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# IAA Risk Book Policyholder Behaviour and Management Actions

Insurance Regulation  
Committee

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# **IAA Risk Book**

## **Policyholder Behaviour and Management Actions**

**This Risk Book chapter has been developed and approved  
by the Insurance Regulation Committee of the IAA**

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## Comment and feedback

Comment and feedback on Risk Book chapters is welcomed.

To provide comments on chapters of the Risk Book or to report any problems with the website, please send an email directly to: [riskbookcomments@actuaries.org](mailto:riskbookcomments@actuaries.org).

## Version

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## Table of Contents

Introducing the IAA Risk Book .....	1
1 Overview.....	2
1.1 Introduction.....	2
1.2 Aim of this chapter .....	2
1.3 Relevance to actuaries.....	2
1.4 Executive Summary.....	2
2 Identification of Policyholder Behaviour.....	3
3 Recognition of Policyholder Behaviour.....	4
4 Typical Policyholder Options .....	5
5 Triggers Affecting Utilization of Options Embedded in the Policies .....	5
6 Lessons Learned by Insurers & Policyholders .....	7
7 Management of Policyholder Options before the Policy is In Force .....	8
8 Typical Management Actions.....	9
9 Assumptions.....	10
10 Application of Behavioural Economics.....	11
11 Modeling Dynamic Policyholder Behaviour .....	12
12 Summary.....	13



## Introducing the IAA Risk Book

The actuarial profession has contributed significantly to the development of risk management tools and processes, in insurance, pensions and related industries. Actuarial skills are also increasingly being applied in new and developing areas of knowledge.

Actuarial practice continues to improve the understanding, measurement and communication of risk and risk events and their implications through the development of tools and increasingly processes to manage the future uncertainty of risks in a sustainable and transparent way. These tools and processes trace, manage and mitigate the acceptance and transmission of the uncertain outcomes of risks.

The Risk Book is intended to provide high-quality reference materials to support a better understanding of the risks and inherently uncertain future outcomes that need to be managed when delivering financial services products – whether they involve insurance, investments or retirement incomes, or more broadly. The Risk Book is written to be accessible to a wide range of readers, many of whom may not be actuaries or experts in the areas discussed but may be decision-makers in those areas. Consequently, the Risk Book should provide insight into the ideas and concepts behind actuarial topics and concepts. It is therefore focused on being descriptive rather than being formal and mathematically precise.

All the Risk Book chapters are publicly available on the IAA website and are periodically updated. See [www.actuaries.org](http://www.actuaries.org) and follow the path to 'Knowledge / Publications / IAA Risk Book'. A discussion of their structure and relationships is provided in the Chapter: *Introduction – Using the Risk Book*.

The Risk Book is intended to be a dynamic and evolving resource, updated over time, reflecting new areas where actuarial expertise can add value, experience and advances, and topics of current interest and importance. It is electronically distributed to support ongoing updates. Risk Book chapters will be reviewed periodically at least every 5 years and more frequently if significant changes or developments occur.

The development and maintenance of the Risk Book is managed by the Risk Book Editorial Board of the IAA Insurance Regulation Committee.

Many people, mostly actuaries, have contributed to the Risk Book. Contributors are listed on the website.

To submit comments or questions about this Risk Book chapter, or to report any problems with the website, please email [riskbookcomments@actuaries.org](mailto:riskbookcomments@actuaries.org). To express interest in becoming involved with the Risk Book please go to the website and provide the requested information.

## 1 Overview

### 1.1 Introduction

Business planning is based on assumptions about the future. A key uncertainty is policyholders<sup>1</sup> future behaviour. It can have a significant effect on the amount and timing of insurable risks and costs of the company. A company needs to anticipate the potential range of policyholder behaviour (both rational and irrational) and the management actions available to mitigate adverse financial impacts.

This chapter addresses possible policyholder options included in insurance policies, related policyholder behaviour and management actions that can influence or mitigate such behaviour.

