The economics of healthy and active ageing series

Will population ageing spell the end of the Welfare State?

A review of evidence and policy options

Jonathan Cylus
Charles Normand
Josep Figueras

European Observatory on Health Systems and Policies
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Will population ageing spell the end of the welfare state? A review of evidence and policy options

Contents

Authors

Jonathan Cylus, London Hubs Coordinator and Economist at the European Observatory on Health Systems and Policies, London School of Economics & Political Science and London School of Hygiene & Tropical Medicine

Charles Normand, Emeritus Professor at Trinity College Dublin and Professor at King's College London

Josep Figueras, Director of the European Observatory on Health Systems and Policies

About the series

Population ageing is often perceived negatively from an economic standpoint. Yet taking a more balanced view, it becomes evident that a growing older population is not necessarily very costly to care for, and that older people provide significant economic and societal benefits – particularly if they are healthy and active. This is the broad perspective of the *Economics of Healthy and Active Ageing* series: to inspire a 're-think' of the economic consequences of population ageing.

In this series we investigate key policy questions associated with population ageing, bringing together findings from research and country experiences. We review what is known about the health and long-term care costs of older people, and consider many of the economic and societal benefits of healthy ageing. We also explore policy options within the health and long-term care sectors, as well as other areas beyond the care sector, which either minimize avoidable health and long-term care costs, support older people so that they can continue to contribute meaningfully to society, or otherwise contribute to the sustainability of care systems in the context of changing demographics.

The outputs of this study series take a variety of brief formats that are accessible, policy-relevant and can be rapidly disseminated.

About this brief

This brief serves as an overview and introduction to the *Economics of Healthy and Active Ageing* series. It reviews the main evidence on the health and long-term care costs associated with ageing populations to better understand the expected cost pressures due to changing demographics. At the same time, the brief explores how older populations can and do contribute meaningfully both in economic and societal terms, particularly if they are able to remain healthy and active into later life. The brief concludes by reviewing selected policy areas that have been shown to either support the health and activity of older people or which otherwise reinforce sustainable care systems more broadly in the context of population ageing.

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Acronyms

ADDR	adult disability dependency ratio
ADL	activities of daily living
AWG	Working Group on Ageing Populations and Sustainability
ESS	European Social Survey
EU	European Union
FTE	full time equivalent
GDP	gross domestic product
HTA	health technology assessment
IADL	instrumental activities of daily living
ICT	information and communication technology
IDI	interactive digital intervention
NCD	non-communicable disease
NTA	National Transfer Accounts
OECD	Organisation for Economic Co-operation and Development
POADR	prospective old-age dependency ratio
RCT	randomized controlled trial
SHARE	Survey of Health, Ageing and Retirement in Europe
WHO	World Health Organization

Boxes, table and figures

Key messages

- Population ageing is raising concerns about how to cope with the expected greater costs of health and long-term care, and over the economic implications of having a comparatively smaller share of younger people at traditional working age.
- This rhetoric is often inspired by misleading metrics, such as the traditional old-age support ratio, which assume that people become dependent on society after reaching some pre-defined age.
- Yet, upon closer inspection, available evidence suggests that caring for a growing older population may not be so costly to finance and that older people provide significant economic and societal benefits, especially when healthy and active:
  - Population ageing has a modest and very gradual effect on health expenditure forecasts, compared to traditional cost drivers such as price growth and technological innovation.
  - Demand for long-term care is expected to increase substantially due to population ageing but it is coming from a low baseline currently. However, projected increases in long-term care spending do not account for the economic cost of informal long-term care, as this is not captured in international statistics (nor fully understood).
  - Many older people continue to provide paid or unpaid work beyond official retirement age and continue to make a positive economic and societal contribution. The value of unpaid work provided by older people is considerable but not regularly quantified.
  - While in Europe older people's consumption is mainly financed by public transfers, many older people pay for (part of) their consumption from private sources, including from incomes from their own continued work or from accumulated assets.
  - Accumulation of asset wealth also benefits the economy indirectly through its contribution to productivity growth; health is a key predictor of asset accumulation.
  - Older people, even if not in paid employment, continue to pay consumption and other non-labour-related taxes, and thus contribute to public-sector revenues.
- Carefully crafted policies can control the costs of health and long-term care for older people, enhance their economic contribution through paid and unpaid work, and support political acceptability of funding and income transfers:
  - Policies that promote cost-effective health and long-term care for older people may include the use of new technology, integration of health and long-term care, as well as other models of care delivery and supporting better treatment and care choices near the end-of-life.
  - Keeping older people active in paid work is dependent on a number of factors, not least their health, and importantly the roles and incentives regarding employment and pensions. On the unpaid work side, policies may include support of informal carers through training or cash transfers and interventions that enable carers to more easily combine unpaid caregiving with paid employment.
  - Health and long-term care financing systems may need to diversify their sources of revenue in many countries or take other steps in order to maintain sufficient resources.
  - Policies to promote healthy and active ageing, which has an intrinsic value in itself, such as those that prevent or delay care dependency, will also indirectly (through enhanced health and functional ability) help achieve the other policy goals outlined above.

The forthcoming briefs in this series will look at issues related to the economics of healthy and active ageing in more detail in an attempt to gauge how big a challenge population ageing actually is for welfare states as we know them today.

Executive summary

Population ageing presents both challenges and opportunities for societies around the world. As the share of the population at older age increases, there are concerns over how to cope with expectations of greater health and long-term care needs, as well as the potential economic implications of having a comparatively smaller share of younger people at traditional working age. There is consensus among many that these demographic changes will have inevitable consequences for households, public finances and economic growth. Faced with the task of addressing these and other supposed ageing-related issues head-on, policy-makers may choose to declare the welfare state itself unsustainable and take remedial actions to dismantle it.

Yet a closer inspection of the available evidence suggests that an increasingly older population is not necessarily so costly to care for, and that older people often provide significant economic and societal benefits – particularly if they are healthy and active. Furthermore, appropriate policy actions can help to enhance the benefits and reduce the costs associated with population ageing. This is the broad perspective of the European Observatory on Health System and Policies' *Economics of Healthy and Active Ageing* programme of work: to inspire a 're-think' of the costs and benefits attributable to population ageing and to identify appropriate policy interventions.

In this overview brief we examine the available research on the health and long-term care costs of older people, on their economic and societal contributions via paid and unpaid work, and on the acceptability, equity and effectiveness of financing care and consumption of older people. Throughout, we identify evidence gaps and methodological challenges. We conclude by identifying key areas for policy intervention. Some of the issues explored in this brief will be analysed in more depth in further briefs in the *Economics of Healthy and Active Ageing* series.

What are the implications of population ageing for health and long-term care needs and costs?

In general, **health and long-term care needs and expenditures increase with age**. However, there are important differences across countries. For example, in 2015, health care spending for the average 80-year-old in Hungary were almost 16 times higher than for the average 20-year-old, but this difference was only 2.7-fold in Cyprus. Yet, despite the typical pattern of higher health care spending on older people, available data show that population ageing has in fact a **relatively modest effect on health care expenditure forecasts** compared to other important historical drivers of health expenditure growth, such as prices or technological innovation. Changes in population age structure alone are expected to add no more than one additional percentage point to average annual per person health care expenditure growth rates between 2010 and 2060 in a selection of European countries. Population ageing is simply too gradual a process to rapidly accelerate health care expenditure growth.

Additionally, much of the evidence suggests that calendar age itself is not the primary reason for higher health care spending associated with older ages. Rather, related factors such as proximity to death and poor health are more important determinants of health spending. **Poor health and disability at all ages are major drivers of health care expenditure trends**, which means that whether people are living longer lifespans in better or worse health will affect care costs. Likewise, although health care spending increases rapidly in the final months of life, there is research showing that **from a certain point, the older people are when they die, the lower their health spending is near to the end of their life**. This is likely due to lower use of resource-intensive interventions in older ages (although it may also reflect discriminatory practices and ageism). Therefore, **where longevity increases, it is possible that the health care costs of older people relative to younger people will actually fall, especially if older people live in better health**, thereby reducing the otherwise modest expected effects of population ageing on health care expenditure growth in the future.

The presence of a formal or informal long-term care system may be another reason behind declining health care costs among the oldest old, as costs are shifted outside of the traditional health care sector into other settings. Alternatively, in countries where there are no suitable alternatives, chronically ill patients may need to occupy acute care facilities inappropriately at far greater cost, again distorting the costs of providing health care to older people.

Where formal long-term care is available, its costs are expected to increase rapidly as a result of population ageing. However, this **growth in spending on long-term care is coming from a low baseline in most countries.** The majority of Organisation for Economic Co-operation and Development (OECD) countries with data available currently spend less than 2% of gross domestic product (GDP) on long-term care, which means that **even large increases in spending are unlikely to consume a large share of resources**.

