

ACTUARY

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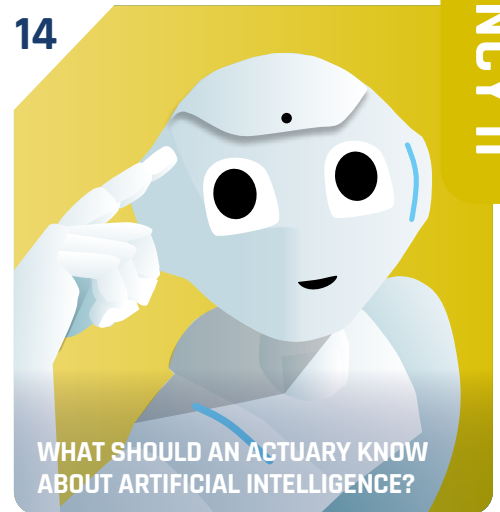
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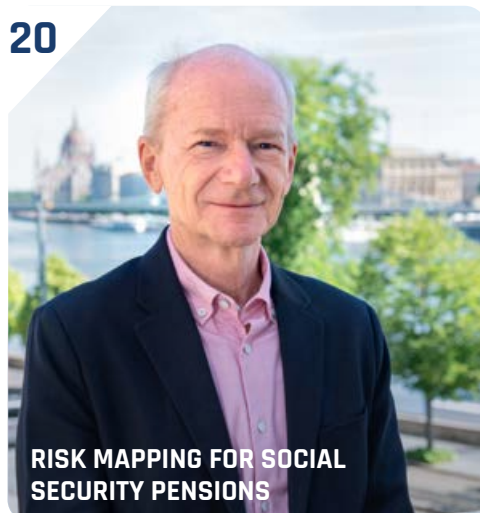
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ACTUARIAL ASSOCIATION OF EUROPE

SOLVENCY II REVIEW

The Editorial Board posed Markus Ferber, Member of the European Parliament, the following questions about the recently achieved agreement on the Solvency II review.



MARKUS FERBER

Agreement on the Solvency II review, which began in 2020, was reached at the end of last year. What do you think are the most relevant changes?

‘The changes in the long-term guarantees and long-term equities framework will probably have the biggest overall impact. Through the adaption of the calibrations, we will achieve meaningful capital release for European insurance undertakings, so that capital becomes available for productive investments. This will not only help insurance companies, but also policyholders who can invest in life insurances with a more attractive return profile. We have also made sure that the key parameters are set directly >

‘ That provides clarity and predictability for insurance undertakings

in the Directive and not via implementing legislation. That provides clarity and predictability for insurance undertakings.’

Would you say that the agreements reached were a good compromise in terms of proportionality?

‘Yes, this agreement is a large step in the right direction. The agreement constitutes a more proportionate approach to insurance supervision by creating a dedicated regime for small and non-complex undertakings that can benefit from proportionality measures in supervision. However, this should only be the starting point for more proportionate insurance supervision. I hope that we can build on this special regime for small and non-complex undertakings in future revisions of the file.’

A major topic in the context of the review was the issue of recovery and resolution/insolvency protection. What has happened here and what is important from a European perspective?

‘We have introduced a recovery and resolution regime that helps deal with failing insurance undertakings. The idea is to make sure that failing insurance undertakings can be dealt without the taxpayer footing the bill. Unfortunately, the Commission proposal was not entirely fit for purpose. We managed to improve it by making it more risk-based and more focussed on protecting policyholders. Specifically, we limited the number of companies that are subject to resolution planning to those that actually pose a risk for financial stability. This is important as resolution planning can be quite complicated and burdensome.’

Did the European Insurance and Occupational Pensions Authority (EIOPA) ensure that insurers can turn into investors in the Green Deal and if so, how?

‘EIOPA has only been involved in the preparatory work on the Solvency II review. All material decisions have been made by the legislator. I think we managed to make long-term investments, which often are

investments in sustainable projects, more attractive. We have also made sure that insurance undertakings better take into account sustainability-related risks in their operations in general and in their risk management practices and investment policies in particular. However, we have opted against a lower capital charge for green investments that some stakeholder have called for. From a financial stability perspective that is the right call as we cannot compromise financial stability for sustainability.’

What do you think of EIOPA's conclusion that the Solvency Capital Requirement (SCR) for the underwriting risk of natural catastrophes should be regularly updated? In your view, does this help to reflect the expected impact of climate change, protect policyholders and ensure the stability of the insurance market?

‘In general, the precise calibration of the Solvency Capital Requirement should be a data-driven exercise that factors in changing risk factors >

‘ **However, we have opted against a lower capital charge for green investments that some stakeholder have called for**

such as climate change. If there are trends in the frequency and severity of natural catastrophes that are not yet sufficiently reflected in insurer’s and reinsurer’s underwriting policy that needs to be addressed. In my experience, insurance undertakings are already at the forefront of addressing those issues in their underwriting policies.’

Can you already see what will be next on the agenda? What will actuaries have to pay particular attention to in their work in the future?

‘On the one hand, the implementation of Solvency II and the Insurance Recovery and Resolution Directive will keep us all busy for some time. There is still a lot of

implementing legislation that it is worth paying attention to. On the other hand, there are of course a few megatrends like sustainability, digitalisation and cyber risks and the rise of artificial intelligence that all have implications for insurance undertakings and will be in the crosshairs of the European legislators in the next term.’ <

MARKUS FERBER



REVIEW OF THE SOLVENCY II (SII) DIRECTIVE: STATE OF PLAY

BY **SIEGBERT BALDAUF**

The approval of the Solvency II directive marks a crucial step towards a new supervisory framework. It contains numerous empowerments for the EU Commission to lay down fundamental specifications in delegated regulations and technical standards. In September 2021, the Commission had announced¹ consideration of EIOPA's advice and legislators have added some additional requirements to provide further guidance in this regard. This has allowed a preliminary assessment of the potential outcome.

