

JFAR Risk Perspective

2022



Joint Forum on
Actuarial Regulation

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Introduction

The Joint Forum on Actuarial Regulation (JFAR) is a unique collaboration between regulators to coordinate the identification and analysis of public interest risks to which actuarial work is relevant. The JFAR was established in 2013 and comprises the Financial Conduct Authority (FCA), the Financial Reporting Council (FRC), the Institute and Faculty of Actuaries (IFoA), the Prudential Regulation Authority (PRA) and The Pensions Regulator (TPR).

Actuaries play a vital role in modern societies and help to address some of the biggest global challenges as trusted thought leaders. Public trust in their work is critical, and the JFAR has an interest in maintaining this trust in the profession.

The *JFAR Risk Perspective 2022* was prepared to encourage broad engagement and readership with both actuaries and users of actuarial work: CEOs, CFOs, NEDs, pension scheme trustees, auditors, accountants and the broader public.

Using Actuarial Risk Identification Architecture (ARIA), the JFAR has identified five 'hotspots' where there was a perceived increase in risk to the public interest, and where actuarial work is central. Although presented in separate sections, it is also important to appreciate the many connections between these issues. The interconnectedness of risks is the central theme throughout the Risk Perspective.

The *JFAR Risk Perspective 2022*'s theme is the interconnectedness of risk.

The five interconnected hotspots identified are:

- Sustainability
- Inflation
- Mortality and morbidity
- Unfair outcomes for individuals
- Technology



Financial Reporting Council



Institute
and Faculty
of Actuaries

Bank of England
Prudential Regulation Authority



2 The interconnectedness of risk

LDI and the mini budget

On 22 September 2022, the Bank of England announced a 0.5% increase in Bank Rate (also known as base rate). As a consequence, the yield on government bonds (gilts) rose and the price of gilts fell. The next day, the government announced a series of tax cuts, aimed at stimulating growth. These were to be funded by borrowing. Following this announcement, gilt yields rose and their price fell again, and continued to rise/fall rapidly into the following week. The Bank of England intervened by undertaking to purchase up to £5 billion of gilts in daily auctions on a time-limited basis (a maximum purchase total of £65 billion), amid press comment that this was done to prevent pension schemes becoming insolvent.

Liability Driven Investment (LDI)

Many defined benefit (DB) pension schemes wanted to ensure that the value of their assets

(that is, investments) moved in line with their liabilities (that is, the pensions they have promised to pay in future). This could be done by investing in a series of gilts which would pay the same amounts of money to the scheme as the scheme is paying out in pensions, at each point in the future. In practice, few schemes hold enough assets to do so, and most attempt to achieve a higher investment return by investing in other assets.

LDI strategies enable pension funds to increase their exposure to long-term gilt yields, helping them hedge more effectively against falling yields, but without selling return-seeking assets or requiring further contributions to simply buy more gilts. This may be done through a repo arrangement, where the scheme secures cash against gilts it owns, and uses that cash to buy more gilts. A simplified illustration of an LDI fund is given below:

Assets	Starting value	10% rise in gilt values	10% fall in gilt values	50% fall in gilt values
Capital (gilts provided by pension scheme)	£10m	£11m	£9m	£5m
Gilts purchased through repo	£10m	£11m	£9m	£5m
Repo arrangement	(£10m)	(£10m)	(£10m)	(£10m)
Net asset value (Total gilts – repo arrangement)	£10m	£12m	£8m	£0

The value of the LDI fund begins as the value of the capital put into it, but it has a greater sensitivity to movements in gilt values – in the example above, a 10% change in gilt values will result in a £2m change in the fund's net asset value, rather than the £1m change if it simply held the capital in gilts and did not enter into a repo arrangement. If a 10% change in gilt values changes the fund's liabilities by £2m, the LDI strategy is reducing the volatility in the fund's deficit by causing the assets to move by the same amount.

The capital in the LDI fund provides a cushion to absorb losses. If the gilts lose enough of their value (50% in the example above, but the higher the ratio of capital to repo in the LDI fund, the more values need to fall for this to happen), the value of the LDI fund will fall to zero, the LDI fund would default on its arrangement, and the counterparty (that is, lender) would make a loss partially mitigated by taking ownership of the gilts. To prevent this, counterparties require pension funds to put up collateral (in the form of cash) whenever the value of the gilts falls below the amount lent by the counterparty.

What happened

As explained in the [Bank of England's correspondence](#) with the Treasury Committee, the market reaction following the government's announcement saw an unprecedented fall in the value of gilts. The magnitude and speed of this was greater than many LDI funds were prepared for. Many LDI funds needed significant additional liquidity on very short notice, which many pension funds were not able to provide. For many LDI funds, the movement threatened to erode the capital cushion completely.

This threatened to create a self-reinforcing spiral. LDI funds unable to raise sufficient cash liquidity were forced to sell gilts on the market to raise cash. The additional sale of gilts on the market served to reduce gilt values even further and counterparties required further cash collateral to be provided to protect their position.

Reflections

The events serve to illustrate how the interplay between different risks can impact the work of advisers working in this environment including actuaries, investment consultants and others; government policy (political risk) and an unprecedented market movement (market risk) which may not have been adequately accounted for in LDI models (modelling risk), resulting in difficulties in meeting collateral calls (liquidity risk). This threatened to reinforce the market movement, creating further difficulties throughout the industry (systemic risk).

The Parliamentary Work and Pensions Select Committee is holding an inquiry into LDI although at the time of writing no conclusions are yet available.

Questions which actuaries and users of actuarial work may wish to reflect on include the following:

- Are the models we are using fit for purpose? Have tail risks and tail dependencies been adequately accounted for?
- To what extent do the models assume that the future will resemble the past? Is this assumption reasonable? Has sufficient consideration been given to what might go wrong and how the models may fail?
- Are there protections we can put in place to mitigate unexpected or low probability risks with significant impacts?
- Have liquidity and funding risks been distinguished and adequately assessed, managed and mitigated? To what extent are our strategies genuinely mitigating risk, and to what extent are they simply trading one risk for another?
- Where risks have been identified, have these been clearly communicated?
- Are there lessons or techniques from outside our own subject matter which we could learn from? For example, can the methods used by insurers and insurance actuaries to assess capital requirements and manage liquidity risk provide further insight into how pension schemes might manage their risks?

Actuaries have an important contribution to make in finding solutions to these increasingly complex challenges.


More interconnected risks

The economic backdrop to the government's 'mini budget' also influenced the events that followed. The mini budget followed previous periods of high borrowing, without which the market may have reacted differently, and the Bank of England was raising interest rates in response to high rates of inflation. Brexit, Covid-19 and Russia's invasion of Ukraine all played a part in creating these conditions.

The high inflation rates were driven in no small part by energy price increases. This in turn was exacerbated by reliance on Russian natural gas, which increased after many countries moved away from nuclear power in the wake of the Fukushima incident in 2011. The Fukushima incident was itself an example of a tail (or extreme) risk not being fully incorporated into risk management processes – the underlying geological fault 'was not previously considered to be capable of generating an earthquake of such large magnitude.'¹

When actuaries are performing their work, they should be aware not just of the direct risks, but also the causal links between them, the wider environment, and interdependencies between risks which may at first appear unrelated.

¹ IFoA, Subject SA3, Unit 12, page 14



3 Summary and current outlook

The last few years have brought about incredibly rapid change. From geopolitics to online meetings, global paradigm shifts have impacted very many aspects of people's lives. The future is highly uncertain, and the current environment is extremely challenging for actuaries and for those they advise.

Sustainability

A central issue of sustainability is climate change, which remains an extremely pressing issue around the world. An effective response requires a coordinated global effort. Russia's invasion of Ukraine is an unwelcome reminder of how challenging such coordination can be, and how intertwined climate change is with global geopolitics. The consequences of climate change are far-reaching and uncertain. Climate change is likely to be associated with changes to:

- longevity and morbidity
- attractiveness of different industries
- investment portfolio selection
- costs of transition to net zero
- global (and local) economic viability
- population movements if temperature increases cannot be limited sufficiently.

Actuaries should consider this in their work, and have a role to play in helping users of their work understand the impact different outcomes of climate change might have and what interventions may be available to control the outcomes.

Inflation

After a long period of low and stable inflation, the world has seen a dramatic uptick in inflation and the prospect of a global recession. Concerns arising from the prospect of 'lower for longer' interest rates – long the subject of discussion among actuaries – have quickly shifted, at least in assessing short-term prospects.

But inflation is linked to other changes, such as spending patterns, mortality and morbidity by socio-economic grouping and the choice of assets to hold in any fund designed to grow in the long term.

Actuaries should consider not just the impact of higher inflation and but also the impact of higher interest rates and the potential for increased volatility in both.

Mortality and morbidity

The excess deaths from Covid have increased mortality rates in the short term, but the long-term impacts on both mortality and morbidity are highly uncertain. The Continuous Mortality Investigation (CMI) has reacted to this by allowing recent mortality experience to be left out of the current mortality tables.

The emergence of Long Covid has compounded this uncertainty. Little is currently understood about its long-term impacts or likely prevalence in the future.

Mortality and morbidity are also closely connected with wealth and healthcare spending, and weather patterns. The prospect of a global recession, increased defence spending following Russia's invasion of Ukraine, and climate change, will all impact mortality and morbidity rates, as will technological advances.

Actuaries need to think carefully about the assumptions to make concerning future mortality and future morbidity rates, and consider the consequences should future mortality rates diverge from their assumptions.

Data and technology

The power of technology to create increasingly complex and sophisticated models is still growing exponentially. Much wider and deeper data sources can now be accessed and analysed. Machine learning can be harnessed to refine and improve models and assumptions, and transform our understanding of complex issues such as the impact of climate change. Used well, technology can aid judgement, help in learning from past decisions, and improve outcomes for individuals. Used improperly, it can remove judgement, reinforce past mistakes and biases, and lead to disastrous consequences.

The skills required of actuaries of the near future may differ radically from those of the past. There is no substitute for sound judgement, and it is crucial that actuaries are aware of the risks presented by the data and technology they use.

Technology is a central component in changes to:

- working patterns (and levels and patterns of employment)
- healthcare and longevity treatments and outlooks

- the ability to segment data into ever finer cells (with the risks that some parts of society may find insurance unaffordable)
- new risks arising from new technologies (for example, driverless cars and liability claims), and
- the degree to which risks are becoming increasingly systemic as computer systems assume larger spans of control.

In modelling the future, the actuary needs to anticipate the changes that technology will stimulate.

Unfair outcomes for individuals

There are two basic themes that may be ascertained: the difficulty of:

- applying group or collective concepts to the individual
- effective communication to individuals of the risks and choices facing them.

Collective Defined Contribution (CDC) schemes offer to protect the employer from volatility of cost while simultaneously allowing members the benefits of collectivisation. But it introduces [a risk of intergenerational unfairness](#), and investment, inflation and mortality risks will need to be managed carefully to improve outcomes for individuals. And effective communications will be essential if members are to be able to understand their risks and choices.

[Pensions dashboards](#) have been [released in several countries](#) and are expected to be available in the UK [from 2023](#). They allow individuals to access their pensions information online, securely and all in one place. They also help individuals reconnect with lost pension pots and plan for their retirement.

A key part of pensions dashboards data is the Estimated Retirement Income (ERI). The availability of such estimates – produced in a consistent manner – from schemes across the industry can give individuals a meaningful indication of the retirement income they might expect from their current arrangements.