A major methodological challenge is **estimating total current and projected health and long-term costs attributable to population ageing**. In particular, challenges with definitions, measurement and disaggregation continue to make it very difficult to measure formal long-term care spending across countries. It is even more difficult to fully understand the economic costs of informal long-term care, including the missed employment opportunities of informal carers. Projections of health care expenditures are also problematic. For example, most projections of future health care expenditures assume that current patterns of care by age will remain unchanged in the future and that all remaining factors that drive health expenditure patterns, including prices and technology, will grow at the same rate as GDP growth in the future. While these provide a practical simplification, they may not be realistic.

What are the implications of population ageing for paid and unpaid work?

There is great scope for older people to contribute meaningfully to society and the economy through both paid and unpaid work, particularly if they are healthy and able to remain active.

While many people leave formal paid employment around their 60s, others remain in paid work. Although comparatively older workers have historically produced less economic output than younger workers, this may have been a reflection of labour market realities that are no longer valid going forward, such as a greater reliance on physically demanding work. There are important differences in how productivity changes over the life course by type of occupation; for example, jobs requiring less physical exertion may benefit from additional years of experience where skills continuously improve with age. Even if older workers are slightly less productive (which may in part be due to discriminatory practices and ageism, such as poorer access to training at older ages), they are still able to make a positive economic contribution compared to if they are not working at all.

Many older people **produce economic and societal value through unpaid work**. One of the most relevant forms of unpaid work is informal caregiving. Accounting for informal carers as part of the employed population (adjusted for full-time equivalency (FTE)) would have a substantial effect on employment rates of older people. For example, among the population aged 55+ in Portugal, including informal carers would have increased the employment rate by nearly 13 percentage points in 2014. Methods to monetize the value of unpaid informal caregiving also demonstrate its considerable economic value. However, informal care, especially if it is very demanding on those providing it, is not without cost. More evidence is needed on how work and retirement affect health and vice versa to understand fully (and under what conditions) it makes good economic sense to incentivize work in older ages.

Provision of informal care by older people also has knock-on effects on formal employment rates, for example, of adult children. If older people are able to provide informal care to dependent older people or care for grandchildren, adult children who would otherwise be providing care may be able to work in paid employment. This important channel through which older people contribute to the economy remains invisible in national statistics.

What are the implications of population ageing for the acceptability, equity and effectiveness of financing care and consumption?

There is a common belief that older people are 'dependent' on the financial support of society, particularly younger people in paid employment. Yet **traditional old-age support ratios** (also known as dependency ratios) – the metrics which often inform this perception – **are misleading**, if not entirely inaccurate. This is because they assume that all people over a certain age threshold (usually age 65) will depend on the support of all adults below it. However, not all people over 65 retire and/or are dependent and not all people below 65 are economically active and/or not reliant on care themselves. Alternative approaches to measure support ratios attempt to either more properly account for changes in population health and disability (though few studies measure care or functional dependency states), or for changes in the number of consumers and producers in the population. These **refined indicators suggest that population ageing will create significantly fewer challenges than anticipated**. For example, estimates from the United Kingdom suggest that while the traditional old-age support ratio will increase from 27% (2005–10) to 41% (2045–50), the share of the adult population with disability will stay unchanged at 10% during the same time period. Additionally, while public transfers fund the majority of consumption among those over age 65 in Europe, **many older people finance some of their own consumption from private sources**, for example, from assets such as savings and investments. The **accumulation of this asset wealth can itself also contribute to economic growth** if these assets translate into increased capital investment.

Additionally, while older people may contribute less to public-sector revenues than working-age people on average, they may still contribute significant amounts through taxation. **Older people who are not in paid work continue to pay consumption taxes** (e.g. VAT or sales tax) **as well as taxes on non-labour income and assets** (e.g. property and capital gains). Tax revenues generated from purely non-income sources (i.e. non-labour-related, but also not including forms of income like capital gains) comprise around 30% to upwards of 50% of tax revenues in OECD countries.

The policy options: how can decision-makers respond to population ageing?

The health care and long-term care costs of older people, as well as the ability of older people to contribute meaningfully to society and the economy are dependent on a number of factors, of which many are amenable to policy intervention. Undoubtedly, health and functional ability are of utmost importance. This is because of their intrinsic value as well as their indirect effects on the economy via their impacts on reducing care costs and promoting the ability of older people to contribute. Healthy older people require less intensive and expensive care; they are able to engage in paid or unpaid work if they choose to do so; and they accumulate greater asset wealth compared to unhealthy people. Policy-makers can employ a range of policies and strategies in order to control costs of care and enhance economic and societal contributions of older people, ensuring that population ageing does not lead to undue economic pressures. Examples of such interventions, both indirect (via improvements in health and functional ability) and direct, are summarized below.

Policies to promote healthy and active ageing

The types of interventions that support health and activity at older ages include those that **delay the onset and progression of disease**, as well as those that **prevent or delay care dependency**. Importantly, policies which encourage behavioural changes can have significant health effects even if those changes do not occur until older ages. For example, there is good evidence that those who quit smoking at age 65 live longer than those who continue to smoke. To prevent dependency, a key focus should be on preventing cognitive decline, where there is some evidence that taking a multidomain approach can improve or maintain functionality. Other interventions to prevent or reduce frailty, such as resistance training or promoting physical activity at older ages, can also be effective.

Policies to promote cost-effective health and long-term care interventions

Technological advancements, such as telemedicine, as well as assistive technologies, such as digital memory aids or automated medication dispensers, can be effective ways to provide care using relatively few resources. There has also been widespread interest in **integration of health and long-term care and other models of care delivery** to help control care costs, particularly given the complex care needs of older populations. There are many varied examples of delivering coordinated or integrated health and long-term care. There is also good evidence that **supporting better treatment and care choices near the end of life** can reduce the use of unnecessary treatments and tests, lower costs, improve the experiences of patients and carers and even, in some cases, contribute to longer survival.

Policies to support paid and unpaid work

While there is widespread interest in keeping people in paid work for longer, raising pension ages alone may simply divert some older people into other state support programmes, such as for unemployed people or people with disabilities if they are not healthy enough to work productively. Health systems can usefully help to keep older people healthy and able to remain in the workforce. There is also growing recognition that **workplace health promotion interventions**, such as screening activities to identify potential health risks and lifestyle management activities to improve health and health behaviours, can keep older workers healthy and productive. **Adapting work practices to accommodate older workers' needs and circumstances** can also help older people to remain in work. Good evidence shows that flexible working practices, such as flexitime, part-time working, job-sharing and working from home, can help older people, particularly those with health issues or caring responsibilities, to remain in employment for longer and can result in healthier lives overall. Changes to the physical work environment can also support older workers to remain in employment, while contributing to improvements in productivity.

On the unpaid work side, strategies that **support informal carers through training or by providing cash for care** have been shown to reduce carers' stress and may also improve the quality of care. However, it is important to acknowledge that cash-for-care benefits can act as a disincentive to participating in formal employment. Much emphasis has been placed on implementing reforms to **enable carers to combine unpaid caregiving with paid employment**, including the introduction of paid or unpaid leave and flexible working arrangements.

Policies to support acceptable, equitable and efficient funding and income transfers

Given likely reductions in the share of the population in paid work as a result of population ageing, **health and long-term care financing systems may need to diversify their sources of revenue** or explore other alternatives if they are to continue to generate sufficient, stable resources. For example, health and long-term care financing systems that are heavily reliant on payroll contributions may need to be redesigned to fill the financing gap using general revenues or private sources.

Increasing the reliance on locally raised taxes or, conversely, centrally raised taxes is one focus of ongoing debate and reforms, with countries moving in different directions. The use of hypothecation (or earmarking) of payroll or 'sin' taxes has been seen by some as a potential source of funding. However, many argue that this introduces unwelcome budgetary controls and that spending is ultimately determined by revenue generated rather than based on changing needs and demand. Earmarked funding sources are also likely to be susceptible to economic fluctuations, resulting in unstable revenue streams. Similar arguments have been made against the introduction of mandatory long-term care insurance arrangements, such as those seen in Germany, Japan and Korea.

Overall, acceptability of higher taxes and transfers varies between countries and can depend in part on the transparency of the process and the perceived fairness of the rules.

Introduction

It is often suggested that population ageing will have adverse consequences for economic growth, public finances and households [1]. As the share of the population at older age increases, there are concerns over how societies will meet older people's expected health and long-term care needs, while at the same time cope with slower growth in economic output due to a relatively smaller share of the population being at traditional working ages. Given the perceived scale of future challenges, some commentators question the sustainability of welfare states, and suggest that the scale and scope of coverage should be reduced.

