Actuaries in a world of contested narratives

Redington revisited: A call for courage, judgement and imagination

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Abstract: Actuaries have long been recognised as smart mathematicians who apply their skills to questions involving finance and risk. Some of the most important issues we are faced with today, such as climate change, demographic change and intergenerational fairness, lend themselves to actuarial analysis. But just being smart mathematicians is not enough. Actuaries need a deeper, broader and more creative understanding of the issues if they are to contribute to providing solutions. This paper brings together the reflections of six actuaries who got together in the summer of 2025 to discuss some of these issues and the philosophical foundations of an approach which can help actuaries be heard when they speak up on these topics.

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About the authors:

Charles Cowling is the immediate Past President of the International Actuarial Association (IAA) having been IAA President in 2024. Until his retirement in 2024, he was the Chief Actuary of Mercer in the UK, and took a lead role on Professional Standards and Thought Leadership at Mercer. In 2024, Charles was ordained as a priest in the Church of England, and he is now a curate in the parish of Kirkby Stephen, Cumbria.

Matthew Edwards is an actuary whose career has covered life insurance, non-life pricing and pensions, including several years overseas. His focus has been demographic risk (particularly longevity) and predictive analytics. He is a former editor of *The Actuary* magazine, chair of the Continuous Mortality Investigation (CMI), and co-chair/founder of the COVID-19 Actuaries Response Group.

Dermot Grenham is a qualified actuary with over 30 years of professional experience. In addition to his mainstream actuarial work he has also lectured in demography at the London School of Economics.

Tan Suee Chieh is a Singapore-based business executive and actuary. He is also a Past President of the Institute and Faculty of Actuaries (IFoA), where he helped shape the 2020–24 strategy and championed thought leadership, scholarship funding, and professional reform. In 2022, he was conferred an honorary Doctor of Letters by Heriot-Watt University for his pioneering contributions to the actuarial profession.

Craig Turnbull is the author of the book *A History of British Actuarial Thought*, a past winner of the IFoA Peter Clark prize and one of the recipients of the IFoA Frank Redington prize. He has served on the IFoA Research and Thought Leadership Board and on a number of IFoA working parties and is a former member of the Bank of England Research Steering Committee. He is a partner at Barnett Waddingham, the actuarial consulting firm.

Colin Wilson has had a varied actuarial career, starting in life insurance and investment before moving into wider risk management and government. He was UK Deputy Government Actuary from 2012 to 2022 and served as President of the IFoA from 2016 to 2017.

Foreword

What motivated a group of senior actuaries to get together in the beautiful scenery of the British Peak District to discuss topics of common interest to them and the wider actuarial profession?

One of the attendees, Tan Suee Chieh, explained it as follows:

"We were a group of actuaries and professionals, some retired from active engagement with actuarial work but none of us retired from thinking about how we can apply our actuarial mindset and experience to responding to some of the key issues of the day. We came together, not out of nostalgia or duty, but because we felt something remained unresolved. We had a sense that the world had changed and that we too needed to change with it, but also that we might in some small way be able to contribute to a better understanding of the changing world."

This retreat was neither a seminar nor a reunion. It emerged organically, through bilateral conversations and the gentle persistence of shared concern. Though most of us have left institutional office we have not abandoned the responsibility, particularly the moral and civic obligations, we once carried in our formal roles. We still care, and we suspect that this caring, quietly, stubbornly, and with a degree of scepticism but not cynicism, is something worth preserving.

What brought us together was a recognition that actuarial thinking, at its best, does not reside solely in technical accuracy. It resides in taking the long view; in judgement; in knowing what to hold constant when the winds shift. That judgement, however, must be formed by experience, by encounter, and by conversation. Hence the retreat.

In that spirit, this gathering was an opportunity to step outside formalities, models, and deliverables. We wandered. We disagreed. We returned to first principles. And in doing so, we remembered what it means to think slowly, in company. The tone was informal, exploratory, and introspective, marked by very British hesitations and rich digressions.

We didn't always come to uniform conclusions but we were always respectful of, and keenly listened to, the opinions and insights of each other. We all came away enriched by this process of listening and being listened to.

Our conversations were wide-ranging. A recurring theme, unpacked in the first session by **Tan Suee Chieh**, was the tension between pluralism of thought and moral relativism. This session set the stage for a deeper inquiry into meaning, value, identity, and the need for moral clarity. The group's desire for philosophical reflection and foundation quickly became clear, particularly in the animated exchange on pluralism versus relativism. This session laid a foundation for what became a profound and wide-ranging three-day encounter.

Yet our dialogue did not remain at the theoretical level. **Charles Cowling** offered a moving reflection on the realities of institutional racism, not abstractly, but as encountered in the actuarial and ecclesiastical worlds. **Colin Wilson** reminded us that intergenerational fairness cannot be reduced to projections. It is lived, felt, and owed. **Craig Turnbull** provided insight into the structural choices underlying public finance and the fragility of fiscal trust. **Matthew Edwards** challenged the narrowing identity of the actuary as mere data scientist, urging us to reclaim a broader intellectual tradition. **Dermot Grenham**, in perhaps the most existential of contributions, asked why we in the developed world had grown ambivalent—even fearful—about fertility and the future of life itself.

These reflections were not rehearsals for policy. They were exercises in moral attention. And they pointed to a profession that, if it is to remain relevant, must rediscover its voice, not just in committee rooms, but in the quiet spaces where conscience gathers.

Looking back over those few days together, perhaps this is what this retreat afforded: a small beginning again. Not loudly, not with resolutions, but with attentiveness. And a recognition that in our final chapters, there is still a lot of work worth doing.

So we returned home, not with answers, but with a deeper resolve to remain present. To speak where appropriate. To listen where needed. And to carry forward a tradition that is more than a set of techniques, it is a way of being.

This is not a manifesto. It is an invitation. Not to action in the grand sense, but to renewed attention. Let us stay involved. Let us stay thoughtful. And let us remember that the voice of the profession, when clear, calm, and unafraid, continues to have a lot to contribute.

The following sections contain a summary of our discussions. These are not meant to give answers to any of the subjects we tackled but rather to stimulate further thought and discussion on these and other major issues facing our societies. Nor have we sought to impose a uniform style on the reflections.

