

Discussion of Demographic Assumptions: Immigration & Mortality

SOCIAL SECURITY TECHNICAL PANEL

MAY 2019

Key Questions for Discussion

1. Is current law an appropriate assumption for the future path of immigration?
2. Should future immigration be projected as a fixed number or a share of the population?
3. Do immigrants differ from natives in their labor supply, fertility, and mortality and does that affect the projections?
4. How significant is the emigration assumption to OASDI finances?

Questions 1 and 2

1. Is current law an appropriate assumption for the future path of immigration?
2. Should future immigration be projected as a fixed number or a share of the population?

Previous technical panel recommendations...

2011

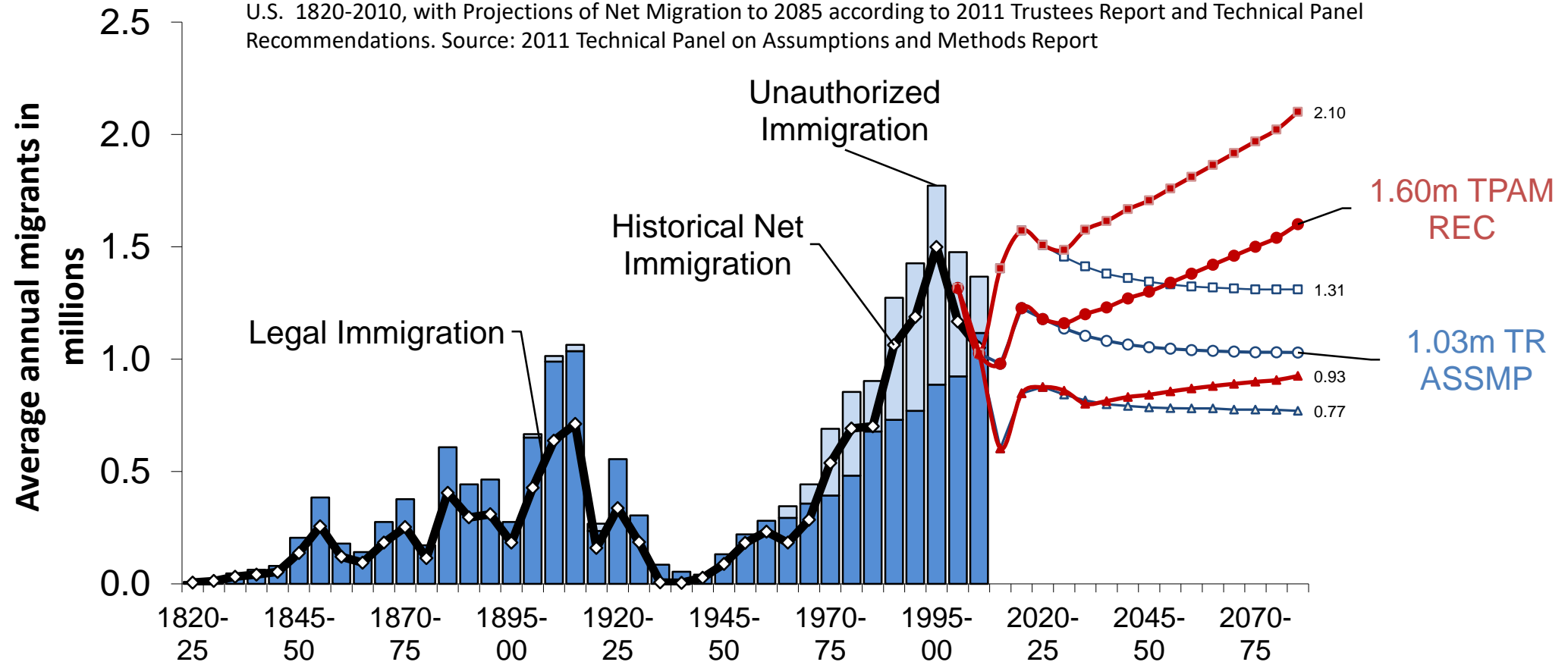
- “The current Technical Panel believes that the Trustees should present policymakers with the most likely projections and formulate assumptions that allow for some changes in immigration law over the next 75 years and beyond.”
- “...the Technical Panel recommends that the Trustees derive their net migration assumption from an analysis of historical trends and careful consideration of theories of international migration.”
- “We concur with the two earlier Technical Panels that the ultimate assumption for net immigration should be linked to population size.”

