

Thank you for joining us – the
webinar will start shortly

COVID-19 longevity scenarios: *a bump in the road or a catalyst for change?*

March 11th, 2021

10am PT / 1pm ET



@ClubVita



[linkedin.com/company/club-vita](https://www.linkedin.com/company/club-vita)

COVID-19 longevity scenarios: *a bump in the road or a catalyst for change?*



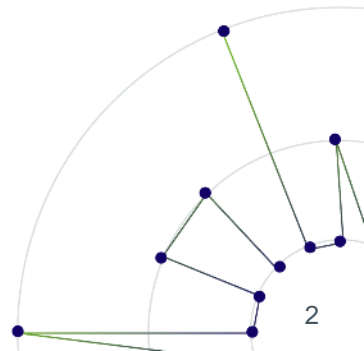
Richard Brown
Canada COO



Matthew Smith
Head of Divisional R&D

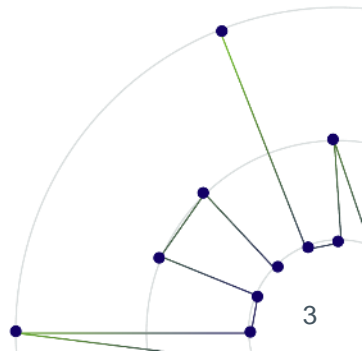


Anne Soh
Vice President & Plan Actuary



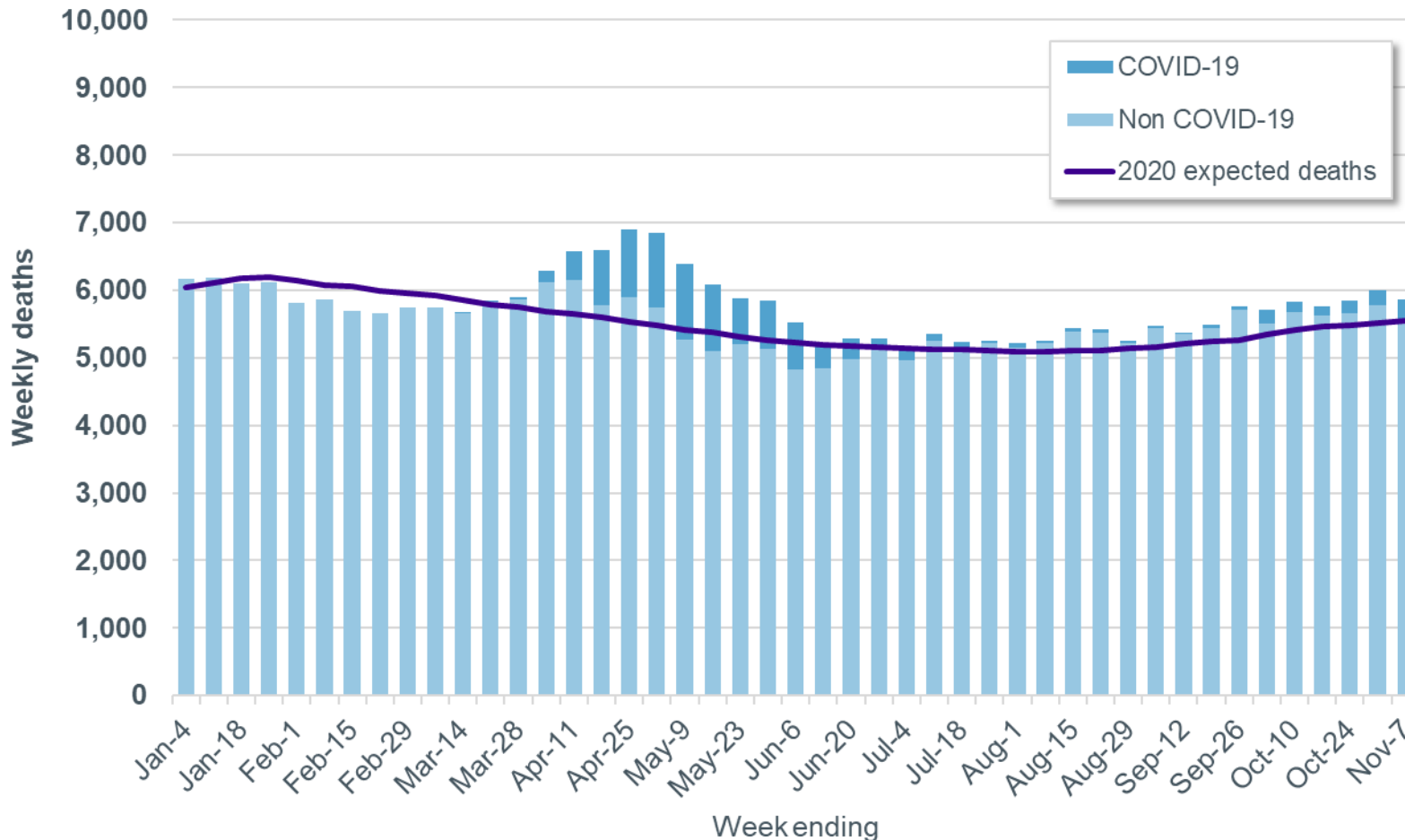
Agenda

1. Impact of COVID-19 on Canadian mortality during 2020
2. Current state of the pandemic
3. Scenario modelling for COVID-19
4. Using scenario analysis in practice



Impact of COVID-19 on Canadian 2020 mortality

Canadian estimated weekly deaths to November 7, 2020

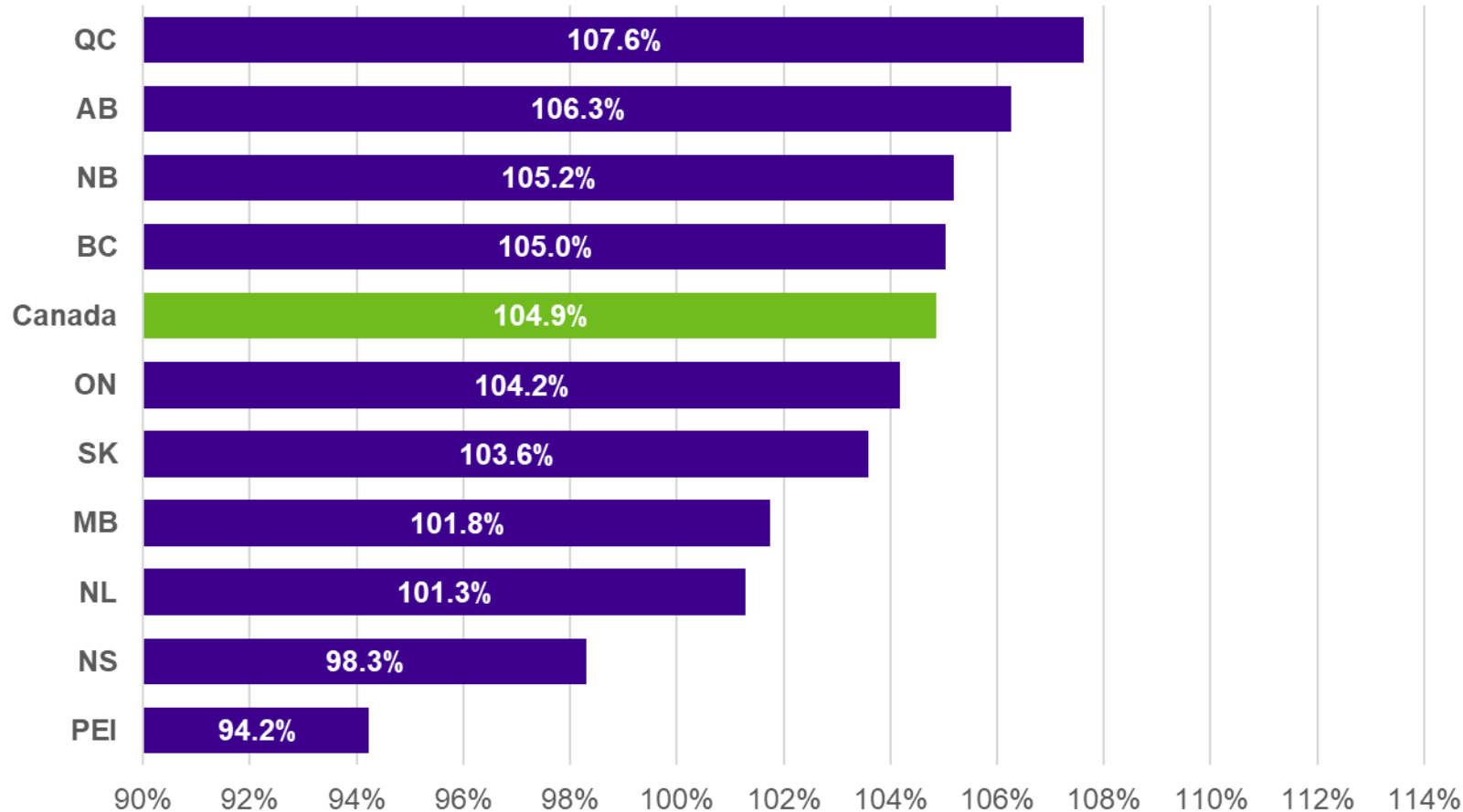


- Almost 14,000 more Canadian deaths than expected over late-March to early November
- Approximately 10,500 COVID-19 deaths reported over the same period
- COVID-19 deaths represent ~75% of the excess



Impact of COVID-19 on Canadian 2020 mortality

Ratio of 2020 deaths to December 5, 2020 to expected deaths based on weekly data for 2015-2019

