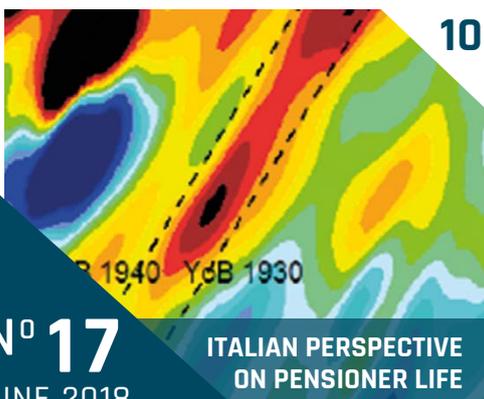


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THE FUTURE OF (RE)INSURANCE

INTERVIEW BY **JENNIFER BAKER**

With the Solvency II Directive up for review in as little as two years, TEA spoke to Dennis Kessler Chairman of the Board of Directors and Chief Executive Officer of SCOR about his views on regulation and the big risks and benefits he sees on the horizon.

‘The question is not whether we should aim for light or heavy regulation, but how we can achieve optimal regulation, i.e., regulation that strikes the right balance between economic growth and (re) insurance market resilience,’ said Mr Kessler.

In general EU regulation aims at creating a level-playing field, and a stable environment to allow firms to operate, invest and succeed. From that perspective, Mr Kessler says the Solvency II Directive is good for the (re)insurance industry. But he added ‘some aspects need to be rethought, adjusted or fine-tuned.’

‘I regret that reinsurance – in non-proportional format in particular – is not always properly accounted for in the Solvency II standard formula. Such inappropriate features hamper risk transfer and risk pooling, which is ultimately detrimental to policyholders through decreases in capacities or increases in rates,’ he said.

He added that the law has ‘greatly reduced – by means of punitive capital charges – the incentive to invest in equities and private equity. These investments are

important economic drivers, and private equity in particular is an important way to support solutions to climate change and the protection gap.’

‘Climate change constitutes a major long-term threat. Tackling and addressing its effects is therefore a global and shared commitment,’ continued Mr Kessler.

‘The (re)insurance industry has a key role to play in the fight against climate change, for two main reasons: its deep expertise in natural event risk modelling in terms of structuring customized risk transfer solutions on the one hand, and its fundamental function of pooling risks to optimize diversification benefits on the other hand,’ Mr Kessler explained.

Certainly the global community of governments, policymakers, businesses - including (re)insurers - must do more to gain expertise and knowledge on climate and natural events from the scientific community.

But Mr Kessler believes we also need to fill the so-called ‘protection gap’. ‘There are still too many



There are still too many people who remain underinsured

people who remain underinsured, in both emerging and developed countries. Addressing this global issue requires the combined efforts of governments and the private (re)insurance industry, in the form of strong and innovative public-private partnerships,' he said.

Protecting the welfare of citizens and communities is part of SCOR's corporate mission in particular through the SCOR Foundation for Science. SCOR is also a signatory of the UN Global Compact, the UNEP-FI PSI (United Nations Environment Programme Finance Initiative), the French Business Climate Pledge and the Geneva Association's Climate Risk Statement.

Leaving aside climate change for a moment, is the 'nature of risk' changing?

Mr Kessler breaks risks down into three categories: **'Acts of God, which are natural catastrophes, Acts of Man, used for involuntary destruction and damage, and finally Acts of the Devil, which refer to acts of malice and deliberate destruction.'**

'Not only is the nature of risk constantly evolving, it's rapidly ►



DENNIS KESSLER



Moreover, increasingly complex interdependencies are appearing between these risks

expanding. While traditional risks – Acts of God – remain, new risks are developing and emerging alongside innovation, technological progress and the development of human activity’ he continued.

‘Moreover, increasingly complex interdependencies are appearing between these risks. For instance, in addition to increasingly destructive weather events and natural catastrophes, climate change-related risks may include water risks, food insecurity, threats to biodiversity, global health, forced migrations, social tensions, political crises, and so on.’

But there is some good news. While the nature of risk may be constantly evolving, so too are the tools to tackle it. Technological developments, including data analytics and Artificial Intelligence (AI), will likely take a quantum leap forward in the next 10-50 years.

‘In the long term, there will no part of the insurance ecosystem that will not have been fundamentally altered by AI,’ said Mr Kessler.

‘Data and AI will significantly reduce information asymmetry which has historically prevailed between

insurers and insureds, by making information easy and cheap to access and analyze, from multiple sources and on a real-time basis. AI also stands to reshape product innovation and distribution, customer experience, underwriting, and claims processing, including fraud detection.’

In particular, he says that technology could contribute to bridging the protection gap by offering a better and more granular match between the risk and the price of the risk.

‘For the (re)insurance industry, coping with this major change requires timely adaptation and innovation in order not to fall victim to ‘disruption’ by outside players. (Re)insurers must embrace and integrate AI by investing in new technologies, both individually – processes and business models – and collectively – shared ledger technology and connectivity. For (re)insurance professionals, it will mean adapting their skillsets to be able to leverage new technologies and refocus their efforts on value-added tasks,’ he explained.

Finally, what else is likely to have a major impact on the (re)insurance industry in the coming years?

‘The global consolidation in (re)insurance seems to be accelerating,’ said Mr Kessler. ‘Reaching critical size is a key concern for (re)insurers, as they seek to achieve expense synergies through economies of scale – which are partially driven by the high structural costs related to regulation and new accounting developments (IFRS 17 and IFRS 9) – and economies of scope. From that perspective, consolidation and M&A will remain a driving force in the (re)insurance industry.’

‘There are several factors that will weigh on M&A activity in the near term, including the ultimate shape of Brexit, the effects of the US tax reform, continued regulatory changes like the EU-US Covered Agreement, the development of the C-Ross solvency regime in China, the upcoming IFRS 17 accounting standard, and the impact of a weak dollar. In the long-term, the end consumer stands to benefit from this consolidation under the condition that the efficiencies that are achieved are effectively passed down the value chain while preserving the customer focus that smaller insurers pride themselves on,’ he concluded. ●

LIMITED DATA, ENDLESS OPPORTUNITIES

THE EXPERIENCE OF LIFE EXPECTANCY IN THE CARIBBEAN REGION

BY **SERVAAS HOUBEN**



CARIBBEAN STREET ART

BACKGROUND AND SCOPE

Despite limited Caribbean data, the Worldbank dataset shows a remarkable overall trend of increasing life expectancy for the Caribbean region. We agree with Deming's quote that "without data you're just another person with an opinion" and therefore believe that despite the challenges of limited data, it is far more preferable to draw conclusions from the available data, than to either use gut feeling, or follow the pricing behaviour of competitors. However, the techniques used for mortality modelling will differ in locations with limited data, and we will show which techniques are available for mortality modelling for smaller populations.

