

Projecting future mortality:

From extrapolation of recent data to drivers of long term trends

Actuaries' Club of Hartford & Springfield

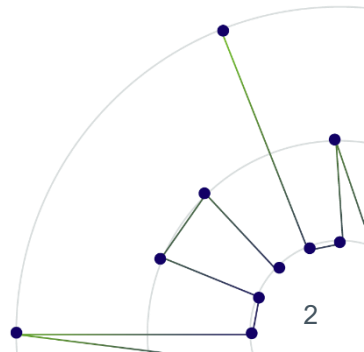
Erik Pickett PhD FIA FSA

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May 19th, 2026

Agenda

- Introduction to mortality risk
- Mortality / longevity projection framework
- Near term regression with COVID-19 data
- Longer term trends
- Q&A





Our mission

To improve later life financial well-being by promoting awareness of longevity risk and making its management transparent and efficient.



Our vision

- to enable financial institutions to understand and actively manage longevity risk
- to modernize market practices and remove market frictions for longevity risk transfer
- to improve access to cutting edge data-science tools and techniques



Our history

Club Vita was born in the UK in 2008. Our systems and processes were designed by a multi-disciplinary team, with a shared passion for “allowing the data to do the talking” by combining modern technology and statistical techniques. Following a successful UK launch, we went on to build similar communities in Canada (2015) and in the United States (2019).



Insightful – Pioneering – Collaborative – Passionate

Our community

We work primarily with workplace pension funds in the UK, Canada and the US to pool data underlying the longevity of retirees. Pension funds and their advisors use our analytics to understand their emerging longevity patterns, to drive more informed strategic decisions and to embed best-practice risk-management into their governance frameworks.

We also support financial institutions that manage longevity risk: insurers, reinsurers and asset managers. Our focus is on helping our clients offer attractive longevity risk protection products in a tech-enabled, efficient manner.



10 consultancies



500 pension funds



40 (re)insurers

Disclaimers

The views expressed by the presenters are not necessarily those of Ernst & Young LLP or other members of the global EY organization.

These slides are for educational purposes only and are not intended to be relied upon as accounting, tax, legal or other professional advice. Please refer to your advisors for specific advice.

Longevity: from assumption to strategy

- Why longevity is “back on the front page” across pensions, life, health
- What has changed in markets (and what hasn't)
- How this sets up mortality improvement methods (next speaker)

*How long **should** a human life last?*

It depends whom you ask ...

Aubrey De Grey

THE OPTIMIST – ESCAPE VELOCITY

Aging is engineering damage;
repair the damage and death
becomes optional.

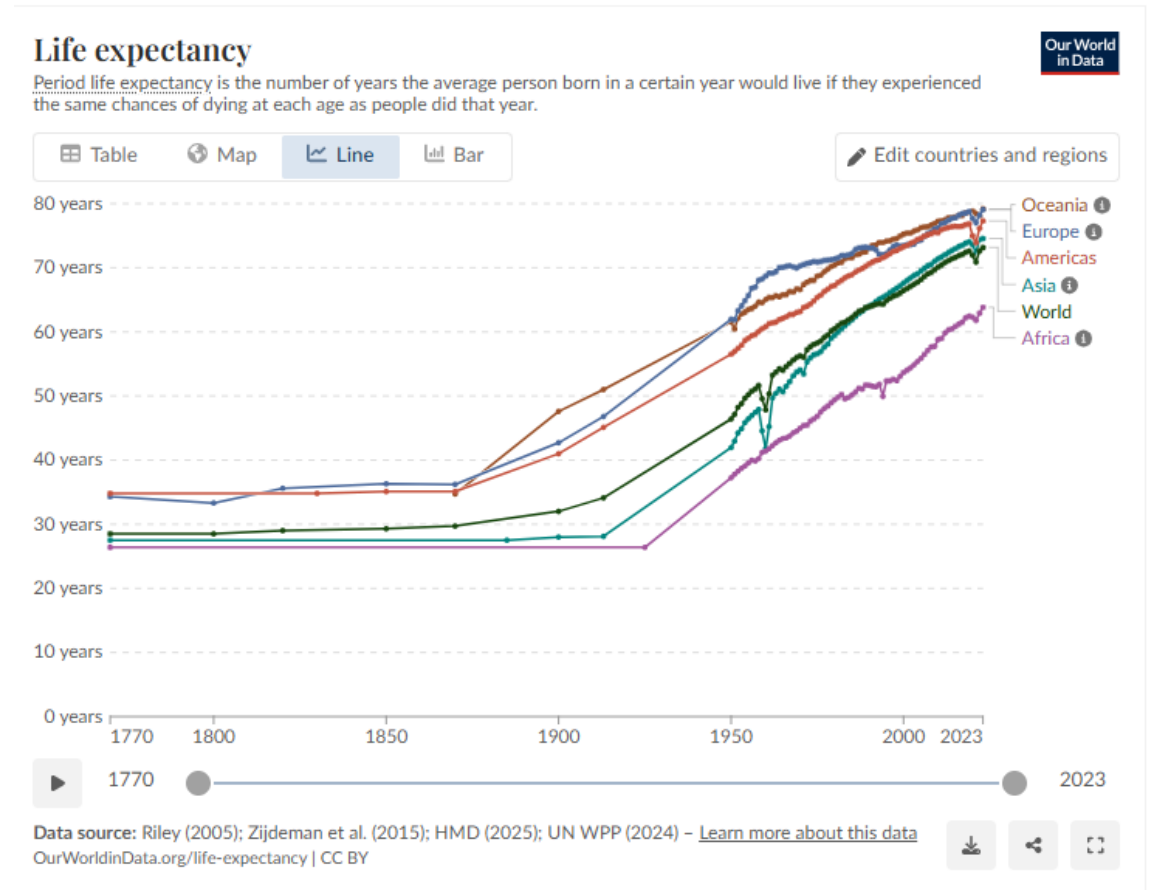
S Jay Olshansky

THE EMPIRICIST – BIOLOGICAL LIMITS

Maximum lifespan is
biologically bounded. Healthy
lifetime, not longer lifetime, is
a realistic goal.

The longevity revolution

- 20th century leap: significant changes in longevity changed society and the pension and annuity models that served them.
- Mortality improvement evolved from a technical actuarial assumption to a board-level concern.



<https://ourworldindata.org/life-expectancy>

Longevity risk debuts on the global stage

The jumbo longevity reinsurance trade:

insurers and pension funds now routinely reinsure longevity exposure

\$50 billion +

US pension risk transfer market annual volume¹

The DC decumulation wave:

simultaneously, **defined-contribution (DC) retirement** systems have proliferated internationally, shifting longevity risk from institutions to individuals

\$63 trillion +

Assets earmarked for retirement in OECD at December 31, 2024²

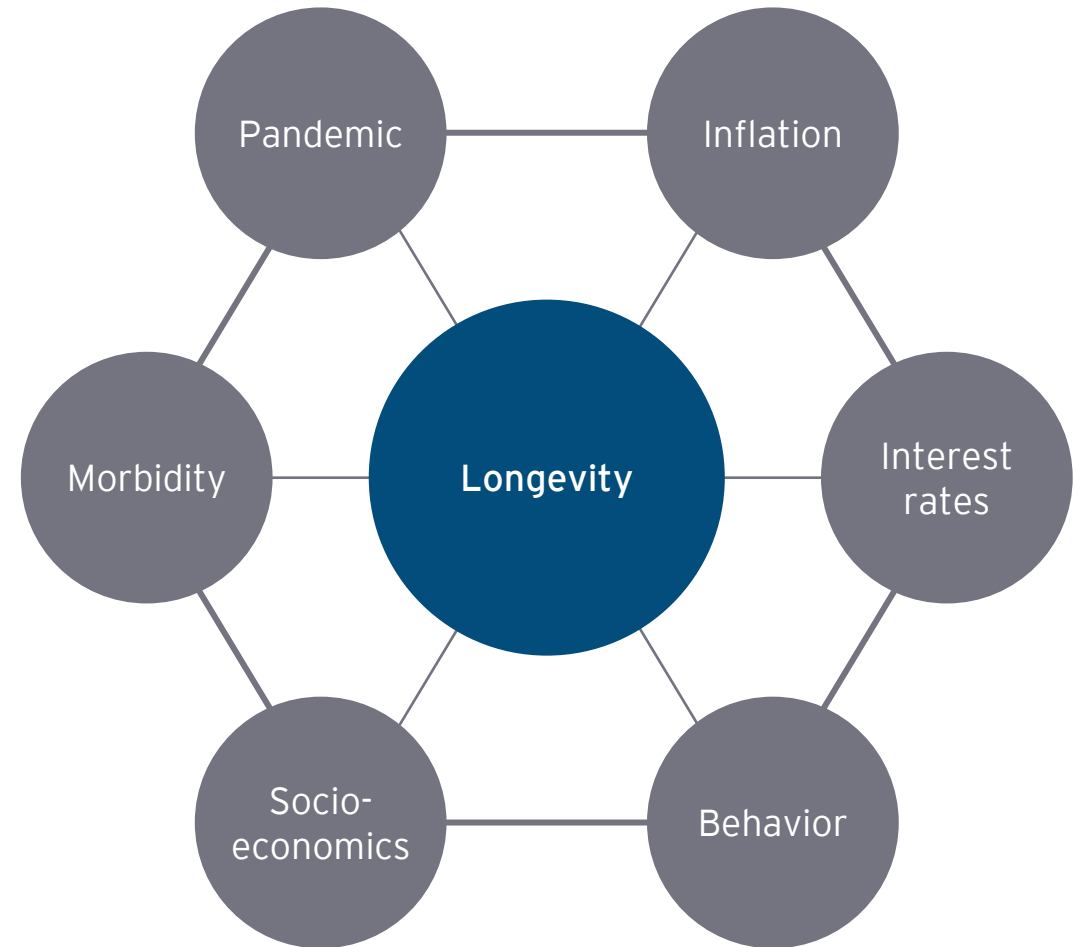
Longevity risk has migrated from a balance sheet line item to a global systematic exposure

¹<https://www.soa.org/sections/reinsurance/reinsurance-newsletter/2023/february/rsn-2023-02-spong/>

²https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/11/pensions-at-a-glance-2025_76510fe4/e40274c1-en.pdf

The new challenge: correlated uncertainty

- Risks that used to feel separable now move together.
- Correlation changes the *shape* of outcomes, not just the mean.
- An actuarial art form: the work of forecasting improvement continues to require judgment.






AI as the engine

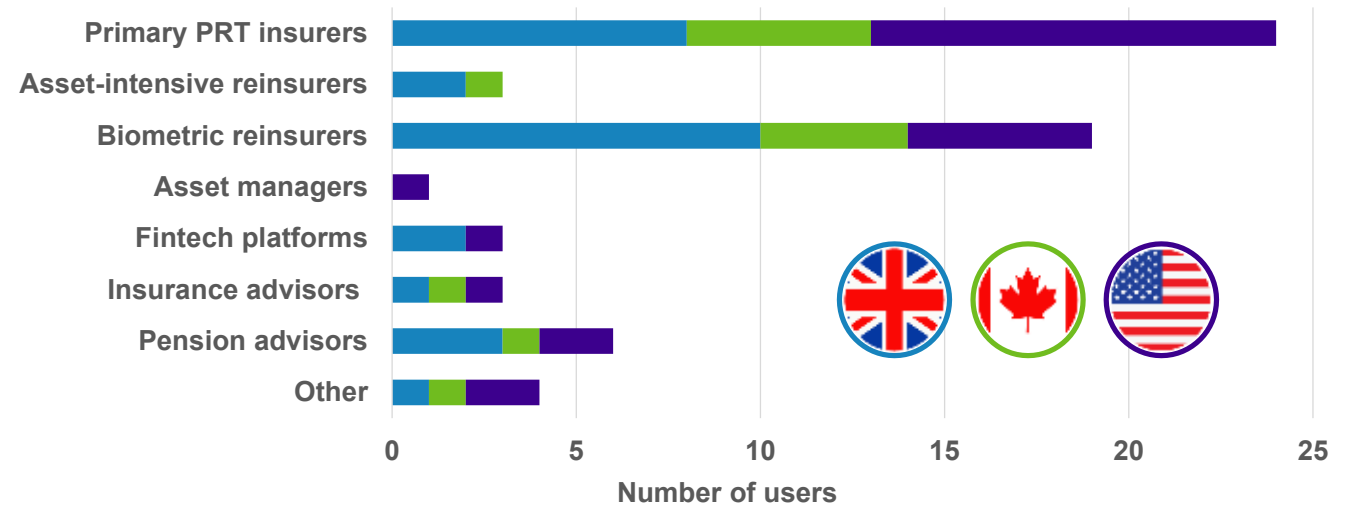
- Better inputs: data infrastructure
- Better engines: computational power
- Better translation: turning patterns into decision-ready assumptions

International adoption

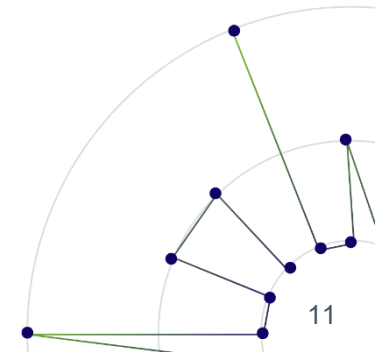
VITALSTATISTICS

			
Founded	2008	2015	2019
Retirees tracked	3.0M+	1.0M+	1.1M+
Pension plans	250+	95+	500+
Re/insurers	20	10	16
Advisors	4	2	4

Club Vita users by market segment as at December 31, 2025

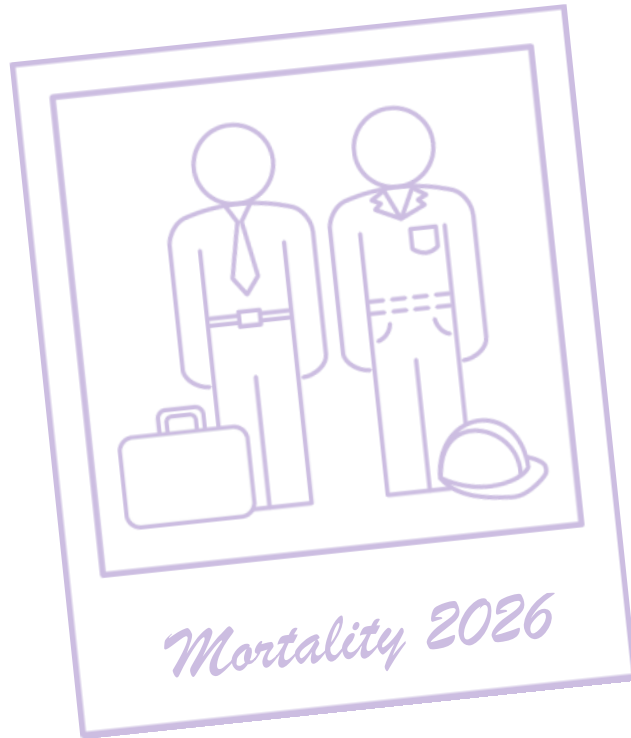


Wide international adoption of Club Vita's models and analytics



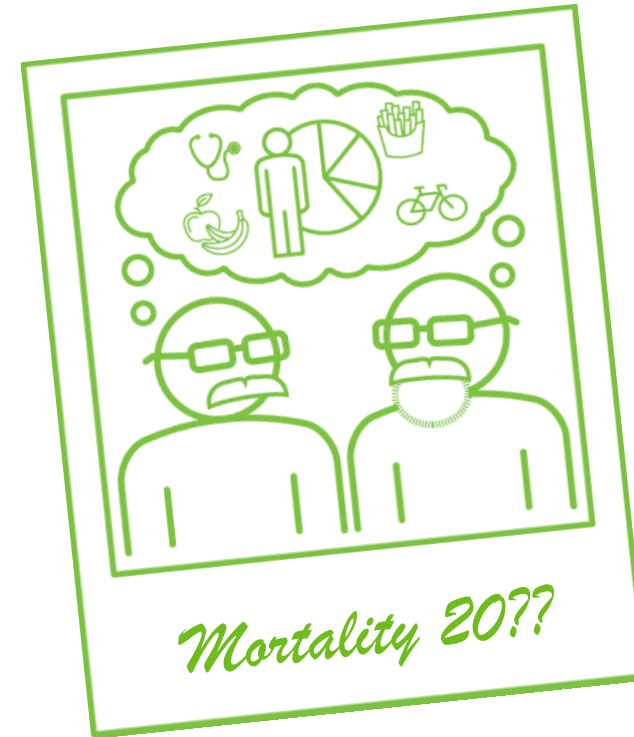
Mortality / Longevity Projection Framework

Two steps to calculate life expectancy



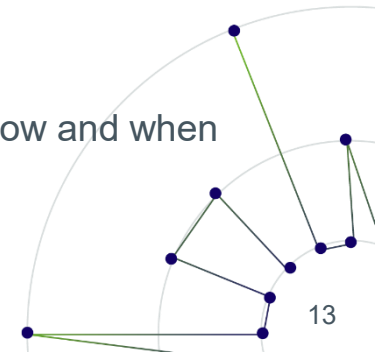
Baseline

- Snapshot of current state of longevity
- Objective measure
- Based on past experience



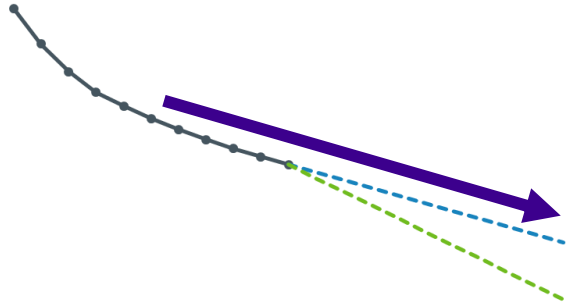
Future trends

- How longevity will change in the future
- More subjective measure
- Recent experience a good starting point, but how and when will it change?



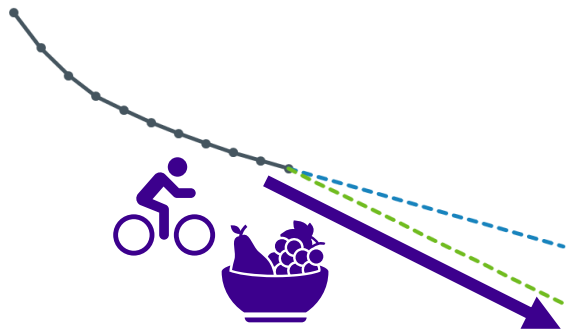
Extrapolative vs explanatory approaches

Best estimate modeling



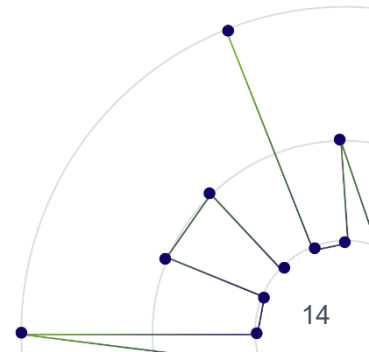
Extrapolative approach

- Projects historical data experience into the future
- Assumes historical trends will continue
- Example: **regression models**



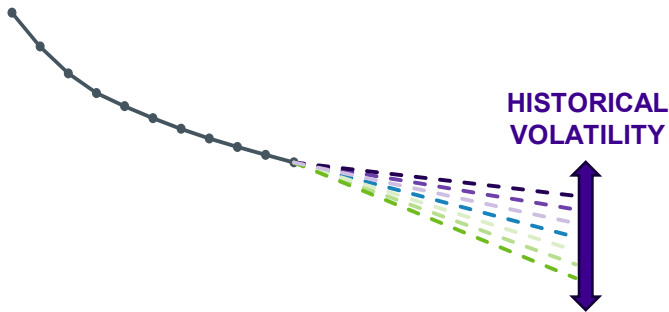
Explanatory approach

- Seeks to understand drivers of mortality changes
- ... and uses changes in these drivers to project mortality
- Example: **cause of death modeling**



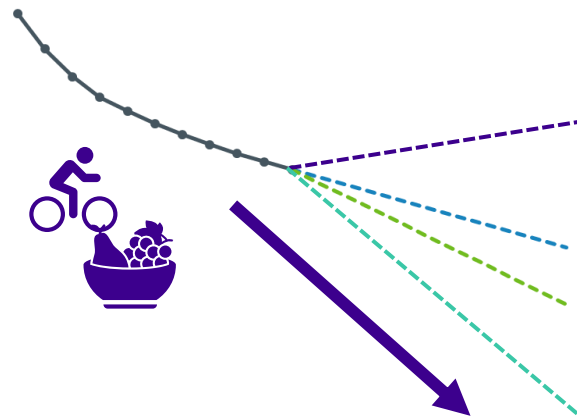
Extrapolative vs explanatory approaches

Risk modeling



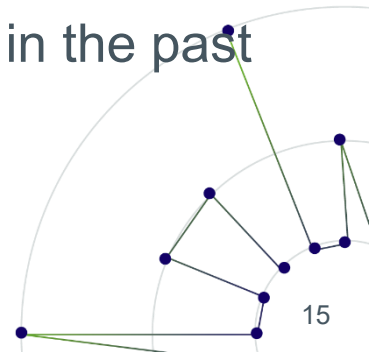
Extrapolative approach

- Assumes historical trends / volatility will continue
- Projects historical data experience into the future
- ...assuming the future follows the same pattern as the past
- Example: **structured stochastic models**

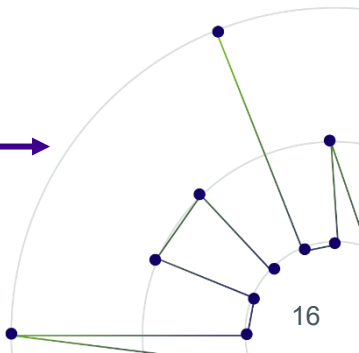
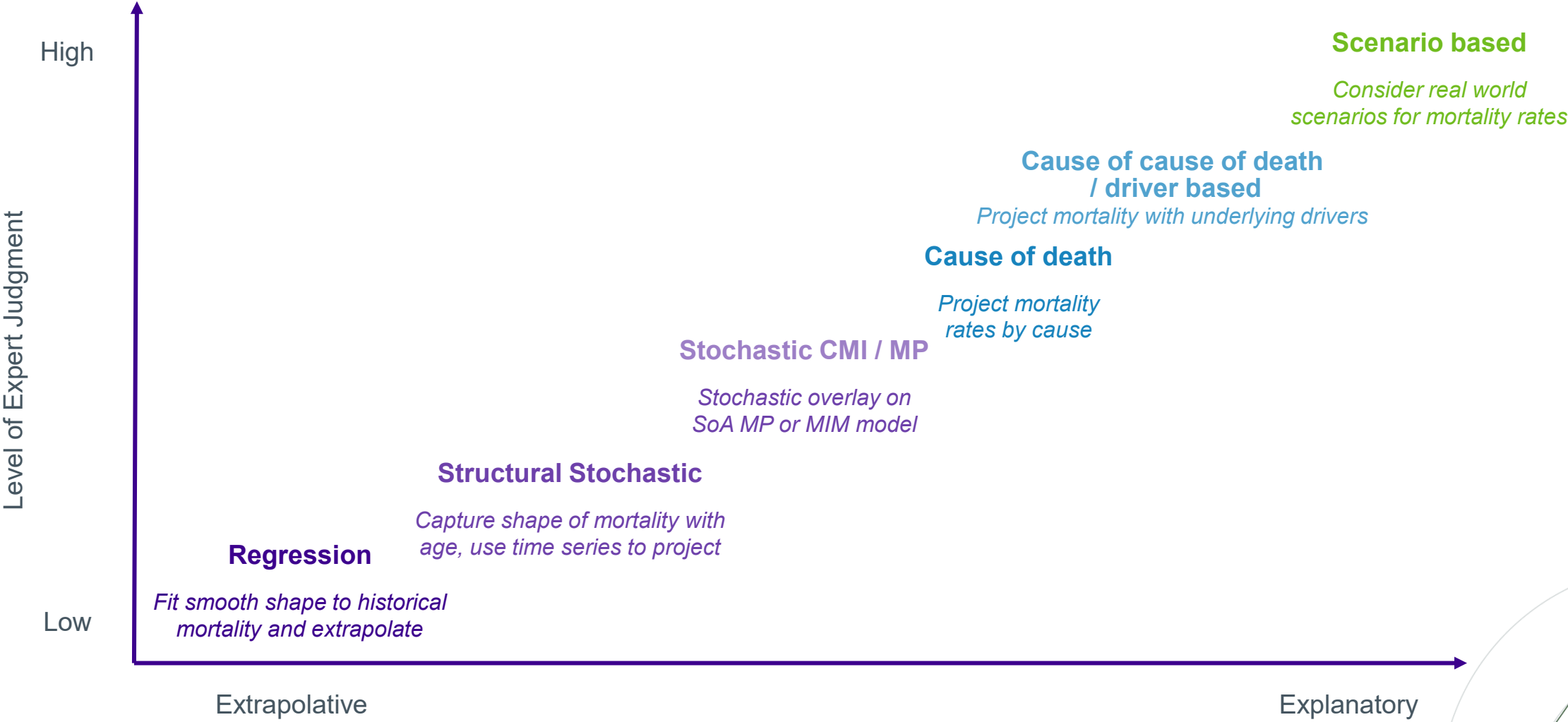


Explanatory approach

- Seeks to understand drivers of mortality changes
- ... and uses changes in these drivers to project mortality
- Can capture impact of extreme events unlike any seen in the past
- Example: **scenario modeling**