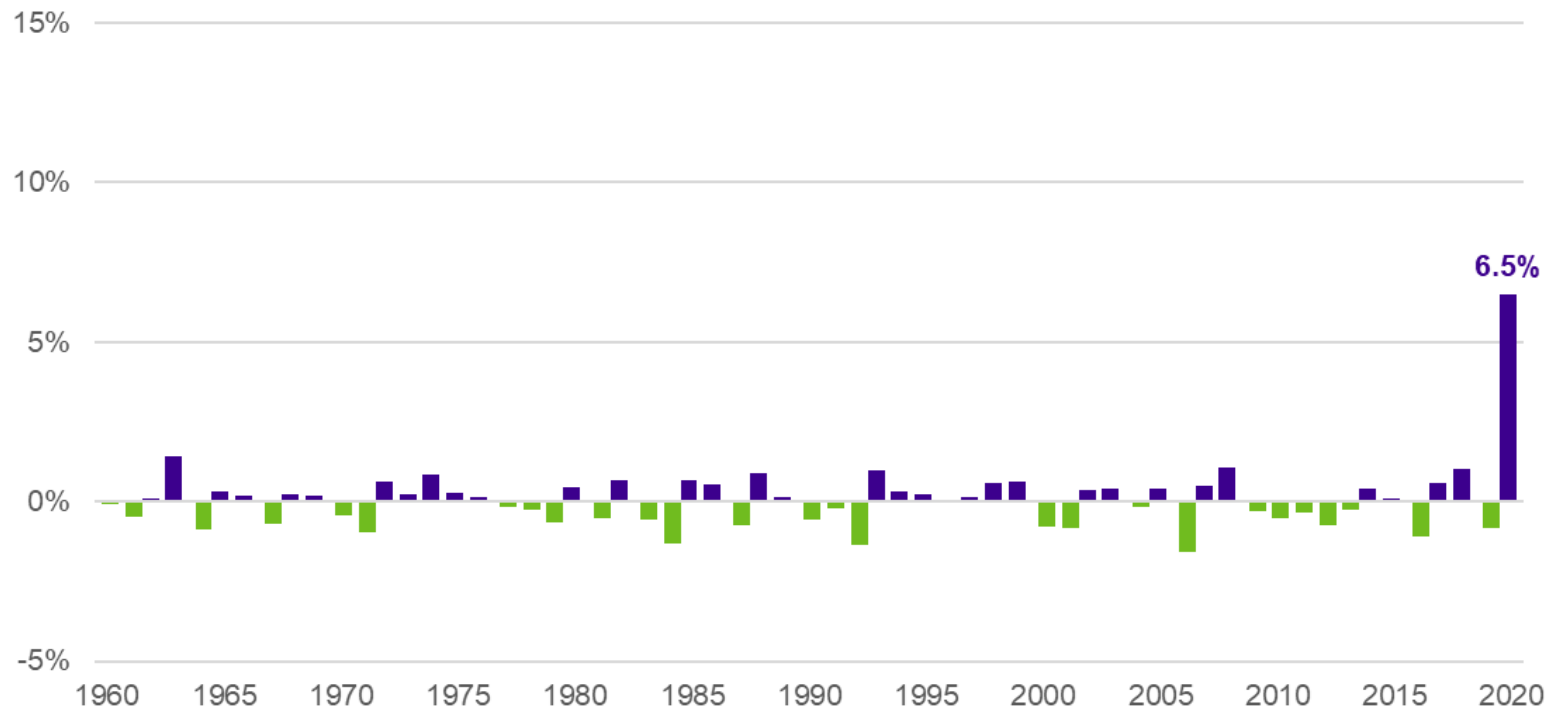


- COVID-19's impact on Canadian mortality has varied across the country
- 2020 deaths only ~1% higher than expected for the Atlantic provinces combined
- Québec has seen the largest increase (particularly in and around Montréal), followed by Alberta



Historical context of 2020 experience

Canada: excess deaths versus underlying trend



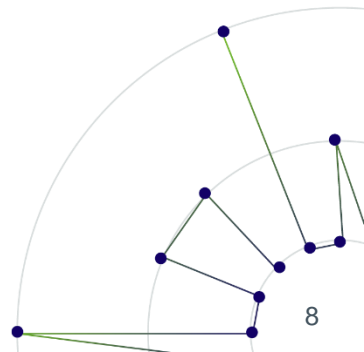
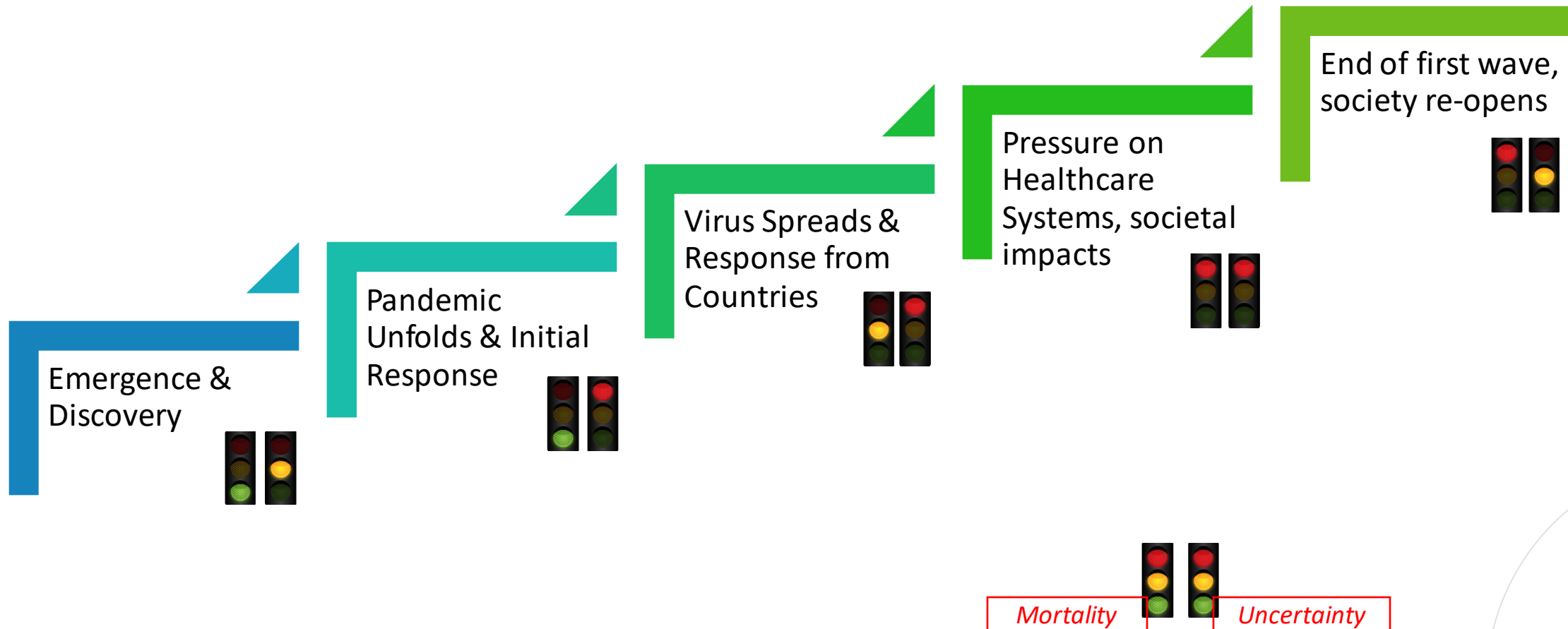
- Club Vita estimates actual 2020 deaths to exceed expected by ~6.5%
- Increase is more than 4-times higher than next highest increase since the 1960s
- In contrast, estimated 2020 increase for the US and UK is 14.8% and 13.5%, respectively

In isolation 2020 excess deaths will not significantly affect pension plan liabilities

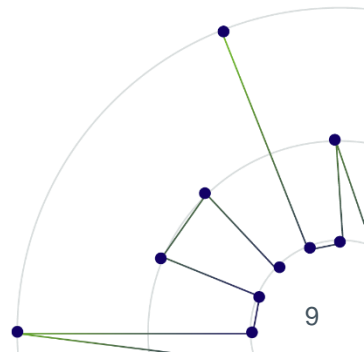
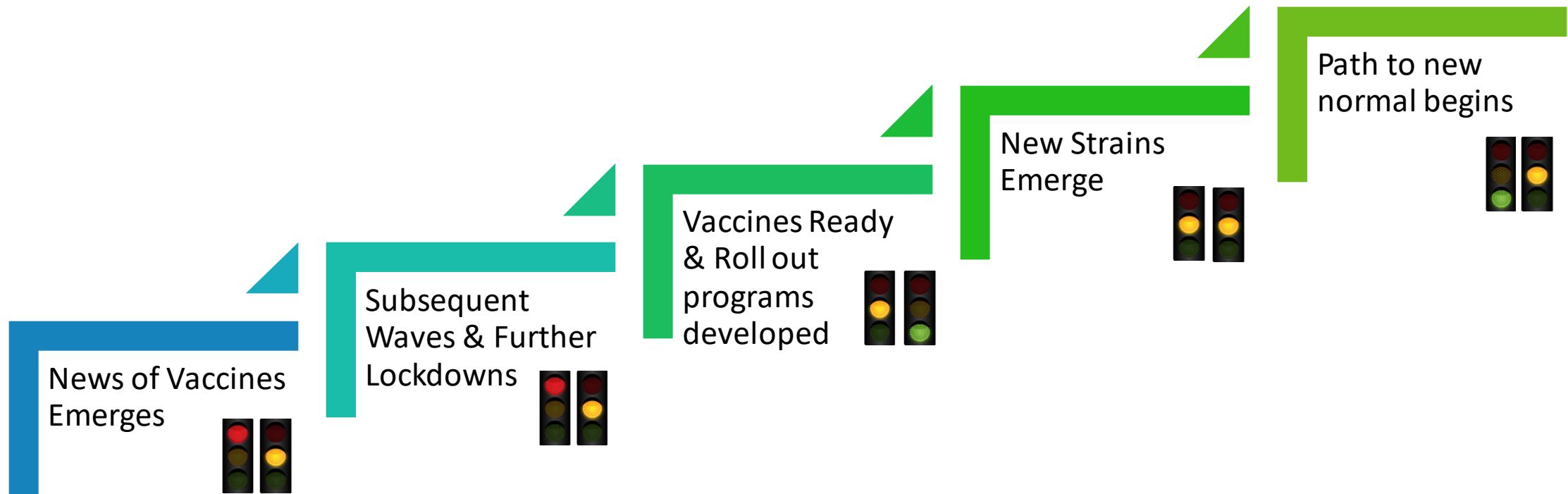


Current state of the pandemic

COVID-19: The Pandemic Story (part I)



COVID-19: The Pandemic Story (part II)



Vaccination Journey

How many are there?

- ❖ Pfizer-BioNTech
 - ❖ MODERNA
 - ❖ AstraZeneca
 - ❖ NOVAVAX
 - ❖ Johnson & Johnson (Janssen)
 - ❖ Sputnik V
- ... and more vaccines in development

Efficacy from Trials






















General efficacy varies but is good
Efficacy is excellent versus severe disease

Early Impact

Promising signs in Israel: using Pfizer, strong roll-out to the elderly with proportion of cases in over 60s dropping materially in last few weeks

UK: although it's early, the proportion of deaths emerging for people in their 80s has noticeably fallen since the start of February. This is consistent with the vaccination roll-out plans

How some of the Covid-19 vaccines compare

Company	Type	Doses	Storage
 Oxford Uni-AstraZeneca	Viral vector (genetically modified virus)	x2 	 2 to 8°C (6 months)
 Moderna	RNA (part of virus genetic code)	x2 	 -25 to -15°C (7 months)
 Pfizer-BioNTech	RNA	x2 	 -80 to -60°C (6 months)
 Gamaleya (Sputnik V)	Viral vector	x2 	 -18.5°C (liquid form) 2 to 8°C (dry form)
 Sinovac (CoronaVac)	Inactivated virus (weakened virus)	x2 	 2 to 8°C
 Novavax	Protein-based	x2 	 2 to 8°C
 Janssen	Viral vector	x1 	 2 to 8°C (3 months)

Approved in Canada

Source: UK government, Reuters

BBC

New Variants

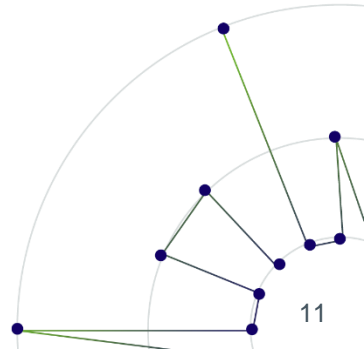
What are they? Viruses constantly change through mutation, and new variants of a virus are expected to occur over time. Multiple variants of the virus that causes COVID-19 have been documented

How many are there? There are three key ‘variants of concern’:

- B.1.1.7 identified in the UK :
 - Likely to become dominant in US, Canada
 - B.1.1.7 almost certainly more transmissible and *possibly* associated with higher mortality
- B.1.351 (South Africa) and P.1 (Brazil) more concerning with potential evasion of immunity

Vaccine Efficacy Vaccine efficacy potentially reduced, especially for mild disease. But we need to carefully define success. For example, a vaccine which has 50% efficacy against mild disease, but 95%+ efficacy against severe disease or death would still be a major achievement.

