Insight INVESTMENT

LOOKING INTO LONGEVITY

Q&A WITH PROFESSOR DAVID BLAKE

JANUARY 2022

BNY MELLON | INVESTMENT MANAGEMENT

CONTRIBUTORS

Professor David Blake

Professor David Blake is Professor of Finance and Director of the Pensions Institute at Bayes Business School in City University of London, and chairman of Square Mile Consultants, a training and research consultancy. He is also co-designer of the PensionMetrics life-cycle financial planning software, co-author of the A2Risk attitude to risk questionnaire, co-inventor of the Cairns-Blake-Dowd stochastic mortality model, and co-founder with JPMorgan of the LifeMetrics Indices. In 2014, he was appointed Chair of the Independent Review of Retirement Income. Its report 'We Need a National Narrative: Building a Consensus around Retirement Income' was published in March 2016. He won the 2016 Robert I Mehr Award for 'A Two-Factor Model for Stochastic Mortality with Parameter Uncertainty: Theory and Calibration' (with Andrew J. G. Cairns and Kevin Dowd), published in the December 2006 issue of the Journal of Risk and Insurance (JRI), the journal of the American Risk and Insurance Association. This award is presented each year for the paper published in the JRI 10 years before that has best stood the test of time. This paper is the most cited paper of all time in the JRI. He has a PhD from the London School of Economics.

Howard Kearns

Howard joined Insight's Financial Solutions Group as a Longevity Pricing Director in March 2017. He is responsible for developing Insight's longevity pricing and structuring capabilities. Prior to joining Insight, Howard spent four years at State Street Global Advisors as Head of LDI. Before this, Howard held executive director positions at Goldman Sachs, Credit Suisse and Nomura, where his responsibilities included pensions, insurance and longevity structuring. He has also been an in-house advisor for the BT Pension Scheme. Howard started his career in 1997 as an actuary at Watson Wyatt. He holds a BSc and MPhil in Mathematics, both from the University of Manchester. Howard also holds an MSc in Financial Maths from Heriot-Watt University and has been a Fellow of the Institute and Faculty of Actuaries since 2001.

DEFINED BENEFIT PENSION SCHEMES ARE INCREASINGLY FOCUSING ON THE IMPACT OF LONGEVITY RISK ON THEIR LIABILITIES. HOWARD KEARNS, LONGEVITY DIRECTOR AT INSIGHT, SPEAKS TO PROFESSOR DAVID BLAKE, PROFESSOR IN THE FACULTY OF FINANCE AT BAYES BUSINESS SCHOOL AND DIRECTOR OF THE PENSIONS INSTITUTE, ON THE IMPACT OF THE PANDEMIC ON LONGEVITY, THE CONSEQUENCES FOR PENSION SCHEMES, AND THE FUTURE OF THE LONGEVITY HEDGING MARKET.

- The COVID-19 pandemic will not have a large impact on mortality in the UK over the next few years, research suggests, though indirect, longer-term implications could be significant.
- There has been a small improvement in defined benefit pension scheme funding because of the increase in COVID-19 related deaths, but no meaningful change in the pricing of longevity risk as a result of the pandemic.
- The market for longevity hedging is growing strongly. It remains dominated by insurers and reinsurers, but there are ongoing initiatives to encourage capital market investors to take on longevity risk, which would significantly increase capacity.

COVID-19 AND THE IMPLICATIONS FOR LONGEVITY

HOWARD KEARNS: What is the likely impact on mortality of the pandemic over the next few years?

PROFESSOR BLAKE: Notwithstanding the personal tragedies surrounding individual deaths, we can be thankful that the global scale of deaths currently at over five million (from 260 million infected)[1] is much lower than the 50 million deaths associated with the last global pandemic, namely Spanish flu in 1918-1919.

In the UK, total deaths are currently around 145,000[1]. This is around twice the size of the number of deaths in a bad winter flu in the 1950s.

As a result of the highly successful vaccination programme, it looks as though we could be over the worst. Spanish flu lasted exactly a year and had three waves, with the second wave being responsible for most of the deaths. With COVID-19, the pandemic has lasted longer than a year and, as of late 2021, we are in the middle of another wave – the third or fifth depending on the country. We have yet to confirm which wave was the biggest, but there could be a long tail with some additional smaller waves before the pandemic is officially declared over.