Besides the mandatory review required by Article 77(f), the directive is extended to consider sustainability, climate change and macroprudential risks. A reduction of the solvency capital requirement (SCR) allows the support of European projects and the Green Deal. Additionally, addressing the issue of proportionality could relieve undue burden from smaller undertakings.

‘The review of the directive results in methodological changes results in methodological changes of extrapolation and volatility adjustment of liquidity risks’

The review of the directive results in methodological changes regarding the extrapolation of the Risk-free

Interest Rate term structure (RFR) in Article 77(a) and the volatility adjustment (VA) in Article 77(d).

Regarding extrapolation, the new methodology based on a formula and a parameter for the convergence speed, replaces for the euro the explicitly prescribed convergence process towards the ultimate forward rate (UFR). The starting value and speed parameter determine the impact on the UFR. The weight of the UFR 40 years past the starting point shall be at least 77.5%.

With regard to the formula proposed by EIOPA, this prescribed weight requires a lower bound of at least 11% for the speed parameter applied in the convergence process, slightly above the 10% proposed by EIOPA. Two impact assessments performed by EIOPA in 2019 and 2020 proved the limited capability of this method to mitigate short-term market turmoil. >

¹ Communication from the commission to the European Parliament and The Council on the review of the EU prudential framework for insurers and reinsurers in the context of the EU's post pandemic recovery, COM(2021) 580 final, Brussels, 22.9.2021

A phasing-in mechanism which runs until 2032 is provided in Article 77(a) to mitigate the impact of the introduction of this requirement.

The VA shall reflect the fact that insurers are not forced to react on daily spread changes. It can help to reduce volatility by allowing an adjustment to the RFR in this regard. Spreads will still be determined from the currency-specific reference portfolio as the difference of the yield earned from included bonds to the basic RFR. A risk correction (RC) aims at eliminating risks inherent in these spreads. Currently the RC is based on the Long-term Average Spread (LTAS), determined over a period of 30 years. For corporate bonds, the risk of default and the cost of downgrade are taken into consideration. The VA amounts to 65% of this risk corrected spread. This static RC does not react on sudden spread increases and can result in an overly high VA. Applying a VA not justified by undertakings' own assets can cause an underestimation of technical provisions. This is referred to as overshooting risk.

'Applying a VA not justified by undertakings' own assets can cause an underestimation of technical provisions'

The proposed determination of the RC as a percentage of the spread is more risk sensitive. To mitigate the effect of daily changes, this percentage shall decrease if the spread increases. The RC shall never exceed an 'appropriate' percentage of the LTAS. An undertaking-specific credit spread sensitivity ratio (CSSR) shall reflect the different sensitivities to spread changes of own assets and liabilities to limit the risk of overshooting. The VA is calculated as 85% of the risk-corrected spread, multiplied by CSSR. Besides these quantitative requirements, the significance of deviation of own-risk profile from the assumptions underlying the VA shall be

assessed within the ORSA and risk management in general. In particular, the VA shall be considered in Liquidity Risk Management Plans (LRMP). It is noted that only internal model users can use the dynamic VA.

The interest rate risk module shall consider an appropriate stress even in a low-interest or negative interest environment. Deviating from the current treatment the stress parameters shall only be applied to the liquid part of the RFR. This stressed part shall be extrapolated like the basic RFR. A 'negative floor' shall be determined in such a way that the likelihood of interest rates falling below is sufficiently small.

The preferred treatment of a sub-set of equity investments as long-term equity investment shall strengthen insurers' role as long-term investors. The conditions concerning eligibility of equities and administration of this asset class are adapted and now included as a new Article 105(a) in the directive. The stress parameter for this class is set at 22%.

A significant reduction in required capital will result from the modified calculation of the risk margin. The risk margin is determined as the product of a Cost of Capital (CoC) rate and the present value of projected SCRs. The CoC-rate will be reduced from 6% to 4.75% and it is expected to vary between 4% and 5% if a future review proves the need for an amendment. The present value of future SCRs shall be adjusted by an exponential and time-dependent element as proposed by EIOPA in its lambda approach. An appropriate lambda and a possible floor should be determined in delegated regulation.

Proportionality is considered by increased thresholds which allow exempting insurers from the use of SII. The new category of small and non-complex undertakings (SNCU) is included. These can automatically make use of a list of proportionality measures and simplifications. >

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Working Group for AAE.

The framework is extended by macroprudential tools. Significant importance is placed on the management of liquidity risks. Liquidity risk management plans (LRMP) are expected to ensure a sufficient capacity to handle financial obligations to policyholders even under stress scenarios. The content and frequency of updates of the LRMP shall be specified in regulatory technical standards.

Undertakings (except SNCUs) which are materially exposed to climate change risk must assess the impact on their business through the ORSA by specifying and considering at least two long-term climate change scenarios with a prescribed temperature increase of up to 2 degrees Celsius and one with a significantly higher increase.

‘Significant importance is placed on the management of liquidity risks’

Transition plans shall be developed and disclosed to document that undertakings are supporting the objectives of the Green Deal. The calibration of the natural catastrophe sub-module shall be reviewed at regular intervals. EIOPA has launched a proposal for the recalibration of this module in April this year and is seeking input from stakeholders through a public consultation.

Overall, the scope of the microprudential framework is widened by consideration of macroprudential tools. While policyholder protection is still an important objective, political goals have gained in importance. The principles-based character is affected by more rules and prescriptive elements. Despite the additional guidance included in the directive, the capability to mitigate short-term market



turmoil or to prevent procyclical behaviour can be reduced compared to the current regulation. It is expected that the administrative burden would increase by the inclusion of macroprudential and sustainability issues.

In today's economic environment, insurers' solvency is not expected to be affected negatively and may possibly benefit from a reduction in capital requirements in certain cases. However, this will not reach €100 bn, as initially expected by the Commission. <

CLIMATE RISK: SHOULD AN ACTUARY HAVE ADDITIONAL SKILLS?