2015

- “...our primary recommendation is that OCACT and the Census Bureau work together to develop a set of improved projections that we expect will reflect the Panel’s judgment that the level of net total immigration is more likely to rise than decline.”
- “The Panel is not suggesting a mechanistic approach, such as an assumption that net total immigration will be at a constant rate applied to a growing U.S. population base ...”

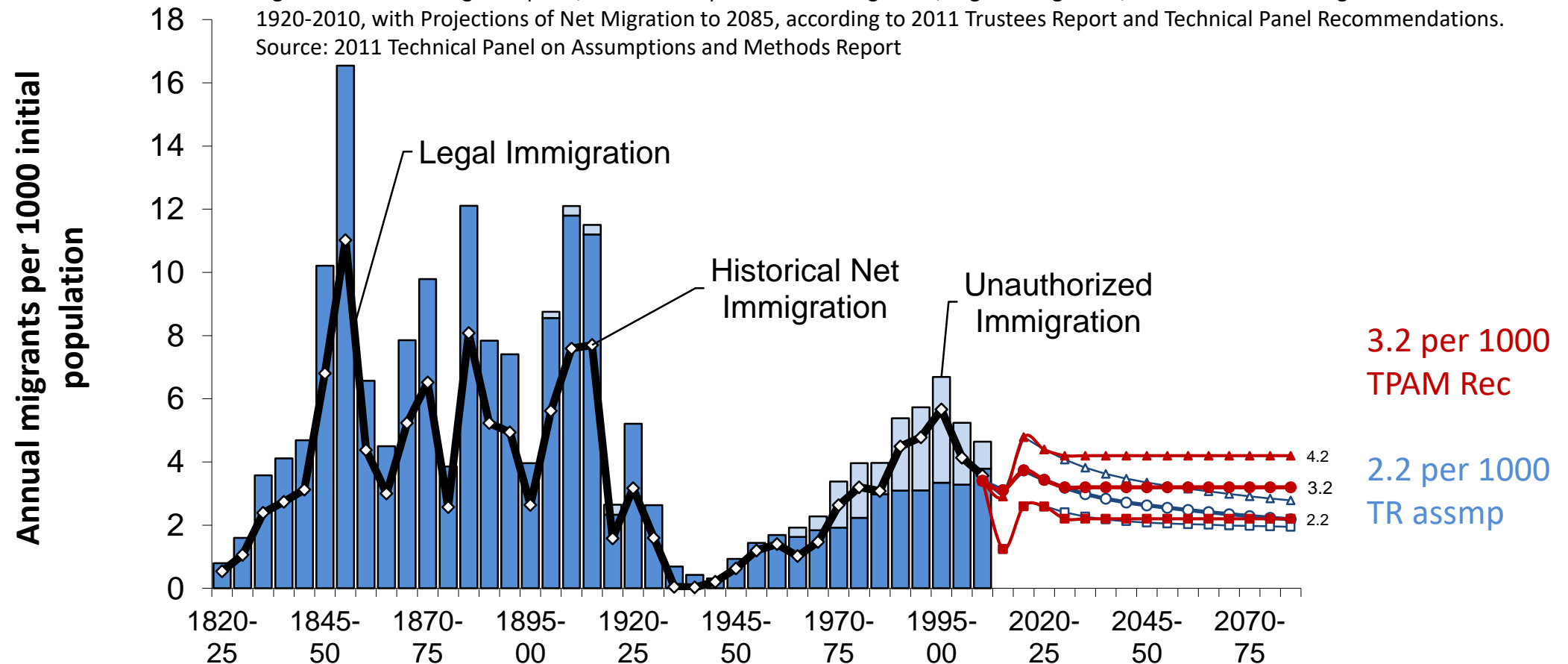
Number of immigrants – 2011 Technical Panel

Figure 32. Average Annual Migrants in Millions: Net Migration, Legal Immigration, and Unauthorized Migration to the U.S. 1820-2010, with Projections of Net Migration to 2085 according to 2011 Trustees Report and Technical Panel Recommendations. Source: 2011 Technical Panel on Assumptions and Methods Report



