



Institute
and Faculty
of Actuaries

Thematic Review Report

General insurance: involvement of actuaries in
pricing for UK home and motor insurance

by Alan Marshall

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Foreword

Neil Buckley, Lay Chair of the IFoA Regulatory Board



I welcome the publication of the Actuarial Monitoring Scheme's (AMS) second thematic review report, *General insurance: involvement of actuaries in pricing for UK home and motor insurance*. This continues the regulatory work of the Institute and Faculty of Actuaries (IFoA) in independently reviewing key areas of work in which actuaries have significant involvement and influence. I would like to thank all those IFoA members and organisations that took part.

The Regulatory Board was pleased to receive this informative and thought-provoking report on a sector that has experienced significant challenges in recent years. General insurance pricing has been a key risk monitored by the Board, and this report, and its recommendations, are a welcome development. The Board supports the recent proposals contained in the Financial Conduct Authority's pricing practices policy statement, and the IFoA response to the earlier consultation paper reflected that support.

Customer fairness is a principle that applies to all financial services professionals and their employers. Actuaries should play their part in this, aligned to the Actuaries' Code and consistent with recent work at the IFoA on **The Great Risk Transfer** and **Inclusive Insurance**.

The Board also recognises the pace of development in this market on the increasingly complex use of data and models – again, actuaries have an important role, alongside other technical specialists, to ensure clear justification and transparency of outputs. This will help the sector in regaining trust in relation to pricing.

We therefore endorse the Review's recommendations, in particular the need for actuaries to contribute to an increased focus on customer fairness outcomes, and for standards, guidance and education to provide further support to actuaries working alongside other insurance and data science professionals in this sector.

Neil Buckley

Lay Chair of the IFoA Regulatory Board



Introduction

Alan Marshall, IFoA Review Actuary



I am delighted to publish the conclusions of this thematic review, which looked at the involvement of actuaries in the pricing of UK home and motor insurance. I would like to thank the seven organisations that completed our review questionnaire, and to others who provided insight through conversations on the topic, ensuring that we were able to conduct a comprehensive and meaningful review.

Actuaries have a long history of involvement in the pricing of personal lines business, applying their analytical and technical skills to the assessment of the underlying

risks to help their organisations arrive at appropriate premiums.

However, it has not been the sole domain of actuaries, and that remains the case today. Actuaries need to remain relevant and vigilant to change, so that organisations continue to value the benefits and advantages they bring to this important area of work. This includes a strong ethos of innovation, coupled with an ethical foundation through professional standards and guidance.

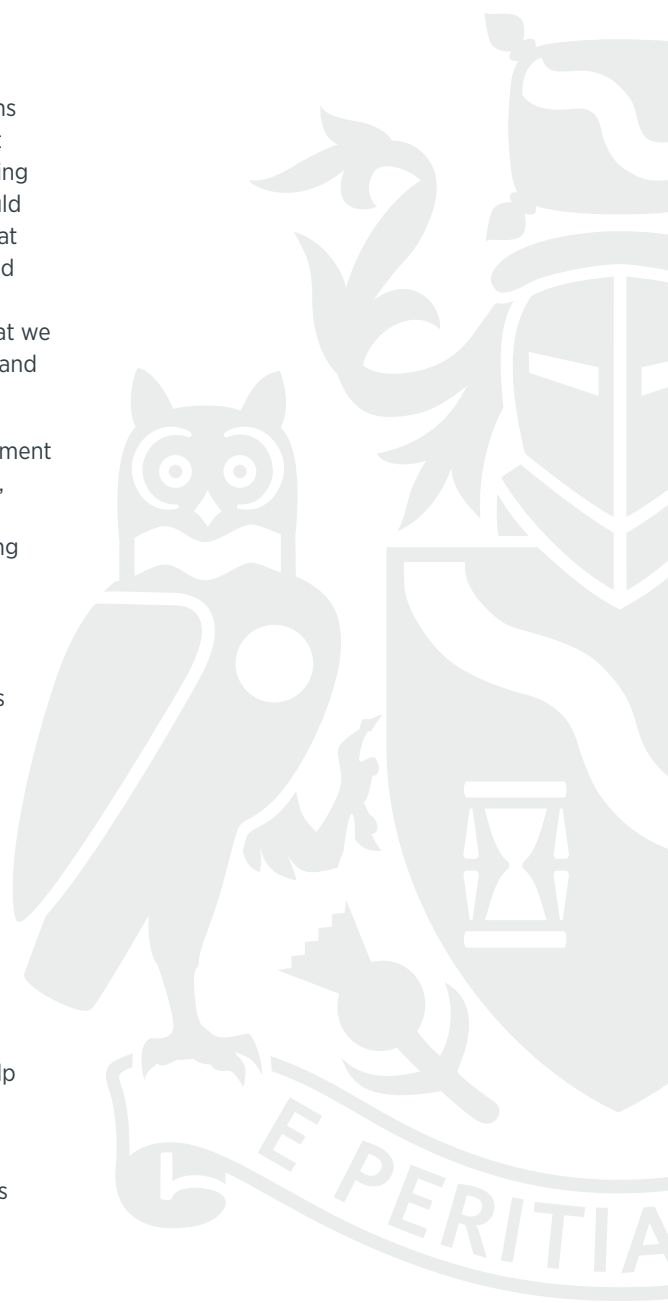
Pricing is an area where actuaries can directly influence customer outcomes, either in 'coal-face' technical roles, or through influencing roles in management or oversight. Different operating models across firms, and the involvement of pricing specialists from other disciplines and backgrounds, means the ultimate responsibility may rest with non-actuaries in any given organisation. It is clear, however, that actuaries still have a role to play in helping the insurance industry change perceptions of the UK home and motor insurance markets so that consumers feel they are fairly treated on price. Our findings are intended to support the continued involvement of actuaries in this key area of work, and help to clarify the important role of the associated actuarial standards and guidance.

The key recommendations are set out in the Executive Summary. The report also contains a detailed summary of the review of the questionnaire responses and follow-up discussions we held with members active in personal lines pricing. Additionally, we have reviewed the current position of actuarial regulation, education and lifelong learning, and the wider business and regulatory environment that organisations face.

The IFoA looks forward to discussing this report and its recommendations with general insurance industry stakeholders.

Alan Marshall
Review Actuary

June 2021



Executive summary

This review focused on motor and home insurance in the UK market

It is well known that this market has had a high level of regulatory focus in recent years. This has principally been in relation to the 'dual-pricing' approach that had become common in an increasingly competitive environment, in part driven by the influence of price-comparison websites. This led to growing concerns among **consumer groups**¹ and regulators that the market was not working well for many consumers, and that vulnerable customers were at greater risk of adverse outcomes. A combination of regulatory-driven changes, such as the requirement to highlight the prior year premium on renewal communications, and industry initiatives to limit renewal increases to some extent, were seen as not having a sufficiently material impact on the issue. As a result, the Financial Conduct Authority (FCA) carried out an in-depth market study into pricing practices, culminating in their **final report**² issued in September 2020. This proposed more radical interventions, such as the linking of renewal prices to an equivalent new business price, enhanced product governance, and increased regulatory reporting requirements. The regulatory **policy statement**³ confirming the implementation of these measures was published in May 2021.

So what can actuaries do to continue to influence this sector and help move it beyond recent market reputational issues, while maintaining a commercial edge to their work? The purpose of insurance is to provide cover to consumers in order to protect them from adverse events in their lives. Although level of involvement differs across organisations, actuaries have, and can continue to play, a key role in personal lines pricing. It is important that actuaries continue to harness their skills and influence in a way that acts in the public interest for both their organisations and the consumers to whom they provide insurance cover, seeking an acceptable balance of commercial outcomes and consumer fairness. This challenge is perhaps one that applies to pricing far more than reserving or capital work.

Our review has benefited from constructive engagement with a range of industry participants, as well as input from IFoA volunteers practising in this area. This has provided a range of contexts in which to consider both the current position of actuarial involvement in this area, and the support and standards in place to help members.

The findings from this review are centred on two key elements, both in the context of actuaries sharing responsibility for pricing with other professionals:

- An increased focus on customer fairness, ensuring standards, guidance and education appropriately balance this with the commercial and innovation drivers important in pricing.
- Ensuring that advances in data science and machine learning modelling are adequately covered by standards, guidance and education.

The proposed recommendations to help deliver this are:

- The IFoA and the Financial Reporting Council (FRC) should consider areas where additional guidance may help actuaries apply existing standards within a multi-disciplinary environment, often with shared responsibility for pricing outcomes with other experts in this field. This may have particular relevance for increased use of data science and machine learning techniques (where steps have already been taken on ethical guidance). This should aim to support actuaries operating across a range of roles and responsibilities within organisations.
- Actuaries working in pricing roles must follow existing professional standards, in particular TAS 100 and 200 and APS X2 (peer review). A proportionate approach to documenting how these have been addressed, including which work is in and out of scope, is likely to be appropriate in most instances, particularly in multi-disciplinary teams. Of particular relevance is how complex data and modelling outcomes are explained and justified, a key skill that actuaries can continue to promote through the application of standards.
- Technical Actuarial Standards (TASs) should be reviewed to recognise significant advances in data science and machine learning techniques, and the increased challenges these bring to validation and communication of outputs. A review of standards should take into account the potential impact of different burdens of regulation on actuaries and other professionals. Developments in these technical areas are not restricted to general insurance (GI) pricing activity, hence changes to the TAS would potentially have wider application.