### 1.2 Aim of this chapter

This chapter focuses on the dynamics of policyholder behaviour options and related management actions, as well as tools that can be used by the company's management, its board and its supervisors to better understand the sensitivity of company results to policyholder behaviour and to challenge the assumptions made<sup>2</sup>

### 1.3 Relevance to actuaries

This topic is relevant to actuaries because, not only is it an important consideration in product design and pricing, but it is a key parameter in assessing technical liabilities and capital requirements.

### 1.4 Executive Summary

The following are the key messages of this chapter:

1. Companies have understood the existence of traditional policyholder behaviour and have taken it into account in product design and business planning. Due to changes in the business environment, accounting standards and revised solvency requirements, the impact of policyholder behaviour on insurers; liabilities and capital requirements have become more significant.
2. Policyholder behaviour options depend on the type of insurance and its intent, whether for life or non-life policyholders.
3. The exercise of certain policyholder options can significantly affect the insurer's profit, and management of these options materially impact pricing, valuation, dividends, hedging and ALM actions.
4. Managing policyholder behaviour risks requires co-ordination within the company from actuaries, risk managers, investment personnel and lawyers, as well as those in marketing and those who provide day-to-day contact with policyholders and their advisors.

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<sup>1</sup> Policyholder in this chapter refers not only to policyholders but in some cases also to the insured and the beneficiaries.

<sup>2</sup> Discussion of modeling techniques can be found in IAA: Stochastic Modeling - Theory and Reality from an Actuarial Perspective, pp. 145 – 147

5. Policyholder behaviour affects both the size and quality of the company's liabilities. It can also affect its capital requirements in either a positive or negative manner.
6. Legal requirements should be taken into account when including policyholder behaviour in certain situations, such as when calculating technical provisions.
7. Policyholder behaviour impacts the entire policy cycle starting with the product design phase.
8. Actuarial modelling often requires the estimate of the impact of policyholder behaviour on cash flows. Such models require an understanding of the drivers of policyholder behaviour.

## **2 Identification of Policyholder Behaviour**

Policyholder behaviour should be considered during the product design phase. In product development, it is not essential to design products so that policyholder behaviour does not adversely impact profitability. However, the company should recognize and estimate its potential impact so as to avoid options which could be too costly relative to the product's profit margin and market. The assumptions made during this phase should be assessed and verified later during the product management cycle.

To this end, the company should identify the options available in the policies and the range of expected outcomes of both economically logical and non-beneficial behaviour of the policyholders.

Policyholder behaviour is not the same as risk classification or risk measurement. In the underwriting process the company chooses which risks it is willing to take. For example, new technologies, like telematic devices and related pay-as-you-drive products, enable more accurate rate making. Though they reflect the policyholder behaviour, they are examples of risk classification rather than policyholder behaviour as understood in this chapter.

There is normally a trigger that results in the exercise of economically logical behaviour. If a mathematical model includes the same trigger, then the expected exercise can be incorporated in the assumption used.

Logical behaviour includes cases when policyholders terminate their motor insurance policies because they are able to obtain the same cover from another insurance company at a lower price. However, it may be difficult to forecast the extent this competitive pressure triggers a policyholder reaction, including anti-selection aspects.

Logical behavior also includes cases when policyholders surrender their life insurance policies when the surrender value is greater than the value to the policyholders of continuing the policies in force to the end of the policy period.

Policyholders can also exhibit what appears to be non-beneficial behaviour. This can occur when a policyholder terminates a policy for liquidity needs, even though the guaranteed interest is higher than the expected yield from alternative investments. Non-beneficial policyholder behaviour is common, is well-studied and will be discussed later in this chapter. When modelling policyholder behaviour such behaviour needs to be anticipated and modelled.

One reason irrational behaviour arises is that policyholders may not have enough information available to make rational decisions. Non-beneficial behaviour in general reduces as market information regarding the option and other market data becomes more well-known to policyholders. It also arises when factors such as convenience or value of a brand exist. Such behaviour can also occur as a result

of policyholder circumstances independent of the contract itself (e.g., a need for cash, tax status or a reaction to media coverage of the company).

### 3 Recognition of Policyholder Behaviour

Policyholder options can affect the profitability of the product and its product management cycle. Notably, this includes the expected cost of guarantees, the cost and feasibility of proposed hedging arrangements as well as the effect of moral hazard and anti-selection.

