



# JOINT FORUM ON ACTUARIAL REGULATION

## RISK PERSPECTIVE: 2017 UPDATE

JANUARY 2018

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## Foreword

The Joint Forum on Actuarial Regulation (JFAR) recognises the importance of high quality actuarial work in mitigating the risks to the public interest in the insurance, pensions and investment industries and in the many other areas where actuaries are involved. In this ever-changing world, actuaries make judgements to measure and manage risk and uncertainty. Whether it is responding to market changing events (such as the demand for new types of pensions and savings products, technological disruption in insurance markets or the global impacts of climate-related risk) or identifying changes in the validity of previously established statistical techniques and assumptions, actuarial work needs to adapt.

In this fourth annual “Joint Forum on Actuarial Regulation: Risk Perspective”, the JFAR has challenged itself to consider risks to actuarial work through four critical lenses: macro environmental drivers, market characteristics, regulation and actuarial work itself. It has used these to deliver a holistic view of current risk hotspots by tackling key topics such as the UK’s exit from the EU, financial security and the forthcoming White Paper on defined benefit pension schemes. In this JFAR Risk Perspective: 2017 Update the JFAR shares its current view of nine key risk hotspots and identifies planned activities responding to these hotspots in 2018.

Previously the JFAR identified two areas warranting deeper consideration in 2017: the risks posed to the work of the actuary by the low interest rate environment; and the risk to the supply of relevant actuarial support in with-profits life assurance business. The JFAR’s Risk Perspective: 2017 Update provides the key insights from these investigations and the ongoing considerations.

The JFAR’s Risk Perspective seeks to raise awareness of current risks to actuarial work considered by its members and to generate discussion about these risks. The JFAR invites feedback from actuaries, users of actuarial work and all those with an interest in this topic.

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# Joint Forum on Actuarial Regulation

Risk Perspective: 2017 Update

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# 1 Introduction

Actuarial work is central to many financial decisions in the insurance, pensions and investment industries and is an important element in other areas that require the evaluation of risk and financial returns. High quality actuarial work promotes well-informed decision making and mitigates risks to users and the public; poor quality actuarial work can result in decisions being made which are detrimental to the public interest.

The Joint Forum on Actuarial Regulation (JFAR) was established in 2013 by the Financial Reporting Council (FRC), the Institute and Faculty of Actuaries (IFoA), the Financial Conduct Authority (FCA), the Pensions Regulator (tPR) and the Prudential Regulation Authority (PRA). The JFAR is a collaboration between regulators involved in actuarial work to co-ordinate, within the context of its members' objectives, the identification and analysis of public interest risks to which actuarial work is relevant.

Since 2014, the JFAR has published its Risk Perspective and this is the fourth such report. The Risk Perspective sets out the collective view of the regulators on risks to high quality actuarial work arising from current issues. It is intended to raise awareness of the risks and potential mitigations, seek views on the risks identified, and guide the JFAR's future work.

The maintenance of high standards, technical and professional, is essential to building and maintaining public trust. Actuaries work in different cultural environments: in some cases they are empowered to influence firm strategy and add value but in others they may find it difficult to have their voice heard. The JFAR recognises its role in promoting and influencing professionalism and highlighting any risks to that professionalism. The Risk Perspective will support actuaries, their employers and users of actuarial work to enable them to consider the regulators' view in their activities, such as risk management activities including the Own Risk and Solvency Assessment and Integrated Risk Management.

Hotspots have been identified where there is a perceived increase in risk to the public interest as a result of current or emerging conditions changing the nature or level of uncertainty. Factors that contribute to a risk being classified as a hotspot may include the uncertainty from macro environmental drivers, the extent of difficult or developing areas of actuarial work or the potential consequences for vulnerable groups.

The JFAR identified nine hotspots which are illustrated in the adjacent word cloud (in purple) along with the issues which make these risks more significant at the current time.

The JFAR's assessment also recognises common themes that cut across the hotspots such as professionalism, intergenerational fairness and Brexit.



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### Market performance and uncertainty

Market performance and its impact on actuarial work has been a hotspot for the JFAR in previous Risk Perspectives. During 2017, the PRA and tPR undertook a review of the impact of low interest rates on the insurance and pensions industry (see Section 5.1) and provided updates to the JFAR at each of its quarterly meetings. Discussion of the impact of market performance on actuarial work will continue at the JFAR's quarterly meetings in 2018.

### Climate-related risk

The JFAR will engage with the IFoA Resource and Environment Board and the FRC's Corporate Reporting and Governance teams to understand the current developments in identifying, measuring, mitigating and disclosing climate-related risk and issues around its effective communication.

### Financial security

The JFAR will use its activities in 2018 to consider what factors contribute to financial security (e.g. consumers' financial literacy, availability of products and communication of risk) and the ways in which the individual actuary and/or actuarial profession can support the public interest in this area. The JFAR began investigating this hotspot through its December 2017 topical discussion of the FCA occasional paper "Ageing Population and Financial Services"<sup>i</sup>.

### Defined benefit pension scheme management

The JFAR will review the findings and any proposals from the White Paper on the security and sustainability of the defined benefit pension sector and consider their impacts on actuarial work.

The JFAR members recognise that pension communications can be a source of confusion for the public and will consider in their activities the suitability of pensions disclosure and the impact of the proposed introduction of a Pensions Dashboard.

The JFAR issued a thematic review in 2016 "Review of transfers from Defined Benefit to Defined Contribution Schemes following pension freedoms"<sup>ii</sup> and will review the findings from this report as part of its 2018 activities.

### Technological change - automation and digitisation, Big Data, artificial intelligence and cyber risk

Following on from its 2017 topical discussions on "Big Data" and the "Impact of Digital Technology on Actuaries" (see Section 6), the JFAR will continue to investigate the potential impacts of technological change on actuaries and their work. The JFAR's activities may involve using sources such as the output from the FCA's review of general insurance pricing practices and the work of the IFoA Modelling Analytics and Insights from Data working party.

### Terrorism and Cyber Crime

The JFAR will talk to experts in this area (e.g. underwriters and pricing actuaries) to understand the risks to high quality actuarial work arising from terrorism and cyber crime. The JFAR is interested in understanding the products being developed to provide protection from these emerging risks.

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## Mortality

The JFAR will liaise with experts in the field of mortality including from the Continuous Mortality Investigation to raise its understanding of mortality trends and investigate how actuaries are using and communicating this information.

The JFAR seeks views on its Risk Perspective and the hotspots identified and welcomes feedback from actuaries, their clients and employers, and other stakeholders by 30 April 2018. Details of how to respond can be found in Section 2.6. The JFAR will also be holding stakeholder outreach events during 2018 to capture the input of practitioners and users of actuarial work. The feedback received will be incorporated into the JFAR's forward agenda when addressing public interest risks.

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## 2 Executive Summary

### 2.1 Risk Perspective: 2017 Update

We live in a rapidly changing, increasingly global world in which people are living longer, environmental concerns are rising and technology is advancing at an unprecedented pace. These developments present opportunities and risks for the economy, society, the insurance, pensions and investment industries and the actuarial profession.

This JFAR Risk Perspective: 2017 Update report sets out:

- the process used to identify the risk hotspots: the Actuarial Risk Identification Architecture;
- the nine risk hotspots identified by the JFAR;
- a summary of the JFAR's 2017 thematic reviews; and
- a summary of the JFAR's 2017 topical discussions.

### 2.2 Actuarial Risk Identification Architecture

In producing the previous reports, and during their regular activities, the FRC and other JFAR members have identified broad risk categories and hotspots. The hotspots relate to current or emerging risks which due to their changing nature or level of uncertainty pose increased risk to the public interest.

In this report the JFAR introduced the Actuarial Risk Identification Architecture (ARIA) to help identify the hotspots in a holistic and dynamic fashion. The ARIA (Figure 2, Section 3) identifies three sources of risk, each with sub-categories; macro environmental drivers, the inherent risk in actuarial work and market characteristics. It also recognises that the ongoing activities of the JFAR members influence the risk to the public interest of actuarial work. There are dynamic interactions between these sources of risk and influences on risk which may have compounding, offsetting or domino effects.