- Part I describes, based on the work of the British philosopher Isaiah Berlin, how we can navigate in a world where people have many different value sets.
- Part II asks what it means to be an actuary and uses the work of Dr Ian McGilchrist regarding differences between the left and right parts of the human brain to help distinguish the work of actuaries from that of data scientists.
- Part III shows how we applied the ideas of value pluralism when discussing the sensitive topic of institutional racism.
- Part IV pulls together our discussions about intergenerational fairness, investing for net zero and fertility.

We hope you enjoy reading the following pages as much as we enjoyed our time in the Peak District and that they inspire you to engage courageously with the many major issues facing our world today.

Part I The Philosophical Thread - Isaiah Berlin and Value Pluralism

The first session began with a metaphor: the interleaved narratives of The French Lieutenant's Woman, a file based on the book by John Fowles, where two love stories—one fictional, one metafictional—run in parallel, each offering a different lens on the same events.

At the heart of the presentation stood Isaiah Berlin, the Jewish-Russian-British thinker who resisted monistic philosophical systems. Instead, Berlin gave us space: intellectual space for competing truths, ethical space for difficult judgments, and political space for coexistence without coercion.

Berlin's central contribution, value pluralism, was the keystone of the presentation. He argued that human values such as freedom, justice, equality, truth and love are all legitimate and deeply held. But they often conflict. And no single "correct" framework can reconcile them all. This is not moral relativism. It is tragic realism. The human condition is such that we must often choose between good things, knowing that in choosing one, we lose another.

Berlin's pluralism is not a licence for indifference. It is a call to judgment, knowing that we act without full certainty, and must live with the weight of our decisions. Berlin's insight remains piercing: the greatest tyrannies are born not of malice but of certainty. Utopians, convinced of their one right answer, become dangerous. "To assume all answers are known," Berlin wrote, "is to become a dangerous person."

In today's increasingly polarised political landscape, Berlin's message is more urgent than ever. "The left speaks in absolutes of justice and equity. The right in absolutes of tradition and order. Both forget: these are not false values. The danger lies in their absolutism, not their content."

A particularly engaging moment came with Berlin's distinction between negative liberty (freedom from interference) and positive liberty (freedom to fulfil oneself). Both are necessary. But each, when pushed too far, becomes dangerous. Negative liberty without civic obligation breeds selfishness. Positive liberty without limits becomes authoritarianism in moral disguise.

A highlight of the session was the spirited discussion on the difference between pluralism and relativism. Participants were eager to tease apart the nuances:

- *Relativism* says all values are equal, and no value can be better than another. Everything is just opinion.
- *Pluralism* says some values matter more than others. There are real moral conflicts. But these values are not always reconcilable.

Berlin's pluralism demands that we choose and recognise that some choices involve real loss, not false dilemmas. Moral life is not an equation to be solved but a path to be walked, often in shadow.

This part of the discussion captured the group's philosophical seriousness and deep hunger for moral discernment. Pluralism is not comfortable. It is a discipline: intellectual, ethical, and emotional.

This theme resonated with later discussions, particularly the session on fertility where the question "whether our societies still believe life is worth beginning" was asked. One response gave a nod to Hannah Arendt's idea of natality: the miracle of new beginnings. "Demography is not just data". "It's an expression of faith—whether people still believe in the future."

In a time of shrinking discourse and shrill absolutism, this session reminded participants that thinking well is a civic act, that ethical clarity does not always mean certainty. And that philosophy, at its best, teaches not what to think, but how to notice what we're thinking.

In the quiet after the session, there was no applause. Just a thoughtful silence. It felt like the beginning of something, serious, plural, and enduring.

Part II What does it mean to be an actuary?

Art or science?

There has been a long-standing debate about the nature of actuarial work: is it science or art?

Redington had much to say about this, and implied that actuarial work is 'art' in the sense of making choices, interpreting data in context, and understanding the broader implications of technical results:

"It is not enough to have the tools; to be great at the craft requires more. Today we are confronted with an almost crazy world where the more we chase science and tools, the further we are from understanding and remembering what is important"

Of course actuaries are not the first 'practical mathematicians' to have wondered where their profession lay on this spectrum. Statisticians occupy somewhat similar ground to us, and the famous R.A. Fisher (father of the p-value) wrote of the importance of judgement and flexibility in choosing and applying statistical techniques, avoiding the blind following of rules. Similarly in the field of epidemiology, Sir Austin Bradford Hill, he of the Bradford Hill criteria for deciding on causality, stressed the idea of judgement, common sense and context in interpreting evidence.

There has been a resurgence of interest in this question, albeit in a slightly different form; instead of being framed under a 'science or art' dichotomy, the question has re-arisen as 'how can actuaries distinguish themselves from data scientists', and in somewhat more worried vein, 'how can actuaries be better than AI robots'?

This session explored how the writings and thinking of Dr Iain McGilchrist regarding left brain and right brain differences can illuminate this debate, and hence inform how actuaries can position themselves as different from, and in many contexts better than, data scientists and AI apps.

Actuaries and data scientists

Matthew Edwards, who led the session, explained: "My thought process has been considerably helped by a recent conversation with a senior actuary, who said he'd worked out what made actuaries distinct from data scientists. He described a work situation that was almost identical to what I had gone through some years ago, with the introduction of predictive analytics to help in pricing. His example was motor insurance, while for me it was annuitant mortality."

At the outset, the techniques were introduced by actuaries, who stayed closely involved while they were still fresh. Then, once they became business as usual, actuaries were no longer needed and data scientists operated the machinery. But each time there was some external novelty or internal development to consider, for instance regulatory impacts or the pros and cons of moving from Generalised Linear Models to more predictive but less transparent methods such as gradient boosting, actuaries would be involved again.

The central point was this: where the skills required were purely analytic, involving data cleaning, running the analytics, precise mathematical skills, validation of results and implementation into the already existing pricing process, there was no need for actuaries. Data scientists were more suited to the work, and less costly.

When were actuaries involved? When there were wider, larger contexts to grapple with, such as market pressures and regulatory aspects; more subjective aspects, such as ethical concerns and professional judgement; novelty to deal with, such as how new methods might work; and, in general, anything requiring substantive creativity and wider thinking.