DATA AVAILABILITY AND CHECKS

The following checks have been applied:

- **Insurance group level:** Comparison of number of policyholders and number of deaths between mortality study 2015 and 2017 to ensure data consistency;
- **Policyholder level:** taking a multi-period timeframe and checking for consistency at the policyholder level therefore avoids omitting mortality cases due to system limitations. ▶

DATA FITTING TECHNIQUES

Several methods were applied to get a better feel for the overall mortality behavior:

Least squares method

Comparing the difference between expected (mortality table estimation) with actual (insurance company data). Two fitting techniques are:

- q_x : this method is preferred as one can create a best fit for each age independently of another age (e.g. fitting the q_{80} is independent of q_{81}). However, there were instances for ages 80+ for which no mortality occurred therefore focusing least squares on best fitting 80+ policyholders. We could have applied smoothing where the q_x value is a function of q_{x-1} and q_{x+1} but felt that by using excess smoothing the overall pattern of the mortality behavior would not represent the original data anymore.
- e_x : a drawback of life expectancy fitting is that life expectancy for age $x+1$ is a function of life expectancy of age x , and hence there is no independence. However this method had the practical advantage that even when there are actual mortality rates of 0 for certain ages, this does not skew the results and hence fitting is done on the part of the data which is most populous. An additional benefit is that due to an increase in life expectancy, pricing of annuities is important which focus on life expectancy.

Shape of mortality behavior

The final method looked at similarity in the pattern of the mortality table and the actual insurance data.

FIGURE 1: LIFE EXPECTANCY FROM AGE

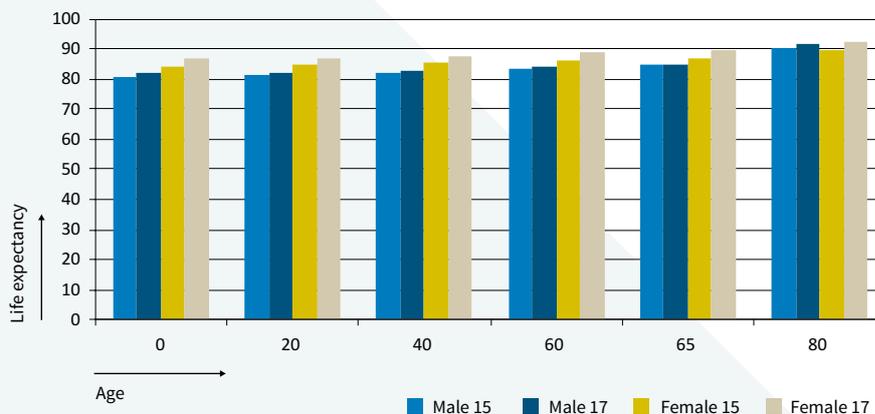


FIGURE 2: LIFE EXPECTANCY FROM AGE

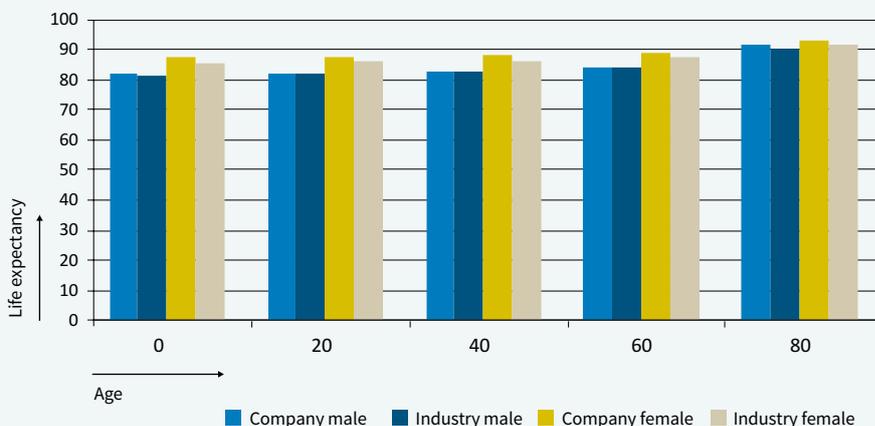
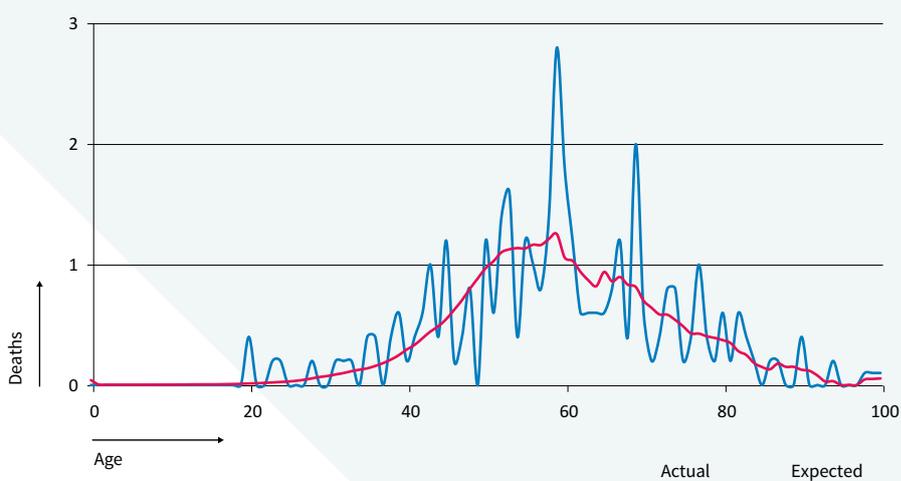


FIGURE 3: ACTUAL VS EXPECTED MORTALITIES - FEMALES



BENCHMARKING

Data limitations increase the importance of benchmarking results:

1. Previous internal mortality study

As the worldwide trend of an increase in life expectancy is also occurring in Curacao, we would expect to see an increase in life expectancy in the 2017 study compared to the 2015 study. This is indeed the case. (see figure 1)

2. An industry wide mortality study

This 2015 study was performed by Phenox in Aruba and ex-NA. Our results are in line with the Phenox results which gives us additional comfort that the data aggregation and data analysis have been done correctly. (see figure 2)

3. Expected vs actual mortalities

This check enables the best fit to be **backtested** with actual data and hence confirms if the fit is appropriate. As the actual data shows a more bumpy pattern compared to the expected mortality predicted by the mortality table, one can observe an overall fit, however for individual ages differences exist (see figure 3 for an example for the female fit)

LIMITATIONS

No analysis has yet been done based on marital status of policyholders, income levels, or the industry people work in. This might be a topic for further research and could provide additional opportunities for pricing segmentation.

SELLING IT TO THE BUSINESS

The following activities help to convince internal and external stakeholders:

Presentations and conferences

Showing local and worldwide trends and the impact of what-if scenarios on profitability will increase awareness of the importance of correct mortality assumptions.

Articles

When clients are aware of the effect of increased life expectancy on pricing, sales projects will run smoother as there is already awareness that the pricing of products could change in the future.

The main point of creating awareness with other stakeholders is to stress the importance of appropriate **risk-sharing** between the insurance company and policyholder: even with price changes, the insurance company is still insuring mortality and longevity risk which is one of the prime risks of policyholders which is difficult for them to mitigate by themselves.

CONCLUSION

We believe that the actuarial profession is already well placed to perform the data cleansing and analysis part of mortality modelling, but believe there are opportunities for the profession to create more awareness to other non-actuarial stakeholders than is currently done. ●



SERVAAS HOUBEN is President of the Dutch Caribbean Economists and is managing the actuarial department of insurance company ENNIA in Willemstad, Curacao. He studied econometrics in the Netherlands and worked there for the first 4 years of his career. Thereafter, Servaas worked in Dublin and London. Besides actuarial, Servaas completed the CFA and FRM qualifications. Servaas regularly writes for newspapers, his blog, CFA digest, and (actuarial) magazines.