However, perhaps surprisingly to some, the bulk of empirical evidence does *not* indicate that population ageing will bring inevitable economic ruin. The extent to which population ageing will lead to economic, fiscal and social difficulties is in fact not so easily gauged using many of the most commonly available metrics, such as the share of the population over a certain age. Rather, differences in the health and capabilities of older people have more important effects on health and long-term care costs, along with older people's capacity to contribute meaningfully to society and the economy, than chronological age by itself.

For example, while people over a certain pre-defined age may be categorized as 'dependent', older people may in fact opt to remain in paid labour for longer if they are healthy enough to do so. This may also depend on other factors, such as the existence or design of pension systems, or employer attitudes and beliefs about ageing and productivity, as well as older people's own preferences. It may also depend on there being some additional flexibility in working conditions and hours. In addition, older people who are healthy and active can provide other, often unrecognized, benefits, such as informal caregiving and other voluntary work. Accounting properly for such outputs paints a more complete picture of the economic implications of population ageing. Indeed, there is growing recognition of the contributions that older people make to both the formal and informal economy, and the term 'grey economy' has been coined by those who identify this expanding demographic group as an opportunity.

Population ageing presents a complex mix of challenges and opportunities for societies around the world. A more nuanced comprehension of these, as well as a better understanding of how policy can influence the effects of population ageing on the economy and society more broadly, is needed. With so much conflicting rhetoric on the topic, this overview brief seeks to provide clarity about the expected economic and societal effects of population ageing, as well as to offer some policy options. We suggest that healthy, active older people are both less costly to care for and also able to contribute to the economy in ways that can be (but are often not) properly measured.

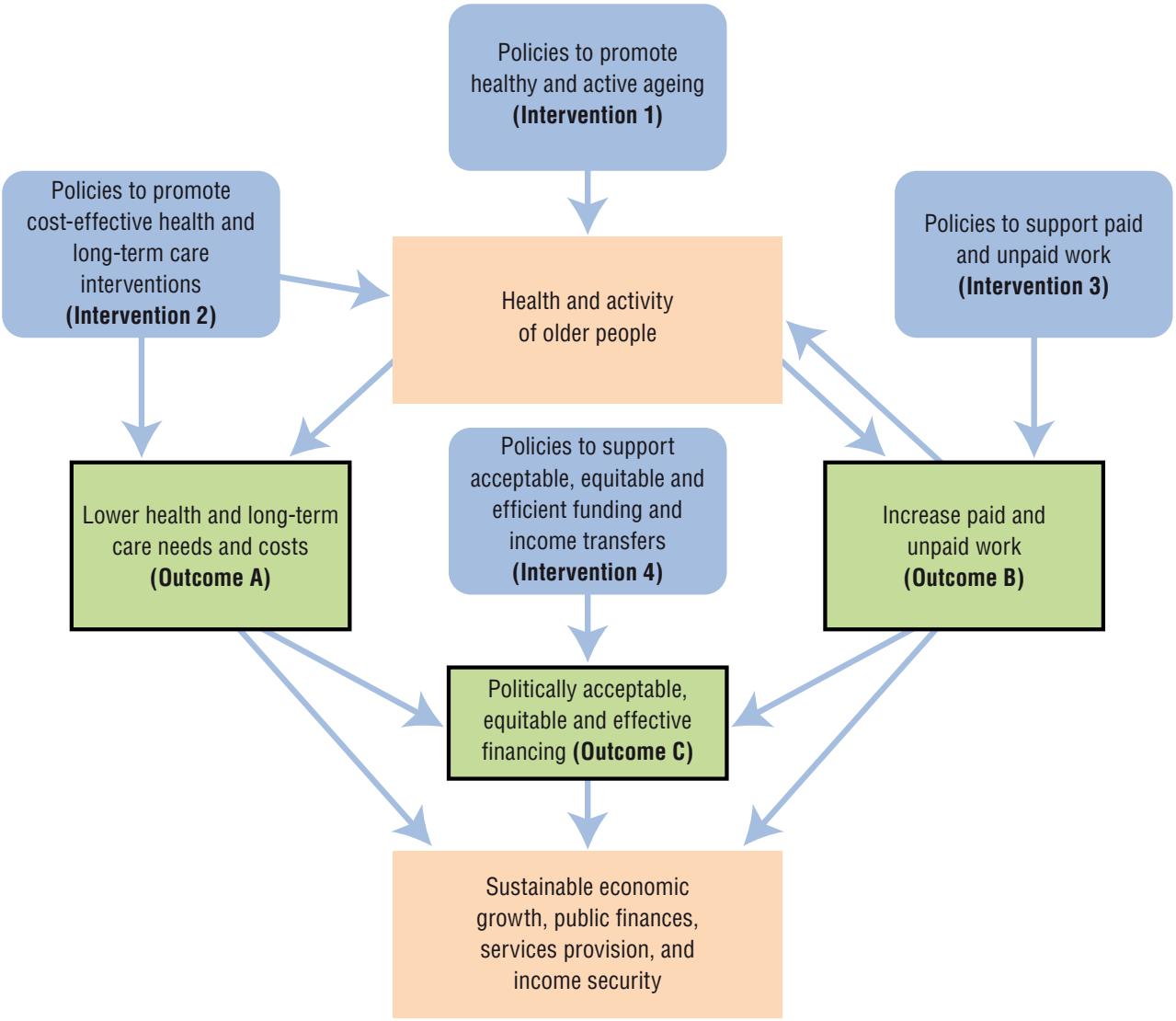
To guide our approach to the *Economics of Healthy and Active Ageing* series, we follow the conceptual framework depicted in Figure 1 that highlights the relationships between the health and activity of older people and, ultimately, economic growth, public finances and societal well-being overall. The pathways underlying these linkages are complex, but the basic premise is simple: healthier, active older people will have lower health and long-term care costs (Figure 1, **Outcome A**) – cross-references to the boxes within Figure 1 are in bold here and elsewhere in this report) and will be able to participate in paid and unpaid work (**Outcome B**), both of which have important and manifest economic and societal implications. Policy interventions (**Interventions 1–4**) play a key role, not only in promoting good health throughout the lifecourse (**Intervention 1**) and kicking off this chain reaction, but also in ensuring that services are provided in efficient ways (**Intervention 2**) and that resources (including labour) can be fully mobilized to maximize economic and societal benefits (**Intervention 3**). To promote social solidarity, effective and equitable mechanisms are also needed (**Intervention 4**) in order to collect, pool and transfer stable and sufficient resources in ways that must be politically acceptable to those who pay and those who receive care (**Outcome C**).

Making use of this framework, we highlight where: existing evidence is at odds with common beliefs; important factors are ignored; and overly simplistic conclusions are drawn. We also highlight areas where: current evidence is inadequate; there are particular challenges in measurement and evaluation; and research is most urgently needed. We explore some of the most relevant policy levers that have clear implications for the health and activity of older people, their health and long-term care costs and their capacity to contribute to society, and which support politically acceptable modes of redistribution.

In the first section of this brief, we consider some of the analyses and projections of the effects of population ageing. We first focus on expectations about how population ageing has affected health and long-term care costs in the past, and how it is likely to do so in the future (**Outcome A**). We consider future trends, looking also at the roles of other significant cost drivers, such as proximity to death, compression (or expansion) of morbidity, and health system characteristics. This provides a more robust basis for judging the probable levels of future needs and costs, the opportunities for effective policy interventions to influence both health needs and costs (**Intervention 2**), and the scale of the challenge to ensure health and long-term care systems remain sustainable.

The second section discusses the societal and economic benefits provided by older people; it looks at the contribution of older people to the economy through both paid work resulting from later and partial retirement, and unpaid work such as child care and other informal care (**Outcome B**). The third section subsequently considers how their care and consumption are paid for, as well as their contributions through revenues and by holding significant assets, mindful of concerns over fairness in financing (**Outcome C**). This provides a better basis for understanding the potential contributions from older people in the future and how this might help ensure the continued economic growth and sustainable financing needed to meet future needs. It also provides a basis for the consideration in the final section of policies that might increase the contribution through work of older people (**Intervention 3**). We demonstrate that, when measured appropriately, many people above pre-defined retirement ages are not dependent on younger workers, and that much can be

Figure 1: Conceptual framework



Source: Authors.

done to avoid a large increase in the numbers of those who are dependent.