The ARIA has helped the JFAR to review and capture the interactions between the various drivers and sources of risk. For example, a macro environmental driver such as improving technology (Big Data), may impact the work of actuaries (using machine learning) and the characteristics of the market (new on-demand insurance products). The interaction of these factors may either increase or decrease the risk to the public interest through the change in the availability or price of suitable insurance products. The ARIA is described in more detail in Section 3.

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## 2.3 Hotspots

In 2017, the JFAR has identified nine hotspots which are summarised in Table 1. For each hotspot, the risk is described in generic terms and the key risk drivers and current influences that lead to its definition as a hotspot are identified.

It should be noted that the JFAR:

- is not necessarily saying there is current evidence of the risks materialising or of poor quality or insufficient actuarial work; and
- does not intend to propose additional regulation to mitigate all the identified risks. Any co-ordinated action will be proportionate and selected from a wide “toolkit”.

The JFAR uses the knowledge gained as part of its members’ ongoing activities along with information from a variety of sources to inform it about potential risks. Information sources include the JFAR members’ Strategy and Business Plan documents, the IFoA Risk Outlook<sup>iii</sup>, regular IFoA Practice Board risk monitoring, quarterly JFAR topical discussions and external publications such as the WEF Global Risk Report<sup>iv</sup>. The ARIA is then used as a tool to provide a structured analysis ensuring that all risks are considered comprehensively and dynamically.

**Table 1: Hotspots and key drivers**

HOTSPOT	HOTSPOT DESCRIPTION	PRIMARY DRIVER
<b>Political and legislative risk</b>	Risk that actuaries do not sufficiently consider or plan for the potential for political or legislative change and as such over or under react to political uncertainty.	Political
<b>Regulatory change</b>	Risk that the quality of actuarial work is adversely impacted by the level of regulatory change resulting in poor outcomes for users.	Legal/ Regulatory
<b>Market performance and uncertainty</b>	Risk that actuaries fail to make sound judgements and risk based decisions given the uncertainty in the current financial market conditions within which they operate.	Economic
<b>Climate-related risk</b>	Risk that actuaries may not take into account appropriately, or communicate clearly, the assumed impact of changing climate on decisions of users.	Environmental
<b>Financial security</b>	Risk that actuaries fail to communicate the impact of the changing economic and social priorities of government on the current and ongoing appropriateness of the assumptions inherent in products designed to meet consumers' long term financial and social care needs.	Economic
<b>Defined benefit pension scheme management</b>	Risk that actuaries provide poor quality advice such that trustees are unable to respond effectively to the challenges facing Defined Benefit pension schemes resulting in poor outcomes for members.	Economic and Political
<b>Technological change – automation and digitisation, Big Data, artificial intelligence and cyber risk</b>	Risk that actuaries may not recognise and take account of technological changes such as the availability of Big Data and new modelling techniques, increasing cyber risk or changing business models.	Technological
<b>Terrorism and Cyber crime</b>	Risk that actuaries may fail to update assumptions or adjust working practices to reflect the changing nature of terrorism and cyber crime risks.	Political and Economic
<b>Mortality</b>	Risk of failure to pick up, understand and respond to changes in mortality trends in an appropriate and timely manner.	Social

Several of the hotspots are interrelated which could result in risks compounding, off-setting or having domino effects. The actions taken to mitigate one may therefore have the potential to decrease or increase risk elsewhere in the system. The JFAR's assessment of the frequency and severity of the risk, the time horizon over which it will manifest, the

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level of actuarial involvement, the existence of other mitigations (e.g. through the ongoing regulatory activities of the JFAR members), and the potential interaction between the hotspots will inform its activities over 2018. The hotspots are described in Section 4.

## 2.4 Thematic reviews 2017

From the hotspots identified in the Risk Perspective: 2016 update, two areas were chosen for thematic reviews in 2017. These were “Economic outlook – impact of low interest rates on insurers and pension schemes” and “Professionalism – the supply of/demand for actuaries in with-profits life assurance business”. These reviews are described in Section 5.

## 2.5 Topical discussions 2017

The JFAR uses its quarterly meeting agenda to discuss current and developing risks and mitigations and to identify appropriate actions. The JFAR invites expert speakers to inform it of current issues and to develop its understanding in areas of emerging risks. These topical discussions are summarised in Section 6.

## 2.6 Feedback

The JFAR recognises that there are limitations in identifying hotspots e.g. the existence of blind spots, assumptions that are taken for granted and the potential for the work to be impacted by group think and bias. Therefore, the JFAR welcomes feedback from actuaries, their clients and employers, and other stakeholders on the Risk Perspective and the hotspots identified. The JFAR will be holding stakeholder outreach events during 2018 to capture the input of practitioners and users of actuarial work. The feedback received from this outreach, or in writing, will be incorporated into the JFAR’s risk perspective and forward agenda when addressing public interest risks.

The JFAR would welcome responses to the questions below.

### FEEDBACK REQUEST

1. Do you think that the JFAR has correctly captured the current hotspots? If not, what other risks do you think should be considered and why do you think they are a particular risk to the public interest at this time?
2. Do you think the JFAR has fully described the hotspots? If not, please comment.
3. The JFAR would also welcome your views on its proposed responses to the hotspots and any further suggestions on how JFAR members could support practitioners or users of actuarial work in responding to the hotspots.

Feedback can be provided at one of the stakeholder outreach events being planned for 2018 or through a written response, which should reach the FRC by 30 April 2018, sent to RiskPerspective@frc.org.uk. Details of the outreach events will be published on the website<sup>1</sup>. The JFAR will make written responses publicly available on the website unless respondents specifically request otherwise.

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<sup>1</sup> <https://www.frc.org.uk/JFAR>

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## 3 Actuarial Risk Identification Architecture

The Actuarial Risk Identification Architecture (ARIA) is used to identify the hotspots in a holistic and dynamic fashion. Hotspots relate to current or emerging risks which due to their changing nature or level of uncertainty pose increased risk to the public interest.

The ARIA (Figure 2) identifies three main sources of risk, with each divided into sub-categories. It also recognises that the ongoing activities of the JFAR members influence the risk to the public interest of actuarial work. Each of these categories is represented by a coloured cog, with the cogs' teeth representing the main sub-categories. The interactions between the sources of risk and influences on risk are represented by the grey lines.

### Macro environmental drivers

The blue cog in the bottom left of the ARIA represents the risks to the public interest from actuarial work that are influenced by external drivers. The JFAR uses the STEEPLE I mnemonic (social, technological, economic, environmental, political, legal/regulatory, ethical, international) to ensure comprehensive consideration of these macro environmental drivers.

### Actuarial work

There is inherent risk in actuarial work due to its complexity. The teal cog in the bottom right of the ARIA represents the risks to the public which arise from this complexity. The nature of the risk will be influenced by the practice area (insurance, pensions, investments, wider fields) and activity (reserving, pricing, capital, product design, advising) but also by the task in hand (methods and modelling, data and assumptions, judgement, systems and technology, risk and uncertainty, communications). By considering both practice area and activity the JFAR aims to reduce the risk of silo thinking.

### Market Characteristics

Actuarial risk will be influenced by the structure and culture of the markets and companies in which actuaries work. The navy cog in the centre of the ARIA represents the risks to the public interest which arise from these. The market characteristics include professionalism, culture, group think, embedded processes and incentives, firm/pension fund strategy and business models.

### JFAR regulators

The ongoing activities of the JFAR members influence the risk to the public interest of actuarial work. The orange cog at the top of the ARIA represents the ways in which JFAR regulators reduce the risk to the public interest. Each JFAR regulator has a different focus to their supervision and approach to identifying, researching and mitigating risks (Technical Actuarial Standards, professional & ethical standards and integrity, financial stability, consumer protection, pensions protection, education & CPD).