THE FUTURE OF REGULATION

INTERVIEW BY **JENNIFER BAKER**



THOMAS BÉHAR

Thomas Béhar, President of the Actuarial Association of Europe (AAE) has the impressive task of representing more than 23,000 actuaries across 35 European countries.

He explains that what unites such a vast group is concern for public interest. 'This is deeply embedded in our profession with a high sense of integrity, independence, transparency and accountability,' he told *The European Actuary* in an exclusive interview.

The AAE is the umbrella association of 36 European actuarial associations, and believes that actuarial services must be based on proper technical education and skills.

'The profession is structured the same way all over Europe. We share an agreement on mutual recognition, which

enables each qualified member of the profession to be accepted as a fully qualified member by another European actuarial association, and work as a fully qualified actuary in that other European country,' said Mr Béhar. 'We share the same education standards, the same code of conduct, and disciplinary process. We have developed actuarial model standards that enable the profession to develop a consistent actuarial practice across the EU. Each actuary also has the obligation to keep up to date on technical matters to perform adequately in their job.'

CONGRESS

One of AAE's strategic objectives is to advise the EU institutions and Mr Béhar pointed to several 'hot topics.' First and foremost is the 2018 review of Solvency II, and AAE will present its own conclusions on the issue at the International Congress of Actuaries in Berlin.

According to Mr Béhar, the profession still sees Solvency II as huge progress, which has enabled every (re)insurance undertaking to be really managed by risks. 'From a practical point of view, the European level playing field is still something for the future. Regulations are applied and supervised via a very national approach. EIOPA's views on the application of that common framework in each country should be disclosed to help achieve the level playing field that we are aiming at.'

When Solvency II was under preparation, no one was able to foresee the politically motivated period of zero interest rates. So

what are the consequences for the risk-bearing ability and the risk management of insurance companies?

'Solvency II and the future IFRS 17 were based on the idea that the market was 'managed' by an invisible hand matching supply and demand. We all discovered that central banks played a visible hand, and the effect was effective as it has helped states to manage their deficit, thanks to lower remuneration of investors, savers, and pensioners. Therefore we should not get confused between short-term conditions with low rates, and real non-political perspectives. Adding new regulation stressing the current low rates as though the current situation was natural, will not help,' responded Mr Béhar.

He added that EIOPA's decision to establish a new methodology for the Ultimate Forward Rate is the 'logical consequence' of the low interest rates environment. 'Long term growth and inflation have clearly decreased whatever we may think of the ECB's actions. The 6% asked for the risk margin calculation should have decreased as well, but the logic stopped at the door of that measure. It could have been fair that RM and UFR have varied in the same time,' he continued.

In addition, IFRS 17 and IFRS 9 will come into effect at the start of 2021 and 2018 respectively. 'This regulation has a huge impact on the way investors will look at the insurance industry,' explains Mr Béhar. 'Modifying regulations has a huge impact on the European economy.'

I would urge [law-makers] not to do things without testing them and balancing their effects. A high volatility on the profit and loss and the IFRS own funds will emerge from that accounting standard, and equity investments will suffer from these new rules. Some improvements can be made to this standard to reduce some of these disadvantages. However, the net profit will still be very reactive to the day-to-day changing economic environment, rather than the countercyclical behaviour insurers could show, based on the long-term nature of their business.'

Taking all this strong regulation, and the ongoing period of low interest rates, into account, the real question for actuaries is how to develop products with a good return on capital as well as a sufficient security for consumers.

Mr Béhar sounded a note of caution: 'Actuaries are not able to construct products with lower risk and higher expected return than can be achieved in the market.' But he is also optimistic: 'However, actuaries can develop products with different risk/return characteristics, and just as important, actuaries can develop means and methods to communicate different levels of risk/return in order for the consumer to make qualified decisions on their individual risk/return tolerance. Sharing actuarial views and forming and a European actuarial community is AAE's strategic objective number three.' ●

PENSIONER LIFE EXPECTANCY: AN ITALIAN PERSPECTIVE

BY THE ITALIAN ACTUARIAL PROFESSION WORKING GROUP ON PENSIONERS

As well as in other countries, in Italy the recent trends and expected further changes in life expectancy present significant challenges. The Italian Actuarial Profession's Working Group on Pensioners - formed by actuaries working in public and private pension funds and insurance companies - processed historical data from 1980 to 2012 provided by public pension providers, including INPS, the main state pension provider, and private funds. For the year 2011, this data (concerning old-age, disability and widow pensioners) covered almost 15 million lives, with annual payments totalling over €190 billion. The Working Group developed - using different models - scenarios for the life expectancy of old-age pensioners up to 2045. The report (http://www.ordineattuari.it/media/228482/170404_rapporto_percettori_2016_def.pdf) shows the contribution actuaries can make to raising awareness on key issues such as the cost of ageing.

ITALIANS ARE LIVING LONGER

Figure 1 shows remaining life expectancy at age 65 for Italian old-age pensioners from 2003 to 2012 by type of employment, compared with the general population. Note that while the general population data includes pensioners receiving disability benefits, the pensioner data examined does not. Pensioner life expectancy has continued to improve: over the ten-year period, the level for retired public employees has seen an increase of 14% for males and 9% for females, compared with 9% and 6% respectively for the general population. The data shows that there are clear differences

in survival prospects by type of employment at retirement; the self-employed – especially medical doctors and lawyers – and public employees have a longer life expectancy in retirement compared with private employees.

Life expectancy weighted by the amount of pensions show slightly higher values compared to a calculation based on an equal weight for all lives. There is a positive correlation between the amount of pension and longevity, especially for males and public employees, (**see Figure 2**).

Italians are living longer...