Percent of Population – 2011 Technical Panel

Figure 33. Annual Migrants per 1,000 Initial Population: Net Migration, Legal Immigration, and Unauthorized Migration to the U.S. 1920-2010, with Projections of Net Migration to 2085, according to 2011 Trustees Report and Technical Panel Recommendations.
 Source: 2011 Technical Panel on Assumptions and Methods Report



Questions 1 and 2 - Initial Thoughts for Discussion

1. Is current law an appropriate assumption for the future path of immigration?
 - Yes in the short term, but in the long term it is reasonable to expect immigration policy to adapt to changing circumstances.
2. Should future immigration be projected as a fixed number or a share of the population?
 - The current approach underestimates the range of plausible outcomes over the long term. A better approach might be to retain the current fixed number for the first 20-30 years of the projection, then migrate to a constant % of population.

Question 3

3. Do immigrants differ from natives in their labor supply, fertility, and mortality, and does that affect the projections?

Potentially Important Immigrant-Native Differences

- Link between timing of immigration and fertility (Parrado).
- “Immigrant paradox” – immigrants have lower mortality despite lower wealth and education (Blue and Fenelon 2011; Dupre et al. 2012; Mehta et al. 2016).
- Immigrants appear to retire and claim Social Security later than natives (Mudrazija et al. 2017; Lopez and Slavov 2019).
- Immigrants also have different earnings and labor force participation

Question 3 - Initial Thoughts for Discussion

1. Do immigrants differ from natives in their labor supply, fertility, and mortality, and does that affect the projections?
 - While some of these characteristics do vary between immigrants and natives, we are unsure what impact more refined assumptions would have on the projections
 - The answer to this question may depend on whether US immigration is primarily from Asia rather than Mexico and central America, as well as the skill mix of immigrants
 - Discuss pros and cons of more refined modeling of cohorts vs microsimulation

2. Other considerations
 - Ensure consistency between assumptions (e.g., immigration and fertility)

Question 4 - Initial Thoughts for Discussion

- How significant is the emigration assumption to OASDI finances?
 - Currently OACT assumes a constant emigration rate from the stock of immigrants (separate for legal and other than legal). Important for age structure of immigrant population.
 - Doug Massey argued that stricter border enforcement reduced in-migration but also reduced out-migration. (Are they linked in OACT projections?)
 - Does the changing composition of immigrants (such as their country of origin) change expected emigration rates? Do unauthorized Chinese and Indian immigrants go back home as readily as Mexicans? If not, should emigration assumptions change with the expected composition of immigrants?

Key Questions for Discussion

5. What are the arguments for and against projecting mortality by cause of death vs in aggregate or by risk factors?
6. Are the assumptions for the Intermediate Scenario consistent with academic and actuarial consensus as to the most likely outlook for future mortality improvement?
 - In aggregate for all ages combined and by age group
 - How should differences between the data and methods at older ages used by Social Security and the Human Mortality Database be taken into account?
 - What do international comparisons tell us?
7. How are issues such as obesity, the opioid crisis, and mental health/ deaths of despair impacting mortality improvement in the US today? How might this change in the future?
8. Do the Low and High Cost assumptions encompass the range of plausible future path for mortality improvement ?

Previous technical panel recommendations...

2007

- Increasing the intermediate scenario ultimate average rate of improvement of 1.0% per year, agreed with the Low Cost assumption (0.33%) and recommended increasing the High Cost assumption to 2.0% to reflect the potential for the US to reach rates of mortality reduction seen in international data.
- Simplifying the projection model by dropping projections by cause of death and “stating assumptions in terms of age-specific rates of decline for all-cause mortality”.

2011

- Summarizing mortality improvement assumptions in terms of life expectancy at birth at the end of the projection period rather than annual percentage reduction in total age- and sex- adjusted death rates.
- Increasing the intermediate life expectancy assumption to 88.7 years in 2085, 3.7 years higher than the Trustees’ assumptions of 85.0 years. The Panel also recommended Low- and High Cost life expectancies of 83.7 and 93.7 years, a wider range than the Trustee’s 7.7 year spread in these assumptions, to reflect the high degree of uncertainty about future mortality trends and the lack of agreement among experts about such trends.
- Simplifying the mortality projection model by eliminating separate projections by cause of death.

Previous technical panel recommendations...