**Interactions**

There are dynamic interactions between these sources of risk and influences on risk which may have compounding, offsetting or domino effects. These are represented by the grey lines.

The ARIA has helped the JFAR to review and capture the interactions between the various drivers and sources of risk. For example, a macro environmental driver such as improving technology (Big Data), may impact the work of actuaries (using machine learning) and the characteristics of the market (new on-demand insurance products). The interaction of these factors may either increase or decrease the risk to the public interest through the change in the availability or price of suitable insurance products.

**Figure 2: Actuarial Risk Identification Architecture**



## 4 Hotspots

### 4.1 Political and legislative risk

#### HOTSPOT DESCRIPTION

Risk that actuaries do not sufficiently consider or plan for the potential for political or legislative change and as such over or under react to political uncertainty.

#### CURRENT INFLUENCES

There is significant uncertainty created by Brexit which will directly or indirectly impact the work of actuaries in several areas e.g. economic impacts, regulatory uncertainty and legal contract validity. There is also uncertainty surrounding developments of UK domestic policy in areas such as monetary policy, pension legislation, health spending and data privacy.

Further, recent international electoral results appear to reflect societal polarisation, income inequality and the inward orientation of countries with the potential to impact national and international government policy in unexpected ways<sup>iv</sup>.

#### KEY DRIVERS

Primary driver: political

Secondary drivers: political landscape influenced by economic, environmental, legal and regulatory, ethical and international factors



#### Brexit

The outcome of Brexit negotiations is a key source of uncertainty currently, as is the UK government's strategy for policy decisions following Brexit. The outcome may impact the context in which actuaries work and/or actuarial work directly e.g. changes to insurance regulation in the UK compared with Solvency II, legality of contracts which are sold by UK companies but underwritten by EU companies.

International political risks may also affect the work of UK actuaries because they impact on the UK's relationships with other countries. They may arise through regulatory requirements, domicile of insured risks, regional economics, or relate to specific characteristics of the work being performed.

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## Pensions

The government White Paper looking at the security and sustainability of the defined benefit pension sector is also a source of uncertainty for actuarial work (see Section 4.6).

## Data and Assumptions

Political decisions could directly change the work of actuaries or the data and methodologies they use e.g. increased regulation of insurance pricing, data protection regulation or restrictions on the use of technology. It could also affect actuaries' models and assumptions e.g. changes in the taxation of defined contribution pension schemes may alter individual's propensity to invest, increased public access to new medicines could improve longevity or changing environmental policies may affect economic or physical risk assumptions.

Insufficient data can be a key risk during periods of political uncertainty as there may be no relevant history of similar situations. Actuarial work could be impacted by government decisions on economic factors such as taxation rules, through strategic changes to pension and other welfare schemes or policies to improve intergenerational fairness.

Where political changes are implemented gradually, such as proposals to stop sales of new diesel and petrol engine vehicles by 2040, there is time for changes to be reflected in data and actuaries to gradually change their assumptions. Unanticipated changes, particularly those which are binary and with material impacts, can adversely affect key decisions by actuaries and users of their work. Incorporating the impact of political decisions into business planning can be an uncertain process and there is a risk that the actual outcome differs significantly from expected. The risk is greater where actuaries have limited knowledge of the factors being considered by government and/or are unaware of, or give insufficient weight to, the views of other groups that may influence the government's actions e.g. changes to the Ogden rate for personal injury claims, incentives or regulation of the use of technology or the introduction of pricing tariffs.

## Group Think

In addition, there is a risk of 'Group Think'<sup>2,v</sup> where actuaries collaborate in sharing market knowledge and developing thought leadership to deal with situations where there is little data and a high degree of uncertainty.

## International

Finally, in considering geopolitical risk UK actuaries may be too far removed from local political considerations to understand the risk and make appropriate judgements. Actuaries may wish to consider ways in which they can keep up to date with relevant political developments in order to support users in making informed decisions.

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<sup>2</sup> 'Group Think' is defined as the tendency for one's own judgement to be influenced by the apparent consensus view of assumptions, methods, processes or approaches leading to a reduction in the variety of ideas in the market.

## 4.2 Regulatory change



### HOTSPOT DESCRIPTION

Risk that the quality of actuarial work is adversely impacted by the level of regulatory change resulting in poor outcomes for users.

### CURRENT INFLUENCES

Recent changes to regulation impacting actuarial work may not yet be fully embedded (e.g. revised Technical Actuarial Standards, Actuarial Professional Standards, Solvency II, Pension Freedoms, Senior Insurance Managers Regime).

### KEY DRIVERS

Primary driver: legal/regulatory  
Secondary drivers: political and international factors

### Response to regulation

There is a risk of over-regulation, placing onerous demands on actuarial resource, or under regulation, resulting in overreliance on professionalism. Regulators aim to follow the principles of good regulation<sup>3,vi</sup> to mitigate the risk of an inappropriate regulatory burden. There is a risk that regulatory changes may unduly affect the business environment. There is also a risk that regulatory change may lead to a strain on resources during initial implementation. Collaboration is required from actuaries and others across the business, including executives, to ensure the best outcomes. Actuaries can play a role in helping firms form a strategic approach to implementing changes to comply with new regulation impacting actuarial work.

There have been several changes to regulation of actuaries and the markets they work in, including revised Technical Actuarial Standards, Actuarial Professional Standards, Solvency II, Pension Freedoms, and changes in the Senior Insurance Managers Regime. This may lead to a perception of over regulation of actuaries leading to them being excluded from areas of work where they could add value. As a result, decision makers may not receive appropriate advice.

A future change impacting actuarial work could be the adoption and implementation of IFRS 17 (accounting for insurance contracts) in the UK. The IASB's objectives for this standard are to improve the consistency, transparency and comparability of financial reporting for insurance contracts globally. The implementation would be an opportunity for actuaries to work with other functions to support a smooth transition to the new financial reporting basis. Challenges for actuaries may arise from implementation, interpretation and communication of the changes in actuarial work supporting financial reporting.

<sup>3</sup> The Regulators' Code seeks "to promote proportionate, consistent and targeted regulatory activity through the development of transparent and effective dialogue and understanding between regulators and those they regulate".

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Actuarial and financial reporting systems may need enhancements to incorporate the new methods and models and to manage the volume and granularity of items required for disclosures. Support from actuaries will be needed in developing and embedding these actuarial valuation models and in other areas requiring judgement. Actuaries may find there are conflicting views on interpretation, particularly for those working in international roles where local differences are currently permitted. Actuaries will be well placed to communicate clearly the results under IFRS 17 and may also play a key role in working with other business functions to consider the short and long-term impacts of different implementation approaches.

### Professionalism

For actuaries, professionalism encapsulates technical competence, ethics and integrity and the skillset to apply these in real life circumstances. Actuaries may face challenges to acting in accordance with their professional values through commercial pressures such as the focus on short term profit generation or because they do not have sufficient support within their organisations.

Actuaries as professionals acting in the public interest are required to comply with the obligations of the Actuaries' Code and have due regard to a wider stakeholder group as well as the immediate user of their work. This could lead to conflicts of interest e.g. between shareholders and policyholders or pension scheme sponsors and members. Actuaries need to make sure judgements and opinions are communicated clearly. This may require moral courage where there are complex judgement calls, commercial and regulatory pressures. Some professional bodies are debating how best to explicitly recognise the principle of moral courage as a characteristic required of professionals<sup>vii, viii</sup>.

Actuaries can also face risks arising from silo thinking or group think or from a reluctance or inability to speak up in difficult circumstances. The JFAR has previously published a report on Group Think<sup>v</sup>. The Actuaries' Code emphasises speaking up and encourages good behaviour<sup>4,ix</sup>. The IFoA has professional skills training to support actuaries in escalating issues.