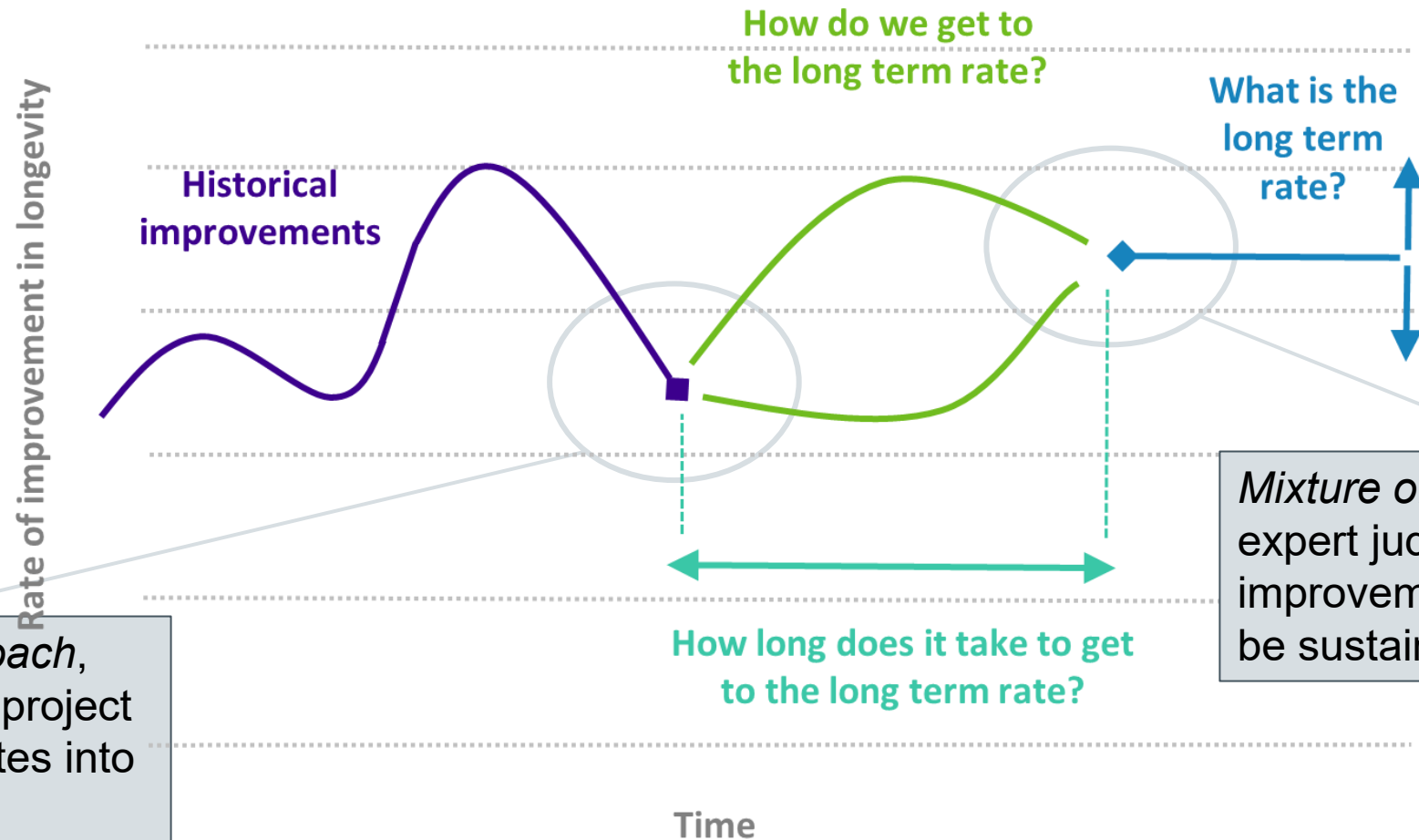


Different types of model



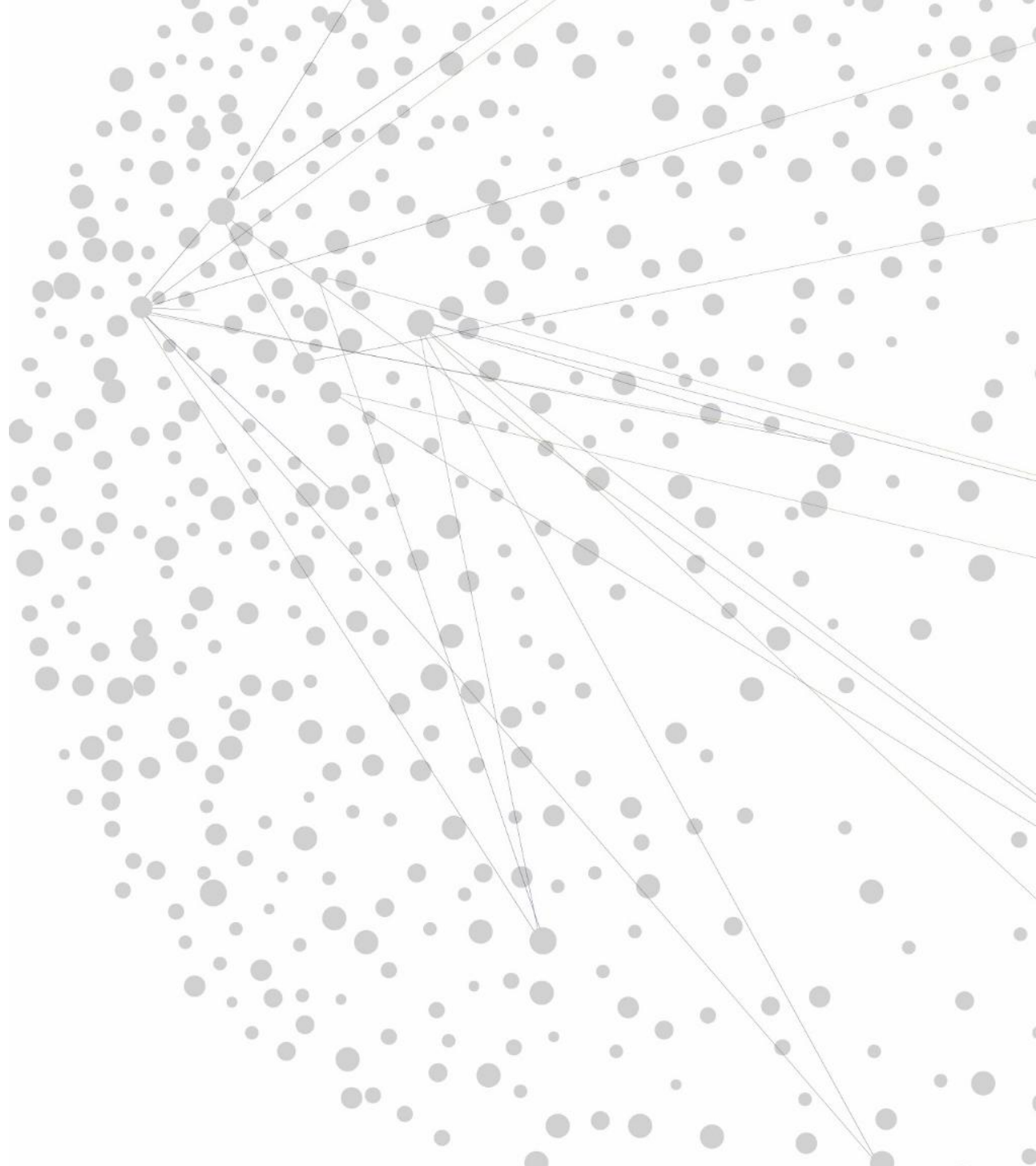
Common projection models in practice

CMI (UK) / MP-scale (US) / Can-MI-2017 & Can-MI-2024 (Canada)



Near term regression with COVID-19 data

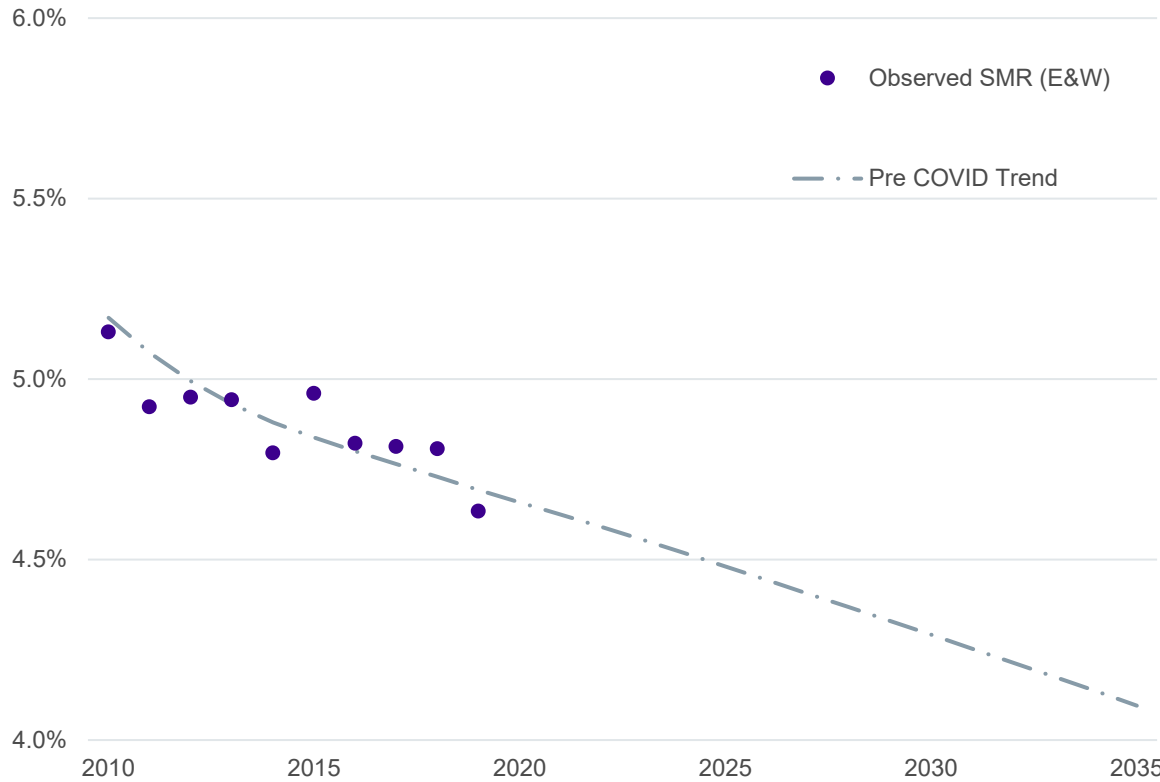
Pre-pandemic trends and post-pandemic data



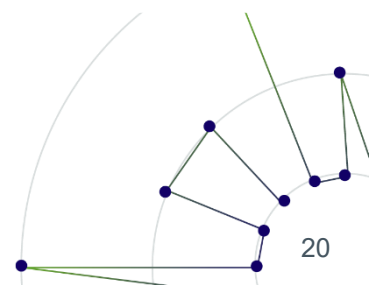
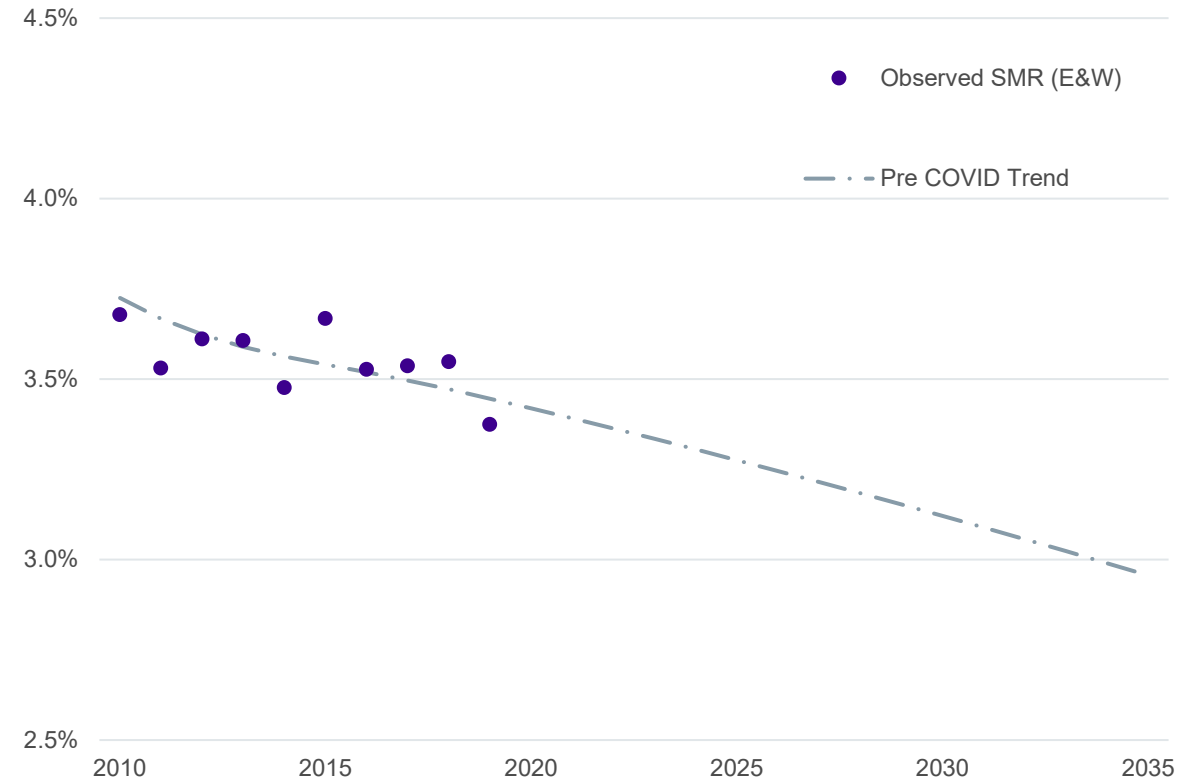
Pre-pandemic trend (UK)



UK Male SMRs (ages 65 to 95)



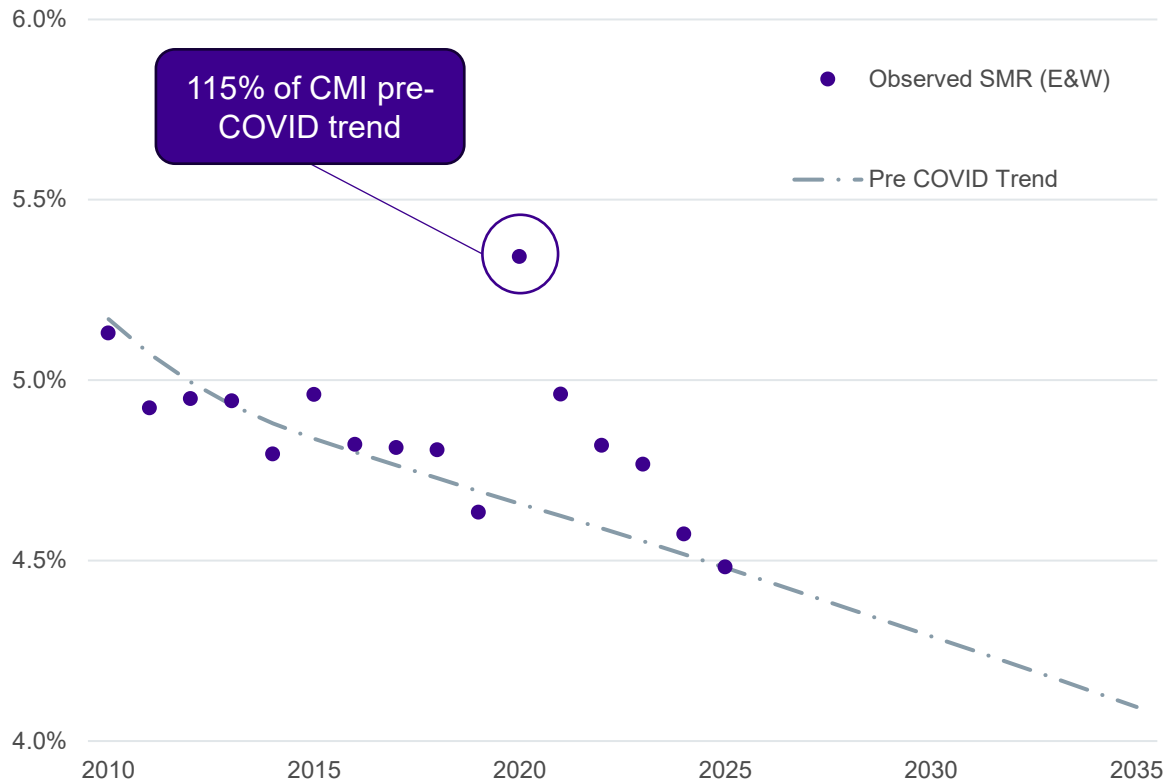
UK Female SMRs (ages 65 to 95)



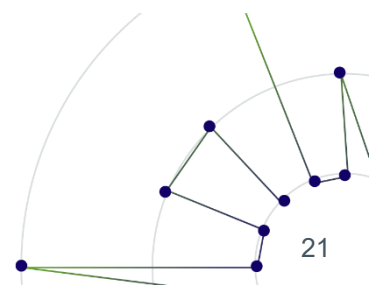
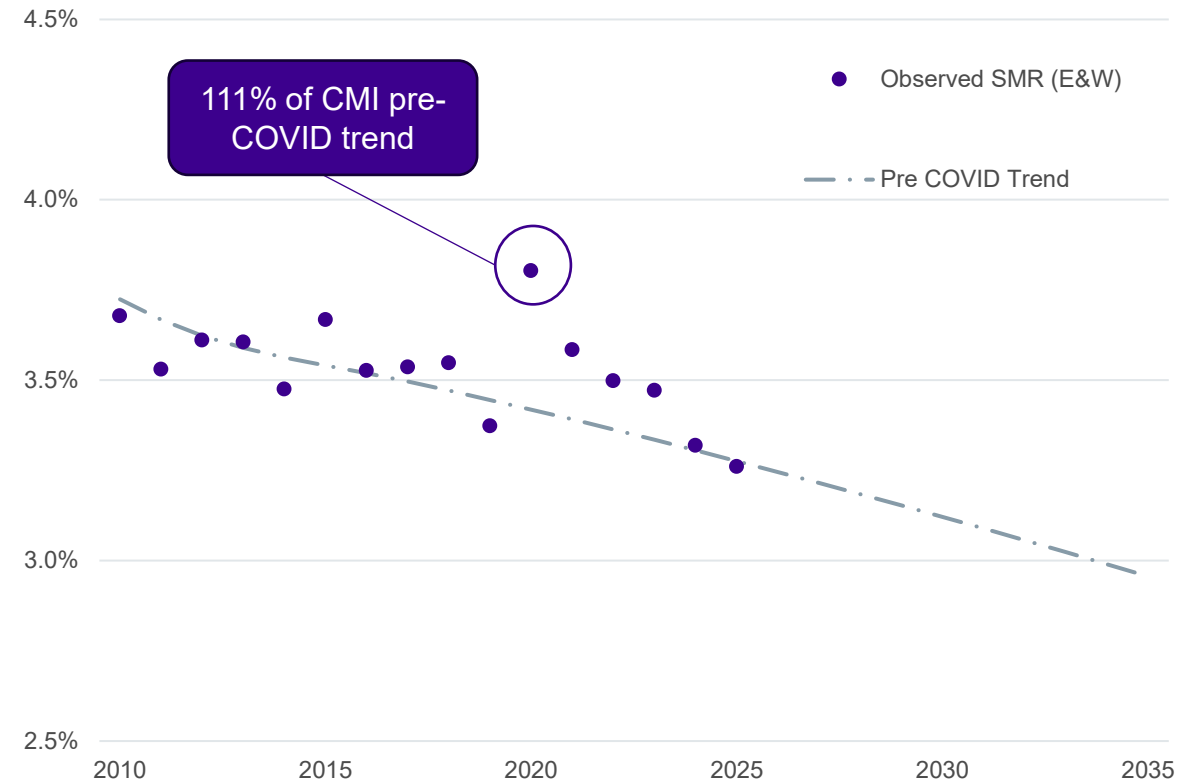


What happened next? (UK)

UK Male SMRs (ages 65 to 95)



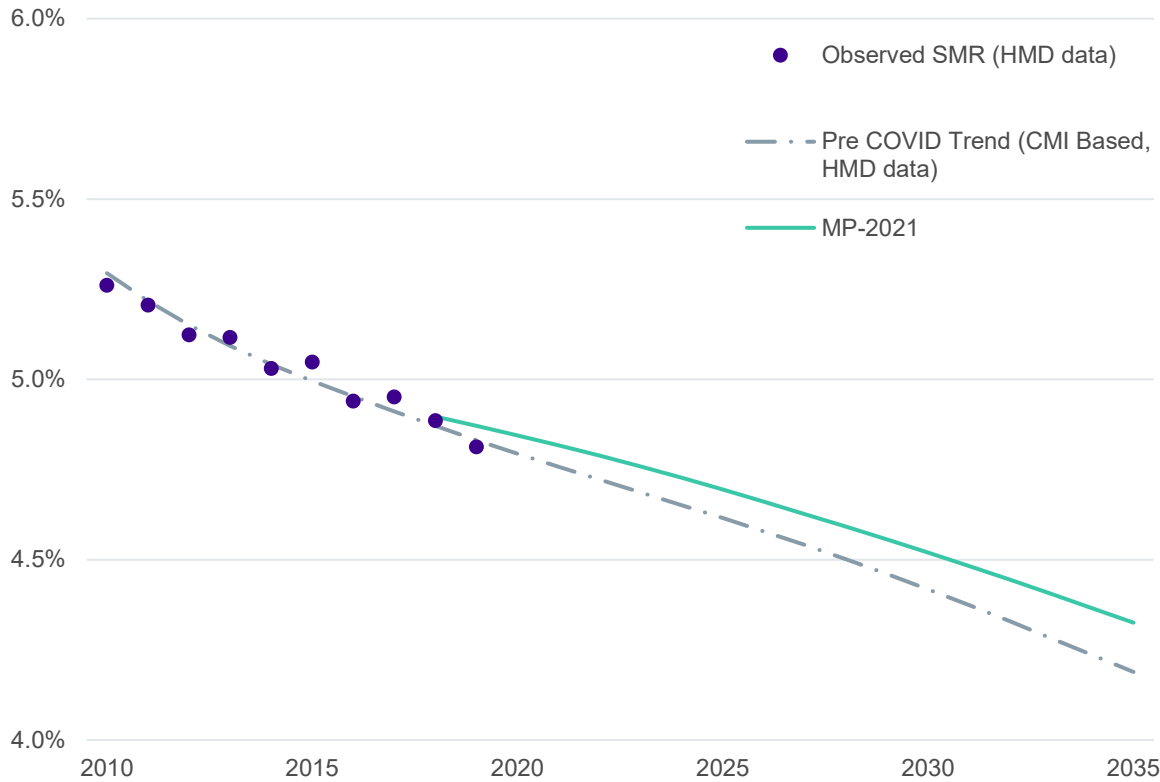
UK Female SMRs (ages 65 to 95)



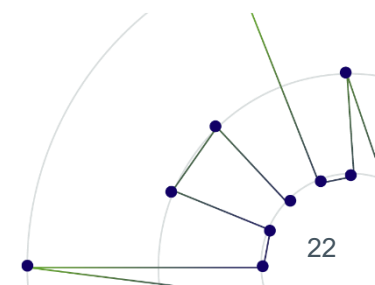
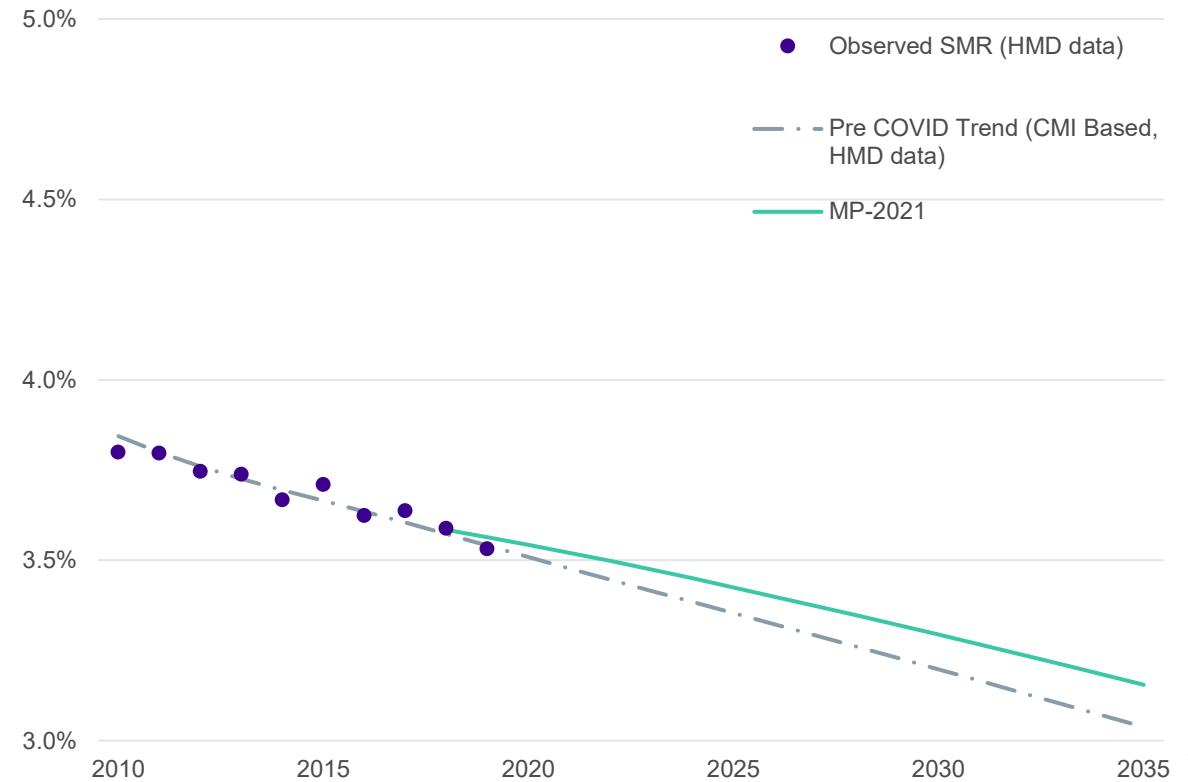
Pre-pandemic trends (US)