1 | Citizens Advice – The insurance loyalty penalty (2017)

2 | FCA General insurance pricing practices – Final Report (2020)

3 | FCA General insurance pricing practices – PS21/5 final rules (2021)

- Actuaries should engage positively with new FCA regulations in relation to personal lines pricing and product governance, helping to implement the required changes that aim to improve overall consumer outcomes. This may be through direct involvement in pricing functions with either technical or senior management roles, or through oversight activity. This should not preclude ongoing analysis and challenge on the success of any measures as part of post-implementation monitoring and feedback.
- Actuaries should always consider potential conflicts of interest, including recent guidance on the ethical application of data science. This is particularly important given the increased use of data and complex models, which may result in a risk that the balance of commercial decision-making and customer fairness is distorted. Aiming for an appropriate balance is not the sole responsibility of actuaries, but is something actuaries should seek alongside other insurance professionals.
- The IFoA's pre-qualification education syllabus covering GI pricing should be reviewed to ensure there is sufficient coverage of:
 - a. Customer fairness in pricing and product design
 - b. Use of new and emerging data and modelling techniques.

Report structure

How this report should be read

We have set out in this report the detailed findings of our thematic review. We have provided comments relating to the submissions we received to the review and also wider areas of consideration impacting the pricing work of actuaries. The Executive Summary sets out our key recommendations and a full list is set out on **page 28-30**.

Recommendations

We have made a number of recommendations, which fall into the following categories:



Member recommendations

These highlight areas of regulations, legal requirements or standards where additional focus from members may be beneficial. Actuaries (and the organisations employing them) should consider these recommendations and whether current processes could benefit from being updated to reflect them.



Regulator recommendations

These suggest adjustments to standards or regulations, with the aim of improving the quality of future actuarial work in this area. We anticipate that these recommendations will be discussed by the IFoA with other relevant regulators, in particular the FRC. Actuaries should also consider whether to comply with these recommendations now, although they are under no obligation to do so.



Education recommendations

These call for potential updates to the IFoA education syllabus and/or core reading. As with the regulator recommendations, we anticipate these education recommendations will be discussed by the IFoA and other relevant stakeholders.

Observations



Observations

During the course of this review, we either observed instances of what may be considered good practice or we formed a conclusion that we felt was worthwhile highlighting as an observation. Note that these observations may not be appropriate within all operating models, and others may arrive at different conclusions; as such they are intended to provide additional insight into the work we carried out. There may also be other ways of addressing an aspect of the process that are equally valid.

References

Referenced documents or webpages are indicated by footnotes on the relevant page of this report, with a full list of documents set out in **Appendix 3**.

Status of report

This report is non-mandatory guidance material; it imposes no obligation upon members over and above those embodied in **The Actuaries' Code**⁴ or the **IFoA Standards Framework**,⁵ which includes the enforcement of the Technical Actuarial Standards set by the FRC. It has been prepared by the IFoA Review Team and is issued by the Regulatory Board of the IFoA. Its purpose is to report on findings of the thematic review, *General insurance: involvement of actuaries in pricing of UK home and motor insurance*.

This report does not constitute legal advice. While care has been taken to ensure that it is accurate, up to date and useful, the IFoA does not accept any legal liability in relation to its content.

Review of this report

The report has been subject to review by individuals acting independently of the author as follows:

- Within the IFoA Review Team by an individual not involved in the thematic review activity
- Members of the IFoA GI Board
- IFoA education module leads (Education section of the report only).

This is deemed to meet the Work Review requirements of APS X2.

We wish to thank the above individuals for their review comments, although the contents of this report, in particular the recommendations and observations within, remain the responsibility of the IFoA Review Team.

Conflicts of interest

We are not aware of any conflicts of interest arising from the contents of this report in relation to the Review Team that carried out the work or the Regulatory Board that has endorsed the findings.

Questions about this report

We welcome questions about this report which should be sent to reviews@actuaries.org.uk or to:

Actuarial Monitoring Scheme
Institute and Faculty of Actuaries
Level 2, Exchange Crescent
7 Conference Square
Edinburgh EH3 8RA

4 | The Actuaries' Code is the ethical Code of Conduct that all members of the IFoA must adhere to

5 | Standard Setting at the IFoA (2020)

Scope and approach

This thematic review was announced in September 2019 with the following broad scope:

General insurance: role of actuarial advice in pricing of specific GI products

The actuarial inputs to general insurance pricing have a direct impact on financial products that are provided to the public and are one of the key ways in which actuaries deliver strategic insight into a business.

Pricing is a broad and complex area utilising a wide range of actuarial skills including market and product knowledge, technical competency, communication and negotiation.

The review will look at current actuarial practice to understand the processes adopted by actuaries and challenges faced when providing advice in this area.

Following the establishment of the IFoA Review Team during early 2020, the scope was broadened to include public interest aspects on GI products/markets that have significant actuarial involvement. The Regulatory Board already considered GI pricing to be a key area of public interest risk, principally as a result of the high-profile issues around dual-pricing for certain lines of business.

Recognising that the Thematic Review Programme should avoid unnecessary overlap with other regulatory activity, we focused our review on the actuarial involvement in UK home and motor insurance so as to understand any ongoing risks relating to actuarial practice in this area. Given other fast-changing market dynamics, such as the emergence of data science and machine learning techniques, it seemed an ideal time to consider this market and actuaries' involvement within it.

Given their skills in large-scale data analysis and statistical modelling, actuaries have traditionally been more involved in the risk or technical pricing part of the process (the cost of servicing a contract, which will include some or all of expected cost of claim, servicing costs and cost of capital). We were keen to understand the influence of actuaries from start-to-end of the pricing journey, and so the scope included consideration of wider street pricing (the actual price quoted to customers, taking into account any additional propensity/demand/margin modelling) and customer considerations.

An area of interest is the application of the Actuaries' Code, **TAS 100**,⁶ **TAS 200**,⁷ and the application of **APS X2**⁸ (review of actuarial work). We recognise that pricing is not a reserved role, and that actuaries are usually working alongside other professionals. We thought it was important to understand what impact this had on the ease of application of existing standards and guidance.

Review methodology

We considered a number of elements as part of our review:

- Completed insurer review questionnaires
- Follow-up conversations with participants
- High-level review of current actuarial education and lifelong learning relating to personal lines pricing
- Review of existing professional standards and guidance relevant to actuaries in this field
- Consideration of the current business environment, including wider regulatory requirements.

6 | Technical Actuarial Standard 100: Principles for Technical Actuarial Work

7 | Technical Actuarial Standard 200: Insurance

8 | APS X2: Review of Actuarial Work

Submissions

We invited organisations actively underwriting in the UK home and/or motor insurance markets to take part in the review. Organisations were asked to complete the review questionnaire covering different aspects of the pricing process and the role of actuaries within that. The aspects considered are set out below. The full questionnaire is provided in **Appendix 4**:

Aspect of process
Responsibility for pricing
Pricing factors
Data and modelling
Customer considerations
Application of actuarial professional and technical standards

Although the questionnaire was designed to allow different responses for home and motor, in practice this did not result in any material differences being highlighted.

Participation level

A total of seven organisations completed questionnaires for the review. These included:

- Aviva
- Co-operative Insurance
- Direct Line Group
- Hastings Group
- RSA

Overall, those organisations that participated represented £7.5bn of gross written premium for the UK home and motor markets during 2019, employing in excess of 100 actuaries and actuarial students in their pricing teams. We held insightful conversations with actuaries from seven other insurers, which also informed this review. We are hugely appreciative of this participation, which provided us with valuable input with which to carry out the review.

UK home and motor insurance pricing – involvement of actuaries

Questionnaire responses

The aim of this review was to consider the involvement of actuaries in pricing of UK home and motor insurance. With this in mind, we reached out over the course of the review to over 20 organisations that either provide underwriting within the market, or are advisers to those organisations. We spoke to individuals from 14 of those organisations and received seven questionnaire submissions to the review. This section of the report focuses on the submissions we received, along with some additional insight from conversations that took place.

Responsibility for pricing

Actuaries perform a mix of roles relating to home and motor pricing, covering technical, managerial and oversight functions. From our relatively limited sample, actuaries are more common in analytical and technical roles, and more so within technical

pricing. Overall responsibility for pricing does not tend to sit with an actuary, although there is actuarial involvement in decision-making roles and evidence of material second-line activity for actuaries. This latter element is often where Chief Actuary or actuarial function activity is focused (noting that not all actuarial functions necessarily sit in the second line permanently, but carry out a mix of first- and second-line activity).

Our questionnaire considered where overall pricing responsibility sat and also key senior management functions, Chief Actuary (SMF20) and Chief Underwriting Officer (SMF23). The table below shows the responses on this for each participating organisation (in no particular order).

Although this indicates that actuaries are not prevalent in terms of overall responsibility, there is still a material level of involvement in pricing through the senior management function roles.

Pricing responsibilities of actuaries	1	2	3	4	5	6	7
Does an actuary have overall responsibility?	Yes	No	No	No	No	No	Yes
Is the Chief Underwriting Officer an actuary?	Yes	No	Yes	Yes	No	No	Yes
Chief Actuary role	First line with second-line role for pricing	Separate first- and second-line roles. Latter has pricing oversight role	First line (there is separate second-line oversight)	First line (there is separate second-line oversight)	Second-line role for pricing oversight	Second line, covers pricing oversight	Second line, covers pricing oversight



Observation 1

The IFoA could consider how actuaries are supported along a career path in senior personal lines pricing roles. For example, this could consider what key competencies organisations may seek for roles such as Chief Underwriting Officer, and how education and lifelong learning opportunities could align to that.

We also asked about governance and the involvement of actuaries in key pricing committees. Most such committees are not chaired by actuaries (in line with responses indicating broader responsibility), although senior pricing actuaries are often present. Attendance by the Chief Actuary was less common; however, there was an example where such attendance was part of the sign-off process for key pricing decisions.



Observation 2

Given the role of Chief Actuaries in providing an underwriting opinion where pricing is key, involvement of the actuarial function in strategic pricing committees may be seen as better governance practice. However, this will depend on other communications and processes organisations adopt to ensure this actuarial role is adequately fulfilled. It may also depend on how organisations are set up to ensure independence between first- and second-line activities.