2015

- Increasing the ultimate average age-sex-adjusted rate of mortality improvement to 1.0% (Intermediate scenario) for the last 50 years of the projection, a significant increase to the Trustees' assumption of 0.71%. It recommended increasing the Low Cost assumption from 0.4% to 0.5% and the high cost assumption from 1.2% to 1.5%
- Continuing the Trustees' approach of applying the same rates of improvement to males and females and to varying rates of improvement by age group with lower rates at older ages as observed in historic data.
- Retaining the current mortality model that involves separate projections by cause of death.
- Investigating alternative approaches to projecting mortality and periodically publishing how their results compare to the current model. In particular, researching methods that formally incorporate drivers such as smoking and obesity and methods that take account of cohort effects.
- Investigating alternative methods for establishing a starting point for the projects and for transitioning from the current period to the ultimate rates of mortality improvement

2019 Trustees Report Assumptions

- Demographic data were updated to incorporate 2016 mortality data from NCHS (under age 65) and 2016 and preliminary 2017 Medicare data for ages 65+.
- While ultimate rates of mortality improvement were unchanged from the 2018 Report, the new starting data resulted in higher death rates for all future years from the previous report.
- These higher death rates increase the actuarial balance by 0.09% of taxable payroll.

Question 5

5. What are the arguments for and against projecting mortality by cause of death vs in aggregate or by risk factors?

By Cause of Death

ADVANTAGES

- Reasons for mortality improvement are different historically and in the future, e.g. social vs. technology. Thus, history may not be indicative.
- While cardiovascular, cancer and respiratory causes will continue, “other” causes, e.g. dementia will become more prevalent and at different levels.
- Clinical research has begun (JHU) and significant room for development exists.

DISADVANTAGES

- **Complexity.** Hard to understand, communicate, and replicate. Not necessary for OASDI finances.
- **No evidence that more accurate.** No reproducible methodology for determining long-run cause-specific rates of decline. (Cf. Lee-Carter, with 1000s of citations, and 100s of validations)
- **Inherently pessimistic.** Slowest declining cause dominates in long term. Medical futurists have poor track record (Oeppen & Vaupel)
- **Incomplete.** Neglects risk factors and covariance between causes.

In Aggregate

ADVANTAGES

- Historically remarkably constant rates of progress.
- Complexity simplifies in the aggregate. An "army of ants"
- The invisible hand is at work. Health is a universal goal, so societies and markets self-organize to advance longevity.
- A parallel to Moore's law or SP500

DISADVANTAGES

- Need to understand the "why", not just the what.
- Aggregate improvement is influenced by numerous factors, some of which have been offsetting historically, but not necessarily in the future.
- "Laws of Nature" do not include mortality improvement.

By Risk Factor

ADVANTAGES

- Much easier to forecast than medical advances because many factors (e.g. smoking, maximum BMI) characteristics of young adults today tell us future profile of the elderly
- Some factors have clear influence on mortality (smoking, extreme obesity)
- Allows us to assess plausibility of pure extrapolation (so far, studies suggest declines in smoking will be about offset by increases in obesity)

DISADVANTAGES

- Data Limitations
- Can be influenced (+/-) by external intervention, e.g. smoking, high blood pressure
- Not always directly related to mortality

Question 6

6. Are the assumptions for the Intermediate Scenario consistent with academic and actuarial consensus as to the most likely outlook for future mortality improvement?
 - In aggregate for all ages combined and by age group
 - How should differences between the data and methods at older ages used by Social Security and the Human Mortality Database be taken into account?
 - What do international comparisons tell us?

Highlights from recent academic and actuarial literature/presentations

- Life expectancy at birth as estimated by the Social Security Administration (SSA) differs from the Human Mortality Database (HMD) solely from differences in mortality rates at ages 65+. The gap first appeared in the early 1980s and has grown progressively to 0.4 years in 2014. The difference is not due to methods but to difference in the data. Using HMD mortality rates would result in increased projected costs for Social Security. (Barbieri, 2018)
- The increased prevalence of obesity in the US from 1988-2011 may be depressing mortality improvement rates by an estimated 0.54% and decreasing life expectancy at age 40 by 0.9 years. Rising levels of BMI have prevented the US from enjoying the full benefits of factors working to improve mortality. (Preston, Vierboom and Stokes, 2018)
- US mortality improvement slowed significantly in 2010-2016 as compared to 2000-2010. While deterioration occurred for both males and females across all age groups, it was generally much worse at ages under 65. Key drivers include slowdowns in improvement for heart disease and stroke along with a stark increase in “accidents” which include drug overdoses. Going forward, the authors believe some of the adverse trends in opioid deaths will abate as more attention and resources are dedicated to this crisis and conclude that it remains appropriate to assume positive mortality improvement for the population at most ages, with the greatest improvement expected at older ages. (Fenton and Kelley, 2018)

