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Combining remaining life expectancy and time-to-death as a measure of old-age dependency related to health care needs

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1. Background

The standard indicator of population aging is the old-age dependency ratio (OADR). It takes the number of those who have reached the state pension age and divides it by the number of 'working age' (16-64 years) adults to measure the dependent elderly population relative to those who pay for them. In the US the OADR increased from 13 elderly per 100 of working age in 1950 to 24 in 2017, and may reach 37 per 100 by 2050. This 'population aging' has worried policy makers because for every worker paying tax and social security there are more older 'dependent' citizens, with greater demands on social insurance, health and welfare systems and increasing prevalence of morbidity and disability [1-4]. However, the OADR is not 'fit for purpose', as it counts neither the dependent elderly nor those who sustain them. It merely takes a cut-off point (the state pension age, usually taken as 65) and assigns adults to the two sides of the ratio accordingly. Moreover, it ignores the fact that 65 year olds in 2016 could expect to live 6 more years than in 1950 (20 vs. 14 years; www.mortality.org). In other words, OADR and similar measures exaggerate the extent, speed and impact of population ageing owing to the fact that they are based solely on fixed chronological ages and consider everyone of working age to be employed. This can be misleading because they implicitly assume that there will be no progress in important factors such as remaining life expectancies, disability rates [4-5] or changes in labor force participation [6].

In consequence, alternative indicators have been developed that address the above mentioned changes. Sanderson and Scherbov [7] devised the so-called prospective age approach in which the old-age threshold is based on the age at which the expected remaining life expectancy (RLE) equals 15 years (henceforth abbreviated as RLE15). Balachandran et al [8] further adjusted this measure to account for cross-country differences in the "exceptionality" of reaching RLE 15 by considering the adult survival ratio in benchmark country Japan when calculating the share of elderly, while AUTHORS [9] argued that only those in paid employment rather than everyone of "working age" (however defined) should be considered the population who pays for elderly health and wellbeing. Rather than using life expectancy or RLE, researchers have also formulated population ageing indicators in terms of disability [4], active life expectancy [10] and health status [11]. However, such measures rely on health data, which is satisfactory if one moment in time or a short period is analyzed, but less so for longer trends and projections, given the lack of long time series data, modifications in health concepts and changes in perception of health and disability among the population due to technological innovation and cultural change, all of which complicates comparison over time. The

alternative indicators proposed in the present study are insensitive to these issues as they are only based on deaths. These indicators combine the population average measurement of RLE with a Time-to-Death (TTD) of <5 years, at any age above the RLE15 threshold to quantify the elderly population who most likely requires health care (HC) needs. The proposed indicators also use denominators that are sensitive to economic fluctuations, as it is argued that, from a public policy perspective, both sides of old-age dependency ratios are important to consider when future state government HC costs are estimated.

In the next section, a brief overview is provided on how alternative ageing indicators measure the (financial) burden of old age dependency at the population level, followed by some illustrative results for the US that compare new and existing old-age dependency indicators and includes projections until 2050. The article concludes with some implications and applications of this work.

2. Method

The level of past, current or future levels in population ageing depend much on how it is measured, but as there is still no consensus as to what indicator is best to use it is not clear as to how aged a society really is. This is in part because the different driving forces behind population ageing, i.e. a decline in fertility, mortality or net migration loss, affect specific ages more than others. If, for instance, a population ageing indicator considers the whole population in its calculations, as is the case with the Total Dependency Ratio (TDR), changing fertility levels will have a more immediate effect on the level of population ageing than if the non-adult population is excluded. This is the case with the OADR, whereby declining fertility rates will only affect the ratio once the smaller birth cohorts reach working age [6]. The level of population ageing also depends on how the old-age and working-age populations are defined.

2.1 Counting the dependent elderly

So while fixed age boundaries linked to the statutory pension age are traditionally used to separate the old-age from the working-age population, the main process that currently causes population aging ―declining *old-age* mortality― makes age a poor measure of its progress. When lifespans lengthen, any given age becomes a marker reached earlier along the life course. In 1950 mean period life expectancy for women in the US aged 65 was 15 years. Data for 2016 shows that this has risen to 21 years (resp. 13 and 18 years for men) (www.mortality.org). We can best capture this changing significance of age by realizing that the age of a population in a particular year comprises two components: the *years lived* of its members (their ages) and their *years left* (i.e. for the same year and a given age, the RLE according to the period life table). This is crucial, because many behaviors and attitudes (including those related to health) are more strongly linked to RLE than age [12-15]. Using

both years lived and years left also helps remind us that populations and individuals are rather different things.