These aspects contrast with the elements of routine work during the business as usual phases, with the emphasis on purely analytical thinking, sharp 'micro-focus' on particular mathematical parts of the process, and a mechanistic approach to solving problems.

These two different 'thinking sets' correspond almost exactly, and perhaps 'fully exactly', with the distinctions Iain McGilchrist draws out in his work *The Matter with Things*[1], itself an expansion of the shorter work *The Master and His Emissary*[2].

Left and right hemispheres

McGilchrist's basic contention is that the brain's hemispheres work with fundamentally different modes of attention and perception; the right hemisphere engages with reality as a whole, as a set of relationships, while the left hemisphere has a narrow focus and reductionist approach. This view is founded on his lifetime's work on neuropsychology, with particular regard to the behaviour found in split-brain patients, patients with brain lesions, and functional brain imaging.

Drilling down into McGilchrist's views, he associates the following with the right hemisphere: creativity, dealing with novelty, working in wide contexts, patterns, values. He associates the following with the left hemisphere: fine-grained analysis, categorizing, manipulating information, working in representations.

It is evident that these two distinct sets of functions correspond closely, perhaps identically, with the previous views of how actuaries 'add value' and distinguish themselves from data scientists.

Implications for actuarial work

If we accept the above points, or at least regard them as plausible with potentially useful pointers, then what are the implications for actuarial work?

Further to the right and left hemisphere distinctions noted above, McGilchrist contends that the right hemisphere is evolutionarily and functionally primary, and uses the metaphor of "the master and his emissary" to describe this dynamic. The right hemisphere (master) should lead, integrating the left's (emissary) analytic capacities. However, when the left hemisphere dominates, it becomes blind to its own limitations, leading to rigidity (insisting on its representations of the world), tunnel vision lacking consideration of the wider context, and a loss of connection to reality.

This dynamic is itself a 'masterful' summary of all that can go wrong in the field of actuarial modelling. Typical (and surprisingly common) missteps here are:

- Using the wrong model – or using the right model, but neglecting everything that operates outside the model's scope
- Over-confidence in the results of the model, and indeed regarding the model and its results as if one were referring to reality (the problem of 'reification')
- Designing a model that is descriptive rather than predictive (predictiveness being arrived at through consideration of causality and the appropriate drivers of the reality in question)

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[1] McGilchrist, Iain (2009), *The Master and His Emissary: The Divided Brain and the Making of the Western World*, Yale University Press

[2] McGilchrist, Iain (2021), *The Matter with Things: Our Brains, Our Delusions, and the Unmaking of the World*, Perspectiva Press

- Belief in the innate predictiveness of parametric methods that satisfy various statistical tests; complexity

None of these observations are in any way dependent on believing all or indeed any of McGilchrist's contentions: the above list is in fact taken largely from the 2012 SIAS paper *The Philosophy of Modelling*[3].

We could therefore construct a form of 'approach validation' checklist, a 'right hemisphere code of conduct', to help actuaries avoid falling down reductionist, narrow focus and out-of-context rabbit holes, but instead bringing a wider and more valuable perspective to bear on the problems we help to solve.

Implications for actuarial education and training

Just as this new perspective offers insights to improve how we approach our work, it provides equivalent and perhaps more important insights into the education and training of actuaries.

If we wish to ensure the 'sustainability' of the actuarial profession as a profession that offers more than adjacent professions such as data scientists, accountants and risk managers, we now have explicated for us the skills that have to date set us apart, and that we must cultivate in the future.

We must ensure that the syllabus, and the testing mechanisms, pay due attention to actuaries as right-hemisphere 'masters' (wide-visioned, creative, flexible thinkers who are adept in areas of uncertainty and ambiguity) who make appropriate use of their left-hemisphere 'emissaries' (focused mathematical manipulators and modellers).

And for individual actuaries the message is to cultivate the right hemisphere and always seek to see the bigger picture.

[3] Edwards, Hoosain (2012), *The Philosophy of Modelling*, SIAS (available from researchgate.net and lulu.com)

Part III Institutional racism

As an example of value pluralism at work, we discussed the topic of institutional racism using, among other examples, the Anglican church's involvement with the transatlantic slave trade during the 17th and 18th centuries. Members of the group had at times different views on this topic but all of us considered that this was an important subject that needed to be discussed in an atmosphere of respectful listening and dialogue. The notes below are based on the presentation by Charles Cowling.

White supremacy, racism and discrimination have their roots in colonialism and slavery.

White supremacy, racism and slavery were initially supported by all denominations of the Church who taught that slavery was part of God's ordained plan. The Church was, in the early centuries of the practice at least, heavily involved in supporting transatlantic chattel slavery.

British law on slavery meant that slaves were not even considered human and had no human rights. Slave owners had complete freedom to do what they liked to their slaves.

Church teaching on the Bible supported racism and sexism. The legacy of centuries of teaching by the Church on racism and sexism still persists today.

Reparations for past wrongs are only just being considered. The example of Haiti, whose current poverty is largely due to paying reparations to France until 1947 for loss of property rights, including slaves, following a successful slave uprising, was cited as highlighting that reparations need to be addressed by countries as well as churches. The example of South Africa was also considered.

Publication of Darwin's "The Origin of Species" caused huge controversy and its eventual acceptance, including the principle of the "survival of the fittest", led to concerted scientific efforts to explain and justify white supremacy and a hierarchy of races. This eventually led to the German Aryan ideal and the Holocaust.

Post World War II scientific reasoning, led by statements from the United Nations Educational, Scientific and Cultural Organization (UNESCO), debunked any idea of a hierarchy of races and concluded that there was no meaningful difference between races or justification for any racial inequality.

Despite current scientific thinking, white supremacy (and sexism), and hence discrimination, is arguably still ubiquitous across society, including in such institutions as the Church of England, English Cricket and British universities. The Church continues to encourage white supremacy, including in its embracing of white images of Christ and God. The legacy of colonialism means that, even today, white western civilisation is perceived by many, both in the west and around the world, as superior to other civilisations. The unconscious or systemic bias of white supremacy can be so ingrained that just raising racism in discussion prompts fear of an attack on all white people - witness social media exchanges - and a refusal to engage, resulting in a victory for the evils of racism.