Highlights from recent academic and actuarial literature/presentations - continued

- Overall age adjusted mortality increased 0.4% in 2017 following a 0.6% decrease in 2016. Heart disease remains the number one cause of death and accidents (including overdoses) the highest external cause of death. Heart disease and cancer mortality improved in 2017 but this was more than offset by deterioration in other causes, notably accidents and “other” (causes not in the top 10 today). (Society of Actuaries, 2019)
- Experts who presented to our Panel cited all cited greater uncertainty: Woodring talked about the opposing effects of things like the opioid crisis vs the future potential of advances in big data, genetics, tailored drugs, etc. Cutler talked about whether recent trends are a cohort or period effect and cited growing income inequality and inequality in access to health care as well.
- John Hopkins’ study found that clinical experts expect improvements in life expectancy to be slower than recent decades, and that most of the improvement between now and 2040 will be concentrated at younger ages with the achieved reductions in smoking being the most important factor driving future improvement. (Canudas-Romo, DuGoff, Wu, Ahmed and Anderson, 2016)

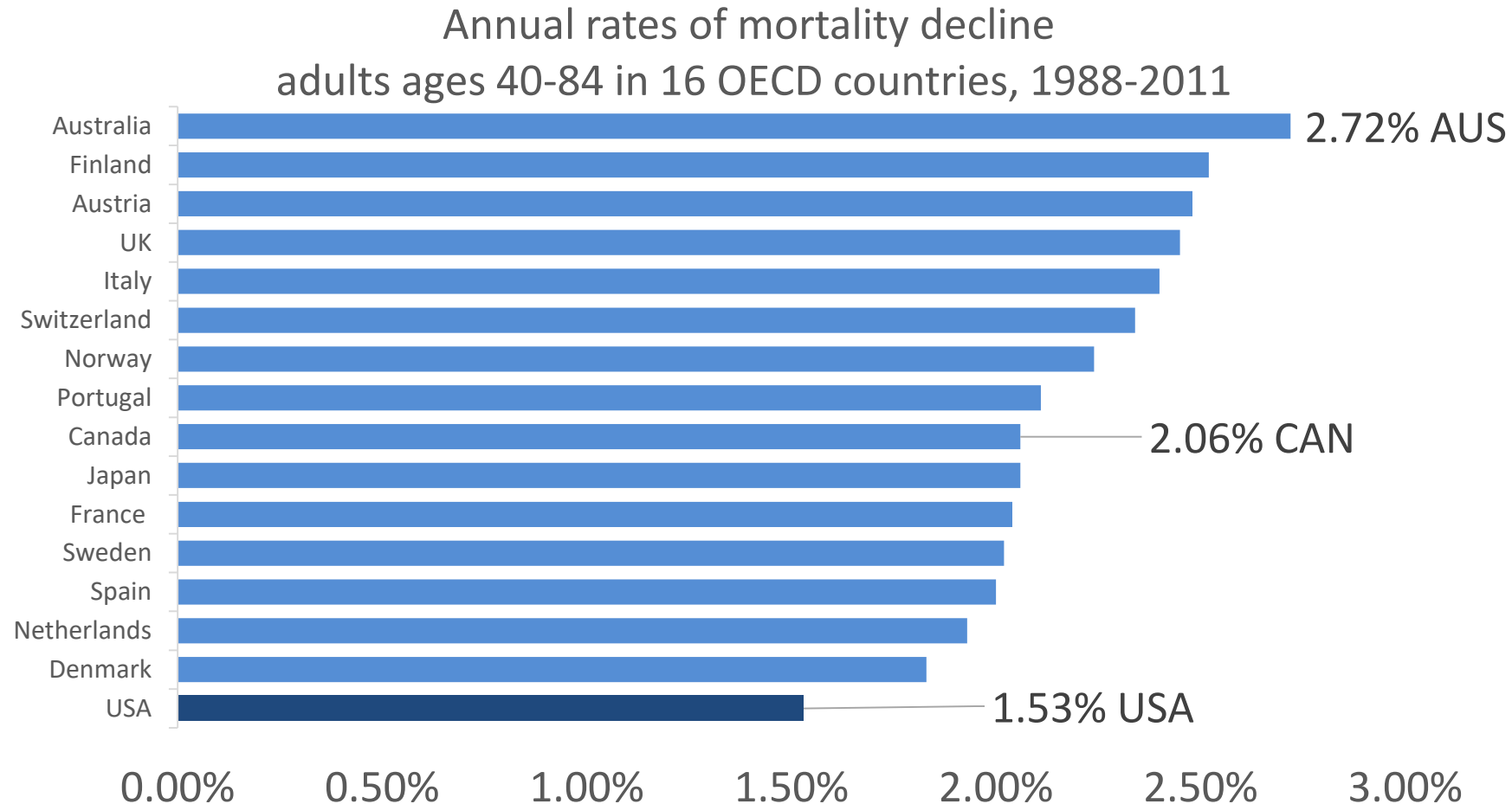
Highlights from recent academic and actuarial literature/presentations - continued