There is a risk that users of actuarial work may find less relevance in the actuaries' professional skills if actuaries do not keep up to date with the changing social, political and business environment. In this case actuaries may face competition from other experts. In the current climate, where there is some mistrust of experts, actuaries and other professionals may be considered to be anti-competitive, too cautious or a barrier to innovation. In order to avoid actuarial work being undervalued it needs to be relevant for users, clearly communicated and delivered in a professional manner.

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<sup>4</sup> The IFoA is currently consulting on changes to the Actuaries' Code. The consultation proposes, amongst other changes, to separate out the requirements on 'speaking up' into a standalone principle to emphasise its importance.

### 4.3 Market performance and uncertainty



#### HOTSPOT DESCRIPTION

Risk that actuaries fail to make sound judgements and risk based decisions given the uncertainty in the current financial market conditions within which they operate.

#### CURRENT INFLUENCES

Brexit and the continuation of the low interest rate environment seen since the global financial crisis may result in new and volatile economic and financial market conditions that create challenges for actuaries managing and communicating uncertainty e.g. the impact of Brexit on inflation, real interest rates, business investment and the currency markets.

#### KEY DRIVERS

Primary driver: economic

Secondary drivers: political, environmental and international factors

#### Market conditions

The monetary policies adopted by Central Banks to manage the financial crisis and more recently Brexit may change in the future. However, Brexit may cause strains beyond those that can be managed by monetary policy<sup>x</sup>. Commitments to managing climate change polices may also impact economic growth<sup>xi,xii</sup> (see Section 4.4).

Economic and market conditions have a direct impact on the assumptions used for pricing products, pricing assets, reserving for risks and calculating capital. All the areas where actuaries are employed are affected (insurance, pensions, investment, and wider fields such as regulatory or consultancy). The unusual economic conditions and persistent low interest rates, which have not been experienced in living memory, mean that past experience may be a poor guide to future outcomes. Market innovations to achieve higher yields, a lack of rational market behaviour and the use of political remedies such as Quantitative Easing also mean that historical relationships cannot be relied on and there is greater uncertainty in selecting and communicating assumptions.

#### Business strategies

Insurers and pension schemes may make strategic decisions to manage this uncertainty e.g. investment policy, business model changes or benefit modifications<sup>xiii,xiv</sup>. To some extent the risk is influenced by group think with a risk of herding around particular solutions even if they are not appropriate in the individual circumstances. Actuaries will play a role in helping decision makers manage these uncertainties. There is a risk that poor decisions may impact the financial security of these organisations and hence the public interest.

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### Modelling and assumptions

There is a risk that actuaries fail to fully understand and adapt their models to reflect the current economic market conditions when setting assumptions for long term inflation and rates of return. Actuaries may use stress and scenario testing to look at a range of potential outcomes. However, there is a risk that economic conditions mean the management actions assumed in these scenarios are no longer valid e.g. the ability to attract capital.

There is also a risk that actuaries do not take into account the risks associated with the new, complex investments created to provide higher yield returns which replace the lower returns on offer from traditional investments. There could be commercial pressure to include complex investments where they may not be appropriate.

## 4.4 Climate-related risk

### HOTSPOT DESCRIPTION

Risk that actuaries may not take into account appropriately, or communicate clearly, the assumed impact of changing climate on decisions of users.

### CURRENT INFLUENCES

There is an increasing body of evidence demonstrating that climate-related issues represent a material risk to future economic stability affecting environmental, societal and governance matters. Users of actuarial work may be exposed to the physical, transition and liability risks related to climate change and actuaries are increasingly involved in assessing their impacts. Governments and users of actuarial work are starting to act to manage these impacts. Actuaries need to help users of their work to understand the risks and uncertainties.

### KEY DRIVERS:

Primary driver: environmental  
Secondary drivers: *inter-connections*: economic impact, legal/regulatory and political responses to changes including international situation, ethical investment policies



Environmental change is a key driver impacting property and liability risks and morbidity and mortality patterns. Economic drivers impact the resilience of different socio-economic groups and the extent of any funding or mitigation of climate risks for these groups. The environmental decisions taken by governments can impact the risk e.g. regarding the use of pollutants or infrastructure developments which may increase the frequency or severity of natural catastrophes. The choice of investment products can be influenced by ethical considerations e.g. companies' environmental policies.

Risks arising from climate change can impact all areas of actuarial work including methods and modelling, judgement, risk and uncertainty, communications, pricing and funding, reserving and capital modelling, investment portfolio design and management. For example, in life insurance and healthcare there is the risk of new epidemics or changes in mortality trends; in general insurance there is the challenge of modelling unpredictable and extreme weather events; in pensions there may be challenges in setting appropriate investment strategies. In all cases, including in wider actuarial fields, the lack of long term data about the effects of climate-related risks may result in limitations in data, assumptions and models which need to be communicated clearly.

If actuaries fail to understand and make allowance for the impact of climate-related risk on existing work and practices or when moving into fields that are affected by climate change factors, then it could contribute to increased exposure within the financial system to these risks. This would not be in the public interest.

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Actuaries may be able to advise on solutions where individuals or entities are no longer insurable due to excessive risk arising from climate-related claims e.g. by designing structures to pool risk or assessing the value of new risk management measures. There is a risk of group think and systemic risk where actuaries collaborate to build new models to take account of climate-related events resulting in the widespread use of models which may be flawed<sup>xv</sup>. Actuaries could mitigate this risk by collaborating with other professionals, encouraging robust independent challenge and ongoing reviews.

During 2017, the IFoA released a Risk Alert on Climate-Related Risks<sup>xvi</sup> and a Practical Guide for Pensions Actuaries Pensions Guide<sup>xvii</sup>. It also ran a webinar on the Financial Stability Board's Task Force on Climate-related Financial Disclosures<sup>xviii</sup>. Sources such as these provide information which actuaries and users may wish to consider when reviewing the impact of climate-related risk on their work<sup>xix,xx</sup>.

## 4.5 Financial security

### HOTSPOT DESCRIPTION

Risk that actuaries fail to communicate the impact of the changing economic and social priorities of government on the current and ongoing appropriateness of the assumptions inherent in products designed to meet consumers' long term financial and social care needs.

### CURRENT INFLUENCES

The combination of slow economic growth, ageing populations and rising income and wealth disparity is increasing the risk that individuals will not have sufficient wealth or income to meet their financial needs<sup>iv</sup>. Furthermore, political and societal changes mean that governments are less willing or able to provide support. In these circumstances actuaries may fail to design products or give advice which appropriately reflects the changing environment.

### KEY DRIVERS

Primary driver: economic  
Secondary drivers: social (e.g. *intergenerational fairness*), international



The main external driver is economic risk impacting both the wealth of individuals and government's willingness to provide social welfare benefits. An increasingly important social consideration is that of intergenerational fairness. The risk to the UK public interest is also influenced by international drivers such as migration e.g. post-Brexit changes in the rights of EU citizens in the UK, or economic and political factors affecting economic migrants and refugees.

Many actuaries are involved in actuarial work in relation to products that provide financial security. Products such as pensions, long-term care, permanent health insurance, third party and employer's liability all provide elements of protection either required by law or designed to meet gaps, or perceived gaps, in the financial security provided by government. Changes to the benefits provided by government, access to employer sponsored benefits and individual's attitude to ensuring their own financial security will all impact on the assumptions and judgements made by actuaries in areas requiring valuations.

#### Data and assumptions

Historical data may not appropriately reflect the future risk characteristics, such as changes in policyholder behaviour in claiming under private policies, making the selection of assumptions particularly uncertain. There is a risk that actuaries do not communicate these uncertainties appropriately.

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### Product design and review

Actuaries may be involved in the design of new products and will need to ensure that these products comply with regulation, remain competitive and represent value for money for beneficiaries. This area of actuarial work could have a significant impact on the public interest. New technology and data sources (see Section 4.7) may facilitate the design of products with new features and broader market penetration.