FIGURE 1: OLD-AGE PENSIONERS LIFE EXPECTANCY (LIVES) AT AGE 65 VS. GENERAL POPULATION

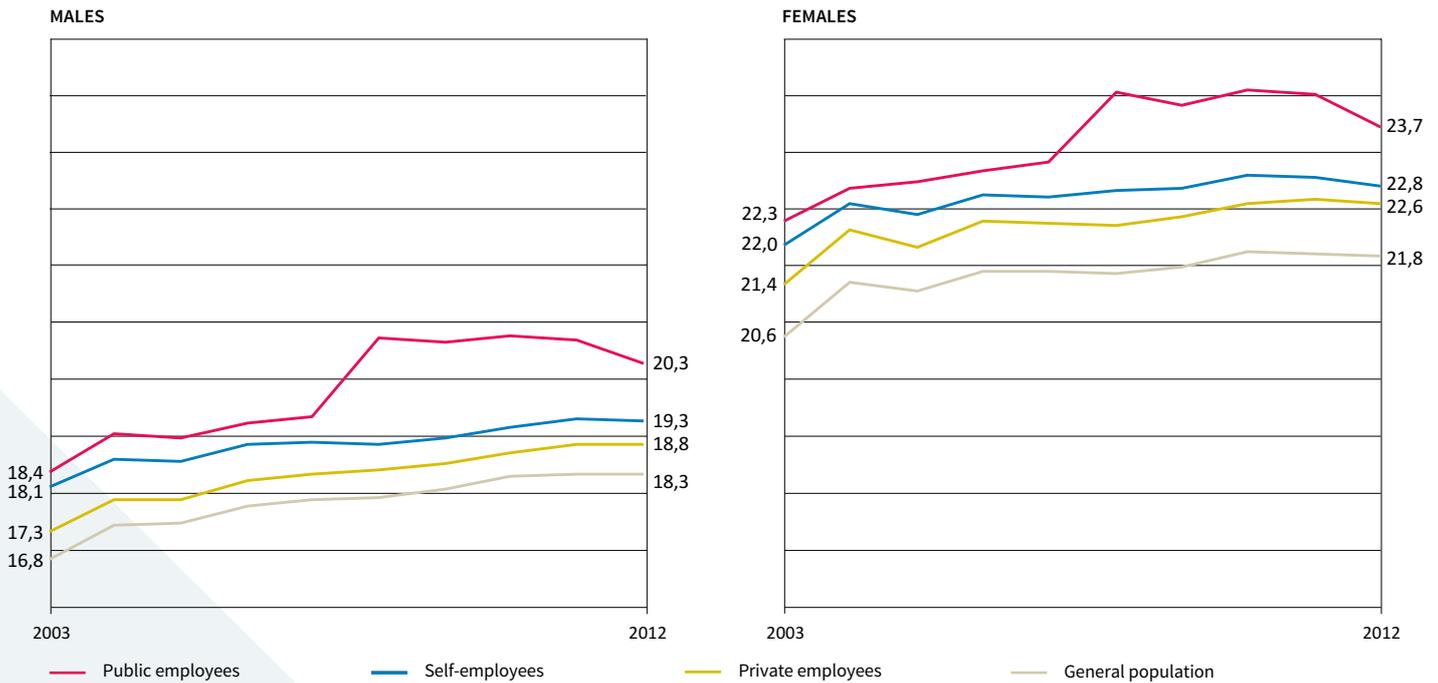
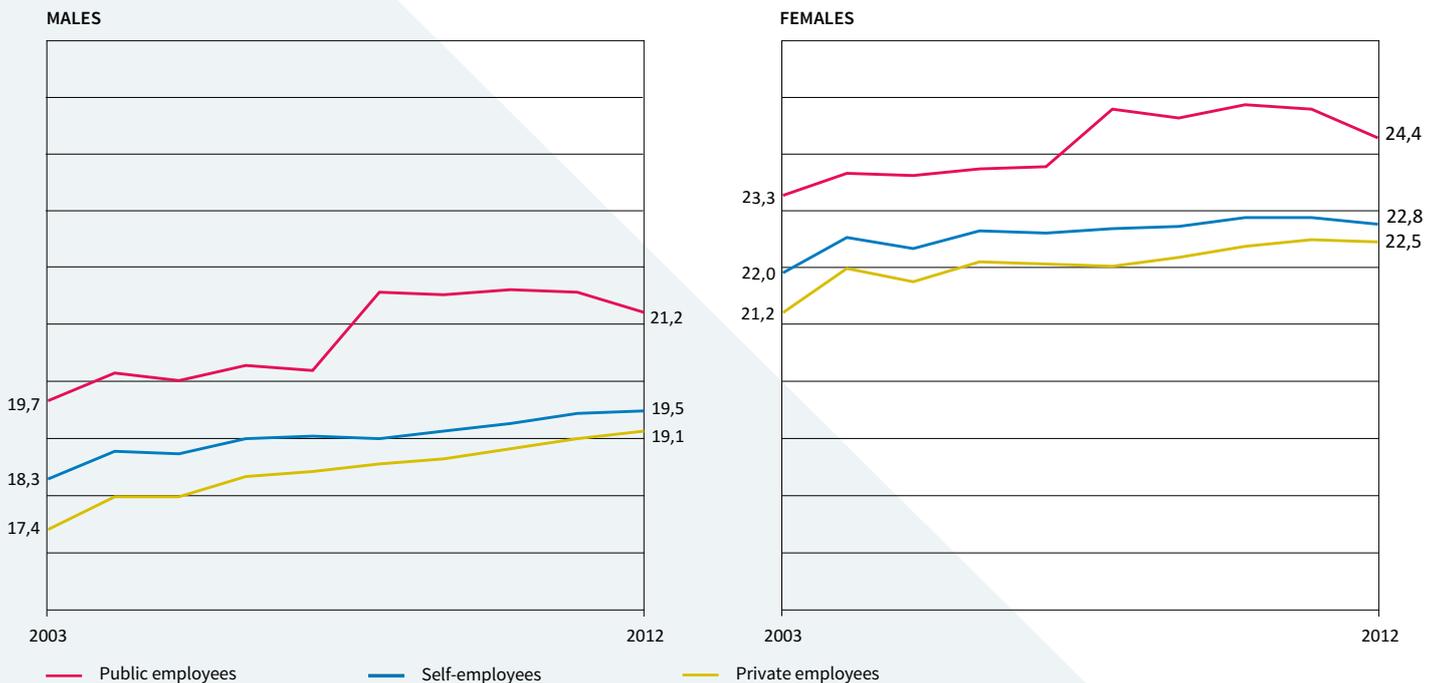


FIGURE 2: OLD-AGE PENSIONERS LIFE EXPECTANCY (AMOUNTS) AT AGE 65



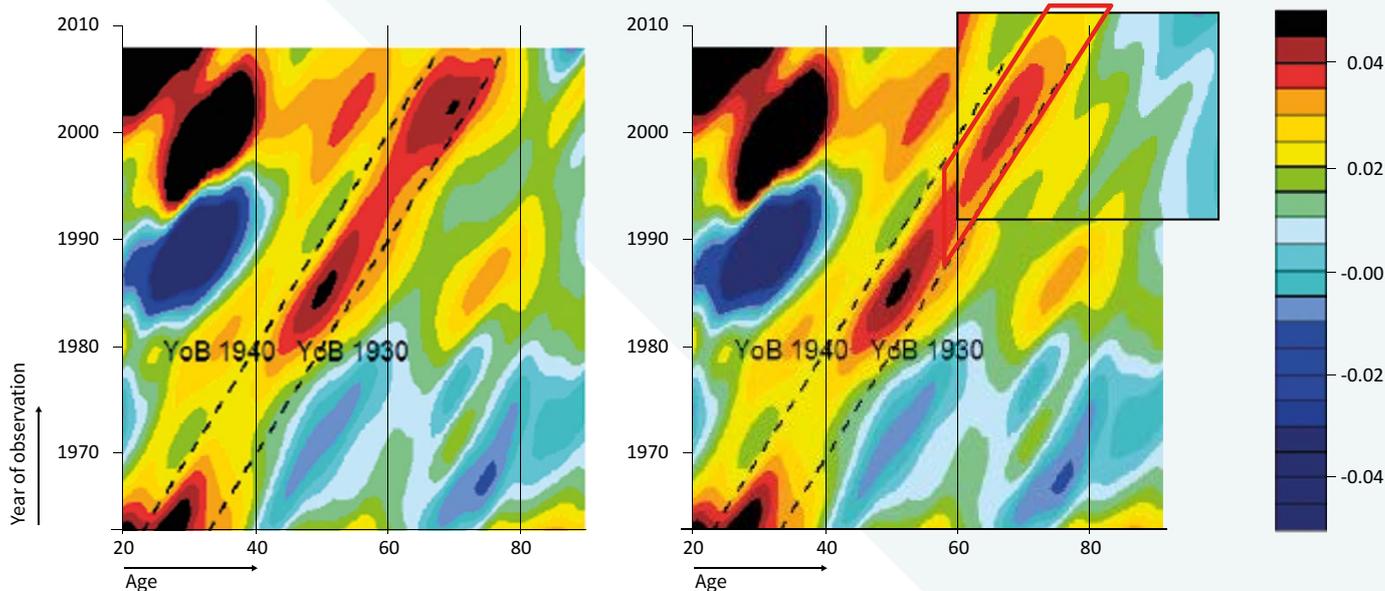
Further analyses confirmed the presence of cohort effects (i.e. significant mortality improvements relevant to certain generations), in particular in the male population. This is shown in the heat map of mortality improvements in the left-hand side of **Figure 3** – where the mortality improvements have been smoothed using the p-spline method (areas in red and yellow indicate an improvement in mortality, a worsening the blue ones).