BY **ROBERT PUSZ**

While the actuarial community in Europe is mainly busy implementing the subsequent amendments to the Solvency II Directive, Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment enters into force. The economic activities covered by this regulation include insurance and reinsurance companies. In particular, attention should be drawn to Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or adaptation, and for determining whether that economic activity causes no significant harm to any other environmental objectives.

The basic requirement that insurance companies must meet in accordance with this regulation is to be a leader in the modeling and pricing of climate risks, i.e. insurance activities



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should use **state-of-the-art modeling techniques** that: (a) properly reflect climate change risks; (b) do not only rely on historical trend; (c) integrate forward-looking scenarios. For reinsurance undertakings, the first requirement is slightly different and takes the form of: (a) are used to properly reflect in the premium level the exposure, hazard and vulnerability to climate change risks as well as actions taken by the policyholder of the insurer to protect the insured asset or activity against those risks, where such information is provided by the insurer to the reinsurer. Although point (a) sounds slightly different, it can be generalized that it is about properly reflecting the risks associated with climate change.

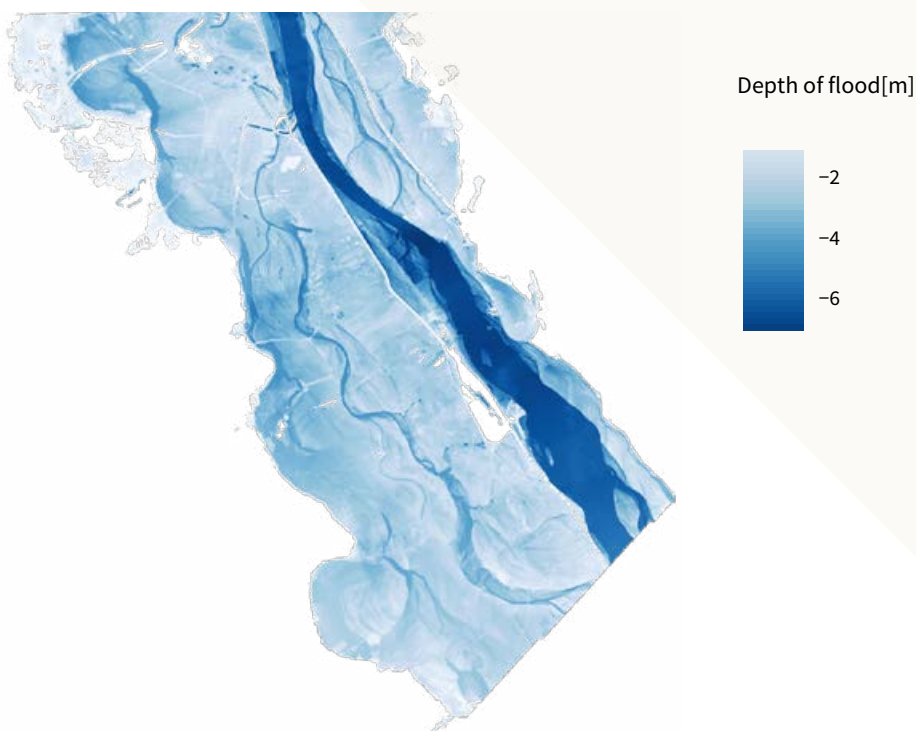
These requirements appear to be tasks that should be addressed by actuaries, as they are generally responsible for modeling the risks associated with hazards caused by natural catastrophic events. At the same time, the regulation does not specify what activities must be performed to be considered as using state-of-the-art techniques for modeling climate-related risks. It is also unclear who would decide whether a given approach is modern or not and, at the same time, whether a given insurance or reinsurance company is a leader or not in this area. Let's take a look at these requirements and consider how ready the actuarial community is to meet them.

Natural catastrophic events are rare and therefore **properly reflecting climate change risks** is very difficult. George E. P. Box, a British statistician, wrote in his article from 1978 'All models are wrong but some are useful'. It is impossible to predict in what region or at what moment a given event will occur. It is important that such a model can be used for appropriate tariffication or proper calculation of capital requirements in a partial or full internal model, if one is used. Hazard maps are commonly used, which indicate the scope of a potential event and the probability of its occurrence. They can also show additional information, e.g. the depth of flooding in the event of a flood (Fig. 1). Threat maps can be used by underwriters when valuing the risk of the insured entity, in tariffication by applying premium charges resulting from increased risk in relation to entities not located in the threat zone, or used for the purposes of determining capital requirements.

'At the same time, the regulation does not specify certain activities'

Initially, hazard maps were created based on meteorological or hydraulic models. These types of maps can be obtained from government or commercial entities. It is important that the person using them understands how they are created. This is one >

FIG. 1: DEPTH OF POTENTIAL FLOOD IN EXTREME EVENT SCENARIO FOR ONE OF DISTRICTS IN WARSAW



of the challenges for an actuary modeling climate risks, as it requires acquiring knowledge in the field of meteorology or hydrology, which is generally not taught during actuarial qualifications.

‘This is one of the challenges for an actuary modeling climate risks, as it requires acquiring knowledge in the field of meteorology or hydrology’

Understanding maps, reading them, and the ability to distinguish geospatial information systems and map projections is crucial to appropriately impose exposure to maps of a given threat. In addition, there is the need to know how to operate on maps, both raster and vector. In order to build own flood risk maps, one needs knowledge about creating digital terrain models. These are created on the basis of a cloud of points from LIDAR (Light Detection and Ranging) measurement data from ALS (Airborne Laser Scanning). The indicated area is knowledge in the field of spatial information systems. It is also not on the standard path to obtain qualifications to practice as an actuary.