Evidence suggests that racism and sexism are still widespread today - at every stage of life and throughout society. In particular, sexism manifests in embedded cultural expectations of men / women which see women as the primary carers of children and homemakers, and men as the ones who have greater time to focus on work and their careers. This is one of the primary reasons, as women compete increasingly in the workplace, that women are choosing not to marry and/or have children, leading to a dramatic fall in fertility rates. Even significant spending on pro-family financial incentives around the world, e.g. South Korea, is not

reversing the trend, which may need cultural acceptance of much greater equality in the home before we see any meaningful change.

Relevance for the actuarial profession

Our profession prides itself not only on its expertise on matters related to risk, mathematical, logical and statistical analysis and data analytics, particularly in the area of insurance, but also on its underlying professionalism, ethical behaviour and code of conduct, which means that as expert professionals we can be trusted to act in the wider public interest.

Given the widespread continuing existence of racism, sexism and discrimination across society, it is logical to assume that such discrimination is equally prevalent within the actuarial profession and institutions where actuaries work.

The actuarial profession must therefore act to demonstrate clearly its opposition to and intolerance of all forms of discrimination, and to encourage fair and equal treatment in the workplace, if it is to continue to justify its role as a body of trusted professionals acting in the public interest.

As a response, Charles Cowling proposed that the inclusion of "encouraging" diversity, equity and inclusion in the Actuaries Code of Conduct is the minimum which should be considered. While the discussion was serious and respectful, there was mixed support for the proposition that racism, sexism and discrimination is prevalent within the actuarial profession and institutions where actuaries work, and that any further action by the actuarial profession was necessary. In particular, there was no support for changing the Actuaries Code in the way originally proposed. It was clear that a successful way forward would need to recognise the different perspectives and value judgements that individuals bring.

Part IV Applying an actuarial approach to some major issues

The challenges

Having spent time conceptualising about how actuaries could contribute to addressing issues, we then looked at some of the major issues of the day. The issues selected are not necessarily the most important nor the most urgent. Instead, they reflected the interests of the attendees who presented these topics. Nonetheless, we think these topics are important and are amenable to actuarial thinking. They provided an opportunity to apply some of the ideas we had been discussing when considering how actuaries think, as described earlier in Part II. Although the topics had been chosen separately, there turned out to be a lot of linkages between them. In particular, it became clear that it was more productive to consider the issues collectively rather than in isolation. The following summary of our discussions therefore takes a holistic view of how we should invest in the future – further details of some of the individual discussions are provided as appendices.

Our actuarial heritage

Before discussing some of the long-term financial, demographic and fiscal challenges facing our society today, we first reflected on some examples of the rich heritage of contributions to such themes that have historically been provided by the leaders of our profession.

As far back as 1772, Richard Price, who was arguably the most important and influential actuarial thinker of the 18th century, wrote his "*Essay on Public Credit and the National Debt*", urging restraint and discipline in the management of the government's growing fiscal deficit and the fast-accumulating national debt.

During the first half of the 19th century, John Finlaison, the first Government Actuary and first President of the Institute of Actuaries, undertook a multi-decade campaign to highlight that the life annuities that the UK government issued as a form of long-term borrowing were materially under-priced (and in doing so, revolutionised mortality experience analysis and highlighted the significant rate at which mortality rates had improved over time).

And, perhaps most notably of all, Frank Redington's Institute Presidential Address of 1958, and the Institute and Faculty's subsequent 1959 public paper "*An Appeal to Statesmanship*", was a vigorous and influential intervention in pensions public policy, and one that was publicly commended by the then Chancellor of the Exchequer: '*I expect and hope that you [the actuarial profession] will continue to play this role of zealous and clear-tongued professional watchdog'*.

Inspired by these historical examples of actuarial leadership in areas of financial public policy, we reflected on some of the profound long-term financial and demographic challenges our society faces today.

A future of promise, uncertainty, challenges and complexity

To quote a popular saying, "we live in interesting times". The world has never been richer[4]. The proportion of the world's population living in extreme poverty has never been lower[5]. Recent technological developments raise the prospect of a new productivity paradigm that

[4] Global GDP 1985-2030| Statista
[5] Figure 1.a, Open Knowledge Repository

could deliver the world of leisure that Keynes predicted for his grandchildren[6]. Nonetheless, there are obvious and deeply concerning global issues such as climate change, wars in Eastern Europe and the Middle East and the global macroeconomic uncertainty associated with an unpredictable US trade policy.

But hasn't the world always been thus? Overall, we might have reason to believe that, as Bill Gates famously ventured, today is a better time than any time in the history of the world to be born into the human race. And yet it is not difficult to identify some quite profound challenges for the human race, and especially for the societies of high-income countries relative to what has come before for them. These challenges do not immediately appear capable of fast, painless resolutions – they are long-term and structural and have the potential to impact on our society's financial and more general well-being in very significant ways. In particular, we considered the following questions:

1. What are the implications of large fiscal deficits and low pension savings rates?
2. What are the possible impacts of low fertility on societies and economies?
3. How can we achieve the necessary level of investment to respond to climate change and other challenges in a way that is fair to future generations?

Our discussions tended to focus particularly on the UK, partly to keep the discussion within reasonable bounds and partly because that's the area the presenters know best. But much of what we discussed, allowing for cultural differences, would be of wider application. There are many countries that share much in common in the above areas: large fiscal deficits, productivity declines, low savings rates, looming increases in costs due to the impact of climate change, the demographic challenges of low fertility rates, ageing populations, increasing unhealthy life expectancy and the increasing costs of long-term care….interesting times indeed.

Priorities

The discussion about investment and climate change started with a set of questions which turned out to be relevant for all three topics:

- What challenges are there?
- What are our moral obligations to future generations?
- What if politics trumps ethics? (The vocabulary used was deliberate)

To answer these questions we discussed to what extent we are responsible for others, depending on how close they are to us, socially (e.g. immediate family), geographically (our country) and temporally (past, present and future generations). We also discussed the extent of our responsibility for the natural world as an end in itself and as an instrumental end for humankind.

The discussion on responsibility for future generations cut across all three of our topics. When discussing low fertility we asked ourselves why do people have children and what responsibility does the current generation have to produce the next generation and to avoid the negative impacts of an ageing population by having more children. This led to a

[6] Keynes, J.M. (2010). Economic Possibilities for Our Grandchildren. In: Essays in Persuasion. Palgrave Macmillan, London. https://doi.org/10.1007/978-1-349-59072-8_25

discussion about the level of social responsibility individuals have, especially in societies that are increasingly secular, individualistic and (to use a modern day trope) everyone is glued to their own smart phone.