This could provide a crucial starting point for getting individuals to engage more, and at an earlier stage, with their pensions and retirement planning. Dashboards present an opportunity to fundamentally change UK pension provision, by empowering individuals to understand the reality of their retirement prospects.

However, dashboards will inevitably make assumptions on a group basis, which may be inappropriate for the individual. For example, individuals may not understand why different funds are projected at different growth rates and may make inappropriate decisions. Effective communication is essential to address this risk.

Progress is being made very slowly towards legislation specific for superfunds, although the most appropriate structures are still being decided. There are signs that consolidation vehicles are beginning to be sold based on the current legislation.

The prospect of changing legislation creates risks for trustees of ceding schemes, corporate sponsors, consolidators, and the actuaries representing them.

Funeral Plan Trusts now benefit from statutorily backed protection. However, some trusts and providers which previously marketed plans either did not apply for – or were refused – authorisation on the new basis. This is an example of how improving protection can have the opposite impact on those that fail to make the transition. Effective communication is essential in these situations to ensure that members of such plans understand their rights and options.

The role of actuaries

The skill of the actuary to model and interpret alternative futures has never been more relevant or important. 'Risk Perspective' is designed to help actuaries and users of actuarial work think about some of the most pressing risks in the near future, and the connections between them.

Actuaries model the future, but their expertise goes far beyond building models and choosing appropriate assumptions for them. They must also understand that every model is a simplification, to which reality will not always conform. They should consider and communicate the risks that this entails as well. And, when the nature of the risks they are presented with change and the world becomes ever more interconnected, they must learn and adapt.

4 Sustainability

Hotspot Description

The risk that actuaries may not appropriately consider, or communicate clearly, the impact of sustainability and climate-related risks in their actuarial work.

Current Influences

Many organisations have been active in sustainability and/or climate-related issues in 2022, including JFAR members, governments, supranational agencies and quasi-government bodies.

Introduction

Sustainability and climate-related risks, including the effects of geophysical impacts such as loss of agriculture, biodiversity and climate disasters, represent a material financial risk to future economic and market conditions. This is likely to impact insurance claims experience and modelling assumptions, and will have a direct impact on both the role of actuaries and their safeguarding of the public interest.

Political and societal pressure on long-term investors (for example, life insurers and pension schemes) to respond to climate change is increasing. This means that users of actuarial work will want to be assured that the impact of their exposures to physical and transition risks related to climate change are appropriately assessed and incorporated into actuarial work. Actuaries need to help users of their work understand the degree to which these risks

have been incorporated in their assessment and the uncertainties around their inclusion. They need to communicate these uncertainties effectively and may also need to help users of their work understand any residual risks that remain.

Physical risk is associated with the damage caused by changes to the world's weather patterns and systems. Global warming represents a significant (and perhaps existential) threat in the long term. Even in the short term, actuaries need to consider risks of changes to frequency and intensity of natural catastrophes leading to severe losses at the extreme of what might be anticipated. This is particularly an issue for pricing general insurance and for investments, especially with real assets. Insurance products will be required to adapt to these risks as they will be unable to physically mitigate against the risks themselves.

Transition risk is the risk to companies arising from the need to transition their business model to one that can be sustained in a low-carbon environment. This is a risk that is present in the short to medium term and will have differential effects on different companies and sectors, and may be heavily influenced by local, national or supranational regulations and actions. Actuaries need to be aware of and

communicate the potential impact of transition risk when advising on which investments to include in portfolios, the asset class, sub-asset class and individual investment performance.

In respect of both risks, there is a risk of climate-related litigation liability, with potential implications for actuaries providing advice; for example, with the pricing of professional indemnity and Directors' and Officers' (D&O) insurance. There may also be implications for organisations if risks materialise; for example, with the pricing of Business Interruption (BI) insurance.

Governments, users of actuarial work, and society more broadly, have increased efforts to mitigate climate-related risk and their impact, as well as developing pathways to a transition to [net zero](#).

Numerous regulations have been introduced to date. For example, there are ongoing efforts to mandate disclosure in line with the recommendations of the Task Force on Climate-related Financial Disclosures² (TCFD). Financial service firms should be increasingly familiar with the regulations and must develop the skill and expertise to meet them. Actuaries must be aware of the increased role they will play in delivering these efforts.

The possible increased risk of greenwashing, where countries or organisations provide false impressions or misleading information about their environmental impact, introduces a need for actuaries to carefully consider reporting where products or services do not match their claim.³

Key developments during 2021 and 2022

JFAR Climate Change Deep Dive

On 28 June 2022, the JFAR published [The Science of Climate Change](#), focusing on bringing to life the 'science' of climate change. The JFAR's hope is that this will elevate the confidence of actuaries in incorporating climate change into their actuarial work.

UK actions

The following paragraphs consider briefly actions taken by the UK government and JFAR member regulators.

Climate-related financial disclosures

From 1 October 2021:

New requirements for large Occupational Pension Schemes, authorised master trust schemes, and authorised CDC schemes⁴ to align their governance processes and disclosures with the Task Force on Climate-related Financial Disclosures.

From 1 October 2022:

- More trust schemes come into scope of the regulations, with the relevant asset threshold for large trust schemes dropping to £1 billion, and
- New requirements require calculation and reporting of a metric which gives the alignment of the scheme's assets with the climate change goal of limiting the increase in the global average temperature to 1.5°C above pre-industrial levels.

From 2023:

Government proposals will also require financial institutions and listed companies to publish transition plans that consider the government's net zero commitment, or to provide an explanation if they have not done so.

² <https://www.fsb-tcfd.org/>; <https://www.fca.org.uk/publications/multi-firm-reviews/tcfd-aligned-disclosures-premium-listed-commercial-companies>

³ Instances of this have recently been investigated, with the result that BNY Mellon were fined \$1.5 million by the US Securities and Exchange Commission for misstating and omitting information about ESG considerations, and Deutsche Bank investigated claims of greenwashing by DWS

⁴ Often called 'collective money purchase' pension schemes: the terms are synonymous

Climate Financial Risk Forum (CFRF)

The [CFRF](#), co-chaired by the FCA and the PRA,⁵ brings together senior representatives from across the financial sector to build capacity and share best practice between financial regulators and the financial industry. In October 2021, the CFRF published its second round of guides⁶ ([Session 2 guides](#)) to help the financial sector develop best practices to manage climate-related financial risks and opportunities.

Institute and Faculty of Actuaries

The IFoA's [climate change statement](#) takes an international outlook on climate-related risk and an actuarial view by focusing on risk mitigation. The statement sets out the context for all activities arising from the IFoA's Climate-Related Risk Taskforce ([CRRT](#)), which aims to support IFoA Members to understand and address climate-related risk in their actuarial work.

The IFoA is working to further incorporate climate change and sustainability into specific subject areas across its career lifelong learning provision, including the introduction of a [Climate Risk and Sustainability course](#) and a Continuing Professional Development (CPD) [Reflective Practice Discussion \(RPD\) toolkit](#) on climate change and sustainability.

An IFoA Actuarial Monitoring Scheme information-gathering report on [actuarial involvement in climate-related risk](#) was published in November 2021. This report found that, in many organisations, actuaries are among those leading the thinking on climate-related risk.

The IFoA issued a [consultation](#) in 2021 on proposals for changes to its regulatory framework to incorporate climate-change and sustainability issues, which resulted in regulatory [commitments](#) including developing guidance on the IFoA's Actuaries' Code on this topic and the publication of a [Risk Alert](#) in April 2022.

Prudential Regulation Authority

In October 2022, the PRA sent a [letter](#) to the CEOs of all PRA-regulated firms to build on the expectations set out in the PRA Supervisory Statement on enhancing banks' and insurers' approaches to managing the financial risks from climate change ([SS3/19](#)). The letter also served to provide observations on good practice and set out steps for implementation.

In its [second climate change adaptation report](#), dated 28 October 2021, the PRA found that since the setting of these expectations there has been a step change among senior executives and boards at firms, with some firms clearly setting out how they embed management of climate-related financial risks. In 2022, the PRA will switch its supervisory approach on these expectations from assessing implementation to actively supervising against them, recognising that the approach by firms will need to evolve as industry-wide understanding continues to develop. Further analysis is being undertaken to understand whether enhancements to the regulatory capital frameworks are needed.

In June 2021, the Bank of England launched the [2021 Biennial Exploratory Scenario](#) (the [CBES](#)). The objective of the CBES was to test the resilience of the largest banks, insurers and the financial system to different possible climate pathways and provide a comprehensive assessment of the UK financial system's exposure to climate-related risk. The CBES asked firms to consider three scenarios, which were based on scenarios published by the Network for Greening the Financial System ([NGFS](#)).

Financial Conduct Authority

In November 2021, the FCA set out its [ESG strategy](#), outlining its target outcomes and key actions it expects to take to deliver these.

Also in November 2021, the FCA sought [initial views](#) on new sustainability disclosure requirements for asset managers, life insurers

⁵ TPR and the FRC are observers

⁶ Guides covered risk management, scenario analysis, disclosure, innovation metrics and an online tool to support smaller firms

and FCA-regulated pension providers, as well as a new classification and labelling system for sustainable investment products. The FCA consulted on the changes in [CP22/20](#) on 25 October 2022.

The FCA's target outcomes are:

- high-quality climate and sustainability related disclosures
- trust and consumer protection from misleading marketing and disclosure
- governance arrangements for effective ESG
- active investor stewardship
- integrity in the market for ESG-labelled securities, and
- innovation in sustainable finance.

In December 2021, the FCA issued Policy Statements [PS21/23](#) and [PS21/24](#).

PS21/23 extends the climate-related disclosure requirements introduced in [PS20/17](#) beyond premium listed commercial companies to issuers of standard listed equity shares.

PS21/24 requires asset managers, life insurers and FCA-regulated pension providers to disclose how they take climate-related risks and opportunities into account when managing investments from 1 January 2022. Those firms are also required to make disclosures about the [climate-related attributes of their products](#). For smaller firms, these rules come into effect from 1 January 2023. The first public disclosures in line with these requirements must be made by 30 June 2023.

In June 2022, in Feedback Statement [FS22/4](#), the FCA set out the policy actions being taken and the potential future direction across different market activities and services.

In July 2022, the FCA released its review of [TCFD-aligned disclosures](#) by premium listed commercial companies.

The Pensions Regulator

The Pensions Regulator (TPR) published its [climate change strategy](#) in April 2021. The strategy sets out how TPR will drive trustees' action on the risks of climate change, influence debates and take part in the transition to net zero. TPR will also be reviewing about 100 TCFD reports from large schemes early in 2023 to identify early trends and good practice. The strategy was published ahead of regulations which require trustees of larger pension schemes and authorised master trust schemes and authorised CDC schemes to maintain oversight of, and make mandatory disclosures in relation to, climate-related risks and opportunities. Beyond the proposed regulations, the strategy outlines TPR's expectations that all pension schemes' trustees will comply with existing requirements; for example, to publish their statement of investment principles and implementation statement.

In October 2021, TPR released its [climate adaptation report](#), detailing the risks from climate change that are most relevant to occupational pension schemes and the approaches TPR is taking to tackle them both, as a regulator and an organisation.

TPR published [guidance](#) in December 2021 outlining expectations of pension schemes' trustees who are subject to the new requirements, and an illustrative example as an appendix to the [guidance in February 2022](#). TPR's guidance is intended to be read alongside [statutory guidance](#) from the Department for Work and Pensions (DWP). TPR also published a new [appendix to its monetary penalties policy](#) in December 2021, which outlined TPR's approach to penalties for breaches of the regulations.