What it means Overall, new variants represent a major set-back if the goal is to eradicate COVID-19. The number of vaccinated people developing *some* disease may remain high and transmission will continue, but still high hopes that severe disease will be significantly reduced. Further mutations are inevitable



Global Comparison Themes

- Vaccine Roll Out

Israel & UAE lead the way

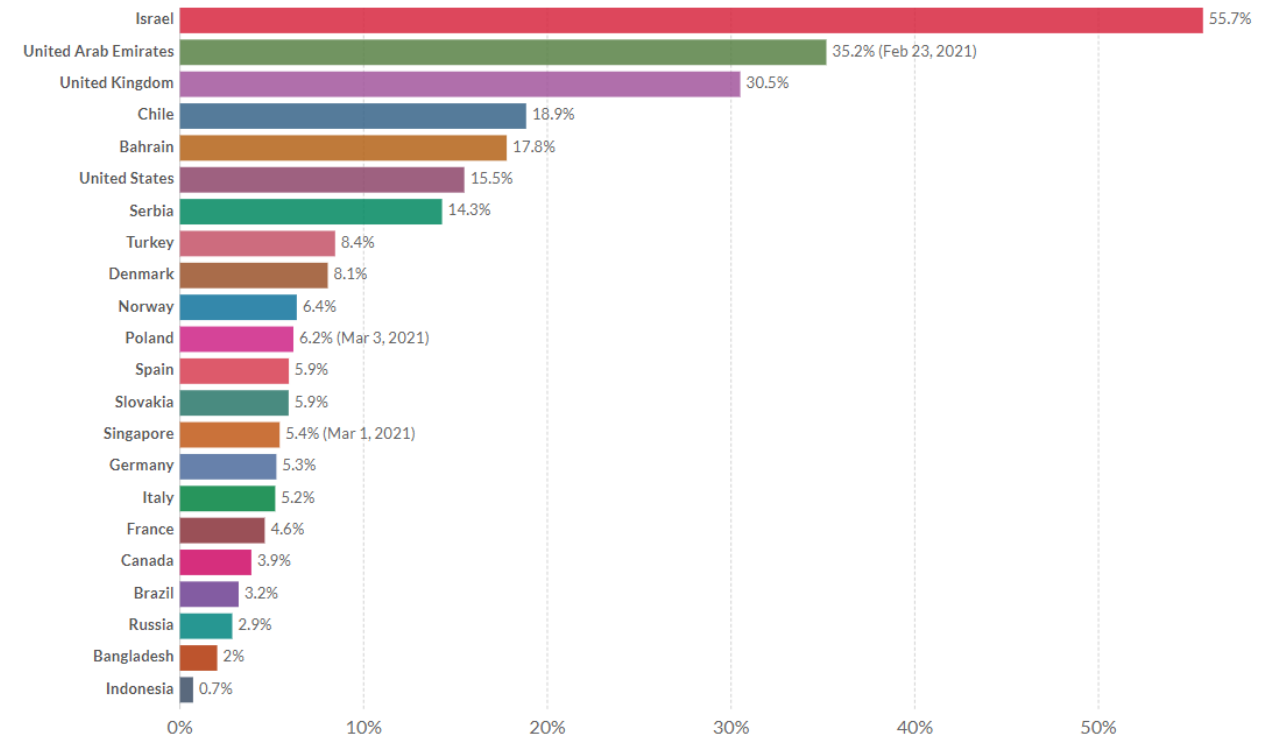
Relatively fast roll outs in UK & US

Slow roll outs in continental Europe, Asia & Canada

Share of people who received at least one dose of COVID-19 vaccine, Mar 2, 2021

Share of the total population that received at least one vaccine dose. This may not equal the share that are fully vaccinated if the vaccine requires two doses.

+ Add country

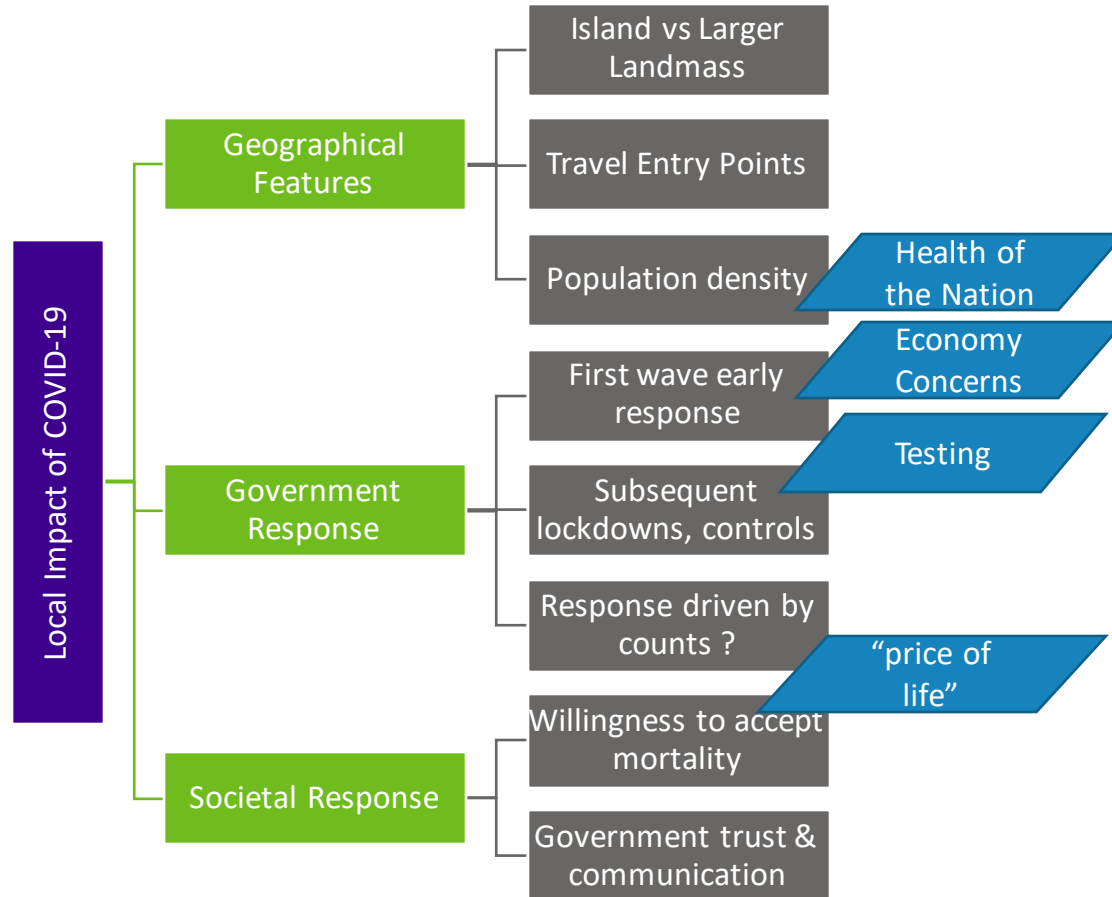


Source: Official data collated by Our World in Data - Last updated 4 March, 11:43 (London time)

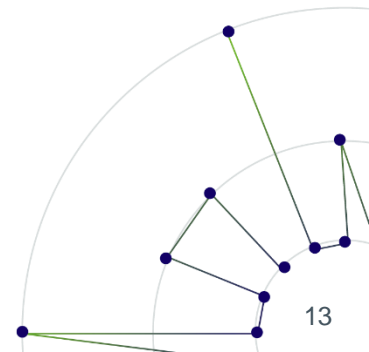
OurWorldInData.org/coronavirus • CC BY

Global Comparison Themes

- Relative Impact by Country



Examples of countries with a relatively poorer COVID-19 mortality outcome	Examples of countries with a relatively better COVID-19 mortality outcome
US UK Italy Spain Mexico Brazil	Singapore China Thailand New Zealand Australia South Korea



What is the new normal?

Zero COVID: Global (or local) elimination of COVID

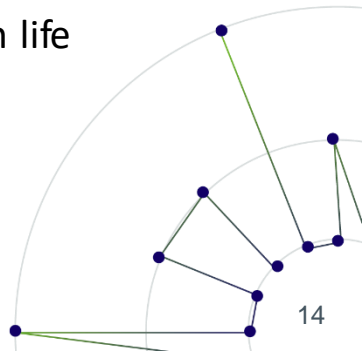
- Global elimination very unlikely given disease features
- Local elimination possible but permanent restrictions on travel requirement
- Regular vaccinations may be required

Near Zero COVID

- Herd immunity levels drive suppression alongside a very high vaccine take-up rate
- COVID-19 becomes a relatively rare disease (similar to other diseases we vaccinate for)
- Regular vaccinations may be required

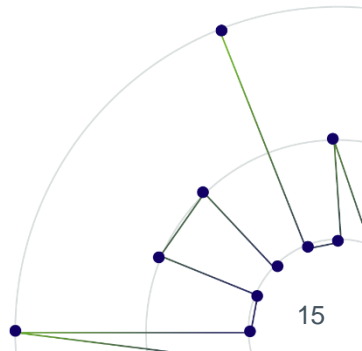
Endemic COVID

- Vaccine protects against severe disease so mortality risk *greatly* reduced once everyone has either had vaccine or had disease
- Mutations mean vaccines will be imperfect but still effective
- Example: COVID may even become like a “common cold”, experienced at early ages and regularly encountered through life
- Outcome is dependent on mutations



Lessons Learned for Pandemic Modelling

Overweighting to Influenza	Influenza has long been the foundation for insurance risk pandemic scenario modelling and the industry should recognize the limitations of this approach
Importance of Geography	Geographical features, government intervention, societal response have proved to be much more important than previously considered
“Disease X”	Although the next disease may have respiratory features similar to influenza and coronaviruses, now is the time to expand our thinking into the next type of disease
Age Dependency	COVID-19 has impacted the world very differently to say the 1918 Spanish Flu in terms of age profile. Future modelling efforts should consider the extent that different diseases affect the age curve in different ways
Overweighting to COVID-19	And despite the above warnings, we should avoid being overweight to the most recent event