In addition to the cross-cutting themes, we were also faced with potential conflicts between the topics under discussion, most notably between climate change on the one hand and population on the other. Some argue that having a smaller population would make dealing with climate change easier. Others argue that it is not the size of the population that matters but the level of consumption, and that a falling population would bring serious problems of its own.

Economic growth and Government spending

The pressures on Government spending, both short-term and long-term, are well-known.

The populations of many large economies are currently ageing at historically unprecedented rates. This is a function of two distinct trends: fertility rates are falling significantly, most notably in high-income countries[7]; and life expectancy continues to rise globally, including unhealthy life expectancy in high-income countries (there have been significant increases in the prevalence of diseases that don't kill quickly but which incapacitate for long periods, such as dementia). As a recent Office for Budget Responsibility report put it:

"The divergence between life expectancy [rising] and healthy life expectancy [falling] reflects the fact that many of the medical advancements that improved life expectancy in the late 20th and early 21st centuries have also prolonged the period for which people live with, often severe or chronic, health conditions, thereby increasing the average number of years spent in poor health."

These two trends – falling fertility rates and increases in unhealthy life expectancy – create very significant medium-term demographic headwinds for economic growth in high-income countries.

Low fertility rates will result in a fall in the working population and a rise in dependency ratios. This is very likely to have a negative effect on economic growth. Ageing populations will contribute to an increase in the consumption of healthcare.

An increasing proportion of the working population will be redirected to caring for the elderly. This work is inherently labour-intensive and difficult to automate (an example of the 'Baumol' effect, whereby some sectors of the economy cannot benefit from technological advancement as much as others, due to their reliance on human interaction, which constrains their productivity growth).

This implies significant extra healthcare expenditure. An increasing amount of labour will be required to care for the elderly at a time when the labour force is shrinking. Many elderly will rely on government support as they will have insufficient savings to fund costs of care. Age-related public spending on health and pensions seems bound to rise in high-income countries.

Overall, these demographic shifts seem likely to increase government spending per capita. Economic growth is the most straightforward way of alleviating the fiscal pressures that this will create. But productivity growth has slowed substantially in the last twenty years in high-income countries across the globe, and the UK has not been immune from this trend. In the

[7] See Appendix A for a discussion of low fertility rates.

absence of such productivity growth, some combination of higher taxes and / or higher inflation seem the most likely consequences of this seemingly inevitable increase in government spending.

There are many potential factors driving the long-term fall in productivity growth. It has been argued that this is at least partly due to a change in the investment behaviour of corporations that has resulted from the introduction in the 1990s of short-term executive incentives that disincentivised long-term corporate investment. The non-financial corporate sector in high-income countries such as the US and UK ceased to be net investors in the early 2000s, resulting in a structural financial surplus arising in the corporate sector. This lack of investment could be an important driver of the decline of productivity growth. It may also be argued that the reduction in corporate investment has arisen because there has been less incentive to invest in equipment to improve the productivity of domestic labour when there has been the cheaper option of outsourcing labour to emerging economies.

Many leading economists are sceptical that a significant re-set of productivity growth to 20th century levels can be achieved over the coming years and decades. Whatever the cause, this long-term decline in productivity growth, if it persists, has a very significant impact on projected long-term financial prosperity.

Under-investment

The UK economy is often said to suffer from inadequate levels of investment. We seem to be willing to benefit from infrastructure provided by previous generations, whilst not giving equal consideration to future generations, especially when it comes to long-term challenges such as climate change. Again, in our discussions we returned to considering our moral obligations to future generations and whether under-investment might be caused by a lack of demand (i.e. a view that there aren't enough opportunities offering an attractive rate of return) or a lack of supply (i.e. a shortage of available capital resulting from a low savings rate).

It is sometimes argued that the companies of the future will not need as much investment as those of the past. Nevertheless, it seems that the private sector faces significant upheaval from the introduction of AI and the potential need to reconfigure global supply chains in the face of geopolitical instability, on top of the normal demands of productivity improvement and innovation. There are regular calls for large levels of public or private investment in neglected infrastructure in areas such as health, education, defence, water. And both private and public sectors must respond to climate change, investing in mitigation, adaptation and repairing loss and damage, and other environmental challenges e.g. the threat of biodiversity loss.

When considering investing in the future, we naturally turned to the consideration of pension saving. Raising public awareness of the need to save for a pension is undoubtedly an important part of improving the financial robustness of our society, particularly given the increasing prevalence of defined contribution pensions. It is also likely we will continue to see more direct policy consequences of the pension savings gap, such as continuing significant increase in retirement ages[8].

[8] See Appendix B for a discussion of the inadequacy of current pension savings rates.

Uncertainty

As would be expected in a discussion involving actuaries, we considered the levels of uncertainty surrounding particularly the impact of climate change and low fertility. Both of these involve long-term projections and are subject not just to natural or biological influences but also behavioural ones.

The projected long-term changes in climate, possible consequential damage to human society and infrastructure, the costs of mitigating these effects and adapting global economic output to be less environmentally damaging, are all, inevitably, highly uncertain and the subject of much debate. Estimates of future costs are also highly dependent on the global political policy paths that are pursued by a range of nations, some of which have, to some degree, conflicting interests, incentives and exposures. Estimates of these costs are generally very large and long-term.

Investment and intergenerational fairness

Investment in some of the areas identified can be expected to have fairly immediate benefits. In others, the benefits may not appear for some time. But in all cases the benefits should accrue over the long term. So how can we ensure that the interests of future generations are taken appropriately into account in today's investment decisions?

Academic philosophers[9] talk about the need for "fair reciprocity" between generations – we expect to benefit from what has been provided by previous generations and so must in turn contribute to the common good for future generations. In the words of the UNESCO 1997 Declaration "The present generations have the responsibility of ensuring that the needs and interests of present and future generations are properly safeguarded".

In practice it is notoriously difficult to define "intergenerational fairness". We do not know what economic growth rates will be over time or what risks future generations will face. Instead, the School of International Futures suggests five questions to ask when assessing any policy, namely does it:

(i) disadvantage people at any particular life stages?