Possible policyholder behaviours should be taken into account when projecting future cash flows. This applies not only to the calculation of premiums and technical provisions, but also to the development of stress tests, sensitivity tests, ALM calculations, replicating portfolios and market consistent economic values to enable testing of different policyholder behaviour assumptions.

When calculating technical provisions for accounting and capital requirement purposes, there may be rules regarding whether policyholder behaviour can be or has to be taken into account in the estimation of cash flows; for example, whether policy lapses can be incorporated in these calculations. In some jurisdictions these rules include the anticipation of policyholder behaviour.

For example, Solvency II regulation<sup>3</sup> explicitly requires that policyholder behaviour has to be taken into account: "When determining the likelihood that policyholders will exercise contractual options, including lapses and surrenders, insurance and reinsurance undertakings shall conduct an analysis of past policyholder behaviour and a prospective assessment of expected policyholder behaviour."

IFRS 17 (as of 2019) mentions in article 33 (a) that the estimates of future cash flows shall "incorporate, in an unbiased way, all reasonable and supportable information available without undue cost or effort about the amount, timing and uncertainty of those future cash flows." Further, the IFRS application guidance (Appendix B) states in paragraph B62 that "the measurement of a group of insurance contracts shall reflect, on an expected value basis, the entity's current estimates of how the policyholders in the group will exercise the options available, and the risk adjustment for non-financial risk shall reflect the entity's current estimates of how the actual behaviour of the policyholders may differ from the expected behaviour".<sup>4</sup>

Accounting and regulatory rules also include provisions relating to contract boundaries<sup>5</sup>. The contract boundary is the point after which premium cash flows associated with insurance coverage may not be recognized. It is a contract level boundary between existing and future business. Current contract boundary regulations usually take into account both eventual (but not always anticipated) policyholder behaviour and management actions. For example, if the company can terminate a contract, reject premiums or amend the premiums or benefits, then the expected reactions of the policyholder must be anticipated and reflected. So, determination of contract boundaries requires analysis of the terms and conditions in the policy contracts.

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<sup>3</sup> See Commission Delegated Regulation (EU) 2015/35, art 26 (implementing measures on Solvency II) ([http://eur-lex.europa.eu/eli/reg\\_del/2015/35/oj](http://eur-lex.europa.eu/eli/reg_del/2015/35/oj))

<sup>4</sup> IFRS 17 Insurance Contracts

<sup>5</sup> E.g. IFRS ED 4 art. 22 (e), 23, 24 and B62 – 64 and Commission Delegated Regulation (EU) 2015/35 art 18 (implementing measures on Solvency II)

In the case of some long-term analysis, such as ORSA scenarios, ALM models and calculations of market consistent economic value, it may be appropriate to ignore regulatory or accounting based contract boundary limitations and apply assumptions of policyholder behaviour happening until the risks have expired. Especially in non-life insurance when the contract boundary is one year or less and the company wants to include the new sales in the scenarios, other contract boundary definitions may be used.

## 4 Typical Policyholder Options

The availability of policyholder options can affect the actual policyholder behaviour. Policyholder options depend on the contract terms and conditions of the products involved. For instance:

- The longer the guaranteed coverage period of the contract, the more likely it is that the contract contains options that need special attention.
- In insurance lines where the contracts are renewed regularly (usually annually), the main concern is the extent to which the policyholders renew or continue their contracts.

The following is a non-exhaustive list of common options in life insurance and annuity policies:

1. lapses and surrenders
2. changes of insurance cover or change in other features
3. changes to premiums/contributions
4. alternative benefits at death (lump sum/annuities)
5. loyalty bonuses (within a company or a group)
6. continued or renewed insurance at the end of term
7. paid-up policy options
8. taking out or repaying policy loans
9. flexible pension start and end age
10. at the end of the savings period, payment as lump sum or as an annuity
11. selection and change of funds in unit linked policies
12. switch-option (reallocation of underlying assets between funds and with profit reserves)
13. settlement options at death, maturity or surrender.