Insurance, pensions and investment products often provide benefits for a long period after the original purchasing decision. Changes in government policy and economic conditions can impact the ongoing suitability of the product over time. Actuaries are well placed to manage the risk of emerging poor value to consumers e.g. reviewing the charges on old products, ongoing benefit of financial guarantees, impact of changing pension's regulations or applicability of tax breaks.

### Public awareness

There is a risk that consumers do not understand the benefits and drawbacks of products and as such make poor decisions and suffer material financial loss e.g. making inappropriate decision with regards to pension transfers or drawdowns (see Section 4.6). There is also a risk that some consumers will find it difficult to source the products they require at an affordable cost due to a lack of capacity or competition in the market.

Government has a key influence through mandating and incentivising the provision of benefits that ensure financial security for individuals. For example, the government encourages pension savings through taxation incentives and mandates the disclosures to members in Statutory Money Purchase Illustrations. However, the government may be overly influenced by election pressures rather than the long-term financial security of the public and it may not consider the risk that societal changes (toward a more individualistic model) lead to financial insecurity for some groups. A lack of public understanding of financial products, low saving rates and mistrust of banks and insurers may increase the risk to financial security.

Actuaries can raise awareness and collaborate with other professionals to share knowledge, develop solutions and help government and individuals understand the risks more fully. For example, actuaries can raise awareness of the opportunities arising from developments such as the proposed Pensions Dashboard to effectively raise individuals' awareness of their pension savings.

## 4.6 Defined benefit pension scheme management



### HOTSPOT DESCRIPTION

Risk that actuaries provide poor quality advice such that trustees are unable to respond effectively to the challenges facing Defined Benefit pension schemes resulting in poor outcomes for members.

### CURRENT INFLUENCES

Current economic conditions, and the ongoing low interest environment in particular, continue to present challenges for the management of Defined Benefit (DB) pension schemes. In addition, these economic conditions mean that transfer values are extremely high making transfers from DB schemes to Defined Contribution (DC) schemes seem highly attractive to scheme members wishing to take advantage of “Freedom and Choice in Pensions (Pension Freedoms)”. The forthcoming White Paper on the security and sustainability of the defined benefit pension sector is a further source of uncertainty.

### KEY DRIVERS

Primary driver: economic and political,  
Secondary drivers: legal/regulatory, ethical

### DB pension scheme management

The financial position of defined benefit pension schemes in the current environment is challenging. Several schemes have reported increasing deficits and are facing higher deficit recovery contributions and/or over a longer recovery period.

Actuaries may face commercial challenges to their work from scheme sponsors to adjust assumptions used for funding to reduce contribution requirements, or to recommend investment strategies which rely on more complex or innovative products in the search for higher returns.

The uncertain economic conditions including Brexit may also make it more difficult to assess employer covenant and the assumptions used in the valuation to allow for it.

### DB to DC scheme transfers

Since the introduction of Pension Freedoms in April 2015, consumers have more options available to access their pension savings. This, along with the current low interest rate environment and the consequent impact on transfer values, has led to historically high levels of transfers. The key drivers for this risk are therefore both political and economic.

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A member who takes a transfer value from a DB scheme swaps defined benefits underwritten by their employer for benefits that depend on the investment performance of a DC pension fund and the future cost of funding retirement. They may also reduce their pension investments by taking some of the benefit immediately as cash. A transfer is potentially attractive to some members for whom the greater flexibility in the DC environment outweighs the potential loss of certainty.

Transfer values paid from DB schemes require assumptions for discount rates, inflation rates and demography for many years into the future, and any difference between these assumptions and actual outturn will impact the value to the transferee. The actuary setting transfer values faces a challenge to balance practical requirements against the needs of fairness – for the ongoing scheme as well as the transferees. There are several reasons why this is a challenge including, allowing for selection risk, the funding level of the scheme, the liquidity of the assets supporting the scheme and the volatility of the investment markets. Actuaries could also face pressure to quote transfer values which encourage transfers reducing the long-term liabilities for the sponsor.

Members reasons to seek transfers are varied (e.g. to have the certainty of a policy in their own name rather than relying on the scheme's finances, to consolidate pensions savings, to flex their pension benefits such as retirement age or to access flexible draw down). It is therefore important that members receive appropriate advice. The findings of a recent FCA review of DB pensions transfer advice given show that a significant number of members are not receiving suitable advice<sup>xxi</sup>.

Actuaries are not often involved in the delivery of professional advice to individual members but may be involved in the design of systems developed to provide robo-advice. Well-designed robo advice can offer affordable advice to individuals and can play an important role in the overall advice landscape. However, there are some risks that need to be managed to ensure that such advice is robust.

There is a risk that the systems and assumptions do not adequately reflect the circumstances of the specific transferee (for example they may make average assumptions about attitude to risk, dependents, other financial resources, etc.). The data for the system providing robo-advice needs to be clearly defined and specified to ensure that users can make appropriate decisions.

There is a further risk that the actuaries designing systems do not communicate the importance of judgement and the inter-relationship of assumptions. This could lead to advice offered as “based on an actuarial assessment” but where the users do not understand these inter-relationships (e.g. the user may not understand that projected growth rates may not reflect their investment choices or may not reflect economic conditions appropriately).

Actuaries are well placed to play a role in advising trustees, sponsors and other users on the complexities of DB pension scheme management. Actuaries may wish to consider the best ways to communicate the assumptions, judgements and uncertainties to their users to support them in making appropriate decisions.

## 4.7 Technological change - automation and digitisation, Big Data, artificial intelligence and cyber risk

### HOTSPOT DESCRIPTION

Risk that actuaries may not recognise and take account of technological changes such as the availability of Big Data and new modelling techniques, increasing cyber risk or changing business models.

### CURRENT INFLUENCES

Technological advances and developments in artificial intelligence (AI) are changing the nature of insured risks and the tools used to model and manage these risks.

Several recent reports and surveys identify the emergence of Big Data and analytics as a key trend and area of investment<sup>xxii,xxiii</sup> especially in the insurance sector. Actuaries may face challenges in interpreting and communicating insights from Big Data and its impacts on consumers, operations and business strategy.

These developments are also likely to result in disruptions to current business models. These changes may invalidate the judgements, models and assumptions currently used by actuaries.

### KEY DRIVERS:

Primary driver: technological

Secondary drivers: social, international nature leads to political and legal/regulatory



### Automation and digitisation

The effects of technological change will impact both the underlying risks which actuaries measure and value and the data and tools available for actuarial work. There is therefore a risk that actuaries fail to understand how the new technologies impact the underlying risk and do not adapt their methods, models and assumptions appropriately.

For example, in the insurance industry there is increasing use of telematics and fitness trackers in motor and health insurance respectively. These devices can inform and influence policyholder's behaviour, to drive more slowly or exercise more frequently. This will impact the frequency and severity of claims meaning that past data may no longer be appropriate for pricing and reserving.

In the investment industry, fund managers are mining alternative data sources as disparate as Twitter, Starbucks and Google Flu Trends, for insights into their investment portfolio and processes<sup>xxiv</sup>.

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## Big Data

In some cases, where technology provides more granular and frequent data, the actuary may be able to incorporate this into existing models or develop new modelling techniques. However, more extensive challenges will come when actuaries consider risks for which there is no existing data or the liability for risk is unclear such as driverless cars, robotic surgery or the impact of genetic modifications on health and mortality.

Big Data is often described in terms of 'three Vs': "...high-volume, high-velocity and high-variety information [used] for enhanced insight and decision making"<sup>xxv</sup>. Actuaries need to consider how to effectively use real time and unstructured data sources to augment their current methodologies whilst recognising the risk and uncertainties associated with it.

When a new source of data becomes available, consideration will need to be given to the extent (if any) to which this data should be used. Judgement will be required to assess factors such as its accuracy, completeness and predictive power. The use of alternative data sources (e.g. social media or shopping data) is also becoming more socially acceptable. However, some data sources may pose ethical considerations e.g. using data relating to health or lifestyle. Actuaries can play a role in decisions around the suitability of data use on technical and ethical grounds and support its use in the public interest.