In June 2022, TPR published an article on their blog, '[Reporting on climate: a challenge but an opportunity](#)', setting out the approach it would take in reviewing the first TCFD reports produced in line with the Occupational Pension Schemes (Climate Change Governance and Reporting) Regulations 2021 and how the output from that review would be used.

Financial Reporting Council

The FRC carried out a review, supported by the FCA, of both TCFD disclosures and of climate-related reporting in the financial statements of 25 premium listed companies. Their [findings](#) were published in July 2022.

In June 2022, the FRC published a [consultation](#) on proposed changes to Technical Actuarial Standard 100 which would require actuaries to include climate-change risks in their technical actuarial work. The report indicated FRC's expectations and surveyed current practice. As would be expected at this early stage, there remain several areas where there is need for improvement in reporting.

International Actions

The following sections consider some wider international developments.

Global actuarial involvement

In 2020, the International Actuarial Association (IAA) put in place a five-year plan to elevate awareness among actuaries of the need to incorporate the financial effects of climate change into their work. In September of that year, the IAA Climate Risk Task Force (CRTF) published the first in a series of planned papers, [Importance of Climate-Related Risks for Actuaries](#). The IAA published the second paper in February 2021, [Introduction to Climate-Related Scenarios](#), which aims to provide background covering the principles and outlining the processes for developing climate-related scenarios. The third paper, [Climate-Related Scenarios Applied to Insurers and Other Financial Institutions](#), was published in August 2021. A fourth paper, [Application of Climate-Related Risk Scenarios to Asset Portfolios](#), was published in April 2022. Further papers are expected to follow.

In September 2022, the Actuarial Association of Europe (AAE) published [Sustainability Issues and Reputational Risk for Insurance Companies and Pension Funds](#).

EU Sustainable Finance Disclosure Regulation

The EU's Sustainable Finance Disclosure Regulation (SFDR) came into force on 19 December 2019 and phasing in commenced on 10 March 2021. The objective of the SFDR is to set out the duties of financial market participants with regards to integrating environmental, social and governance (ESG) risks and disclosing information on this. The UK government has opted not to implement the SFDR into UK domestic law following the UK's post-EU Exit transition period, but it will be relevant for UK firms, either as a requirement under the regulation or as a practical matter.

European Commission's Corporate Sustainability Reporting Directive

In April 2021, the Commission adopted a proposal for a Corporate Sustainability Reporting Directive (CSRD), amending the existing reporting requirements of the 2014 Non-Financial Reporting Directive (NFRD). This extends the scope to all large companies and all companies listed on regulated markets, except listed micro-enterprises, and requires the audit (assurance) of reported information.

EIOPA issues opinion on the supervision of the use of climate-change risk scenarios in ORSA

In April 2021, the European Insurance and Occupational Pensions Authority (EIOPA) issued an opinion on the supervision of the use of climate-change scenarios in the Own Risk and Solvency Assessment (ORSA) addressed to national supervisory authorities, which outlined expectations on the supervision of the integration of climate-change risk scenarios by insurers in their ORSA.

Conclusion

The impact of climate change is widely recognised as an existential threat to the way we live and to the way that markets, nations and people exist. As can be seen, much work is being done:

- to ensure that reliable information is in the public domain, and
- to advise professionals (and actuaries in particular) how to incorporate the impact of climate change into their activities and advice to clients.

It is clear that actuaries will be at the heart of how the financial impact of climate change is recognised in insurers, pension funds, investment funds and other financial institutions. There is a developing body of available knowledge. However, such knowledge remains at an early stage and actuaries should not be lulled into a false sense of security. It is vital that actuaries remain aware of developing trends, events and knowledge.

As indicated by the example in Section 3, climate change is affected by political, social and economic decisions. For example, the war in Ukraine could derail attempts to limit global temperature rises. Actuaries may need to consider alternative scenarios when making decisions involving the impact of climate change.

Further reading

5 Inflation

Hotspot Description

The risk that actuaries may not allow appropriately for inflation and consequently mis-estimate the future cash flows in their actuarial work.

Current Influences

Inflation, long benign, has increased significantly in 2022, as a result of a sharp rise in energy costs and strains in supply chains (particularly of food). Measures to manage inflation and deal with strains on energy supply have knock-on effects on other risks, particularly climate-related risks, as governments put coal, natural gas, fracking, nuclear and other forms of non-renewable energy back under active consideration.

Introduction

A commonly used [definition of inflation](#) is the rate at which prices are rising over a given time. In the UK, the two measures of inflation that are currently most used are the Consumer Price Index (CPI) and the Retail Price Index (RPI), which is being phased out. Both measures are weighted averages of price rises over a wide range of goods and services, with some changes to the goods and services included over time. These measures alone will seldom be appropriate for any one area of actuarial work. Typically, actuarial work will look to adjust one of these measures to derive a measure of inflation that is relevant for the actuarial work in

question. In some cases, the relevant measure will involve caps or floors on the inflation rate (for example, DB pension payment increases).

Actuaries are interested in how inflation impacts future cash flows that are being estimated or projected. Actuaries should consider how the following types of inflation might impact future cash flows:

- ‘Price inflation’ is the commonly used definition of inflation, that is, the rate at which prices are rising over a given time.
- ‘Social inflation’ is the inflation impact on future cash flows due to reasons other than price inflation.⁷ For example:
 - During the Covid-19 pandemic, the reduced amount of mileage driven resulted in fewer motor insurance claims and a downward inflation effect of motor insurance claim cash outgo.
 - Social trends with respect to the propensity to take legal action for damages might result in an increased number of liability insurance claims.
 - Social trends on awards given for damages to third parties might result in increased claim size for liability insurance claims.

⁷ See ‘Developments in Social Inflation’, SOA, June 2021

- New technologies resulting in increased number of health-related treatments; for example, the existence of knee replacement treatment carried out by robots has led to more people choosing to have knee replacements as opposed to just ‘living with it’.

Key developments during 2021 and 2022

The potential impact of inflation on five types of cash flow that are typically considered in actuarial work are discussed below.

1) Benefits and claims cash outgo arising from non-life and private medical insurance policies

The change (usually an increase) over time in the amount paid on claims arising from non-life or private medical insurance policies is typically referred to as ‘claims inflation’.

Claims inflation is made up of two components:

- the change over time in claim size, the amount of a claim when it occurs (that is, severity), and
- the change over time in the number of claims (that is, frequency).

Data might not be available to consider these two components separately. Where this is the case, one needs to consider overall claims inflation, that is, the average claim payment per policy. This can be calculated as the total amount of all claims divided by the total number of policies in force, over a given period.

It is preferable to consider claim size inflation and claim frequency inflation separately because they arise from different causes. Claim size inflation is primarily a price inflation, whereas claim frequency inflation is based on social trends. However, there can be an element of social inflation in claim size inflation. For example, court awards for suffering as a result

of a third-party action might be affected by changes in social attitudes; healthcare costs might be affected by technology trends.

Claim size inflation will be specific to the type of claim. For example, repairing damage to, or replacing, property (such as homes, factories, aircraft or motor vehicles) will require different materials, and labour of a different nature, from the materials and labour required for healthcare. The inflation on property replacement costs and healthcare costs may therefore differ significantly.

There is a risk of actuaries or users of actuarial work conflating claim size inflation and claim frequency inflation, particularly for policies which require claims to exceed a limit before the policyholder will be paid. Claim size inflation will not impact the frequency of claim events but might impact the frequency with which these claim events exceed the limit, and therefore the frequency with which claims are actually made.

Sometimes the claim size can be directly linked to inflation; for example, if a claim for bodily injury is part-settled with a stream of payments over future periods of time (that is, a periodic payment order (PPO) or non-life annuity), the future payments might be linked to a specified inflation measure (for example, [ASHE 26](#) (Annual Survey of Hours and Earnings Table 26), statistics for earnings and hours worked for care workers). If a claim for bodily injury is settled with a lump sum, assumptions about future specific inflation measures might be explicitly factored into the lump sum.

2) Benefits and claims cash outgo arising from life or pension business, and a pension scheme’s obligations

Here, the impact of inflation will depend on the type of policy in question or the nature of a pension scheme’s rules; for example, inflation will have materially less impact in the case where benefit payments increase at fixed rates (which could be zero) than in the case where benefit payments increase at rates linked to a public measure of inflation. Sometimes a

public measure of price inflation is dictated in a pension scheme's rules which is then capped (for example, limited to a maximum of 5% per annum) and floored (for example, limited to a minimum of 0%).

For life and pension business, actuaries should also consider inflation on cash in-flows (for example, insurance premiums and pension contributions, which may be proportional to salaries).

The UK Statistics Authority (UKSA), arguing that [RPI has serious shortcomings](#),⁸ plans to replace RPI, from 2030, with CPI, which will include owner occupiers' housing costs (CPIH). This has resulted in [legal action](#) by various pension schemes' trustees, which the UKSA has recently won. While few argue with RPI's shortcomings, the impact on pension schemes' members is significant: CPIH has typically been around 1 percentage point (p.p.) lower than RPI. In addition, pension schemes hold RPI-linked gilts, and these may be negatively impacted.

3) Expense cash outgo

These will be impacted by price inflation. The inflation measure will need to be relevant to the nature of the expenses. For example, an insurance company's expenses might be largely driven by wages, and inflation on claims' management costs might be largely driven by legal fees and loss adjusters' fees.

4) Investment cash income

The most important types of investment for actuaries to consider are those where the cash flows are linked to inflation, either explicitly (for example, index-linked bonds and inflation swaps) or implicitly (for example, equities).

In some areas of actuarial work, it might be appropriate to use inflation-based financial instruments in the setting of assumptions used for valuing liabilities; for example, using the market price of index-linked government

bonds or inflation swaps in forming a view of the market expectations of future inflation measures. Similarly, UK government bonds linked to RPI, or inflation swaps linked to RPI, might provide an indication of the market view of RPI over a specified time horizon. When using these instruments in setting inflation assumptions, one should bear in mind that the yield on these instruments might not solely relate to the market's view of inflation expectations. Supply and demand issues might also affect the yield; for example, if there is a limited supply of long-dated inflation-linked bonds, pension schemes might be willing to 'pay a premium' for them.

5) Prepaid funeral plans

Funeral plans, which provide the promise of a funeral service for an individual in return for an up-front payment made during the individual's lifetime, will be subject to their own specific causes of inflation (for example, rise in cost of burial materials) as well more general causes of inflation (for example, rising energy costs).

Background information: measures of inflation

Price inflation (rate of price rises)

There are two measures of price inflation that are most used in the UK, both calculated by the Office for National Statistics (ONS). These are CPI and RPI. In 2022, CPI was at its highest level since 1992. The main driver of the higher CPI was an increase in energy and fuel costs.

According to the article '[CPI vs RPI inflation: what's the difference?](#)', the main difference between CPI and RPI is that CPI does not include housing costs (buying homes, renting homes, mortgage payments). The (annualised) CPI has typically been 1 to 1.5 p.p. lower than the RPI.⁹ In the main, CPI is the more relevant inflation measure from an actuarial perspective.

