

# **INSTITUTE AND FACULTY OF ACTUARIES**

120

## **Subject CP3 – Communications Practice**

### **Scenario Material**

#### **INSTRUCTIONS FOR CANDIDATES**

You are provided with this advance information to enable you to digest it in your own time, and not under exam conditions. Please note that this is an exam to test your ability to communicate technical information to a non-technical audience. It is not a test of your knowledge of any technical actuarial knowledge or skills. As such, any technical actuarial information or techniques that you need to answer the question will be provided. You do not need to spend time revising other subjects or looking for further information on the topics covered in the paper. You must assume that any numerical information provided in this scenario material is correct unless otherwise stated.

## Background

Insure One Limited is a general insurance company writing home (buildings and contents) insurance. It was founded in 2011 by One Group Limited. One Group Limited owns a price comparison website where consumers can fill in their details on an online form and get quotes from many different insurers for the cover they want. Insure One's products are sold via the internet through One Group's price comparison website, other price comparison websites in the market, and directly to customers through Insure One's website.

Insure One aims to price in a granular way with the aim of writing business that other companies may have mispriced. Its pricing team has developed the following three-part philosophy, which underpins its pricing:

- Differentiate our pricing by any factors that are statistically significant.
- Ensure best estimates are truly central – avoid unnecessary prudence.
- Maximise margins while aiming to be competitive in every quote.

Prices are reviewed annually, principally using a number of Generalised Linear Models (GLMs). You have been provided with an extract from the year-end 2019 pricing review document. This document is used to capture an overview of the results of the review, along with the decisions made by the pricing committee about the pricing approach to take the following year. The pricing committee comprises the Commercial Director, the Proposition Director (responsible for the design of the product), the Head of Pricing, and the Chief Risk Officer.

## Pricing Review Document

### December 2018

A Generalised Linear Model has been run based on data from policies sold from 1 January 2017 to 30 July 2019. The GLM takes the following basic form:

$$Y = \beta_i X_i + \alpha$$

where:

$Y$  is a measure of claims cost.

$X_i$  are a set of independent variables that may impact the claims cost.

$\beta_i$  are a set of coefficients of the independent variables determined when the GLM is fitted.

$\alpha$  is the intercept determined by the fitting of the model.

The following table was presented to the pricing committee and outlines the key results of the fitting of the GLM. Notes below the table offer some further explanation.

$X_i$	<i>Explanation of variable</i>	$\beta_i$	<i>P-value</i>	<i>Approximate impact on average premium</i>
$X_1$	Value of property	-6.002	0.006	±15%
$X_2$	Value of contents	-2.622	0.013	±6%
$X_3$	Socio-economic group 1	7.324	0.015	+18%
$X_4$	Socio-economic group 2	4.884	0.031	+11%
$X_5$	Socio-economic group 3	3.902	0.049	+9%
$X_6$	Socio-economic group 4	-0.615	0.077	-3%
$X_7$	Socio-economic group 5	-5.767	0.028	-13%
$X_8$	Socio-economic group 6	-8.600	0.016	-20%
$X_9$	Location	5.601	0.002	±185%
$X_{10}$	Age of policyholder	-1.233	0.009	±6%
$X_{11}$	Marital status 1	-1.423	0.045	-10%
$X_{12}$	Marital status 2	9.329	0.039	+25%
$X_{13}$	Marital status 3	-2.559	0.138	-15%
$X_{14}$	Number of people in household	0.689	0.276	±4%
$X_{15}$	Enhanced security on doors and windows	-4.506	0.114	±5%
$X_{16}$	Number of household pets	0.655	0.021	±3%
$X_{17}$	Open fire or wood burning stove	0.940	0.344	±2%

## Notes:

- 1 Value of property and contents indicates the change in premium per £ of cover. For example, covering a £200,000 property will likely cost more than covering a £100,000 property, because the amount of cover is higher. However, the rate per £ covered is likely to be less for a £200,000 property than for a £100,000 property because claims experience shows us that claims are generally lower as a proportion of the amount insured, and less frequent, as the value of the insured property or contents rises. It is only this latter impact that is being assessed in this GLM.
- 2 Socio-economic groups are based on the policyholder's postcode and occupation. Two separate GLMs are used to rank claim experience by postcode and occupation. The results of these models are combined to produce a single figure, which is then mapped to six socio-economic groups. These groups are used in this GLM because in the past they have been found to be a strong predictor of claims experience.
- 3 Socio-economic group 6 is the most affluent group – in general, these are professionals on relatively high salaries. Group 1 is the least affluent, and in general these people are unemployed.
- 4 Three marital statuses are used:
  - (a) Marital status 1 represents married/civil partnership.
  - (b) Marital status 2 represents single/divorced.
  - (c) Marital status 3 represents widowed.
- 5 'Number of people in household' includes all occupants (they do not need to be related to the policyholder) and includes children.
- 6 The quote system maps the security arrangements of the property of each potential customer into a binary output (i.e. 'yes' or 'no' is assigned depending on whether they have enhanced security, e.g. a burglar alarm). This mapping is set using the advice of security consultants. The GLM uses the output of this mapping.
- 7 The intercept has not been shown as it does not directly relate to anything used in pricing business. While the model is used as an indication of the magnitude of the impact of different factors, along with their statistical significance, it is not used directly to price business. It should be noted that the final column of the table has been included to give an indication of the magnitude of the price impact. The  $\beta_i$  factors alone cannot be used to directly determine this without a full explanation of the model, which is beyond the scope of this paper.
- 8 The *P*-value is a measure of statistical significance, with a lower figure indicating more significance. A figure below 0.05 indicates that the variable is significant at the 5% level.

## Decisions by the pricing committee

The decisions and observations made by the pricing committee are outlined below:

- ‘Number of people in household’ and ‘Open fire or wood burning stove’ will not be used as pricing factors because they are not statistically significant at the 5% level.
- Enhanced security on doors and windows will be used as a pricing factor despite the fact that this is not significant at a 5% level. It was felt by the committee that customers would expect a difference in premium for enhancing security, and therefore this factor was retained for commercial reasons. The impact will be dampened from the  $\pm 5\%$  implied by the model to  $\pm 3\%$ .
- All other factors will be used in line with the results of the model.
- It was acknowledged that some factors in socio-economic group and marital status were not significant on their own. However, the committee felt that each of these two groups should be viewed as a package and it did not make sense to exclude individual factors from these groups.

## Progression of typical pricing

As with previous years, the price of a typical policy has been calculated to show how this has changed. A typical policy is defined as follows:

<i>Characteristic</i>	<i>Assumption</i>
Value of property in 2010 terms	£150,000
Value of contents	£40,000
Socio-economic group	3
Location	Average (median adjustment)
Age of policyholder	40
Marital status	Married
Number of people in household	4
Enhanced security on doors and windows	No
Number of household pets	1
Open fire or wood burning stove	None

The following table shows how the annual premium for the above policy has changed over the last 10 years:

<i>Year</i>	<i>Annual price of standard policy (adjusted for inflation)</i>
2011	£172
2012	£163
2013	£154
2014	£155
2015	£150
2016	£109
2017	£104
2018	£102
2019	£103
2020	£99

Note that the GLM currently used in pricing was introduced in 2016, and this enabled much more granular pricing. At this point, prices rose substantially for policyholders who the model indicated were ‘higher risk’, but fell for the majority of policyholders.

**END OF SCENARIO MATERIAL**