- Mortality improvement in the US from 1986-2014 lagged that of 12 developed countries for every age-sex group, with the difference most pronounced among women and diminishing with age. Looking at the more recent period 2001-2014, the US disadvantage is much more dramatic. This widened an already existing gap between these countries and the US. When compared to the SSA 2016 Trustees Report, the authors found the SSA assumed much slower rates of improvement than recently observed in OECD countries – thus assuming that the US is unlikely to “catch up”. Further study of the causes of difference between the US and other countries is recommended to evaluate whether this is a reasonable assumption. (Vierboom and Preston, 2017)

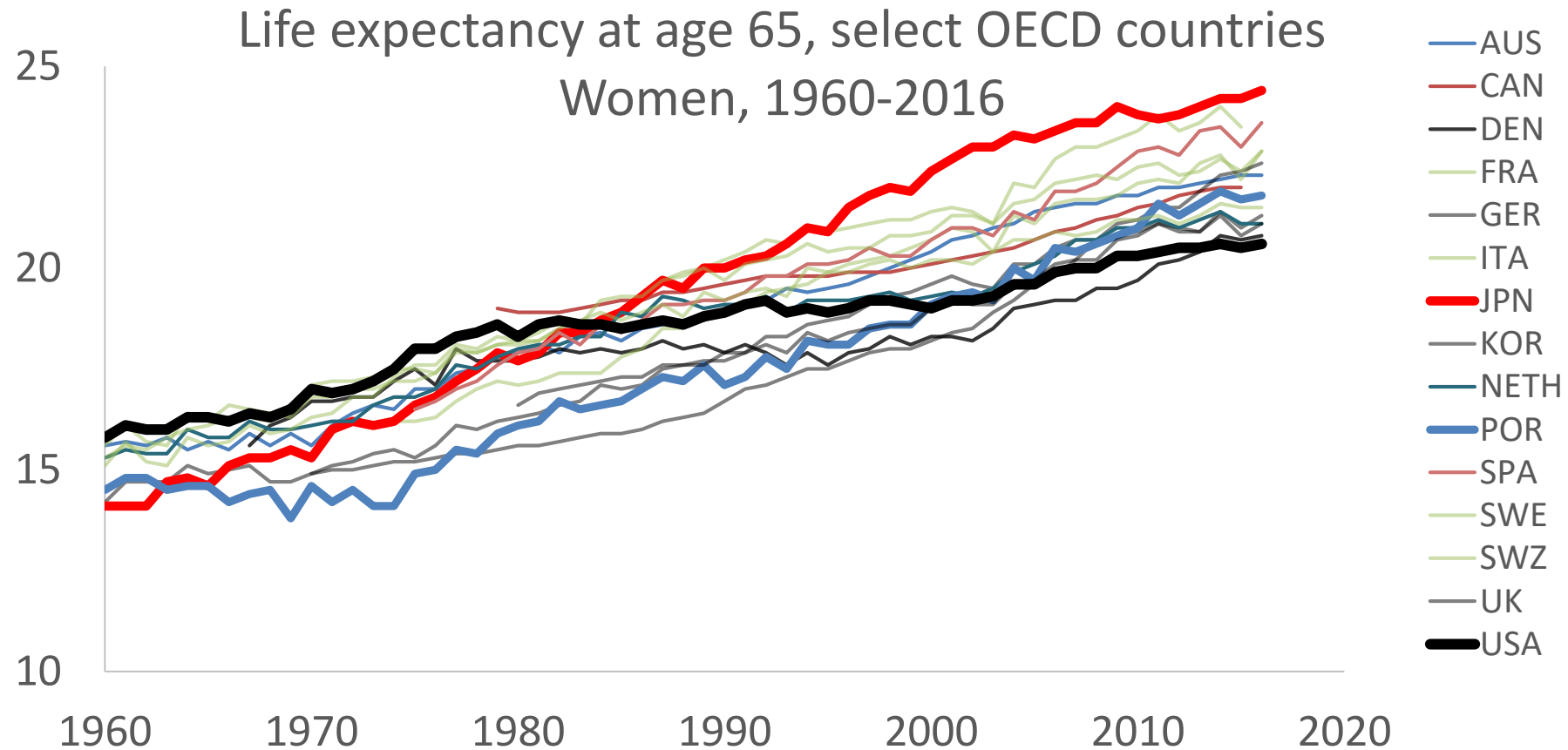
Highlights from recent academic and actuarial literature/presentations - continued