(ii) disadvantage people at any period in time, present or future?

(iii) increase the chances of inequality being passed on through time?

(iv) restrict the choices of future generations?

(v) move society further away from its vision for the future?

Of course, asking these questions doesn't mean that the answers will always be "no". People may not be prepared to accept the sacrifices implied by such policies. But asking the questions should increase the chances that we do not inadvertently "steal from" future generations.

[9] For example, see "Intergenerational Exploitation" Nicola Mulkeen (2023) Political Studies Vol. 71 pp756-775

De-leveraging the economy

It is not just the amount of investment that matters but the form it takes. Some economic commentators[10] have argued that a key issue for high-income countries is the excessive use of debt (across the fiscal, corporate and private sectors and to finance both investment and consumption) and that economies, especially high-income economies, should de-leverage. A range of policies and approaches have been identified by such commentators to encourage greater use of forms of equity funding and less use of debt funding across the economy, such as:

- The corporation tax advantages of debt funding over equity funding could be removed (e.g. by reducing the tax deductibility of interest expense and / or allowing some element of the cost of equity capital to also be made a tax-deductible expense)
- The government / financial sector could explore equity financing for house purchases instead of mortgages, or hybrid approaches such as indexing mortgage nominal values to house prices
- Student loans could be replaced with a graduate tax
- Governments could offer bonds that vary with income linked to GDP instead of fixed or inflation-linked cashflows
- The leverage of financial institutions could be reduced by materially increasing regulatory capital requirements.

Saving and consumption

Many of the above challenges would appear to benefit from a reduction in consumption (and especially debt-fuelled consumption) and an accompanying increase in the level of savings, which in turn would drive increases in investment. Such a rebalancing of the economy could be expected to, in time, improve the adequacy of pension savings and the funding of long-term care, improve productivity growth, better adapt the economy to climate change, reduce the fiscal deficit and improve the robustness of the financial system. There may be significant short-term costs and disruption caused by such an economic rebalancing (on this point we must defer to economists), but the long-term need for such a rebalancing seems clear.

But is it possible for people to invest more rather than spend and even if they can, will they?[11] The current culture and attitudes seem to pose problems when it comes to invigorating investment. And a policy of reducing aggregate consumption also faces the headwind of inevitable increases in healthcare consumption at older ages. This is where the question of intergenerational fairness becomes prominent. Redington articulated a particularly simple principle in this regard: current generations should not commit younger generations to costs in support of the current generation that are greater than the costs the current generation are prepared to incur in support of older generations.

The scale of challenges facing society at present and their potential impact on future generations suggest that business as usual for politics and investment is not enough. Present generations are likely to need to make greater sacrifices in terms of reduced consumption

[10] For example, see Wolf, Goodhart & Pradhan and Smithers.
[11] See Appendix C for a discussion of some of the numbers involved.

than they currently appear willing to make, possibly because the trade-off is not well understood.

We believe the political and cultural narrative will need to change if this is to happen. For example there would need to be greater transparency on how much it will cost to implement net-zero policies in the UK and who will pay and when. And we believe the actuarial profession should play a more proactive role in the analysis of the implications for intergenerational fairness in our long-term economic outlook.

The UK must find ways to encourage the necessary investment and at the same time increase its savings rate (which means reducing consumption). A number of current policy initiatives are directed towards the first of these ends in particular. For example, in recent months the UK Government has announced the creation of a National Wealth Fund and has launched a new industrial strategy.

However, commentators have observed that "the challenge is to increase the efficiency of capital not just the investment rate"[12] and "reducing the cost of capital will require a combination of measures at the international and country levels to reduce both actual and perceived risks"[13]. And if consumption is not reduced voluntarily through higher direct savings, then economically higher saving can be forced through increasing taxes.

Introducing an actuarial contribution to the debates

Each of the topics that we discussed attracts diverse global communities of domain experts that provide deep analysis and policy advice. Actuaries are present and active in many of these communities, and this is natural given the actuary's professional skillset and mindset as described earlier in Parts I and II. But speculation about any 'special' actuarial contribution should be addressed with humility.

And yet, surveying these topics, it is apparent that many of the above challenges facing our society have an actuarial flavour: they are profound, long-term, characterised by deep uncertainty, and are driven by financial and demographic issues that bring the subject of intergenerational fairness to the fore. Above all, we found it insightful to consider the challenges collectively and holistically rather than individually.

Redington's professional call to action, as delivered in his Presidential Address back in 1958, may resonate strongly in these circumstances:

"The work of the actuary is mainly concerned with long-term obligations and in that sphere he has a professional duty to the community: to protect the future against the ravages of the present. If he sees that happening, he should not pass on the other side."

It is the authors' hope that this brief survey of some of the long-term economic, demographic and intergenerational challenges faced by our society today will motivate our profession to re-double the contribution it can make to addressing these societal challenges, and not, in Redington's words, to pass on the other side.

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[12] "Is reaching net zero a growth and prosperity plan? Economics, tools and actions for a rapidly changing world" Cambridge Zero Policy Forum (2024)

[13] "Raising ambition and accelerating delivery of climate finance" Independent High Level Expert Group on Climate Finance (COP29, Nov 24)

Appendix A: Causes and consequences of low fertility

Throughout the history of mankind there has tended to be more concern about the risk of overpopulation than underpopulation. Plato and Aristotle proposed ideas for how to limit a state's population; the early Christian writer Tertullian decried the teeming population he beheld; while Machiavelli used terminology which foreshadowed what we would nowadays associate more with Malthus. But it is probably the Rev Thomas Malthus who, as well as giving rise to the description of economics as the dismal science, we associate most with pessimistic views of population growth. He argued, against those who held that the human race was entering a period of plenty, that population will, absent positive or negative constraints, sooner or later push up against the availability of resources, particularly food, which will lead to the return of poverty and misery. The positive constraints included war, pestilence and famine, while the negative constraint was delayed marriage.

Since the time of Malthus, and especially since the 1960s, there has been a lot of concern expressed over the danger of overpopulation, with Paul Ehrlich's Population Bomb being possibly the best known but not unique tract on this topic.