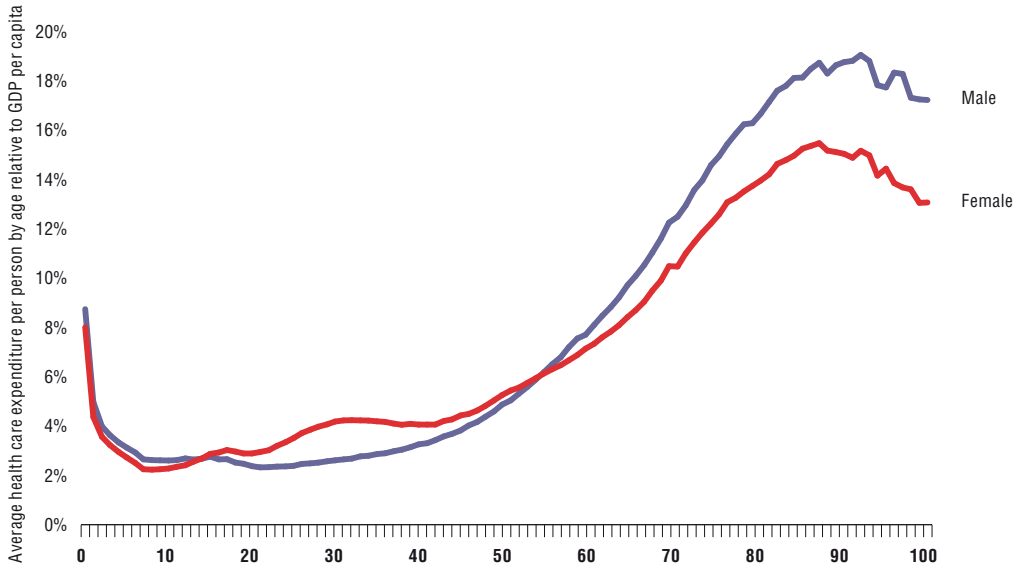
In the final section, we look at the options for policy-makers. We provide an overview of the four main areas of policy interventions outlined in the conceptual framework above: promoting healthy and active ageing (**Intervention 1**); policies to promote cost-effective health and long-term care interventions (**Intervention 2**); policies to support paid and unpaid work at older age (**Intervention 3**); and policies to support acceptable, equitable and efficient funding and income transfers (**Intervention 4**). In this context, therefore, sustainability will be enhanced if policy focuses on minimizing health needs, increasing efficiency of service provision, maximizing the contributions of older people, and ensuring that the mechanisms for funding care and income security are fair.

1. What are the implications of population ageing for health and long-term care needs and costs?

The idea that it is costly to provide health and long-term care to older people is plausible and pervasive. A common observation is that health and long-term care spending is higher for older people, and so, because older people will comprise a larger share of the population, health expenditures will increase commensurately and 'unsustainably' without policy action. But is this really true? In this section we review evidence on expenditure patterns by age to better understand how population ageing is most likely to affect future spending trends.

We start by analysing projected growth in health care expenditures due solely to population ageing and find that its effect is modest.

Figure 2: Health care expenditures by age and gender relative to GDP per capita, EU + Norway



Source: [2].
Note: France not included.

Health care expenditures generally increase with age but age has relatively modest effects on health care expenditure forecasts

Data on health care spending by age are collected for countries in the European Union (EU) by the Working Group on Ageing Populations and Sustainability (AWG) of the European Commission. These data show that overall in 2015, with the exception of the very young (e.g. under 1 year) and the oldest old (e.g. approximately 90+), per capita health care expenditures are higher at higher chronological age in Europe, with a particularly pronounced difference from around the mid-40s to the mid-80s (Figure 2). These patterns differ across countries. In Hungary, for example, the data show that the average 80-year-old man's health care expenses were 15.8 times as much as that of the average 20-year-old man in 2015, whereas in Cyprus, the average 80-year-old man's health care expenses were only 2.7 times as much as that of the average 20-year-old man.

Given the general pattern of higher spending for older people, one might reasonably expect that having a larger share of the population at older ages would bring a significant increase in spending. To assess long-term sustainability of health systems in the EU, the AWG carries out ageing-related projections based on the data they collect on health care spending by age [2]. While this approach has problems (see Box 1), it is interesting to explore the findings. They suggest that as populations age, a gradually increasing share of economic resources is likely to be allocated to health care. According to the AWG, public expenditure on health care due to demographic changes is expected to increase between 2013 and 2060, ranging from a low of 0.1 additional percentage points of GDP in Lithuania to a high of 2.8 additional percentage points of GDP in Portugal. In the latter case, this still only amounts to an average increase in spending on health due to population ageing of 0.06 percentage points of GDP per year.

Figure 3 shows the expected contribution of changing age demographics to health care expenditures presented as average per person spending growth per year for five EU countries [5]. In these countries, changing demographics are expected to cause marginal increases in average annual per person health care expenditure growth rates from 2010 to 2060. In no 5-year period between 2010 and 2060 is ageing expected to contribute more than one percentage point to average annual health expenditure growth for the countries shown. To put that in perspective, among OECD countries, nominal per person annual health care expenditure growth (in local currency units) between 2000 and 2015 varied substantially across countries but was 5.5% in the median country (New Zealand). Thus, by historical standards, population ageing is expected to make up only a modest share of average annual growth in per person health spending.

Compared with other important historical drivers of health expenditure growth, such as price growth or technological innovation, population ageing on its own plays a minor role. Population ageing is simply too gradual a process to be a major driver of health care spending [6]. In addition, while the projections do suggest that population ageing will result in health care expenditures consuming an increasing share of economic resources, this may be deemed sustainable in many societies. An increase in the *share* of GDP for one sector inevitably means a smaller share for one or more other sectors (but not necessarily an absolute decrease elsewhere). If this is based on a growing preference for health spending over other sectors, and resources are used efficiently, it is not clear that this should be considered to be unsustainable.

While a better understanding of the pure effect of ageing on spending suggests that any growth in spending will be slow and may be modest, cost pressures may arise both from improved opportunities to treat diseases common

Box 1: Forecasting future health care expenditure trends by age

Forecasting the contribution of population ageing to increasing health care expenditures can be done by taking annual population estimates by age group and weighting each year's population by current expenditure levels for the respective age group.

This approach assumes that all age groups will be treated in the future with identical intensity as compared to other age groups currently. So, while expenditures will change over time for all age groups due to changes in prices, technology, care delivery models and other factors, if a 65-year-old today uses three times as many resources for health as a 25-year-old, it is assumed that in the future this relative intensity of treatment will be maintained. This is an important assumption because although such an approach does not produce a full picture of total future health care expenditures, it helps to isolate the effects of the changing age-mix of the population on future health spending; but it is only sensible to assume constant relative intensity of resource use by age if needs at different ages remain in the same proportions. Given the importance of proximity to death in driving expenditures (see below) and given the changing patterns of age at death, this relationship is unlikely to remain the same and projections will be misleading. This is particularly important if end-of-life costs are lower for older decedents. As life expectancy has increased fairly consistently in most (although not all [3,4]) parts of the world over the past few decades, it may be that the health care costs of older people have actually fallen relative to younger people, and may continue to fall in the future; to put it another way, the curves shown in Figure 2 may have flattened or otherwise shifted towards the right.

Forecasts of the contribution of population ageing to health expenditure trends can be presented either as a share of future GDP or as a growth rate. Showing these forecasts as a share of GDP identifies whether population ageing will result in health expenditures consuming a higher or lower share of economic resources, whereas showing the forecasts as a growth rate facilitates comparison with other non-demographic drivers of health expenditure growth.

in older age and raised expectations from (politically strong) older people who are increasing in numbers and as proportions of the population. One recent study suggested that population ageing could exert much greater pressures on health care expenditure because of the possibility that future economic growth will disproportionately drive expensive technological advances that target older people, since they will comprise an increasingly large share of the health care market [7][1]. However, the adoption and funding of technological innovations is a policy choice, and has typically been a larger driver of increased spending than ageing itself. If these new technologies are of particular benefit to older people, ageing may increase the proportion of people who will benefit from such services.