The OADR defines all people above the statutory pension age as 'dependent', regardless of their economic, social or medical circumstances. This overlooks the fact that rising RLEs render these elderly 'younger', healthier and fitter than their peers in earlier cohorts. We know that most acute medical care costs occur in the final months of life, with little impact from the age at which these months occur [16, 4]. At least some forms of disability are being postponed to later ages. Good data on population health by age is only available for the last couple of decades, but RLE data is a robust substitute as it provides a more accurate picture of the extent of aging by taking account of falling old-age mortality. Therefore, following Sanderson and Scherbov [7, 4] and others [17-19], the age at which RLE equals 15 years is considered a better alternative threshold of elderly dependency and the population at and above this age the old-age population (henceforth abbreviated as RLE15-), although this is more precisely estimated when calculated for each sex separately [9]. Dividing RLE15- by the total population we obtain the Proportion Dependent Elderly (Prop RLE15-). This indicator can be considered as a life expectancy-adjusted proportion of old-age people in a population.

2.2 Time to death

Even though taking RLE15- as the elderly dependent population is a clear improvement compared to taking a static age as 65+, it remains a population *average* measurement: many persons in the corresponding age group (e.g. 70+) are likely to live another 20 years, yet others die within one, two or five years. Moreover, as the literature also shows, time to death (TTD) is a better indicator for HC expenditure as most acute HC costs are incurred during the last 5 years of life, irrespective of age [20]. Conversely, RLE15- does provide a way to define the general elderly population in an era of ever improving old-age survival. For our numerator we therefore propose here to extract from RLE15- those with a TTD of up to 5 years (TTD<5). This is our HC need-adjusted dependent population.

2.3 Counting the 'working' population, productivity and tax revenue

When the OADR is calculated it is assumed that everyone of 'working age', often taken as between ages 16 or 20 and 64, actually works. The denominator used in Sanderson and Scherbov's Prospective Old Age Dependency Ratio (POADR), i.e. the population aged between 20 and RLE15 [7], has a similar connotation. However the knowledge economy keeps youngsters in education for longer while many older workers choose or are obliged to retire early. Using an age category to define the working population thus makes little sense. Indeed, if we count the non-employed, for whatever reason, as 'dependent' there were more civilian non-institutionalised 'dependents' of 'working' age (60 million) in 2018 than non-working elderly (42 million). On the other hand, greater gender equality, dual career

families and migration added, according to the Current Population Survey (CPS) 43 million women workers between 1970 and 2018 (vs. +34 million male workers) in the US (www.bls.gov/cps/). Given the economic and labour market fluctuations it therefore makes more sense to account for the population in paid employment in the denominator of a dependency ratio: any increase in labour force participation (LFP) could potentially reduce per capita costs associated with a growing elderly population while high unemployment would do the opposite. Using RLE15- as the numerator, we obtain the Real Elderly Dependency Ratio (REDR) [9], while a complimentary approach to raising the normal pension age to support ageing populations is to raise the average LFP rate [21].

Another economic productivity-related denominator that better approximates the financial burden of an old-age population is to use total productivity, measured as GDP or similar. It is worthy to note that GDP increased faster over the last half a century than the number of paid workers and is what generates the necessary income for the government to use on health and social care. From a government policy perspective, we are not interested in *per capita* GDP but the total economic output, irrespective of the number of workers. Hence, government tax revenue is another alternative denominator, given that any government expenditure on the elderly has to come from taxes.

2.4 Alternative elderly dependency ratios

From the above we can construct a series of new indicators that can be used as alternatives to the proportion aged 65+ and OADR as well as Sanderson and Scherbov's Prop RLE15- and POADR. First of all, our real elderly population RLE15- can be divided by various economic productivity-related denominators in order to better approximate the financial burden of an old-age population:

- If RLE15- is divided by the number of people in paid employment, we obtain the Real Elderly Dependency Ratio (REDR) [9].
- If RLE15- is divided by the economic productivity-related denominator, GDP, we obtain the Real Elderly to GDP Ratio (RLE15-/gdp).
- If RLE15- is divided by the total government tax revenue, we obtain the Real Elderly to Tax Ratio (RLE15-/tax).