The data shows a similarity in cohort effect for (private employees) pensioners and the general population. This is what can reasonably be expected, considering that a significant proportion of the general population at those ages are private employees pensioners.

FIGURE 3: HEAT MAP OF MORTALITY IMPROVEMENTS (*) IN THE ITALIAN POPULATION AND FOR PENSIONERS- MALES

MORTALITY IMPROVEMENTS - ITALIAN POPULATION
MALES- 1962-2012 - AGES 20-90

SAME AS LEFT EXCEPT TOP-RIGHT BOX SHOWING IMPROVEMENTS
FOR PENSIONERS (PRIV. EMPL.) IN 1991-2012 - AGES 60-100



$$(*) : r(x, t) = 1 - \frac{q_x^T}{q_x^t}$$

... and are expected to continue to live longer

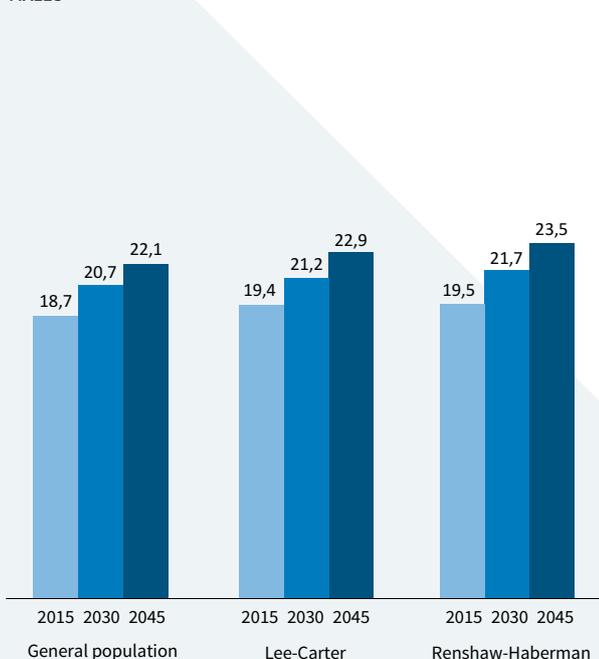
Finally, the study covers normal retirement pensioner mortality scenarios until 2045. The forecast was carried out on different data sets: private employees, self-employed and the combination of the two datasets, using lives data (that is: not weighted by amount of pension). Forecasts have been developed using the Lee-Carter Poisson log-bilinear model and the Renshaw-Haberman model with a cohort effect, with multiple scenarios associated with a probability distribution, namely including a central scenario, and high and a low scenarios (respectively the 5th and 95th percentile).

Figure 4 outline a synthesis of the results in terms of life expectancy scenarios at age 65 until 2045, compared with projections for the general population made by ISTAT, the National Institute of Statistics.

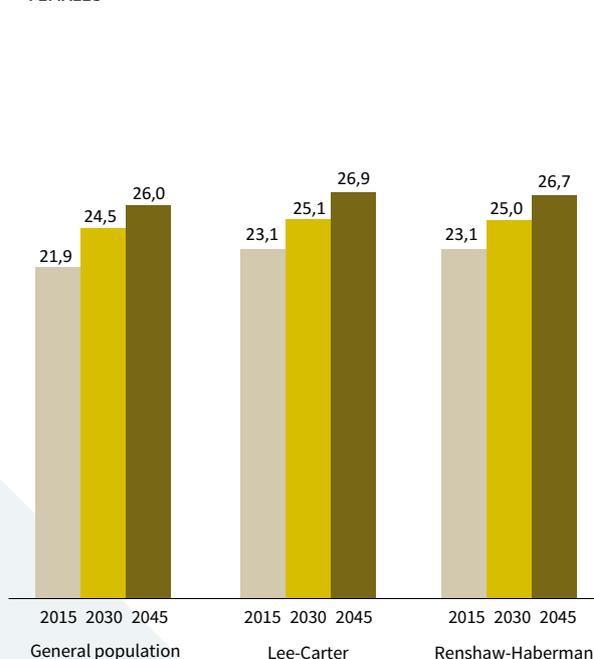
The historically observed difference persists also in the forecast period, with values for pensioners remaining higher than those projected for the general population. For males, general life expectancy in 2045 is expected to reach 22,1 years, while old-age pensioners should reach 22,9-23,5 years depending on the model. Similarly, the general female population in 2045 should have 26 years to live, compared to 26,7-26,9 years for old-age pensioners. ●

FIGURE 4: CENTRAL SCENARIOS OF LIFE EXPECTANCY UP TO YEAR 2045 - TOTAL (PRIVATE EMPLOYEES AND SELF-EMPLOYED) LIVES - AGE 65 - LEE-CARTER (LC) AND RENSHAW-HABERMAN (RH) MODEL

MALES



FEMALES



DIGITALISATION WITHIN INSURANCE

BY **PIERRE MIEHE**

The Swiss Insurtech, mostly based in Zurich, is very active at this time on Digitalisation. One of the main newcomers, TONI-DIS, an MGA company, aims at proposing new digital Motor insurance products to the Swiss market. Pierre Miehe had the opportunity to interview its founder, Philippe Regazzoni (former Amlin-Re CEO).



PHILIPPE REGAZZONI

Philippe, Big Data, the Internet of things (IoT) and Artificial Intelligence (AI) are the main technologies used by Insurtechs nowadays. They try to improve User experience and develop a customer-centric approach. Would you say that TONI-DIS is an Insurtech?

‘TONI-DIS is not really a Technology or Insurtech company. TONI-DIS is more an insurance company which uses the possibilities of digital technology to organize the insurance value chain in a new

way. The digital system is a core element of the “TONI system” but to organize a customer centric approach, the entire value chain has to be reorganized, and this includes a cooperation with over 20 different partners.

Difficulties in raising funds or regulations are often seen as the main entry barriers for Insurtechs. What challenges did you face for launching TONI-DIS?

‘The main challenge is to raise funds for a concept or idea. Money

is very difficult to raise before you can deliver a proof of concept. But besides that, as TONI-DIS is a comprehensive insurance system based on digital technology, our main challenge was to organize a system of over 20 different partners around a digital system. Regulation was not a major issue for us. We are working with several risk carriers, and this helps a lot. Because it’s true that there are high regulatory barriers, financially or in terms of administration, which a startup cannot easily overcome.’