Costs rise before death, but less so for the older old

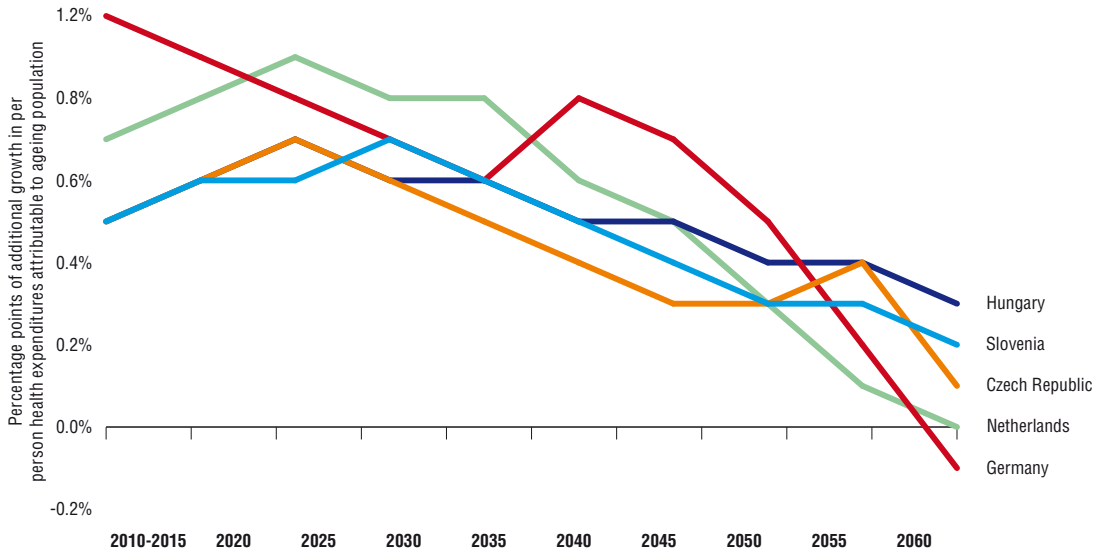
A large body of research investigates how proximity to death – measured in terms of the number of months before death, as opposed to age itself, influences health care utilization and expenditure [8–10]. The literature shows that the costs of dying are substantial, particularly relative to the health care costs of survivors. For example, research from the US Medicare programme, which provides health care coverage primarily to those age 65 and above, finds that nearly seven times more per person was spent on Medicare beneficiaries who were in their last year of life, compared to Medicare beneficiaries who survived [11]. In aggregate, this amounts to over a quarter of Medicare spending going towards people in their last year of life, a share which did not materially change between the 1970s and 2000s, despite changes in medical technology and care delivery [10]. While research suggests this is largely a function of increased hospital utilization around the time of death [8], the pattern has also been found for medicines expenditure, for example, in Ireland [12]. This Irish study of a longitudinal sample of people aged 70 years and over compared the deceased matched with survivors of similar age, gender and region, and found that differences in medicines expenditure between the two groups were not explained by calendar age; however, those who died within the 36-month study period had on average 23% higher medicines expenditure.

There is also research showing that, beginning at a certain age, the older people are when they die, the cheaper is their death. For example, evidence from Canada finds that the health care costs of dying are comparatively lower for those over age 80 [9]. Another study from the Netherlands finds that the level of spending on so-called curative care (e.g. general practitioners, hospitals, medicines) among those in their last year of life begins to fall notably, and almost linearly, around age 70 [13]. Yet, long-term care expenditures (e.g. both nursing homes and home care) are found to increase fairly steadily along with age for both survivors and decedents, albeit from a much lower baseline than health care costs. According to the study, this increase in long-term care spending as people age dampens but does not cancel out the overall downward trend in total spending for people who live to older ages.

Researchers have incorporated time-to-death into models that forecast hospital costs. This research finds that since longer life expectancy postpones death-related costs, the contribution of population ageing to health care expenditures would be even lower than estimated when using the traditional projection methods described above in Box 1 [14]. Other researchers have modelled future health care costs separately for survivors and decedents in a given year so as not to overstate any effects of demographic change on health care spending [15]. Overall, it appears that a substantial share of health care expenditure on older people occurs near the time of death, and that dying at older ages can mean that the health care costs of death are lower. This is likely to be due to a lower use of resource-intensive interventions in older ages. While this may reflect a more efficient resource use, there could also be concerns about potential discriminatory practices and ageism [16].

1 The relationship between GDP levels and spending by age is determined in this study using cross-sectional country data. However, much like the Preston curve (which compares country cross-sectional life expectancy data to GDP per capita), it is unclear that longitudinal changes in GDP levels within countries will have the same effects on age as those observed in cross-sectional panels.

Figure 3: Contribution of changing age-structure to growth rates of health care expenditures per person, selected EU countries



Source: [5].

Whether people are living longer in better or worse health affects care costs

The costs of caring for older people are likely to vary in the future depending on whether older people are in good or bad health. Indeed, poor health or disability at all ages are major drivers of health care expenditure trends [17]. Some estimates from the United Kingdom show that models that do not account for end-of-life costs or morbidity may under- or overestimate future health care expenditures, demonstrating that these factors can be important in determining expenditure trends [18]. Proximity to death itself, as described above, may also function to some extent as a proxy for high levels of morbidity or for dependency.

A key question, therefore, is whether people are in fact living longer in better or worse health. Findings from the Survey of Health, Ageing and Retirement in Europe (SHARE) show reductions in mild/moderate disability for older people in several countries between 2004 and 2013, with much of this improvement attributable to declining rates of chronic conditions [19]. Comprehensive understanding of whether there has been a compression of morbidity (i.e. a reduction in the number of unhealthy years lived as a proportion of life expectancy) or expansion of morbidity (an increase in unhealthy relative to healthy life-years due to increased survival of frail people) among older people, however, presents measurement challenges. On the one hand, there are differences in how health and disability are measured across countries as well as across time, making it difficult to capture trends accurately. Additionally, some research suggests that declines in the share of older people reporting disability in terms of activities of daily living (ADL) or instrumental activities of daily living (IADL) are a result of changes in the environment and society overall, rather than evidence of health improvements [20]. A person with severe arthritis may have reported difficulty moving within the community (an IADL) in decades past, for example, but currently can benefit from assistive technologies such as a motorized scooter to aid transport to overcome such difficulties. There are also likely to be varying trends by health condition, making it impossible to draw definitive conclusions overall for older cohorts. Given the importance of understanding how health and disability evolve among older people, prioritizing measurement of morbidity and disability at older ages (and their implications for health and long-term care costs) is needed. The World Health Organization (WHO) has emphasized that health in older age should not be considered in terms of the presence or absence of disease, but rather the functional ability of an older person to do the things that are important. At present, severe losses of function are identified by deterioration in IADLs or ADLs, but it would also be useful to see trends earlier in the life course and for specific domains such as cognitive capacity.

Yet, we still do not fully understand to what degree poor health at older ages influences health expenditure trends. One study from the World Bank shows that current approaches to modelling health care expenditures suggest that there are only small effects of poor health on spending patterns [21]. The authors project public spending on health as a share of GDP in Eastern Europe and the former Soviet Union under four scenarios: (1) pure ageing; (2) constant morbidity; (3) compressed morbidity; (4) adjusted for death-related costs. Perhaps surprisingly, the differences between the projections are small in most countries. Sensitivity analyses of similar health spending projections from the United Kingdom's Office for Budget Responsibility also find that their expenditure forecasts are not very sensitive to varying assumptions of future morbidity [15]. This could, in part, reflect limited access to expensive services by older people and, therefore, limited effects on treatment costs of different levels of morbidity, particularly in some countries.

Box 2: Estimating total costs of formal and informal long-term care

Expenditure data on formal long-term care is split into health care and social care components according to the System of Health Accounts [24]. The health care component includes either medical or core personal care services to assist individuals with ADL, such as health services in support of family care. The social care component provides assistance with IADL, such as preparing meals, housework and household management. However, these definitions are not applied uniformly across countries, with the social component being particularly difficult to measure. There are also differences between countries in how care is financed and which Ministry is responsible for which services. Challenges with definitions, measurement and disaggregation continue to make it very difficult to be definitive about long-term care costs across countries, despite initiatives like the Joint Health Accounts Questionnaire and the System of Health Accounts.

To fully understand the total economic costs of providing long-term care, one must also account for the costs of providing care by family and other unpaid carers. These models of care predominate in some countries and can have important effects in terms of time of work and decision to retire. According to the ANCIEN study, around 14% of people in EU countries provide unpaid help to someone for one or more ADLs [25]. Since these contributions are not normally quantified, it appears as if sustainability questions and cost increases will only be of concern in countries with care models using paid employees.

Indeed, households' costs of informal caregiving in the form of missed employment opportunities (particularly when caring for those with the most intensive needs [26]), the labour associated with caregiving itself, and emotional, physical and social well-being may be substantial [27]. Better quantifying the costs borne by households who provide care would be useful to shed light on the true costs of long-term care, and would make data and forecasts more comparable across countries. It may be that the low-cost baseline described in this report is not so low when the hidden costs of informal care are considered. Moreover, better understanding the costs of both formal and informal care would then allow consideration of the broader economic impacts of government investment in this area. In the same way, we need to take into account that much of the informal care is provided by older people themselves, for example, to their spouses or other relatives. This question is raised again later in this brief where we discuss the need to properly account for the economic contributions to society by the elderly.

Health system characteristics also drive variations in spending at older ages

Understanding the role of health policy choices, such as on entitlements, coverage levels and access to care, is important in determining spending patterns by age and ultimately how demographic change will affect expenditure growth. Evidence from longitudinal ageing studies show that having better insurance coverage increases use of services [22] and studies comparing use of free and full-cost primary care show large differences in service use. Some of the observed patterns of primary care use in Ireland are driven by free access for older people while those under 70 normally pay the full cost [22].