The second group of indicators maintain the same denominators but only consider the elderly RLE15- population who are expected to die within 5 years (RLE15-&TTD<5), which we define as our 'real' dependent population in terms of HC needs:

- If this HC need-adjusted dependent population is divided by the total population we obtain the proportion of the elderly population with HC needs (Prop. RLE15-&TTD<5).
- If this HC need-adjusted dependent population is divided by the number of people in paid employment, we obtain the HC need-adjusted Real Elderly Dependency Ratio (REDR5TTD).
- Likewise, dividing RLE15-&TTD<5 by GDP we obtain the HC need- and GDP-adjusted Real

Elderly Dependency Ratio (RLE15-&5TTD/gdp).

- Finally, dividing RLE15-&TTD<5 by the government tax revenue we obtain the HC need- and tax-adjusted Real Elderly Dependency Ratio (RLE15-&5TTD/tax).

How RLE15- and TTD<5 are calculated is explained in detail in, respectively, Sanderson and Scherbov [7] and Riffe and Brouard [22]. We do not consider Balachandran et al [8] adjustment of adult survival until the old-age threshold when calculating RLE15 because their time trend observations revealed virtually no difference to Sanderson and Scherbov's [7] RLE15 method.

The standard and alternative ageing indicators are listed in Table 1. US data are used to illustrate their different time trends. Sex-specific population and mortality data come from the Human Mortality Database (www.mortality.org) (until 2016) and projected data from the US Census Bureau (www.census.gov). Employment data come from the CPS (www.bls.gov/cps/) and the GDP, measured in 2017 US$, from The Conference Board Total Economy Database [23]. Tax revenue data were obtained from the OECD website (www.oecd.org).

Table 1 Standard and Alternative elderly dependency ratios

Nr	Name [figure]	Abbreviation	Measured as
	Standard elderly dependency indicators		
A	Proportion aged 65 or older [1]	Prop 65+	$\frac{\sum population\ 65+}{\sum population\ 0+} * 100$
B	Old Age Dependency Ratio [2]	OADR	$\frac{\sum population\ 65+}{\sum population\ 20-64} * 100$
	Alternative elderly dependency indicators		
1	Proportion Dependent Elderly [1]	*Prop RLE15-*	$\frac{\sum_s population\ RLE15-}{\sum population\ 0+} * 100$
2	Prospective OADR [2]	*POADR*	$\left(\frac{\sum_s population\ RLE15-}{\sum_s population\ 20+\ \&\ \sum_s population\ RLE>15}\right) * 100$
3	Real Elderly Dependency Ratio [2]	*REDR*	$\left(\frac{\sum_s population\ RLE15-}{\sum paid\ employment}\right) * 100$
4	Real Elderly to GDP Ratio [4]	*RLE15-/gdp*	$\left(\frac{\sum_s population\ RLE15-}{\sum GDP}\right) * 1.0E6^a$
5	Real Elderly to Tax Ratio [4]	*RLE15-/tax*	$\left(\frac{\sum_s population\ RLE15-}{\sum tax\ revenue}\right) * 1.0E6^a$
6	Proportion HC need-adjusted Dependent Elderly Ratio [1]	*Prop RLE15-&5TTD*	$\left(\frac{\sum_s population\ RLE15-\ \&\ TTD<5}{\sum population\ 0+}\right) * 100$
7	HC need-adjusted REDR [2]	*REDR5TTD*	$\left(\frac{\sum_s population\ RLE15-\ \&\ TTD<5}{\sum paid\ employment}\right) * 100$
8	HC need-adjusted Dependent Population to GDP Ratio [4]	*RLE15-&5TTD/gdp*	$\left(\frac{\sum_s population\ RLE15-\ \&\ TTD<5}{\sum GDP}\right) * 1.0E6^a$
9	HC need-adjusted Dependent Population to Tax Ratio [4]	*RLE15-&5TTD/tax*	$\left(\frac{\sum_s population\ RLE15-\ \&\ TTD<5}{\sum tax\ revenue}\right) * 1.0E6^a$

Sources: Indicators 1 and 2 were developed by Sanderson and Scherbov [7], 3 by AUTHOR [8], indicators 4, 5 and 7 in a working paper [6], while 8 and 9 have only been previously presented by the author at various conferences. Indicator 6 is completely new.