Big Data can also lead to new products being developed or coverage being extended to new groups of consumers e.g. life or disability insurance can be extended to those with long term conditions such as diabetes or HIV by using regular monitoring. Whilst Big Data may lead to some groups of risks gaining greater access to coverage or paying a lower price for cover, the corollary is that there may be other groups which will pay a higher price and, in some cases, may be uninsurable.

Furthermore, Big Data can also be used to assess the policyholder's propensity to pay the required cost of cover with those who are less likely to shop around for a keener price being charged more. There may be ethical challenges to the extent to which such segmentation is considered appropriate, especially where groups may be disadvantaged unfairly e.g. older policyholders with limited access to or understanding of digital technology. The individual actuary's professionalism and the culture of the organisation will influence the outcomes.

Pricing at a more granular level also challenges the underlying principle of insurance – that of pooling risk. Segmenting data will reduce the pooling benefits and can lead to more volatile results. As data becomes more granular it will be difficult to identify data items which have true predictive power from those with spurious effects. There is a risk that actuaries will lack sufficient skills and experience to make and explain judgements around which data to include in decision making.

## Artificial Intelligence

The developments in AI and in machine learning (ML) may impact the work of actuaries. Traditionally, actuarial work has been based on deterministic or statistical modelling using the actuary's understanding of the context to find the optimal model for predicting risk. In the case of ML, systems learn from the data to find the optimal solution. The resulting models are machine led not hypothesis led.

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A common technique in ML is supervised learning where systems are developed by providing lots of examples of the correct answer to a problem e.g. policyholder data and claims costs. If the data provided for the system to learn from is limited or the rules for algorithms are biased, then the resulting solution will also be biased<sup>xxvi</sup>. Identifying such biases can be difficult due to the nature of most ML algorithms which are complex and “black box”. Actuaries need to ensure that they have the means to understand and explain the decisions and to adequately check the results. There is a risk that overly complex or opaque modelling could lead actuaries to choose to accept model results without applying sufficient verification and professional judgement.



ML systems are being used to improve operational efficiency in the sales and claims process and especially in the detection of fraud. Actuaries should be aware of the potential impact on data, models and assumptions used in all areas of their work.

The skills required for ML are similar to those used traditionally by actuaries. However, actuaries may need to work with experts in data science and programming to ensure that they have sufficient understanding of the current capabilities of AI and use the available tools appropriately. This is a rapidly developing area of science and there is a risk that actuaries fail to develop the necessary skills or plan accordingly.

Where new data or modelling techniques are found to be useful there is a risk that commercial pressures lead to implementation with insufficient challenge or inadequate governance procedures (e.g. due to a desire to implement quickly).

AI may enable more actuarial tools and systems to be placed in the hands of end users empowering them to make decisions without directly engaging the actuary (examples could be robo-advice systems or pensions actuarial systems being used by clients). However, actuarial work often requires appreciation of nuance and application of judgement which may not be easily replicable in these tools. There may be a risk that poor decisions emerge where nuance and judgement are not applied.

Actuaries may wish to consider ways in which they can keep up to date with relevant developments in AI and incorporate them in actuarial work. This may involve building collaborative relationships with other experts to support the provision of high quality actuarial work.

### Cyber risk

Increasing digitisation and connectivity creates new risks, e.g. data loss and cyber crime. These risks may impact actuaries themselves, e.g. data corruption or systems failure could make it impossible to deliver the required services or lead to inappropriate actuarial advice based on misstated or incomplete data. To protect themselves businesses are looking to the general insurance market to develop cyber covers to insure these risks. For actuaries in this area there is a risk of insufficient understanding of accumulation risk and exposure management which, along with the lack of data, could lead to mispricing or failure to communicate the uncertainties. Insurance companies are also at risk of providing unintended coverage (e.g. property coverage impacted by the expansion of the Internet of Things<sup>5</sup>) without appropriate pricing and coverage restrictions.

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<sup>5</sup> The Internet of things is a network of physical devices [embedded](#) with [electronics](#), [software](#), [sensors](#) and network connectivity that enable them to connect and exchange [data](#).

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A further consideration for actuarial work is the global nature of technological change – the internet has no borders. This means that the political regimes and legislative controls in different countries will impact the pace of development of technology, the way in which it can be used and the incidence and response to cyber crime (see Section 4.8).

### Business Models

Technological change and digitisation will have far reaching impacts on the insurance, pensions and investment industries. There is a risk that actuaries may fail to appreciate the extent to which business models will change. (For example, the increased ability to measure and understand risk may lead to new product designs such as “on-demand” policies, or to services that help policyholders to reduce risk or provide assistance in the event of a claim.) Reports of business model disruption include the increasing use of alternative data sources and new digital distribution channels to attract and retain policyholders; reshaping the claims process by using AI claims handlers, drones for assessing and 3D printing technologies for repairs; and implementing new technologies such as blockchain to improve exposure management and minimise fraud. All of these technological developments may invalidate models and assumptions and will require actuaries to remain up to date and communicate clearly.

## 4.8 Terrorism and Cyber crime

### HOTSPOT DESCRIPTION

Risk that actuaries may fail to update assumptions or adjust working practices to reflect the changing nature of terrorism and cyber crime risks.

### CURRENT INFLUENCES

Recent high-profile terror attacks on major cities in Europe and the US have shown a change in the operations of terrorists – using irregular, low tech means to target the general population.

High-tech crimes are also increasing such as the recent ransomware attack on the NHS, alleged political espionage and use of cyber crime, scams and frauds by organised criminal gangs.

This changing nature of crime may pose challenges in managing disruption and associated costs and invalidate actuarial judgements, models and assumptions.

### KEY DRIVERS

Primary driver: political, economic  
Secondary drivers: international, technological



### Terrorism

Traditionally insurance products for terrorism coverage have been designed primarily to cover property damage (including cover provided by Pool Re). However, significant losses have occurred in recent attacks not from property damage but from business interruption caused by police cordons and economic damage as a result of reduced visitor numbers. Terror is usually excluded from small business policies which cover risks such as public liability and professional indemnity and standalone terror policies do not always extend coverage to business interruption losses<sup>xxvii</sup>.

Standard individual travel policies typically exclude losses arising out of acts of terrorism. This may become an increasingly important coverage if terrorist attacks become more widespread in popular tourist and city destinations.

Actuaries may be involved in designing and pricing new products to cover these risks and insureds. Setting assumptions for pricing, measuring accumulations and reserving for standalone terrorism policies or add-ons will be challenging given the limitations of the data and uncertainties in the future developments of the risk profile.

It is in the public interest to ensure that products are fit for purpose, providing financial security for individuals and businesses that is affordable, appropriate and understood by consumers.

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## Cyber crime

Cyber crime is a result of economic and technological risk drivers. It often exploits people's culture and behaviour to breach computer security. It can involve the loss of money, data or reputation. It may also aim to spy on or undermine confidence in corporations or governments. It invariably causes significant business disruption.

Insurers and pension schemes (and banks) hold large amounts of personal and financial data that is attractive to criminals. Any breach of security would be a great concern to the industry. Past banking fraud losses indicate the potentially large amounts involved. Pension schemes and insurers along with scheme members and policyholders, are also vulnerable to fraud and scam attacks.

Actuaries are reliant on data from many sources. They need to be aware of the risk of it being manipulated or stolen and of the IT policies and support in place to protect the systems they use from cyber crime. The risk of cyber attack is likely to be poorly understood and the potential impact of an attack may be difficult to assess.

Actuaries should also be aware of requirements to comply with data privacy regulation<sup>xxviii</sup>.

In these areas of emerging risk where data is limited, actuaries may need to work collaboratively with others to increase their understanding of the underlying risk drivers and develop ways to measure and respond to them.