While many new or improved interventions are likely to benefit older people disproportionately, since they are the people most likely to have (treatable) chronic conditions, the decisions to fund or reimburse service access should be subject to rigorous evaluation. It is not logical to consider services to be both cost-effective and unsustainable, since cost-effectiveness means this is a good use of resources in the context of overall resources. There is some variation in patterns of entitlements and service use by age between countries, but there remain difficulties in understanding these due to limited availability of appropriate data.

Formal long-term care costs are expected to increase but from a low baseline

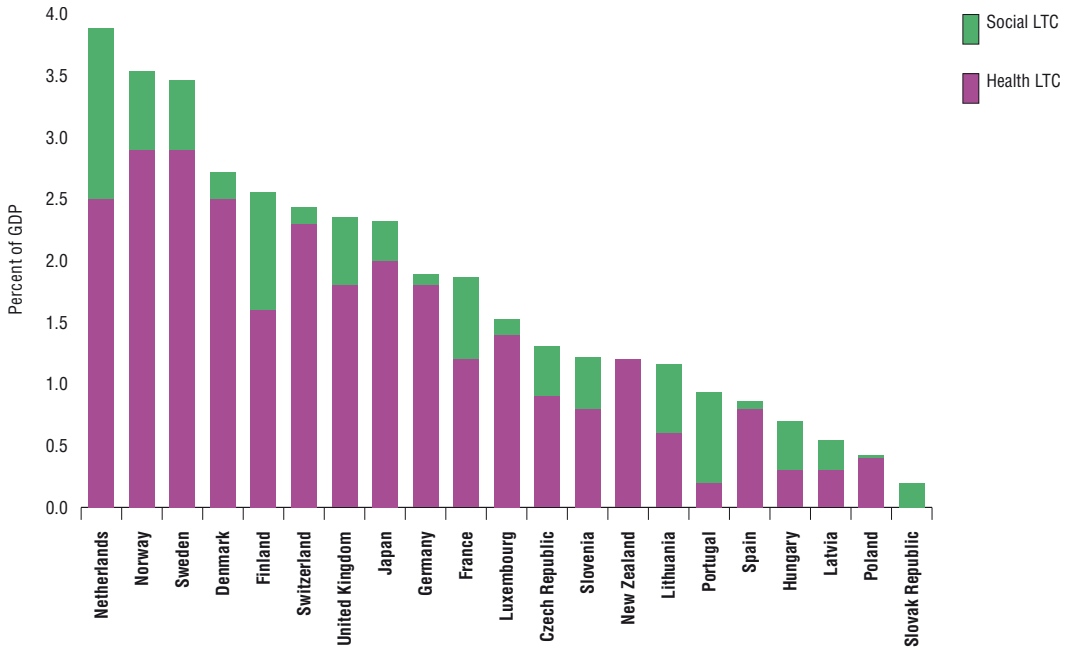
In a sense, it is artificial to examine health care costs without also considering long-term or social care. For example, the presence of a long-term care system may be one of the reasons that health care costs decline among the oldest old, as costs are shifted outside of the traditional health care sector into other settings. Likewise, in countries where there are no suitable alternatives, chronically frail patients may need to occupy acute care facilities inappropriately at far greater cost, again distorting the costs of providing health care to older people.

In addition to health care spending, there are also worries about increased spending on long-term care as populations age. Demand for long-term care is closely linked to age, with around half of users being over 80 years of age in most countries [23].

Obtaining an accurate assessment of aggregate long-term care costs (formal and informal) within and across countries faces a number of challenges, such as different definitions, measurement approaches or the problems of disaggregation, for instance, between the health and social care components. Moreover, we cannot understand the real costs of providing long-term care until we account for the economic costs of informal caregiving, which are not well known in many countries (see Box 2).

In spite of the methodological complexities in measuring long-term care costs, most estimates suggest rapid growth in long-term care expenditures over the coming decades. For example, although political decisions and funding priorities in recent years would suggest the contrary [28], a study from the United Kingdom finds that the need for long-term care spending will more than double by 2035 [29]. However, it is important to recognize that long-term care spending is currently coming from a low baseline in most countries, including the United Kingdom, so that even a doubling of expenditure levels represents a modest absolute increase. In the aforementioned study, total expenditure needed for long-term care for those over 65 years of age is expected to increase by 162% from 2015 to 2035 under the baseline scenario; however, as a share of GDP this represents an increase from just 1.02% to 1.68%. Indeed, recent data suggest that the health and social care components of formal long-term care consume less than 2% of GDP in the majority of OECD countries with available data (Figure 4).

Figure 4: Long-term care (LTC) expenditure as a share of GDP, OECD countries, most recent year available



Source: [30].

2. What are the implications of population ageing for paid and unpaid work?

In this section we outline some of the economic and societal benefits of older populations. Older people contribute in a number of ways, not all of which can be easily quantified. Here we concentrate primarily on their immediate contributions in terms of paid work and their often unrecognized contributions in terms of unpaid work.

While many people leave the paid labour force in their 60s, others remain in paid work

Population ageing is frequently associated with increases in the share of the population that is retired from paid work. According to data from the European Social Survey (ESS) in 2014, there was a sharp decline in the percentage of the population in paid employment between the ages of 55–59 (when 76.2% of this age cohort was in paid employment) and 65–69 (when only 9.0% was in paid employment) [31] (Figure 5). While many people leave the paid labour force in their 60s (both those that want to retire and others who are forced to retire), others do remain in paid work, either by choice or because of increased pension ages or pensions that are inadequate for their needs.

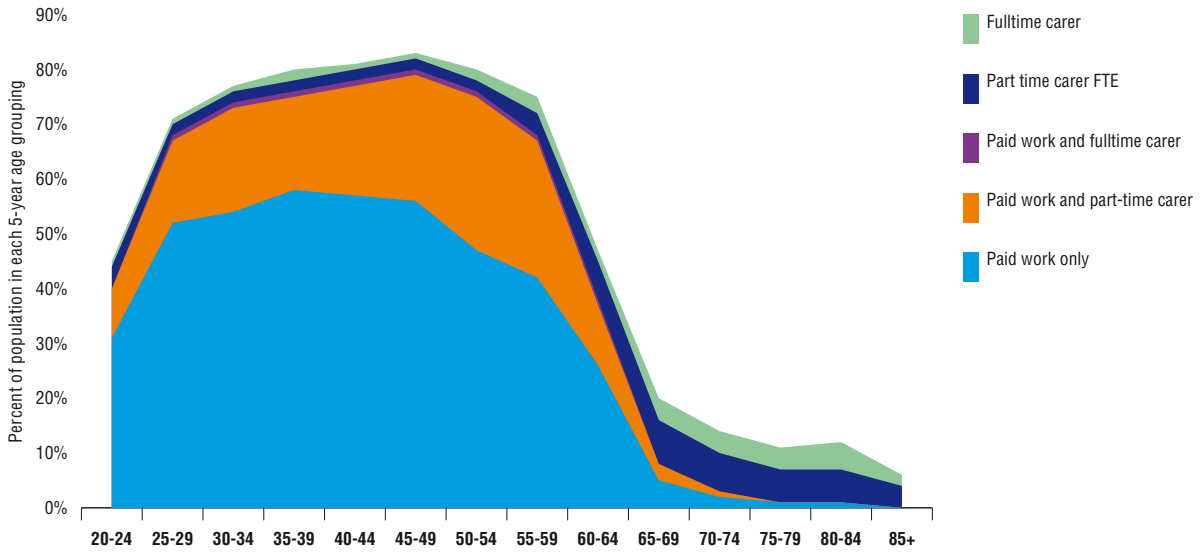
It is difficult in many countries to identify who wants to be retired and who wants to work among those in older age groups. Retirement and 'early retirement' were used extensively during the financial crisis to encourage labour market exit of older workers in an attempt to free up paid employment for younger workers. Not surprisingly, this increases the proportion of older people who are outside the formal workforce.

Productivity varies over the life course but there are important differences by type of occupation

A possible explanation for efforts to force older people into retirement is that there is a perception that older workers are less productive than younger workers. A recent study of labour productivity by age from the International Monetary Fund finds that comparatively older workforces in Europe have historically produced less economic output [32]. Modelling the relationship between the age structure of the labour force and real output per worker, they find in aggregate that population ageing will reduce productivity growth by an average of 0.2 percentage points each year over the next two decades. One issue to keep in mind in this sort of analysis is that the mix of manual and non-manual jobs has changed over time and continues to change. Predicted declines in productivity in this study could be a function of greater reliance in years past on physically demanding work where poor health and a decline in physical functionality could prove a hindrance. This may not reflect labour market realities going forward.