But during the 200 years since Malthus there have also been periods when concern over underpopulation has held sway. This was true in the UK during the late 19th and early 20th centuries and now, increasingly, over the past decade or two. Terms such as 'race suicide' and 'twilight of parenthood' were coined to describe what was happening at the start of the 20th century.

Concerns over population are therefore not new, yet the human race is still here. What are we as human beings and as actuaries to make of the current population discourse? Are things different now from what they have been in the past? Is the catastrophising about the future population of the world justified or over-hyped?

As actuaries we like to know what the numbers are. Currently, the world's population is just over 8 billion. According to the UN the world's population is projected to peak at a bit over 10 billion in the 2080s, after the lifetimes of those of us on the retreat but certainly within the lifetime of many actuaries. Just as each additional billion added to the global population is given some attention, so too will be the point when the world's population starts to decrease (not that anyone will know exactly when this has happened).

A stable population requires, over the long term, women to give birth to an average of 2.1 children. The global fertility rate is currently higher than this, mainly thanks to Africa where, for example, the fertility rate in Chad is 6. But many countries of the world are experiencing much lower fertility rates. The UK's fertility rate is currently 1.44, the US is 1.6, South Korea 0.75, Japan is 1.15. Although African countries generally have higher fertility rates than most other countries, their fertility rates are also falling. Among OECD countries only Israel has an above replacement fertility rate.

There are many causes for the current low and falling fertility rates. At a socio-economic level these include greater female education and workforce participation, lower levels of religious practice, increased urbanisation, increased costs of housing and childcare, lower levels of marriage, difficulties in combining work with bringing up children. There are also some medical reasons such as increases in infertility among both men and women.

The consequences of falling fertility rates are also many and varied. In the absence of specific government policies, a falling birth rate may initially enable a country to develop, as there will be fewer young dependants to support. However, if this continues and especially if combined, as it often is, with increases in life expectancy, the number of older people to support will increase while the number of those able to support them, financially and

physically, will fall (or at least not increase as fast). This could create pressure to increase tax in order to pay pensions and the costs of elderly care. AI and automation may take up some of the slack. But keeping up production is not enough to maintain all sectors of the economy, one also needs consumers, and younger people tend to consume more and differently to the elderly. There may also be too few workers to carry out those jobs that AI and automation cannot take over.

Governments and society in general have a choice as to whether to try and reverse or halt the fall in birth rates or to focus on dealing with the potential impact of falling birth rates; or a mixture of these two approaches. A number of countries have tried, and are trying, to reverse the fall in birth rates, with limited success. At best one might be able to say that their birth rates may have been even lower without these efforts. Policies have included: tax benefits for those with larger families, baby bonuses on the birth of a child, subsidised child care, preferential housing options. Governments have also resorted to publicity campaigns to encourage their citizens to carry out their 'patriotic duty' to have more children. The UK government is taking a hands-off approach, not wanting to get involved in people's decisions about how many children to have.

Policies to deal with the potential consequences of a falling birth rate, especially when coupled with increasing longevity, have tended to focus on changes to state pension provision, for example increasing pension age or reducing the value of the pension. Increasing productivity and labour force participation at all adult ages would also help to relieve pressure on the working population, but achieving these is easier said than done. Another policy, at least in the short to medium term, would be to allow greater levels of immigration, but this is fraught with cultural difficulties.

The actuarial profession is well placed to contribute, as part of a wider team of experts, to the discussion around future fertility rates and ageing populations and, indeed, the IFoA has recently set up an Ageing Population Working Party. Our modelling skills can be used to analyse population data, make population projections, review the potential impact on pensions and health and social care services, and test the impact of proposed solutions. The actuarial profession has a great heritage in demography and continues this in the work carried out regarding mortality by the CMI and actuaries in academia and industry. But we should not be shy of getting involved with discussions regarding fertility and migration, even though these may at times be more emotional and political.

Suggested further reading:

Goodhart and Pradhan (2020), *The Great Demographic Reversal*, Palgrave Macmillan.
Institute and Faculty of Actuaries (2024), *Population Implosion*
Morland (2025), *No One Left*, Forum
Berg and Wiseman (2024), *What are Children for? On Ambivalence and Choice,* Oneworld
Babad, Grenham and Gutterman (2023), *Fertility and ageing – actuarial perspectives*, British Actuarial Journal

Appendix B: Fiscal deficits and pension savings

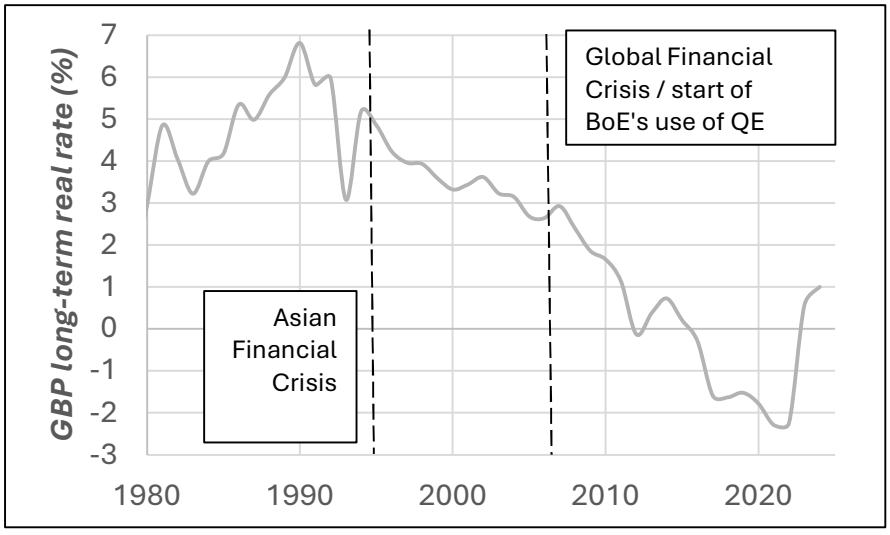
Fiscal debt levels, along with corporate debt levels, have increased materially since the Global Financial Crisis (GFC). At an aggregate level, increases in corporate debt levels have not been driven by the funding requirements of corporate investment but primarily by a desire to increase corporate leverage (for example, by their use in share buybacks).