US Male SMRs (ages 65 to 95)



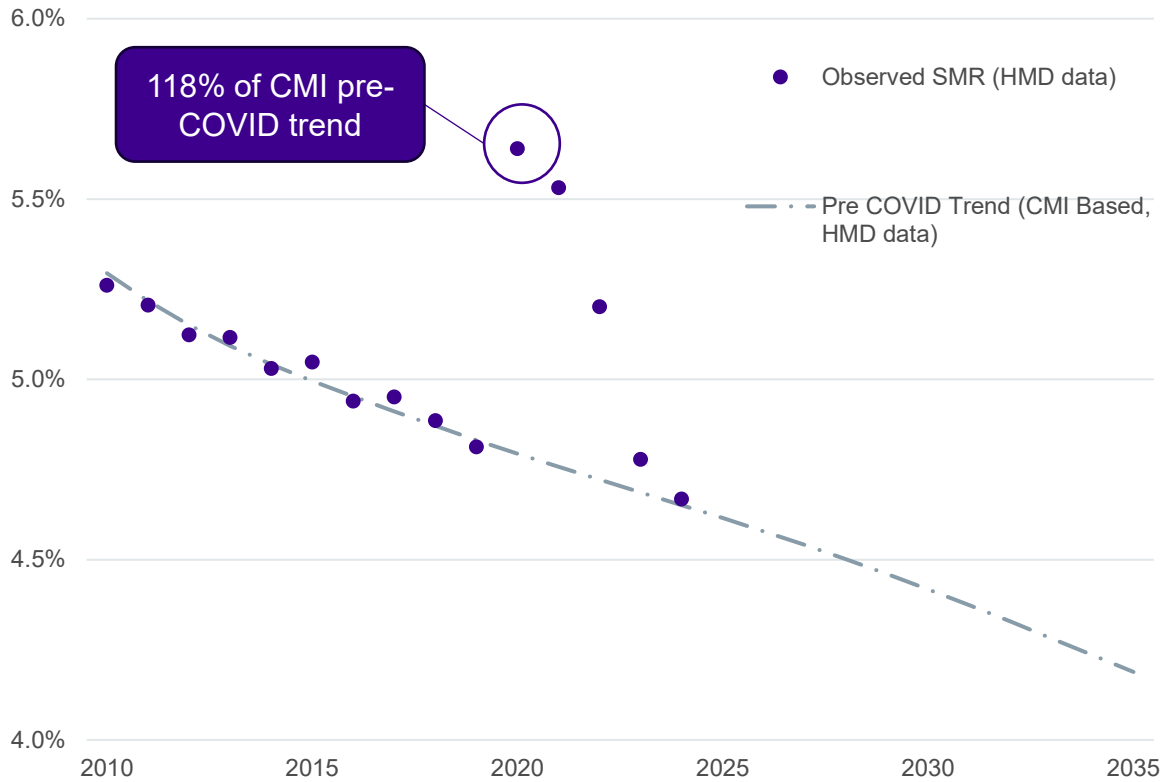
US Female SMRs (ages 65 to 95)



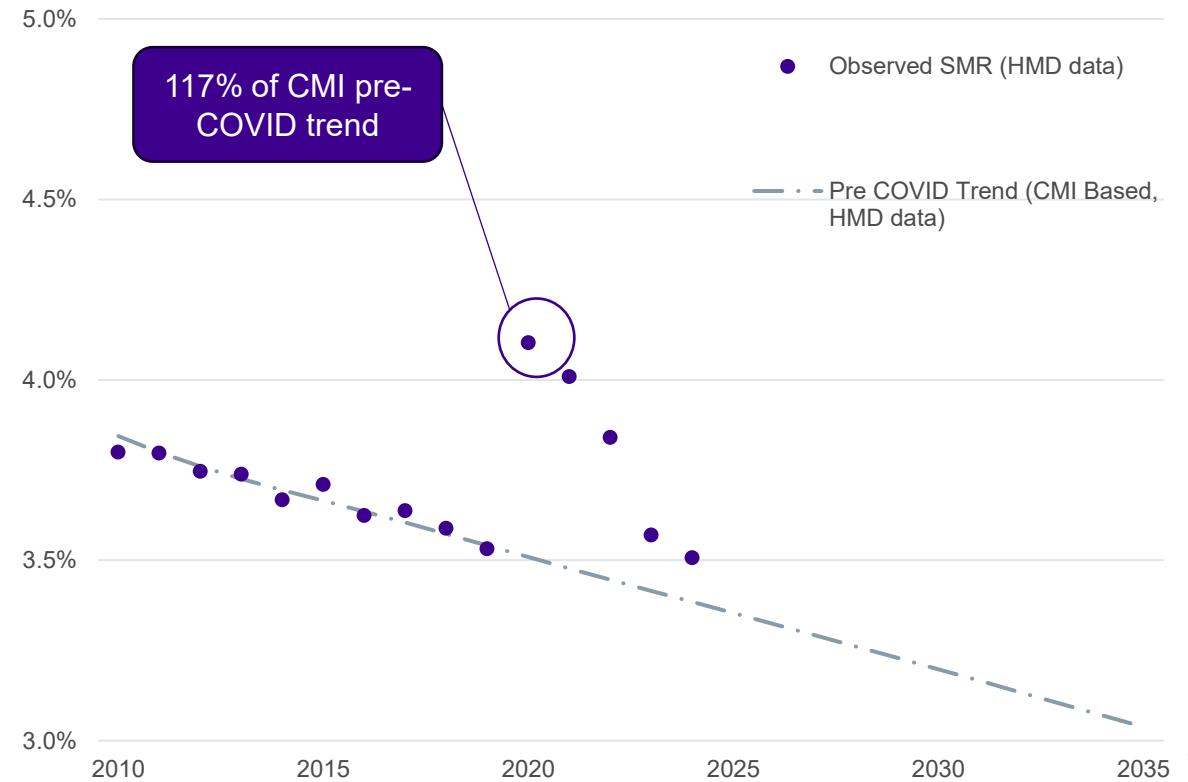
What happened next? (US)



US Male SMRs (ages 65 to 95)



US Female SMRs (ages 65 to 95)



At the population level, COVID hit hardest in 2020, with excess almost as high in 2021, then halving in 2022. 2024 mortality almost back to trend for men, still high for women



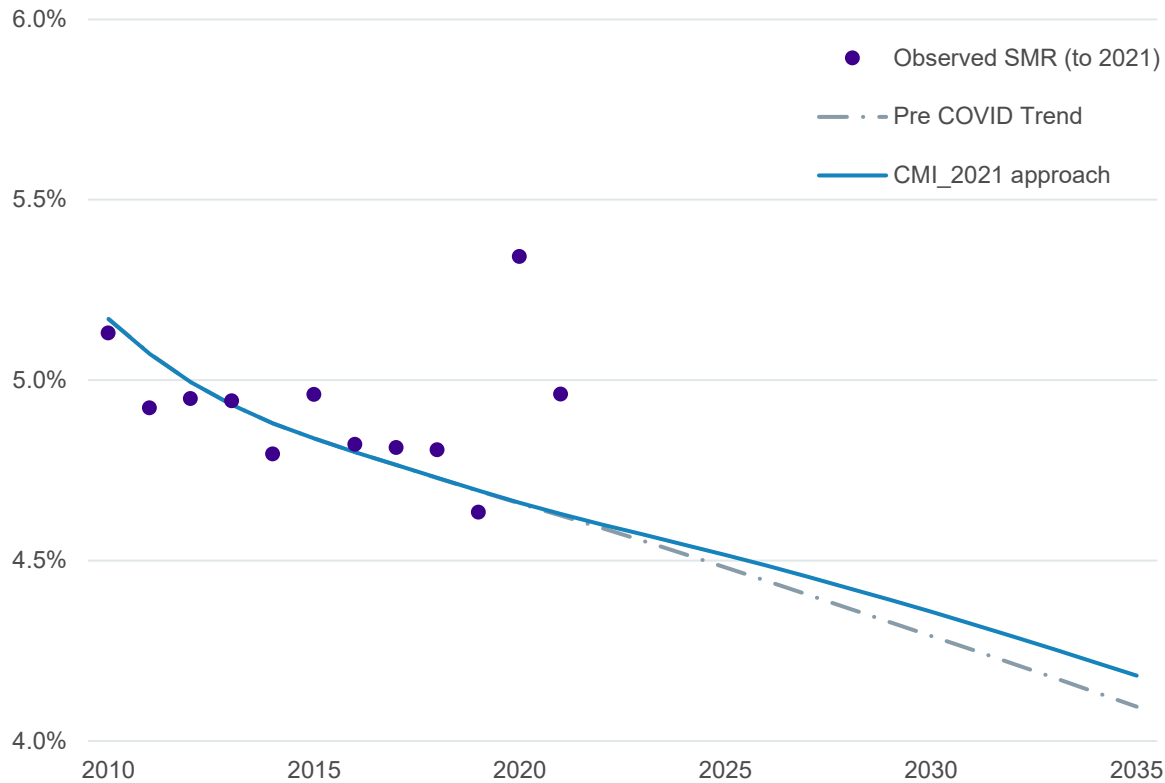
The development of the CMI's “fitted overlay” methodology



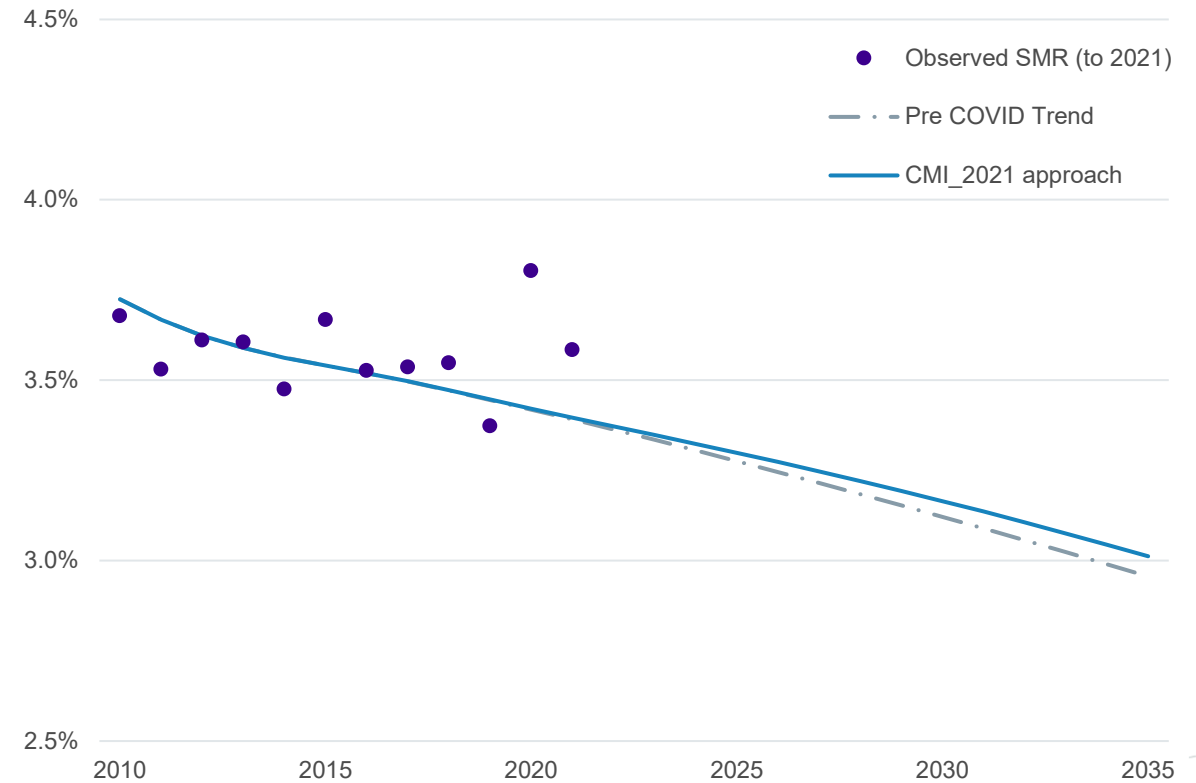
CMI approach to COVID: CMI_2020 / 2021



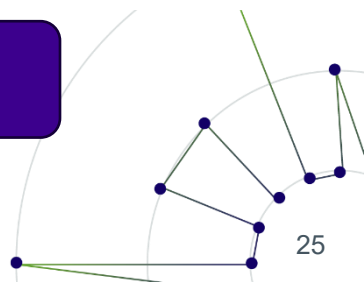
UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



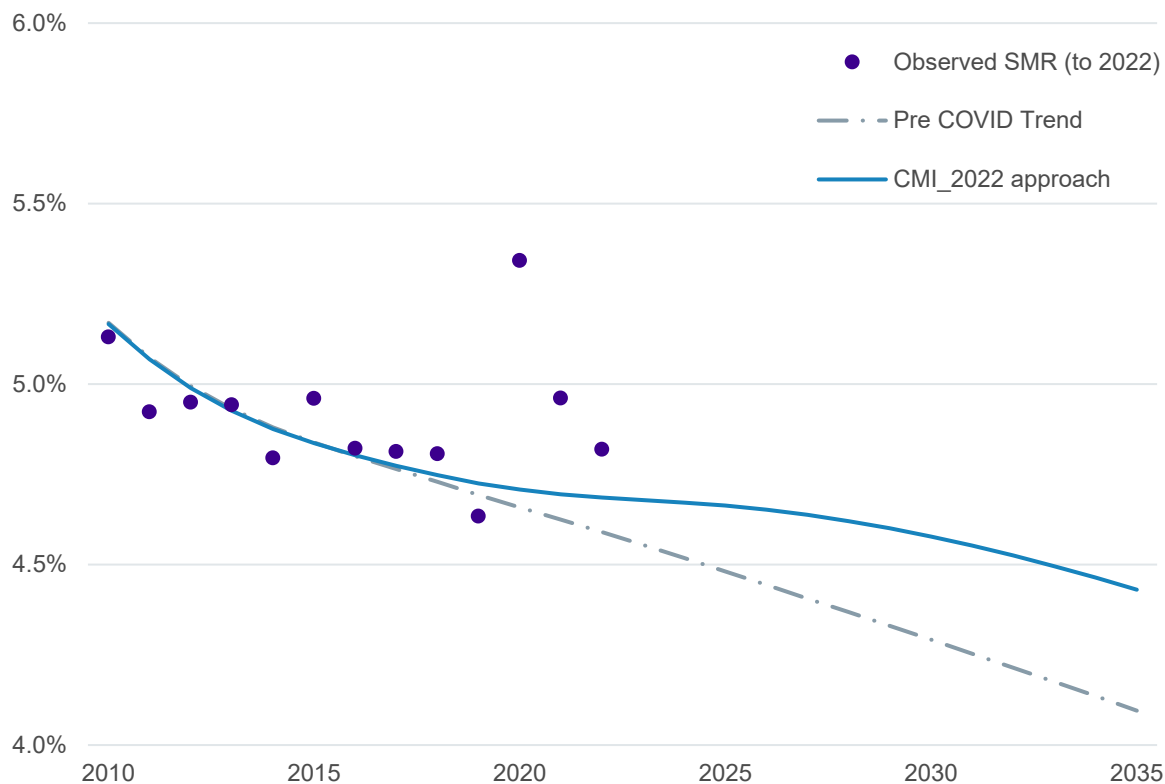
CMI_2020 and CMI_2021 put zero weight on post 2019 data via “W” parameter. Pushing out the long-term rate leads to a slightly weaker projection.



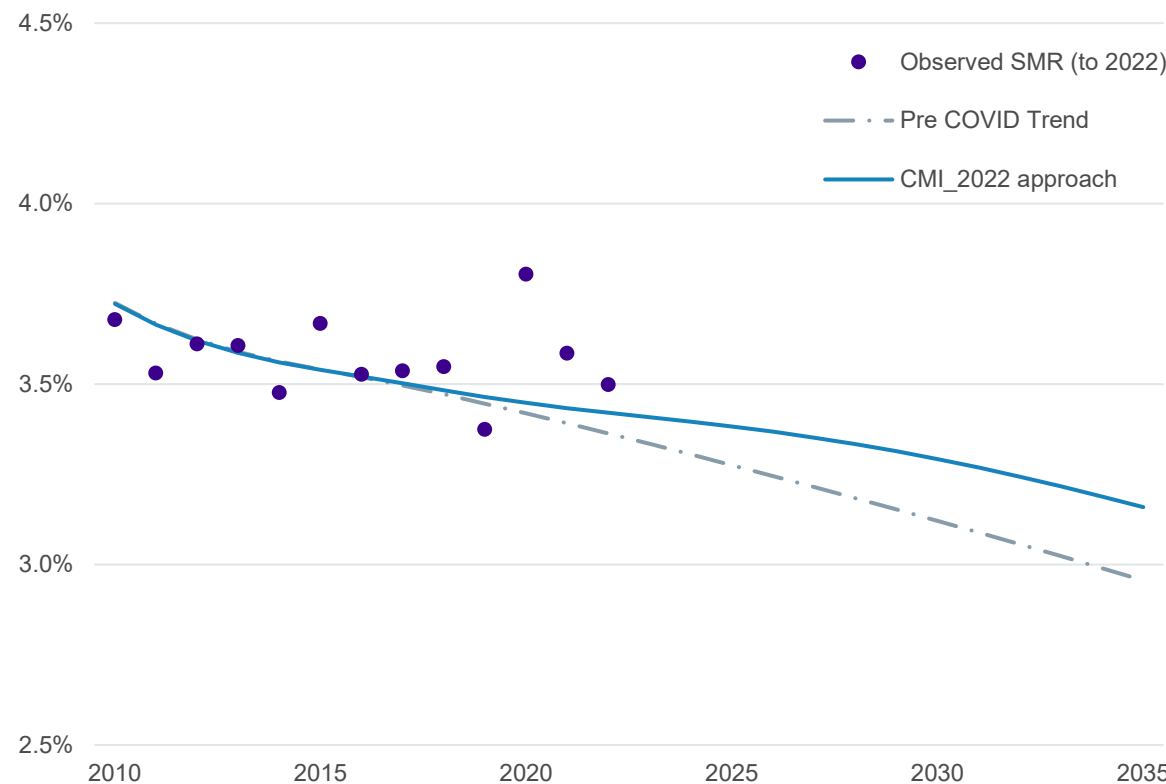


CMI approach to COVID: CMI_2022

UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



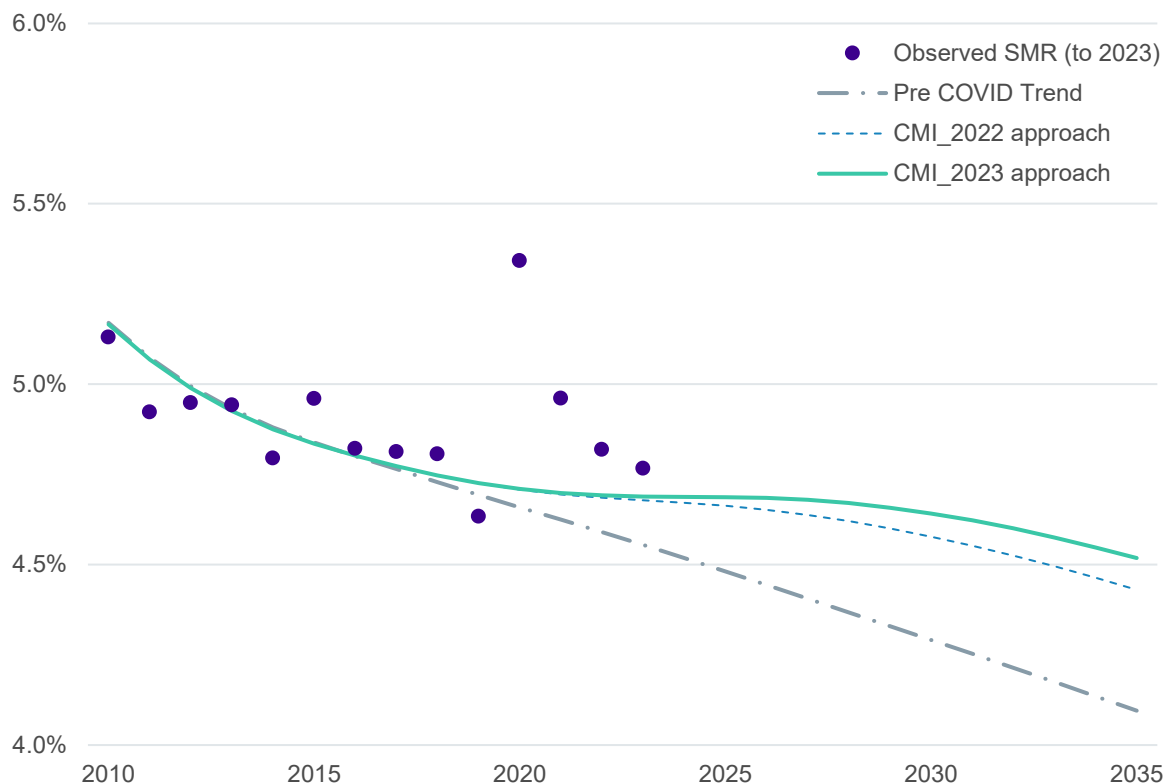
**CMI_2022 was first version to allow for post-COVID data in fitted trend.
25% weight placed on 2022 data via “W” parameter.**



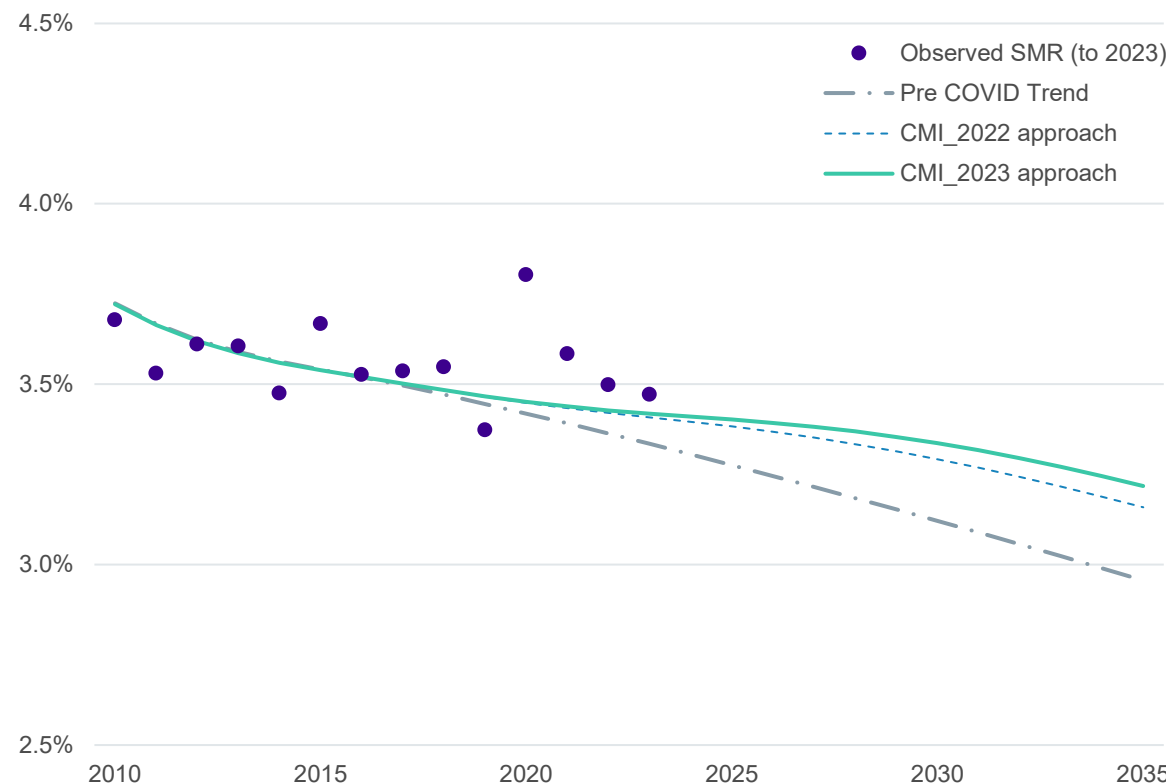


CMI approach to COVID: CMI_2023

UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



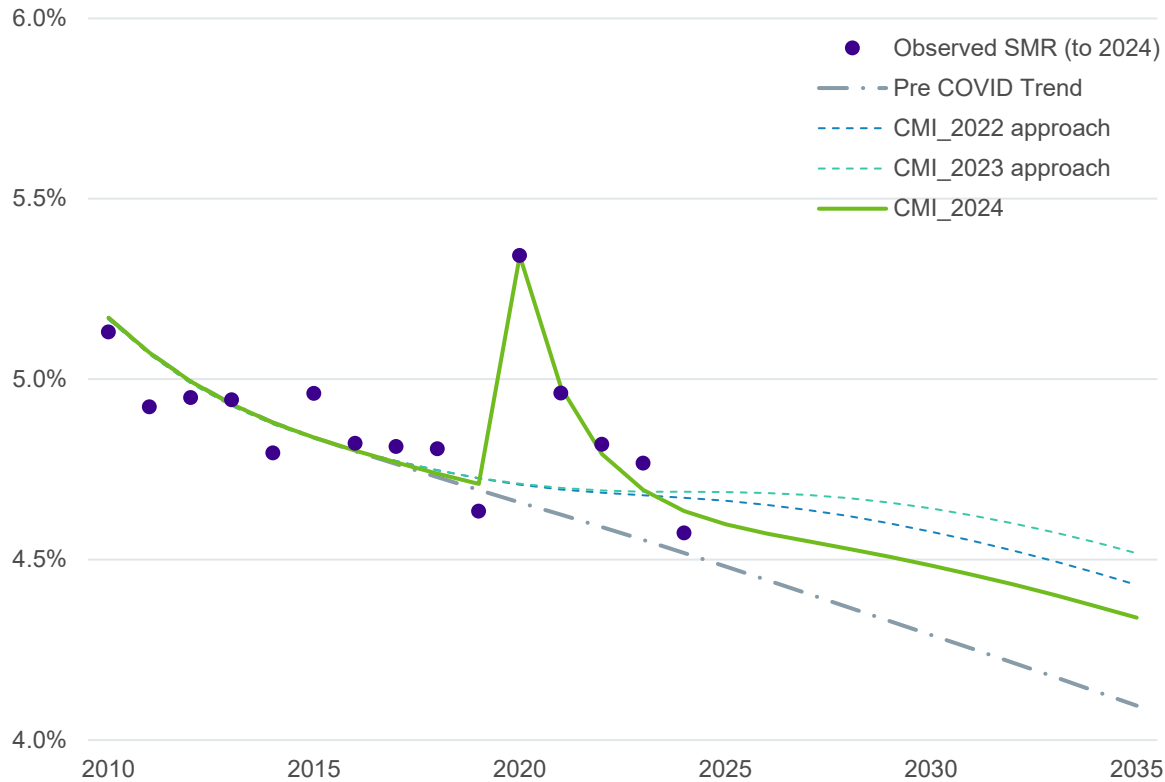
Approach modified for CMI_2023.
15% weight placed on 2022 and 2023 data via "W" parameter.