In a paper on the impact of COVID-19 on future higher-age mortality in the UK, my colleagues and I showed that, conditional on catching the coronavirus, the increase in the mortality rate approximately equals the pre-existing mortality rate, so the overall mortality rate doubles[2].

This means an average 65-year-old male's mortality rate doubles from around 1% to 2%. This is very modest, so we do not believe that in aggregate the impact of the pandemic on mortality over the next few years will be large, at least in the UK.

HOWARD KEARNS: How has the emergence of new variants changed the situation?

PROFESSOR BLAKE: In short, new variants mean that the virus will not be eliminated but, like the common flu, it will be something humankind lives with on an ongoing basis without closing down the economy.

Initially, before the development of the vaccine, the epidemiologists were talking about herd immunity and estimated that once 85% of the UK population had become infected this would be sufficient to prevent further infections. But the UK government panicked when Imperial College predicted that this would lead to 500,000 deaths and the National Health Service would become overwhelmed. In March 2020, the first of a series of lockdowns was imposed.

The Australian and New Zealand governments went further and introduced what has turned out to be a more or less permanent lockdown, as part of a zero-COVID strategy to eliminate the virus completely from these countries. China has tried the same strategy.

However, the Delta variant has changed everything. It has a sufficient viral load, even among those who are vaccinated, that the epidemiologists are predicting that herd immunity will not work and that everyone will eventually get COVID-19. But it will have a much-reduced impact on the vaccinated. The same seems to be true of the new Omicron variant – while it is even more transmissible than Delta, the early evidence suggests that any infection is typically very mild. The previous strong correlation between infection, hospitalisation and death (with a two to three-week gap between them) has broken following the success of the vaccine rollout.

This suggests that the best we can hope for is that the pandemic becomes an epidemic and we will have to live with it on a permanent basis. This makes sense, since the common cold is a type of coronavirus and we live with that without closing down the economy.

[1] As at 5 December 2021. Source: www.ourworldindata.org/coronavirus
[2] The Impact of Covid-19 on Future Higher-Age Mortality; Andrew J.G. Cairns, David Blake, Amy R. Kessler and Marsha Kessler; Pensions Institute, May 2020. Available at http://www.pensions-institute.org/wp-content/uploads/wp2007.pdf

HOWARD KEARNS: What is the likely long-term longevity impact of the indirect implications of the pandemic, such as the vaccination programme and delayed NHS operations?

PROFESSOR BLAKE: If the vaccines can be modified to deal with new variants – like the flu jab – then an annual booster jab might be needed to keep mortality rates under control. There is increasing evidence that vaccine efficacy is falling much faster than was initially expected – falling below 50% after six months. The efficacy of the Pfizer/BioNTech vaccine, although it starts higher than the AstraZeneca vaccine, declines at a faster rate and falls below AstraZeneca after four months[3].

Delays to NHS operations are a much bigger problem

There have been significant delays in the treatment of non-COVID-19 patients because the health system cut back its non-essential services in order to redirect resources to deal with the pandemic, and because 'coronaphobia' has led people to delay getting a diagnosis for other potentially serious illnesses. For example, thousands of cancers are failing to be diagnosed every week because patients are not going or even able to see their doctor: last year Cancer Research UK reported that referrals by doctors for urgent hospital appointments had fallen by 75% – equivalent to 2,300 cases per week[4]. It also estimated 380 cancers a week were being missed because 200,000 weekly screenings for breast, cervical, lung and bowel cancer were suspended during the lockdown[5]. A study from University College London and the Health Data Research Hub for Cancer predicted that up to 18,000 more people could die from cancer over one year in England because of the impact of COVID-19[6]. Meanwhile, the pandemic has caused waiting times, and the waiting list, for elective (non-urgent) treatment to grow substantially[7].