Many options are of financial importance for the companies because of the guarantees embedded in the renewal years of a policy.

In non-life insurance, points 1 – 6 in the above list are relevant, but the possible costs of options differ from those in life insurance.

## 5 Triggers Affecting Utilization of Options Embedded in the Policies

The following are some of the reasons why policyholders might exercise options:

1. Change in policyholder circumstances leading to a change in need for coverage: A policyholder sells his car and the need for insurance ends, or after a divorce there is no need for a joint life

insurance policy. Such a trigger may also be due to a change in perspective by a policyholder, such as considering flood insurance to be useless because the last flood was 30 years ago, or the house is far from the riverbank.

2. An increase in premium or decrease of benefits, especially when compared to policies provided by competitors: In certain insurance lines, such as life insurance and motor insurance, this has become more and more relevant after the introduction of user-friendly premium comparison websites.
3. Claims practices: Rejection of a claim may cause dissatisfaction, leading to a switch in company.
4. Change in insurer's reputation or strength: News of unethical practices of the company or a poor financial situation may increase lapsation rates.
5. Influence of the distribution channel: Influence and recommendations of the sales agent can affect the use of available options by the policyholders.
6. Change in competition: Competitors start selling the cover at a lower premium; newcomers offer more competitive premiums or contractual features; or substitute investment products become available.
7. Change in economic environment: In some business lines, such as workers' compensation insurance, the economic cycles affect the premium. In life insurance the policyholder may alter their choice of the economic options available in the contract (e.g. selection of funds or contribution rates).
8. Changes in regulation or employer benefit provisions: Some changes, like tax-deductibility, may affect the viability of a whole product line
9. Mortality anti-selection: The policyholder chooses between alternative indemnities, e.g. pension and lump sum.
10. Immediate need for money: The policyholder builds a house, or their financial situation deteriorates.
11. It is beneficial to use the option: Expectation of projected future development of the surrender value is less than the current surrender value, e.g. the case in variable annuities.
12. Selling of a life insurance policy in the secondary market where a third party buys the policy and keeps in force (not possible in all countries). In this case the market selects those with worsened mortality and "buys" the policy by providing a payment to the original policyholder and assumes the remaining premium obligations in order to be paid the death benefit.

Points 9 – 12 in the above list are relevant only for life insurance and annuity policies.

To model the potential cost of these options it is necessary to understand the underlying triggers. Sometimes the primary trigger can be quite unexpected. For example, in 2003, SARS (severe acute respiratory syndrome) caused people to cancel trips to Singapore which caused an economic downturn with lay-offs. As a result, laid-off employees then lapsed their policies due to a need for cash. While the reason for the massive number of lapses was the change in the economic environment, the trigger was SARS.

A health insurance example is where a company could give policyholders a company card for paying health-related expenses. This made it easier for the policyholders to see a doctor, which increased the number of claim events. This also changed the behaviour of the doctors as the doctors knew that the

patients did not need cash to make additional medical appointments and examinations. This option increased claims paid as a whole; as a result, the company took the management action to terminate the use of company cards.

It should be noted that the use of an option can result in either positive or negative financial results. For example, in a low interest rate environment lapsation of a policy may benefit the company because it loses an unprofitable contract. However, quite often the use of the option is adverse.

## 6 Lessons Learned by Insurers & Policyholders

Some options have turned out in the long run to be quite costly for insurers. Here we present some examples:

- **Long term guarantees**

During a low interest rate environment, some companies can find that the interest guarantees provided in some of their long-term life and annuity products are now too aggressive. If in previous years when underwriting policies, 4 – 5 % interest guarantees may not have been considered unusual, a low interest rate environment results in such a guarantee having value to policyholders and a cost to the company. Even though the companies may have hedged their interest rate risks, the policies may have had options that allow future premiums and deferred annuities to be entitled to the same interest guarantees. Also, an option to amend the annuity period by postponing the timing of annuitization has proven costly. For example, if the policy has 4 % guaranteed interest, postponing the annuity in a 1 % interest rate environment would increase the costs to service the policy.