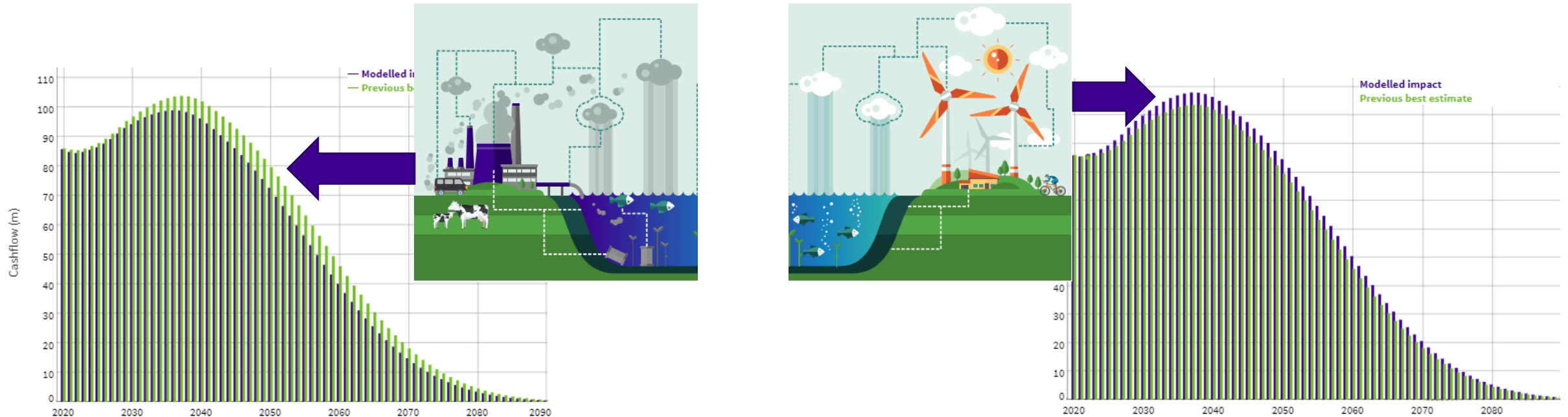


Longevity scenario modelling

Introduction to scenario modelling

Scenario modelling

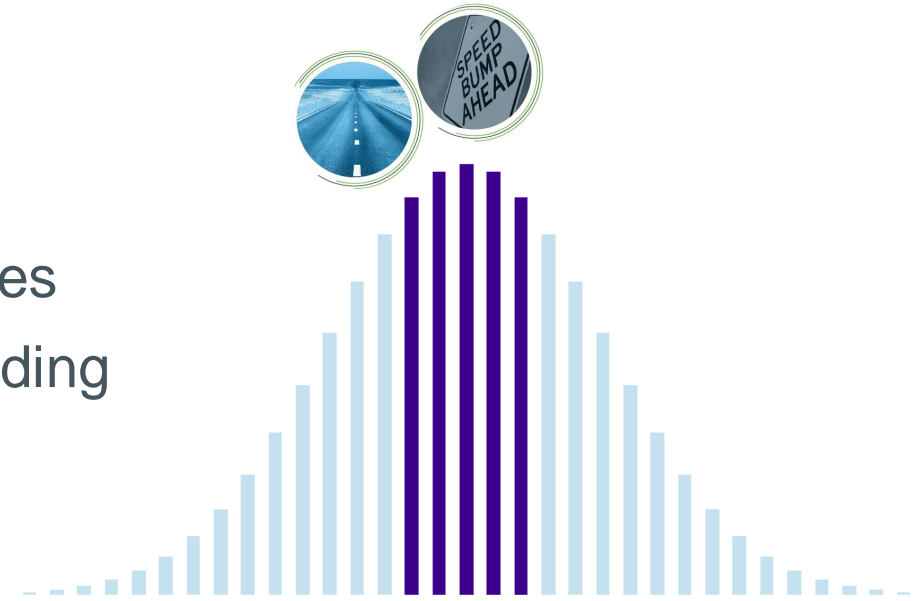
The process of assessing the effects of specific scenarios on a pension plan's future financial position.



Uses of scenario modelling

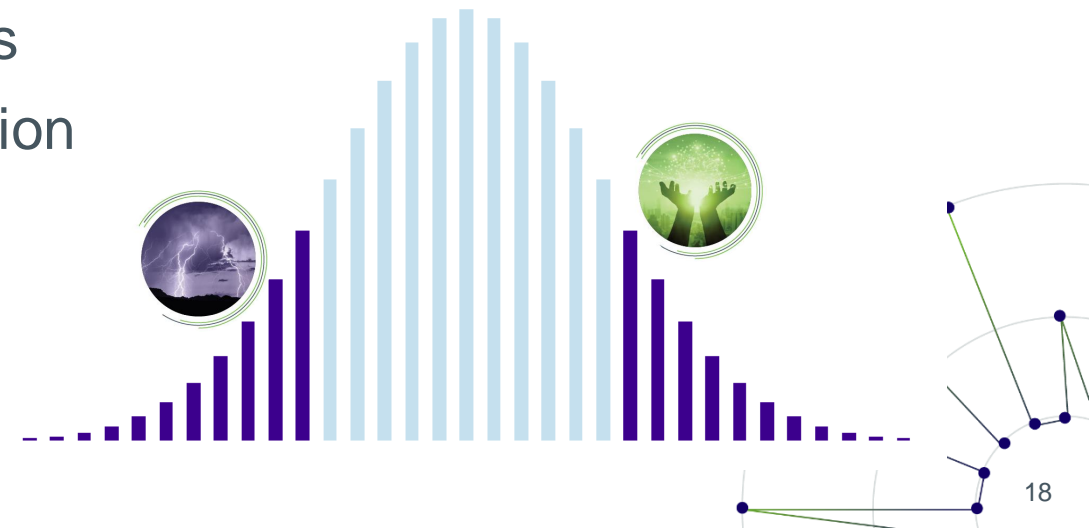
Middle ground

- Understand range of reasonable best estimates
- Insight into impact of demographic risk on funding and investment strategies

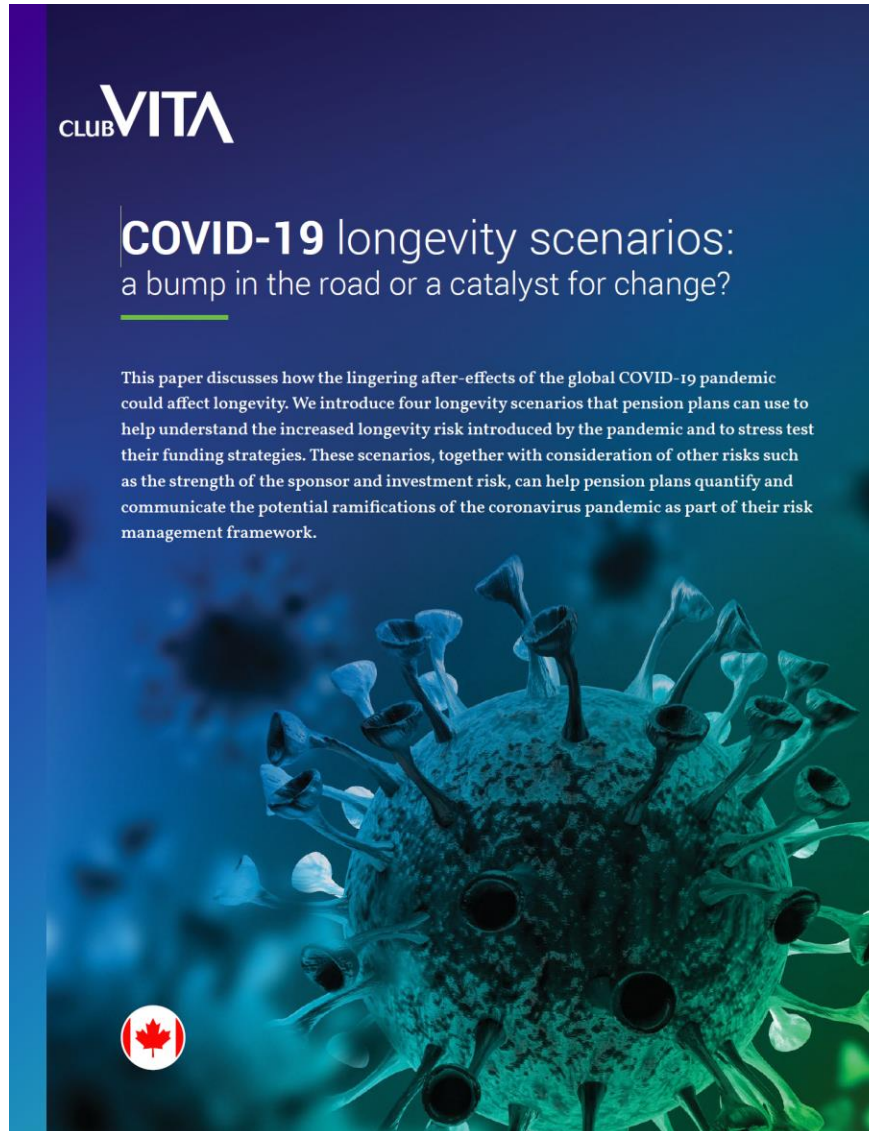


Extreme events

- Understand effects of lower probability events
- Identify unmanaged risk and possible mitigation strategies
- Test resilience of funding and investment strategies

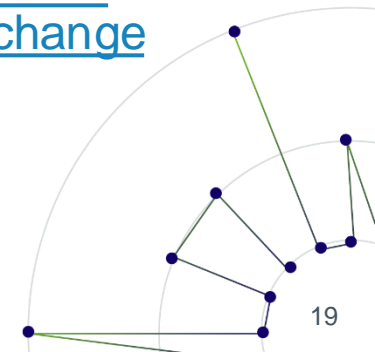


Club Vita research paper



Research paper and accompanying technical appendices

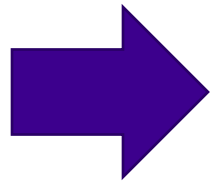
- Canada:
<https://clubvita.ca/Collaboration/Scenarios>
- US:
<https://www.clubvita.us/collaborative-research/covid-19-longevity-scenarios-a-bump-in-the-road-or-a-catalyst-for-change>
- UK:
<https://www.clubvita.co.uk/collaborative-research/covid-19-longevity-scenarios-a-bump-in-the-road-or-a-catalyst-for-change>



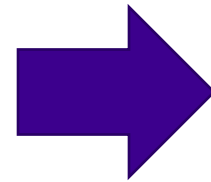
Calibration process







Define scenarios

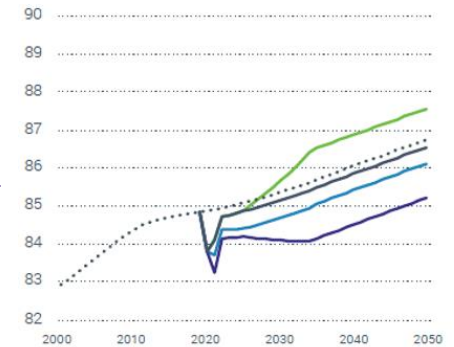
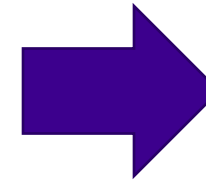