The area of climate risk modeling continues to expand and **has not only relied on historical trend** for a long time. Let's take the example of models for flood risk. In recent years, more and more articles have appeared on how to combine machine learning models, data from satellite images and information on terrain surface, soil characteristic, distance from water reservoirs, rainfall levels and water flow speeds to create flood risk maps. The area of Data Science, including the use of machine learning models, has been developing for over a dozen years and is a natural direction of development for actuaries. In line with this, work is underway to expand the education program for people on the actuarial path. However, knowledge of satellite images, specific satellites, and measurement methods is another challenge for actuaries, an area that is not an element of actuarial science.

The final element to recognize that state-of-the-art risk modeling techniques are used is **the integration of forward-looking scenarios**. This requirement is the easiest to meet because, in general, models that are created on the basis of historical data or additional data mentioned above allow for the creation of various forecasts. Under Solvency II, the standard approach is to set the capital

requirement at 99.5%, measured by the Value-at-Risk measure, over a one-year time horizon. As part of the forecasts, different probabilities of a given event, different scopes of a given scenario, different time horizons or other measurement methods can be used.

‘It seems that an actuary who wants to use the state-of-the-art climate risk modeling techniques needs to acquire additional skills’

To sum up, it seems that an actuary who wants to use the state-of-the-art climate risk modeling techniques needs to acquire additional skills in the field of meteorology, hydrology, machine learning, spatial information systems or satellite images. And whether a given insurance or reinsurance company uses the latest modeling techniques will probably be subject to the independent opinion of companies auditing compliance with the principles of the established framework facilitating sustainable investments. <

REVIEW OF SOLVENCY II IN THE UK AND THE ACTUARIAL PROFESSION

BY **TOM KENNY** AND **FLORIN GINGHINA**

the authors wrote the article as members of the Solvency UK taskforce

Since the UK's departure from the European Union in 2020, the UK Government together with the Prudential Regulatory Authority (PRA) has sought to tailor the regulatory environment to better suit the UK's domestic market while maintaining high standards of financial stability and policyholder protection. At the time of writing, the review is at its final stage, and it is expected to be fully implemented by 31 December 2024. There is however the possibility of some disruption or change to this timescale as a result of the recently announced UK general election on 4 July 2024.

The review of the Solvency II in the UK (Solvency UK) covers a wide range of areas including:

- **Risk Margin**, with the Cost of Capital parameter reduced from 6% to 4% and the introduction of a risk tapering factor of 0.9 for life insurance and reinsurance obligations and 1.0 for non-life, subject to a floor of 0.25, in force from 31 December 2023.
- **Recalculations simplifications** to Transitional Measures of Technical Provisions (TMTP), in force from 31 December 2023. The changes are being phased in to minimise disruption and provide insurers and reinsurers with adequate time to adjust to the changes.
- **Matching Adjustment**, which allows insurers to adjust their liabilities to reflect the value of matching assets held to back long-term insurance products.
- Reporting and disclosure requirements, with policy statements now published (**PS3/24 – Review of Solvency II: Reporting and disclosure phase 2 near-final**) and expected to come in force on 31 December 2024. The review is aimed at simplifying reporting and disclosure requirements.
- Innovation and technology, with the review considering how the regulatory framework can support innovation, including the use of InsurTech solutions and data analytics to enhance risk management and customer service. >



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The proposed changes to Matching Adjustment are of particular importance to the bulk purchase annuity market, with changes aimed at relaxing some requirements to encourage investment in UK productive finance such as long-term investments in infrastructure and sustainable projects. Matching Adjustment benefit is a key benefit – the PRA estimates suggest it was circa £66bn¹, whilst life insurers were holding circa £250bn² in assets to back their long-term liabilities at the end of 2022.

Under current rules, strict requirements apply to assets that are eligible for Matching Adjustment. Some long-term investments do not meet these requirements, in particular requirements for fixed cash flows. As a result, the proposed changes introduced a new asset category to be eligible – assets with highly-predictable cash flows. At the same time, the proposed changes also introduced additional requirements, some which are specifically designed for assets with highly predictable cash flows.

Solvency UK is expected to increase the competitiveness of UK based insurers (by tailoring the regulatory framework to better fit the UK market), enhance investment in long-term, productive assets (through changes to the Risk margin and Matching Adjustment), and streamlined improved regulatory framework.

The UK Government and the PRA conducted consultations with various stakeholders, including insurance companies and industry bodies. As

part of these efforts, in 2023 several major life insurance companies and long-term saving firms set up the [Investment Delivery Forum](#), with the aim of accelerating large-scale infrastructure investment.

With the Matching Adjustment one of the few areas still being consulted on, the Institute and Faculty of Actuaries (IFoA) has set up a [taskforce](#), looking at the impacts of the Matching Adjustment reforms introduced through Solvency UK and the relative competitiveness of the UK regulations relative to other countries.

IFOA SOLVENCY UK TASKFORCE

The PRA intends to reform the regulations that apply to the calculation of the Matching Adjustment to introduce a more principle-based approach. The end outcome of the reforms is intended to enable broader and quicker investments by UK based insurers to encourage them to play a greater role in the UK economy while ensuring that insurers hold sufficient capital to protect their policyholders.

Within these new requirements, there are several areas where there is no established actuarial practice, and the Solvency UK taskforce was established by the IFoA Life Board in March 2024 with the intent of publishing several timely discussions and thought leadership pieces to help establish potential acceptable approaches to meeting the PRA's requirements. The proposed requirement for an attestation for firms using the Matching Adjustment is of particular interest to all stakeholders, with the attestation covering both the >



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¹ [CP19/23 – Review of Solvency II: Reform of the matching adjustment](#), 28 September 2023.

² [What next? Bulk Annuity insurers – Regulatory developments – speech by Lisa Leaman](#), 25 April 2024.

Matching Adjustment and the Fundamental Spread, which applies to the whole Matching Adjustment fund and all assets within it.

The taskforce has so far provided a strong foundation for careful and helpful considerations amongst its more than 20 members on some of the newly introduced areas, such the broadening of the asset universe eligible for Matching Adjustment alongside requirements for an attestation of the Fundamental Spread and Matching Adjustment. Related to this, some areas are being identified as potentially of greater importance for actuaries, such as a broadening and deepening of our understanding of new asset classes, asset specific risks including credit risk, credit rating assessment, asset restructuring and climate risk.