On the fiscal side, the fiscal deficits across many high-income countries have been impacted by two very large and exceptional events over the last twenty years: the GFC and the Covid pandemic. However, this is not a purely historical issue. The latest report of the OBR on the UK's fiscal risks and sustainability[14] highlights that on current policies the significant gap in public spending and tax revenues is likely to continue to widen:

'Over the next 50 years, public spending is projected to rise from 45% to over 60% of GDP, while revenues remain at around 40% of GDP. As a result, debt would rise rapidly from 2030s to 274% in our baseline projection'.

The report identified unexpected increases in productivity as the most effective means of narrowing fiscal deficits and arresting this projected increase in public debt. As noted in Part IV, productivity growth in the UK has been falling over the last twenty years or more, and many economists are sceptical that such productivity gains can be found. If not, it seems likely that policy action will be taken to control fiscal deficits through significant increases in future taxation (and / or for higher inflation to erode the real value of the national debt).

The transition of private sector pensions from Defined Benefit to Defined Contribution has naturally occupied the attention of the actuarial profession in recent years. Putting risk-sharing arrangements to one side, the most fundamental economic driver of the long-term cost of funding either form of pension is the long-term real interest rate. In the decades prior to the GFC, the long-term real risk-free interest rate in the UK was reliably above +3% and occasionally over +6%. In the post-GFC era, it has moved within the range of -2% to +2% (see chart below).



Whilst economic theory may argue that falls in interest rates reduce the incentives that a rational person has to defer consumption by saving rather than consuming now, an individual who seeks to contribute to a pension in order to smooth out their lifetime consumption must contribute *more* to their pension fund as real interest rates fall.

[14] CP 1142 – Office for Budget Responsibility Fiscal risks and sustainability

Pension contributions (in aggregate from employers, employees and the State) have not increased to offset the implications of a long-term real interest rate environment that is c. 0% rather than c. +3%. As a result, the 1950s political aspiration to fund an inflation-linked pension income equal to half-pay for life starting at age 65 is simply no longer plausible in today's economic environment. A back-of-the-envelope calculation suggests a pension contribution rate of over 35% would be necessary to fund such a pension today[15]. By comparison, increasing the assumed real interest rate from +1% to +3% approximately halves the required contribution rate.

Of course, this raises the question of why the real interest rate has behaved in this extraordinary way over recent decades. The impact of quantitative easing has doubtless made a contribution. Some economists have argued that the long-term fall in real rates in economies such as the US and UK is partly due to global macroeconomic imbalances and a 'global savings glut' – and, in particular, how rapidly-growing exporting economies and oil exporters have run large current account surpluses and have accumulated very large foreign currency reserves. Economically, we would expect the long-term real interest rate to have a strong relationship with productivity growth. So, another potential driver of the fall in long-term real rates in economies such as the UK could be a secular shift in productivity growth expectations that has occurred over the last few decades. Whatever the reasons, it is impossible to confidently predict where long-term real interest rates may go in the future. If they revert to the 6% level of 1990, then the funding of retirement incomes will be made profoundly easier (all else equal, which it may well not be in such circumstances!). But there seems little obvious reason to expect such an outcome.

The economic arithmetic of pension funding at a national level is of a consequential scale. The Swiss Re Institute estimated that the UK's 2022 retirement savings gap (taking account of all three 'pillars' of pension provision and using a 70% of pre-retirement income as target retirement income) was approximately £13 trillion (400% of annual GDP)[16]. The inadequacy of the levels of current pension contributions means that this savings gap is growing fast and is forecast to more than double by 2050.

Suggested further reading:

Goodhart and Pradhan (2020), *The Great Demographic Reversal*, Palgrave Macmillan.
Institute and Faculty of Actuaries (2021), *The Great Risk Transfer*.
Office for Budget Responsibility (2024), *Fiscal risks and sustainability*.
Price (1772), *Observations on Reversionary Payments…*, Cadfll[17]
Redington (1986), *A Ramble Through the Actuarial Countryside*, Staple Inn[18].
Swiss Re Institute (2023), *A Retirement Lifeline*.
Turnbull (2017), *A History of British Actuarial Thought*, Palgrave Macmillan[19].
Wolf (2014), *The Shifts and the Shocks*, Allen Lane.

[15] A simple contribution accumulation projection assuming real earnings growth of 1%, a real interest rate of +1%, 0.5% p.a. costs / expenses and a 2% asset risk premium implies a contribution rate of around 35% would be required to fund the half-pay annuity at age 65.
[16] 2023-10-sri-retirement-lifeline-insurance.pdf
[17] In particular, Chapter III is the essay *Of Public Credit and the National Debt*.
[18] In particular, Section 3, *The Presidency & National Pensions*.
[19] In particular, pages 75 to 80 discuss Finlaison's work on the British government's life annuity pricing.

Appendix C: Investing in the future

Estimates of the amount of investment required to meet current challenges vary. Most focus on climate change, and many still focus within that on mitigation, ie investment to reduce carbon emissions to try to reduce the amount of climate change, rather than adaptation to respond to the changing climate. For example, the Grantham Institute predicts the total cost of climate change to the UK economy will grow over the long-term from 1.1% p.a. of GDP currently, to 3.3% by 2050, and to 7.4% by 2100 . The OECD has estimated that 7% of global GDP is required annually in low-carbon, climate-resilient infrastructure. Within the UK the Common Sense Policy Group estimates a similar 7% of GDP of investment is needed for the required social and environmental transformation.

These are very big numbers. For example, to fund an increase in government spending equal to 7% of GDP in the UK from personal taxation would require an increase in income tax rates of nearly 20 percentage points.

It's helpful to put these figures in context. Over the last 25 years, total investment has averaged 21.3% of GDP in G7 countries, made up of 18.0% private investment and 3.3% public investment. In the UK investment has averaged 17.3%, made up of 14.8% private investment and 2.5% public investment. So investment in the UK is already below international comparators and there is much discussion about why businesses don't seem prepared to invest more. Even if a (relatively small) part of the required 7% is already within today's figures, we are talking about a very significant increase in investment.

Furthermore the current UK average savings rate is only 16%. So part of the existing 17.3% investment must be borrowed from other countries. (In fact it's worse than that because over this period the UK current account deficit has averaged around 3% of GDP, implying that we are also borrowing to finance current consumption.)

The inevitable conclusion would seem to be that the UK must find ways to encourage the necessary investment and at the same time increase its savings rate.