

THE RISK OF LIVING LONGER

Thank you for joining us – the webinar will start shortly



Douglas and Uli ask the ultimate question of human longevity for financial institutions: How long can we go?



Series program

| Session 1 April 16 th , 2024 | An introduction to the question of human longevity: how long can we go? | • | Dan Ryan, Just Group Phil Newman, Longevity.technology | <u>Recording</u> <u>here</u> |
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| Session 2 May 7 th , 2024 | The biology of aging | • | Richard Faragher, University of Brighton Niharika Duggal, University of Birmingham | <u>Recording</u> <u>here</u> |
| Session 3 May 28 th , 2024 | Cancer research | • | Gao Xiao, SCOR Catherine Pickworth, Cancer Research UK | Today! |
| Session 4 June 18 th , 2024 | Biological clocks | • | Peter Joshi, Humanity Inc | <u>Register</u> <u>here</u> |
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For full details and registration for the series,

visit:

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Poll question

"How will cancer research contribute to changes in life expectancy for a 60-year-old in 20 years' time?"

- Reduce life expectancy
- Increase by less than 2 years
- Increase by 2 to 5 years
- Increase by 6 to 10 years
- Increase by 11 to 20 years
- Increase by more than 20 years



THE RISK OF LIVING LONGER Session 3: Cancer Research









Douglas Anderson (Chair) Founder & Chief Visionary Officer, Club Vita Ulrich Stengele (Chair) Chief Actuary, Nationwide Financial

Gao Xiao Epidemiologis

Epidemiologist, SCOR Catherine Pickworth

Research Evaluation and • Impact Manager Cancer Research/UK

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Causes of death over time

(Age standardised deaths per 100,000, ages 65+)



What are we trying to understand?



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A brief history of cancer



2500BC 2000BC 400BC 50AD Cluster of cancer cells in lymph nodes





NH₂





Trends in the index of 10-year survival for all cancers combined, adults, England and Wales, 1971-2018



Source: LSHTM cancer survival group

Cancer survival is not equal across cancer types

100 80 Survival (%) 60 40 20 0 Lung Bladder Rectal Thyroid Anal Colon Pancreatic Oesophageal Bowel Stomach Myeloma Urinary tract (excl. bladder) Leukaemia Kidney and Urinary Tract Non-Hodgkin Lymphoma Hodgkin Lymphoma Melanoma Skin Kidney (excl. renal pelvis) CANCER

Cancer Site

Ten-Year Age-standardised Predicted Survival for England, Persons aged 15-99: (Year of Diagnosis: 2013-2017)

Stage of diagnosis and cancer survival



Earliest stage = stage 1; latest stage = stage 4. Data is age-standardised net survival for adults (aged 15 to 99 years) in England in 2015-2019 followed up to 2020. Source: Cancer survival in England, NHS Digital 2022.

cruk.org Together we will beat cancer













Market Failure

Funding



Mechanistic Insight



Protracted Timelines









Market Dynamics



Implementation

Best Estimate: Mortality improvement trend methodology





Extreme Scenario Analysis: Cancer Footprint

Purpose: to evaluate the potential future impact of emerging technologies on SCOR's current portfolio with long-term biometric risk exposure.





Three emerging technologies having a material impact on cancer

Liquid Biopsy





Cancer Vaccine

Immunotherapy





Technologies at laboratory research stage without solid results in clinical trials. Unknown future technologies in theory.



Two Cancer Footprint Scenarios



The Art & Science of

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Data and Modeling – Changes in Cancer Incidence and Mortality

Scenario 1: multi-cancer early detection tests and other new detection technologies become more accurate and are distributed widely at low cost in the next 10 years.

- Shifts part of late-stage cancers (stages III & IV) to early stages (stages I & II): Reduce mortality
- Shifts 50% of stage I & II cancers to pre-cancer: Reduce incidence and mortality

Scenario 2: 75% reduction in both cancer incidence and mortality over the next 30 years.





US Population Age-Adjusted Mortality Rates by Educational Attainment



Business Impact on main lines of business

| Line of Business | Scenario 1 | Scenario 2 | |
|----------------------|---------------------------------|---------------------------------|--|
| Mortality | +++ Large Positive Impact | +++ Large Positive Impact | |
| Longevity | Large Negative Impact | Large Negative | |
| Long Term Care | - Small Negative Impact | Large Negative Impact | |
| Critical Illness* | - Small Negative Impact | +++ Large Positive Impact | |

* For CI markets covering stage I thyroid cancer as major condition.



Data and Modeling – Archimedean Copula model

Modelling: use **hierarchical Archimedean copula** to derive the marginal mortality intensities of each cause of death allowing for **asymmetric dependence among competing risks** within-cohorts. The marginal mortality intensities of all cohorts are then grouped together and fitted using a **Lee Carter model**.



The hierarchical structure of HAC for mortality and longevity impact assessment



Modeling Result – post-shock mortality intensities

Mortality intensity by cause of death

Mortality intensities by cause of death and aggregated for UK longevity insured male, age 80, for scenario 1



Aggregated mortality intensity



Mortality intensities for each cause for the longevity UK insured male population proxy, age 80, for scenario 1

Modeling Result – post-shock mortality intensities

Mortality intensities by cause of death and aggregated for UK longevity insured male, age 80, for scenario 2.



Aggregated mortality intensity





Share of cancer research funding per sector (2021)





From Discovery to Treatment

Cancer-causing virus in chickens (1911)

- Triggered a wave of research
- 57 countries worldwide analyse EGFR for lung cancer
- 11 new cancer drugs
- Treatment for 6 types of cancer (including pancreatic, breast, bowel)
- Erlotinib is a WHO essential medicine
- Herceptin and other targeted drugs in second wave of research identifying HER2

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