Distil available research on specific / similar events

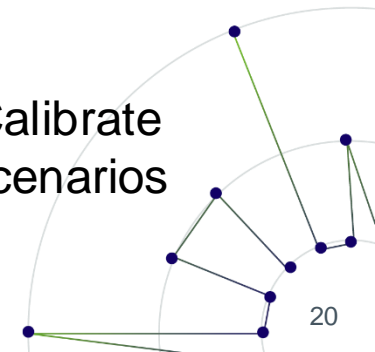


Key mortality drivers	
	Direct short-term risk of COVID-19
	Disruption to non-COVID medical care
	Changes to health and care systems
	Global Recession

Determine effects of specific events on key longevity drivers



Calibrate scenarios



Club Vita's COVID longevity scenarios



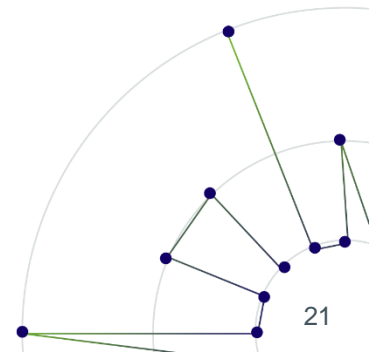
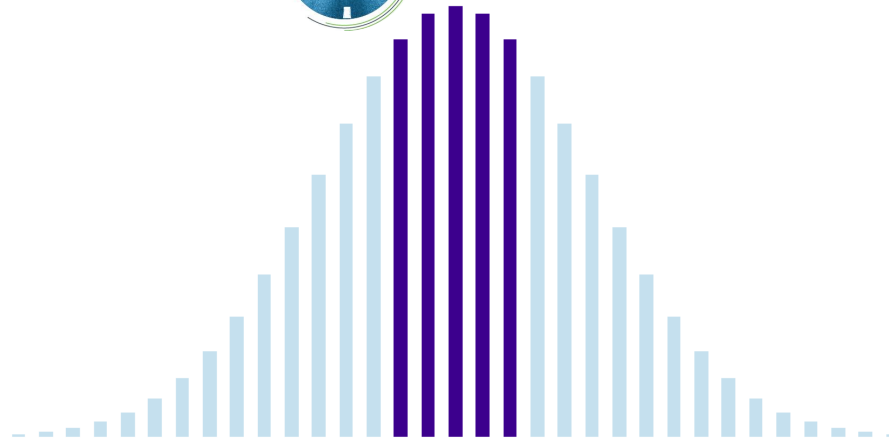
Bump in the Road

- Effective roll out of vaccine results in a swift recovery from the pandemic
- Marked increase in deaths in 2020 and 2021
- Then largely return to pre-pandemic trajectory
- ...but with a couple of “lost-years” of improvements



Long Road to Recovery

- Challenges to efficacy and take up of the vaccine result in prolonged effect of the pandemic
- COVID-19 related excess mortality continues through first half of 2020s
- Longer term disruption to non-COVID medical services: low levels of improvements in 2020s and 2030s
- Lower socioeconomic groups hardest hit



Club Vita's COVID longevity scenarios



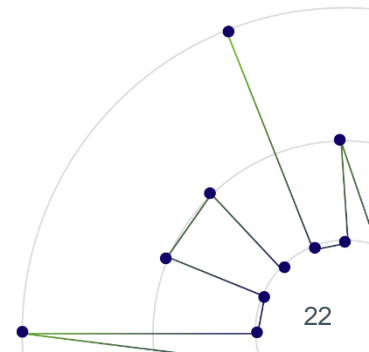
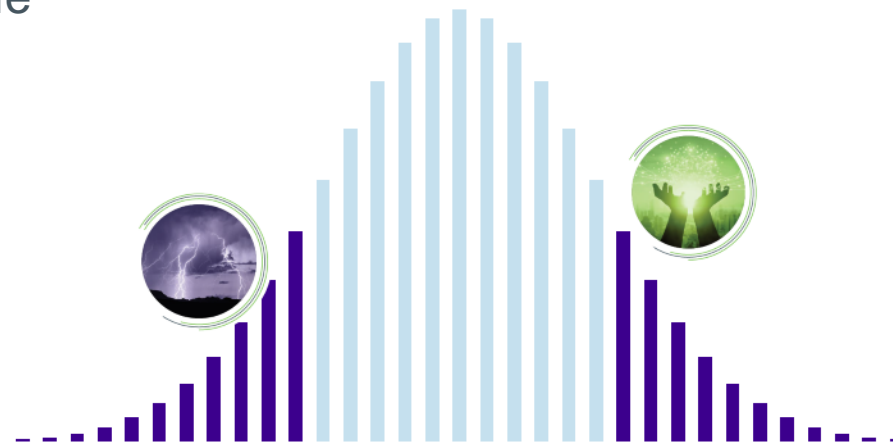
Healthcare Decline

- Initial optimism around the vaccine proves unfounded – adverse publicity limits uptake and new mutations limit effectiveness
- Persistent waves of COVID-19 mortality through 2020s
- Healthcare systems overwhelmed by each wave
- Massive disruptions to non-COVID medical treatments with no periods of catch up possible



Innovation in Adversity

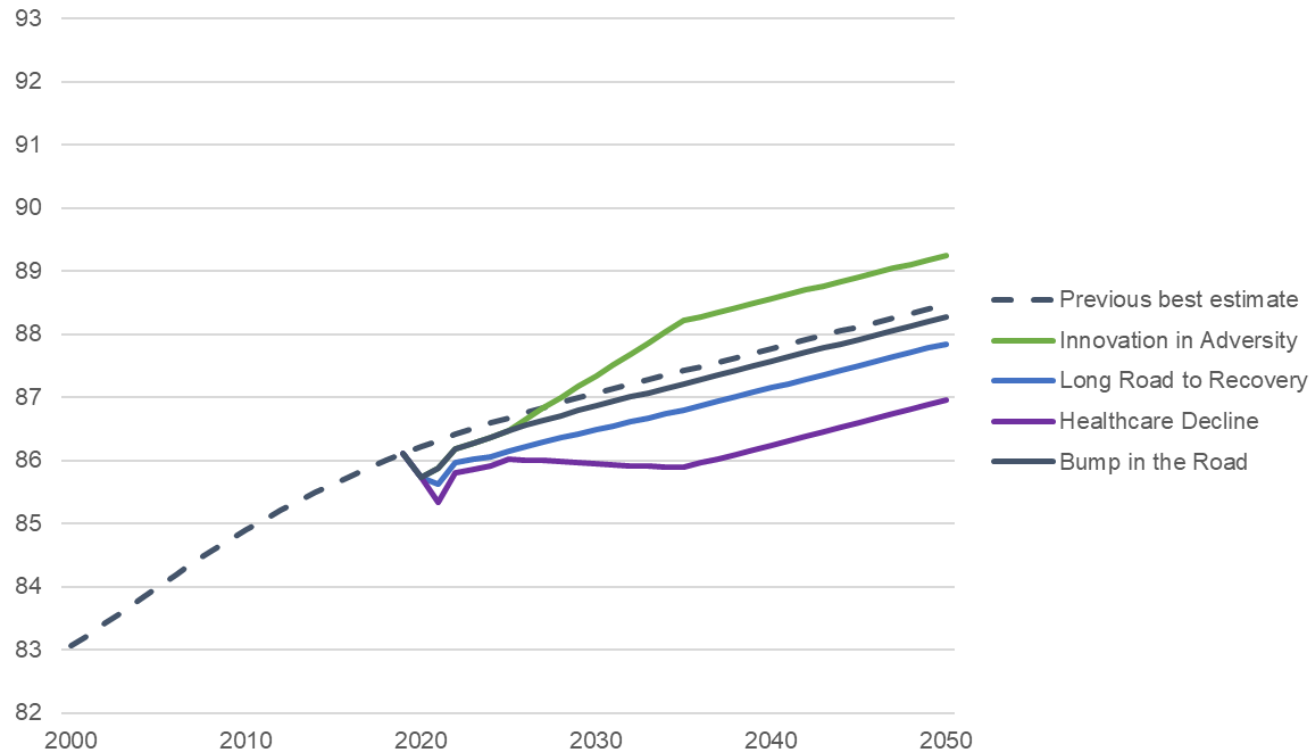
- Effective roll out of vaccine results in a swift recovery from the pandemic
- 'V-shaped' economic recovery allowing catch-up in lost years of improvements
- Lessons learned act as catalyst for longer term improvements – directly from medical advances and indirectly from efforts to address health inequality