In recent weeks, the members of the task force authored and published five articles:

- **What is the definition of ‘high degree of confidence’?** (17 April 2024)
- **Matching Adjustment attestation – how granular do you go?** (19 April 2024)
- **Strengthening Confidence in Matching Adjustment: The Role of the Attestation Report,** (29 April 2024)

- **Solvency UK Matching Adjustment Reforms: Highly Predictable cash flows and their implications for investment in UK productive finance** (6 May 2024)

- **Matching Adjustment Attestation Policy - A Key Piece of the Puzzle** (14 May 2024).

Five articles will be published in the next few weeks, covering:

- The Fundamental Spread sufficiency and add-on requirements
- How should climate risk be allowed for in the attestation
- International comparison of regulatory regimes
- What have we learnt from previous supervisory statements on Equity Release Mortgages and the Effective Value Test, and
- Environment and social impact bonds.

The taskforce has had initial discussions with the PRA, ahead of the publication of the final policy statement on Matching Adjustment, expected in June 2024, with an effective date 30 June 2024, subject to the comments noted above on the UK general election in July 2024. It is expected that the taskforce will support further IFoA/PRA

discussions focussed on how practitioners are implementing the new regulations, given the wide range of potential solutions to meeting the new principle-based regulations.

The industry recognises the importance of these reforms, and in particular the opportunity to be at the forefront of sustainable investments in the wider economy, with circa £1,700bln of assets³ available from Defined Benefit schemes which could transition to Bulk Purchase Annuity providers.

CONCLUSION

The Solvency II review in the UK represents a significant step towards creating a more tailored and effective regulatory framework for the insurance industry, by addressing key areas such as the Risk Margin, Matching Adjustment, and other requirements. The actuarial profession has reacted quickly and effectively in providing views from the profession on key issues surrounding the review.

The taskforce has a key role to play in assisting practitioners with adapting to the new rules and engaging with the PRA to help them identify where further guidance on implementation could be helpful. <

³ **Options for Defined Benefit schemes: a call for evidence,** 22 November 2023.

WHAT SHOULD AN ACTUARY KNOW ABOUT ARTIFICIAL INTELLIGENCE?

BY **ESKO KIVISAARI, CLAUDIO SENATORE AND BOGDAN TAUTAN**

The AAE published recently a [paper](#) under the title What Should and Actuary Know of AI. The paper was based on the discussions in the AAE Artificial Intelligence and Data Science Working Group, operating under the Professionalism Committee of the AAE. The main authors of this paper are Jonas Hirz, Esko Kivisaari, Philipp Miehle, Claudio Senatore, Bogdan Tautan and Francesco Toraldo.

Actuaries are there to serve the common good, to serve our societies. The paper tries to help our profession with new tools in the domain of data science. Actuaries need to use them responsibly. Actuaries need to understand how they can, based on their long experience with complex models, bring their expertise to this novel area, and also warn

of the possible dangers with models that might be used when assumptions they are based on are not valid or when the tools are used in areas where their validity has not been tested.

AI AND DATA SCIENCE APPLICATIONS

The evolution of AI and its surrounding technologies

has recently been accelerated through Generative AI and is now impacting the insurance industry much more profoundly than a few years ago. This technological leap extends beyond the obvious enhancements of computational power and data processing, reaching deep into every segment of the insurance value chain. For instance, AI applications are now used >

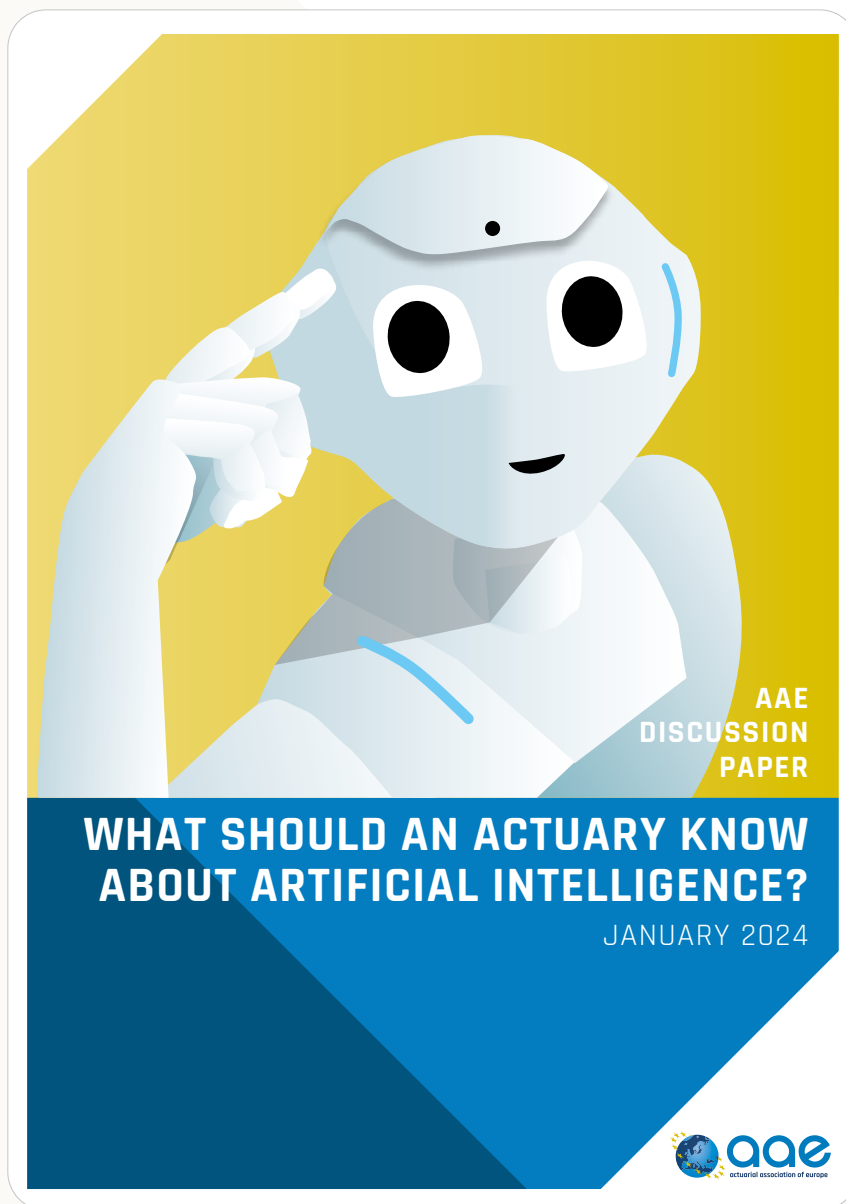
not only to automate isolated tasks, but can be employed in much more complex settings, considering a much broader set of input data, and can operate in real-time. As competitive pressures mount, insurers are rapidly adopting AI to enhance their offerings and operational efficiencies. However, they also face the complexities of emerging AI-related risks, such as algorithmic biases, data security vulnerabilities, shifts in customer behaviour, and ethical concerns. These issues necessitate the development of innovative risk assessment frameworks and robust governance structures. Consequently, the increasing regulatory focus on AI presents a significant opportunity for actuaries to play a pivotal role in shaping and adhering to standards that ensure the ethical, transparent, and effective use of AI in insurance. This evolving landscape calls for actuaries to not only adapt but also lead in the responsible implementation of AI technologies.