## 4.9 Mortality

### HOTSPOT DESCRIPTION

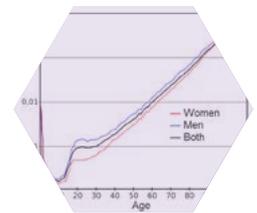
Risk of failure to pick up, understand and respond to changes in mortality trends in an appropriate and timely manner.

### CURRENT INFLUENCES

Recent CMI reports show a change in mortality experience. The slowdown in general population mortality improvements in the UK since 2011 has been greater than that predicted by most projection models. This presents a challenge for actuaries in understanding, interpreting and communicating its impact.

### KEY DRIVERS

Primary driver: social  
Secondary drivers: political, economic, environmental



A key external driver of this risk is changing demographics. However, this is also influenced by political priorities, social care government spending, the varying impacts on different socio-economic groups and the potential impact of climate change on future patterns of mortality and morbidity.

The slowing pace of mortality improvements in the UK is a trend seen elsewhere in the world with lower mortality improvements seen in recent years in Canada, Ireland and the USA, although not so far in France or Japan<sup>xxix</sup>.

There is inherent uncertainty in assessing future mortality trends, and uncertainty remains as to whether the current emerging mortality data is a “blip” or indicative of a long-term change in future mortality trends. There is a risk that there is insufficient understanding of the drivers for the change in experience at this time. There is evidence of different effects when viewed by socio-economic group and there may also be variances between healthy and unhealthy lives. Professional judgement will be required by actuaries to assess how, when and whether to recognise a change in trend and what action, if any, is appropriate.

Whilst the reasons for the current changes in trend are not fully understood there is a risk that actuaries may make judgements in setting assumptions for pricing and reserving that are not reflective of the true underlying reasons for the observed change. Examples of assumptions where this issue is relevant are annuity and assurance pricing and reserving in life (re)insurance; pension scheme funding; longevity de-risking activity; and assessment of factors such as transfer values in pensions. While the risks may be lower in general insurance, there is still exposure through Periodic Payment Orders, and, for investment activity, there is a risk that there is an impact on duration matching.

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Another aspect of this risk is the potential ethical and professional challenge for actuaries if they are placed under commercial pressure to make overly optimistic or overly prudent assumptions regarding the implications of the recent data. Additionally, there is a risk that group think could result in overconfidence with actuaries not challenging their understanding of the drivers behind the changes in trends.

To support users to make informed decision actuaries may need to consider the most effective ways to communicate the judgements made, the basis for these judgements and the level of risk and uncertainty in the assumptions. Consulting professionals in other relevant disciplines and deep interrogation of the data could help actuaries and users understand the reasons for the changes seen in mortality patterns.

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## 5 Thematic reviews 2017

From the hotspots identified in the Risk Perspective: 2016 update, two areas were chosen to be the main focus of the JFAR's work in 2017. These are areas where actuarial work is in the public interest, is central and where feedback indicated that the risks to the quality of actuarial work were developing.

The risks considered in more depth were:

- *“Economic outlook - impact on insurers and pension schemes”*: The JFAR undertook a review to understand the risks posed by the low interest rate environment to the work of the actuary in insurers and pension schemes e.g. potential risks relating to setting valuation assumptions for non-traditional assets with little data and complex structures.
- *“Professionalism”*: The JFAR considered the role of the actuary in with-profits life assurance and whether there are any risks to the supply of relevant actuarial support for the future management of with-profits business.

### 5.1 Low interest rates

The persistent low interest rate environment which has existed since the financial crisis has the potential to introduce new risks for the insurance and pensions industry.

During 2017, the PRA and tPR have worked together on a JFAR thematic review which aimed to assess the risks to actuarial work of the low interest rate environment persisting for a long time and consider actions to manage those risks.

JFAR was interested in both the financial impact of the low interest rates on the insurance and pensions industries and how any risks to actuarial work in setting and challenging assumptions can be assessed and managed. In particular, to consider the financial impact of the continuing low interest rates (and investment yields) on financial product performance, business models, impact on savers, impact of ‘cheap money’ on individual (high personal debt) and corporate (zombie firms) behaviour, and the interest rate ‘bounce back’ risk of a return to normal monetary policy.

The interim findings of the review did not indicate that the low interest rate environment introduced any major risks which JFAR members were not aware of and which individual regulators were not already considering in their regular activities.

JFAR was updated throughout the year by the PRA and tPR on the low interest rate environment. JFAR will continue to monitor the situation including the impacts of the uncertainty caused by the political changes through 2016 and 2017. Market performance and uncertainty has been identified as a hotspot in the current risk perspective and is discussed further in Section 4.3.

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## 5.2 With-profits actuaries

The IFoA and the FCA have worked together on a JFAR thematic review of the changing nature of the demand for, and supply of, with-profits actuaries (WPAs).

The review concluded that there does not appear to be a shortage of suitably experienced WPAs to meet the market demand that currently exists. Whilst the number of IFoA With-Profits Practising Certificate (PC) holders has been decreasing in recent years, the demand for WPAs has also been reducing in line with the run-off, merger or consolidation through transfers of individual with-profits funds. Furthermore, there is currently sufficient supply of actuaries approved in SIMF21 roles to meet regulatory requirements within firms undertaking with-profits business.

The review included a survey of current WPAs, who raised two potential concerns which may lead to a future gap in supply of suitably experienced actuaries to fulfil the role:

- the requirements of the IFoA With-Profits PC that WPAs must evidence significant recent with-profits experience, rather than evidencing suitable skills more widely, may be difficult to fulfil; and
- the perceptions of some actuaries that obtaining with-profits experience is not career enhancing.

The first will be taken into consideration as part of the IFoA's current PC review. The IFoA will also consider promotion of the role and the transferrable skills provided, including consideration of whether the education system for student actuaries has sufficient coverage of with-profits.

JFAR will continue to monitor this issue.

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## 6 Topical discussions 2017

As well as discussing the current work of the individual regulators, the JFAR uses its quarterly meeting agenda to discuss current and developing risks and mitigations and to identify appropriate actions. The JFAR invites expert speakers to inform it of current issues and to develop its understanding in areas of emerging risks. During the last year JFAR has had discussions on:

- Integrated risk management in pensions;
- Big Data;
- Climate-related risk; and
- The impact of technology on actuarial work.

The topical discussion at the JFAR meeting in December 2017 was on the topic of intergenerational fairness and the ageing population. The JFAR will include commentary on this discussion in its 2018 update.

### 6.1 Integrated risk management in pensions

At its December 2016 meeting, members of the IFoA Integrated Risk Management Working Party outlined for the JFAR the background to the working party, its findings and recommendations. The working party paper “IRM for DB Pension Schemes: A practical guide”<sup>xxx</sup> formed the basis for the discussion. The paper includes practical advice for actuaries, trustees and employers. It sets out broad principles looking at how integrated risk management (IRM) could be applied in a range of circumstances with case studies to illustrate the benefits.

IRM is a developing area of pensions work where there are several different advisors. The working party therefore had published the paper to help illustrate the process and issues, over and above that set out in tPR’s own guidance<sup>xxxi</sup>, and to give practical output that practitioners could use.

The JFAR noted that the IRM process was most successful when it was collaborative, involving different types of experts covering and incorporating many bases and opinions. Therefore, it recommends that IRM should be a collaboration of employer, trustee and advisors.

The working party paper includes “The 10 Commandments for effective IRM” for effective IRM including defining a clear, shared long-term objective, incorporating employer covenant as a key part of advice and strategy, applying IRM proportionally and applying a broad view of risk to consciously choose the risk level.

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The JFAR welcomed the paper and discussed potential ways in which the uptake of IRM could be encouraged and actuaries' skills could be developed in this area. This could be through issuing guidance which would take into account the role of the actuary in various situations e.g. actuaries acting for schemes, employers, as investment consultants or covenant advisors.