⁸ A major factor is that RPI is based on an arithmetic mean, whereas the geometric mean used by both CPI and CPIH is considered more appropriate for measuring true inflation

⁹ 1.0 p.p. for 5 years to December 2021; 1.3 p.p. for 5 years to July 2022; 1.4 p.p. for 10 years to July 2022

Other measures of inflation calculated include:

- CPIH – CPI that includes owner occupiers' [housing costs](#)
- RPIX – RPI that excludes [mortgage interest payments](#)
- [Producer price inflation](#)
- [Medical services inflation](#) (part of the CPI)
- Inflation of earnings and hours worked for care workers ([ASHE 26](#) (Annual Survey of Hours and Earnings Table 26)).

The Office of Budget Responsibility (OBR) produces [forecasts](#) of CPI and RPI. However, inflation forecasts can be hugely uncertain. For example, the forecast made in October 2021 of the CPI in April 2022 was materially lower than the actual CPI in April 2022.¹⁰

Conclusion

The anticipated rate of inflation plays an important part in the assessment of liabilities. It can be tempting for actuaries to rely on past experience and current economic predictions when determining the rates to assume. However, it is clear that future inflation is likely to be affected by many future developments, such as:

- success or failure in the battle against climate change
- success or failure in the battle against pandemics and the attempts to prolong healthy lifetimes
- changes in technologies and changes in spending patterns
- socio-political disruptive events, such as the war in Ukraine, and
- the interconnectedness of all of these factors.

At the current time, there is a great deal of uncertainty in the above and in many other areas. Actuaries should consider this carefully when choosing inflation assumptions.

Further reading

¹⁰ <https://www.thetimes.co.uk/money-mentor/article/rpi-versus-cpi/>, 19 April 2022, updated 3 November 2022, under the subheading 'Why is inflation going up?'



6 Mortality and morbidity

Hotspot Description

The risk that actuaries may not allow appropriately for the changing costs of mortality and morbidity in their actuarial work, due to future experience deviating from previously set projections.

Current Influences

Covid-19 and the still unknown effects of Long Covid are casting a long shadow over future mortality and morbidity rate improvements. In addition, there is emerging evidence of a link between government health expenditure and mortality/morbidity outcomes in developed nations;¹¹ and with recessionary fears once again rising this may be an important factor in the short to medium term.

Introduction

Mortality and morbidity assumptions are some of the most important that an actuary will make in their actuarial work. They are often a material element of pricing, valuation and capital work carried out by actuaries, particularly in the commercial domains of pension schemes, life insurance and private medical insurance.

Assumptions are usually set with a combination of a base table, based on experience analysis, and projected improvements, which allows for observed trends in the underlying experience and expert judgement. Typically, actuaries will allow for 'mortality (or morbidity) improvements', which reflect the long-standing trend that these rates improve over time. This approach can lead to a risk that the real effect of any changing circumstances on future mortality or morbidity rates is not properly investigated or considered in actuarial work. There are currently a range of economic and demographic uncertainties driven by past and current events and experience, which combined may lead to traditional assumptions around mortality and morbidity trends no longer being appropriate. Actuaries should consider that the assumptions they propose or advise are assessed in this context, with uncertainties appropriately allowed for and communicated to stakeholders.

¹¹ See, for example, the article 'Causal impact of social care, public health and healthcare expenditure on mortality in England: cross-sectional evidence for 2013/2014'

Key developments during 2021 and 2022

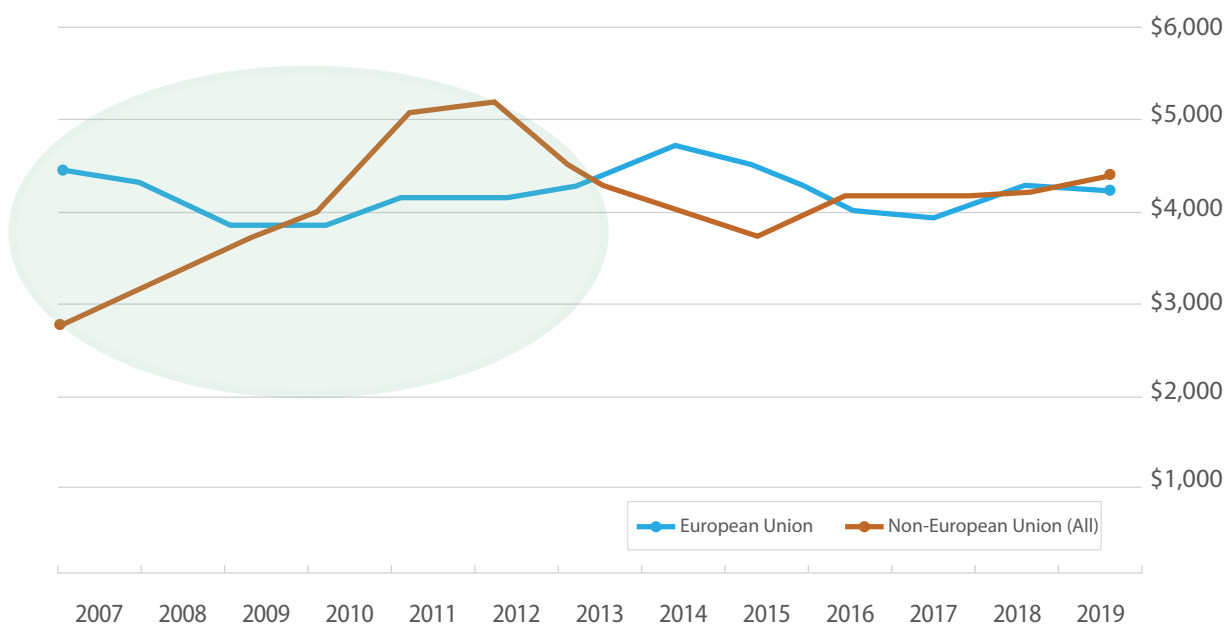
Economic impacts on mortality improvement rates

Since 2011, life expectancy in the UK has continued to improve, but at a much slower rate than seen before. This same slowdown in improvement is evident in several countries across Europe, North America and Australia. Some slowdown could be expected, as 'some of the factors that led to previous high improvements could not persist.'

health and social care. On the other hand, Japan was ranked the country second-least-affected by the Great Recession,^{12,13} significantly increasing government spending on health and social care.

As the global economy slows sharply, there is a high risk of another global recession. This leads to the potential for similar reductions in GDP and healthcare expenditure. This could lead to

Current health expenditure per capita (current US\$)



Source: [World Bank Open Data](#)

However, the pace of slowdown has varied globally, with the UK experiencing 'one of the largest slowdowns in improvements in life expectancy' in the last decade, while Japan saw mortality improvements accelerate over the same period.

Although the factors leading to the slowdown are complex and not known with certainty, one component of the explanation is economic factors. Between 2008 and 2009, the UK experienced significant reductions in Gross Domestic Product (GDP) per capita, leading to lower growth in government spending on

a further slowdown in mortality improvements and an increased reliance on healthcare services and insurance products. In general, the effect of a recession on mortality rates is more pronounced in developing countries, and, within those countries, in children and those most vulnerable.

According to the *Financial Times*, the energy crisis in the United Kingdom could play an important role in shaping mortality rates, particularly within older age groups and lower socioeconomic groups.

¹² <https://carnegieendowment.org/2009/07/09/unequal-impact-of-economic-crisis-pub-23385>

¹³ The Great Recession and Its Aftermath

Healthy life expectancy

While globally life expectancy continues to increase, healthy life expectancy – the expected number of years spent in good health – is not keeping pace.

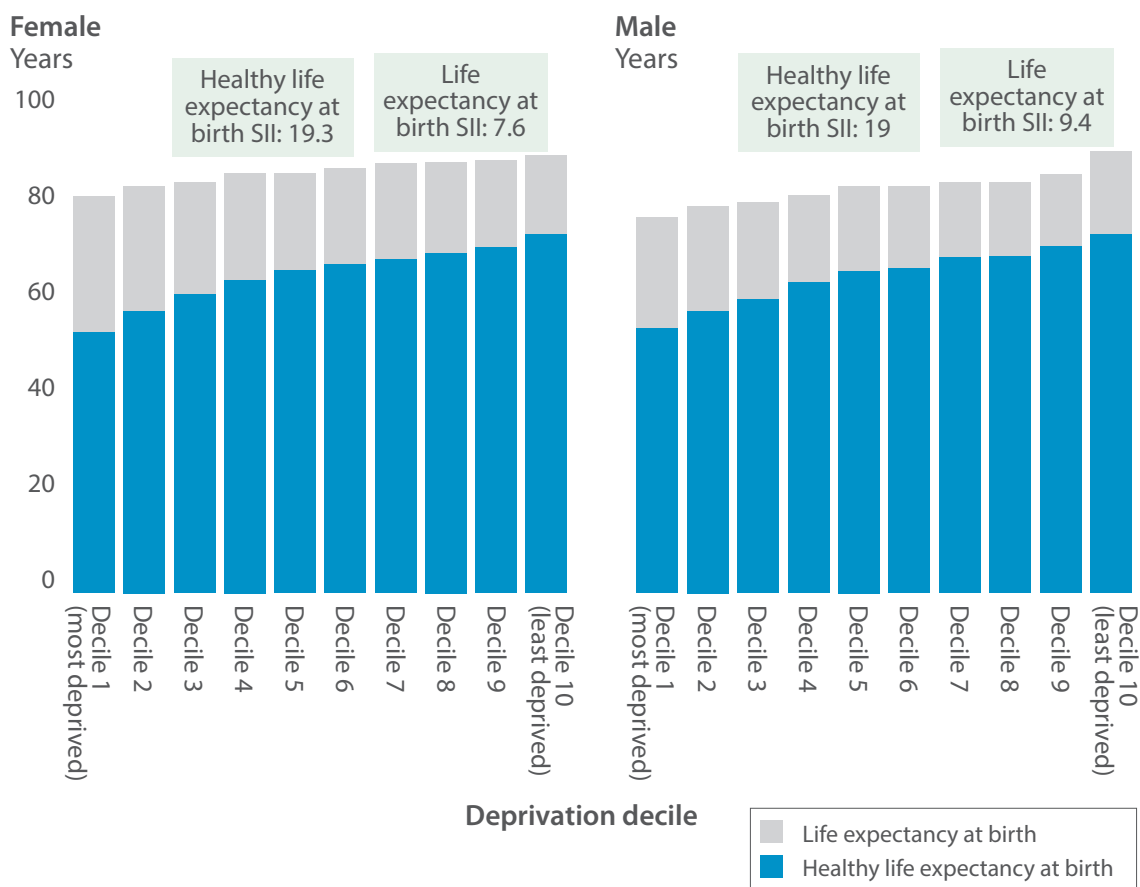
In England, between 2009 and 2019, the expected number of years spent in poor health increased from 18.7 years to 19.9 years for females, and from 15.8 years to 16.6 years for males.¹⁴

There are also significant regional disparities, with people from more deprived areas not only having a shorter life expectancy¹⁵ but also a higher expected number of years spent in poor health, as shown in the graph below.

As may be seen in the charts, the difference between the highest and lowest deciles of healthy life expectancy (for both males and females) is just under 20 years. Although the difference (termed the Slope Index of Inequality) for overall life expectancy is less than 10 years (which is still substantial), this implies that in deprived areas people will spend considerably more time in ill health and require much more in healthcare costs.

An increased number of years spent in poor health increases the expected cost of healthcare for individuals, as well as putting a strain on national healthcare services. These charts demonstrate the importance of understanding social situations when assessing either morbidity or mortality costs.