Are you looking to disrupt the Swiss insurance market? Do you think Insurtechs are a threat to traditional insurance companies?

‘They are a threat and an opportunity. Insurance companies can use technological developments to improve their services and offerings. Insurtechs could provide flexibility, short time-to-market or scalable solutions - all things that are difficult to achieve in strongly structured companies. So most likely an Insurtech would be an enabler for traditional companies. TONI-DIS, for example, is deeply linked to traditional actors in the Swiss market. We can’t say we want to disrupt the market, but we will be a part of it, bringing a new vision of the value chain.’

Do you have pan-European ambitions, despite national market specificities?

‘Not immediately. We will try to make it work in our home market. When it works in our home market, we will explore going abroad as one of many potential development options. But each market will require the same level of organization as the home market, as insurance is in the main lines something fundamentally national.’



To dive into more actuarial bits, Pierre Miehe also interviewed Guillaume Serdeczny, who has work 20% for one of the French major insurance groups, and 80% for Tony-Dis in Switzerland, as Chief Actuary.

Guillaume, how would you describe your role in TONI-DIS?

‘Basically, I’m in charge of the pricing. Of course, I’m also involved in Underwriting, reporting or reserving. But my main task is pricing. When TONI-DIS approached me back in 2016 to join them, it was clear to me that pricing, rather than reserving or capital modelling, was the key skill needed for the job.’

Is pricing work in a startup different from a traditional company? ▶

'I used to be in charge of pricing in a French company for more than 10 years before the TONI-DIS experience. I would say that, for now, the two are pretty close. It's still about building a pricing equation based on rating factors, trying to be as competitive as possible while ensuring profitability.

The main difference is undoubtedly the lack of data. At TONI-DIS, we do not have access to any claims history database. Building a pricing system without this fundamental element was clearly a major challenge. To override this, we used some market data, interviewed some experts and tried to collect as much data as possible on the Internet. As usual, zoning and vehicle classification are the most difficult factors to deal with. In the end we have been able to build a pricing system complying with our initial requirements in terms of positioning and expected profitability.

In the future, if TONI-DIS develops some usage-based insurance (UBI) or Artificial Intelligence based process, we may need to invest more in data science, but I think this could also be true in a traditional company.'

What you are describing is referring to the building phase of the pricing system. Will it change after that?

'Yes indeed. Once the system is in place, gaps appear. We will run a very flexible system. Sells and positioning will be monitored carefully - and claims also, of course - and prices will be adjusted on a very frequent basis. This is really different from what I know of the French market, but may be not too far from UK practices.'

And I imagine that the working environment is also specific, isn't it?

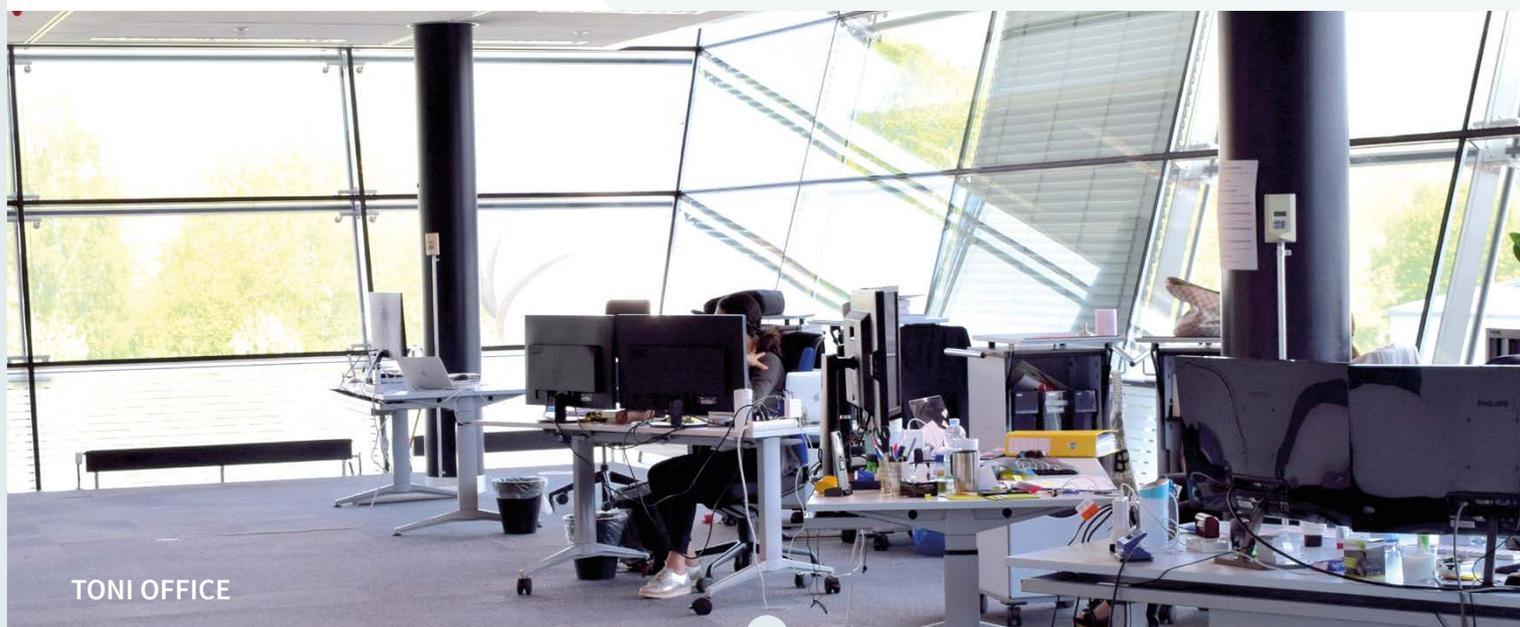
'Of course! That's one of the reason why I chose to meet the TONI-DIS challenge. You are not running a project in a four people team like in a big company. Everything goes faster, decisions can be taken immediately and, for example, when you need an IT development, you just ask the colleague in front of you! That's a huge change, when you are used to having to ask one year in advance for some 1000 man-days budget...'

I'm also deeply involved in building things again: I'm programming, modeling or creating reports all by myself. I lost this when I became manager in my previous position, and I was missing it!

Another big change is the fact that the results of our work will be quickly observable. Even in P&C insurance, actuaries don't always see for many years - if ever! - if their assumptions were correct or not. With this project, starting from scratch, we will know very soon if we were right or not. Obviously, to be certain of profitability we will have to wait as usual.

Of course, there are also some drawbacks, such as strong pressure, high availability level needed or constantly moving environment, but that's really worth it.