For each alternative indicator, the old-age population is estimated for men and women separately, as indicated by subscript *s* in the numerator.

[a] To avoid very small numbers these ratio were multiplied by one million.

In the results section below, first the standard indicator Prop 65+ is compared with Prop RLE15- and Prop RLE15-&5TTD given their common denominator. Subsequently, the OADR is compared with POADR, REDR and REDR5TTD. The latter two indicators also include an additional employment scenario where working-age LFP gradually increases until 2023 to the pre-recession high recorded in 2000 and older workers LFP by one percentage point annually. In the final exercise the denominator used in REDR and REDR5TTD is replaced by GDP and government tax revenue.

3. Results

If we define the dependent elderly population as those with ages at which RLE is 15 years or less (RLE15-), we find a very different trend than observed for standard measures of aging (Figure 1). For instance, in the 1950s the Prop. RLE15- was still higher than the Prop 65+. Around 1970 the two lines cross over as RLE15 surpasses age 65 due to the improvements made in old-age mortality. Interestingly, Prop. RLE15- remained remarkably stable between 1950 and 2000 at around 9-10 elderly per population of 100, contrary to the conventional measure. Only after 2020 will there be an increasing relative demand (until ≈2038), but the rate of annual increase is also less than if we take the Prop 65+ trend. If we consider only those elderly who are actually expected to die within 5 years (i.e. the acute elderly health needs proxy; Prop. RLE15-&TTD<5), levels were remarkably stable since 1950 at about 3% of the total population. Only after 2020 will this proportion slowly increase to 4% in 2050. This suggests that population ageing is not fueling the demand for HC services but other factors such as progress in medical knowledge and technology, costs of hospitalization and the increasing use of long-term care facilities.

FIGURE 1 ABOUT HERE

If we now exclude children and elderly from the indicators' denominators and compare these alternative elderly dependency ratios with the standard OADR we obtain quite different results. In the case of the POADR we observe that once the RLE15 age threshold is above 65, the ratio becomes higher than the OADR (if age 20 is used as the lower boundary of working age in both indicators) as the size of the numerator reduces and that of the denominator enlarges (Figure 2). Indeed, the POADR actually fell by almost one third between 1960 and its lowest point in 2012 at 12 older persons per 100 adults below the old-age threshold, while the conventional OADR was already increasing at that time. Moreover, although the POADR dependency measure is expected to increase for another two decades,

it will do so at a much slower rate than the OADR given that improving life expectancy is taken into consideration. When only considering the employed population in the denominator (i.e. the REDR indicator), we see that between 1960 and today the later entry into and earlier exit from employment was more than offset by the dramatic rise in female employment: the proportion of the working-age population currently employed is higher (70% in 2017) than it was in 1960 (62%), although still down from its pre-Great Recession peak (74% in 2000). Given its link with economic conditions, the REDR dependency measure experienced a slight increase in the population ageing burden during the recent Great Recession, while the POADR —unaffected by economic fluctuations— still declined until 2012.

FIGURE 2 ABOUT HERE

The expected increase during the next two decades in both indicators is because the increase in elderly will not be offset by improvements in life expectancy. However, if we would apply an annual 1% increase in LFP rates among 16-64 year olds from 2018 to 2023 to attain rates similar to the recorded maximum in the year 2000 and apply the same increase for ages 65-69, 70-74 and 75+ in the anticipation of better health and incentives to work beyond retirement age, then the rate of increase would be slower than if the LPF would be held constant (compare the trends for REDR and REDRemp+ in Figure 2). It should be mentioned that this projection is probably a conservative one as there are no adjustments for a possible effect of the gradual increase in the Social Security Retirement Age to 67 years by 2027, disincentives to early retirement and further progress on gender equality. The last two indicators shown in the graph, REDR5TTD and REDR5TTDemp+, show that the number of elderly with acute health needs, measured by a TTD of <5 years per 100 paid workers, has been stable since 1980 (between 5 and 6). Only after 2020 are the indicators predicted to rise very slowly, while the standard OADR has already been rising for close to a decade and especially since 2010 (Figure 1). Adjusting the employment rates in the same way as before has only a minor effect on the expected HC burden.