Life expectancy and healthy life expectancy at birth by deprivation decile, England, 2017 to 2018



Source: [PHE: Health Profile for England 2021](https://phe.org.uk/resources/publications/files/2021/04/Health-Profile-for-England-2021-Figure-14) Figure 14

SII = Slope Index of Inequality. See data and definition document for more details

¹⁴ https://fingertips.phe.org.uk/static-reports/health-profile-for-england/hpfe_report.html, Figure 14a

¹⁵ The lowest deprivation decile has a life expectancy 'similar to North Korea' (at the 23:20 mark of <https://youtu.be/8257mu0tFVM> (Jonny Pearson-Stuttard, Head of Health Analytics and Partner, LCP; Chair-elect, Royal Society for Public Health))

Actuaries need to account for any future cost increases, which are determined by the pace at which life expectancy increases relative to healthy life expectancy.

Covid-19

Efforts attempting to assess the impact of Covid-19 are beset with difficulties. Data must be gathered from countries around the world, and there are inconsistencies in the way data is gathered and statistics are prepared across different countries. Estimates of deaths caused indirectly by Covid-19 (for example, because healthcare systems became overrun) are uncertain, as there are a number of different factors impacting changes in mortality rates over time.

The metric used to measure the impact is also important. [Our World in Data](#) estimates the total number of confirmed deaths attributed to Covid-19 to be 6.6 million (up to 12 October 2022). On the other hand, worldwide excess mortality, which includes deaths indirectly caused by Covid-19, is estimated as 22.3 million. This illustrates the importance of choosing an appropriate measure for assessing impacts, and the dangers of focusing only on the direct impact.

The World Health Organisation (WHO) estimated Covid-19 to have directly or indirectly caused 14.9 million [excess deaths worldwide in 2020 and 2021](#).

In 2022, Covid-19 global mortality rates have reduced, suggesting the immediate impact has subsided. This is likely to be largely because of [vaccines](#), which have prevented an estimated 20 million deaths globally in the first year since their initial deployment.

However, the long-term effects of Covid-19, especially for morbidity, are still unknown.

Lockdown effects and healthcare strain

The effect of national lockdowns and the pandemic could lead to negative long-term effects on non-Covid-related mortality and morbidity rates.

Restrictions placed on individuals could have led to significant lifestyle changes. For example, researchers at the University of Sheffield found that up to 25,000 more people may die in the next 20 years in England due to drinking habits that began in the UK lockdown. They estimate this could cost the NHS up to [£5.2 billion](#). Furthermore, the restrictions on individuals going outdoors could have resulted in [lower physical activity for some](#), which could have long-term health implications.

Lockdowns led to the further risk that individuals were unwilling or unable to seek medical advice or treatment. Any [delays](#) in the diagnosis or the treatment of serious conditions could also lead to an increase in morbidity and mortality rates. Individuals who were reluctant to seek healthcare during lockdown, may now find that they face further delays in seeing GPs or receiving treatment as a result of a healthcare system that has been strained, firstly by the pandemic and then afterwards by a backlog of patients that were not seen during lockdown. In the UK, the [NHS wait times are long](#) with almost 700,000 people having waited more than 12 hours in A&E in the first seven months of 2022. The pressures on national healthcare systems globally could lead to [additional deaths](#) that may have otherwise been avoided. [Diagnoses of early-stage cancer](#) in England fell by 33% in the first wave of the Covid-19 pandemic in 2020. [Non-Covid-related deaths](#) rose significantly above the five-year average in the Summer of 2022 in the UK.

Long Covid

‘Long Covid’ refers to lingering health effects long after a Covid-19 infection has subsided. It is estimated that [Long Covid](#) affects around two million people in the UK, with millions more worldwide.

The symptoms, such as fatigue and headaches, are unspecific and subjectively assessed by patients and medical practitioners, rather than through an objective diagnostic test. The [symptoms](#) can fluctuate over time and have no clear duration or effective treatment.

While the severity of the symptoms varies, there is evidence of a risk of individuals being [seriously disabled for a prolonged period](#) by Long Covid.

The effects of Long Covid are felt most amongst [vulnerable individuals](#), with disproportionate effects on certain occupations and communities, such as those with lower vaccination rates.

Long Covid presents difficulties for actuaries. For example, the lack of an objective diagnostic test can lead to delays and uncertainty in underwriting, a higher risk of misdiagnosis, and possible fraudulent claims. Due to the unknown duration of the condition, it is hard to assess when symptoms have cleared and the person is able to work again. In the longer term, there will probably be a significant but uncertain effect on morbidity trends.

While some insurers are providing [support](#) for Long Covid sufferers, these difficulties can lead to people with Long Covid being [denied coverage](#), or to delays in claim payments.

The long-term implications on the insurance industry are unknown. Robust [research is required](#) to fully understand the condition, so that products can be adapted to consider mortality and morbidity impacts. Actuaries have a role to ensure products remain sustainable and are adapted to the changing needs of consumers. Failing to do so will lead to financial issues for consumers and increase the [mental health challenges](#) presented by the pandemic.

Further reading

Regional events

The issues outlined above are not specific to one country. However, there are a number of current issues affecting the mortality and morbidity rates of specific regions. For example:

- Russia's invasion of Ukraine will have significant one-off and longer-term effects on the mortality and morbidity rates of both countries. It threatens to deepen Russia's already serious [demographic crisis](#), and the long-term economic impacts on both countries could have [knock-on effects on the health of both nations](#).
- In the US, [new research](#) suggests deaths from drug overdoses, suicide and heart disease have contributed to life expectancy falling significantly behind other developed nations.
- In [Africa](#), improvements in the provision of essential health services and a fight against infectious diseases has led to healthy life expectancy increasing, on average, by 10 years between 2000 and 2019, a rise greater than any other region in the world during the same period.

Conclusions

Actuaries will usually place some reliance on past experience when making future mortality and morbidity rate assumptions. However, due to the impact of shocks like Covid-19 and Russia's invasion of Ukraine, recent data may no longer be a good indicator of future experience.

Actuaries must be mindful to ensure the appropriateness of the data they use to forecast future mortality. In the UK, the CMI announced in March 2022 that it has put [no weight on the data for 2020 and 2021](#) in its most recent mortality calculations. While one-off effects may lead to data being skewed, these shocks may have significant long-term effects which, if ignored, could lead to assumptions being inaccurate. This could make projection models more complex to understand and lead to the risk that there is inappropriate allowance for shock events that may affect mortality in the long term.



7

Unfair outcomes for individuals

Hotspot Description

The risk that actuaries may not act in the best interests of consumers in their actuarial work, either intentionally or unintentionally, which may result in unfair treatment of some individuals or groups in favour of others.

Current Influences

The FCA principle of Treating Customers Fairly (TCF) has long been a bedrock of UK regulation, but 2022 saw the introduction of a new [Consumer Duty](#). There was active work in redress and updating redress methodology. New forms of financial arrangement such as CDC schemes and pension superfunds are nearly 'live', after long gestation periods. Regulation of funeral plans moved from the Funeral Planning Authority to the FCA.

Introduction

Users of actuarial work can include insurance policyholders, a pension scheme's members, savers, general consumers and corporate entities. The perceptions of unfairness in outcomes of actuarial work can arise from actual or expected outcomes which affect, or appear to affect, different individuals in different ways. This could be seen, for example, in the use of sex as a risk factor in the pricing of insurance products, which was judged to violate the [Charter of Fundamental Rights](#) of the European Union in 2011.

Actuarial work involves the application of judgement, which may affect the end outcomes. Examples are the choice of models and assumptions or the views of long-term trends in mortality and morbidity. In the funding of a DB pension scheme, judgements are applied to balance risks between employers and members (and/or between different groups of members). This can lead to outcomes which may appear unfair to some, particularly if risks crystallise while schemes are in deficit and assets have to be applied in ways which affect some members more than others.

When setting the investment strategy, actuarial advice is important in resolving any tensions between the safer but lower-yielding investments (such as cash or bonds), and the riskier but higher-yielding investments (such as equities or property).

In the design of products, there may be a focus on promotion of certain features, sharing of risks, industry trends or political motivations, all of which may favour certain groups and create new risks which affect some individuals more than others.

A key industry trend in insurance is the rise of digitalisation, with increasing access to 'big data' and sophisticated technology. This allows actuaries to identify ever-smaller homogenous groups, which can result in the reduction of risk pooling in favour of risk-based individual pricing. This can leave some consumers with less choice, while others may find that products are unaffordable. This can be problematic for individuals seeking compulsory insurance cover, and also where insurance offers important financial peace of mind.

The impacts of climate change fall heavily on [vulnerable individuals](#)¹⁶ who often have the least ability to respond and meet any new expectations. This is particularly important for 'defined contribution' (DC) pension schemes, which tend to include a higher proportion of low-income members and minority groups' members. Therefore, the way in which the impacts of climate change are addressed will have the potential to either alleviate or exacerbate any existing inequalities. Actuaries will have an important role in all areas of insurance, investments and pension schemes, including within the product design, pricing and reserving, investment management, and the accompanying governance.

Key developments during 2021 and 2022

Collective defined contribution pension schemes

CDC pension schemes offer a new option in pension provision, whereby employers and members contribute fixed amounts to a collective fund and members receive pensions with periodic actuarial adjustments (up or down, including after the pension has commenced). This is done via a risk-sharing mechanism which reflects the financial performance of the fund. Among the public interest risks is the risk that the actuarial

adjustments may be viewed as unfair by some under certain circumstances, and that CDC pension schemes may not be seen as a secure way of achieving good outcomes for members.

There is ongoing work in relation to CDC pension schemes across the JFAR including the following:

- A JFAR working group which has highlighted the key actuarial risks to be addressed.
- TPR published a [new code](#) for authorisation and ongoing supervision and management of CDC pension schemes.
- The FRC is updating the [Technical Actuarial Standards](#) to incorporate CDC pension schemes.
- The IFoA is consulting on introducing a new [Practising Certificate](#) for actuaries who are appointed as a Scheme Actuary to a CDC pension scheme.

Pension 'superfunds'

Traditionally, employers have severed their link to their DB pension scheme by buying-out benefits with an insurance company. Pension 'superfunds' provide a new severance route for employers. Superfunds are occupational pension schemes regulated by TPR. The premium required to secure the scheme's benefits in a superfund is expected to be lower than that payable to an insurance company to buy-out the scheme's benefits. Superfunds introduce new risks as well as new opportunities for delivering DB pension promises. The members of these superfunds need the confidence that they are well governed, run by fit and proper people, and are backed by adequate capital.

TPR has issued [guidance](#) setting out its expectations for both superfunds as well as pension schemes' trustees and sponsoring employers who are considering transferring to a superfund. However, in the absence of any specific legislation on superfunds, there

¹⁶ According to the UN: 'The impacts of climate change will not be borne equally or fairly, between rich and poor, women and men, and older and younger generations.'

is a risk that potential providers may promote consolidation propositions which create new and untested risks for actuaries, potentially culminating in unfair outcomes for some members.

DB funding

TPR has been working on a new funding code for DB pension schemes to minimise the risk of members not receiving their promised benefits. It focuses on managing risk better by setting a clear end-goal, developing a long-term funding and investment strategy to achieve it by taking only affordable levels of risk, and reducing the reliance on the employer by progressive de-risking as the scheme matures. Schemes will be required to think in advance about the key risks along the way and prepare an Own Risk Assessment which, among other things, will consider the effectiveness of their risk management. DWP's [consultation](#) on the draft regulations ended on 17 October 2022, and TPR's draft funding code is expected to be published for consultation soon after.