The questionnaire also asked about the specific involvement of actuaries in pricing, thinking about different types of roles. As expected, this showed more involvement in analytical and technical roles, although there is also a reasonable level of involvement in decision-making and oversight roles. See table below.

More actuarial presence in technical roles is perhaps not a surprise, although this is subject to increasing competition with other emerging disciplines and skills. A common theme is that most organisations see pricing roles as ‘qualification-agnostic’ and focus more on each individual’s specific skills and experience. Responses indicated a significant role for data scientists, including organisations where this is the more common discipline within technical pricing. This emphasises the importance of the IFoA’s education and lifelong learning opportunities sufficiently supporting members to remain competent and competitive in this key sector.

We asked about the existence of pricing strategy documents and the level of actuarial involvement in preparing them. As expected, such documentation existed in some form across all our participants, with ownership principally sitting with senior pricing management. Actuaries’ involvement was generally incidental (as opposed to direct ownership of such documents), again linked to the roles being carried out by actuaries within pricing teams, rather than such a document being deemed to require actuarial input, or indeed being an actuarial report.

Pricing factors

The selection of pricing factors is critical as firms seek to differentiate customer risk characteristics and to price appropriately. The recent history of personal lines pricing is one of innovation as firms looked to identify profitable risks and maintain a competitive edge. There tends to be a separation between factors considered to identify underlying insurance risk, and those used in optimisation or propensity modelling (ie technical versus street pricing).

It was clear from responses that actuaries work alongside others on the analysis and development of rating factors, and it is not seen as a predominantly actuarial task. However, where actuaries are involved their influence is significant, particularly in terms of analysis and technical work. This is likely to be correlated to significant involvement in data and modelling activity. Although involved in both technical and street pricing, actuaries tend to be more common in the former.

Extent of involvement	1	2	3	4	5	6	7
Analytical & Technical	Significant	Reasonable	Significant	Reasonable	Reasonable	Reasonable	Minimal
Decision & Influence	Significant	Minimal	Reasonable	Minimal	Reasonable	Minimal	Minimal
Validation & Oversight	Reasonable	Minimal	Significant	Minimal	Minimal	Significant	Reasonable

Responses indicated a wide range of approaches to documentation justifying each rating factor, from limited reliance on in-model documentation to detailed explanations and justifications in specific pricing principles documents. There is clearly a balance to be struck in terms of what is valuable to users of information.



Observation 3

It would be best practice, and in line with actuarial standards, to ensure sufficient and clear documentation is in place, in particular justifying the fairness of particular factors that could unduly impact certain cohorts of customers (for example where there may be indicators of vulnerability).

Note that this observation is not to suggest documentation needs to be extensive, or to get in the way of agile processes. Instead it allows reasonably informed individuals to understand the rationale behind factors and, crucially, to allow appropriate challenge to take place.

More commonly considered aspects included statistical predictiveness and the extent to which the law precluded certain factors. The latter point extended to consideration of fairness and inclusiveness.

We asked about the extent to which climate change was allowed for in rating factors (both physical and behavioural risk). For most of the participants there was no explicit allowance at this stage (implicit through how existing data might include some impact). Two of the responses indicated more explicit consideration through input from in-house weather modelling expertise, or specific recent climate-risk review exercise (for home insurance). We plan to explore this aspect further in our 2021 information gathering exercise on climate-related risk and the involvement of actuaries.

Data and modelling

The need for core actuarial data analysis and modelling skills is reflected in the historic and ongoing involvement of actuaries in this area. It continues to be an area that is shared with other appropriately qualified and experienced professionals and it is important that the profession keeps this topic high on its agenda as a potential domain of choice for actuaries.

From the responses we received it is clear that the use of wider sources of data continues to expand, with increasing incidence of external data within the pricing process. This extends to the practice of data enrichment, where firms look beyond the traditional informational use of a data item in order to

derive additional insight on individual risks. This is clearly an area where ethics and fairness have a part to play – there is increasing tension between a desire to ask potential customers fewer questions at point of sale, and then to seek a wider range of data in the background from other sources to price the risk. Participants indicated that recent significant developments in data usage are expected to continue in the coming years as capability and capacity also develop.



Observation 4

Actuaries involved in developments in this space should follow the recently published **IFoA Data Science ethical guidance**⁹ which explains the need to ensure innovation benefits both organisations and consumers.

Participants also indicated that data science is a developing, or established, area both in terms of the increase in data scientists within pricing teams (or indeed data science teams being created) and actuaries developing their skills in this area, with the new **Certificate in Data Science**¹⁰ being referenced. This is an area that the IFoA should continue to ensure is supported, with underlying education and lifelong learning reviewed on a regular basis.

Generalised linear models (GLM) continue to be highly prevalent, with third-party modelling solutions most commonly deployed. Most firms are looking to explore and develop more complex machine learning or similar models (gradient boosting techniques were an example mentioned in responses), and are aware of open-source opportunities as part of this. Submissions to this review indicated that modelling has also gone through significant development in recent years and that this trend is expected to continue, principally in relation to machine learning. There is also an expectation of greater agility in modelling, allowing more frequent pricing updates to take place.

Challenges expected from continued moves to more complex modelling include:

- How to validate – will new techniques be required?
- Risk of more 'black-box' models, making transparency and interpretation difficult, with implications for how to communicate results
- Expertise and key person risk – both ability to train individuals appropriately and then to be able to retain potentially highly sought after resource
- Infrastructure requirements to support big data and required modelling capacity
- Ability to map legacy systems to newer data and modelling techniques.

9 | IFoA Ethical and professional guidance on Data Science: A Guide for Members (2021)

10 | Certificate in Data Science jointly accredited by the Web Science Institute at the University of Southampton

There was a particular quote that provided insight into the challenges actuaries face to ensure they maintain skill sets relevant to the changing personal lines pricing landscape:

“... actuarial approaches at times can feel a little outdated given the pace of change within the analytical world. Insurance is behind that seen elsewhere in the market but it’s catching up quickly and the market approach is a fast fail or continual model development approach where inter day changes are made to the pricing models based upon the very latest information.”

It is important that training, standards and guidance are able to support actuaries to succeed in this space, ensuring that existing core skills can be adapted to remain relevant. Developments to education syllabuses and lifelong learning opportunities so far are a good start. However, the fast-changing nature of this aspect of work means more will need to be done to help actuaries stay up to speed and attractive to employers. Without continual focus on this, there is a risk that it becomes more challenging for actuaries to show value in this domain compared with other specialists.

Customer considerations

All firms in our survey were very clear about the importance of customer considerations, both historically and going forward, as the FCA pricing practices measures move towards implementation. Direct actuarial involvement is limited in terms of responsibility for customer issues. It is clear, though, that firms view it as a responsibility of all participants in the pricing process to focus appropriately on customer outcomes. Senior customer-focused committees have responsibility for assessing customer outcomes at a number of firms. There are examples where senior actuarial representation on pricing or customer committees provides a direct opportunity to influence.

We asked about potential differences in the treatment of legacy products. In general, firms aim to have no significant differences for pricing approaches for newer and older products. However, aspects such as availability of data, or the channels being used, could result in some differences. This is an area firms will need to consider carefully in light of the FCA’s measures to ensure that legacy products meet the requirements in the same way as newer products.

We also asked about processes for the treatment of **vulnerable customers**,¹¹ another key focus for the FCA. As expected, all our participants had processes in place to help ensure that pricing practices would not result in adverse outcomes for vulnerable customers, with different forms of approaches being used (eg regular reporting or specialised processes).

Although customer considerations is not perhaps a traditional area for direct actuarial involvement, it is an increasing focus for organisations and regulators. The ability to understand and influence customer outcomes is key to a profession acting in the public interest, particularly in a complex market where there is significant regulatory intervention taking place on behalf of customers. As risk management professionals we should include conduct risk within this, a risk that all insurers are actively managing, and another key focus of the FCA. It is likely that actuarial employers in this domain will also have customer-focused values and behaviours in place, which all employees, including actuaries, will be expected to follow.

Standards and guidance

From the responses we received, and further discussions with organisations, there is generally a less formal approach to application of actuarial standards within pricing, compared with other areas of actuarial involvement. There are multiple reasons behind this:

- Perception of applicability of the TASs to pricing work
- The multi-disciplinary nature of most pricing teams, involving both actuaries and non-actuaries
- How to apply in the context of an often more agile working environment
- Peer review being part of internal processes, and hence APS X2 viewed as implicit to some extent.

It is clear that technical pricing is the area most likely to see the TASs being formally applied. This reflects both the likelihood of actuarial involvement and the fact that this is perhaps the most straightforward area of pricing work to label as ‘technical actuarial work’.

The tables below summarise the responses to the questions we asked (in some cases a similar response was provided across different questions and so not repeated):

11 | FCA Guidance for firms on the fair treatment of vulnerable customers (2021)

Which aspects of pricing activity are considered ‘actuarial work’ (in line with APS X1 and X2 definition) within your organisation (independent of senior manager responsibilities and reporting lines)?

Risk pricing, retail pricing, key pricing performance monitoring, base rate setting.

The process that determines the base technical price, known as Costings, is considered actuarial work.

The setting of the technical price.

The setting of the customer pricing margin model.

Professional standards are undertaken throughout the activities of the work that is progressed through the pricing teams. These standards are more likely to more formally apply within the reserving and capital modelling functions but good practice and approach is observed throughout pricing teams.

Technical pricing model development and their calibration.

Within Pricing teams, technical and street pricing, any actuary carrying out work on modelling, calculations, or for decision etc would consider the APS (and TAS) as part of their actuarial profession, but wider implementation would not usually occur.

Which aspects of pricing work are considered to be covered by Technical Actuarial Standards (TAS 100 and 200) within your organisation?

The Group aims for the design of the pricing modelling checklists to comply with the TASs as they provide a basis for good modelling practice.