- **Universal Life**

Highly flexible universal life policies have created the situation where premiums combined with the remaining funds have been insufficient to cover the mortality costs of the insurance, resulting in the policies lapsing with, perhaps, a gain to the company. On the other hand, there has been a legal dispute in the US over the ability of insurers to raise mortality charges in order to address increased costs.

- **Variable annuities**

Another set of products that may become costly have been variable annuity products with special rider guarantees. The following set describes many of the product options in the market:

GMDB	Guaranteed Minimum	Death Benefit
GMWB	Guaranteed Minimum	Withdrawal Benefit
GMAB	Guaranteed Minimum	Accumulation Benefit
GMIB	Guaranteed Minimum	Income Benefit

The guarantee itself varies by product. Examples are a return of paid premiums with/without loadings, bonuses or possibly a ratchet provision.

Policyholders can make decisions regarding the type of assets invested and the guarantees provided resulting in the companies bearing some of the investment risks for these assets. This can result in the products becoming costly for the companies. There is also an eventual possibility for anti-selection if the value of the linked investments is below the guaranteed minimum.

Managing the risks of these variable annuity options requires hedging based on stochastic calculations. However, the death cover of a GMDB product may be charged annually and this annual premium equals the economic mortality cost to the company. This aspect of the contract can be compared with annual term life insurance.

- **Health insurance**

The claims ratio of health insurance can become higher than expected if the premiums are fixed and the policyholder has the option to renew the policy. Those policyholders whose health has declined tend to automatically renew the policy while healthier insured may be able to obtain less expensive, freshly underwritten contracts, leaving the remaining policies to be of worse than expected health. Also, premium increases may not keep up with the claims costs (sometimes resulting in an assessment spiral).

- **Pay-as-you-live Products**

The pay-as-you-live products whose insureds are encouraged to use health applications and wearable devices to monitor their living habits, also differentiate the companies and may affect the policyholder behaviour assumptions.

## 7 Management of Policyholder Options before the Policy is In Force

The possible effects of policyholder options, as well as any possible resultant management actions, should be considered during the product design and pricing phases of product development.

Once the company has identified the policyholder options it wants to include in the new product, the probability of their utilization and their impact on expected cash flows and capital requirements should be estimated. If the options are exercised in a manner adverse to the insurer, the need for, feasibility of, desirability of, and design of additional charges should be considered.

Limiting the available options, their level or their type may be possible and should be considered in the initial product design of the terms and conditions in the policy contract. Some companies have experienced problems when allowing switches into asset funds whose performance cannot be easily hedged. This has resulted in onerous costs resulting from the guarantees.

Many actions, especially for non-life insurance, occur prior to the issuance of the contract. These actions can include:

1. The contract terms can restrict coverage or require certain policyholder actions from the insured, including:
  - a. Timely notice of an event that may lead to a claim
  - b. Timely remediation to limit the size of a loss (e.g., covering up a hole in a roof)
  - c. Required duty of care prior to a loss

- d. Required purchase commensurate with the value of a property (for property insurance) or requiring mandatory co-insurance to the extent the property is underinsured
2. Investigating the exposure before writing the policy (e.g., seeing if the house or car to be insured actually exists and is currently undamaged)
3. Use of facultative reinsurance or other reinsurance treaty arrangements
4. Underwriting (e.g. to evaluate the likelihood of moral hazard with a particular client).

## 8 Typical Management Actions

Pricing best estimates need to be linked to the financial effect of possible policyholder options, and the combination has then to be combined with management actions. In order to calculate the effect of management actions, assumptions have to be made about whether management will take actions (and if they have the right to do this). All of the permutations for possible actions by both the policyholders and management are typically included in scenario cash flow projections to better understand the risks for the company.

In addition to reacting to the exercise of policyholder options, the company management needs to consider whether the current terms of policies or management behaviour as to claims practices (such as claim expenses) and/or renewal rights impacts policyholder behaviour.

Although management has to decide on appropriate actions, for the calculation of scenarios a realistic management action plan is needed. The management action plan should be revisited regularly, especially where such actions have or are expected to deviate from the plan. This management action plan is the basis for the calculations of future cash flows in scenarios.