Pensions dashboards

Pensions dashboards are now approaching reality. They offer an opportunity for individuals to see all their accruing pension values in one place and – ultimately – to make better decisions about their retirement planning. Pensions dashboards will include illustrations of the retirement incomes users might receive from each of their pension arrangements.

In this new environment the key needs are:

- to ensure that all material values are accessed consistently and securely
- to ensure that these values are projected to retirement consistently
- to ensure that the information is presented in a way that enables the individual to understand and to use the information to help their decision-making.

The second of these points is inherently an actuarial function, and the FRC is amending the projection standard (AS TM1) for DC illustrations to move towards greater consistency of projection. The third point may also require actuarial support. The risk is that many individuals will not understand the degree to which the projections are merely illustrations of one of many possible outcomes, and that there is no guarantee that this will be the actual outcome. There is a need to educate dashboard users about the nature of risk and uncertainty, and actuarial support is an important component in being able to do this.

To make dashboards successful, government and regulators need to keep these risks in mind, and actuaries need to ensure that their clients understand the uncertainty in illustrations.

The Great Risk Transfer

In April 2021, the IFoA published its [final report](#) in the Great Risk Transfer campaign, which explored the trend to transfer risks from institutions, such as employers, the state and financial service providers, towards individuals. The report brought together a broad body of evidence to make recommendations to address key challenges. One observation was an urgent need for practical solutions, exacerbated by the pandemic, as individuals are confronted by the need to manage risks they did not have to worry about previously.

Since publication, the IFoA has commissioned research on the potential role of a [Flood Re](#)-type scheme to support public policy goals around societal management of risk.

Differential pricing of insurance products

In May 2021, following a [market study](#) into non-life pricing practices ('price walking'), the FCA published Policy Statement [PS21/5](#), outlining new rules for non-life insurers to ensure renewing home and motor insurance

consumers are quoted prices that are no more than they would be quoted as a new customer through the same channel. The new rules are also designed to make it simpler for consumers to stop automatic renewals if they wish to do so, and they introduce new product governance rules to ensure that firms deliver fair value on all their insurance products. Following engagement with stakeholders to understand the challenges involved with implementing these rules, the FCA issued Policy Statement [PS21/11](#), outlining slight changes to address these challenges. The new rules came into effect from January 2022.

In July 2022, the FCA conducted a multi-firm review to assess whether manufacturers of non-life insurance and pure protection products were undertaking the necessary work to comply with these rules. They emailed all firms with non-life insurance permissions, outlining the key findings and the actions they expect firms to take.

Insurance companies are responsible for ensuring that they avoid price walking. Actuaries, through their understanding of the calculation of risk premiums, are well positioned to understand what this means for insurance premiums in practice, and have an important role to play in ensuring their organisations comply with these requirements.

It is important that actuaries are fully engaged in making the new rules for non-life insurers work, and that they monitor the impact on the market to assess any unintended consequences. Actuaries must now take a more active role to ensure that the street premiums are in line with legislative requirements, and may need to consider their responsibilities to intervene and – in the extreme – to report breaches.

Value for money

On 16 September 2021, TPR and the FCA published a [joint discussion paper](#) on developing a common framework for

measuring the key metrics of value for money in DC pension schemes for Independent Governance Committees (IGCs), pension schemes' trustees, and employers. This includes the investment performance; scheme oversight, including data quality and communications; and costs and charges. [Responses](#) were published on 24 May 2022.

TPR is working with the UK government's Department for Work and Pensions (DWP) and an industry working group called the Small Pots Coordination Group to address the erosion of small pots due to costs and charges. The working group published its [second report](#) in June 2022 on potential models that could be introduced, with further analysis being undertaken, including research by DWP.

In the meantime, regulations which came into effect from 6 April 2022 provide a £100 de minimis threshold for default auto enrolment pension pots below which flat fees cannot be charged – it is estimated that this will benefit three million DC pension schemes' members immediately.

Actuarial factors for UK pension scheme benefits

The IFoA's Actuarial Monitoring Scheme previously published a [thematic review report on actuarial factors](#) used to calculate benefits in UK pension schemes. This considered the current practices adopted by actuaries advising on commutation rates and transfer values in the calculation of benefits.

The use of factors which convert at less than actuarial equivalence can lead to unfair outcomes. The actuary needs to consider what actuarial equivalence really means – is it a fair market discount rate and standardised mortality suitable for the utility discount rate¹⁷ or does it reflect actual health/lifestyle of the individual and their economic circumstances? They should also consider how members might perceive the relative values of different forms of benefit.

¹⁷ By this term we mean the discount rate that the individual would consider fair, taking into account all the individual circumstances that affect the individual's choice between less money now and more money later

Consumer Duty

The FCA have found that financial services markets do not always work well to provide adequate levels of consumer protection, and competition does not always work in consumers' interests. This leads to unfair outcomes for consumers, who may find it harder to make informed or timely decisions; receive unsatisfactory support from their provider; or buy products and services that are inappropriate for their needs, of inadequate quality, are too risky or otherwise harmful.

In July 2022, the FCA issued their new Consumer Duty rules ([PS22/9](#)) and guidance ([FG22/5](#)), which will require firms to consistently ensure and evidence that their products and services meet the needs of their customers and ensure good outcomes.

The new rules require firms to consider the needs, characteristics and objectives of their customers – including those with characteristics of vulnerability – and how they behave, at every stage of the customer journey. As well as acting to deliver good customer outcomes, firms will need to understand and evidence whether those outcomes are being met.

Insurers are already subject to product governance and fair value rules under the [Insurance Distribution Directive](#) and the [non-life insurance pricing practices](#). However, the Consumer Duty is significantly broader in its application, and insurers and actuaries must ensure [compliance across the entire lifecycle](#) of their products and services.

The rules create new challenges for actuaries working in life insurance. For example, in the with-profits market there are inherent conflicts between different generations of policyholders. Inevitably, actuaries will need to make decisions that lead to better outcomes for some policyholders than others. Actuaries must consider how they are able to still evidence that the product ensures good outcomes for policyholders in these circumstances.

Prepaid funeral plans

Regulation of individual funeral plans (which provide the promise of a funeral service for an individual in return for an up-front payment made during the individual's lifetime), which total over 1.5 million, moved from the Funeral Planning Authority (FPA) to the FCA in July 2022. The aim of this transition is to bring in higher standards and improved consumer protection for consumers of funeral plan providers who met the [authorisation](#) requirements of the FCA.

In order to help ensure high-quality actuarial work for funeral plan trusts, the relevant technical actuarial standard (TAS 400) set by the FRC is in the process of being updated following a [call for feedback](#).

The IFoA will also be consulting on updates to their professional regulatory requirements for IFoA Members who are involved in advising on UK prepaid funeral plans. The IFoA has been active in supporting IFoA Members operating in this field, including publishing a [Risk Alert](#) and undertaking a [thematic review](#).

There is a risk of unfair outcomes for consumers who hold existing funeral plans with providers who failed to meet the FCA's authorisation requirements, or who chose not to apply. These funeral plan providers had until 31 October 2022 to transfer their funeral plans to authorised firms or refund their customers. Crucially, these funeral plan providers are not authorised by the FCA and hence their customers do not benefit from the protection of the Financial Ombudsman Service (FOS) or the Financial Services Compensation Scheme (FSCS). Should such a funeral plan provider fail,^{18,19} these consumers could face significant losses on the amounts paid for their funeral plans. Additionally, authorised firms receiving these transferred funeral plans may not be appropriately resourced.

¹⁸ <https://www.safehandsplans.co.uk/important-update/>

¹⁹ <https://www.dailymail.co.uk/news/article-10904953/Watchdog-warns-not-money-two-funeral-plan-firms-Safe-Hands-collapse-hit-thousands.html>

The ‘poverty premium’

In 2021, the IFoA published a [report](#) on the poverty premium in insurance, in conjunction with Fair by Design. The poverty premium refers to the scenario where those consumers on lower incomes pay more for essential goods and services.

The research by Fair by Design indicated that insurance made the largest contribution to the poverty premium. In an insurance context, many vulnerable and low-income consumers can present a higher risk to insurers due to a range of factors, often outside the consumers’ control. These consumers can be quoted higher premiums for insurance, which they are less likely to be able to afford; they may be refused cover altogether. This is unfortunate given that the financial peace of mind/redress insurance offers could be particularly beneficial to vulnerable/low-income consumers.

Since the publication of the report last year, the IFoA and Fair by Design have engaged on the topic with a range of relevant stakeholders,

including HMT and the FCA. Given the prevailing cost of living crisis, tackling the poverty premium – in relation to insurance, but also more generally – is as important as ever.

In a slightly different context, the Institute of Actuaries of Australia has been investigating home insurance affordability and socioeconomic equity in a changing climate. The results appear in a [report](#) released in August 2022.

Ethnicity penalty

Research from [Citizens Advice](#) found that in areas where there are large communities of colour, there are, on average, higher insurance prices. Citizen’s Advice termed this the ‘ethnicity penalty’ in the car insurance market. This issue is sometimes linked to unfair algorithms and problems designing better algorithms. This is discussed further in Section 8.

Further reading



8 Technology

Hotspot Description

The risk that actuaries may not adequately understand the latest modelling techniques and approaches in their actuarial work; for example, the move towards Machine Learning (ML) models.

Current Influences

Artificial Intelligence (AI), ML and Big Data continue to generate interest among actuaries and the general population, and impact every aspect of every person's life, often for the better. AI is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. ML is the autonomous learning of computer software.²⁰

Technological advances, and the speed at which these are happening, are raising numerous ethical concerns. Blockchain and cryptocurrencies continue to grab headlines, but their place in the world is less certain. The ambitious Pensions Dashboards Programme is ramping up, and this is essentially a technology project.

The speed of advances, flexibility and adaptability of technology has created digital solutions to geopolitical and other shocks, such as the Covid-19 pandemic. This is demonstrated by the advancement of work from home, and the ability to roll out significant changes to the delivery of social care. The success of digital solutions may well accelerate the efficiency of the delivery of care in the future.

Introduction

Technology underpins much of the technical work carried out by actuaries. Technology has radically transformed the way actuaries and others do their work (for example, the increased use of video calling), as well as the data and models that underpin actuarial work. If actuaries do not adequately understand the latest modelling techniques, and approaches associated with these models, then there is a risk that the development of these tools could be unchecked, with possible errors in the tools themselves or the use of them potentially leading to unfair outcomes.

Without robust and expert understanding of these tools, actuaries may fail to identify and mitigate potential risks to the public interest. In addition, further risks directly related to technology may be inadequately managed.

In a general business context, there is a trend of increasingly common cybersecurity breaches, with the managing boards of entities increasingly viewing cyber risks as a high priority.²¹

²⁰ Arthur Samuels of IBM is credited with this definition. Widely taken to be in a 1959 paper but probably first appears in a subsequent paper in 1967

²¹ See 'Board Engagement' under 'Key Findings' in the *Cyber Security Breaches Survey 2022*

Key developments during 2021 and 2022

Artificial Intelligence, Machine Learning and Big Data

AI, ML and Big Data are growing areas, with an array of potential future applications.

Applications

Natural Language Processing (NLP, a subfield of AI) is a field which combines AI and linguistics, which allows machines to understand text (in large amounts, either digital or handwritten), make decisions based on their interpretation and produce [human-like text](#) as an output,²² and could be used to [generate a report](#) similar to this one.