Technical pricing models will fall within the scope of TAS and suitable representation will be made when considering the suitability, limitations and risks involved.

Pricing changes - included in the paper template as a reminder to the paper's author (regardless of whether they are an actuary).

The responses to these two questions show that a reasonably wide range of work is considered to be covered by existing standards and guidance. Although there is perhaps more focus on technical pricing, the responses also indicated examples where the definition of actuarial work extends to street pricing and other elements within the process.

Are any aspects of pricing work at your organisation subject to peer review, including independent peer review, in line with Actuarial Professional Standard X2 (APS X2)?

All work that will materially influence pricing decisions (including those listed above) is subject to peer review within the department.

Yes, peer review is commonplace within the pricing teams across all functions.

Some pieces of pricing work will be subject to review from actuaries who work in the Pricing, Risk or Reserving teams.

The pricing models are subject to 2nd line risk review.

Peer review is a part of our normal working practice, including technical work carried out by non-actuaries.

Peer review was also covered in follow-up conversations with participants. Peer review is often considered to be embedded within existing internal processes, as opposed to being a distinct formal APS X2 exercise driven by actuarial standards. Some participants raised the question of how to carry out an APS X2 style approach where mixed disciplinary teams are in place.

To what extent do you think that current TAS and APS are relevant and applicable to aspects of pricing work? Are there improvements to the current standards that would enhance their relevance and applicability?

Both are relevant and applicable - information on which pricing decisions are based needs to be correct and clearly documented.

The reality is that the market is moving quickly and documenting approaches and steps taken is now an outdated approach. Good quality systems and regular refreshes of models due to machine learning techniques are removing the risks associated with a pricing change that might take months to reverse out of cause large economic impact for a company.

Standards should be more focused on core critical models within the technical pricing world, but these should be nimble enough to allow flexibility for the Actuary to progress this.

Pricing is rapidly becoming a statistician/data science led activity. Some of the principles from actuarial science carry across, however actuarial involvement in the technical aspects of pricing is reducing. The skills and professionalism of an actuary are helpful within the pricing process in managing risk. The TAS and APS are helpful tools in setting governance frameworks for pricing processes.

Guidance on applicability on GI pricing space is limited.

The general principles of APS and TAS are relevant to Pricing work. They would be more widely applied if the role of pricing lead was a regulated actuary, for example, or if there were more actuaries involved in an area. However, we believe we have robust work practices which produce outcomes aligned to the APS and TAS requirements.

The responses indicate that, in the main, actuaries and firms recognise the value of following the disciplines and principles provided by TAS 100 and 200. However, there are questions around a) the relevance of the standards for different parts of the pricing process, and b) how to deal with shared responsibility when it is rare for teams to consist mainly of actuaries. The firms that took part in this review have processes and controls in place that will implicitly meet much of what is set out in the standards; the question is how actuaries should ensure that they are comfortable that these demonstrably meet TAS and APS requirements, and how this is documented in a proportionate manner.



Regulatory recommendation 1

The IFoA and the Financial Reporting Council should consider areas where additional guidance may help actuaries apply existing standards within a multi-disciplinary environment, often with shared responsibility for pricing outcomes with other experts in this field. This may have particular relevance for increased use of data science and machine learning techniques (where steps have already been taken on ethical guidance). This should aim to support actuaries operating across a range of roles and responsibilities within organisations.



Member recommendation 1

Actuaries working in pricing roles must follow existing professional standards, in particular TAS 100 and 200 and APS X2 (peer review). A proportionate approach to documenting how these have been addressed, including which work is in and out of scope, is likely to be appropriate in most instances, particularly in multi-disciplinary teams. Of particular relevance is how complex data and modelling outcomes are explained and justified, a key skill that actuaries can continue to promote through the application of standards.

As part of the work carried out for this review, we considered the applicability and relevance of current actuarial standards and guidance for personal lines pricing. This is covered on **pages 24-26** of this report.

Wider business and regulatory environment

This section sets out areas where, at the present time, actuaries need to consider the wider business and regulatory environment for UK home and motor insurance.

There have been a number of significant exercises or events that have, and will continue to have, a material impact on this market, influencing how actuaries operate and apply their skills going forward.

A key theme is that of customer fairness. The market has experienced an extended period where insurers have been challenged on their approach to setting premiums, particularly for longer-standing customers. In light of recent challenges, and upcoming regulatory changes, there is an opportunity for actuaries to balance business and technical acumen with an approach that achieves fair outcomes for customers. As the market continues evolving to new ways of pricing, it is important that actuaries are equipped with the appropriate skills and regulatory frameworks. This should ensure that they can apply their skills to harness emerging techniques in data and modelling to good effect for their employers, while encouraging inclusive insurance and widening risk coverage wherever possible.

FCA pricing practices final report and policy statement

The FCA recently completed their review of GI pricing practices, focused on UK home and motor, a detailed exercise carried out over a number of years. This involved significant interaction with market participants, with wide-ranging data supplied to support the FCA activity, culminating in their final report and accompanying consultation in September 2020, and final policy statement in May 2021. During the course of that review, Citizens Advice also lodged a **super-complaint**¹² with the Competition and Markets Authority that focused heavily on the 'loyalty penalty' associated with certain products, including home and motor insurance.

The main findings of the FCA final report included:

- Some firms gradually increase the price to customers who renew with them year on year ('price walking'). The fact that firms do this is not clear to customers and so many are not aware of it
- Some firms also use practices that raise barriers to switching, making it more difficult for consumers to make informed decisions. In particular, the FCA saw practices that make it difficult for consumers to stop their policy from automatically renewing
- Some consumers are unlikely to switch because they are not aware that their renewal price may not be competitive. These consumers tend to be price walked each year. Some consumers may wrongly think that price increases are due to industry-wide cost increases and so underestimate the benefit of switching provider. Over time, some of these consumers are charged prices that are substantially greater than those available to them if they were to switch.

There are four key areas in which the FCA are updating regulation, following **consultation**¹³ with the industry:

- End dual-pricing by forcing insurers to link renewal prices to an equivalent new business price
- Make changes to auto-renewal rules to ensure it is easier for consumers to choose to switch
- Enhance product governance to strengthen senior manager accountability
- Introduce a regular reporting regime to analyse adherence to the measures put in place, and allow future analysis to check no unintended consequences of measures.

These findings in an area where actuaries have involvement are a concern, and it is important that, where they can, actuaries play an active role in implementing improvements in the market. The IFoA provided a **detailed response**¹⁴ to the

12 | Citizens Advice - Excessive prices for disengaged consumers (2018)

13 | FCA General insurance pricing practices market study: Consultation on Handbook changes (2020)

14 | IFoA Response to FCA CP20/19 General insurance pricing practices market study

consultation. We understand that the FCA received over 100 responses, reflecting the radical nature of the changes proposed. The IFoA response was supportive of the proposed measures, including the undertaking by the FCA to review outcomes to ensure no unintended consequences arise over time.

These measures will also have a direct impact on actuaries working in decision-making and oversight roles, as they are likely to be either responsible for implementing and adhering to measures or for carrying out checks to ensure that they are being followed appropriately. It is possible that the proposed designated senior manager position responsible for the implementation and tracking of the measures could be an actuary in some firms.

There may also be a knock-on effect into more technical and analytical roles, with greater reliance and focus on technical risk premium work, as organisations seek competitive advantage through greater use of data and complex modelling. There may be a tension within this as the market moves towards asking fewer questions of potential customers, while looking to use increased supplementary data from other sources (both internal and external). Transparency and fairness will be key in order that consumers can have confidence that market innovation is working to their benefit. A model that seeks out ever-improving risks, while discriminating against poorer risks, may result in a market that fails to provide sufficient overall loss coverage. It is important that actuaries (along with other pricing professionals) balance the interests of consumers with the commercial interests of employers and clients.

In addition to the IFoA response, actuaries will have been involved in the consultation feedback to the FCA on behalf of many organisations, and this will have included feedback from both a consumer and commercial perspective. It is important that the measures put in place by the regulator are supported, and subject to ongoing analysis, by actuaries, hopefully helping the personal lines market to move to an improved position of trust with consumers in relation to pricing.



Member recommendation 2

Actuaries should engage positively with new FCA regulations in relation to personal lines pricing and product governance, helping to implement the required changes that aim to improve overall consumer outcomes. This may be through direct involvement in pricing functions with either technical or senior management roles, or through oversight activity. This should not preclude ongoing analysis and challenge on the success of any measures as part of post-implementation monitoring and feedback.

Impact of Covid-19

The impact of the pandemic on motor and home insurance has principally been one of risk exposure changes. These have been driven by lockdown measures changing, for example the amount of driving by individuals, or the occupancy and use of the home.

The following has been observed as a result:

- Reduced incidence of motor claims, which has led some insurers to offer premium refunds in certain circumstances. There may have been some offsetting from increased claim severity where repair costs were impacted by supply or labour issues during lockdown
- Insurers allowing extended 'travel to work' or voluntary work use of vehicle under existing terms of cover
- Insurers making allowance for increased 'business' use of home address under existing coverage.

It will be interesting to see which measures become more permanent policy features. The industry may face significant short-term premium pressure where customers expect reduced prices where claims have been significantly reduced.

A further challenge for pricing (in common with reserving) is how the experience since March 2020 should be taken into account in risk rates going forward (complicated further by the extended period of varying lockdown measures across the UK). Actuaries are well-placed to provide insight, analysis and judgement in this area while highlighting uncertainty.

A **recent IFoA blog**¹⁵ considered potential impacts on reserving, but the principles would apply equally to pricing assumptions:

"Motor insurers and actuaries face difficulties in determining the appropriate allowance for Covid-19 on pricing and reserving assumptions. Actuaries will need to adapt their models and assumptions to changing circumstances and must consider whether changes are temporary or are the 'new normal' eg reduced road traffic due to the work-from-home model.