In the US, the tertiarization and automation of its economy has led to economic productivity (GDP) and government tax revenue increase faster over the last half-a-century than the number of workers, although during the Great Recession government tax revenue was hit harder than GDP (see the larger drop between 2008 and 2009 in Figure 3). Both macroeconomic indicators also increased faster than the 'dependent elderly' population according to each of three definitions analysed here (65+, RLE15- and RLE15-&5TTD). Considering the trend until 2030, this means that for every additional dollar of productivity or tax in the US the rise in elderly and particularly HC dependent elderly will actually be lower.

FIGURE 3 ABOUT HERE

Not surprisingly, the current trend in the real number of elderly per GDP (RLE15-/gdp) does not look disconcerting either (Figure 4) as they experienced a huge decline since the early 1970s. If we project GDP into the future based on a predicted 2.7% growth rate in 2019, 2.1% in 2020 (OECD 2019) and 2.3% thereafter (equivalent to the 2016-20 average), little change in the ratio can be expected (around 1.5 elderly per GDP of US$1 million). A similar conclusion can be drawn from the projected trend in the ratio of those elderly who are expected to die within 5 years to GDP (RLE15-&5TTD/gdp), hovering around 0.4 HC dependent elderly per 1 million equivalized US dollars that is produced by the economy. If we only consider government tax revenue in the denominator, the resulting dependency ratios are obviously higher than the corresponding ones for GDP. Although the overall pattern for RLE15-/tax is similar to RLE15-/gdp (declines to the late 2000s after which it stabilizes and starts to slowly increase), several pronounced bumps can be observed. These coincide with the 1973 oil crisis, the early 1980s and early 2000s recessions and the Great Recession from 2008 to 2012. During these periods government expenditure was cut, in particular that of HC, hitting a historic low growth rate in 2008 [24] that likely affected the general elderly population. The projected value for 2030 suggests that the Real Elderly to Tax Ratio will marginally increase from 5.5 to 5.8 elderly per US$ 1 million tax dollars. If we now turn to our last indicator, the HC Dependent Elderly Population to Tax Revenue Ratio, a slow *decline* in the elderly HC burden can be observed between 1973 and 2008 after which the ratio stabilizes and is predicted to remain about the same over the next decade.

FIGURE 4 ABOUT HERE

4. Discussion

The very different story of population aging told by our measures has several important implications for policy. First and foremost, the OADR is a poor indicator. Perhaps because of its simplicity, it remains widely used. Yet, it gives a false picture of both the level and trend in population aging because it takes no account of rising life expectancies, nor the fact that a substantial proportion of the working-age population does not contribute to the economic output. This is the basis for the suggested alternatives in this paper. Secondly, it is wrong to assume that population aging itself will strain health and social care systems. Although a growing body of evidence has indicated an increasing prevalence of multimorbidity [25] and evidence of considerable economic burden associated with multimorbidity is consistent [26], increasing HC costs will also be driven by other factors, chiefly progress in medical knowledge and technology, costs of hospitalization and the increasing use of long-term care facilities. As others have suggested, the economic costs of old age dependency have typically been exaggerated and especially so in the US [27, 28]. As the results presented here have shown, since 1970 economic output, and even tax revenue, has increased much faster than the proportion elderly (even in terms of

the standard definition, i.e. ages 65+), despite economic downturns producing temporal declines, particularly in tax revenue.

Nevertheless, urgent attention needs to be paid to the changing relationship between morbidity and RLE. While counting the number of elderly people with TTD<5 could be considered an approximation for the population not in good health, health status or disability was not explicitly taken into consideration in the indicators presented here (a review of such indicators is provided in [6]). For instance, while age-specific disability rates appear to be have fallen during the 1990s and 2000s among the older population [29-31, 16], prevalence of metabolic risk factors, in particular overweight and obesity, is higher in more recently born generations compared to those 10 years earlier at a similar age [32, 33]. These unfavorable generation shifts are likely to lead to more elderly developing overweight-related diseases such as diabetes and cardiovascular disease and doing so starting at a younger age, but also aging-related diseases like osteoarthritis [33]. Osteoarthritis is also predicted to significantly increase as a consequence of an increasing use of cancer chemo- and radiotherapies that lead to a rapid accumulation of senescent cells, augmenting the risk of cardiovascular and other chronic diseases [34]. These examples would suggest that the aging process can speed up as well as slow down, with obvious implications for public health policy.