The emergence of 'long COVID' means the long-term health problems are potentially even more significant

While most COVID patients fully recover, many experience severe organ – such as kidney or liver – failure, lung scarring, sepsis, and strokes, despite many being young and having only mild symptoms. If these impairments persist and shorten life expectancy, then the mortality models will have to be modified to treat those with these impairments differently from other survivors.

Potential health problems associated with lockdown and the economic recession that followed

These could have consequences for medium and long-term mortality. Self-isolation during lockdown led to an increase in alcohol and drug consumption. Long-term unemployment and/or more jobs being automated in response to the pandemic could result in higher death rates, including 'deaths of despair'.

On the positive side

The behavioural changes required by lockdown – such as social distancing, wearing face masks in public, and reduced automobile and airline usage – might have health benefits if these changes are maintained long term. The discovery, in April 2020, that the drug remdesivir shortens recovery times in serious coronavirus illness may mitigate impairments going forward. Pfizer's new COVID pill, Paxlovid, also looks promising.

The COVID-19 pandemic might also speed up the search for treatments that delay ageing, one of the primary factors that make people more susceptible to the virus. This is because if ageing can be slowed at the cellular level, then the diseases that afflict older people in particular – cancer, heart disease, dementia, and now COVID-19 – can be prevented or their effects ameliorated.

Three drugs in particular are attracting interest. The first is metformin which has already been shown to have a positive effect in mitigating or delaying diabetes, cardiovascular diseases, cancer, and dementia. For example, elderly diabetics on metformin experience 20% lower mortality than age-matched subjects without diabetes. The second is a new category of drugs called rapalogues, which have been shown to extend health and lifespan in animal experiments and to increase resistance to flu and reduce respiratory tract infections in older human adults. The third is ronapreve, developed by Regeneron/Roche, which uses antibodies made by cloning a unique white blood cell to prevent and treat coronavirus.

[3] COVID vaccine protection wanes within six months – UK researchers, 25 August 2021, Reuters.
[4] Urgent cancer referrals being turned down during coronavirus pandemic, 8 July 2020, Cancer Research UK.
[5] Over 2 million people waiting for cancer screening, tests and treatments, 1 June 2020, Cancer Research UK.
[6] Estimating excess mortality in people with cancer and multimorbidity in the COVID-19 emergency, April 2020.
[7] Waiting times for elective (non-urgent) treatment: referral to treatment (RTT), 5 August 2021, The King's Fund.

HOW PENSION SCHEMES HAVE BEEN AFFECTED BY THE PANDEMIC AND ITS IMPACT ON LONGEVITY

HOWARD KEARNS: Changes in mortality expectations have implications for pension schemes. What do you think is the likely impact on pension scheme funding?

PROFESSOR BLAKE: There has been a small improvement in pension scheme funding because of the increase in deaths of elderly members. Our accelerated deaths model predicts that these deaths are more likely to have occurred among members who were already frail – that is, their deaths have been accelerated by a few months or years. The surviving members will therefore have a slightly higher overall life expectancy. Overall, we believe that the impact has been very small and is likely to remain so.

There could however be an increase in ill-health early retirements if members with long COVID are no longer able to continue working. This would have the effect of increasing liabilities if the pension was enhanced relative to its actuarially fair level.

There is, of course, a difference between mortality expectations and mortality experience. In many cases (e.g., those with long COVID), it is too early to say what the impact will be on mortality experience, but the early evidence of pension schemes with elderly members is that mortality experience is only marginally different from expectations prior to the pandemic.

HOWARD KEARNS: Members of defined benefit pension schemes tend to be from more affluent groups – does this have any implications when thinking about the impact of the pandemic?

PROFESSOR BLAKE: It is true that members of defined benefit pension schemes tend to be from higher socio-economic groups. This means that they are less likely to catch COVID since they can work from home – unlike, say, shop workers. This reinforces the view given above that the pandemic will have only a modest impact on pension liabilities.

WHAT HAS HAPPENED TO LONGEVITY EXPECTATIONS AS A RESULT OF THE PANDEMIC?