- The Continuous Mortality Investigation (CMI) in the UK recently amended its mortality projections model such that PwC estimated that the funding deficit in the UK's defined benefit plans could be halved. Mortality improvement has declined from 2-3% per year in 2000-2010 to near zero by 2016. Austerity measures taken by the UK government after the financial crisis is cited as possibly responsible for 30,000 excess deaths. Note that the US did not take this approach.
- Canada and much – but not all - of Europe experienced a similar decline.
- Improvement in Australia has also fallen back but remains relatively strong.
- Japan set new longevity records for a 5th straight year in 2016 and now rank second in world life expectancy thanks to medical advances and suicide prevention steps.
- In contrast, mortality for US white non Hispanics has been rising largely due to rapidly increasing death rates from the sum of drug and alcohol poisoning, suicide, chronic liver disease and cirrhosis.
- Also of note, 2014/2015 and 2016/2017 were very bad flu seasons and thus a cause of increased mortality in these years.
- (Risdale presentation to the AAI/IAA 2017)

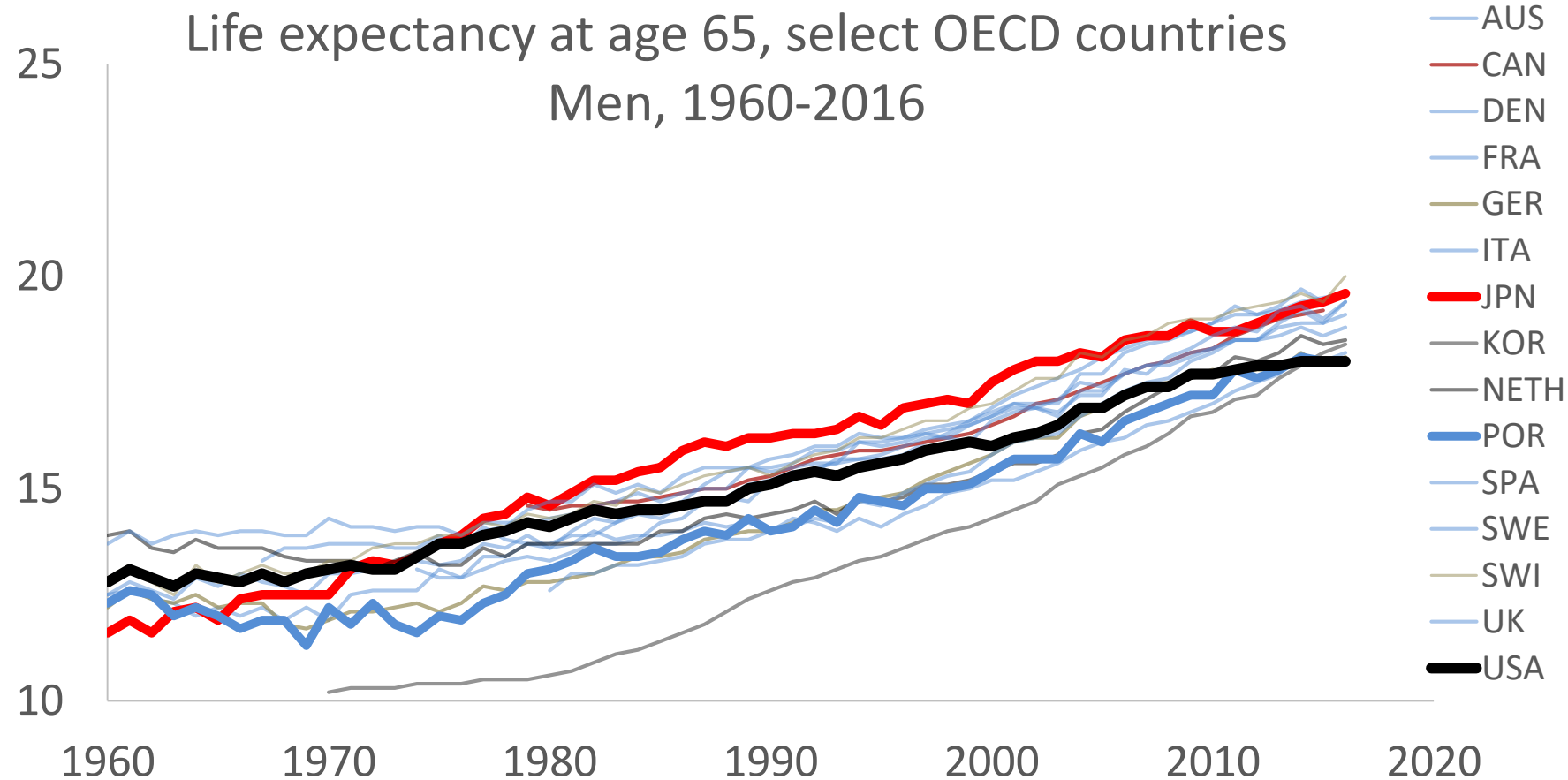
Comparison of Mortality Improvement across OECD Countries



Comparison of Mortality Improvement across OECD Countries



Comparison of Mortality Improvement across OECD Countries



Question 7

7. How are issues such as obesity, the opioid crisis, and mental health/ deaths of despair impacting mortality improvement in the US today? How might this change in the future?
- The age adjusted rate of drug overdose deaths in 2017 climbed to 21.7 per 100,000. This was 9.6% over 2016 which continued a trend of ever increasing drug related deaths this century. Fentanyl and related drugs showed an alarming 45% increase from 2016 to 2017 while deaths from heroin and natural opioids held steady. (NCHS Data Brief No. 329, 2018)