In conclusion, I'm deeply convinced that working in an Insurtech is a great challenge for both experienced and beginner actuaries. If you are curious, open-minded and looking for a smashing experience, just go for it! ●



TONI OFFICE

INDIVIDUAL DEFINED AMBITION

A FRESH LOOK AT DEFINED CONTRIBUTION PENSION CONTRACT DESIGN

BY **ANTOON PELSSER** AND **ROB VAN LEEUWEN**

One of the main advantages¹ of a classic Defined Contribution (DC) pension system is that the rights of each participant are **explicitly identifiable**. It is possible to determine an explicit market value at each moment in time. The assets of the pension fund represent the sum of the rights of all the participants and the pension provider's funding ratio is by definition always exactly equal to 100%. This excludes any scope for intergenerational transfers, which we believe is a blessing as the possibility of such transfers (as is the case in a Defined Benefit (DB) system) can lead to strong pressure from the current generation to "borrow" from future generations in case an underfunding situation occurs in the pension fund. Furthermore, this enables the free movement of individuals between pension providers and the merger of such providers. Finally, explicit rights avoid discussions about who owns the surplus (or must pay for the deficit) in a pension fund.

The major disadvantage of classic DC systems is that the asset-position of each individual is well defined, but the future benefits are not well defined. In this article we propose a new way of thinking about DC systems, with the ambition to mitigate this disadvantage.

In our approach, the DC-account would stay with the participant for his/her entire working life, rather than be associated with one or another particular employer. This allows the participant to change jobs or (maybe temporarily) become self-employed, without disrupting asset accumulation. It would also blur the distinction between "occupational pensions" and (currently often expensive) "individual solutions". The account can be funded by employer, employee and voluntary individual participant contributions. This will allow the participant, assisted by his provider, to take a long-term perspective². ▶

¹ As will become clear, the other advantage - that contributions are easy to forecast for the employer - is of less importance for the argument in this article.

² Currently such a perspective is offered only based on the (nowadays unlikely) fiction that the employee remains with the same employer or branch of industry for his remaining working life and the pension plan remains immutable for the entire period.

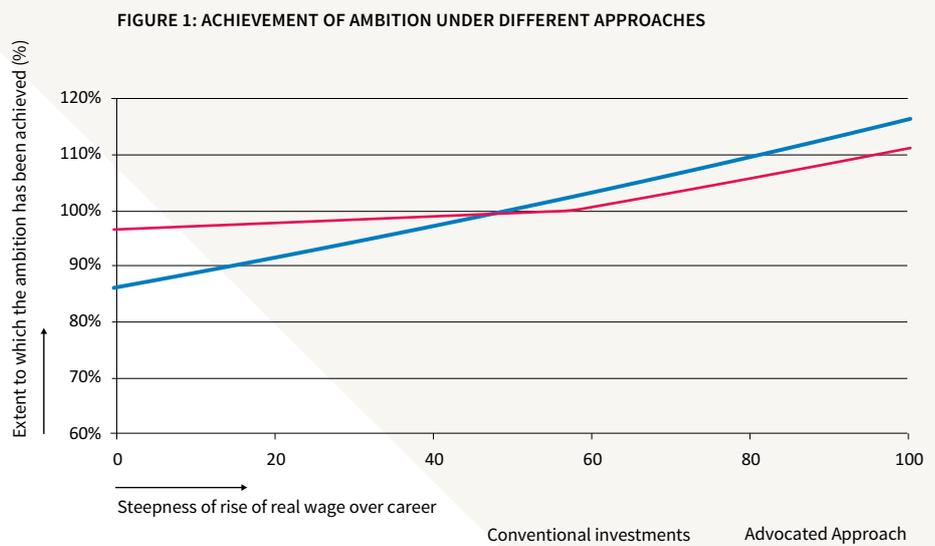
The participant should define an explicit, individual, **payout ambition** at the retirement age. The ambition must be formulated in such a way that it is possible to determine an explicit market value of the ambition. An example of such an ambition could be: “*at retirement age 67 the accumulated pension wealth is sufficient to make an annuity payout equal to 70% of the last earned salary*”³. This ambition should be supported by an explicit **funding plan**. The purpose of the funding plan is to explicitly identify sources of funding to bring the ambition in line with the economic budget constraint. The funding plan should be re-assessed regularly to ensure that the formulated plan remains feasible, using a mix of two available levers: a) future pension contributions and b) explicit reductions (or increases) in the ambition level⁴.

The final building block of our approach is that an **investment strategy** is defined that will realize the ambition, given the funding plan. This investment strategy can be determined using the available ALM techniques that are also used in DB plans. However, we propose to assess the investment plan such that the ambition is more likely to be achieved in situations where the individual’s career has taken off less than

he/she had hoped. This can be due to individual circumstances (bad luck, temporary illness, need to provide care etc. etc.) or due to macroeconomic factors (e.g. being part of a generation that lived through more than average or deeper economic crises).

After all, when one has a high-flying career, a pension that is only 40% of former wage (that is: the ambition has clearly not been met), can still provide for a decent retirement. However, if a career has been rather stagnant, it is much more important to realize a pension of around 70% of the former wage. The assessment of the investment result can therefore be summarised using a “utility function” that measures the investment result relative to the ambition and quantifies seriousness of the shortfall (or outperformance) as compared with the ambition level.

Thus, we propose to weigh ALM scenarios leading to the investment plan in such a way, that in “low career growth” scenarios the ambition is more likely to be realized. As a result, the likelihood that the ambition is realized in “high career growth” scenarios may have to suffer. Graphically, this can be represented as follows:



³ Or, more modestly: “70% of the career-average real salary”

⁴ Please note that “hoping that riskier investments will lead to sustainably superior returns” is not a lever, although currently in practice it is often treated as one.

It should be noted that the ambition is not a nominal amount, and therefore a “low risk” investment plan should not necessarily mean investment in fixed income instruments. Which instruments are most suitable, given assumptions about inflation, growth of the economy, asset returns and their correlations, should be determined using well-known ALM techniques.

Furthermore, it is important to note that the degree of risk-averseness can be gauged from an individual questionnaire or more general surveys. This can result in a “one-size-fits-all” utility function, a more individual assessment of risk-averseness, or a mix using a credibility-based approach.

The above is only a rather abstract representation of the idea behind this approach. Currently research is being conducted to actually implement this approach.

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LOW INTEREST RATES

THE CHALLENGE CONTINUES

BY **CHRISTOPH KRISCHANITZ**

LOW AND NEGATIVE INTEREST RATES

When in June 2014 the European Central Bank lowered the deposit interest rate to a negative value for the first time, a new economic world was born. Suddenly some of the old economic rules were not valid anymore and new rules had to be defined. The ECB took this unusual step to support price stability in a weakened economy after the financial crisis starting with the closure of Lehmann Brothers in 2008. The main objective of this measure was to encourage banks to lend money to private firms and households to help the “real” economy start growing again. But there are two sides to every coin. What is good for borrowers is usually bad for savers. Accumulated wealth especially as in life insurance contracts or pension plans suffers from this low interest rate environment. And it is not the low interest rate alone which makes long-term insurance and pension business difficult these days; additional pressure brought the combination with the new market-consistent supervisory rules, namely Solvency II. Now insurance companies find themselves in a severe financial dilemma. How

can you raise additional capital for a business when this business became unattractive for investors?

TECHNICAL CHALLENGES FOR ACTUARIES

But negative interest rates also became a challenge for the mathematical experts in the insurance and pensions field – the Actuaries. The classical interest-rate models were built by mathematicians in a way that these rates never can drop below zero, because this assumption used to be the dogma of the last centuries. And these interest-rate models are used intensively in calculating regulatory requirements like Solvency Capital Requirements, stress tests, ORSA and so on. With the new reality these models have also to be adapted to allow for negative interest rates. There are usually two possible approaches to make negative interest rates feasible, the first approach is to base the model on a probability measure which is defined over negative variables, as for example the normal distribution is defined for all real values.