This clearly makes a static age boundary such as 65 a bad indicator of the start of old age and why an old-age threshold should be adjusted for improving survival [7] if comparisons of population ageing are made over time or between countries. Nevertheless, it could still be criticized for including many elderly who consider themselves healthy. Moreover, it remains a population average measurement as many persons in the corresponding age group may still live another 30 years, while others will die within a few years. Depending on the purpose of the population ageing indicator, using RLE15- may therefore not always be appropriate [6]. This is especially with regard to elderly HC needs and expenditure because many components of adult HC expenditure have been shown to be driven by proximity to death, not age [20, 14]. As RLE15- does provide a way to define the general elderly population in an era of ever improving old-age survival, one solution is to incorporate TTD<5 in the indicator as a way to approximate acute HC needs. This is also one way to consider the changing relationship between ‘old’ and ‘age’, not only given the steady declines in mortality over the course of the last century that has delayed the typical onset of senescence and its associated morbidities [16, 35, 36] and thus HC costs, but also a possible opposite scenario for the coming decades.

Finally, to get a better insight into the (un)affordability of HC, ageing indicators should also incorporate macroeconomic or labor statistics, as any government expenditure on elderly health and wellbeing comes from taxes, in particular income tax. One way to increase labour force participation would be to eliminate or reduce the current impediments to longer working lives, including sex and age discrimination and high wages among older workers in relation to productivity [37]. Health is also a common concern, even though older Americans appear to have the health capacity to substantially

extend their work lives. Research based on plots of the relationship between employment and mortality in 1977 compared to 2010 has suggested that the share of older men working at ages 60-64 could be 17-27 percentage points higher than it is today and at ages 65-69 even 31-42 percentage points higher, with similar estimates for women [37]. As the authors from the study stated, such estimates should not be taken as a reflection of how much older workers "should" work, but their results suggest that older workers are healthy enough to work another couple or so years. This goes in line with the results presented here, i.e. although the US has an ageing population, it not only has the economic potential to deal with it, the actual level of population ageing is much lower than is often perceived given the improvements in old-age survival over the last half-a-century.

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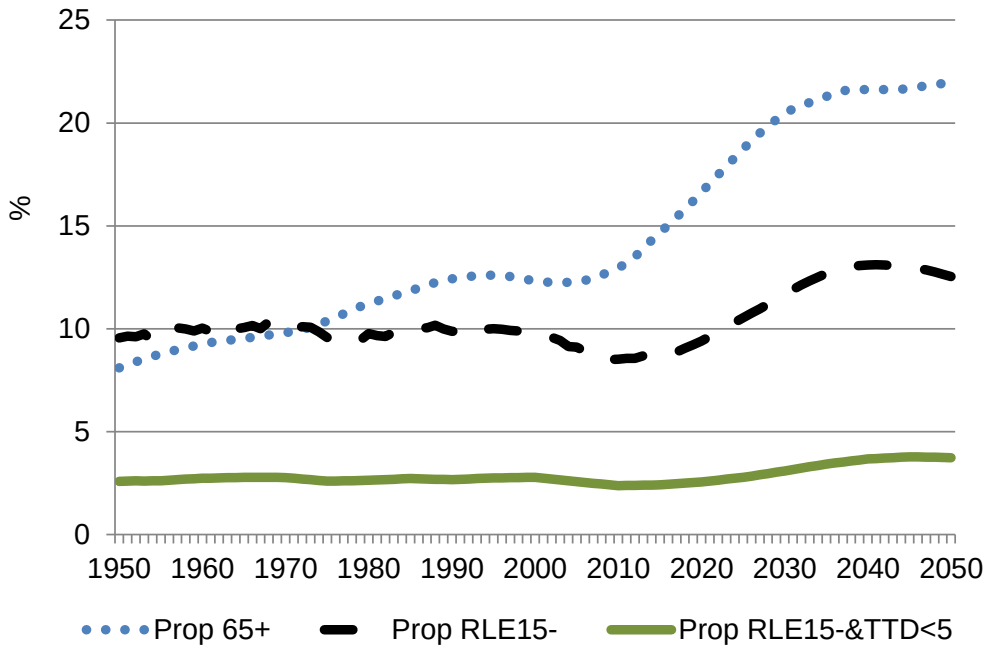
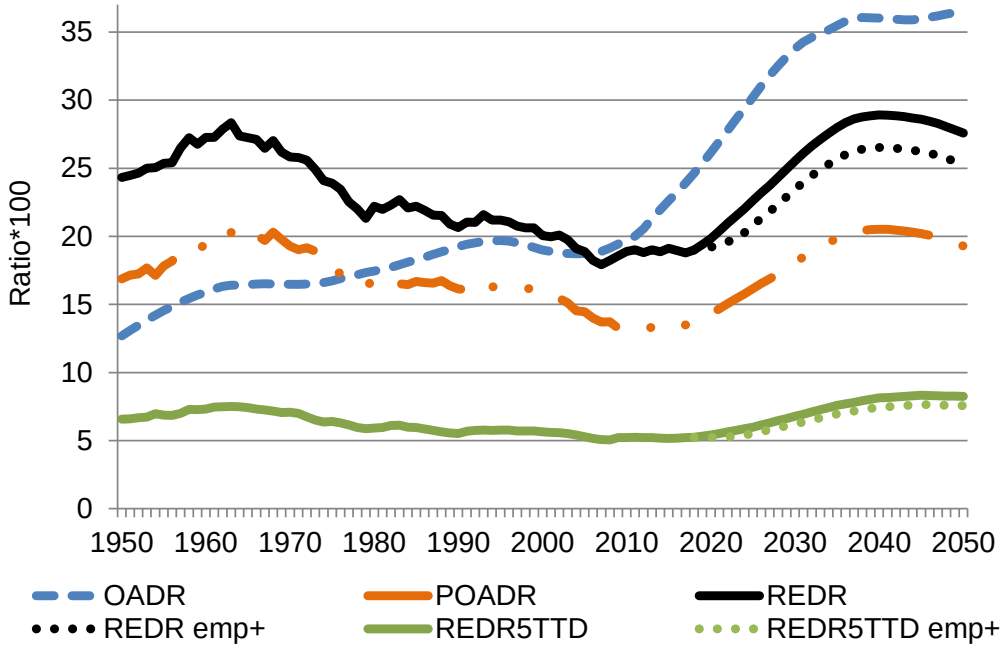
Figure