Worker productivity naturally varies over the life course for reasons such as accumulation of experience over time, changes in skill needs of the workforce, and changes in mental and physical capacity. For some occupations, such as those requiring intensive manual labour, it is unsurprising that older people would experience declines in output. Researchers have documented that the productivity of workers in automobile manufacturing has been found to decline around age 60, although older workers are also found to make fewer mistakes [33]. Multigenerational teams (which include older people) in the automotive industry have actually been found to be more productive than single-generation teams.

Figure 5: Age structure of the workforce, including informal carers, adjusted for full time equivalence (FTE)



Source: Author's calculation based on [31].

Alternatively, jobs requiring less physical exertion may benefit from additional years of experience where skills continuously improve with age [34]. Research from the French manufacturing sector suggests that one reason some older workers – particularly in low-skilled occupations – may be less productive or choose to exit the workforce is that they may be systematically given less access to training on how to use new technologies than comparable younger workers, placing them at a disadvantage that can be linked more to ageism or discrimination than to inability at older ages [35]. Even if older workers are slightly less productive, they are still able to make a positive contribution (compared to if they are not working) and can help achieve higher overall economic output.

Many older people participate in unpaid work, producing outputs that have clear (but often unrecognized) economic or social value

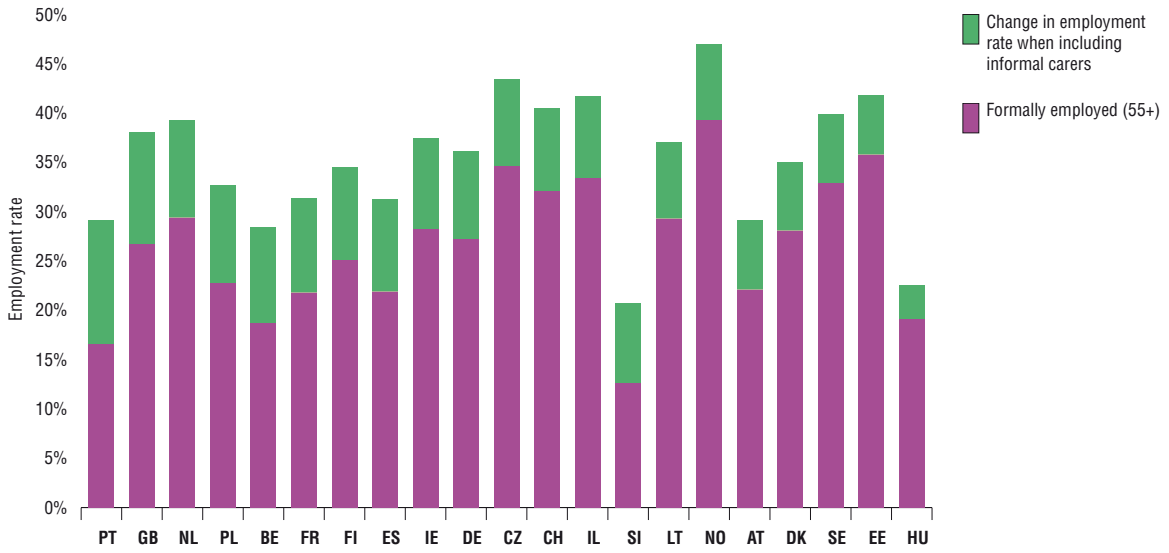
There are similarly many unpaid workers (as well as paid workers who also take part in some additional unpaid work), particularly at older ages, producing outputs that have economic or social value. To understand how productivity (as well as the sustainability of the welfare state) is affected by demographic change, it is important to take stock of these non-market-based outputs in addition to those which are monetized and thus more directly observed. Accounting for unpaid household labour, for example, can reveal that the per person costs of caring for children (which are often unmonetized and borne by households) are actually greater than the costs of caring for older people (which are more often borne by society) [36].

One of the most relevant forms of unpaid work is informal caregiving. Using the ESS data, we examine the age structure of the workforce in Europe, distinguishing between paid workers, full-time informal carers and part-time informal carers, and those involved in both paid work and informal care, to obtain a more complete picture of the paid and unpaid workforce (Figure 5). The data are adjusted for full-time equivalence (FTE) based on self-reported hours providing care. Here, we see that at younger adult ages there is a substantial share of the population which is both in paid work and also providing part-time informal unpaid care (up to 30 hours per week). We also see by 5-year age group that the number of people doing full- or part-time informal caregiving increases sharply at around the same ages where we see a large decline in those undertaking paid work. The increase in work participation rates if we were to include informal carers is most evident over age 65.

National income estimates (and associated employment rates) underestimate useful economic activity, and this problem will get worse if the numbers carrying out unpaid work increase with population ageing. We constructed employment rates for the 55+ population in European countries that account for both paid and unpaid work. Among the population aged 55+, without including informal carers, the ESS 2014 data suggest, for example, that 16.6% of people in Portugal were working [31] (Figure 6). However, after including unpaid caregiving, this number jumps to 29.2%. Data suggest that there are fewer older people providing informal care in Nordic countries (i.e. primarily to the right of Figure 6) and more providing informal care in Southern and Eastern Europe (i.e. to the left of Figure 6), although there are clear exceptions. This is consistent with evidence of a North–South gradient within Europe in the response of adult women to their parents' care needs following an adverse health shock [38].

Since paid and unpaid work both represent useful economic activity, and there is likely to be an increase in the numbers available and willing to undertake unpaid work as people age and leave the formal labour market, failure to take account of unpaid work is likely to exaggerate the impact of ageing on the need for financial support for care. This may be particularly true in countries where the tradition of caring for older people is within families. It also distorts

Figure 6: Participation in paid employment and full time equivalent (FTE) informal caregiving among the 55+, selected European countries



Source: Author's calculation based on [31].

Notes: Sorted by size of workforce in informal caregiving.

Box 3: Accounting for the monetary value of informal care

There are two common methods to monetize informal care – revealed preference and stated preference [39–45]. Using revealed preferences, unpaid work is valued at hourly wages for similar paid work or for work that the carer might otherwise have done. Stated preference approaches use methods such as choice experiments to determine the value of the work done [41].

Results vary for each methodology, but in all cases suggest that there is substantial value in unpaid work. A study in Spain found that using a proxy wage, the total value of informal caregiving ranges from 2.96–6.23% of GDP; using the opportunity cost method, it ranges from 2.18–2.75 % of GDP; and using contingent valuation, it ranges from 1.73–3.43% of GDP [40]. One study looks specifically at valuing care provided by older people [46]. Using 2006–2007 SHARE data, the authors find that nearly a third of respondents act as unpaid non-co-resident carers (9768 out of 29 471). Based on a subjective well-being valuation method (where the value of care is estimated based on carers' life satisfaction ratings), the authors find that less intensive caregiving improves life satisfaction (the equivalent essentially of a negative wage rate) but that this is not the case for more intensive care (i.e. over 30 hours per week), which is more demanding and therefore should be more highly valued. This reinforces the idea that informal caregiving, especially if it is difficult, is not without cost. This also suggests that it is important to provide paid care support to help mobilize unpaid work and avoid excessive costs on informal carers.

the comparisons of GDP and employment rates between different countries.

Older people who are able to provide informal care to more dependent older people, or, for example, who are able to care for grandchildren, may also allow adult children who would otherwise be providing care to work in paid employment. Mothers' employment has been found in some countries to be positively and significantly associated with grandparents providing childcare [37]. It is also interesting to note that female employment may increase more generally due to declining fertility rates, as there are fewer children to care for. In addition to knock-on effects of informal caregiving on the formal employment rates of adult children, there is a need to account for the value of informal work more generally to understand its contribution to GDP (see Box 3).

3. What are the implications of population ageing for the acceptability, equity and effectiveness of financing care and consumption?

In the sections above we looked at the health and long-term care costs of older people as well as at how they benefit the economy and society through paid and unpaid work. In this section we begin to examine how politically acceptable, equitable and effective financing mechanisms are, by looking at the extent to which older people are directly 'dependent' on the financial support of working-age people and on public transfers. This continues the analysis that forms the basis for the conceptual framework in Figure 1.

Box 4: Accounting for health and disability in the old-age support ratio

Simply put, people 'age' at different rates and the fact that someone is above a particular age threshold does not mean they are necessarily 'dependent'. Demographers have made great progress in developing indicators that account both for changes in life expectancy and changes in disability when calculating support ratios [48]. One option is the prospective old-age dependency ratio (POADR), defined as the number of people in age groups with life expectancies of 15 or fewer years, divided by the number of people over age 20 in age groups with greater than 15 years of life expectancy. The POADR has generally been shown to increase less rapidly than the regular old-age support ratio over the coming years. In Western Europe, for example, while the proportion of the population over age 60 is expected to increase from 21% in 2010 to 46% by 2100, the proportion of people with fewer than 15 years of life expectancy remaining is only expected to increase from 13% to 19% by the end of the century [49].