EXPLAINABILITY AND TRANSPARENCY

Actuaries along with other professions need to understand what the definition of an AI system is. On a global scale, we should all adapt definitions that align. In essence AI systems are a representation of the real-world we live in. They are adaptive, have a certain degree of autonomy and

influence virtual or physical environments. Under such circumstances model **bias** is inevitable. This can relate, for example, to gender or ethnicity. The truth about AI systems is that they are trained on large data sets shaped by human interactions. An algorithm can easily inherit those biases from the training material – often seen in applications such as covered by Large Language Models. Similarly, as

a consequence of bias, we get to deal with **direct** or **indirect discrimination**. Especially, actuaries that are dealing with insurance pricing and risk assessment exercises using AI will need to be careful on how unfavourable treatment towards individuals can be formed. There are protected characteristics of individuals, that are very clear and easy to exclude from data. However, there might be also other >



‘ This evolving landscape calls for actuaries to not only adapt but also lead in the responsible implementation of AI technologies

factors, or proxy variables, representing non-protected characteristics. When those are used, they can indirectly relate to protected characteristics – putting individuals at disadvantage. The important aspect here is the adaptiveness of algorithms, seen through feedback loops and dynamic data collection. Algorithms can alter their behaviour, turning from a non-discriminatory to being discriminatory. It might sound counterintuitive, but it is our role as actuaries to use sensitive information in the experimental implementation phase, such that in the end, we ensure that all potential links between factors that might lead to discrimination are excluded. Such practices will help us deal with the concept of **fairness**.

There exists a vast array of principles proposed within the realm of AI ethics, with over 160 identified according to the *AI Ethics Guidelines Global Inventory*. This abundance may prove misleading due to potential fragmentation or redundancy. They are essentially distilled into four core tenets: **beneficence**,

non-maleficence, autonomy and **justice**. Recently a fifth one has been added, **explainability**, given its importance. There is an entire research field dedicated to explainability named Explainable Artificial Intelligence (XAI). Explainability involves not only making AI intelligible in terms of its epistemological understanding but also ensuring accountability from an ethical standpoint. To ensure that AI contributes positively and avoids exacerbating or introducing new challenges, it's crucial to comprehend its impacts and implications thoroughly.

GOVERNING AI RESPONSIBLY

Globally, there are constant developments on building appropriate governance frameworks. Notable efforts include the European Commission's¹ development of the Ethics Guidelines for Trustworthy AI, and the Monetary Authority of Singapore's earlier principles aimed at promoting Fairness, Ethics, Accountability, and Transparency², or the recent OECD³ recommendations to further shed light on the definitions related to AI systems. >

¹ [Ethics guidelines for trustworthy AI, 2019](#)

² Monitoring Authority of Singapore, Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector

³ OECD, May 2024, Recommendation of the Council on OECD Legal Instruments Artificial Intelligence

‘ *Explainability involves not only making AI intelligible in terms of its epistemological understanding but also ensuring accountability from an ethical standpoint*

As part of a horizontal legislation, the European Union developed the AI Act. The basic objective is to protect fundamental rights when AI systems are used. The act sets guard rails when placing on the market different AI systems. Some are outright forbidden, while others are deemed to be high-risk systems with more requirements compared to systems in the low-risk category. Ultimately, this should make the EU a pioneer in professionally managing the risks of AI while creating a leading environment for innovation and growth.

We believe there can be no real artificial intelligence for the benefit of our sustainable future without a profession that combines technical excellence with a strong ethos of responsibility. Regulatory environments changing at a fast pace and technological advancements will require our profession to keep up to date with the advancements in the fields of **data analytics**, **predictive modelling**, and

reporting practices. AI algorithms, which thrive on data, require actuaries to master topics of advanced data modelling, alternative data sources, and to deal with concepts of synthetic data. Moreover, technical modelling is becoming increasingly complex, as seen in deep learning models like convolutional or recurrent neural networks, which process spatial or sequential data. Complying solely to traditional risk management frameworks could lead to underdeveloped practices and work ethics, resulting in the inexplicable, opaque, and irresponsible use of AI. While already including data, systems and neural networks topics, our education syllabus undergoes a change as well. From 1.1.2024 the CPD guidelines became compulsory for all full members associations, with further developments to address the topics of AI and data science. Given our code of conduct, standards of actuarial practice and industry wide professional recognition, we believe that

actuaries bear significant responsibility in remaining **fit and proper** in the context of AI. Actuaries have built a reputation for trustworthiness and reliability in their analyses and predictions, which is pivotal in fostering public trust in AI applications. We believe that , what we would call ‘**actuarial intelligence**’, is needed to foster innovation and support the appropriate use of Artificial Intelligence. <

INTRODUCING OUR NEW COLLEAGUE: **STEPHANOS HADJISTYLLIS**

The Actuarial Association of Europe (AAE) is pleased to welcome Stephanos Hadjistyllis to our team. As of January 1, 2024, Stephanos has taken on the role of Senior Actuary & Project Manager, bringing with him extensive experience across various sectors of actuarial science and a deep commitment to advancing the profession.