Examples of the types of management actions include:

- Annual bonuses determination. Companies may have a bonus (policyholder dividend) policy or practice which can be modelled. In some countries there is a requirement to have a written bonus policy.
- Adverse experience. Significantly adverse policyholder behaviour can trigger management actions. For example, if the policies become unprofitable, some jurisdictions permit the amendment of premiums and terms of the policies. Sometimes this action requires the consent of the insurance regulator. How to take this into account in the calculation of profitability and capital requirements depends on the jurisdiction.
- A reallocation of assets. For example, there can be legal restrictions regarding how large an equity exposure the company can have in its asset portfolio and this could lead to the company hedging certain assets.
- Claims practice. A company can change its approach to settling claims, including the type of claims that should be rejected under the terms of a contract. Some claims practices are very liberal with regards to contract terms while others are very restrictive. A change in claims management or claims policy may be a possibility, but policyholder expectations at time of sale need to be considered as well.
- Sales. A change in sales strategies can also be considered. Expenses can be cut, especially if the volume of the product has decreased. Some product lines can be put into a run-off position.

- Commissions. If the policyholder behaviour has been affected by the distribution channel, management may consider restructuring the commission policy.

## 9 Assumptions

Modeling policyholder behaviour and management actions requires setting assumptions where, in many cases there may not be a significant amount of historically relevant data. For example, Solvency II requires that the assumptions used to calculate the best estimate be based upon up-to-date and credible information and realistic assumptions<sup>6</sup>. Care is thus needed in setting those assumptions where data may not be credible/realistic.

There are many drivers that affect policyholder behaviour that also simultaneously affect assumptions. For example, lapsation may depend on the age of the insured, type of policy and duration in force. Some findings show that lapsation of investment products has a peak at approximately the age of 30 and then at the retirement age. On the other hand, lapsation in general may slow down gradually over the policy term. This suggests the influence of age is due to policyholders of savings policies having competing needs for money during their life cycle. At the age of 30 the young families tend to buy or build their houses; after retirement age, people may prefer travel. Quite often the option to withdraw money from the policy is used as a selling argument.

Sometimes lack of data suggests the use of one specific assumption, but special attention is needed in the selection of the assumption type. For example, if the cash flow duration covers a long period of time, use of the age of the insured as an explanatory variable may be appropriate because it doesn't depend on the length of the cash flow and old data may not be available or is not reliable. However, in practice this may not always fit with the observations of how policies lapse during the first years and when there are significant option/benefits toward the end of the period of the cash flows.

An additional issue to consider is when assumptions are set in a set of risk neutral scenarios. Since the scenarios themselves are "exaggerated" in order to reflect risk, there will never be real experience available to validate them. In both cases, thoughtful judgement is needed when modelling the impact of these different drivers.

As shown in these lapsation examples, the challenge is to determine the different drivers and quantify the sensitivity of policyholder behaviour. Both statistical methods and expert judgement can be used for this purpose. A data warehouse can be used for analysis purposes, though it will be important to document where the data may not contain all possible drivers of the policyholder behaviour. For example, not including the amount of guaranteed interest or the age of a car would cause these possible drivers to be omitted from the analysis.

Not all policyholder behaviour should be incorporated into the calculation model. The data from which the premiums have been determined already reflects the past policyholder behaviour. Companies know approximately how many, for example, of travel insurance claims can be explained by insurance fraud.

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<sup>6</sup> Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II), art 77 (2) The delegated acts have additional provisions regarding assumption setting.  
(<http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32009L0138>)

Most insurance fraud expenses are embedded in the premiums. Only if it is likely that management actions could reduce the insurance fraud, then the effect of reducing insurance fraud can be considered.

Instead of incorporating the policyholder behaviour rate into the calculation model, the company should be aware of the volatility of the future policyholder behaviour. For example, a discount from the first-year premium of a household insurance policy may attract some new customers, but the likelihood that the policies will lapse in the future is increased.

Also, the behaviour of policyholders differs over time. It is possible to identify several different generations whose values and behaviour differ from each other. A classic example is the difference between baby boomers and generations X, Y and Z. The use of old data is therefore limited.