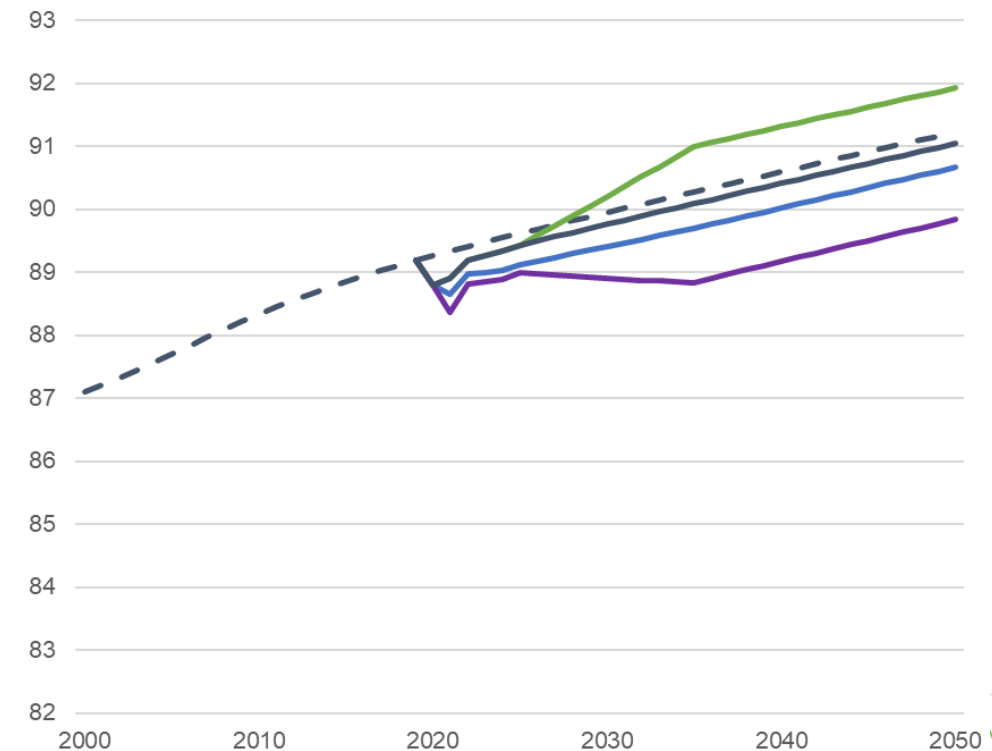
Comparison of scenarios

Period life expectancy from age 65

Men



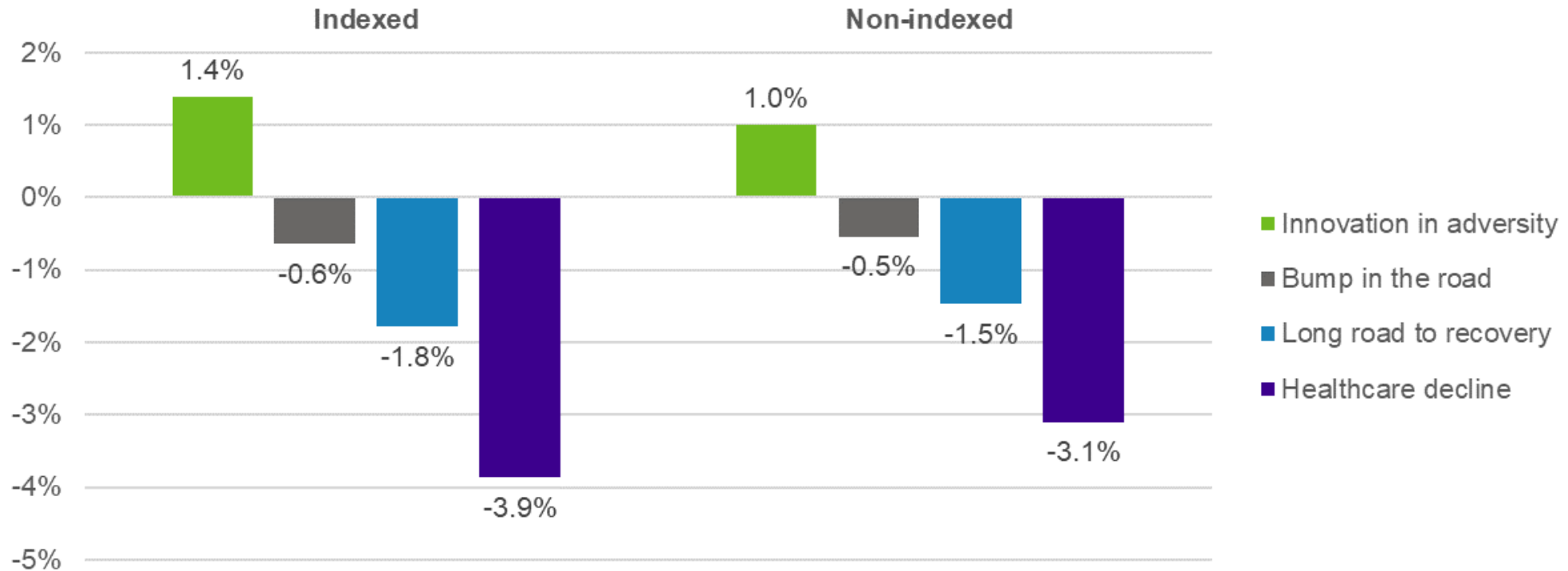
Women



Period life expectancy will only stay low if 2020/21 experience persists

Liability impact for “typical” plans

Liability Impacts (Typical Plans)

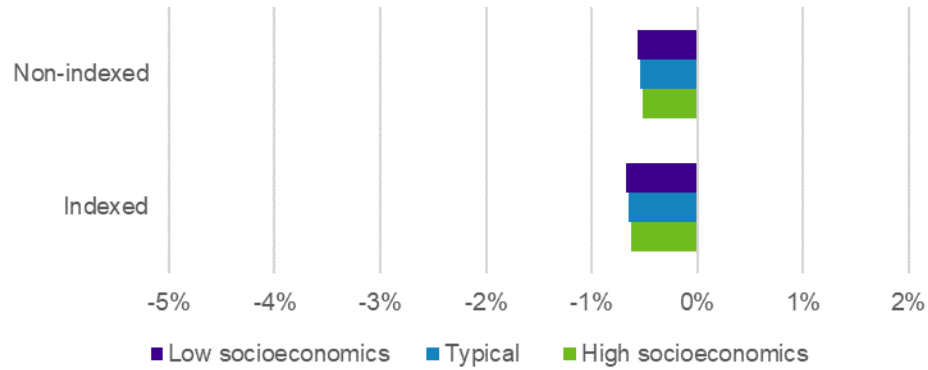


Liabilities will also be affected by changes to other demographics and financial conditions / outlook

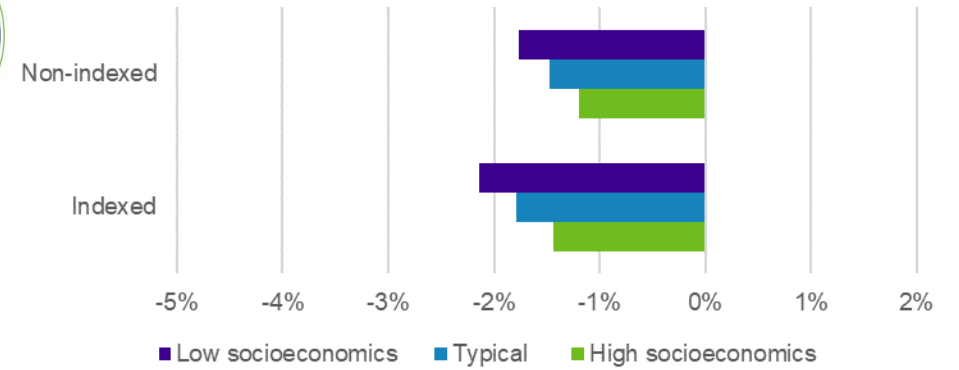
Liability impacts by socioeconomic mix



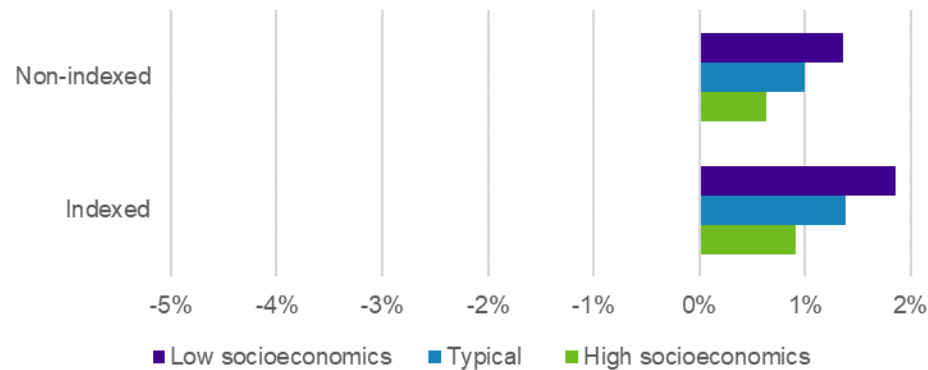
Bump in the Road



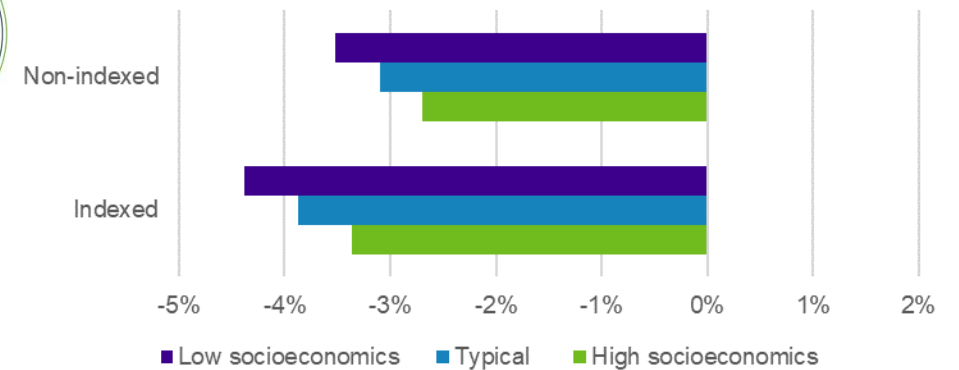
Long Road to Recovery



Innovation in Adversity



Healthcare Decline

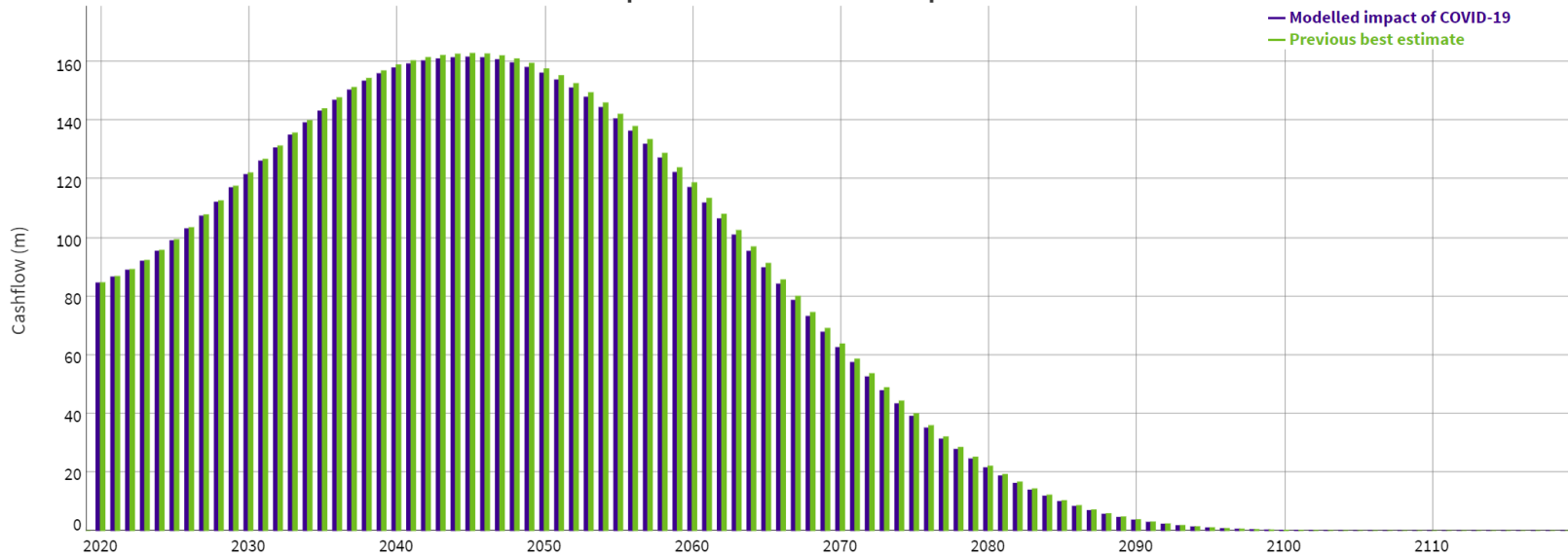


Calibration of scenarios



Bump in the road

Modelled impact of COVID-19 on annual plan cashflows



-0.64%

CHANGE IN PRESENT VALUE

-0.047 yrs

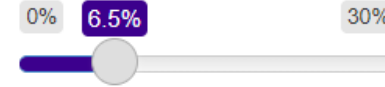
CHANGE IN DURATION

-0.22 / -0.2 yrs

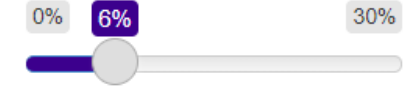
CHANGE IN AVERAGE LIFE EXPECTANCY

Immediate impact of COVID-19*

Year 0 (2020)

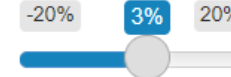


Year 1 (2021)

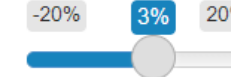


Longer term impact*

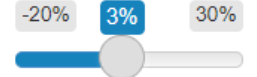
Initial



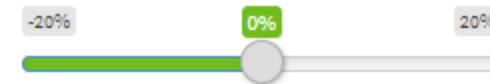
Intermediate



Ultimate



Socioeconomic differences*



*calibration has been simplified for ease of presentation

Dynamic scenario modelling

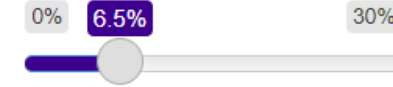
Larger impact in 2021?