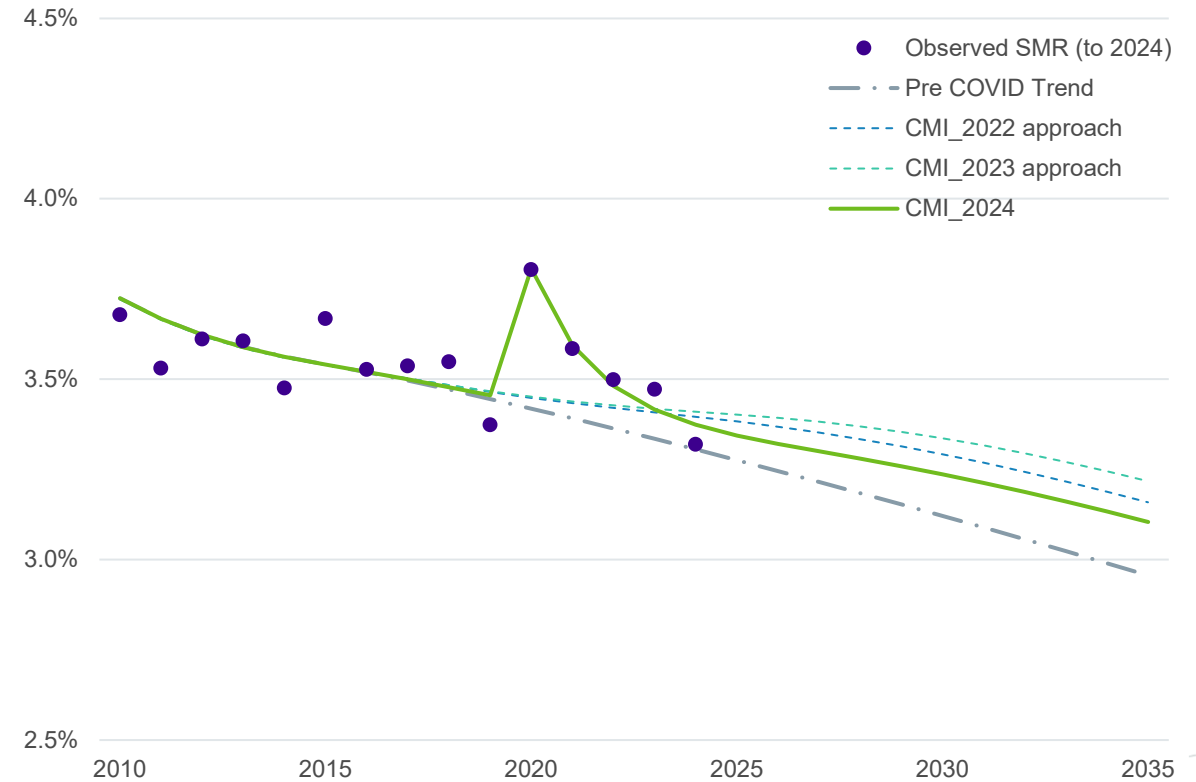
CMI approach to COVID: CMI_2024



UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



CMI_2024 introduced a “Fitted Overlay” to directly model COVID excess mortality. Core calibration assumes excess mortality to half each year after a peak in 2020.

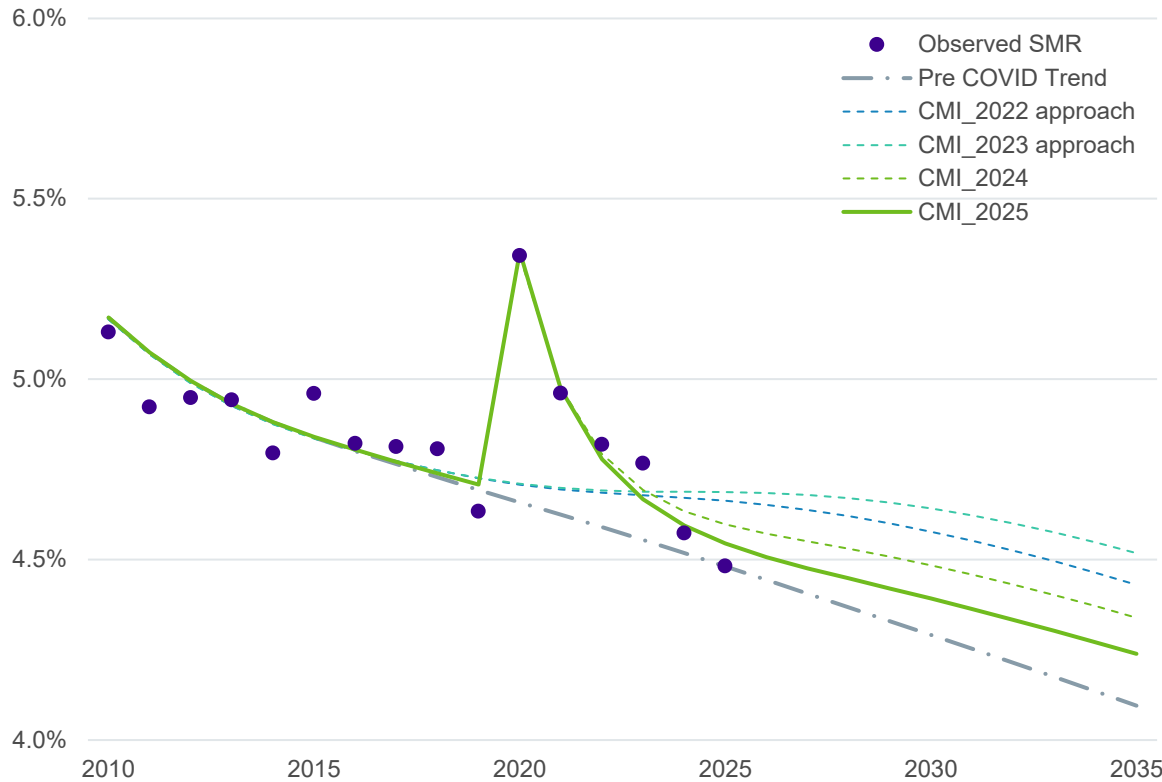
CMI_2025 shows output from the core CMI_2024 v05 BETA model with a long-term rate of 1.5% pa.



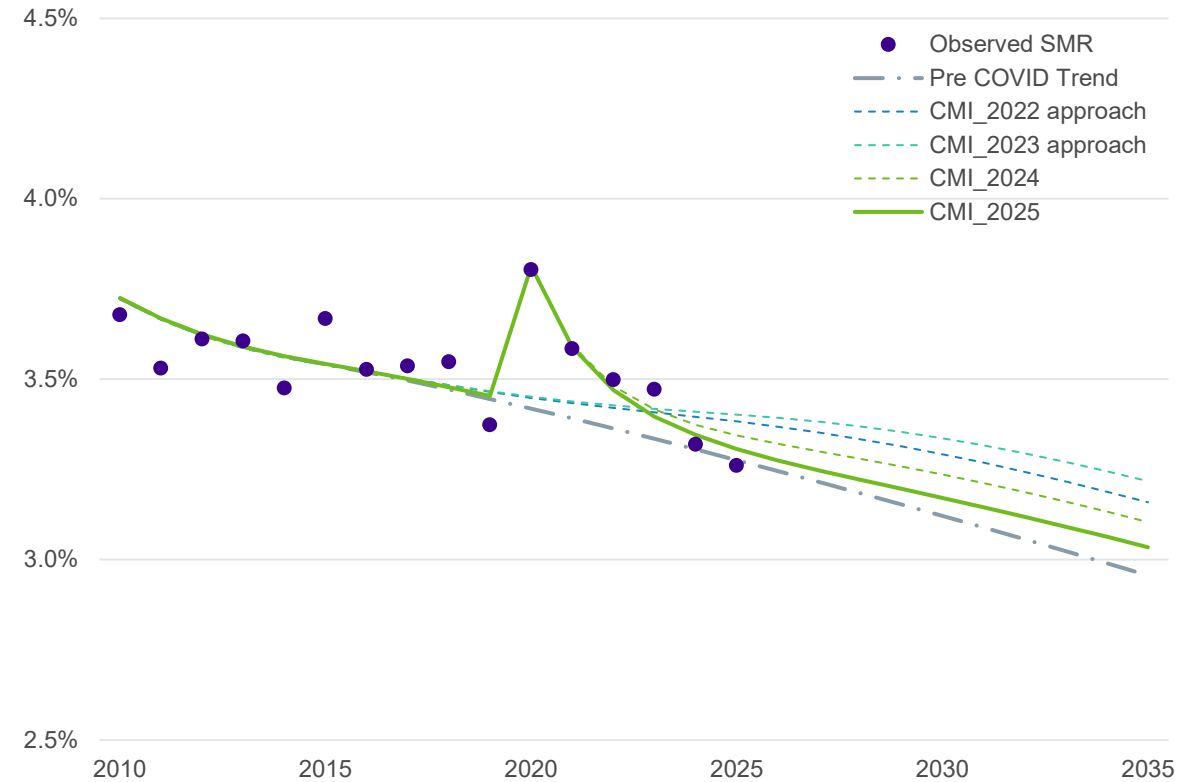
CMI approach to COVID: CMI_2025



UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



CMI_2025 was the first “business as usual” year under new approach. Further strengthening of projection due to light mortality in 2025.



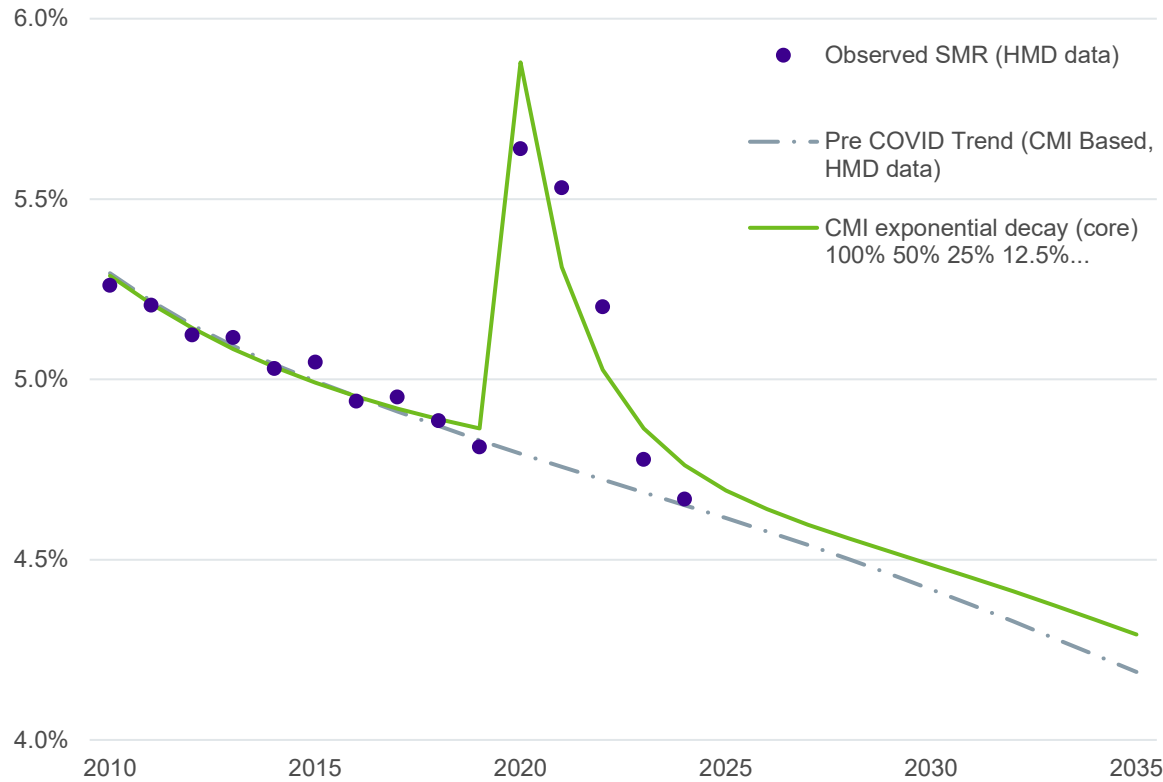
Applying the fitted overlay to the US



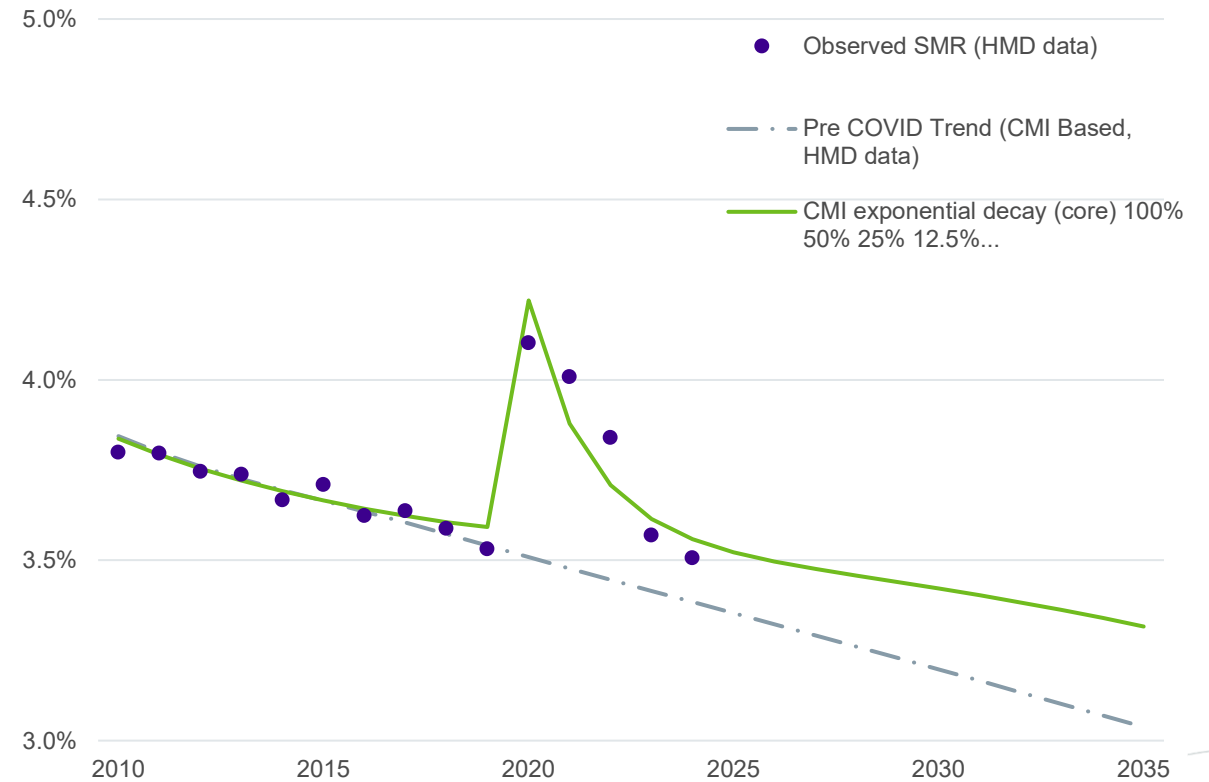
Using pandemic data - exponential decay (US)



US Male SMRs (ages 65 to 95)



US Female SMRs (ages 65 to 95)



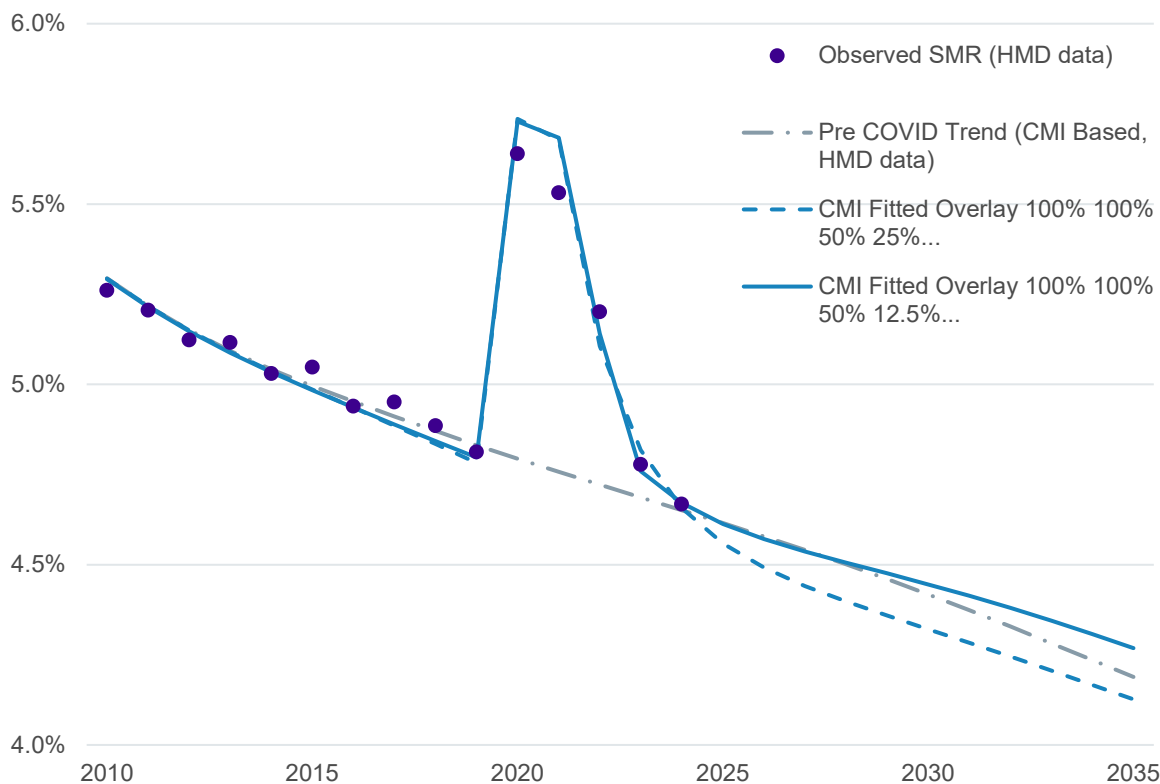
US prolonged peak not captured by exponential decay starting in 2020 – should we try to capture pandemic shape better?



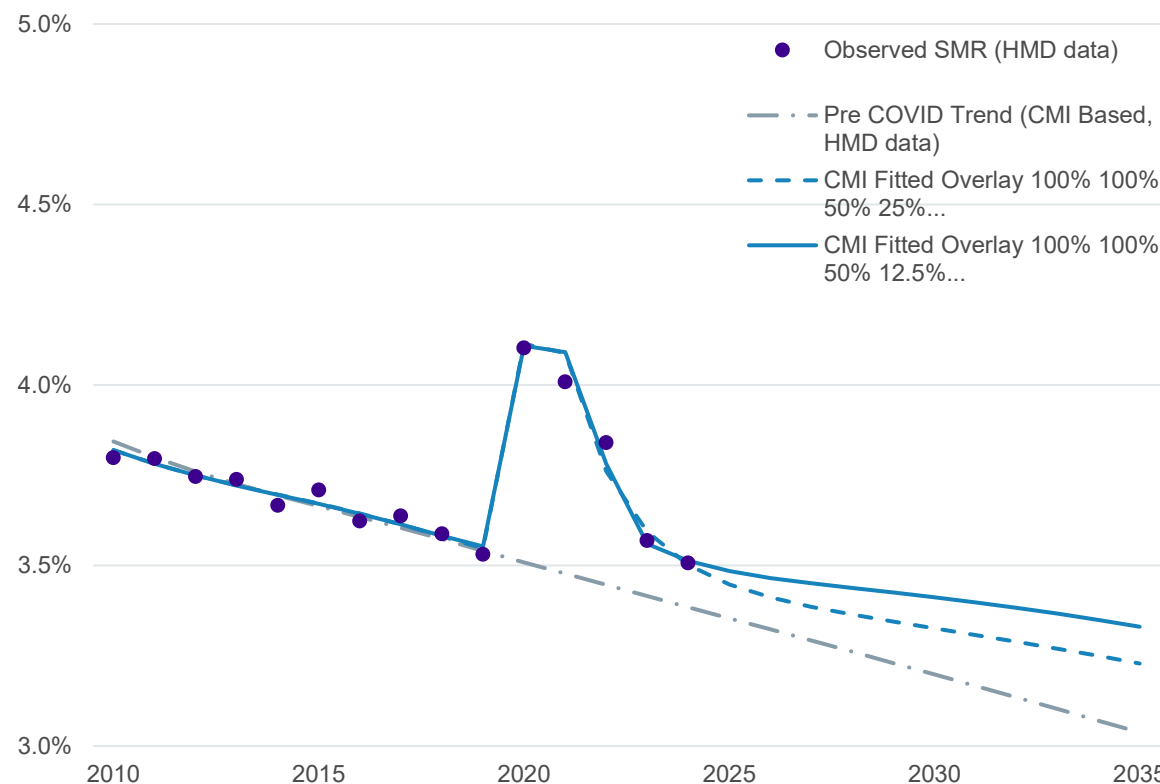


Using pandemic data - fitted overlay (US)

US Male SMRs (ages 65 to 95)



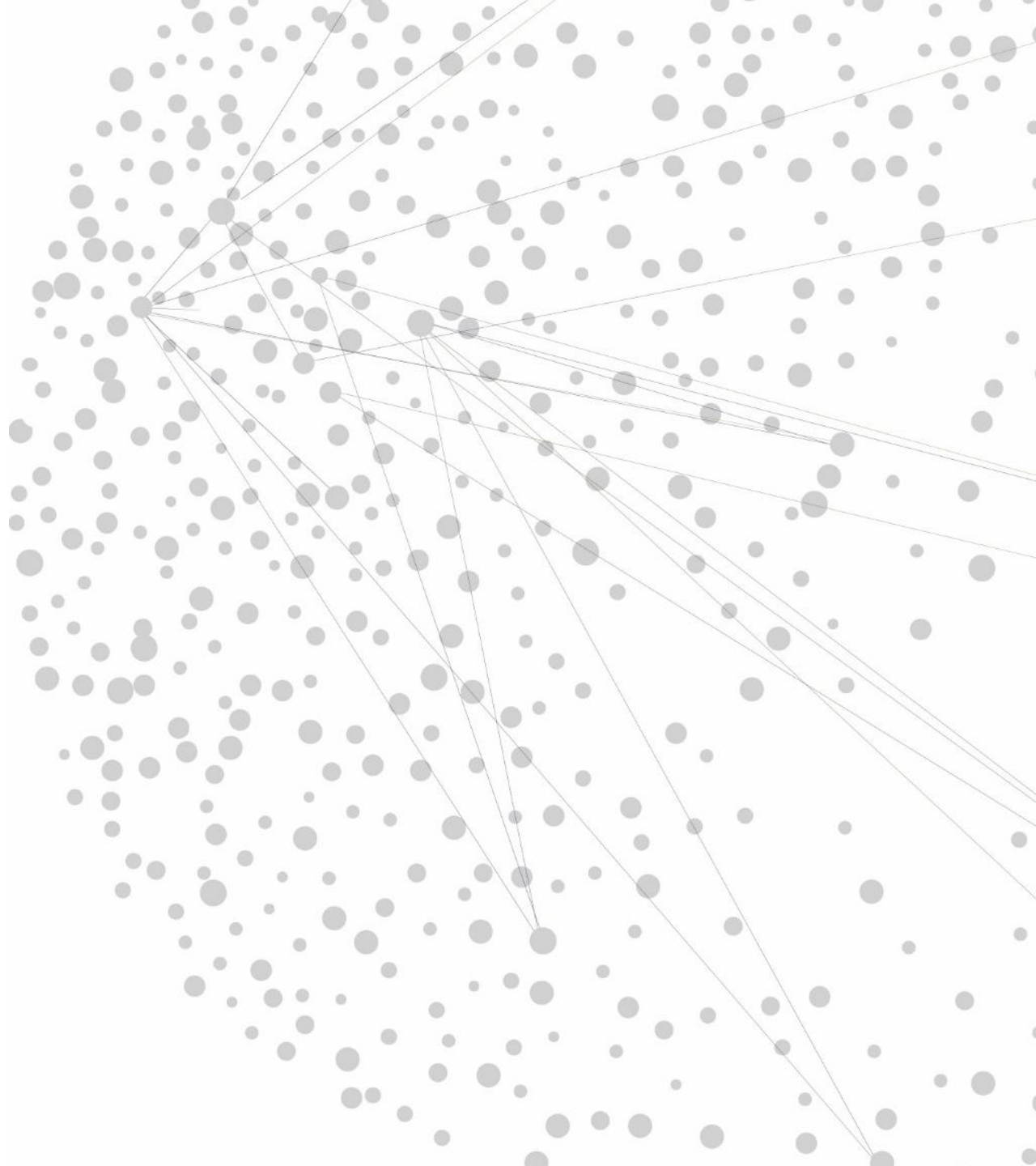
US Female SMRs (ages 65 to 95)