The changes require actuarial judgment to be applied and communicated clearly in order that boards have the necessary information to take informed decisions. Boards should be made aware of the key assumptions and risks and reasons why the results may materially change from the current review."

In addition to considering the impacts of the current pandemic, insurers will need to consider whether additional risk assessment might be required for pricing should we face similar challenges in the future. A **recent IFoA paper**¹⁶ considered scenario modelling to analyse potential outcomes.

15 | IFoA Blog – The road ahead to motor insurance reserving (2021, Harshitta Malakar)

16 | Scenario Modelling of COVID-19: Analysis of Key Classes in P&C Industry (2021 Darshan Purmessur AIA, Haedeh Nazari FIA)

Climate change

It is not the purpose of this review or report to cover in detail the implications of climate change in relation to home and motor pricing (or indeed wider considerations for these products). However, the market will inevitably develop further as firms make changes to their business models to reflect climate-related risk, meaning pricing methodologies will adapt over time.

Given the short-term nature of many of the risks and contracts, pricing changes are perhaps more difficult to assess and, as indicated previously, the responses to our questionnaire highlighted that climate-related risk is more likely to be implicit (through past data) as opposed to explicit in current pricing models. Areas for actuaries to focus on might include:

- Changes to the universe of properties at risk from key weather-related risks: either increased risk as flooding risk extends, both inland and coastal, or decreased risk where flood-defence work develops
- Potential for wetter winters and dryer summers to exacerbate subsidence issues
- Increased cost of claims where weather events become more severe in nature
- Potential for products to develop, and hence risks covered, where incentives are put in place for customers to be more climate aware. This may be as a result of industry or government initiatives (eg encouraging greater use of electric vehicles or car-pooling arrangements)
- Knock-on implications where investment returns are impacted by changes to investment strategy.



Observation 5

Actuaries in pricing fields should stay abreast of the many climate-change developments and consider how they may apply to their ongoing work. Interaction with reserving and capital colleagues may help inform this.

During 2021 the IFoA Review Team is carrying out an **information gathering exercise**¹⁷ to better understand where actuaries have involvement and influence on climate-related developments in their organisations.

There will also be ongoing considerations for actuaries in terms of what they might consider insurable risks within a risk appetite acceptable to their firm. A balance needs to be struck to ensure that consumers are not left again in a potential position of no cover being available in the market. Actuaries were instrumental in setting up Flood Re, the industry-funded reinsurer that provides high-risk flood cover that would otherwise be declined, and there may be more work the profession can do in other similar areas.

Brexit, including Solvency II developments

Although much of the risk covered by UK home and motor insurance relates to exposure within the UK, there is still potential impact from Brexit to manage.

This may include cost of parts, materials, or labour required to cover claims (in particular where a form of stress event occurs, such as major floods). It is the associated uncertainty that is a challenge in terms of use of data and modelling and subsequent appropriate allowance within pricing.

Following its **consultation**,¹⁸ the government is now reviewing the responses on where adjustments to Solvency II might be made post-Brexit. Although some of the more material implications of this may be felt in the Life sector (eg matching adjustment, risk margin), there are developments in personal lines that may impact pricing through changes to levels of technical provisions or capital (eg risk margin on longer-tailed claims), and the relative attractiveness of markets may change.

There are, of course, other areas where regulations could diverge following Brexit. GDPR is a further area that could be considered, and one with potential implications for the UK home and motor market as extensive users of personal data.

Insurtech

Increasing investment in the insurtech sector will have an impact on the type of work actuaries carry out and the job opportunities available. A **recent news item on The Actuary website**¹⁹ highlighted the continued extensive investment in this sector, which includes entrants into both home and motor markets.

17 | IFoA Thematic Review Programme – Current and planned reviews: Climate-related risk (2021)

18 | HM Treasury - Review of Solvency II: Call for Evidence (2020)

19 | The Actuary – InsurTech investment hits record high (2021)

There are two key impacts taking place:

- Insurtech market entrants targeting parts of the market where established players are potentially not delivering competitive prices (often younger cohorts of consumers, for example through contents-only cover for renters, or learner/young-driver motor cover)
- Such market entrants are likely to be specifically focused on cutting-edge data and modelling approaches.

The emergence of insurtech may amplify challenges in ensuring a balanced approach in the use of data and models (ie between commercial pressures and customer outcomes), although there are potential advantages to sectors of the market previously less well served by established firms. There is likely to be significant potential for ongoing innovation, and supporting IFoA members through proportionate regulation and relevant learning opportunities.

Education and lifelong learning

In 2007 a **report**²⁰ sponsored by the GI Board (GRIP - General Insurance Premium Rating Issues Working Party) provided a 'state of the nation' for GI pricing across a range of markets and considerations. One of the areas considered was education, with the report identifying a significant gap in relation to pricing. One recommendation was for a dedicated GI pricing subject to be introduced to the curriculum, with reserving and capital covered in a separate subject. This recommendation was ultimately implemented and there is now a Specialist Principles (SP) subject SP8 specifically covering GI pricing (SP7 covering GI Reserving and Capital Modelling). Within the UK, exam entry data shows that this subject is as popular as other SP subjects (it is also a popular choice outside of the UK).

GI pricing actuarial education is, of course, not limited to SP8. An actuarial student is prepared for SP and Specialist Advanced (SA) subjects through the core range of subjects that cover actuarial statistics, mathematics and practice elements (CS, CM and CP subjects), including many aspects highly relevant to a pricing discipline. This includes topics such as data analysis and a range of modelling techniques. SA3, General Insurance advanced, also covers a number of areas that prepare actuarial students for a role in pricing. Updates to the education syllabus and core reading need to be considered in a holistic fashion, and any observations or proposals in this section of the report recognises this. In particular, the recently launched IFoA **Learning Change Programme**²¹ is likely to impact on a number of aspects of the education pathway for potential actuaries.

Through the GI Board and supporting committees and working parties, the GI community has a strong history of encouraging and promoting research, thought leadership and lifelong learning. Pricing is a regular source of topics, with the **GIRO conference**,²² in particular, holding a wide range of pricing sessions for those looking for CPD opportunities. This has extended to its sister mini-conferences CIGI and TIGI (which ran as a combined conference in 2021), providing GI actuaries with many opportunities to explore established and emerging pricing topics.

More recently, the IFoA has also introduced the **Certificate in Data Science**, in partnership with Southampton University. While not restricted to a GI pricing lens, this is a further example of developments to enhance lifelong learning opportunities for actuaries in this field.

Nevertheless, we should consider whether there are aspects of the current offerings that could be improved to reflect new developments or issues that arise in the industry. As part of this thematic review we have considered the current subject SP8 syllabus in the context of UK home and motor insurance pricing, with a more limited review of subject SA3.

General Insurance Pricing (SP8) syllabus and core reading

In relation to UK home and motor pricing, there are three areas of significant development where it may be helpful to review the current coverage of the syllabus and core reading, and consider appropriate and proportionate updates to material. (It should be borne in mind that the IFoA education material is deliberately designed to be country-agnostic given the international reach of our organisation.)

The three areas are as follows:

- Customer fairness
- Use of data, in particular the increased pace of big data / external data developments
- Increasing use of machine learning modelling techniques.

Although this thematic review is focused on UK home and motor insurance, the above areas are relevant to a wider range of GI products and markets. Any potential updates to the syllabus would be widely relevant to the work of actuaries across GI pricing.

The IFoA Review Team carried out a high-level review of the SP8 core reading and our observations are set out below.

20 | GRIP - General Insurance Premium Rating Issues Working Party (2007, Anderson et al)

21 | <https://www.actuaries.org.uk/about-us/reinventing-profession/learning-change-programme>

22 | IFoA Blog: GIRO – bigger and better (Catherine Drummond, 2020)

We recognise that there will always be a number of fast-changing areas, which may mean education syllabuses often have a long list of priorities to consider. Our observations and recommendations are made in that context, with the understanding that the IFoA's education actuaries and member subject-matter experts, notably module leads, are best-placed to prioritise any education updates, including as part of the Learning Change Programme. It is also acknowledged that our observations may be better suited to consideration in the SA3 or practice module courses.

Customer fairness

In recent years the UK's home and motor market has faced reputational pressures, as a perception of unfair pricing practices has grown, bringing significant consumer group and regulatory focus. The impact of FCA pricing practices recommendations is likely to be material, both in terms of prices offered to consumers and associated governance requirements. Although this example is UK-specific, thought could be given to how this may extend to wider customer fairness considerations in the education syllabus, with parallels applicable in non-UK markets.

All organisations that operate in UK personal lines markets will consider conduct risk as a key element of their risk management strategy. As risk management professionals, it is important that actuaries are covering this key aspect within their training. This is particularly important for areas with direct impact on customers, such as pricing.

The FCA recently updated its **guidance** for firms in this area, and statistics show a sobering figure of 28 million UK adults with some form of vulnerability that may impact their financial wellbeing. Actuaries should ensure that products and pricing reflect the needs of the wider population; education and lifelong learning can help with this.

Current units covering 'Products' or 'Business environment' could have a specific customer considerations section, differentiating between individual and commercial markets. Such a section would cover broad principles that a pricing approach could adopt to ensure commercial and customer requirements are appropriately balanced (allowing for local regulatory requirements) including treatment of vulnerable customers.

There is already wording within the core reading that could be expanded. For example, there is an existing section, 'Regulatory and fiscal regimes', which touches upon aspects relevant to customer fairness. This considers how regulations or laws can constrain premium calculations, or more widely to address consumer protection through specific bodies or levies.

The 'Business environment' unit broadly covers professional guidance, indicating that this may apply to both professional standards and technical issues. This material could be extended to cover ethical issues, with a focus on actuaries acting in the public interest, including consideration of customer fairness.