Higher long term impact?

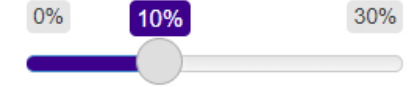
Reduced long term impact on higher socioeconomic groups?

Immediate impact of COVID-19*

Year 0 (2020)

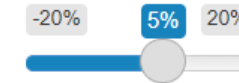


Year 1 (2021)

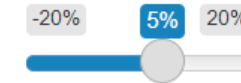


Longer term impact*

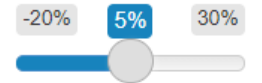
Initial



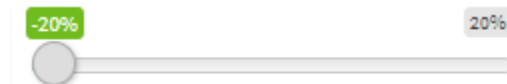
Intermediate



Ultimate



Socioeconomic differences*

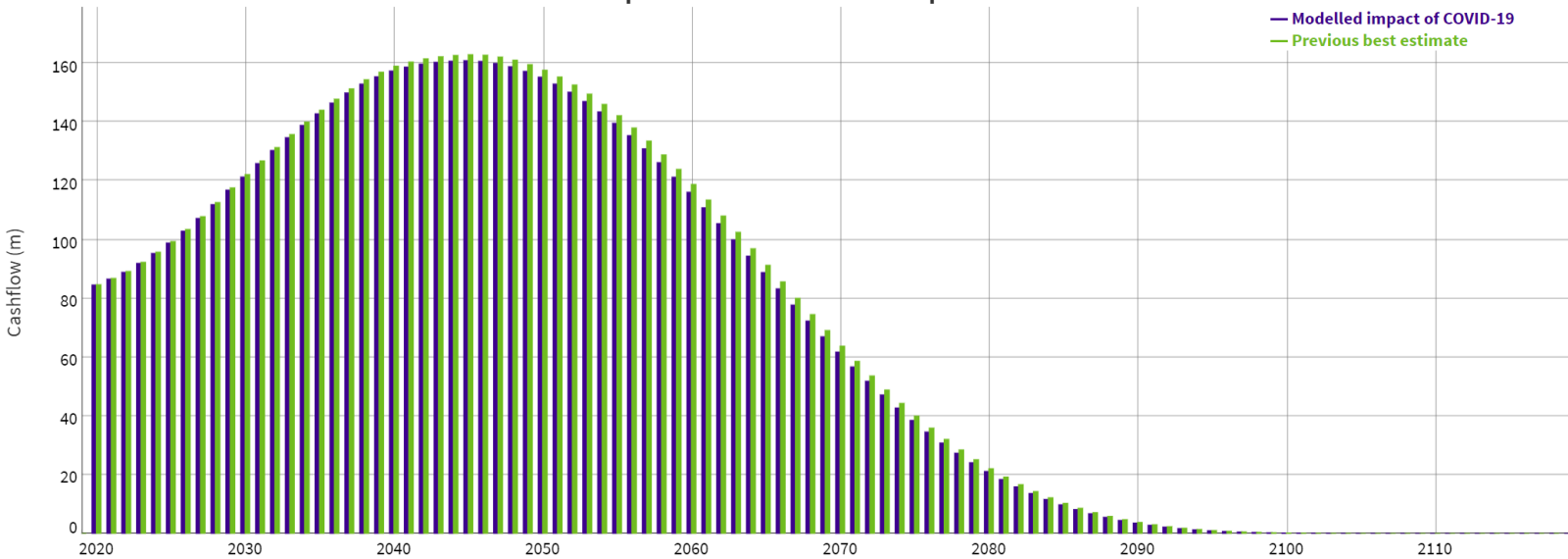


*calibration has been simplified for ease of presentation

Dynamic scenario modelling

Customized scenario

Modelled impact of COVID-19 on annual plan cashflows

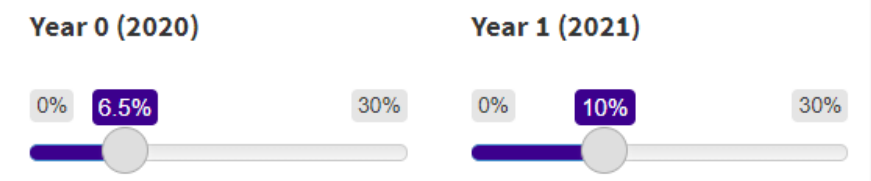


-1%
CHANGE IN PRESENT VALUE

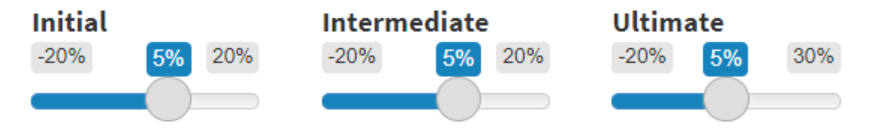
-0.082 yrs
CHANGE IN DURATION

-0.35 / -0.32 yrs
CHANGE IN AVERAGE LIFE EXPECTANCY

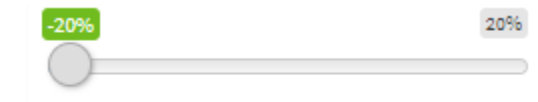
Immediate impact of COVID-19*



Longer term impact*



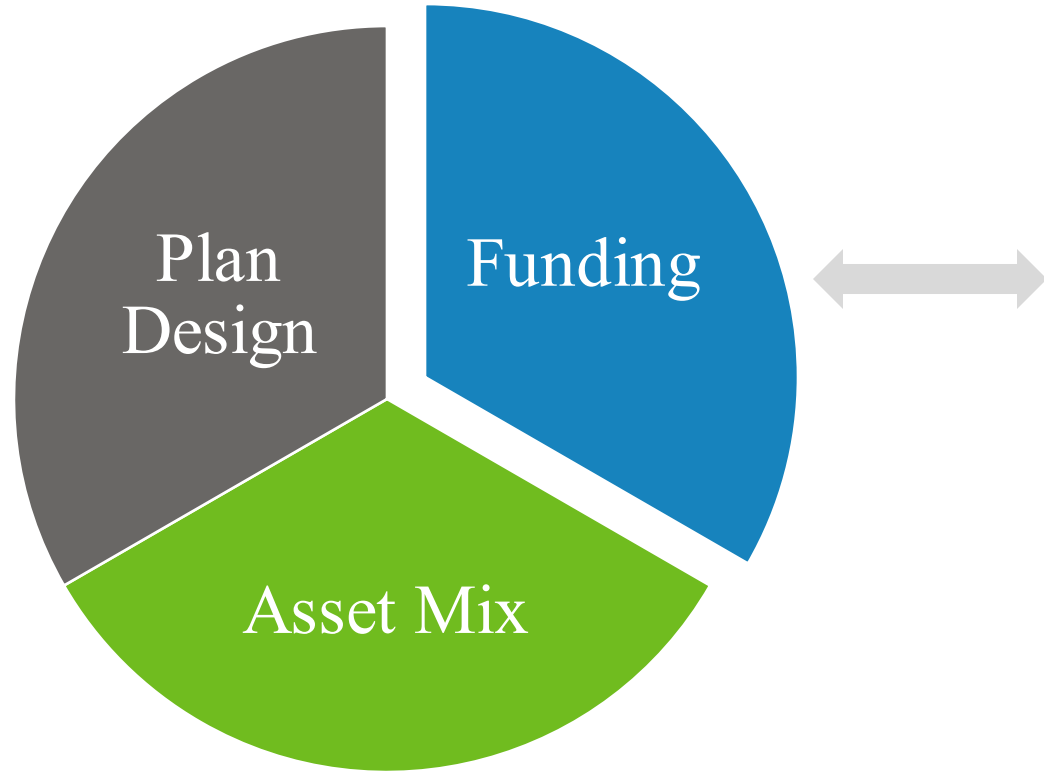
Socioeconomic differences*



*calibration has been simplified for ease of presentation

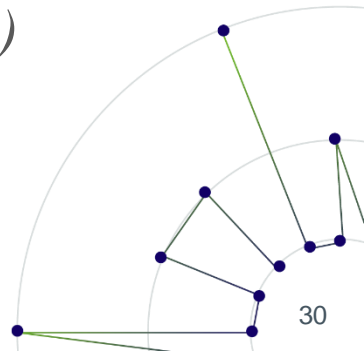
Using scenario analysis in practice

Plan management overview



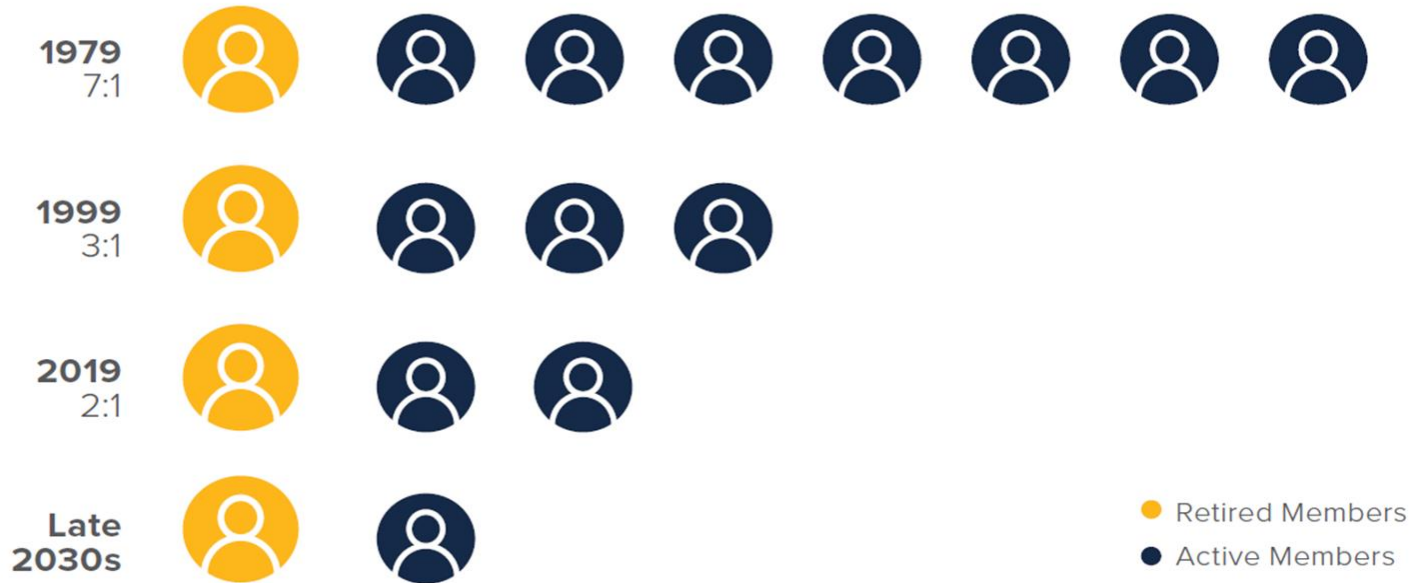
- Actuarial valuations
- Assumption setting
- Deterministic projections
- Stochastic projections
- Defining risk appetite and measuring risk profile