## 6.2 Big Data

The JFAR is keen to understand the benefits and impacts of Big Data on actuarial work. At its March 2017 meeting JFAR discussed the background and headline findings from the FCA's report "Call for Inputs on Big Data in retail general insurance"<sup>xxxii</sup>. The FCA representatives explained that they had undertaken this work with a focus on consumers and competition and any potential for FCA regulations to constrain beneficial innovation in this area. The report had looked at motor and home insurance sectors where there are large volumes of data in use.

The JFAR discussed the risk to the public interest arising from the potential for the use of Big Data and micro segmentation to lead to some groups being excluded from (or priced out of) insurance. However, the JFAR noted the FCA's discussion with consumer interest groups who had suggested that access to insurance may, in fact, be improved if insurers used more granular information to understand these groups better.

The JFAR also discussed whether price optimisation using Big Data had the potential to lead to conduct risk if the data used by insurers was felt to be inappropriate or used without a consumer's consent e.g. information from social media.

The JFAR discussed whether the use of Big Data could become an ethical issue for actuaries in the future. However, it was noted that insurers, including their actuaries, were challenging themselves regarding ethical treatment of consumers.

The JFAR encourages the actuarial profession to question and raise any concerns about fairness or the use of data and for pricing actuaries to consider appropriately the interests of the consumer.

It was noted that the Information Commissioner's Office (ICO) had also published a paper on Big Data<sup>xxxiii</sup>.

## 6.3 Climate-related risk

In June 2017, the Chair of the IFoA Resource and Environment (R&E) Board introduced the JFAR to the work of the Board, the Risk Alert<sup>xvi</sup> published in May 2017 and the Practical Guide for Pensions Actuaries<sup>xvii</sup>. The R&E Board was set up in 2014 to promote knowledge of risks related to climate change within the profession and to promote actuaries externally as risk experts who may be able to help in this area.

The key message from the Risk Alert is that actuaries should communicate with their clients to raise awareness of the physical, transition and liability risks related to climate change. The Practical Guide for Pensions Actuaries includes suggestions for navigating climate risk work. The R&E Board will consider developing guides across other practice areas beginning with investments and DC pension schemes.

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The JFAR had a wide-ranging discussion on the potential impacts of climate-related risk on actuarial work. The discussion covered areas such as the importance of building knowledge and connections to ensure actuaries are aware of any changes that may invalidate traditional actuarial techniques, the Task Force on Climate-related Financial Disclosures (TCFD) recommendations on non-financial disclosure and the potential for climate change to lead to uninsurable policies.

The JFAR recognised the opportunities for actuaries to add value in the area of climate-related risk, as actuaries have experience in forecasting and measuring risk and uncertainty over the long term. However, the JFAR felt there was a potential reputational risk if actuaries hold themselves out as experts without sufficient competence. As such, the JFAR felt that it would be helpful for actuaries to share best practice and group learning to assist the profession. This could include creating a bank of scenarios, pooling of information across the market or helping to identify where the biggest risk falls in the time horizon. It was suggested that the IFoA should provide support for communication across groups and guides for new information or other practice areas

#### **6.4 Impact of technology on actuarial work**

In September 2017, the JFAR had a topical discussion on the “Impact of Digital Technology on Actuaries – AI, Big Data, Insurtech”. Two experienced industry actuaries gave insights into the current developments in data science and their impact on actuaries’ work.

Developments in computing and mathematics are enabling greater and faster data processing leading to more advanced analytical methodologies (e.g. Moore’s law, Hadoop, decision forests, neural networks, machine learning). The IFoA working party Modelling Analytics and Insights from Data (MAID) was set up in May 2016 to raise awareness of the developments in data science and to try to ensure that actuaries engage with them and are not left behind as other experts take on this work. It has four work streams which focus on research and education, the application of new tools and techniques in existing areas of work, exploring the wider opportunities for new areas of actuarial work and the implications for the profession.

There are increasing numbers of data scientists working in the insurance, pensions and investment industries. Their backgrounds in computing and statistics give them the knowledge and skills to effectively see the patterns in data and create efficient processes for manipulating and analysing data. In contrast, actuaries tend to focus on problems from the user’s perspective and analyse data to find support for the business decisions which are being investigated. The JFAR debated the concern from some practitioners that there could be poorer outcomes for users if data scientists do not undertake work with as much emphasis on ethics, regulation or professionalism as would be the norm for actuaries. The JFAR felt that any potential risk could be mitigated by collaboration with data scientists, making the most of the each group’s complementary skills. To facilitate this, actuaries will need increased access to and encouragement to take on lifelong learning, collaboration with academics, data scientists and other professionals.

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The IFoA had recently hosted a Data Science Summit to provide a platform for discussion on the data science initiatives undertaken by different actuarial associations and to enable them to address some of the challenges, share ideas and develop strategies to make the most of this opportunity. Actuarial professions may need to consider adapting the levels/routes to membership. (For example, the Casualty Actuarial Society and Institut des Actuaire have created data scientist qualifications and the IFoA syllabus will be revised from 2019 to include programming in R.)

The JFAR discussion also covered wider considerations such as difficulties in explaining “black box” and algorithm driven models and judgements and whether widespread use of such models could lead to mistakes causing systematic failure, whether policyholders would understand or be willing to accept that more granular modelling may transfer risk back from insurers to the individual, and the ethical and societal implications if some policyholders become excluded from coverage.

Wider technology changes may also impact actuaries. For example, telematics and on-demand products are changing the type of work required<sup>xxxiv</sup>. Actuaries need to show they can add value, rather than be seen as risk averse or slow to change. The JFAR noted that actuaries have moved into new markets in the past where they have been proven to bring relevant technical skills and broad understanding to business problems (e.g. general insurance pricing) and dealt with significant changes (e.g. Solvency II implementation). The knowledge built up from dealing with these challenges may be useful in dealing with a changing technological environment.

The JFAR suggested that MAID should keep the regulators up to date with their findings and suggested that a key success factor for actuaries in this area will be access to relevant pre- and post-qualification education.

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## Appendix

### Comparison of prior year risk categories

In producing the previous reports, and during their regular activities, the FRC and other JFAR members have identified broad risk categories and hotspots. In this report the JFAR introduced the Actuarial Risk Identification Architecture (ARIA) to help identify the hotspots in a holistic and dynamic fashion.

The ARIA identifies three main sources of risk, each with sub-categories, and the interactions between them. The main sources are macro environmental drivers, actuarial work and market characteristics. It also recognises that the ongoing activities of the JFAR members influence the risk to the public interest of actuarial work. The ARIA is described in Section 3.

This approach updates the risks identified in prior years. A comparison of the risk sources and characteristics used in the ARIA to those considered previously is shown in Table 2. The revised architecture does not invalidate the risk categories identified previously but aims to extend and develop a more efficient approach to deal with them.

**Table 2: Comparison of current and prior risk identification categories**

	RISK SOURCES AND THEIR CHARACTERISTICS		MAPPING TO 2016 CATEGORISATION	
Macro environmental drivers	Social Technological Economic Environmental Political Legal/Regulatory Ethical International		Environmental conditions	R1 - Changes in the external environment R2 - Economic outlook - impact on insurers and pension schemes R3 - Competitive pressures on insurers R4 - Legislative pressures
Characteristics of actuarial work	Methods and Modelling Data and Assumptions Judgement Systems and Technology Risk and Uncertainty Communication		Inherent factors in actuarial work and its use	R5 - Modelling R6 - Group Think R7 - Understanding of risk and return
	Insurance Pensions Investments Wider Fields	Reserving Pricing Capital modelling Product design Advising	Characteristics of markets in which actuarial work is used	R8 - Product design and distribution R9 - Financial reporting R10 - General insurance claims provisions R11 - Management of Defined Benefit pension schemes
Central influence of market characteristics	Culture Professionalism Group think Embedded processes, incentives Firm/pension fund strategy Business models		Professionalism	R12 - Professionalism

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