**How should exponential decay begin from a prolonged peak?
Does a higher/longer peak justify assuming pandemic excess to be over sooner?**



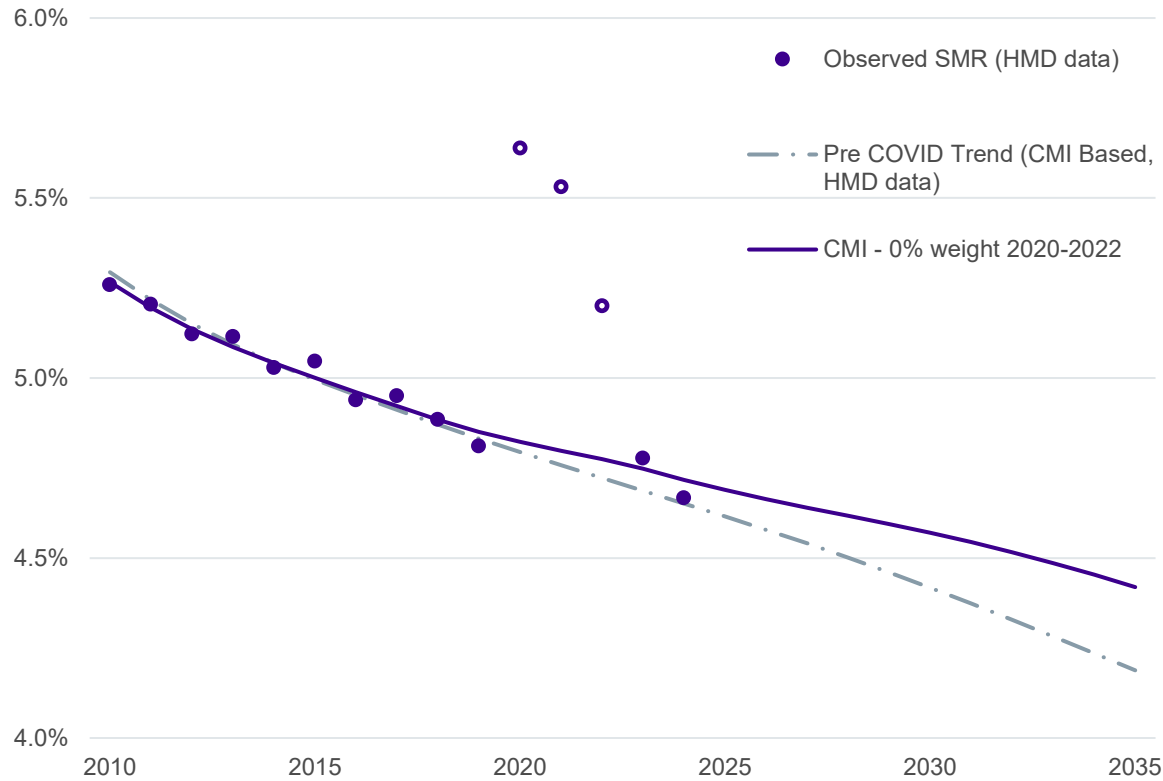
“Skipping” pandemic years of data



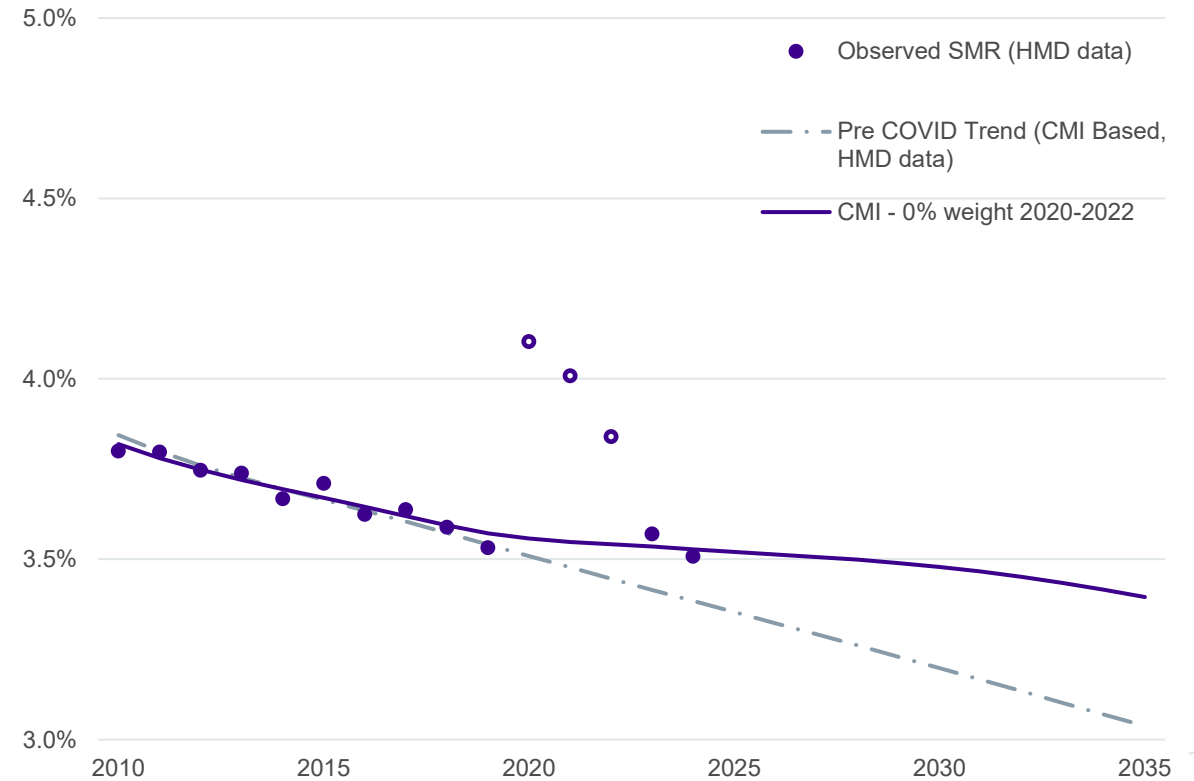
“Skipping” the pandemic years of data (US)



US Male SMRs (ages 65 to 95)



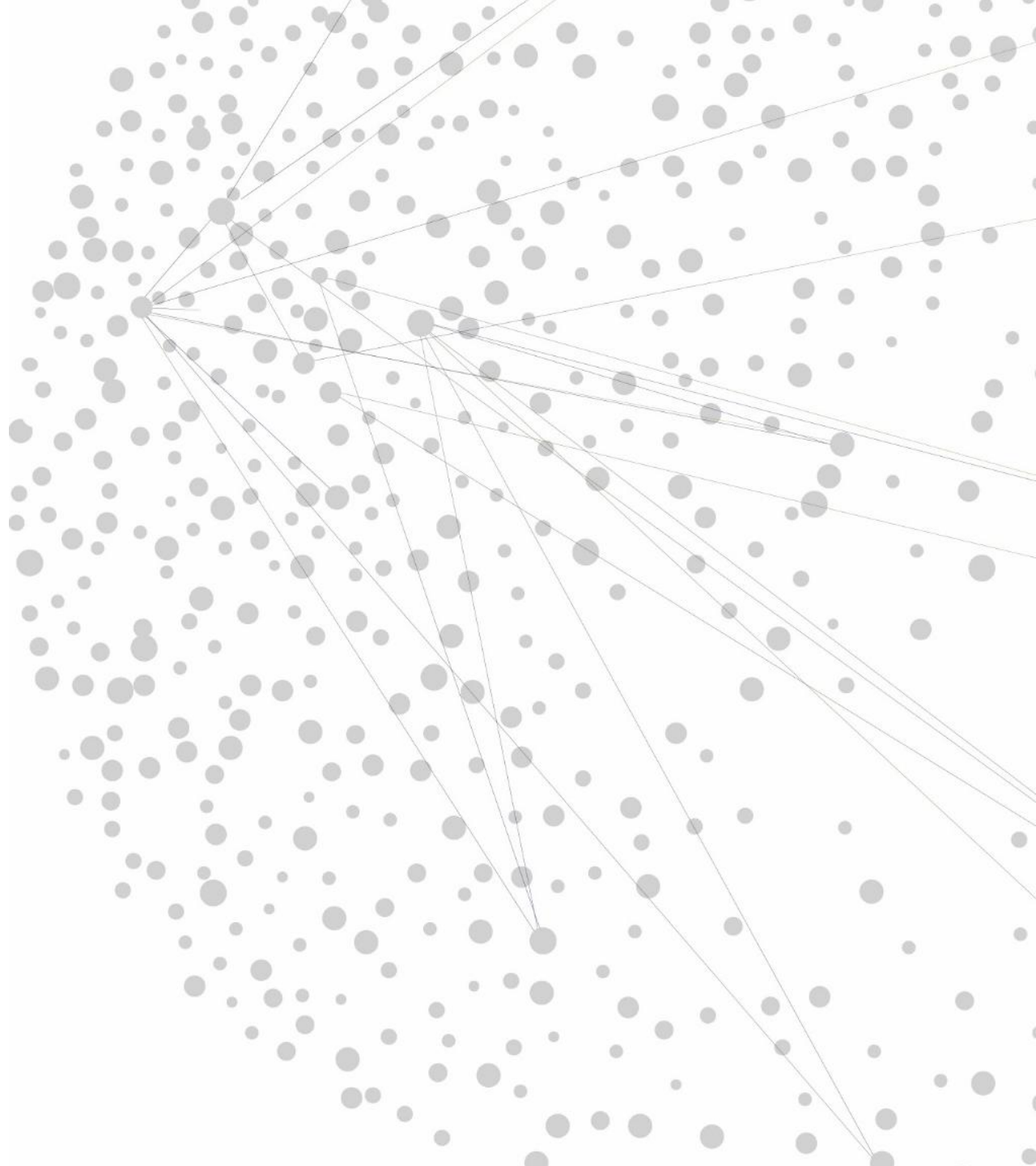
US Female SMRs (ages 65 to 95)



A plausible alternative approach?
Will depend on your view of 2023-2024 data.



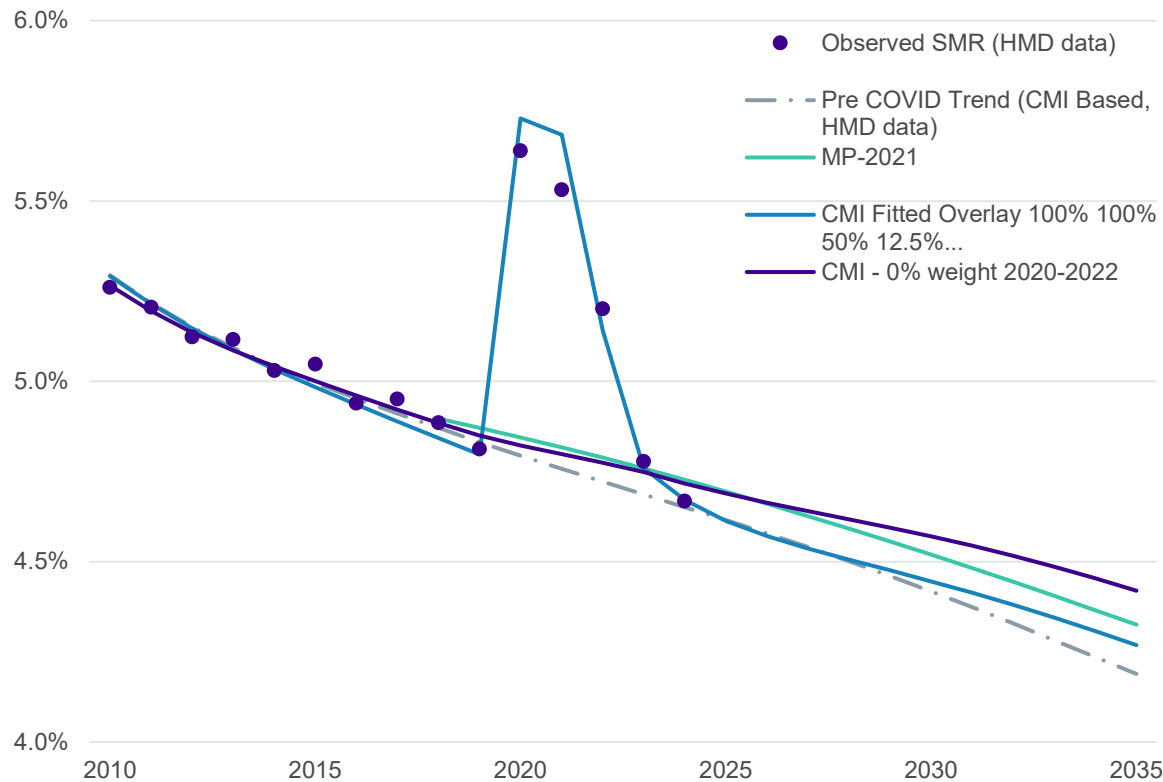
Summary



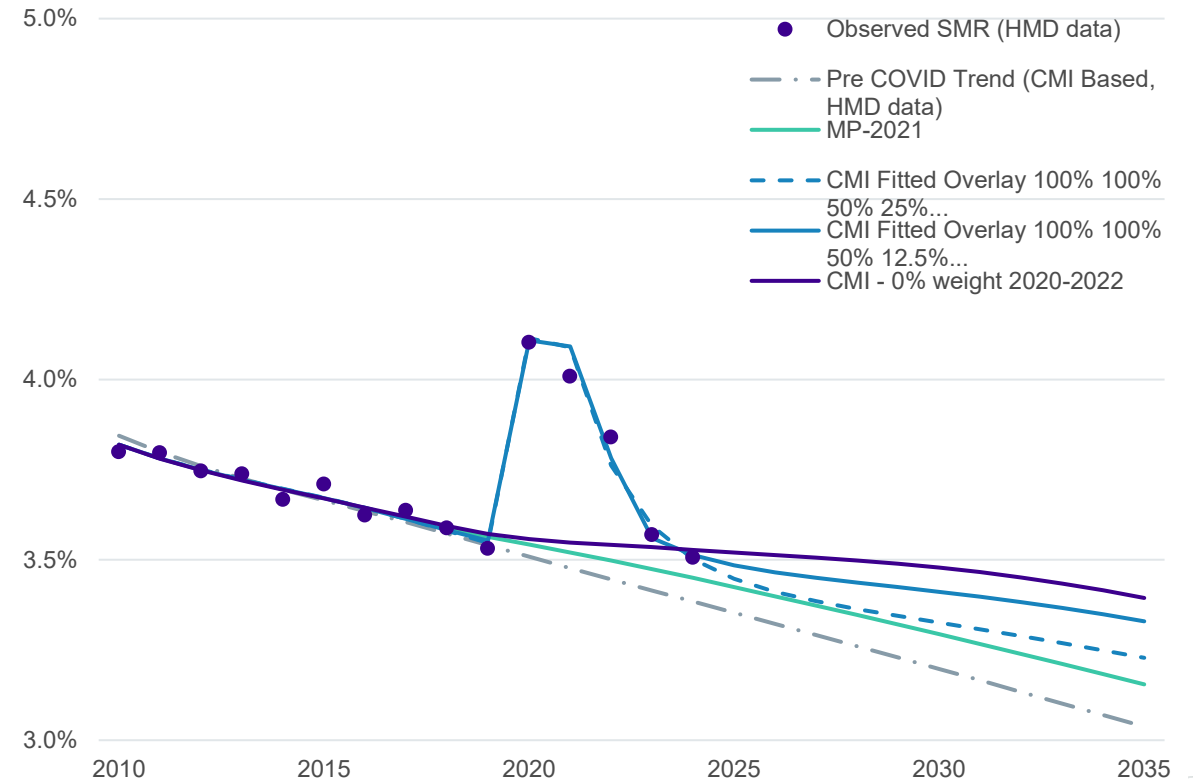
Summary (US)



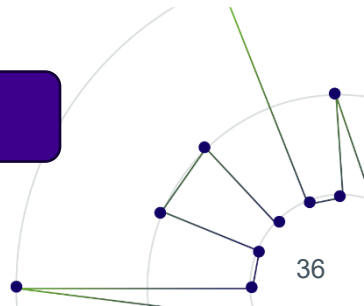
US Male SMRs (ages 65 to 95)



US Female SMRs (ages 65 to 95)



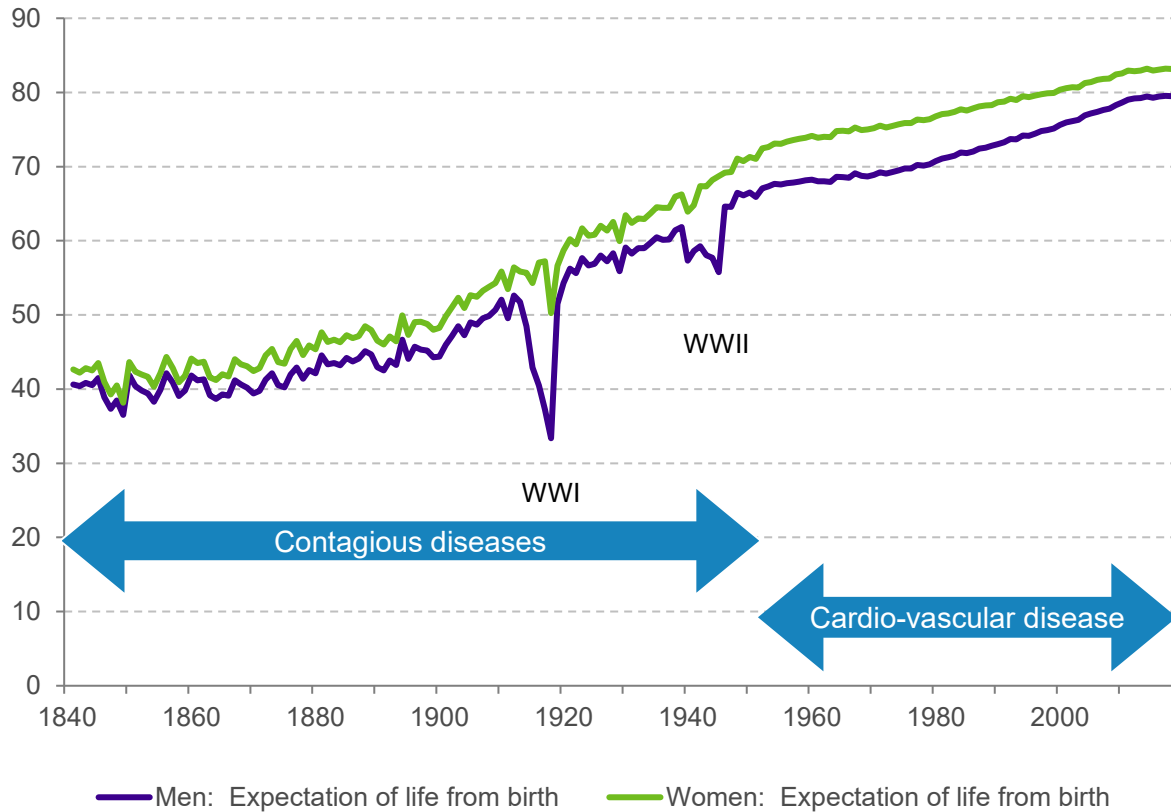
Judgement required on outlook for excess – new years of data very important.