The other approach is still to use a distribution function defined only for positive numbers and shift it to the negative area. Obviously this second approach needs a floor which limits the interest rates to the bottom. So how deep can interest rates fall? As the phenomenon of negative interest rates is very young, experience is very limited. Important technical questions cannot be answered based on sound data analysis. The question about the floor has already been raised, but there are also questions like, how do interest rates behave when they become negative? How can volatility be described at zero interest? Is there symmetrical behaviour of the interest rate around zero? A more detailed discussion on these problems can be found in the AAE paper “Negative interest rates and Their Technical Consequences”.

ECONOMIC CHALLENGES FOR INSURANCE COMPANIES AND PENSION PLANS

But what is the way out of this very special economic situation. The ECB made very clear, that rises in interest rates will only happen when inflation in Europe is close to 2 per cent. And here the next risk

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for insurance companies is in sight. What can happen if interest rates rise very sharply? A working group of Actuaries based in the AAE is currently debating possible effects of such an event. One possible risk is a policyholder run in case of such a sharp rise. Thus the pure financial risk of low interest rates suddenly becomes a systemic risk to a whole industry. A lot of measures to manage these new risks have to be defined by the supervisory authorities in Europe led by EIOPA. The actuarial profession stands ready to help.

REFERENCES:

AAE position paper: Negative Interest Rates and Their Technical Consequences, https://actuary.eu/wp-content/uploads/2017/08/AAE-negative-interest-rates_FINAL-161216.pdf . ●



CHRISTOPH KRISCHANITZ

DIGITALISATION

CHALLENGE AND OPPORTUNITY FOR ALL ACTUARIES

BY **LUTZ WILHELMY**



LUTZ WILHELMY

Digitisation is having an all-pervasive influence on society as a whole and particularly on the economy. This is the result of three factors: **1) data**, particularly our ability to convert the informational essence of all kinds of objects or processes into electronically storable and processible digital representations; **2) processing power**, i.e. the ever increasing affordable computational power, from smartphone to super computers; and **3) access**, i.e. ubiquitous broadband connectivity and real-time access to knowledge and talent, ranging from the location of the next restaurant or Wikipedia articles to highly specialised content.

Insurance, always including reinsurance, is and will be affected in two ways. Digitalisation changes what we insure and, more profoundly, how we insure. While the production principle of insurance, harnessing the law of large numbers, remains untouched, digitalisation affects the whole value chain of insurance:

A) INSURABLE GOODS, SERVICES AND NEW RISKS

Changes are omnipresent, e.g. individual car insurance will shift to insurance of fleets and driving algorithms, other services and their insurance will disappear entirely, and new covers against new risks, like cyber risks, will gain importance.

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B) CUSTOMER INTERACTION AND DISTRIBUTION

Insurance is currently mainly sold, not bought. This will change rapidly, at least in property and casualty insurance. Digitalisation will bring individual digital agents that are seeking to buy optimized coverages as and when needed based on the behaviour of insurance clients. Insurers are starting to offer products that are sufficiently simple and comparable. This allows them to record them as smart contracts in a private blockchain and to automate the buying decision of the digital agent. Distribution will be often linked to buying a good (resulting in a longer term but revisable cover) or to ordering a service or entering into an activity (temporary cover). For life insurance, the development is less clear and certainly slower, however the customer experience will change dramatically, too.

C) OPERATIONS AND ADMINISTRATION

Insurance is currently an administration intense business. But contract handling, investment, finance, and claims management—all can be digitalised.

Operational cost and employment in these occupations will decrease significantly.

D) RISK INSIGHT

Pricing, costing, reserving, and capital assessment are revolutionised at this very moment. While insurers continue to pool all kinds of different risks to harness the law of large numbers, risk assessments become increasingly individualised. Actuarial work will shift from analysing pools of similarly exposed risks to the analysis of individual risk profiles. Digitisation brings an end to risk pools for risk assessment—risk pooling to produce insurance is not affected at all. Costing, reserving and capital assessment will increasingly rely on digitalised, automated algorithms, starting with simple one-layer machine learning to full-fledged artificial intelligent systems capable of making entirely autonomous decisions. Similar techniques will dominate claims management, especially for fraud detection, and pricing. While costing still answers the question “How much is the insurer’s cost to fulfil the contract in a reliable, compliant way?”, pricing will newly need to answer “How much is *this individual*

client willing to pay to enter into this contract *at this point in time?*”.

This situation opens challenges and opportunities for actuaries. Who should assess and test the algorithms for biases and violation of anti-discrimination rules, if not the actuary? Who should take responsibility that algorithmic decisions are ethically acceptable and that data privacy as well as data protection was complied with, if not the actuary? Who should explain that the individual cost of the cover is its fair price, i.e. the reasonable, morally right, treating-all-equal price, if not the actuary? Who should rebalance the new information asymmetries, if not the actuary? Who should explain to society and politicians that digitisation vastly increases the access to insurance for many, but makes certain covers unaffordable for some, if not the actuary? And who can invent the societal financing schemes to ensure access to insurance where really needed, e.g. health insurance for the chronically ill, if not the actuary?

The future is here. Let’s embrace and shape it. ●

THE ACTUARIAL ASSOCIATION OF EUROPE 40 YEARS OF ACTUARIAL ACTIVITY IN EUROPE

On 13 June 1973, shortly after the enlargement of the EC in January that year from six to nine Member States with the admission of Denmark, Ireland and the United Kingdom, Paul Thyron, president of the Belgian actuarial association, with Abel Montador and Marcel Henry, presidents of the two French actuarial associations, wrote to their presidential colleagues in the other Member States of the EC suggesting they explore together the possibility of establishing 'un organe commun de représentation de la profession d'actuaire auprès des Communautés Européennes'.

The proposal was well received by all associations and discussed further with its authors at informal meetings. A significant point made in the discussions was that the European dimension of the proposed organisation should be emphasized. The first meeting of the Groupe Consultatif took place in Paris on 11 May 1978 in the presence of association representatives from Belgium, Denmark, France, Germany, The Netherlands, Italy and the United Kingdom. The EC institutions were advised of the establishment of this new European professional organization.

Today the Actuarial Association of Europe (AAE), as it is called now, consists of 36 member associations from 35 European countries and represents more than 23,000 European actuaries.

Our vibrant organization has an efficient organizational structure based on five main Committees where all initiatives are taken and activities discussed. Throughout the year many discussions take place culminating into two major meeting events: the AAE Spring Meeting and the AAE Annual Meeting in autumn. On a voluntary basis between 150 and 200 actuaries contribute to the work of the AAE.

The AAE can be proud of being an independent organization of professional European actuaries and that its advice and comments are totally independent of industry interests. Many discussion and position papers have been published in the 40 years of its existence and since 2012 the AAE organizes every four years the European Congress of Actuaries.

After 40 years there are still many challenges but also opportunities in the European actuarial field. The AAE is well prepared and more than willing to face these.

Ad A.M. Kok AAG Hon FIA
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COLOPHON

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The Editorial Board welcomes comments and reactions on this edition under info@theeuropeanactuary.org.

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<http://actuary.eu/event-calendar/>
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