Observation 6

Existing core reading units describing products and/or business environment could be developed with expanded material covering customer fairness and the role of a pricing actuary within this. This could draw on themes around use of data, transparency of products, and promoting a customer fairness agenda (including adherence to relevant regulations).

Exam setters could consider including more questions that focus on consumer impacts and fairness considerations (acting in the public interest).

Data

A syllabus objective could be added to cover ethical use of data in pricing. This is increasingly important in the context of the growth in data science and external data use in the industry. Recent IFoA publications providing non-mandatory guidance in this area could then be referenced as part of what an actuarial student should consider in this field.

External data is already extensively used in the industry, and presents different challenges in ensuring well-controlled and fair usage. This topic is currently covered in a relatively limited way in the core reading. For example, there is no direct reference to customer fairness and transparency in the use of data that is not directly related to the insurance proposal or prior claims (such data is often used as a proxy for behavioural rating factors).

In the data section of the material it may be worth reminding students that certain data items already cannot be used explicitly or implicitly as rating factors in pricing under EU law (and post-Brexit UK law) eg sex. Although this is mentioned in 'The general business environment' section – a cross-reference in the 'Data' section would be helpful to emphasise this important point. Some distinction could be drawn between legal requirements such as data protection, and customer fairness or conduct considerations around what constitutes reasonable use of data.

The unit 'Setting rates' provides criteria for good rating factors, including those that 'are acceptable to the policyholder'.

The core reading could expand upon this point, in particular drawing together themes of customer fairness and ethical use of data, illustrating what additional criteria would be required to meet this requirement (eg transparency, ability to influence or change, low risk of perception of unfairness, inclusiveness).

Machine learning modelling techniques

Although machine learning modelling techniques are already used by many across the industry, they are only briefly mentioned in the current SP8 material. Subject CS2 (Risk modelling and Survival analysis) does introduce actuarial students to machine learning. The SP8 core reading should link and expand on this, thinking about practical use in GI pricing (this may, of course, extend beyond personal lines pricing).

The possible increased challenges in validating such models, or communicating results to senior management and to non-actuaries, could also be considered. There is potential linkage here to material within the Certificate in Data Science syllabus.

The current SP8 material understandably focuses on GLM-type techniques or, more widely, multivariate modelling. While this remains critically important within the industry, with such models likely to remain in use for some time, it is important that the IFoA looks ahead and considers how to balance the material with additional machine learning elements. This may be relevant in the context of wider GI pricing, which would further support syllabus development in this area.



Observation 7

Data and Modelling core reading units could mention the balance of commercial drivers, customer fairness and transparency of outcomes. This could focus on the risks of expanding data usage and more complex, and potentially less transparent, models.

The Modelling unit could cover in more detail new techniques that are increasingly being used, especially machine learning, and the challenges these may bring around validation and communication. This could link to earlier material in core statistics and practice subjects, and how this would apply to practical usage in GI pricing. Any planned developments to data science material within the overall education offering should, of course, be taken into account.

Additional information considered

General Insurance Advanced (SA3)

We have not considered the SA3 core reading in as much detail as for SP8.

SA3 syllabus has the following relevant sub-sections:

- *2.3 Explain the relevance of legislation to general insurance business, in relation to:*
 - *consumer protection*
 - *equality legislation.*
- *2.8 Outline the requirements of actuarial standards in relation to actuaries practising in or advising general insurance companies.*

There is a unit covering 'Legislation' in line with the syllabus objective above. This has a useful section on consumer protection in the context of legislation. Consideration could be given to changing the emphasis of this unit to being based upon customer fairness, and then indicating where legislation helps to deliver this. This may seem a relatively subtle point; however, the driver of customer fairness should be from a desire to do the right thing under the Actuaries' Code, independent of local legislative considerations. The latter then provides a framework and boundaries for customer fairness to be delivered.



Education recommendation 1

The IFoA's pre-qualification education syllabus covering GI pricing should be reviewed to ensure there is sufficient coverage of:

- a) Customer fairness in pricing and product design
- b) Use of new and emerging data and modelling techniques.

Application of existing standards and guidance

For actuaries involved in personal lines pricing in the UK there is a range of relevant standards and guidance in place to help ensure professional judgement and skills are appropriately applied. This section of the report provides a summary of key references and their relevance to UK home and motor insurance work.

The Actuaries' Code

All sections of the Actuaries' Code are relevant to some extent, and the recently published ***Ethical and professional guidance on Data Science: A Guide for Members*** provides helpful guidance that maps well to many aspects of personal lines pricing. Some elements covered in that guidance, along with further areas of relevance, are set out below:

Principle	Guidance
Integrity	• There are safeguards to prevent data being used in a manner that results in unfair or discriminatory outcomes for users. • Data is not used for a purpose for which the appropriate consent has not been obtained.
Competence & Care	• Ensuring that there is a full understanding within the team of the sources of error and bias in data and keeping models under regular review. • Obtaining input from other suitably knowledgeable professionals. This is particularly relevant where, given the complexity of many data science related projects, it is unlikely that an actuary will be an expert in all aspects, nor may the actuary have responsibility for all aspects of the project. • Personal lines pricing is a fast-developing field of work, particularly in regard to regulatory developments and more complex use of data and models. It is important that actuaries working in this field ensure they keep up to date with emerging changes; there are a range of CPD options to help do this. Where an actuary is unsure of what areas to consider, or how to go about this, the reflective practice discussion element of the new CPD scheme may provide a good opportunity to discuss this with an experienced peer.
Impartiality	• Ensuring any potential biases are communicated transparently to the users and stakeholders. • Where members are working within a multi-disciplinary team, with data scientists for example, ensure that they consider the risks of conflicts of interest and bias and communicate this to the wider team so that appropriate action is taken. It will be helpful for members to explain to other team members their professional responsibilities in this area.
Compliance	• Transparency for consumers with regards to the information that is collected and how this data is being used. • Following major pricing practices work carried out by the FCA in recent years, and the significant proposals in the final policy statement, actuaries should play their part in the implementation and operation of the new regulations in their organisations. This should not preclude ongoing healthy debate, including where emerging experience of new rules may differ from that expected.

Principle	Guidance
Communication	Our questionnaire responses showed that actuaries are involved in the pricing process at a number of points, including those in technical roles and with decision-making responsibilities. These roles differ between organisations and over time. It is important that actuaries focus on the communication requirements of whatever role they carry out, ensuring that this is appropriate to their audience, with responsibility and hand-off clearly indicated.

Technical Actuarial Standards

There are a number of areas of TAS 100 that are relevant to GI pricing activity. Although the TASs are intended to cover technical actuarial work, the requirements in many instances focus on the importance of communicating appropriately, particularly where complexity is involved.

The questionnaire responses showed that organisations and actuaries generally see TAS 100 (and 200) as relevant in technical pricing, and to a lesser extent in street pricing. In the table below, we have indicated particular parts of the TASs that we feel are most relevant, recognising there may be challenges when these are applied in a multi-disciplinary team.

Reference	Provision	Relevance
TAS 100: principles for technical actuarial work		
Data – 2.4	Communications shall describe the data used in the technical actuarial work, the source of the data, the rationale for the selection of the data, whether checks and controls have been applied, any material uncertainty in the data, and the approach taken to deal with that uncertainty.	There is extensive and increasing use of data in personal lines pricing. Actuaries should focus carefully on the rationale for the use of data, and the communication of uncertainties, in particular from the use of new and/or proxy rating factors.
Models – 4.1	An explanation of how a model is fit for the purpose for which it is used and what it does shall be documented.	It is likely that well-established GLM models will have documentation in place. As novel and more complex modelling is developed, actuaries should consider what additional documentation may be required to allow an appropriate level of understanding.
Models – 4.3	Communications shall explain the methods and measures used in the technical actuarial work and describe their rationale.	This may become more challenging with increased use of more complex and/or less transparent modelling techniques, including machine learning.
Models – 4.4	Communications shall include an explanation of any changes to the methods and measures used from the previous exercise carried out for the same purpose (if one exists).	Relevant in terms of a move to more agile pricing processes and the need for potentially quick turnaround in pricing outputs.
Models – 4.5	Communications shall include explanations of any significant limitations of the models used and the implications of those limitations.	With the potential for development of more complex models, it will become ever more important to clearly highlight limitations, and communicate these appropriately to colleagues and to senior management.
Comms – 5.2	The style, structure and content of communications shall be suited to the skills, understanding and levels of relevant technical knowledge of their users.	Where there is increased use of Big Data and machine learning techniques, actuaries should carefully consider how new concepts are being communicated in their work.

Reference	Provision	Relevance
TAS 100: principles for technical actuarial work		
Comms – 5.3	Material information provided orally shall be confirmed in permanent form.	Where there is a requirement for agility in the pricing process, actuaries should ensure that documentation is available at least retrospectively to backup decisions made quickly.
Comms – 5.4	Communications shall include a comparison of results of calculations with the previous exercise carried out for the same purpose with an explanation of any differences (if one exists).	This may prove challenging where certain machine learning techniques are used. Actuaries may need to consider alternative validation techniques to meet this requirement.
Comms – 5.5	Communications shall: a) indicate the nature and extent of any material uncertainty in the actuarial information they contain; and b) state the nature and significance of each material risk or uncertainty faced by the entity in relation to the technical actuarial work and explain the approach taken to the risk.	This requirement becomes more relevant where the use of new and more complex modelling techniques in itself introduces additional risk and uncertainty.
Documentation - 6	Documentation shall contain enough detail for a technically competent person with no previous knowledge of the technical actuarial work to understand the matters involved and assess the judgements made.	Increased challenges in ensuring that documentation is appropriately accessible in a more complex environment.
TAS 200: insurance (Core Provisions)		
Judgements - 2	Communications shall describe the sensitivity of results to judgements that are material either individually or in combination.	The choice of datasets and modelling techniques are key judgements and should be appropriately justified and communicated.
Data – 3	The documentation of the data used in the technical actuarial work shall include data definitions, data sources, data checks and controls, and the source and justification of any data proxies.	This requirement is already relevant in the context of GLM and existing uses of data proxies for rating. However with increased use of data, and potentially greater focus given removal of new business discounting, actuaries should review practice in this area.
Data – 6	Communications shall explain any data proxies used in the technical actuarial work and their rationale.	As above for Data - 3.
Models – 9	Implementations and realisations of models shall be reproducible.	More challenging in the context of some machine learning techniques. However, remains important to ensure robustness of a particular approach.
Regulations – 11	If technical actuarial work is performed in order that the insurer or any other party commissioning the work complies with regulations, communications shall state the regulations applying to the work and confirm compliance with them.	Increased requirements in this area following implementation of FCA policy statement.