STEPHANOS HADJISTYLLIS

Stephanos is a notable member of the actuarial community, having qualified as a Fellow of the Institute and Faculty of Actuaries in the UK (FIA) during the start of his career in London. He is also a Chartered Enterprise Risk Actuary (CERA) and a Fellow of the Cyprus Association of Actuaries (FCAA). In addition to his professional designations, Stephanos holds a BSc (Hons) in Mathematics with Statistics from the University of Nottingham and a Masters degree in Actuarial Science from Bayes Business School, both achieved with distinction.

With over 12 years of experience, his career has been marked by significant contributions across various domains. Stephanos has specialised in actuarial valuations for pension funds, particularly in relation to funding and accounting disclosures under IFRS. His consulting experience includes strategic investment advice to institutional clients, helping design their investment strategies, selecting asset managers, and monitoring the investment performance and risk exposures of investment portfolios. His expertise further extends to supporting pension schemes in meeting the demands of pan-European EIOPA asset-liability stress tests. >

Formerly the Chairman of the Board of Directors of the Cyprus Association of Actuaries, Stephanos has made substantial contributions to the development of the profession in Cyprus. He has also served as actuarial function holder and risk function holder at several pension schemes and offered his support as an expert witness in high-profile litigation cases related to pension disputes.

In his new role at the AAE, Stephanos has embraced a diverse set of responsibilities designed to enhance the association's influence and efficiency in the European actuarial landscape. His efforts are focused on several key areas:

EUROPEAN CONSULTATIONS AND POLICY INFLUENCE

Stephanos manages our responses to European consultations, ensuring that our viewpoints are well-represented and influential in shaping actuarial policies across Europe.

TECHNICAL SUPPORT AND PUBLICATIONS

Stephanos is responsible for reviewing AAE publications ensuring the technical accuracy of our reports and content. His oversight ensures that materials reflect industry standards and are relevant to stakeholder needs.

He also supports the AAE in the creation and publication of relevant actuarial content.

STAKEHOLDER ENGAGEMENT

Through active participation in AAE meetings and close cooperation with the AAE Secretariat team, Stephanos helps facilitate our efforts to support European authorities and enhance the association's visibility and impact.

SUPPORTING AND COORDINATING WORKING GROUPS

He supports and coordinates activities across various working groups ensuring that these groups contribute effectively to their respective fields and maintain alignment with the AAE's strategic objectives.

PROCESS IMPROVEMENT

His work on the review of internal processes, such as the consultation response procedure is important for enhancing our responsiveness and efficiency.

PROJECT OVERSIGHT

Managing projects that hold strategic importance to the AAE, especially those addressing broader issues like sustainability, Stephanos ensures these initiatives are well-aligned

with the European agenda. His proactive approach in these projects demonstrates a keen understanding of the global challenges and opportunities facing the actuarial profession.

Furthermore, Stephanos is involved in the representation of AAE at Events. He has recently moderated a discussion panel at the pan-European conference Convention A regarding the Challenges facing IORPs in Europe.

More generally, Stephanos is committed to the professional development of our members and the broader actuarial community. He actively promotes the exchange of information and ideas, encouraging discussions within the AAE on wider actuarial topics.

Stephanos' appointment is a significant asset to the AAE team, and his experience and commitment positions him as a key contributor to achieving our association's goals. We warmly welcome Stephanos to our team and anticipate his continued impact on our collective endeavours in the European and global actuarial arenas. <

RISK MAPPING FOR SOCIAL SECURITY PENSIONS¹

BY **TIBOR PÁRNICZKY**



TIBOR PÁRNICZKY

Risk management and social security are both complex concepts. Social security pensions are different throughout Europe. But in common, we are all thinking of a mandatory system which covers all the working population as well as those who retired from working and an intergenerational social contract linking them. Risk management on the other hand has become an integral aspect of all organisational governance and operations. The intersection of these two areas is particularly crucial for entities tasked with ensuring the financial stability and long-term sustainability of their operations for the sake of their beneficiaries. This context requires and enables a general approach to define a social security risk management framework. During this journey starting by devising general risk categories for all organisations, we examine similar institutions' risk management solutions and take into account the social dimensions of pensions as the main difference with the counterpart institution.

'Every entity faces risks of governance and organizational structures, operational risks of the organisation and risks of their own business from their specific operations'

¹ The paper *'Risk Mapping for Social Security Pension Systems'* is published by the Actuarial Association of Europe on March 25, 2024.

Enterprise Risk Management (ERM) principles are widely adopted as standard practice, even if individual institutions have unique characteristics that necessitate specialised risk management frameworks. Governance and organisational structures apply to all >

By including affordability and robustness in the definition, we arrive at the core concept of the COSO risk framework

enterprises and institutions. It is their individual mission and the approach they are fulfilling it that sets them apart.

Based on these common and distinctive characteristics, we define a new approach for the main risk categories for all organisations. In specific: Every entity faces risks of governance and organizational structures, operational risks of the organisation and risks of their own business from their specific operations. A share company with a board and organisation of general assembly, Chief Officers, heads of departments and units is a general governance and organisational model with its usual risks. This is applicable in all sectors: from factories to banks. However, their individual business area and business model define their specific own risks even in the same industry.