In order to assess policyholder behaviour better for the purpose of setting assumptions and modeling cash flows, surveys targeted to the policyholders and questionnaires in the event of claims can provide valuable information. Also useful are retrospective studies of past behaviour under different circumstances, where available. Because of the many drivers who use policyholder options, predictive modeling, using big data approaches and advanced algorithms might prove useful.

Possible adverse effects of policyholder behaviour should be assessed and reflected. One approach is taken by Solvency II which has laid a separate capital requirement for mass lapsation.<sup>7</sup>

In the calculation of technical provisions for regulatory purposes, policyholder behaviour is typically limited to existing policies only, and sometimes considered only for a short period of time. However, some calculation assumptions, such as premiums, may be affected by the competitive pressure that the companies are facing. Due to lapsation of renewable policies, this may require the management to decide on decreasing the premiums which should be taken into account in long-term analysis.

## 10 Application of Behavioural Economics

In modelling, it is necessary to understand policyholder behaviour. In this process historical data and behavioural economics methods may be used.

Deciding to utilize policy options constitutes a part of a personal decision-making process. Behavioural economics studies the problem of the factors behind people's financial decisions. The application of behavioural economics helps to better understand policyholder behaviour. Useful references to this subject are Daniel Kahneman's and Richard H. Thaler's books. From an insurance industry point of view there is also a paper on this topic published by the Society of Actuaries<sup>8</sup>. The following describes a few findings from behavioral economics.

Behavioural economics questions whether people always act rationally. Insurance companies should ask the same question with regard to their policyholders. Some, but not all policyholders behave irrationally.

Behavioural economics has found that people tend to be risk-averse for losses and risk-seeking for gains. Risk aversion is often in fact the ultimate incentive to purchase insurance coverage. When having

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<sup>7</sup> See Commission Delegated Regulation (EU) 2015/35 art 142 (6) (implementing measures on Solvency II)

<sup>8</sup> Daniel Kahneman: "Thinking, fast and slow", 2011, Farrar, Straus and Giroux;

Richard H. Thaler: "Misbehaving", 2015, W. W. Norton & Company, Inc.

Society of Actuaries: Modeling of Policyholder Behavior for Life Insurance and Annuity Products

to make a choice between a certain loss and an uncertain higher loss, people tend to choose the certain loss. If a choice has to be made between a certain gain and an uncertain bigger gain but with a possibility to increase the loss, people tend to choose the less risky option. In other words, if at all possible, they try to avoid a loss. As a result, people tend to sell those investments from where they gain profits rather than those from where they make losses.

Because of the so-called anchoring effect people may value the loss by comparing it to the purchase price or a later higher value. People tend to consider that they make a loss if the value of shares has for example once been 400 though it was bought at 300 and the current price is 350.

Not all people are risk and loss averse to the same extent. The mixture of types of policyholders affects the size and quality of the insurance portfolios, as will be discussed in the next paragraph.

In addition, the existence of an endowment reduces lapsation rates. When people have bought insurance, most tend not to want to lapse it, even when lapsation represents financially rational behaviour, though some of this inertia may be due to different products not being easily compared. In addition, in life and health insurance, surrendering a policy may be irrational if it is not possible to agree on another contract in another company due to health reasons.

This behaviour also affects lapsation of different types of savings policies and deferred annuities.

Also, the selection of insurance products affects the surrenders. Customers who own more than one product from a company are less likely to shop around for new deals, but dissatisfaction may result into lapse of all policies of the policyholder at the same time. The lapsation rates may depend on whether the policyholder is a company or an individual person, but there may be interlinkage between the company and the individual person. If the representative of a company is not satisfied with the premiums or claims practices of a workers' compensation policy, also the policies of the representative may be terminated at the same time as the policies of the company.

Products may be bought to ensure continuation of coverage (and hence, "peace of mind"), not necessarily for an investment. Thus, although rationality is valid, it takes into account broader considerations than just looking at the financial impacts.

There are some findings that in financial conglomerates that manage the same funds in mutual fund companies and life insurance companies, the customers of life insurance companies tend to be "stickier" in their persistence to maintain the product.