Fig. 1 Proportion of the total population aged 65+ (Prop65+), in age groups with Remaining Life Expectancy ≤ 15 years (Prop RLE15–) and with both RLE15- and a time to death of <5 years (Prop RLE15-&5TTD), US 1950-2050



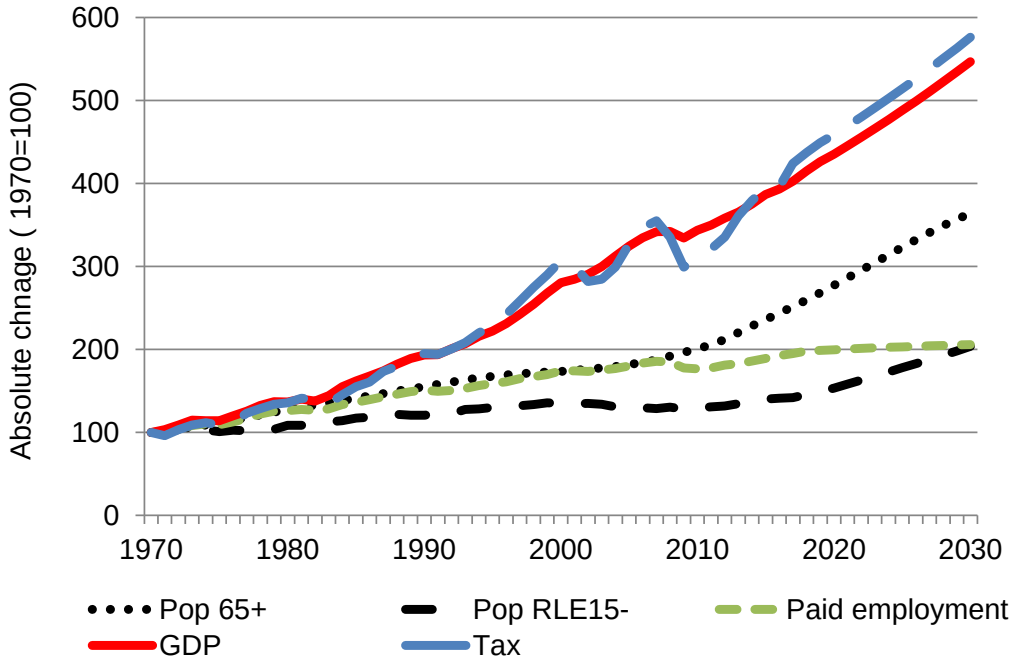
Data sources: see main text. Prop 65+ = Proportion aged 65 or older; Prop RLE15- = Proportion Dependent Elderly. Prop RLE15-&5TTD = Proportion HC need-adjusted Dependent Elderly Ratio.