The general COSO or ISO31000² ERM approach may serve as the common starting point in finding the similarities and differences between pensions and other financial institutions: their processes and methods are similar; the objectives differ.

Within the financial sector, banks adhere to the Basel Accords, while insurers operate under the principles

of the Solvency regime. These regulations, predating the ERM standards, effectively manage own risks specific to banks and insurers. However, they also integrate ERM into their risk management strategies as organizations.

In a step-by-step approach pension funds, which are financial institutions entrusted with safeguarding the financial security of many individuals in their retirement years, are often perceived to be similar to insurance products or savings plans, despite their intricacies and crucial societal role. Pension funds though as financial institutions, trade in risk and money collect contributions and pay pension on retirement.

Considering the similarities with other financial institutions, we may find where they differ.

In specific: The event space of a pension entity can be described by a multi-state model of the events of the active career and the eventual retirement. In a multi-pillar pension system, the different pillars are usually defined along their targeted socio-economic group and their corresponding level of pension benefit and risk appetite. A basic pillar covers the largest part of the population with the most guarantees. In an occupational pillar trustees protect >

² Committee of Sponsoring Organizations of the Treadway Commission, International Standards Organisation

Actuaries can contribute positively to the adoption of a holistic approach to risk management

the interest of the beneficiaries in a fiduciary relationship. In an individual arrangement the contractual relationship suppose adequate financial literacy and disposable income of the client. In this sense, a multi-pillar system in itself can be regarded as an old-age risk management tool. By including affordability and robustness in the definition, we arrive at the core concept of the COSO risk framework with appetite/tolerance and performance/target coordinates, ready to be applied to social security. This strategic integration not only enhances our understanding but also facilitates the systematic development of a Risk Management Framework tailored to social security pension systems.

This way we can interpret the general principles of ERM, applicable to pensions as financial institutions and identify the intrinsic features of social security pension schemes that differentiate them. Mandatory social security pension schemes, generally designated as 1st pillar, designed to provide a safety net for the working population add an additional layer of complexity to risk management practices.

A universally applicable, comprehensive risk management framework tailored specifically to social security pension systems remains an underdeveloped area of study. Our outline for a generalised Risk Management Framework for social security systems intends to identify the gaps in social security risk management for actuaries and initiate the discussion about this topic.

Actuarial knowledge and expertise are essential in designing, implementing, and operating the risk management framework of social security pension schemes. Establishing a Risk Management Function in the organisation and preparing regular Own Risk Assessment reporting framework involving actuaries, would be beneficial for Social Security Administrators. Actuaries may play a fundamental role in this. As regular actuarial reviews of the financial health of social systems are already critical measures in risk monitoring and risk mitigation, actuaries can contribute positively to the adoption of a holistic approach to risk management. This will result in the improvement of both the management and the outcomes for the beneficiaries of the social security systems. <

TIBOR PÁRNICZKY is an Independent Pension Consultant with public service, regulation and supervision, and actuarial background. He has long experience in public service, ever since being the Vice President of the Hungarian Mutual (Pension) Funds Supervisory Authority.

COLUMN

DEVELOPING THE ACTUARIAL PROFESSION

In last time's Column I stressed the importance of thought leadership for the actuarial profession and I thanked everyone who contributes to this aspect of our shared professional life, whether through this magazine or through other forums within or outside the profession. I mentioned the forthcoming European Congress of Actuaries, on 6 and 7 June in Rome. If you are quick, you might still be able to register. There are 36 break-out sessions on topics such as cyber risk, ESG ratings, Artificial Intelligence, pension tracking, social security adequacy, IFRS 17, implied volatilities, Monte Carlo methods and many others. There are four plenary sessions involving regulators, politicians and other leading industry figures. And there will be plenty of networking opportunities in Rome, *'a vibrant and cosmopolitan city steeped in history, art, culture, music and entertainment – a perfect host city for this conference'*.

This range of topics highlights other strengths of the actuarial profession, including its breadth, depth and willingness to think outside the box. Actuaries have long been at the cutting edge of innovation. Yesterday, I visited the Science Museum in London and came across an 'Arithmometer' from the 1800s, the first mechanical calculator to be developed on a commercial scale. One early adopter was the Prudential Assurance Company, established in 1848, replacing its human 'computers' with these mechanical calculators. The Prudential was considered very innovative in its approach, allowing it to take and maintain a lead in industrial assurance, principally the provision of funeral expenses for the working class. Please do continue to develop and promote actuarial skills in new fields and old!

And please consider the European Actuary magazine as a possible venue to share your insights. Part of the role of the Actuarial Association of Europe is to develop the actuarial community in Europe. Part of its rationale for publishing this magazine is to help with this goal. On this note, I would like to thank the magazine's editorial board and magazine manager for all that they do behind the scenes to make the magazine a success.

Malcolm Kemp

AAE Board Member and AAE Liaison on the Editorial Board of the European Actuary Magazine



COLOPHON

The European Actuary (TEA) is the quarterly magazine about international actuarial developments. TEA is written for European actuaries, financial specialists and board members. It will be released primarily as e-mail newsletter. The views and opinions expressed in TEA are those of the authors and do not necessarily reflect the official policy or position of the Editorial Board and/or the AAE. The Editorial Board welcomes comments and reactions on this edition under info@theeuropeanactuary.org.

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NEXT ISSUE

The next issue will appear 1 September 2024. Suggestions can be e-mailed to info@theeuropeanactuary.org. The deadline is 1 August 2024.

EUROPEAN AGENDA

Please check <http://actuary.eu/event-calendar/> for the most actual forthcoming events.

ADVERTISING IN THE EUROPEAN ACTUARY

The European Actuary (TEA) is sent as an online magazine to 25,000 actuaries and financial professionals throughout Europe. An advertisement in TEA, size 210 x 145 mm (half A4 and seen as full-screen), costs 3,500 euros. Information on info@theeuropeanactuary.org