Informed by scenario analysis (e.g., retirement patterns, membership growth, longevity)



Plan maturity

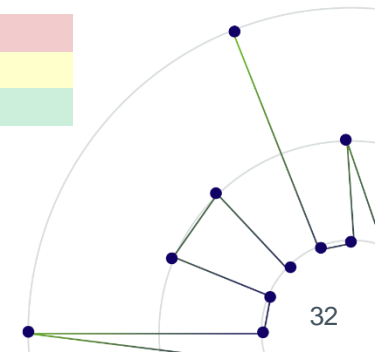
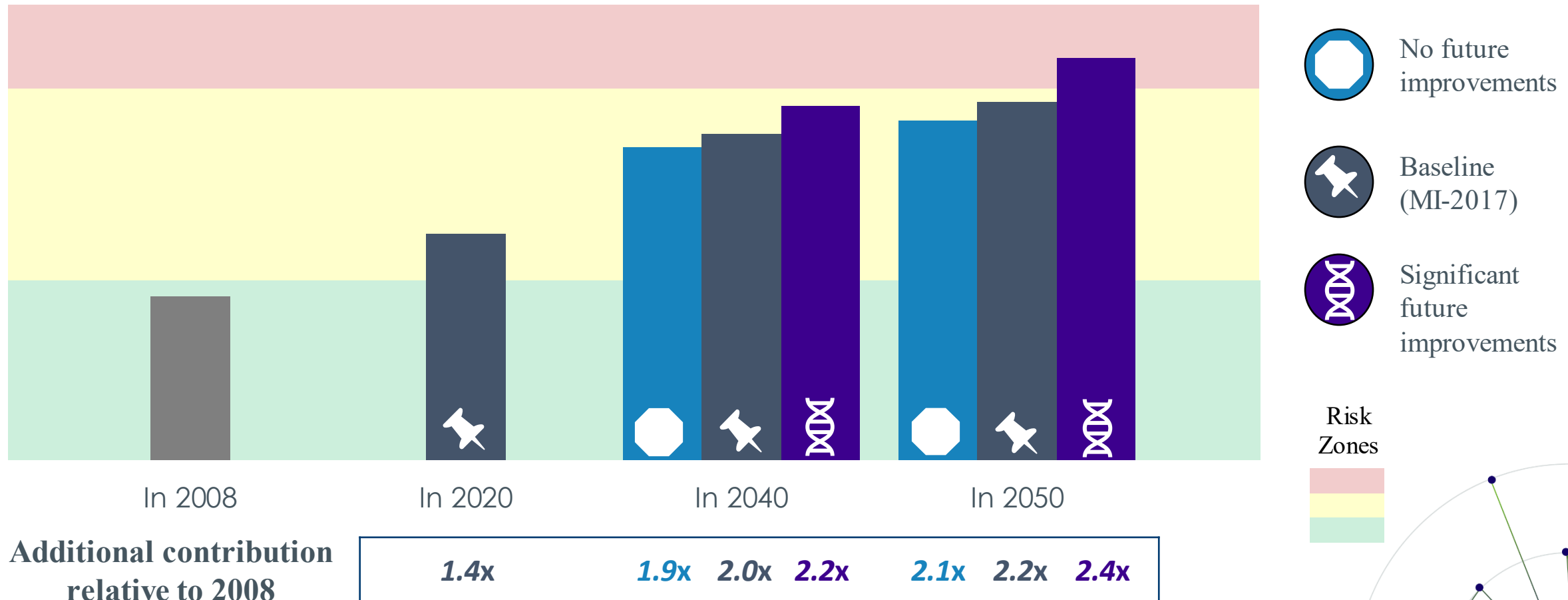
Active to retired ratio



- Phenomena where retiree population is growing at faster rate than active population
- Longevity is a factor impacting the pace of how fast a plan matures
- Scenario testing of potential longevity outcomes is essential to understand risk exposure

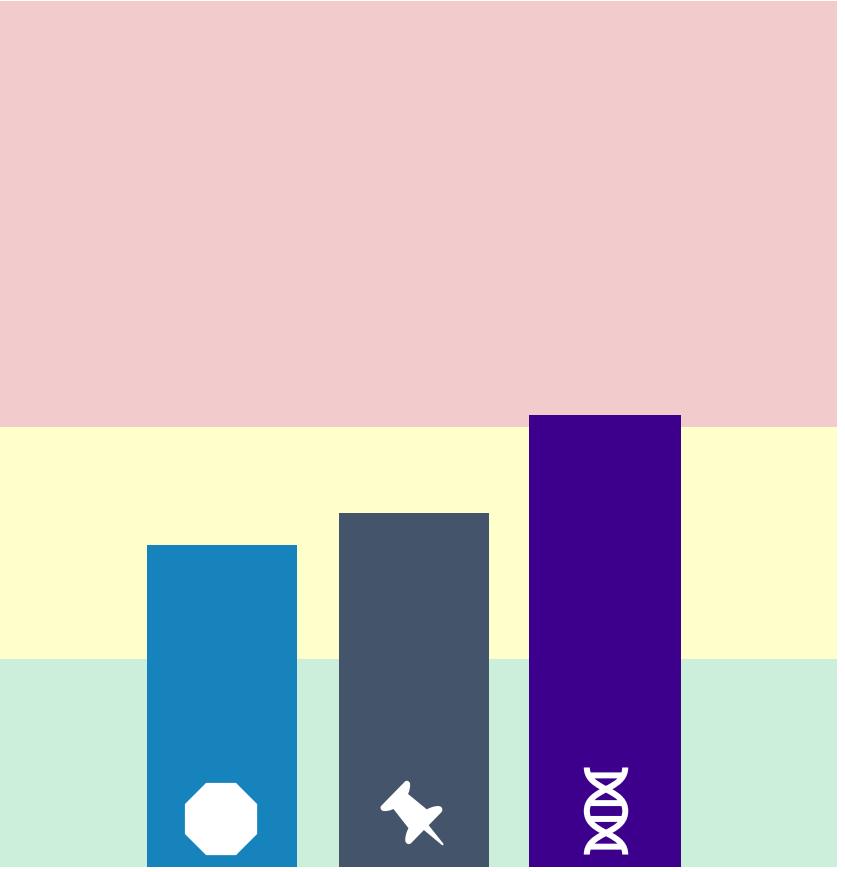
Impact on plan maturity & inter-generational equity

Additional contribution (% of pay) required to fund a 2008-sized loss



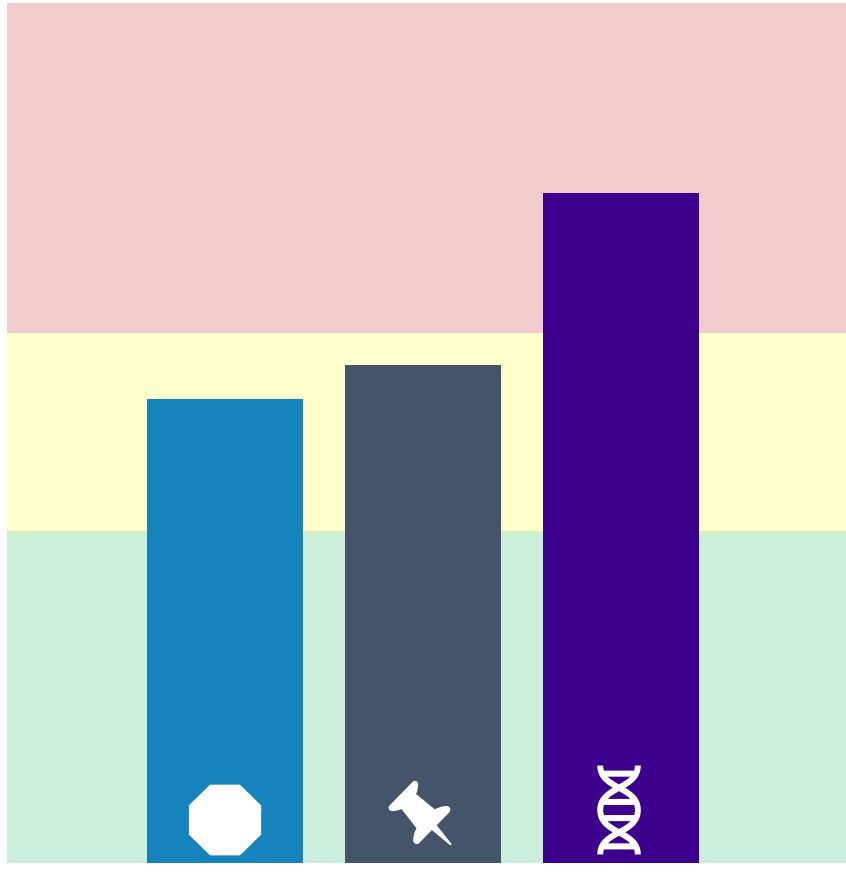
Metrics: Impact of longevity scenarios

Likelihood of unacceptable contributions for level of benefits



By 2040

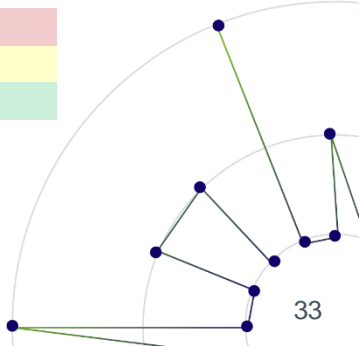
Likelihood of contributions reaching or exceeding threshold



By 2040

- No future improvements
- Baseline (MI-2017)
- Significant future improvements

- Risk zones
- High risk zone
 - Medium risk zone
 - Low risk zone



Questions?



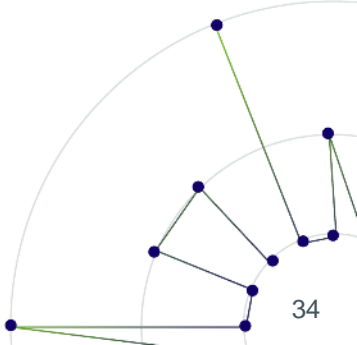
Richard Brown
Canada COO



Matthew Smith
Head of Divisional R&D



Anne Soh
Vice President & Plan Actuary



Thank you