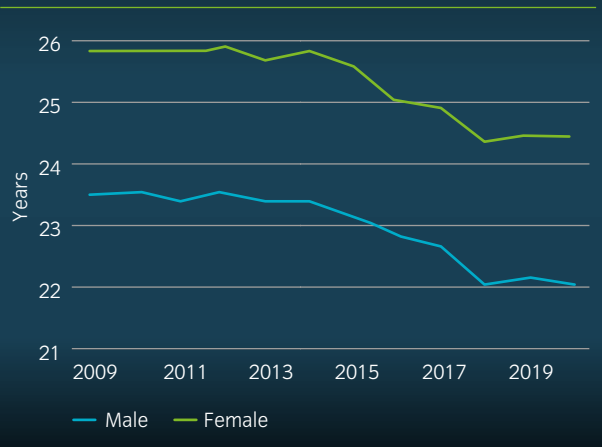
HOWARD KEARNS: The increase in deaths as a result of the pandemic has clearly had a directly impact on current rates of mortality, with standardised mortality rates in England and Wales on average 12% higher in 2020 than in 2019.

However, it is not yet clear how the pandemic will affect forward life expectancy figures. During the five years prior to the pandemic, cohort life expectancy for both males and females in the UK had already been on a downward trend (see Figure 1). This fall was not driven by significant changes in current mortality rates; it was primarily driven by a reassessment of the extent to which these rates will fall in future years.

Assuming that the significantly increased mortality rates experienced during the pandemic are not repeated in future years, it is not obvious how the pandemic might affect mortality rates in future. Will mortality rates be higher due to pressures on the NHS and delays in diagnosing serious medical conditions, or will they be lower as a result of people making long-lasting behavioural changes?

At present, reinsurers appear to be taking a wait-and-see approach, leaving their longevity assumptions largely unchanged until more conclusive data becomes available. They remain keen to take on more longevity risk at prices consistent with pre-pandemic levels, perhaps suggesting that they view the pandemic as being neutral for life expectancy in the longer term.

Figure 1: Cohort life expectancies at age 65 based on the Continuous Mortality Investigation



Source: Continuous Mortality Investigation.

THE IMPACT OF THE PANDEMIC ON THE LONGEVITY HEDGING MARKET

HOWARD KEARNS: What are the implications for insurance/ reinsurance longevity reserving and pricing?

PROFESSOR BLAKE: The pandemic could increase the uncertainty concerning future mortality rates: long COVID could reduce life expectancy, while behavioural changes and medical advances could increase life expectancy. But these are medium- to long-term effects which could lead to a trend change in life expectancy, and it is not currently clear in which direction.

However, the Solvency II framework has a one-year-ahead time horizon. It seems unlikely that an increase in downside risk as measured by VaR would justify an increase in solvency capital for insurers/reinsurers under Solvency II.

This explains why longevity pricing has not changed as a result of the pandemic, and it is unlikely that it will change in the near future. Most insurers and reinsurers I have talked to believe this.

// ...longevity pricing has not changed as a result of the pandemic, and it is unlikely that it will change in the near future. //

INNOVATION IN THE LONGEVITY HEDGING MARKET

HOWARD KEARNS: Is it possible to bring capital markets investors to the market? Would this need more liquidity, or short-dated transactions?

PROFESSOR BLAKE: The longevity market is growing strongly and has executed more than $600bn of pension risk transfers globally, mainly in the UK, the US, the Netherlands and Canada. But it is currently a market dominated by insurers and reinsurers.

The biggest remaining challenge in developing the longevity market as a global capital market with adequate liquidity is to attract sufficient numbers of external investors. The key attraction of assets linked to longevity risk is that their returns are uncorrelated with those on conventional asset classes such as equities, bonds and real estate. This makes them an important new risk-diversifying asset class.

The problem is that investors are still wary of longevity-linked assets because they are concerned that those offloading the longevity risk – the insurers and reinsurers – know much more about the risk than they do, and they are worried they will be sold a 'lemon'. This is an example of asymmetric information where one party to the contract knows much more than the other. The classic solution to this problem is for the insurer or reinsurer to 'keep some skin in the game' by co-sharing the risk with investors using vehicles such as 'sidecars'[10]. These have been used in the longevity market since late 2017, when Athene Holding Ltd and Voya Financial executed a sidecar involving $19bn of annuities[8].

