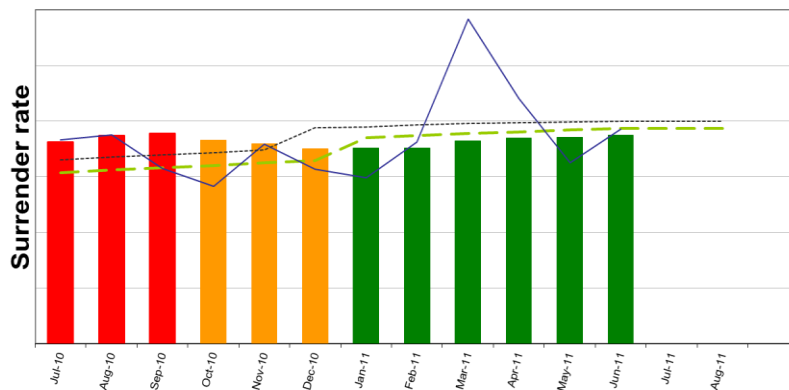
Data sources

- Internal experience
- Economic data
 - Unemployment levels
 - FTSE levels
- FSA Persistency survey
- Regulatory development papers
- Economic forecasts

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Standard Life case study - Monitoring of experience



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Standard Life case study - Monitoring of experience

Monthly monitoring

- Detailed analysis of recent experience
- Monthly, YTD and rolling 12 month trends
- Working with Customer Services and Marketing to understand patterns
- Key financial impacts analysed
- Used across the business to influence retention activity

Weekly monitoring

- High level outflow movements analysed

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Standard Life case study - Stressed lapse modelling

- Calibrating severe scenarios for S2 purposes
- Recognition that there are different types of stress:
 - Long term stress of assumptions
 - Short term stress of experience
- S2 standard model contains a 'mass lapse' element
- This is in line with Standard Life's thinking on persistency risk

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Standard Life case study

- Mass lapse stress

- A number of factors could lead to a short term spike in lapses
- The impacts are likely to differ from product to product
- Two key drivers are market risk and operational risk
- Credible experience for the impact of a market downturn
 - Market crash of 2008/09
- Operational risk event scenarios considered with relevant business experts
 - Quantifying likely policyholder reaction
- Correlated to market and operational risks

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Standard Life case study

- Long term stress

- Long term best estimate basis is based on available data
 - i.e. historic data, current view of future regulatory environment etc
- Therefore there's a risk this isn't right
 - Set a stress to capture this
- Ideally would have a very long data set to analyse historic volatility
- Other external data sources available – but with issues:
 - FSA Persistency survey, industry survey results
- Stress to assumptions, rather than experience

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Which of the three goals have been met?

Encourage discussions on persistency

- Why are economic factors not taken into account?
- Why is FSA data not regarded credible?
- Do we need to debate this or is everyone comfortable with status quo?

Benchmark the industry's current approach

- Current approach is reasonably consistent but not very complex

Identify possible future areas of development

- Which PDFs and calibration methods should we use?
- Could we make use of data to fit regression models?
- Should we try to predict future lapse rates with our models?

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Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.

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