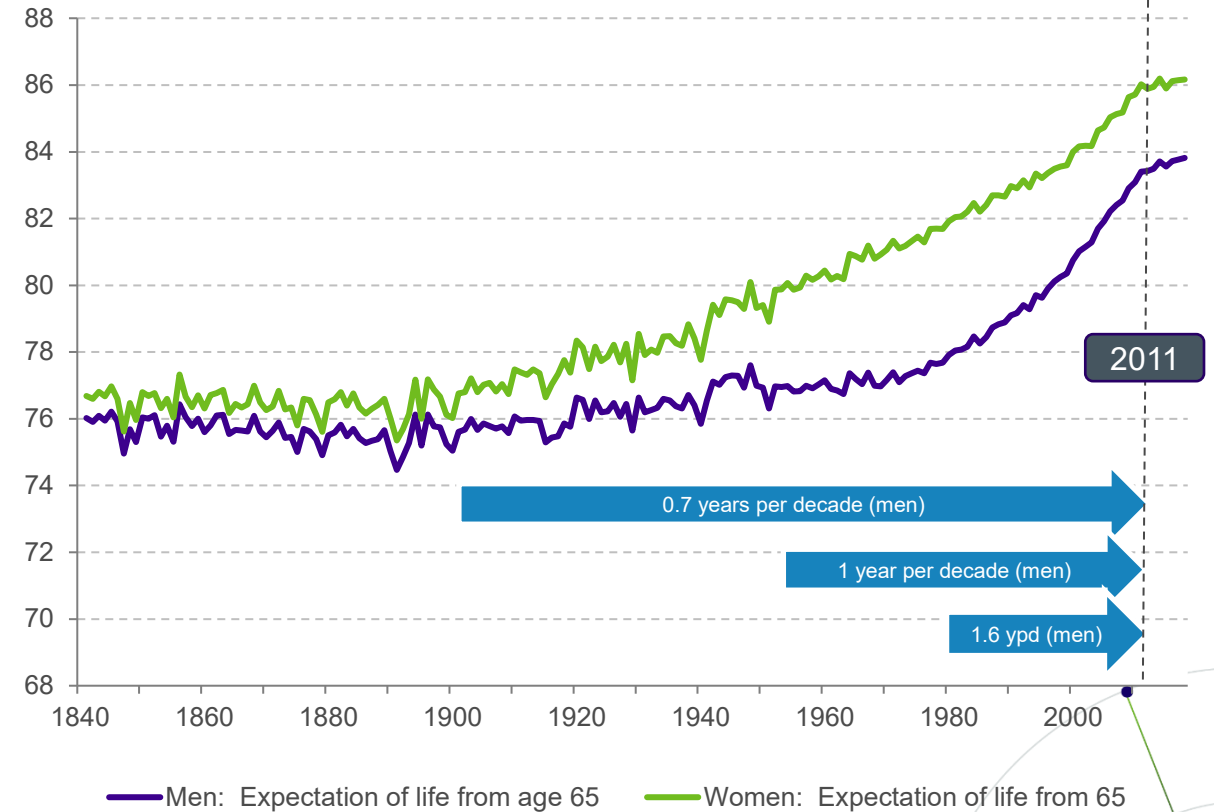
Longer term trends

Progression of longevity *at birth vs in retirement*

E&W (Period) life expectancy at birth

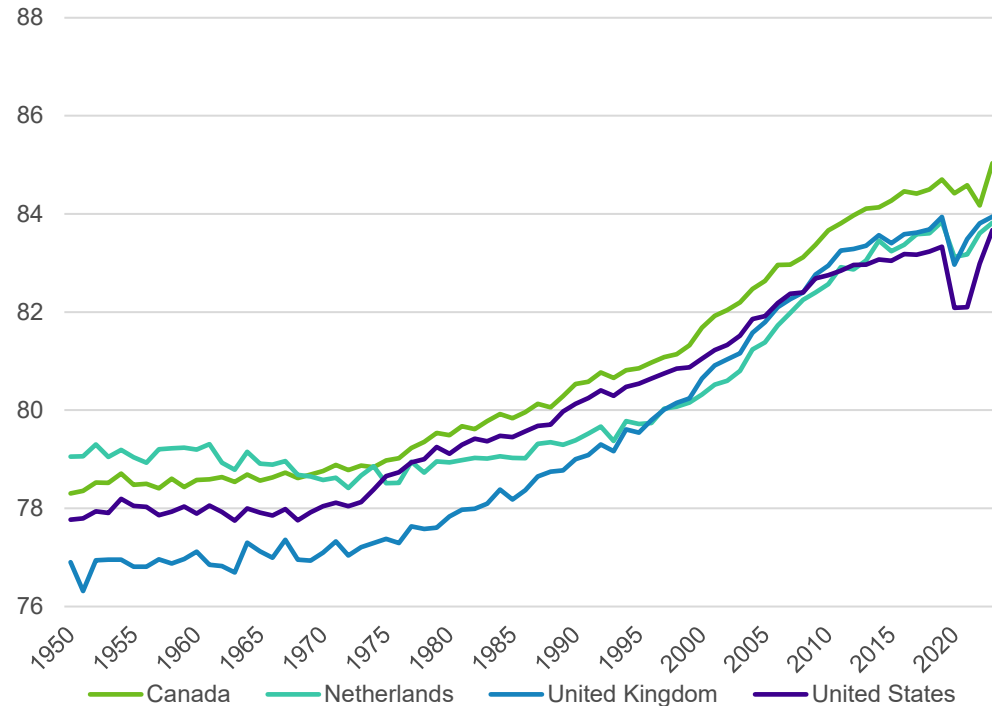


E&W (Period) life expectancy at age 65

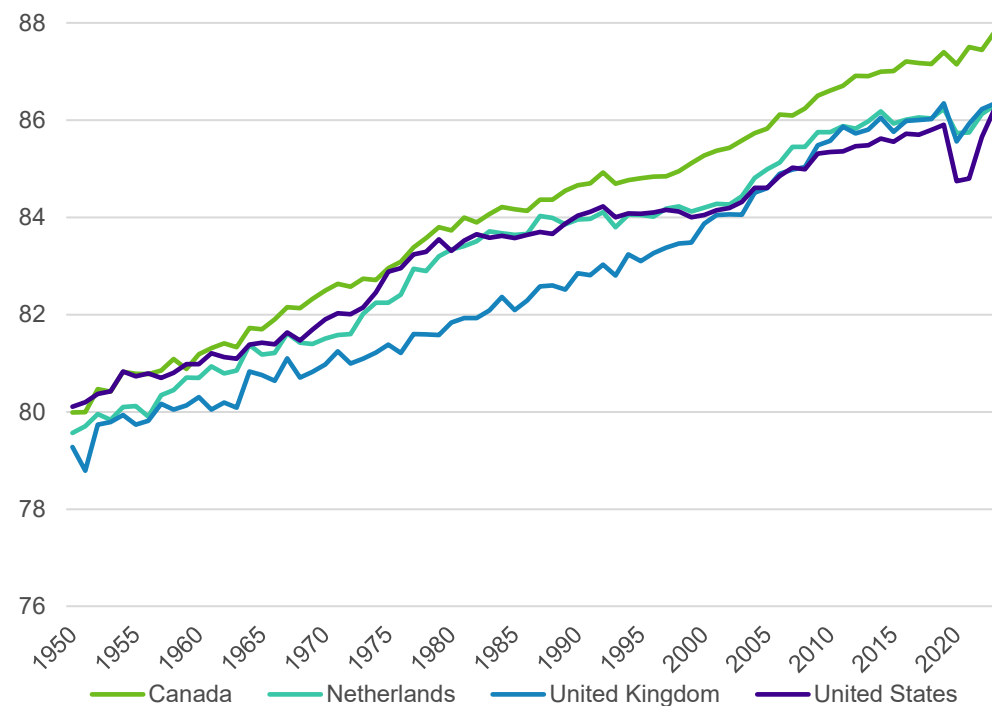


Progression of longevity in retirement over time

Period Life Expectancy from 65 - men

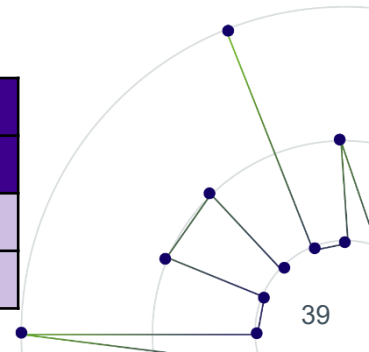


Period life expectancy at age 65 - women



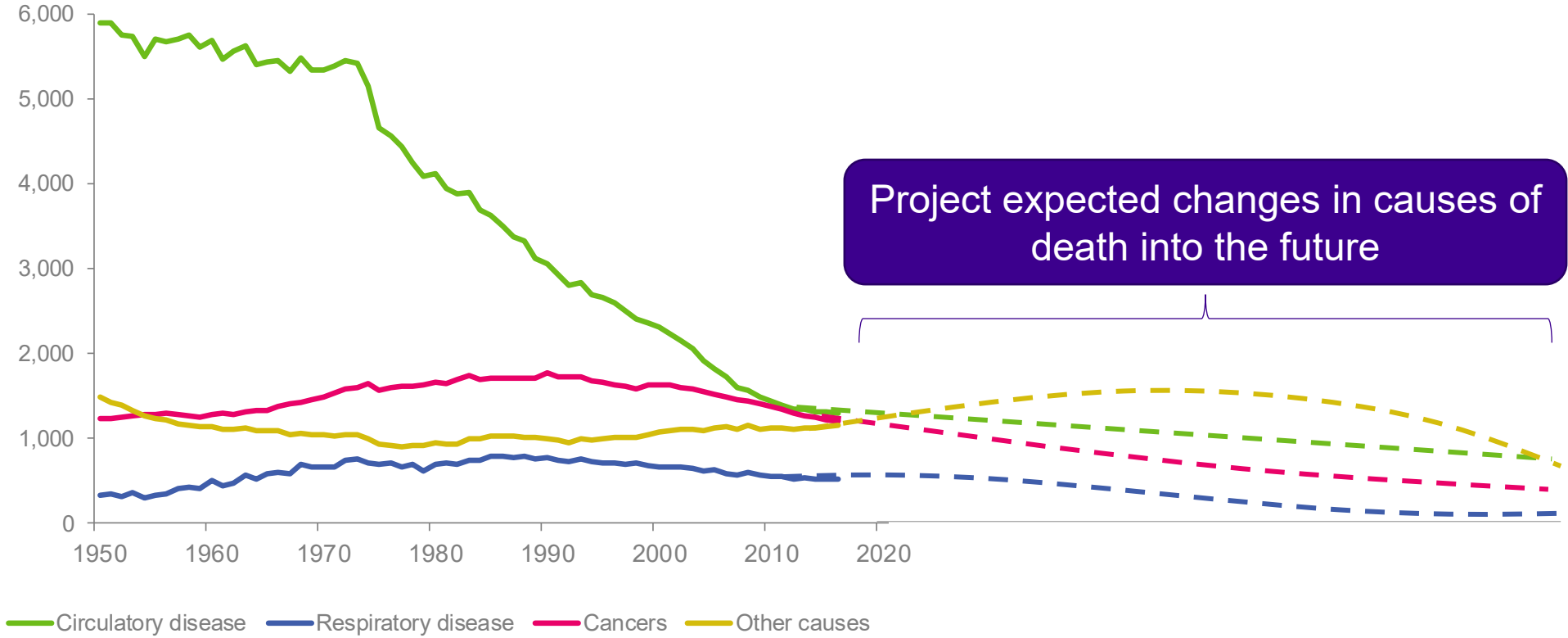
Source
Chart: [Our World in Data](#) (original source UN)

Decades/year improvements in LE65	Canada		Netherlands		UK		US	
	Men	Women	Men	Women	Men	Women	Men	Women
1950-2019	0.9	1.1	0.7	1.0	1.0	1.0	0.8	0.8
1980-2019	1.3	1.0	1.3	0.7	1.6	1.2	1.1	0.7

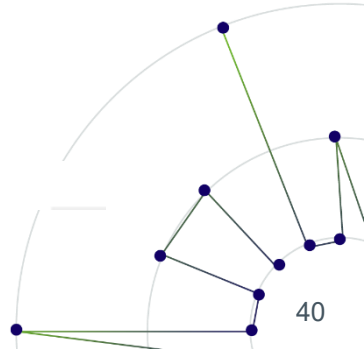


Improvement components (cause of death)

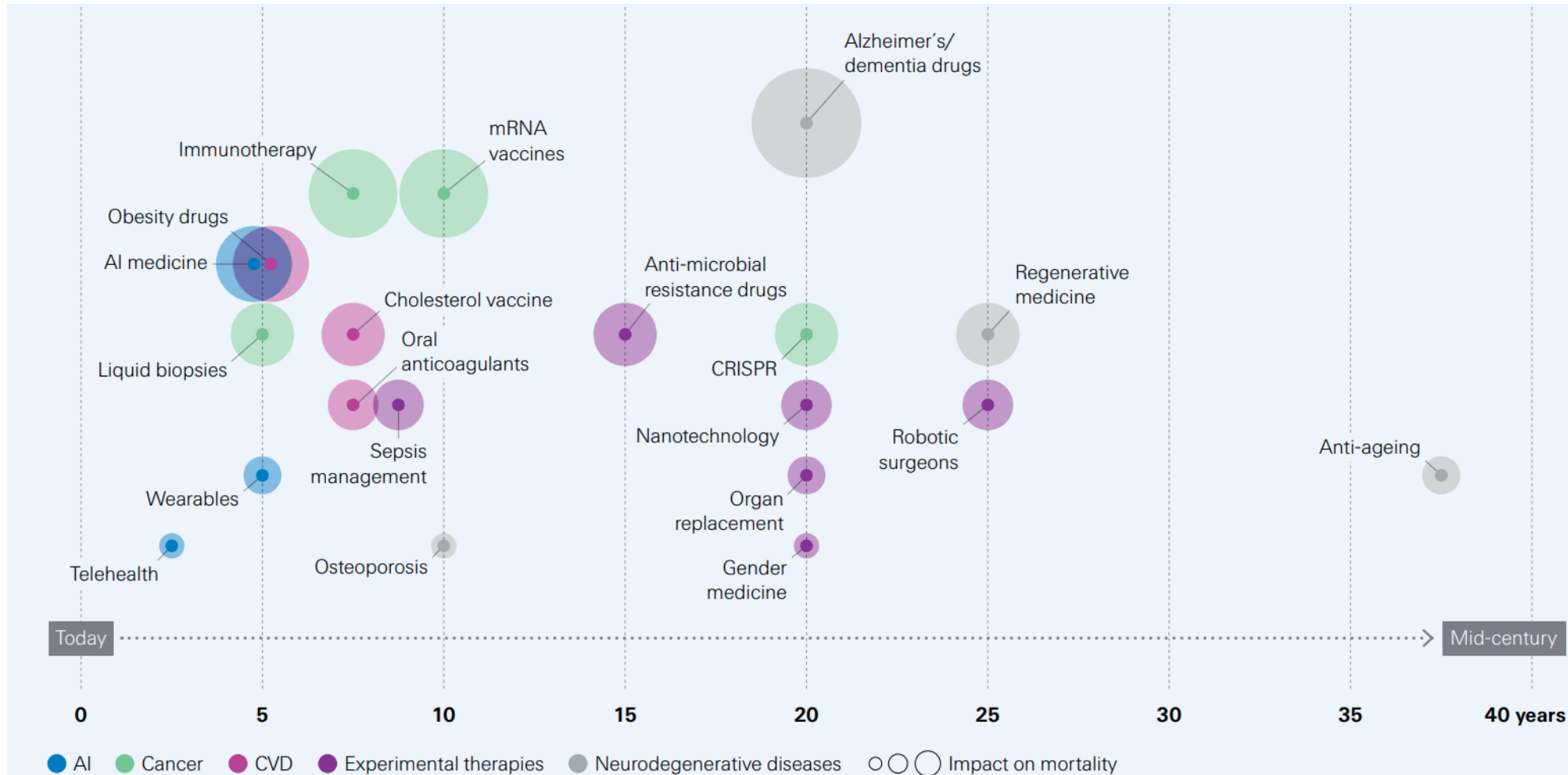
US, deaths per 100,000 lives
Men, aged 75-79



Own calculations based upon data from World Health Organisation (WHO) and United Nations (UN). Figures are shown as deaths per 100,000 lives.



Improvement components (driver based approach)

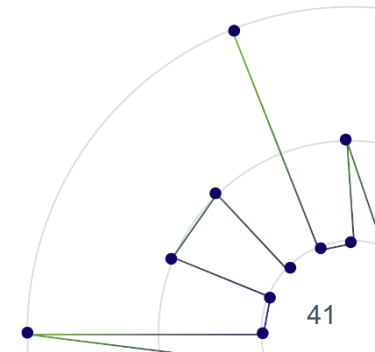


Questions to ask?

How likely?

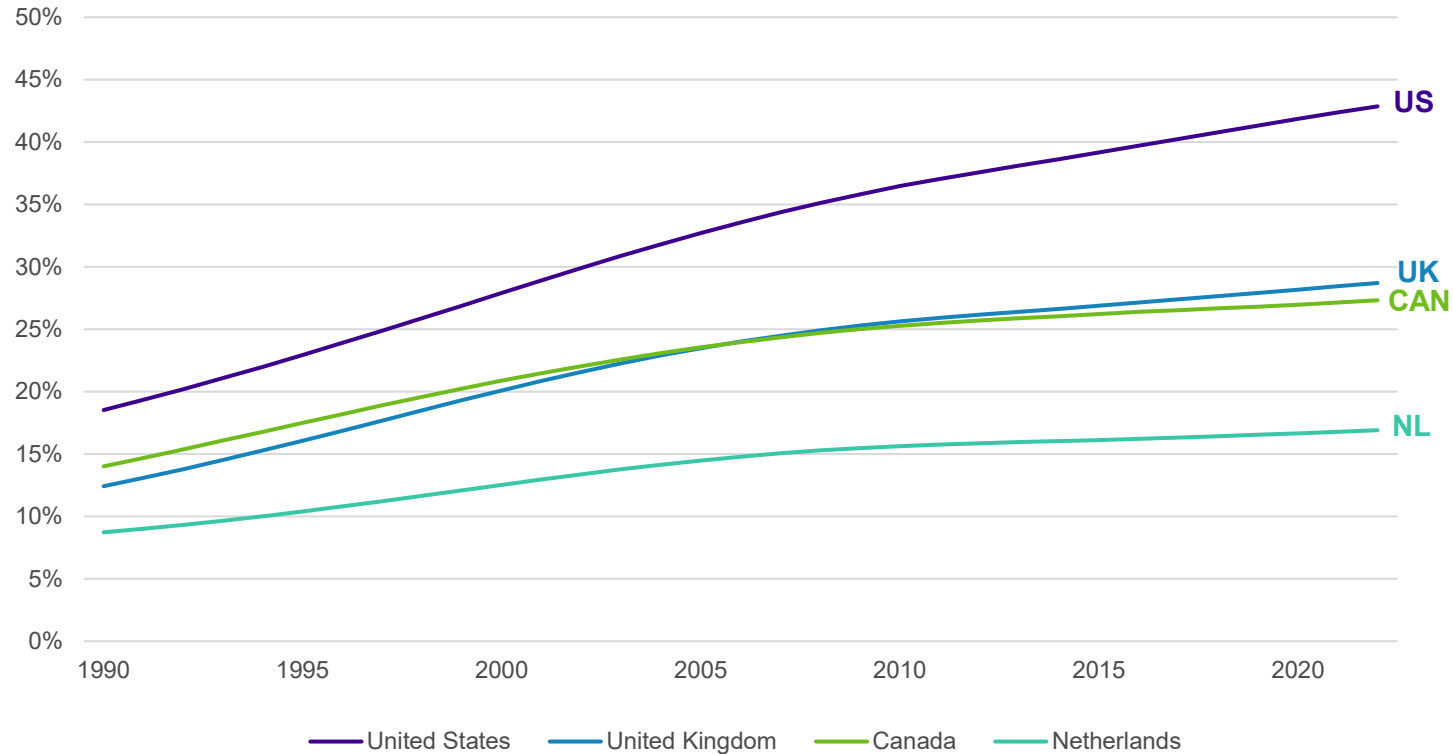
Peak impact?

When and where available?



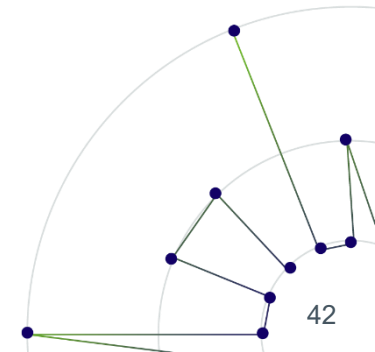
Anti-obesity medication: *latest hot topic*

Percent of 18+ population with a BMI over 30



Source
Chart: [Our World in Data](#) (original source WHO)

Obesity is a known risk factor for multiple causes of death



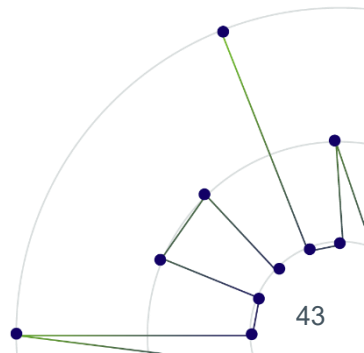
Anti-obesity medication: *possible impact*

	Publication	Links to research papers
Crystallise	Geroscience Focus, Issue 2 – March 2025	Research available for subscribers – contact Crystallise for more information
Swiss Re	The future of metabolic health and weight loss drugs – September 2025	https://www.swissre.com/press-release/GLP-1-drugs-may-reduce-mortality-by-up-to-6-4-in-the-US-by-2045/3f8ec083-2b76-4eea-88cb-e5af644e045d
Club Vita	Longevity trend scenarios: <i>stressing the future</i> – October 2025	US insights session available for subscribers – contact Club Vita for more information
RGA	Weighing the Evidence – November 2025	https://www.rgare.com/knowledge-center/article/rga-glp-1-study--weighing-the-evidence
Munich Re	GLP-1 therapies and mortality risk: <i>Implications for life insurers</i> – February 2026	https://www.munichre.com/us-life/en/insights/clinical-knowledge/glp-1-therapies-and-mortality-risk-implications-for-life-insurers.html

For a deep dive comparing these scenario models see the recent webinar from Club Vita:

<https://www.clubvita.net/us/events/risk-of-living-longer-the-glp-1-effect>

Will gains from AOM be the main driver of near-term improvements or compound with other advances?



The impacts in 20 years...



Swiss Re



3.5%

contribution to cumulative mortality reduction (range of 1.0-8.8%)

4.0%

contribution to cumulative mortality reduction (range of 2.3-6.4%)

4.0-9.5%*

contribution to cumulative mortality reduction

5.0%

contribution to cumulative mortality reduction (expressed relative to MP-2021)

15.0%

contribution to cumulative mortality reduction (range of 11.0-20.1%)

0.2% p.a.*

mortality improvement (range of 0.05-0.5%)

0.2% p.a.*

mortality improvement (range of 0.1-0.3%)

0.2-0.5% p.a.

mortality improvement

0.3% p.a.

mortality improvement

0.7% p.a.*

mortality improvement

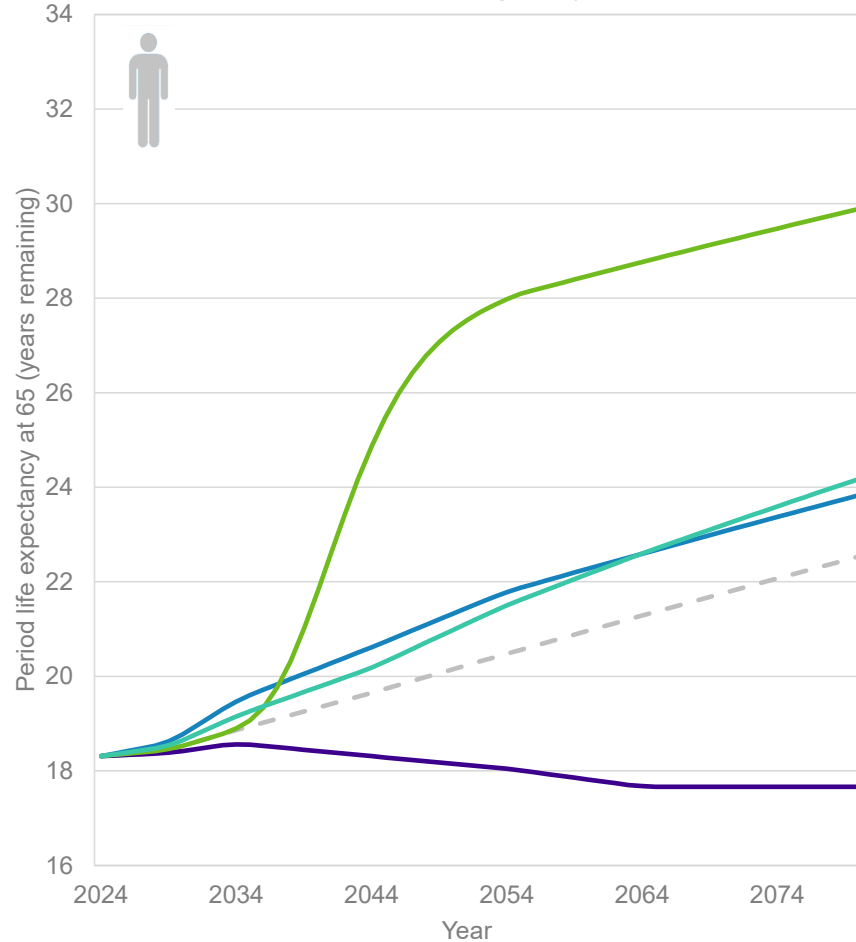
*Club Vita inferred calculation

Note: Impact shown here is for US population to enable comparisons, Crystallise figures are for a general population, but are derived from England & Wales data



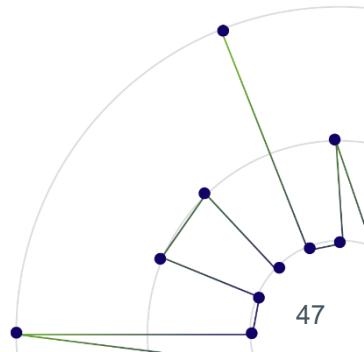
Assessing drivers with scenario modelling

Illustrative male period life expectancy under different future longevity scenarios



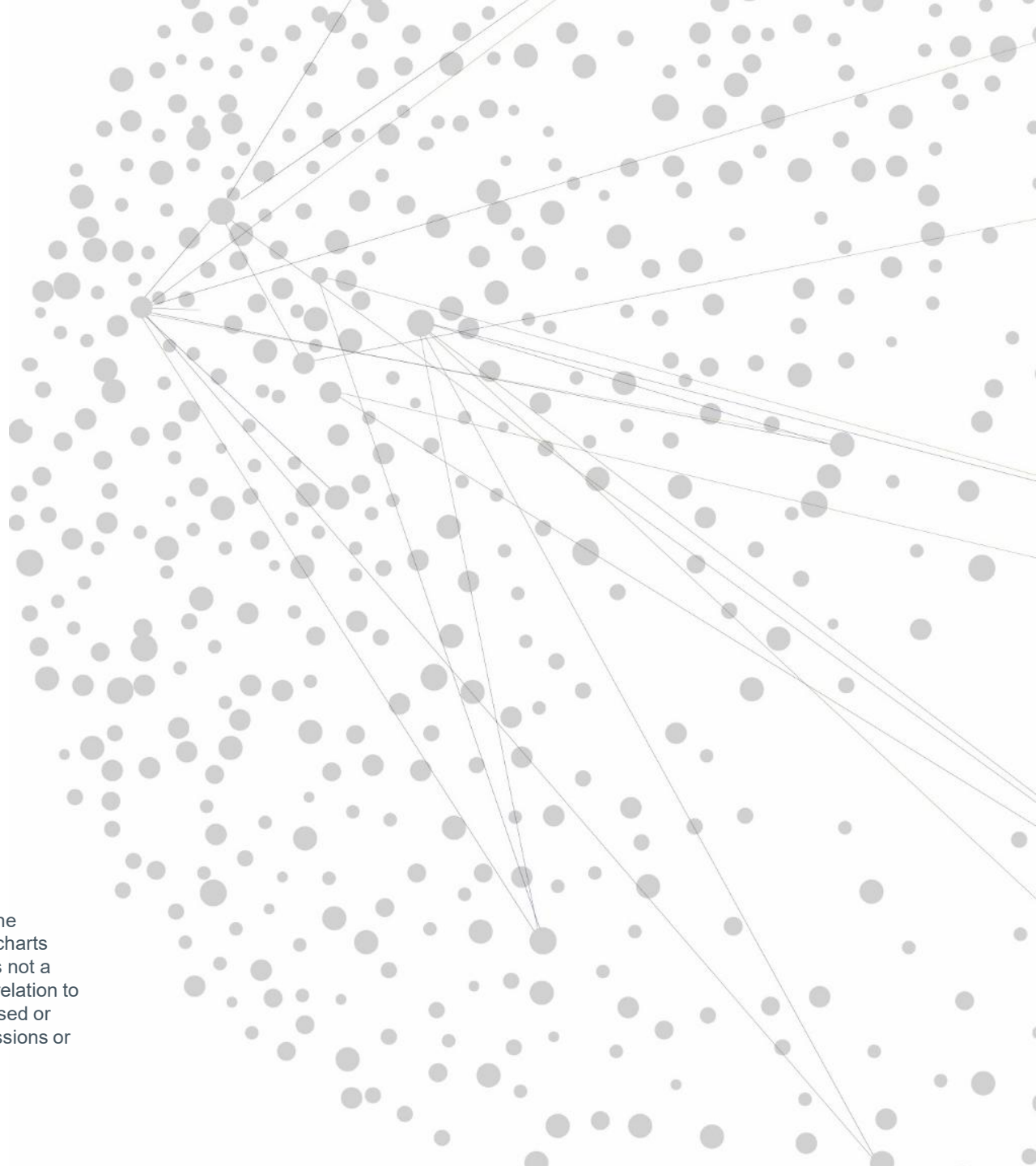
Scenario name	Description
Senolytics for all	Novel advances in therapies specifically designed to slow the aging process lead to reduced mortality and increased health-span
Obesity reversal	Reversal of multi-decade increase in obesity prevalence, influenced by obesity therapeutics.
Cure for cancer	Widespread reductions in cancer mortality from various therapeutics, screening and lifestyle interventions.
Longevity depression	A combination of adverse economic and lifestyle trends along with a limited pipeline of “blockbuster” therapy leads to long term worsening in mortality rates.