Investors currently using sidecars to access the longevity market include sovereign wealth funds, family offices, high net worth individuals and investors who have previously owned insurance-linked securities. But we clearly still have a long way to go to reach even $1trn of longevity risk transfers, let alone the $60trn to $80trn that is estimated to be currently locked away in global corporate pension plans and insurers' annuity books[9].

HOWARD KEARNS: Could there ever be a two-way market for longevity risk?

PROFESSOR BLAKE: The longevity market is never going to be a market with two-way prices offered by market-makers, as in the case of publicly traded bonds or shares – at least not any time soon.

Sidecars are short-dated vehicles and do not have any liquidity. They are set up using a special purpose vehicle and have a maturity of two to three years. This is a step forward: we now know that longevity risk can be transferred effectively using short-dated instruments.

The next step would be for longer-maturity instruments, with the cedant insurer/reinsurer agreeing to buy back from the external investor on terms that are set in the contract.

After that, the next step would be a bulletin board (or matched bargain) system as used in some markets for very illiquid securities. Bids and offers (and volumes) are posted on the bulletin board and when a bid and offer price match, a deal is executed. This is likely to be as far as the market could develop in the near to medium term.

In the longer term, it is possible that an even more liquid market might develop. Real estate investment trusts (REITs) could provide a model for doing this. The underlying investments in REITs are lumpy and very heterogenous, yet REITs are traded on public markets. Mortgage-backed securities provide another example. In this case, mortgages with similar profiles in terms of credit risk and other characteristics are packaged up and sold off to investors. It seems reasonable to expect, in due course, that a similar approach might occur in the longevity market.

HOWARD KEARNS: For a long time, longevity indices have seemed like the answer to a lot of the market's problems – they would potentially create a liquid two-way market, allow for shorter-dated transactions, give a clear price for longevity, allow us to observe price volatility, and enable schemes to enter transactions quickly and cheaply. Why have index initiatives failed in the past? What could we do differently?

PROFESSOR BLAKE: Almost since the beginning of the longevity market in 2006, various commentators have argued that the best way to get the market to take off would be to design standardised instruments using longevity indices based on national mortality data. And the first attempt to do this was the LifeMetrics indices set up by JP Morgan, the Pensions Institute and Towers Watson. JP Morgan did go on to execute some transactions using 'q-forward' contracts based on the LifeMetrics indices beginning in 2008.

[8] Athene Holding Ltd. Enters into Reinsurance Agreement with Voya Financial, 12 December 2017, Athene Holding Ltd.
[9] Strategy for increasing the global capacity for longevity risk transfer: developing transactions that attract capital markets investors, A Michaelson and J Mulholland; The Journal of Alternative Investments, Summer 2014.

Unfortunately, this initiative was premature for several reasons. First, the knowledge and understanding of these risk transfer products by pension fund trustees was limited. While the products provided a high degree of hedge effectiveness (at around 85%), there was still some basis risk: that is, the mortality experience of the pension scheme members was not perfectly correlated with the underlying index. The trustees did not fully understand this – they said that if they were paying for a hedging solution it had to be 100% effective, which is why they preferred full indemnification solutions like the buy-ins and buy-outs offered by insurers.

Similarly, the regulators were not brought in at the early design stage of these instruments, so they too did not understand the basis risk or accept that these instruments provided adequate hedge effectiveness. As a result, they did not give the regulatory capital relief that the insurers and reinsurers had expected.

Knowledge of the market has improved significantly since then. It turned out to be sensible for insurers to take the risk off pension funds using buy-ins and buy-outs. They could therefore aggregate the risk and offload it onto reinsurers, who would then seek to co-share the risk with external investors using sidecars. Regulators are also now better informed and have begun to allow Solvency II capital relief on index deals. A good example is the Dutch regulator.

However, there is currently a big increase in concentration risk – global longevity risk is being concentrated among a small number of insurers and reinsurers. Global regulators ought to be concerned about this and be willing to support measures that help transfer the risk out into the wider capital markets.