In the actuarial profession, these applications have arguably been most prominent in the [insurance field](#), spanning the lifecycle of non-life insurance claims:

- [price setting](#) (ML to improve pricing)
- [insurance claim management](#)²³ (NLP, in combination with Optical Character Recognition (OCR))
- [detecting claims fraud](#), and even
- [processing claims at world record pace!](#)

Actuaries have a crucial role in championing and ensuring that 'explainable AI' is at the forefront as these applications develop.

AI is also increasingly used for risk management. For example, [Ernst & Young](#) have stated that AI 'can also assist businesses in modelling and understanding connections between risks, for example, by using it to automate basic risk research; identify important risk statements in unstructured documentation; and undertake causal analysis to identify risk interdependencies.'

AI is being brought into cybersecurity (for example, 20% of UK firms in this [study](#)) and is [helping tackle climate change](#), with its thirst for information and data. The technology risks in this hotspot are closely connected with the sustainability risks.

More specific to the actuarial profession, there are opportunities for insurers to provide cover for businesses' cyber risk exposures arising from their use of AI. With the scale of AI use (for example, from driverless cars to medical diagnoses), the opportunities are vast. However, interconnectedness could create risks to the insurers of AI (cyber risk), as reinsurance company Guy Carpenter points out in its paper in 2022 on Public Risks: 'AI ecosystems will carry significant aggregate exposures that will be difficult to understand and underwrite.'²⁴

The autonomy of models and their dependence on data to learn brings risks to areas where ML is being applied. It is therefore very important that actuaries fully understand these risks and mitigate or account for them where possible. One particularly difficult area is ML adversarial examples.^{25,26} These are inputs that an attacker has intentionally designed to cause ML models to make mistakes. Other risks are the use of third-party data (see below) and [ethical considerations](#).²⁷

Data danger

As described above, ML requires the input of real-life datasets to improve the model's understanding and ability to predict events in the future. As such, the quantity and quality of this data is critical. Many organisations may not have access to the quantities of data their ML models require and therefore they look to third-parties to provide them with data.

²² There are various NLP subgroups with uses in actuarial work: NLP can be considered a wide concept or system which incorporates Natural Language Understanding (NLU) (machines understanding text) and Natural Language Generation (NLG) (generating human-like output based on that understanding)

²³ See #21 'Insurance claims management' in the linked article

²⁴ <https://www.guycarp.com/content/dam/guycarp-rebrand/pdf/Insights/2022/2022-AI-Peter-Hearn.pdf> for a good overview of insuring AI <https://cms.law/en/media/local/cms-cmno/files/publications/other/ai-consequences-for-professional-indemnity-insurers-when-ai-fails-to-perform?v=1> for a legal view from a Professional Indemnity point-of-view

²⁵ <https://openai.com/blog/adversarial-example-research/>

²⁶ <https://www.technologynetworks.com/informatics/articles/cars-require-regular-inspection-why-should-ai-models-be-any-different-359405>

²⁷ Specifically: fairness for individuals affected by algorithmic processing

However, this can create risks of pitfalls and uncertainty on responsibilities. As the data source moves away from the entity the following risks arise:

- Risks from new data sources and types (unstructured data, such as images or text, and synthetic data, that is, 'generated algorithmically rather than from actual events'),²⁸ including quality, understanding the true source, and legal issues.
- Risks arising from relying on external data providers (sufficient due diligence required)²⁹ with the backdrop of regulators becoming increasingly active in this area (for example, the SEC).

These risks are pertinent to ESG disclosures. One issue for those completing these disclosures is limited data, in particular in respect of Scope 3 emissions,³⁰ since the data required in order to report on these emissions is often not plentiful or comprehensive. Alternative data may therefore be required, bringing with it the risks identified above.

Regulator support

- The IFoA's Certificate in Data Science was launched in 2020 and provides IFoA Members with a course that contains modules covering AI and ML, as well as good practice and ethical issues that may arise.
- The IFoA's Regulation Board has published non-mandatory ethical and professional guidance on data science, including a guide produced in conjunction with the Royal Statistical Society.
- The IFoA's Actuarial Monitoring Scheme Thematic Review of General Insurance pricing produced recommendations for more AI/ML content in the professional examinations' syllabus.
- The FRC's exposure draft of its Technical Actuarial Standard 100 (TAS 100) contains principles relating to the use of data (checks and controls), models and communications.

- The PRA is currently consulting on its model risk management principles for banks (CP6/22); this is a useful framework beyond the banking sector.
- The ICO (Information Commissioner's Office) has published guidance on data and AI.

Blockchain and cryptocurrency

Cryptocurrency

Cryptocurrency has been in the public discussion for a few years now, including reporting on spectacular gains, the more recent turmoil in prices, and commentary from regulators and governments. Cryptocurrency or cryptoassets³¹ avoid the use of a trusted central authority and are described as a digital or virtual currency that is secured by cryptography, which makes it nearly impossible to counterfeit or double-spend.

Cryptoasset investments are the subject of some debate, but have been growing quickly and forcing regulators to respond quickly with the possibility of the asset class infiltrating or challenging established markets and means of payment, and additionally presenting systemic risk.

As cryptoassets grow, there are increasing opportunities for actuaries to operate in this field. More than \$1.3 billion has been stolen from cryptocurrency exchanges since the first Bitcoin block was mined in 2009, according to a report from Aon. Losses of this magnitude lend themselves to a need for insurance. It is, however, a relatively immature market, with currently only 2–3% of global cryptoassets thought to be insured. Lloyds of London, Coincover (to some extent) and others, are offering cryptocurrency insurance but there may be some time to go before the supply of this insurance meets demand. The challenge for actuaries involved in pricing such cover is fully understanding the risks given the limited historic data on which to base their analysis.

²⁸ Pages 15–20 ('Data'; PDF pages 16–21), paragraph 64 for 'Synthetic data'

²⁹ App Annie' example in the article

³⁰ These are emissions generated indirectly by an entity

³¹ Central banks prefer 'cryptoasset' rather than 'cryptocurrency' as the term

Insurers participate in the cryptocurrency sphere as underwriters, of either cryptoassets or cryptoasset businesses.³² Other exposures include insurers holding cryptoassets as a balance sheet item or accepting cryptoassets as payment. As with any new area of insurance, the challenge for actuaries working with cryptoassets is to understand the risks and draw on as much empirical evidence as possible to cement this understanding and make estimates of future risks. In addition, the uncertain regulatory position in regard to cryptoassets and inconsistent approaches in different geographies pose a risk to actuaries looking to estimate future patterns.

Away from direct insurance of cryptoassets, losses from cryptoasset businesses are ultimately finding their way into claims under cyber insurance policies. Some problems exist with the way this is defined, and actuaries pricing cyber insurance will need to fully understand the boundaries of cover.³³

Blockchain

Blockchain can be defined as 'a shared database/ledger on which the state (i.e. current snapshot of data) is confirmed and verified without the need for a trusted centralised authority.' The ledger is not centrally stored but rather the blocks of data are shared across a network of computers worldwide which verify changes.

Among the key features of blockchain are that it is immutable (unable to be changed), transparent, secure and decentralised. It therefore dovetails with cryptocurrencies and the desire of some to decentralise financial systems/transactions.

Despite the high-profile link with cryptoassets, there are numerous other advantages blockchain is purported to offer that may have a greater impact on the work of actuaries.

The solutions relevant to some of the areas where actuaries are traditionally employed, insurance and pension schemes, relate to reducing the need for intermediaries via smart contracts and increasing efficiency. In particular, blockchain can be used throughout the whole insurance value-chain; for example, automating claims processes, improving data synchronisation in healthcare, and preventing fraud.

The risk to actuaries is not fully understanding or embracing this blockchain technology and hence not being positioned correctly. In addition, actuaries must understand the risks that blockchain presents and act accordingly.

While the insurance industry finds a suitable place for blockchain, there is some useful research and discussion being carried out to support actuaries. One such example is EIOPA's discussion paper, which covers many of the applications and risks.

Pensions dashboards and technology

In the UK, one of the most ambitious projects in the pensions industry of recent times is taking place. This is the launch of pensions dashboards. Many in the UK population have accrued numerous pension pots separately with various pension providers over time, which can be difficult to track. The aim of pensions dashboards is to enable people to collate all of their pensions information online, in one place (noting that pension providers will be able to develop and host their own pensions dashboards). It is estimated there could be up to 1.6 million lost pensions pots with a value up to £19 billion.

The timeline for the implementation of the Pensions Dashboards Programme is for compulsory onboarding for pension schemes and pension providers to commence in Summer 2023. It is expected that many members will start to be able to use pensions dashboards from 2024.³⁴

³² Figure 3 in the Oxbow Partners article

³³ A recent High Court decision in UK determined that cryptocurrencies are 'property' for legal purposes which has added complexities to cyber insurance

³⁴ Slide 7 of the 'Prepare, connect, comply... and then what?' presentation

Actuarial input is part of this. Actuaries will be central to the calculation of benefits, which will form some of the data that will be shown on pensions dashboards. Vital to this is having a consistent method of showing the expected value of benefits for members at retirement so that the figures from different arrangements are comparable. Actuarial Standard Technical Memorandum 1: Statutory Money Purchase Illustrations ([ASTM1](#)) will be the standard used to calculate benefits. The FRC has recently consulted on the method and assumptions used within ASTM1, and a revised standard is expected to be effective in 2023.

This is essentially a technology project. Underlying the project is the dependence on technology to bring together data from the population of pension schemes and funds to a central place, whereby individuals can pull in all the data relevant to them. This pensions dashboards [ecosystem](#) requires input from various pension providers and a system to pick up the relevant information from the various sources and provide the required information to the user.

Further reading

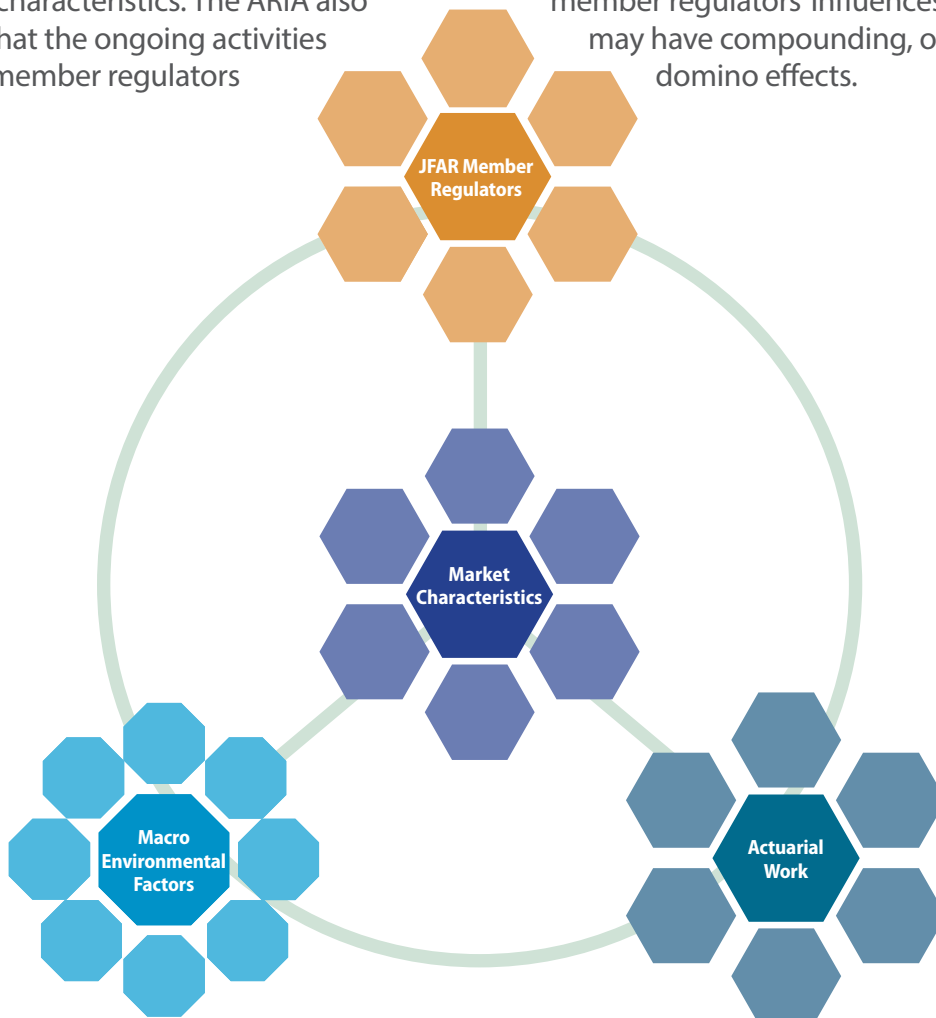


Appendix: Actuarial Risk Identification Architecture

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 identifies three sources of risk, each with sub-categories: macro environmental factors, the inherent risk in actuarial work, and market characteristics. The ARIA also recognises that the ongoing activities of the JFAR member regulators

influence the risk to the public interest of actuarial work. There are dynamic interactions between these three sources of risk and JFAR member regulators' influences on risk which may have compounding, offsetting, or domino effects.