Source: Club Vita Longevity Trend Scenarios: *stressing the future*, October 2025
 Note: Scenario impact modelled here is in addition to other improvements



Thank you

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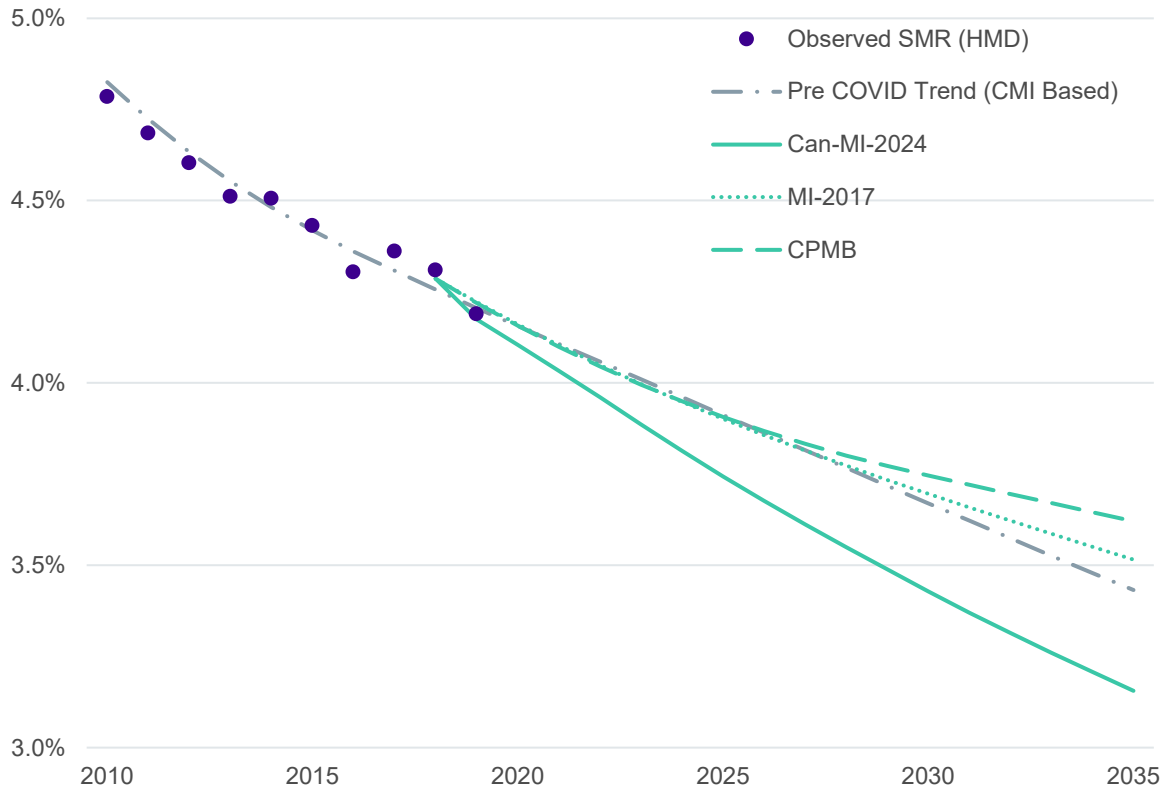
Appendices

Canada

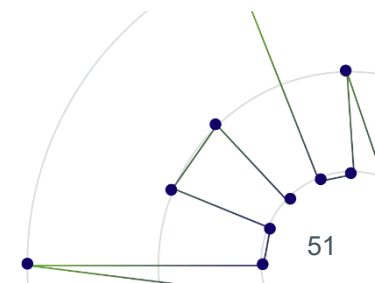
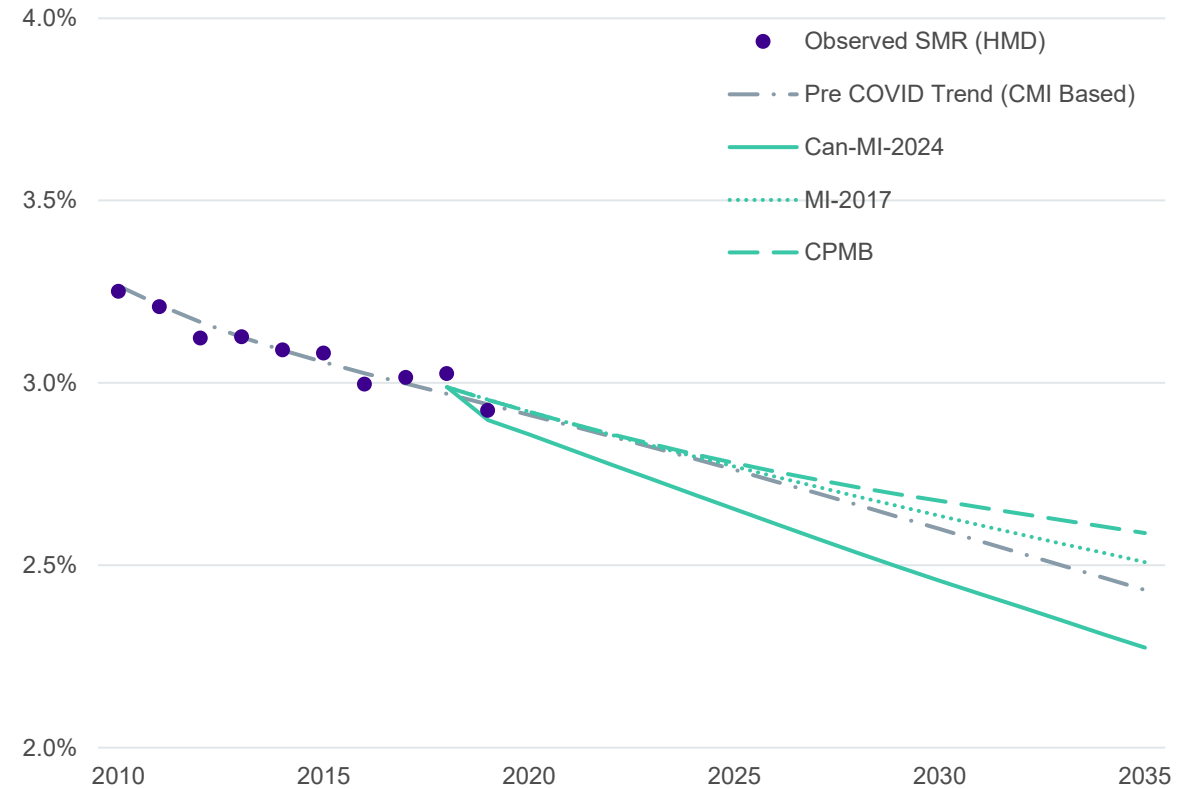
Pre-pandemic trends (Canada)



Canada Male SMRs (ages 65 to 95)



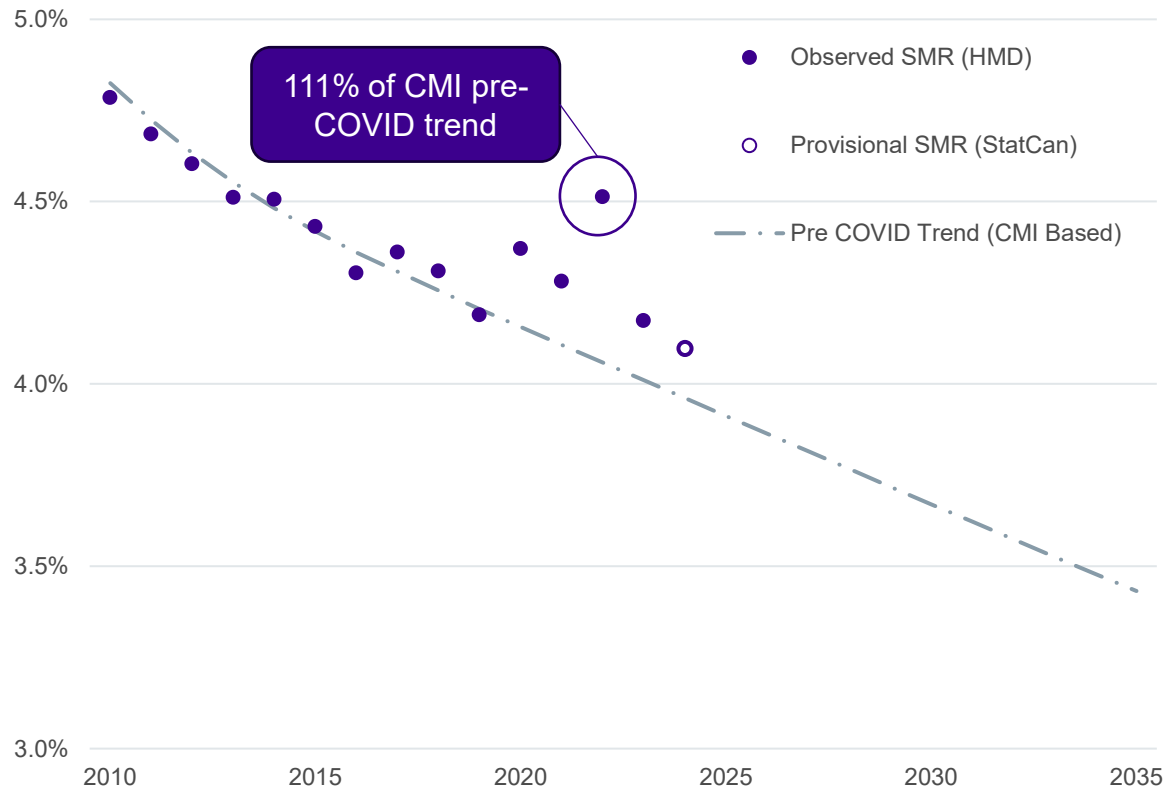
Canada Female SMRs (ages 65 to 95)



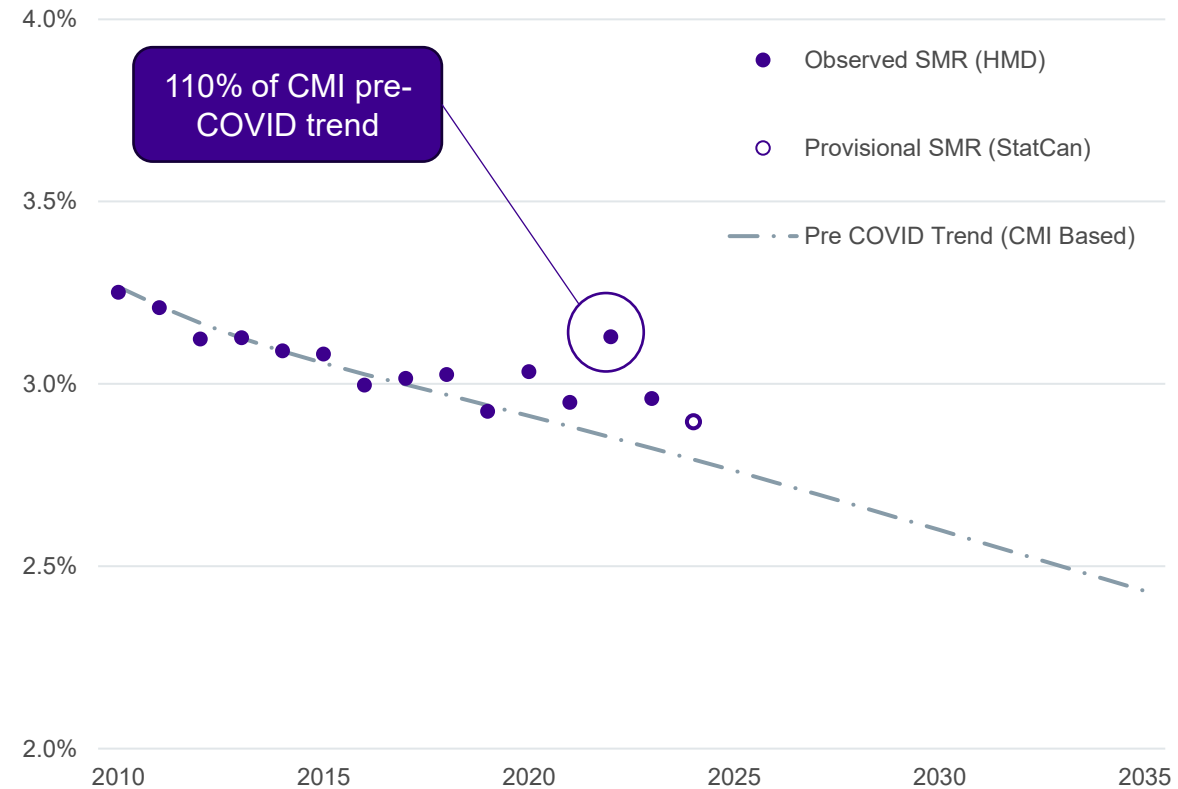


What happened next? (Canada)

Canada Male SMRs (ages 65 to 95)



Canada Female SMRs (ages 65 to 95)



COVID peak delayed until 2022 in Canada and excess (or new normal) is persisting. 2024 mortality still higher than pre-pandemic trends.

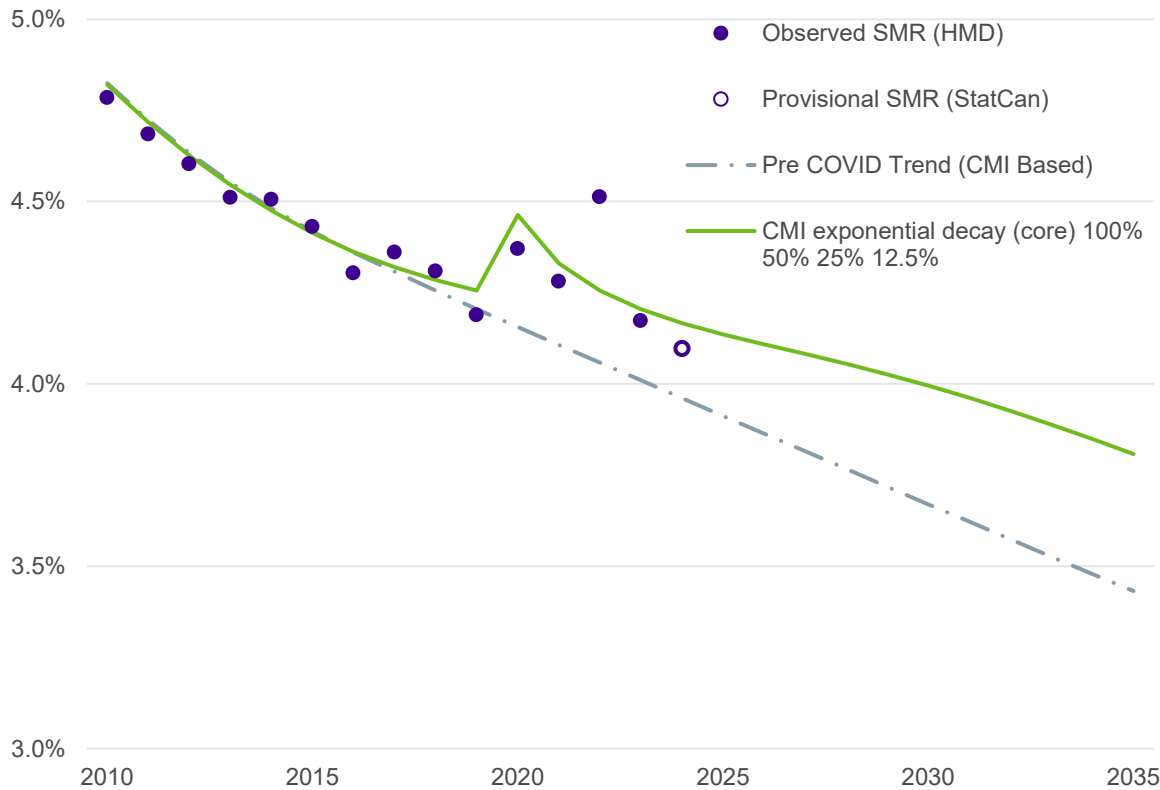
Source: Club Vita calculations using CMI_2024 v05 projections model. Canadian data up to 2023 from the Human Mortality Database (www.mortality.org), 2024 data estimated using [StatisticsCanada life table](https://www150.statcan.gc.ca/n1/pub/82-625-x/2024001/article/00001-eng.htm). Note: 1.3% long term rate of improvement is used throughout



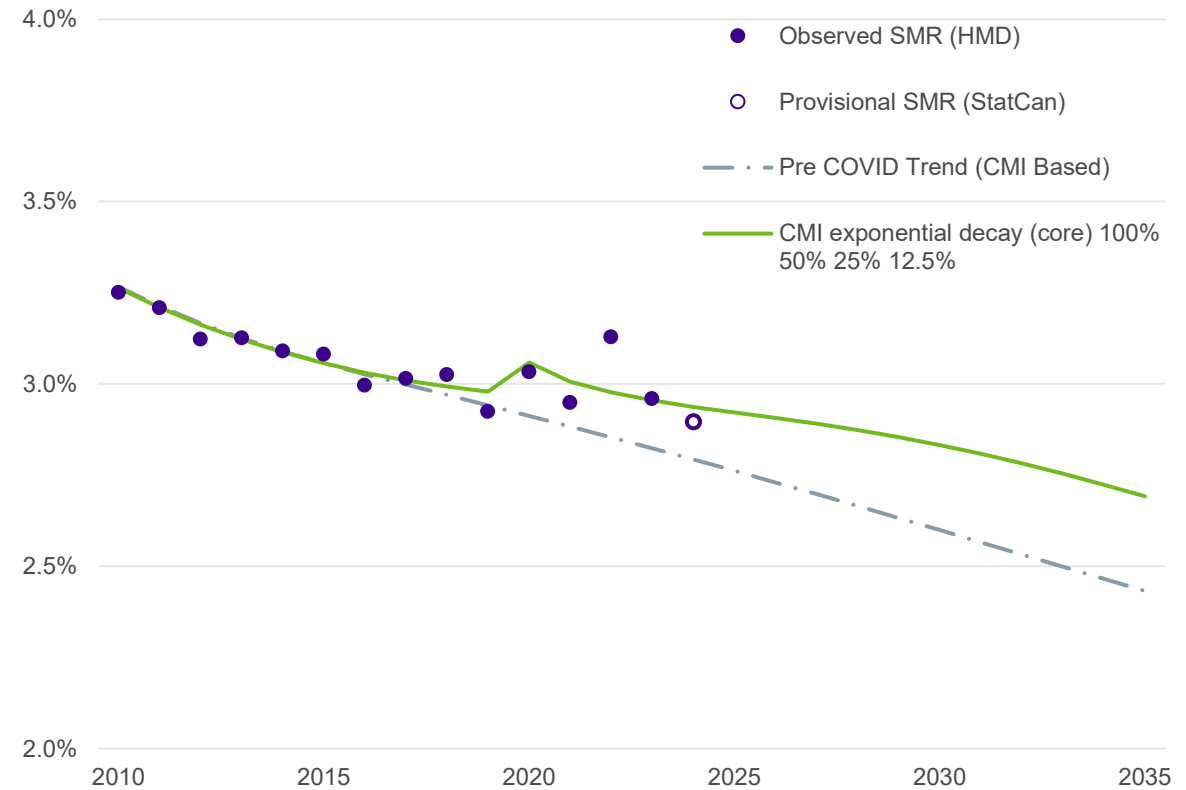


Using pandemic data - exponential decay (Canada)

Canada Male SMRs (ages 65 to 95)



Canada Female SMRs (ages 65 to 95)



Later peak not captured by exponential decay starting in 2020

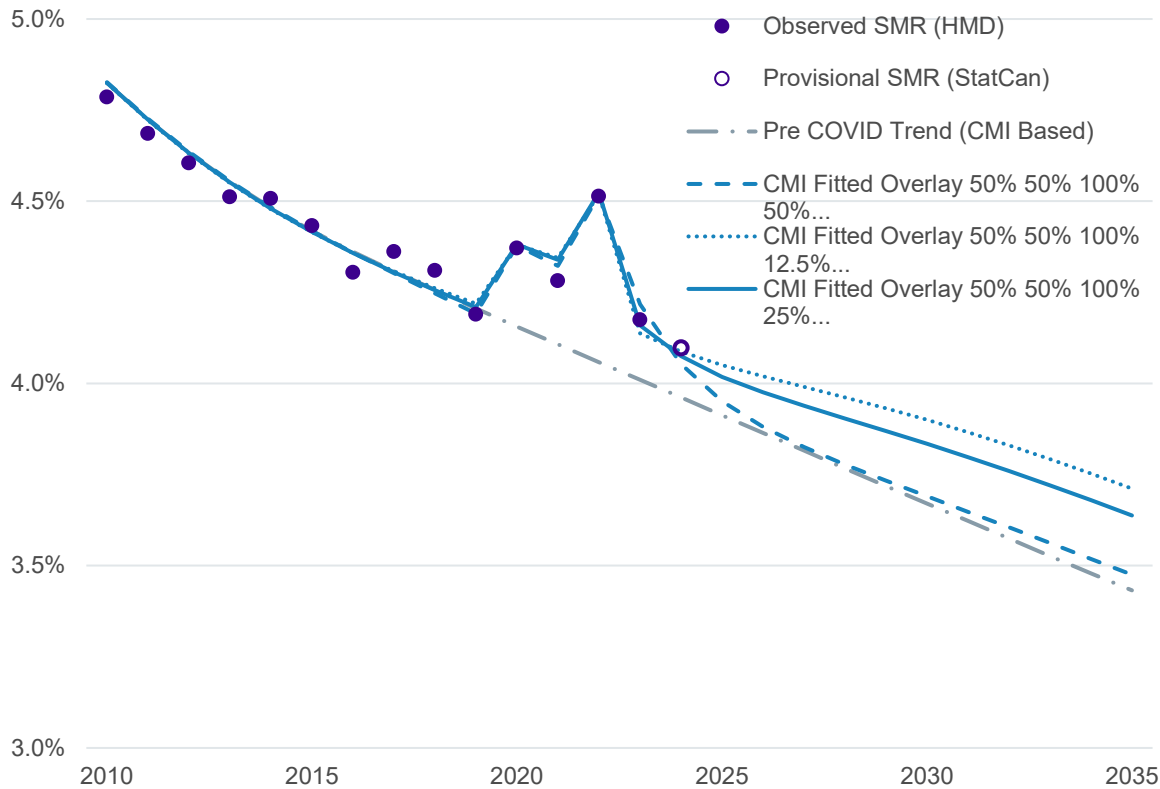
Source: Club Vita calculations using CMI_2024 v05 projections model. Canadian data up to 2023 from the Human Mortality Database (www.mortality.org), 2024 data estimated using [StatisticsCanada life table](https://www150.statcan.gc.ca/n1/pub/82-625-x/2024001/article/00001-eng.htm). Note: 1.3% long term rate of improvement is used throughout. Fitted overlay excess weightings half in each subsequent from last weighting disclosed.



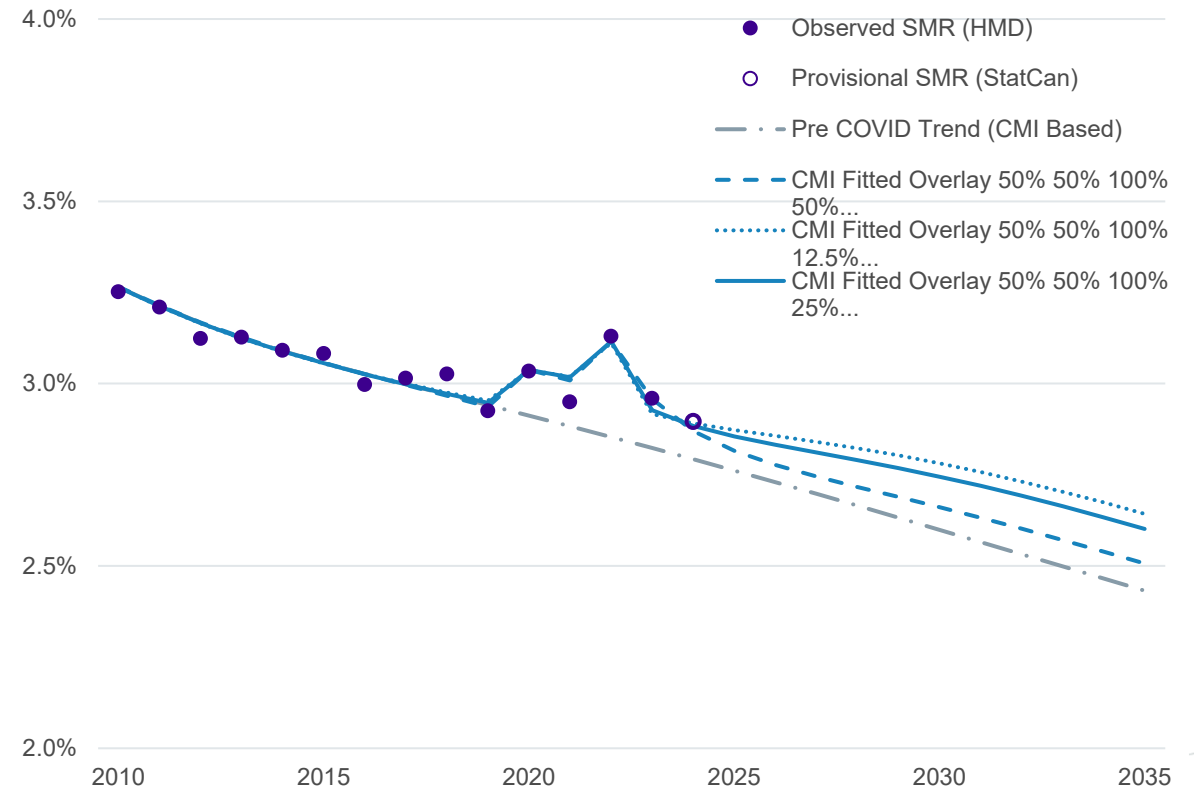
Using pandemic data - fitted overlay (Canada)



Canada Male SMRs (ages 65 to 95)



Canada Female SMRs (ages 65 to 95)



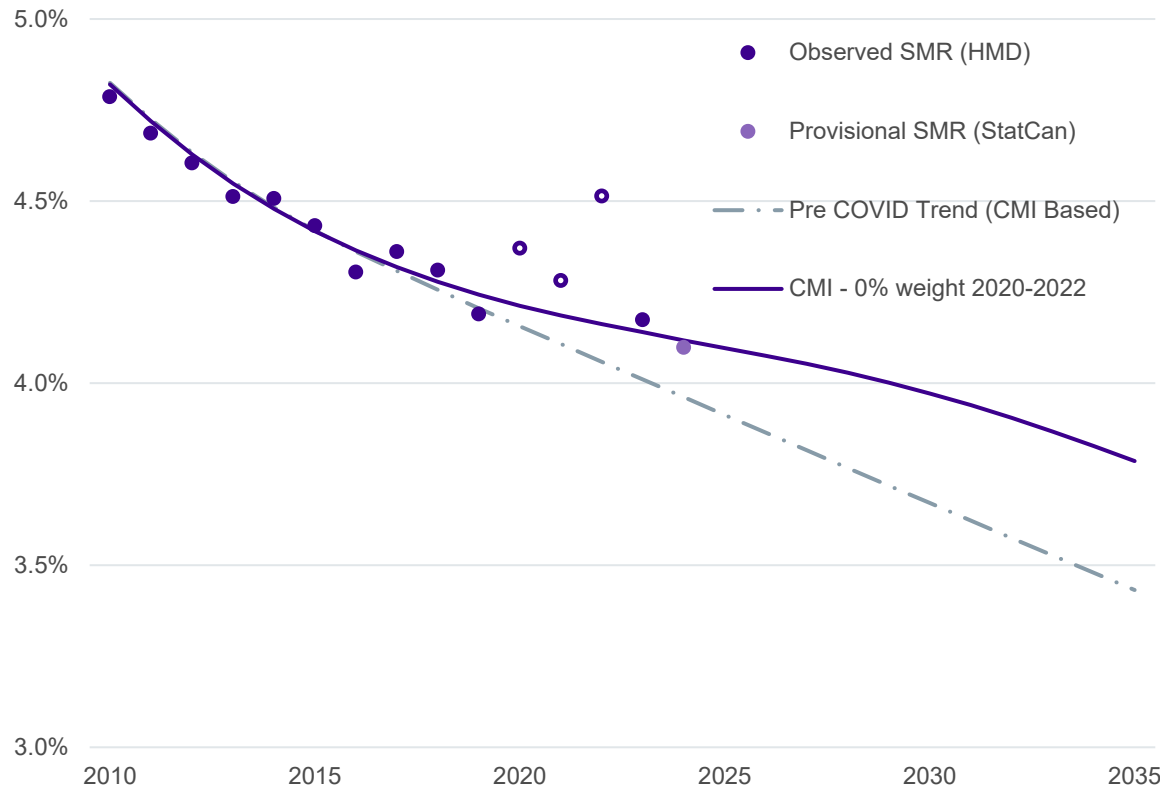
Best approach will depend on view of recent data – Is the transitory experience from the pandemic over?