 - From 1999-2017, the age-adjusted suicide rate in the US increased 33% from 10.5 to 14 per 100,000. Males increased from 17.8 in 1999 to 22.4 in 2017, a 26% increase, and females rose 53%, from 4.0 to 6.1. Rates have been increasing 2-3% per year on average for the last decade and are significantly higher at ages 10-74 for both males and females. Rates for those aged 75+ declined somewhat over the period. The most rural counties exhibit a suicide rate 1.8 times that for large metro counties. (NCHS Data Brief No. 330, 2018)

Question 8

8. Do the Low and High Cost assumptions encompass the range of plausible future path for mortality improvement ?
- Experts across academia, the insurance industry, and pension arena agree that the future of mortality is more uncertain today than it was over much of recent history.
 - Many feel past drivers of improvement (medical advances in treating heart disease and reduced prevalence of smoking) have run their course and don't see big breakthroughs coming in other areas to take their place
 - Others feel we are close to significant breakthroughs in genetics and cancer treatment that can be made affordable for broad swaths of the population
 - There are also divergent opinions on whether obesity, drug and alcohol abuse and suicide will be permanent factors driving higher US mortality or whether solutions to these and other issues will allow the US to experience higher rates of improvement to catch up with life expectancy in other developed countries
 - There are also varied opinion on whether there is a maximum frontier for human life.