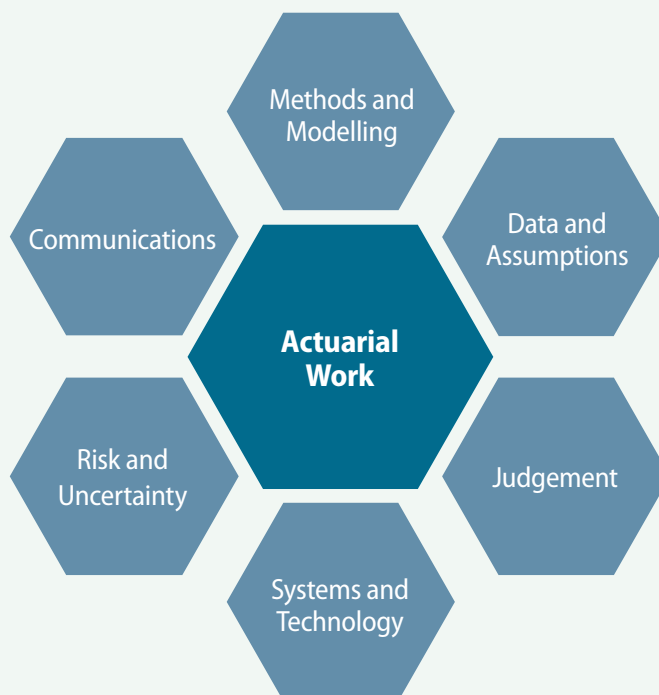
Macro-environmental factors

The light-blue cog represents the risk to the public interest from actuarial work that is influenced by external factors: social, technological, economic, environmental, political, legal/regulatory, ethical, and international.



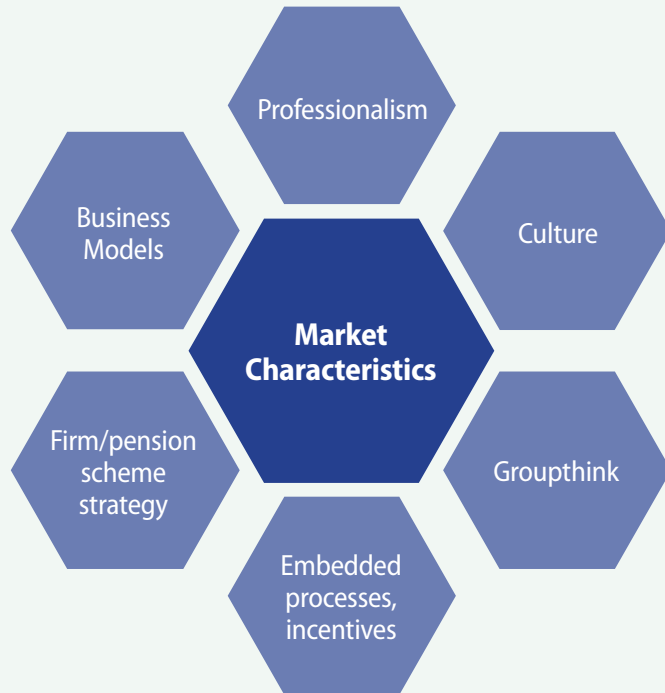
Actuarial work

There is inherent risk in actuarial work due to its complexity and this is represented in the teal cog. The nature of the risk will be influenced by the practice area, activity and the task in hand. 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 represents the risk to the public interest which arises from this. The market characteristics include professionalism, culture, groupthink, embedded processes and incentives, firm/pension scheme strategy, and business models.



JFAR member regulators

The ongoing activities of the JFAR member regulators influence the risk to the public interest of actuarial work. The orange cog represents the ways in which the JFAR member regulators reduce the risk to the public interest. Each JFAR member regulator has a different focus to their supervision and a different approach to identifying, researching and mitigating risks.



Further reading: Sustainability

Background information on climate change

- JFAR Climate Change Deep Dive
- UK's path to net zero

Relevant organisations and networks

- Background to TCFD
- Climate Financial Risk Forum
- Network for Greening the Financial System

Climate change, finance and regulation

- Net zero-aligned financial disclosures fact sheet
- FCA review of TCFD-related disclosures
- IFoA Climate-related risk task force report
- IFoA climate-related risk report
- IFoA consultation on changes to regulatory framework on climate Change and sustainability
- IFoA climate change and sustainability risk alert
- IAA climate risk papers
- BoE supervisory statement (SS3/19)
- BoE 2021 Biennial Exploratory Scenario – key elements
- BoE 2021 Biennial Exploratory Scenario – results
- PRA Climate Change Adaption Report 2021
- FCA ESG priorities
- TPR climate change strategy
- FCA, Improving consumer comprehension of sustainability disclosures, Annex 1, Annex 2
- FCA, Sustainability Disclosure Requirements (SDR) and investment labels (CP22/20***)

Further reading: Inflation

General background

- ONS, Consumer price inflation tables homepage
- IFoA, Risk Alert, 'The impact of high inflation on actuarial practice', 31 August 2022

Non-life claims inflation

- PRA letter to Chief Actuaries of general insurance firms, published 20 October 2022, 'Insights from PRA thematic review of general insurance reserving and capital modelling'. (Much of the content of the letter is concerned with non-life claims inflation.)
- Allowing for Inflation in Reserving, a thematic review of Lloyd's Market reserving approaches for claims inflation, August 2022
- Reserving for inflation, Lloyd's Guidance for NEDs, June 2022 (recording also available, or selected links)
- Lloyd's, Reserving Guidance – Allowing for Inflation, May 2022 (also available on this landing page)
- FRC, Thematic Review: Discount Rates, May 2022 (also includes discussion on inflation in Section 6)
- Modelling of claims inflation, a thematic review of Lloyd's Market capital modelling approaches for claims inflation, August 2021
- Assessing Inflation Risk in Non-Life Insurance, October 2015, Friedrich-Alexander University Erlangen-Nürnberg (FAU)
- Lloyd's, Claims Inflation Discussion Document, 18 November 2014 (also available on this landing page)
- Claims Inflation: An emerging risk for non-life insurers, 25 June 2014, a presentation at an IFoA Reserving Seminar
- Claims Inflation – Uses and Abuses, IFoA's GIRO 2005

Social inflation

- Insurance Information Institute, Social inflation: hard to measure, important to understand, 17 July 2022
- WTW, Insurers are in the grips of 'social inflation', 25 May 2021
- The Geneva Association, Social Inflation: Navigating the evolving claims environment, most figures in document 2020H1
- Insurance Business, What is social inflation, and why it is hurting insurance?, 3 January 2020
- Superimposed Inflation - Australian Accident Compensation Landscape in 2007, April 2007, presented to the Institute of Actuaries of Australia
- International Risk Management Institute's (IRMI) definition of 'social inflation'

Further reading: Inflation (cont'd)

Inflation-linked market instruments

- Zero-Coupon Inflation Swap (ZCIS), updated 14 August 2022
- Index-linked gilts and the end of RPI, 15 January 2021
- Hymans Robertson, RPI reform – replacing RPI with CPIH (CPI adjusted for owner occupier housing costs), April 2020
- Primer: Inflation Swaps, 20 June 2018
- International Monetary Institute, What do the Prices of UK Inflation-linked Securities Say on Inflation Expectations, Risk Premia and Liquidity Risks?, IMI Working Paper No. 1803, March 2018
- Pimco, Understanding Investing: Inflation-Linked Bonds, June 2016
- Federal Reserve Bank of Atlanta, A Note on Extracting Inflation Expectations from Market Prices of TIPS and Inflation Derivatives, November 2015
- Inflation Risk: Beyond the One-Year Horizon, IFoA's GIRO 2012
- Federal Reserve Bank of San Francisco, TIPS Liquidity, Breakeven Inflation, and Inflation Expectations, 20 June 2011
- Treasury Inflation Protected Securities (TIPS)
- Bank of England, Yield curves homepage (includes nominal and real yield curves – both of which are used to determine the breakeven inflation rate)
- Bank of England, Index-linked gilts homepage
- Bank of England, On market-based measures of inflation expectations, Spring 2002

Further reading: Mortality and morbidity

The link between economic stresses and mortality improvement rates

- [Recessions and mortality: a global perspective](#)

Covid-19 mortality and its effect on the work of actuaries

- [Overview of Long Covid and plausible subgrouping for the condition](#)
- [Actuarial considerations regarding Long Covid](#)
- [Personal Long Covid account and income protection complications](#)
- [Long Covid coverage in America](#)
- [The role of insurance as we learn to live with Long Covid](#)
- [IFoA Pandemics Hub](#)

The mortality impacts of Russia's invasion of Ukraine

- [Russia's demographic crisis](#)
- [Paper on the long-term effects of Russia's invasion on Ukrainian health](#)

Mortality forecasting

- [Mind the Gap: Safely Incorporating Deep Learning Models into the Actuarial Toolkit](#)

Further reading: Unfair outcomes for individuals

- Citizens Advice sounds the alarm on £280 car insurance ethnicity premium, March 2022
- The Problem with the 'Poverty Premium', Harvard Business Review, April 2013
- The poverty premium in insurance, Fair by Design and IFoA
- Reducing the Poverty Premium, University of Bristol
- The Poverty Premium, University of Bristol PFRC
- Measuring the Poverty Premium, Social Market Foundation
- Pension dashboard rules for providers, FCA
- House of Commons Library, Briefing on Collective Defined Contribution (CDC) pensions
- The Pensions Regulator, CDC code of practice
- The Pensions Regulator, DB superfunds guidance

Further reading: Technology

- General Applications of NLP
- Artificial Intelligence Public-Private Forum, final report
- Explainable AI: the basics
- The benefits and harms of algorithms: a shared perspective from the four digital regulators
- Blockchain and crypto assets
- Pensions Dashboards Programme



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