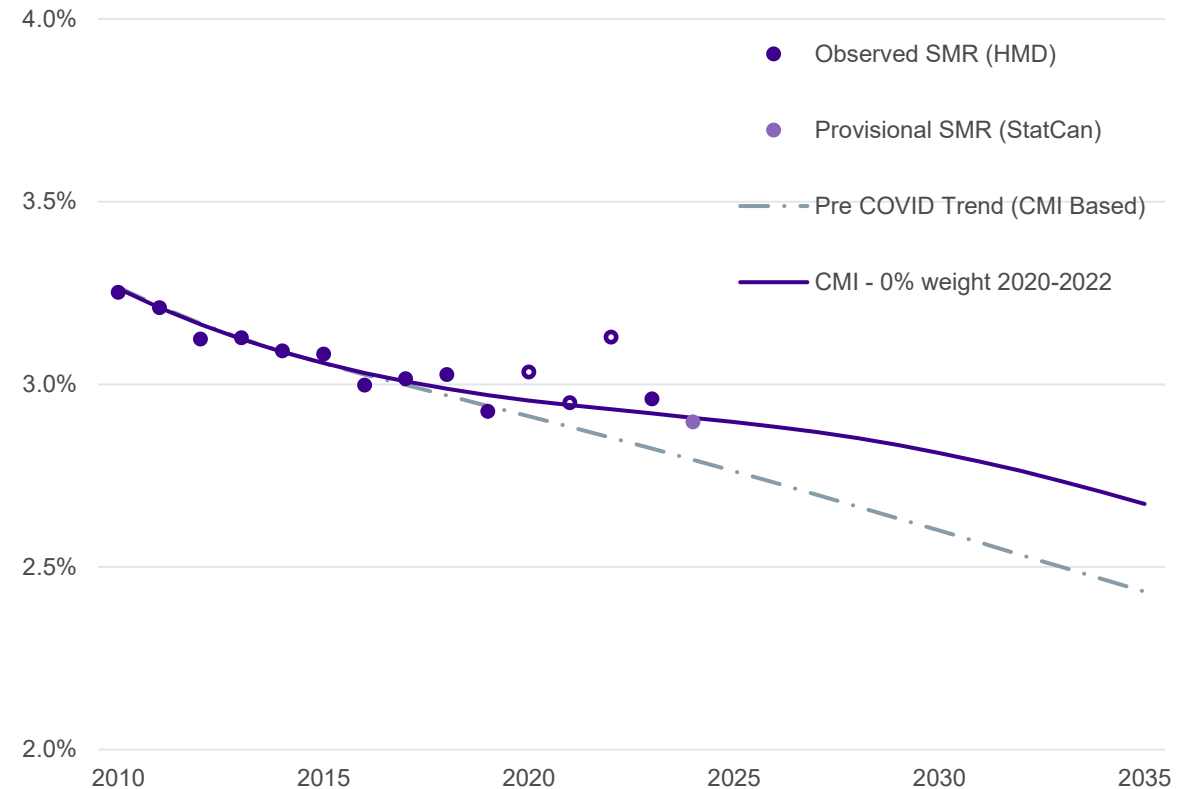
“Skipping” the pandemic years of data (Canada)



Canada Male SMRs (ages 65 to 95)



Canada Female SMRs (ages 65 to 95)



A plausible alternative approach?
Will depend on your view of 2023-2024 data.

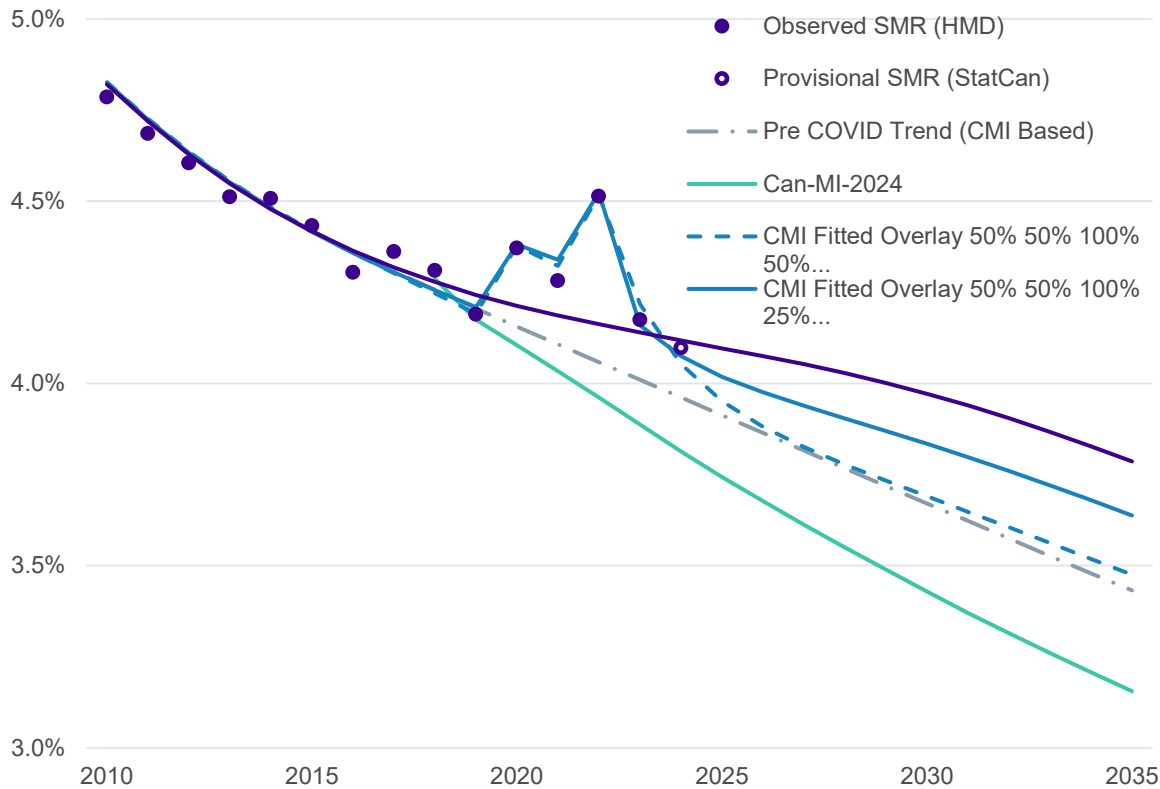
Source: Club Vita calculations using CMI_2024 v05 projections model. Canadian data up to 2023 from the Human Mortality Database (www.mortality.org), 2024 data estimated using [StatisticsCanada life table](https://www150.statcan.gc.ca/n1/pub/82-625-x/2024001/article/00001-eng.htm). Note: 1.3% long term rate of improvement is used throughout



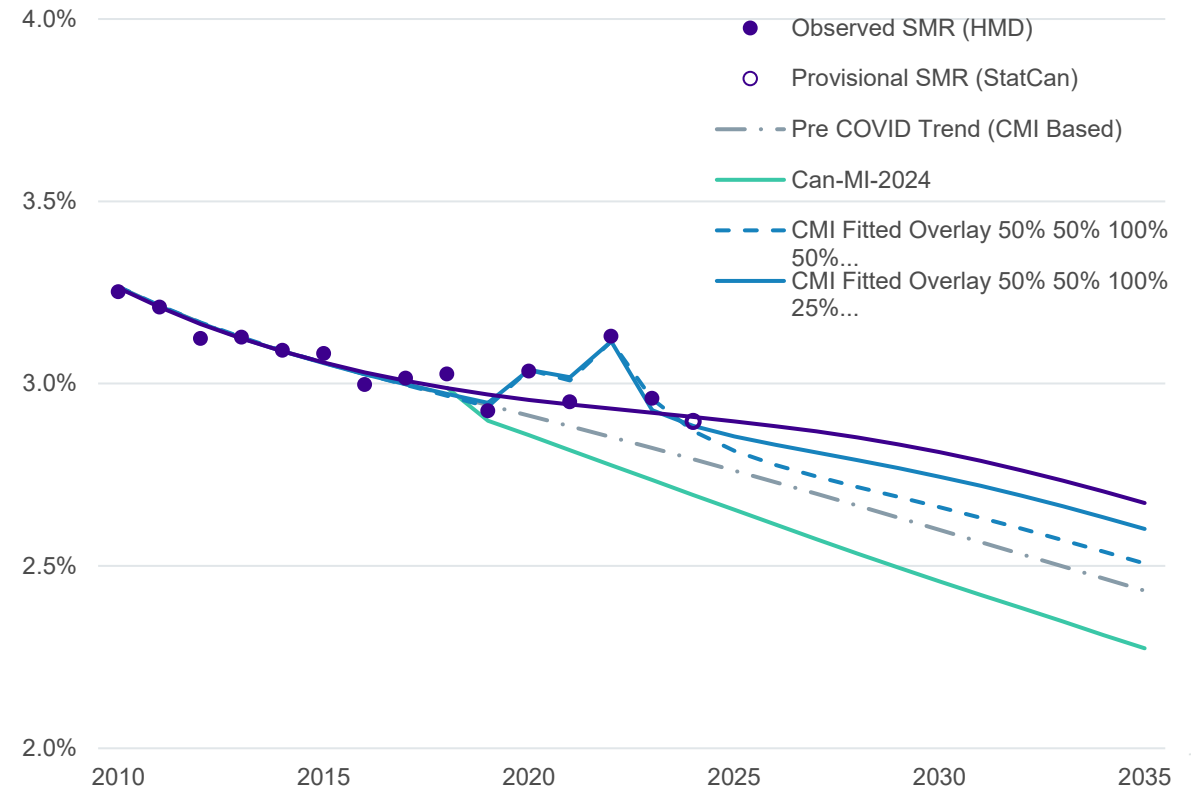
Summary (Canada)



Canada Male SMRs (ages 65 to 95)

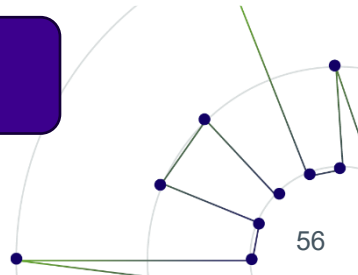


Canada Female SMRs (ages 65 to 95)



Judgement required on outlook for excess – new years of data very important.

Source: Club Vita calculations using CMI_2024 v05 projections model. Canadian data up to 2023 from the Human Mortality Database (www.mortality.org), 2024 data estimated using [StatisticsCanada life table](https://www150.statcan.gc.ca/n1/pub/82-625-x/2024001/article/00001-eng.htm). Note: 1.3% long term rate of improvement is used throughout. Fitted overlay excess weightings half in each subsequent from last weighting disclosed.

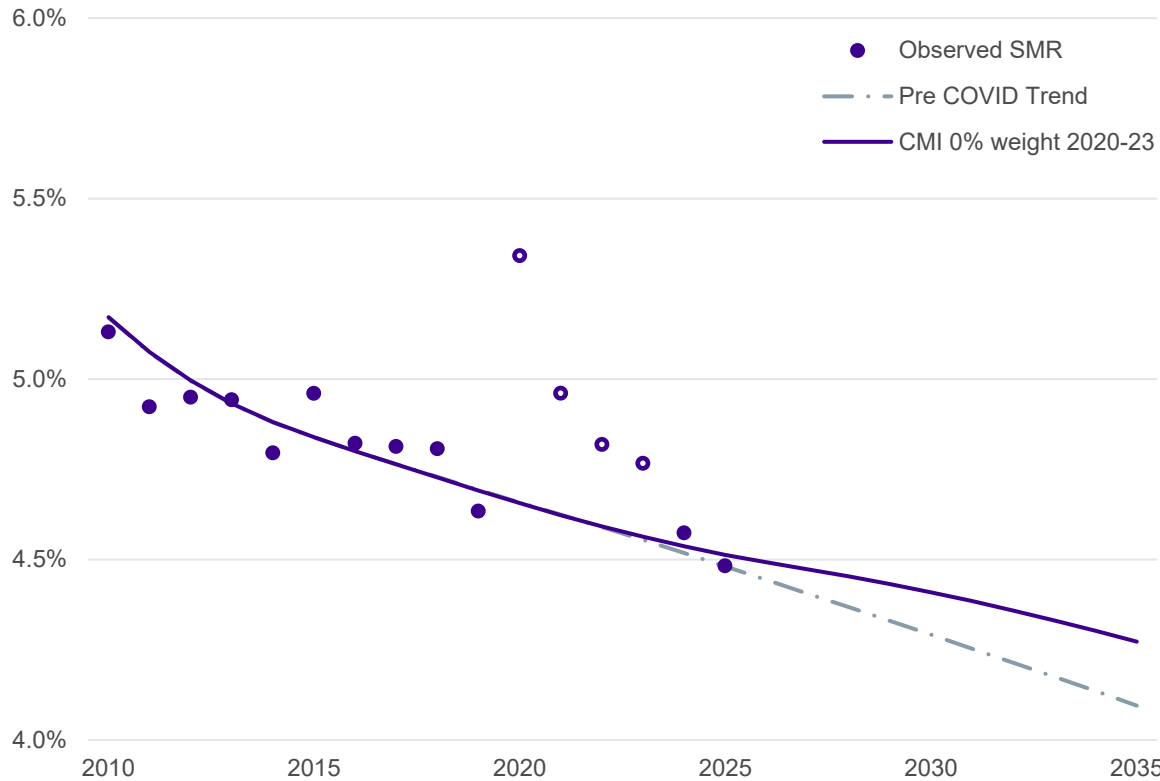


UK – “skipping the pandemic” and summary

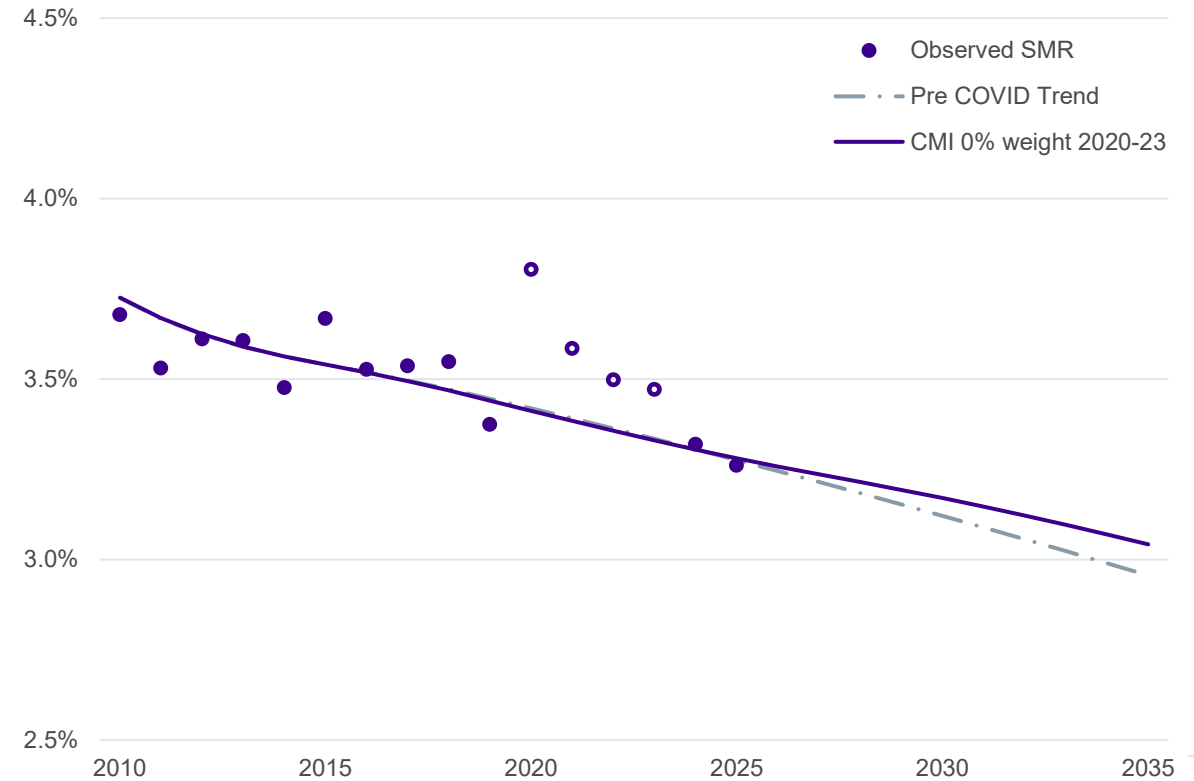
Skipping the pandemic years of data (UK)



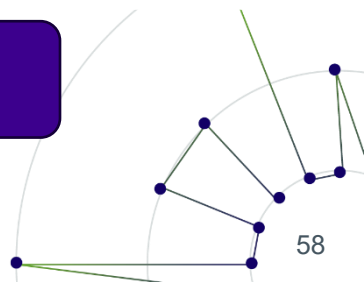
UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



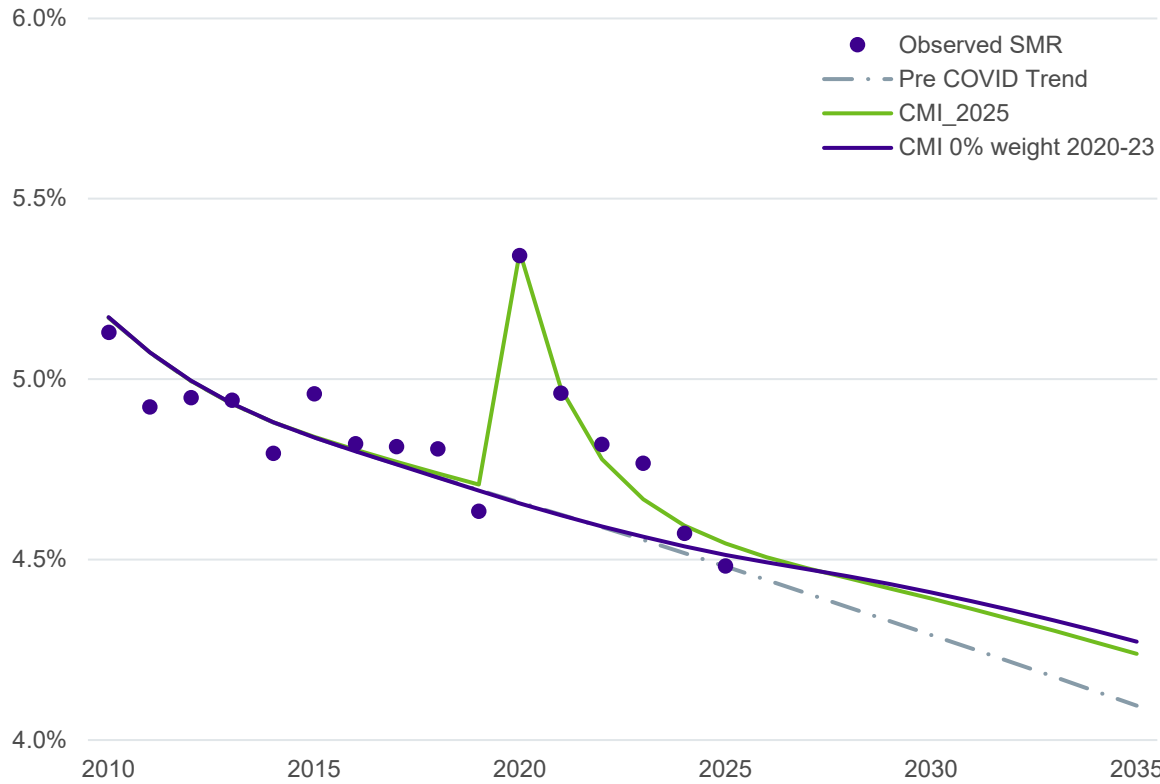
A plausible alternative approach?



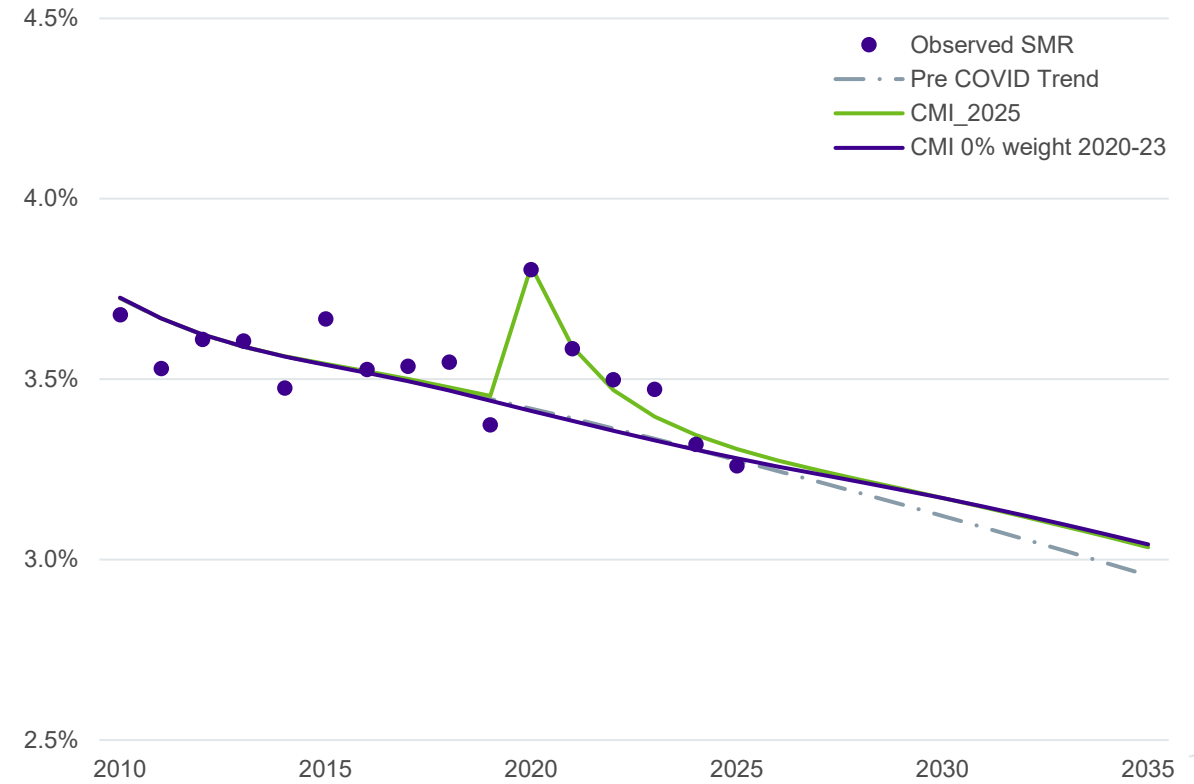
Summary (UK)



UK Male SMRs (ages 65 to 95)



UK Female SMRs (ages 65 to 95)



Could a light 2026 lead to a full reversion to the pre-COVID trend?
The CMI_2024+ model is well placed to adapt to the emerging signal.