TAS 200 applies to *Technical actuarial work to support pricing frameworks*, although there are no specific provisions relating to pricing (in contrast to other areas of actuarial work covered by TAS 200). This could be considered in the planned FRC review of TAS 200, with focus on the use of data science techniques and the particular challenges this may bring.



Regulatory recommendation 2

Technical Actuarial Standards should be reviewed to recognise significant advances in data science and machine learning techniques, and the increased challenges this brings to validation and communication of outputs. A review of standards should take into account the potential impact of different burdens of regulation on actuaries and other professionals. Developments in these technical areas are not restricted to GI pricing activity and hence changes to the TAS would potentially have wider application.

APS X2 – Review of actuarial work

Given the complexity of data and modelling that is carried out for personal lines pricing, a form of work review within the process would be expected in well-controlled organisations. Questionnaire responses showed this was the case, although likely to be less formally linked to specific requirements of APS X2.

This may become even more challenging with the advance of more complex data and modelling usage, coupled with the mix of disciplines within pricing teams which means that colleagues who actuaries report to, or manage, may not necessarily be covered by similar requirements. Actuaries working in this field should ensure they are satisfied with the work or independent peer review requirement in their organisations, and may wish to consider documenting how this broadly aligns to APS X2 requirements. This might include interaction with other quality assurance controls being applied to a piece of work (in line with paragraph 1.3.6 of APS X2).

The IFoA has produced additional guidance on the **application of APS X2**²³ including case studies.

Non-mandatory guidance

Conflicts of interest

The IFoA's **Conflicts of interest guidance**²⁴ was updated in April 2019, principally to provide a more succinct view of some of the challenges members might face to ensure they work in an impartial manner. There are a couple of specific questions for members to consider when identifying a potential conflict that could be relevant in a GI pricing context:

Is there a conflict between the commercial interests of the person who has commissioned the work and others whose interests may ultimately depend on my advice?

As pricing actuary or underwriter, am I in a position where competitive pressures will compromise my ability to comply fully with TASs and/or the Code?

Understandably, insurers will expect work to meet commercial requirements in a competitive marketplace. It is important that this is balanced with the expectations of consumers that they will be treated fairly, aligned to relevant conduct regulations. Seeking a commercial advantage is a key part of doing business in any environment – actuaries should consider whether what they are being asked to do is reasonable in the context of other stakeholders in the outcome. This may apply to the choice of rating factors, use of data items, or behavioural modelling approaches, for example. It would be reasonable to expect other disciplines to apply the same principles in line with applicable organisational values.



Member recommendation 3

Actuaries should always consider potential conflicts of interest, including recent guidance on the ethical application of data science. This is particularly important given the increased use of data and complex models, which may result in a risk that the balance of commercial decision-making and customer fairness is distorted. Aiming for an appropriate balance is not the sole responsibility of actuaries, but is something actuaries should seek alongside other insurance professionals.

Ethical and professional guidance on Data Science: A Guide for Members (and Ethical Data Science)

In 2019 the IFoA, in conjunction with the Royal Statistical Society, published **A Guide for Ethical Data Science**.²⁵ This contained high-level principles for actuaries, and other statisticians, to follow in the use of data science and related models.

23 | Guidance - APS X2: Review of Actuarial Work

24 | Conflicts of interest: A Guide for Members

25 | A Guide for Ethical Data Science

In February 2021 the IFoA published more detailed guidance ***Ethical and professional guidance on Data Science: A Guide for Members***. This provided additional material for actuaries to consider, as well as helpful case studies, including one directly relevant to GI personal lines pricing.

As more complex data and modelling techniques continue to advance, it is important that actuaries ensure ethical use is a high priority. It is essential that customer and commercial interests are balanced to ensure all participants in this competitive market see the benefits of these advances.

Recommendations and observations

The tables below set out the recommendations and observations in this report



Member recommendations

No.	Member recommendation	Standards / Guidance reference
1	Actuaries working in pricing roles must follow existing professional standards, in particular TAS 100 and 200 and APS X2 (peer review). A proportionate approach to documenting how these have been addressed, including which work is in and out of scope, is likely to be appropriate in most instances, particularly in multi-disciplinary teams. Of particular relevance is how complex data and modelling outcomes are explained and justified, a key skill that actuaries can continue to promote through the application of standards.	TAS 100, TAS 200, APS X2
2	Actuaries should engage positively with new FCA regulations in relation to personal lines pricing and product governance, helping to implement the required changes that aim to improve overall consumer outcomes. This may be through direct involvement in pricing functions with either technical or senior management roles, or through oversight activity. This should not preclude ongoing analysis and challenge on the success of any measures as part of post-implementation monitoring and feedback.	Actuaries' Code
3	Actuaries should always consider potential conflicts of interest, including recent guidance on the ethical application of data science. This is particularly important given the increased use of data and complex models which may result in a risk that the balance of commercial decision-making and customer fairness is distorted. Aiming for an appropriate balance is not the sole responsibility of actuaries, but is something actuaries should seek alongside other insurance professionals.	Conflicts of interest guidance; Ethical use of Data Science guidance



Regulator recommendations

No.	Regulator recommendation
1	The IFoA and the Financial Reporting Council should consider areas where additional guidance may help actuaries apply existing standards within a multi-disciplinary environment, often with shared responsibility for pricing outcomes with other experts in this field. This may have particular relevance for increased use of data science and machine learning techniques (where steps have already been taken on ethical guidance). This should aim to support actuaries operating across a range of roles and responsibilities within organisations.
2	Technical Actuarial Standards should be reviewed to recognise significant advances in data science and machine learning techniques, and the increased challenges this brings to validation and communication of outputs. A review of standards should take into account the potential impact of different burdens of regulation on actuaries and other professionals. Developments in these technical areas are not restricted to GI pricing activity and hence changes to the TAS would potentially have wider application.



Education recommendations

No.	Education recommendation
1	The IFoA's pre-qualification education syllabus covering GI pricing should be reviewed to ensure there is sufficient coverage of: • Customer fairness in pricing and product design • Use of new and emerging data and modelling techniques.



Observations

No.	Observation	Topic
1	The IFoA could consider how actuaries are supported along a career path in senior personal lines pricing roles. For example, this could consider what key competencies organisations may seek for roles such as Chief Underwriting Officer, and how education and lifelong learning opportunities could align to that.	Lifelong learning
2	Given the role of Chief Actuaries in providing an underwriting opinion where pricing is key, involvement of the actuarial function in strategic pricing committees may be seen as better governance practice. However, this will depend on other communications and processes organisations adopt to ensure this actuarial role is adequately fulfilled. It may also depend on how organisations are set up to ensure independence between first- and second-line activities.	Good practice
3	It would be best practice, and in line with actuarial standards, to ensure sufficient and clear documentation is in place, in particular justifying the fairness of particular factors that could unduly impact certain cohorts of customers (for example where there may be indicators of vulnerability).	Good practice
4	Actuaries involved in developments in this space should follow the recently published IFoA Data Science ethical guidance which explains the need to ensure innovation benefits both organisations and consumers.	Guidance
5	Actuaries in pricing fields should stay abreast of the many climate-change developments and consider how they may apply to their ongoing work. Interaction with reserving and capital colleagues may help inform this.	Business environment
6	Existing core reading units describing products and/or business environment could be developed with expanded material covering customer fairness and the role of a pricing actuary within this. This could draw on themes around use of data, transparency of products, and promoting a customer fairness agenda (including adherence to relevant regulations). Exam setters could consider including more questions that focus on consumer impacts and fairness considerations (acting in the public interest).	Education

No.	Observation	Topic
7	Data and Modelling core reading units could mention the balance of commercial drivers, customer fairness and transparency of outcomes. This could focus on the risks of expanding data usage and more complex, and potentially less transparent, models. The Modelling unit could cover in more detail new techniques that are increasingly being used, especially machine learning, and the challenges these may bring around validation and communication. This could link to earlier material in core statistics and practice subjects, and how this would apply to practical usage in GI pricing. Any planned developments to data science material within the overall education offering should, of course, be taken into account.	Education

Appendix 1 – Thematic Review Programme

Actuarial Monitoring Scheme

The Institute and Faculty of Actuaries launched the Thematic Review Programme in September 2019, as part of the Actuarial Monitoring Scheme (AMS). The AMS is designed to improve the effectiveness of actuarial regulation in the public interest, provide meaningful, credible, independent feedback to members and their employers, and promote ongoing reinforcement and continual improvement.

The AMS forms an important part of a professionalism framework designed, through carefully balanced interventions and support, to provide evidence of the quality of actuarial work and to promote best practice. In time, it will allow the IFoA to consider issues of relevance to members across the profession, wherever they are practising.

The IFoA's Regulatory Board has initially introduced regular thematic reviews looking at particular topics, roles and/or areas of work relevant to actuaries, and data-gathering activities on a scheduled and ad hoc thematic basis.

Thematic reviews

The outcome of thematic reviews and data gathering will be used to continually improve and, if necessary, adapt the AMS, to ensure that those forms of monitoring are working effectively.