Fig. 2 The Old Age Dependency Ratio (OADR), the Prospective Old Age Dependency Ratio (POADR), the Real Elderly Dependency Ratio (REDR) and the HC need-adjusted REDR (REDR5TTD), US 1950-2050



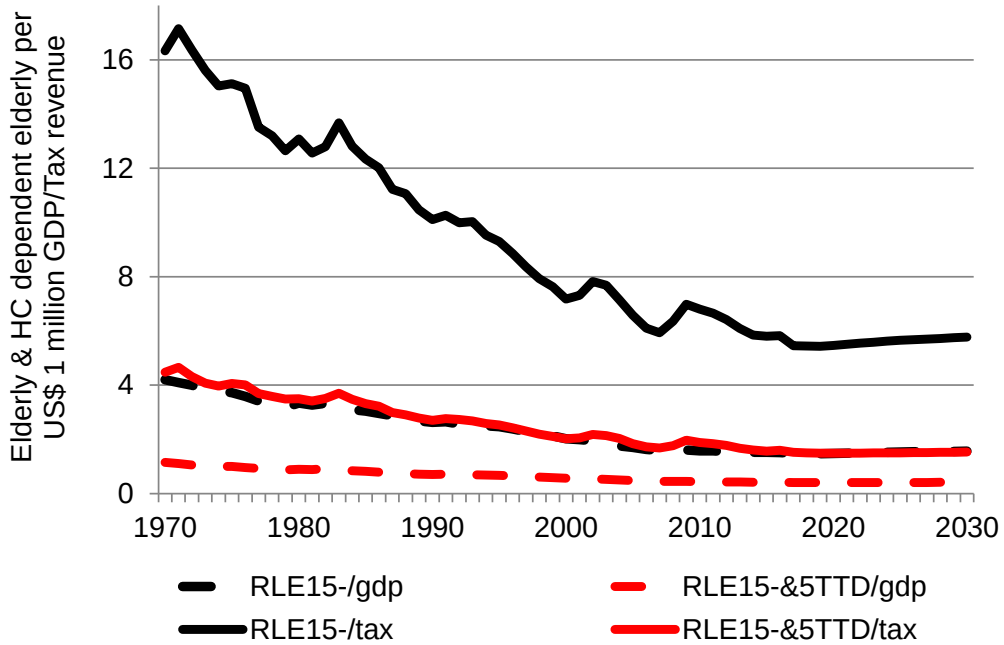
Data sources: see main text. OADR = Old Age Dependency Ratio; POADR = Prospective OADR; REDR = Real Elderly Dependency Ratio; REDR emp+ = REDR adjusted for increase in labor force participation; REDR5TTD = Health care (HC) need-adjusted REDR; REDR5TTD emp+ = REDR adjusted for increase in labor force participation.

Fig. 3 GDP, government tax revenue and the population in paid employment, aged 65+ and in ages above the threshold RLE15- since 1950 (2000 = 100), US 1950-2050



Data sources: see main text. Prop 65+ = Proportion aged 65 or older; Prop RLE15- = Proportion Dependent Elderly. Paid employment: Number of persons in paid employment; GDP = Gross Domestic Product in 2017 US dollars; Tax: Government tax revenue.

Fig. 4 The Real Elderly to GDP (RLE15-/gdp) and tax (RLE15-/tax) ratios and the HC need-adjusted dependent population to GDP (RLE15-&5TTD/gdp) and tax (RLE15-&5TTD) ratios, US 1950-2050



Data sources: see main text. RLE15-/gdp = Real Elderly to GDP Ratio; RLE15-/tax = Real Elderly to Tax Ratio; RLE15-&5TTD/gdp = HC need-adjusted Dependent Population to GDP Ratio; RLE15-&5TTD/tax = HC need-adjusted Dependent Population to Tax Ratio