It is also worth noting that those who are wealthy do not react as strongly to the loss of equivalent amount of money as do those who are not. Thus, the characteristics of the policyholders also affects the extent of lapsation.

## **11 Modeling Dynamic Policyholder Behaviour**

Dynamic lapsation models can be used to model policyholder behaviour, as addressed in the IAA's book on Stochastic Modeling.<sup>9</sup> The book proposes to link the lapsation rate to a dynamic factor which depends on the product in concern and one or more external factors, like changes in investment markets and bonus rates. Premiums of some product lines, e.g. workers' compensation insurance, are linked

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<sup>9</sup> IAA: Stochastic Modeling - Theory and Reality from an Actuarial Perspective, pp. 145 – 147

with economic cycles and their lapsation rates can be dynamically linked to the output of economic scenario generators.

In life insurance the dynamic factor is often more complicated and thus subject to greater uncertainty because there are several drivers that simultaneously affect lapsation, including policyholders' health condition, changes in competitive position (including in some cases products offered by non-insurance companies), age, size of the policy, policy duration, guaranteed interest and extent of the surrender charge, if any. Some life companies have not found a significant correlation between lapsation rates and economic cycles. The dynamic factor also often depends on the terms of the policy. For example, in a low interest rate environment, the guaranteed interest rate and possible bonus policy will have greater significance.

Policyholders can be classified into those who are risk-averse and loss-averse and those who are not.<sup>10</sup> Depending on the mix of policyholders, the effect of the aggregate behaviour between two groups of policyholders may go in opposite directions. It is relatively easy to show that under some assumptions the lapsation rate of the whole portfolio may vary in an unexpected way and change from year to year.

Thus, policyholder behaviour depends not only on the products involved and the financial markets, but also on economic and personal situations. As a result, testing the validity of the assumptions and models used should be conducted on an ongoing basis, using alternative assumptions.

## 12 Summary

Policyholder behaviour and management actions and their drivers, while differing for life and non-life business, are important considerations for an insurer. They should be taken into account not only during the product design phase, but through the entire policy cycle.

Modeling is often required, especially in long-term analyses, like in life insurance and deferred annuities and in market consistent economic value calculations in general. Modeling and estimating policyholder behaviour are challenging and requires a thorough understanding of the company's policyholders and their behaviour for each contract type. If relevant data are not available, the actuaries may use simpler methods and expert judgement, but should test results using a range rather than only a single set of policyholder behaviour assumptions. Even here, those methods need to lay the groundwork for better understanding of the drivers of the policyholder behaviour. Company management and insurance supervisors can then challenge and assess the assumptions used in actuarial calculations and the degree to which the modeled behaviours are validated by emerging experience.

There are multiple heterogeneous sets of policyholder behaviours. In addition, behaviour and actions vary geographically and by distribution systems.

Cash in a policyholder's pocket and certainty have great value. Policyholders and shareholders may not be economically rational in the classical sense and may act on other reasons, not apparent to the company, including inertia, suspicion, misinformation, short term horizons of self-interest or longer-term tax and/or estate needs.

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<sup>10</sup> See: Daniel Kahneman: "Thinking, fast and slow", Prospect Theory, pp. 278 – 288, 2011, Farrar, Straus and Giroux;  
Richard, H. Thaler: "Misbehaving", Value Theory, pp. 25 – 34, 2015, W. W. Norton & Company, Inc.



An increase in the rate of lapsation and surrenders used to value insurance liabilities (notably life insurance and annuities) may increase the value for some contracts and decrease it for others at the same time. A similar situation arises in some long-duration non-life contracts. Providing for adversity in the valuation of insurance liabilities frequently requires consideration of the direction of the lapse adversity at the contract and duration level. A mass lapse assumption (as part of stress testing or a solvency shock test) will therefore affect the value of insurance liabilities in an uneven and possibly unexpected fashion. The value of insurance liabilities (notably life insurance and annuities) can be very sensitive to the policyholder behaviour assumption, especially in the presence of significant policyholder options.





IAA Risk Book  
Policyholder Behaviour and Management Actions

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