The scheme is based on collaboration between the IFoA, its members, and the organisations for which they work. The IFoA has a dedicated Review Team in place to undertake reviews on topics identified as having the potential to provide useful insight into the work of our members.

The scheme involves review of how work is being carried out in practice by actuaries, including where possible review of the work itself, which will allow the IFoA to share useful learning and good practice with members and their employers. The IFoA hopes that the benefits to organisations will include enhanced information about the work of actuaries upon which they rely to make significant decisions.

The outputs of the reviews will be used by the IFoA to ensure that its standards, guidance, continuing professional development events, and education offerings are as effective and relevant as possible, helping it to safeguard the reputation of the profession and serve the wider public interest.

The thematic reviews will potentially apply to any area of actuarial work and themes will be identified using a range of sources, including:

- Ongoing risk analysis undertaken by the IFoA's Regulatory Board
- The *Risk Perspective* document published by the Joint Forum on Actuarial Regulation (JFAR)
- Insights shared with the IFoA by fellow regulators including the Financial Conduct Authority, Financial Reporting Council, Prudential Regulation Authority, and The Pensions Regulator
- The IFoA's other regulatory activities (including its disciplinary process).

A key driver of potential themes is the public interest, which in turn is a key principle in the regulatory responsibility of the IFoA through its Royal Charter. A topic such as this thematic review on the involvement of actuaries in pricing, which directly affects insurance costs of consumers, falls squarely into this.

Appendix 2 – Glossary

There is some terminology used in the report which is explained here.

The following broad definitions for price are used:

- **Technical (or risk) price** – the cost of servicing a contract, which will include some or all of expected cost of claim, servicing costs and cost of capital.
- **Street (or market) price** – the actual price quoted to customers, taking into account any additional propensity/demand/margin modelling.
- **Dual-pricing** – a practice where the new business and renewal price for a given similar insurance risk may differ, usually due to significant new business discounting.

The following broad definitions for type of work/activity are used:

- **Analytical and technical** – roles focused on data and modelling parts of the process
- **Decision and influence** – managerial and/or director roles with specific pricing responsibilities, including communication/attendance at Executive Committee and/or Board level
- **Validation and oversight** – First- or second-line roles with specific responsibility for review and challenge of overall pricing activity, proposals and outcomes

The following definitions are taken from existing actuarial guidance and standards:

- APS X1 and APS X2 definition of **actuarial work**
“Work undertaken by a Member in their capacity as a person with actuarial skills on which the intended recipient of that work is entitled to rely. This may include carrying out calculations, modelling or the rendering of advice, recommendations, findings, or opinions.”
- TAS 100 definition of **technical actuarial work** is:
“work performed for a user:
 - (1) where the use of principles and/or techniques of actuarial science is central to the work and which involves the exercise of judgement; or*
 - (2) which the user may reasonably regard as technical actuarial work by virtue of the manner of its presentation.”*

Appendix 3 – References

Documents referenced in this report

Report Footnote	Title	Author	Description
1	Citizens Advice – The insurance loyalty penalty (2017)	Citizens Advice	Consumer group report on loyalty penalty experienced across different markets
2	FCA General insurance pricing practices – Final Report (2020)	FCA	Final report setting out proposed remedy package and final findings of the general insurance pricing practices market study
3	FCA General insurance pricing practices – PS21/5 final rules (2021)	FCA	Policy statement setting out final rules following pricing practices market study
4	Actuaries’ Code	IFoA	Ethical code for all actuaries
5	Standard setting at the IFoA	IFoA	Information about the Standards Framework and the principles that inform standard setting at the IFoA
6	TAS 100: Principles for Technical Actuarial Work	FRC	Technical standard covering all actuarial work
7	TAS 200: Insurance	FRC	Technical standard for specified actuarial work on insurance
8	APS X2: Review of Actuarial Work	IFoA	Actuarial professional standard setting out types of review to be applied to actuarial work
9	IFoA Ethical and professional guidance on Data Science: A Guide for Members (2021)	IFoA	2021 ethical guidance published by the IFoA on data science
10	Certificate in Data Science	IFoA / University of Southampton	Jointly accredited certificate providing an introduction to data science concepts
11	FCA Guidance for firms on the fair treatment of vulnerable customers (2021)	FCA	Regulatory guidance for the treatment of vulnerable customers
12	Citizens Advice - Excessive prices for disengaged consumers (2018)	Citizens Advice	Super-complaint raised on behalf on consumers

Report Footnote	Title	Author	Description
13	FCA General insurance pricing practices market study: Consultation on Handbook changes (2020)	FCA	Regulatory consultation following the FCA final report on GI pricing
14	IFoA Response to FCA CP20/19 General insurance pricing practices market study	IFoA	IFoA Policy and GI Board response to FCA consultation
15	IFoA Blog – The road ahead to motor insurance reserving (2021)	Harshitta Malakar	Blog outlining potential impacts to GI reserving from Covid-19 experience
16	Scenario Modelling of COVID-19: Analysis of Key Classes in P&C Industry (2021)	Darshan Purmessur AIA, Haedeh Nazari FIA	Paper setting out potential benefits of scenario modelling to consider potential future pandemic impacts
17	IFoA Thematic Review Programme – Current and planned reviews: Climate-related risk (2021)	IFoA	Webpage which outlines information gathering review on climate-related risk
18	HM Treasury – Review of Solvency II: Call for Evidence (2020)	HM Treasury	Call for evidence for potential future updates to UK application of Solvency II (post-Brexit)
19	The Actuary – InsurTech investment hits record high (2021)	Chris Seekings	Actuary news item on the high levels of Insurtech investment
20	GRIP – General Insurance Premium Rating Issues Working Party	General Insurance Premium Rating Issues Working Party	2007 paper commissioned by GI Board
21	IFoA Learning Change Programme	IFoA	Webpage setting out key aspects of the Learning Change Programme
22	IFoA Blog: GIRO – bigger and better (2020)	Catherine Drummond	Blog summarising the wide range of sessions available at GIRO
23	Guidance – APS X2: Review of Actuarial Work	IFoA	Additional guidance for the application of work or peer review
24	Conflicts of interest: A Guide for Members	IFoA	Additional guidance for members in identifying and assessing conflicts of interest
25	A Guide for Ethical Data Science	IFoA	A guide for members working in the area of data science

All links correct as of June 2021

Appendix 4 – Review questionnaire

Aspect of Pricing	Questions
Responsibility for Pricing	Who has overall responsibility for pricing within your organisation, and is that individual an actuary? Does your organisation have actuaries carrying out regulatory senior management function roles SMF20 (Chief Actuary) and SMF23 (Chief Underwriting Officer)? Are there different reporting lines for technical pricing and street pricing in your organisation? Does actuarial involvement in the 2 separate stages differ in terms of senior management? How many actuaries or actuarial students work in the Pricing function of your organisation? If possible and relevant please indicate splits between technical and street pricing activity for each of Home and Motor. What is the role of the Chief Actuary and the Actuarial Function in pricing? Is this in a 1st line or 2nd line capacity? If the Actuarial Function sits in 1st line, what role does 2nd line play in pricing oversight, and does this involve actuaries? Who chairs the main Pricing Committee, or equivalent governance forum with pricing responsibility, within your organisation? Please provide roles of any actuary members of the committee (e.g. Head of Technical Pricing). How would you categorise the extent of the overall role of actuaries in pricing according to the following broad aspects? • Analytical and Technical • Decision and Influence • Validation and Oversight Does your organisation have a pricing strategy or philosophy document in place? If so, who owns this, and what is the extent of actuarial involvement?
Pricing Factors	What is the broad approach for selecting and analysing risk/rating or propensity/elasticity factors? To what extent is the rationale for factors documented and who owns this documentation? What is the approach to explaining and communicating pricing factors (risk/rating or propensity/elasticity) to Senior Management and the Board? How is climate change reflected in risk/rating factors, either through changes in physical risk factors or behavioural factors? What is the role of actuaries in your organisation with respect to the factors part of the process?

Aspect of Pricing	Questions
Data, Methodology and Models	What data sources are typically used for pricing? (e.g. internal only, internal and specific external providers, wider external data)
	What methodologies are typically used? (e.g. GLM, data science, machine learning techniques). Please expand where possible, including any differences between technical and street pricing approaches.
	To what extent does your organisation use internally developed software (including open source) versus 3rd party vendor models?
	What documentation exists to support and validate data and model choices, and outcomes?
	In relation to data sources and modelling what key developments have taken place in (say) the last 3 years, and what changes do you expect in the next 3 years?
	What is the level of involvement of actuaries in data analysis and or modelling activity for pricing? How does this compare to other specialists (e.g. data scientists, technical underwriters, climatologists, analysts)?
Customer Considerations	How is customer fairness monitored and governed for pricing, and who has this responsibility?
	Are there any significant differences in pricing methodology for old and newer products, or for different channels? If so what are the key drivers for this (e.g. level of underlying risk, market price competition, differences in underlying systems)?
	What controls are in place to analyse potential detriment to vulnerable customers, or indirect issues relating to protected characteristics, through the use of certain factors within pricing?
	To what extent are actuaries involved in fairness and product design aspects of the pricing process, in particular thinking about Decision/Influence or Oversight roles?
Application of Actuarial Standards and Guidance	Which aspects of pricing activity are considered “actuarial work” (in line with APS X1 and X2 definition) within your organisation (independent of senior manager responsibilities and reporting lines)?
	Which aspects of pricing work are considered to be covered by Technical Actuarial Standards (TAS 100 and 200) within your organisation?
	Are any aspects of pricing work at your organisation subject to Peer Review, including Independent Peer Review, in line with Actuarial Professional Standard X2 (APS X2)?
	To what extent do you think that current TAS and APS are relevant and applicable to aspects of pricing work? Are there improvements to the current standards that would enhance their relevance and applicability?



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