Dr Richard Sandor, one of the fathers of the financial futures market and founder of Chicago Climate Exchange, argues that there are seven stages in the evolution of any financial market[10]:

1. Structural change–leading to a demand for capital
2. Development of uniform commodity/security standards
3. Introduction of legal instruments providing evidence of ownership
4. Development of informal spot and forward markets
5. Emergence of formal exchanges
6. Introduction of organized futures and options markets
7. Proliferation of over-the-counter (OTC) markets, deconstruction[11]

I would argue that in the longevity market, we are at the beginning of stage 4, the development of informal spot and forward markets. This means that we are halfway there. Not bad for a market that only started in 2006.

HOW CAN PENSION SCHEMES HEDGE THEIR LONGEVITY RISK TODAY?

HOWARD KEARNS: **As exposures to interest rate and inflation risk have been hedged, so longevity risk has become the last significant liability risk that many schemes now face. There are three approaches that can be taken to mitigate against longevity risk:**

1. **Build a reserve:** A scheme could target a funded status higher than 100% in order to build in a buffer for any future changes in longevity, but it is difficult to know what size of buffer may be needed.
2. **An insurance buy-in:** This effectively insures longevity risk. However, it also carries the risks inherent more generally with buy-ins and, unless a scheme is very well funded on a prudent basis, could significantly delay the time it takes to reach the endgame, or even make it unachievable.
3. **Hedging via a longevity swap:** In the past, longevity swaps were only available to very large pension schemes, but today schemes with assets in excess of £500m can implement longevity swaps. Insight is aiming to make longevity swaps available to all pension schemes, regardless of size.

Figure 2: Longevity risk has become the dominant remaining risk for many schemes[12]

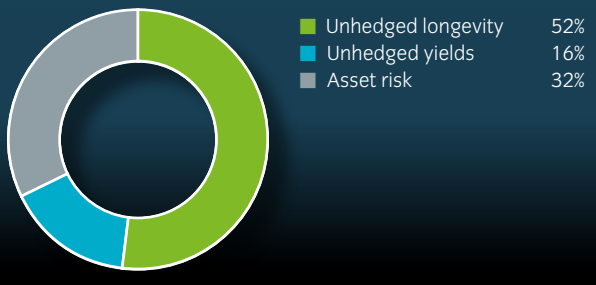
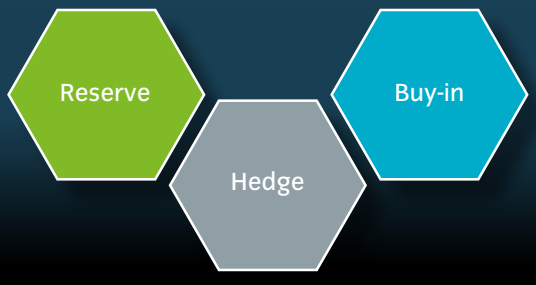


Figure 3: Three ways for pension schemes to mitigate longevity risk



[10] In Search of Market Trees: Market Architecture and Tradable Entitlements for CO2 Abatement, R.L. Sandor, 1994; in Combating Global Warming: Possible Rules, Regulations, and Administrative Arrangements for a Global Market in CO2 Emission Entitlements (New York: United Nations Conference on Trade and Development).
[11] The ability to decompose an asset into its constituent components and trade these separately.
[12] Club Vita, April 2021. Based from information in TPR's Scheme Funding Analysis 2020 and 2010 and the PPF's Purple Books, approximately converted. Figures show the drivers that would increase the deficit in the average of the worst 5% (1 in 20) outcomes.

FURTHER READING

The case for longevity hedging

If longevity risk is not hedged, the implications for a pension scheme could be significant – it could lead to a delay in reaching target funding or increased deficit contributions. A longevity swap could help a scheme avoid these outcomes.

Longevity hedging – how Insight can help you manage the biggest unhedged liability risk

We explain how pension schemes can hedge longevity risk and provide a case study on how we have helped a scheme to manage this risk.

Longevity hedging for pension schemes – investment implications and new developments

Pension schemes are increasingly considering whether and how to hedge longevity risk. This paper outlines how longevity swaps work, their implications for pension scheme strategy, and explains key developments in the market.

IMPORTANT INFORMATION

RISK DISCLOSURES

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Longevity

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