Another option is to adjust for disability, since it is disabled people who typically most require support. The adult disability dependency ratio (ADDR) is defined as the number of adults at least 20 years old with disabilities, divided by the number of adults at least 20 years old without them. Disability can be defined, for example, based on activity limitations, while the relationship between disability rates and mortality, as well as disability rates across ages, can be modelled. Estimates from the United Kingdom suggest, for example, that while the regular old-age dependency ratio will increase from 27% (2005–10) to 41% (2045–50), the ADDR will stay unchanged at 10% during the same time period.

Those who are in paid work are typically young and middle-aged adults, producing labour income above the amount they consume, whereas those not in the labour force, including many older people, consume more on average than they produce contemporaneously through paid labour. Some societies may be reluctant to finance older people's care or, more generally, to pay for their consumption. This raises important questions about who actually bears the costs of supporting older people; what the redistribution mechanisms to do so are; and what may be the overall impact on long-term financial sustainability. While in the case of public transfers it appears that those receiving pensions and benefits are directly supported by the current working population (although the pensioner may have paid over long periods for the right to a pension), people living off savings or private pensions can be considered to be living off postponed spending. While there remains debate about who really pays for the incomes of those who are not in paid employment, a clear difference between those who fund their own incomes and those funded on state pensions is the effect on public finances and the need for public transfers.

The size of the 'dependent' population depends on how it is measured

The old-age dependency ratio (also referred to as a 'support ratio') is a common indicator used to reflect the extent of necessary support of older people by others in the population. These indicators often aim to compare the ratio of the 'non-working' population to the 'working' population by relating the size of the population above a pre-determined chronological age (considered not to be working and to require 'support') to the adult population below the pre-determined age (who are considered to be working and thus 'supporting' them). For example, one could calculate the ratio of the population size over 65 years to the population size 15–64 years and express the ratio per 100 working-age people (e.g. 30 older people for every 100 of working age). The age threshold is often 65, which appears to be chosen because it is somewhat consistent with official pension ages.

One limitation of this measure is the assumption that older people above a certain age are out of work, requiring and in receipt of external financial support, while younger-age adults are assumed to be economically active and contributing into support systems (either formally or informally). In fact, there is considerable variability in terms of normal retirement ages (i.e. the official age at which an individual can retire with a full pension) and average effective retirement ages (i.e. the age of exit from the labour force), both across countries and within countries across time, as well as between men and women. For example, according to the most recently available OECD data, in South Korea, men work on average 11.0 years beyond their normal retirement age, whereas in Slovenia men leave the labour force on average 5.4 years before their normal retirement age. Women in South Korea work 11.2 years longer, while women in Poland leave the labour force 7.2 years before normal retirement age [47].

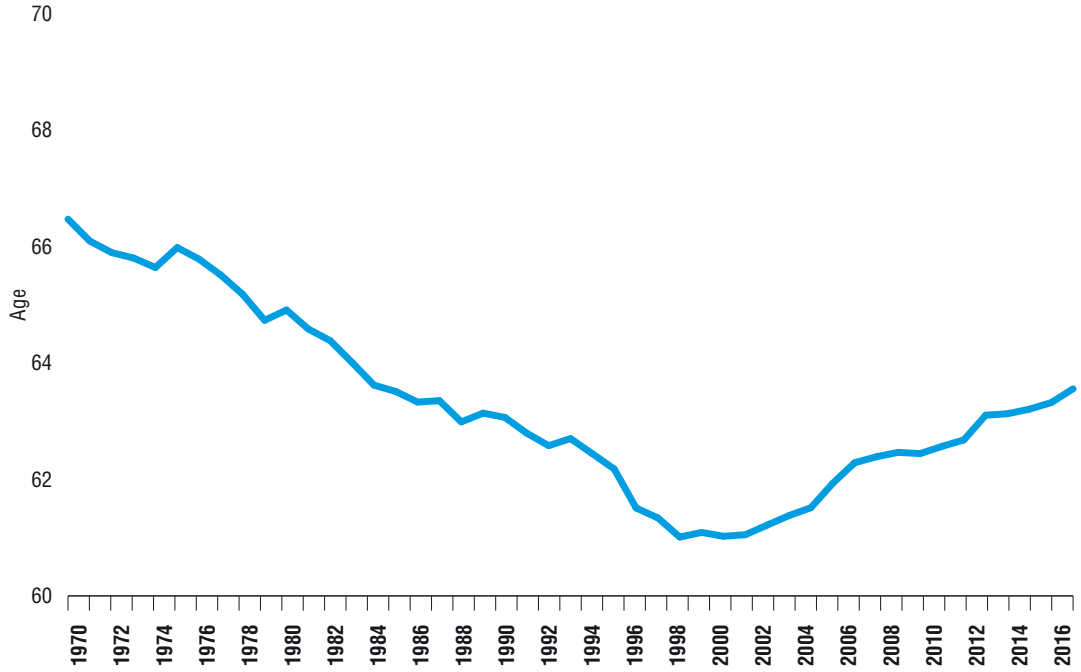
Data from 1970 to 2014 also suggest that across countries, people have been leaving the formal labour force at progressively earlier ages over time, with a slight reversal to that trend in recent years (Figure 7). The OECD-34 average retirement age for men in 1970 was 68.4 years, but this fell to a low of 63 years by 2004 before slowly rising again to 65.1 years in 2016.

In reality, using any single age threshold for the support ratio will mask the fact that many people above the age threshold remain in the workforce, particularly in low-income countries, and many other older people who are not in the workforce are economically independent, are not a burden on the state for their incomes and pay tax on asset-based income and pensions. Likewise, not all younger people below the age threshold are economically active; for example, as of May 2017, seasonally adjusted EU youth unemployment (under 25 years) was 16.9% according to Eurostat. Increases in working-age unemployment rates 'effectively' increase the ratio of those who are genuinely dependent to those who are supporting them. This is a particular problem given high levels of youth unemployment in many countries – but has no effect on the support ratio metric itself.

There are alternative and better approaches to measure the old-age support ratio

Fortunately, there are alternative measurement approaches to the support ratio, which provide more useful information. In essence, the old-age support ratio seeks to answer an important policy question: will the older portion of the

Figure 7: Average retirement ages among men in OECD-34 countries, 1970 to 2016



Source: Author calculations based on [47].

population become so large that it is unsustainable to continue to support it in the same way as before? The challenge is determining how most accurately to capture the comparison between the size of the population requiring support and the size of the supporting population. There are additional caveats to consider, including the fact that the supported population may be supporting itself to some extent through its own taxes, providing informal care for other people requiring support, or through income from savings and assets. Two alternative approaches attempt more properly to account for changes in population health and disability, and for changes in the number of consumers and producers (see Boxes 4 and 5).

Paying for the consumption of older people in European countries

It is clear that there are difficulties understanding the degree to which societies will need to provide financial support to older people in the future, both to deliver services for them and to ensure income security. To explore this further, we review data on consumption levels (including consumption of services provided free at the point of use) by age, and how that consumption is currently paid for across countries. Sustainability may depend both on the levels of support needed to maintain consumption levels and the mechanisms used.

Figure 8 shows that there are variations in per person consumption expenditure (which includes health and long-term care) by age across a wide selection of countries. Consumption in these data also includes some services that may not be paid for at the time, such as housing, which in many cases is paid for earlier in life but consumed over the life course. In some countries, consumption levels stay relatively constant throughout adulthood, while in others consumption increases significantly at older ages. For example, in Sweden per person consumption at age 65 was just over half of the labour income of a 30-49-year-old working-age person. However, for those at age 80 it increased to nearly 80% of working-age labour income, and by 90+ it was over 130%.

In nearly all of the 59 countries with data available, per person consumption is greater for older people than for children, the other age group whose consumption on average exceeds their own labour income. However, private spending, rather than public spending, largely drives this pattern. This is because, while children generally have no history of paid income or assets on which to draw, some consumption of older people is financed through their own private assets and savings. This in part enables older people to consume at higher levels overall. Public spending on consumption is greater per person for children than for older people in all but 14 countries (Australia, Japan, Taiwan, Cambodia, India, Costa Rica, El Salvador, Canada, United States, Finland, France, Germany, Sweden and the United Kingdom). In many of these countries, having a relatively smaller share of children in the population (assuming fertility rates are and remain low) could partially offset the total public financial burden associated with a larger older population.

Consumption by older people is financed in a variety of ways, including through continued work, assets (e.g. spending down savings and income from investments), pensions, family support and other private transfers and public transfers (e.g. health and long-term care); pensions and public transfers are of course funded in part by taxes generated from labour income. In Europe, the majority

Box 5: Accounting for the number of consumers and producers in the old-age support ratio

Alternatively, we can also gauge the level of 'dependency' by accounting for the actual numbers of consumers and producers in the old-age dependency ratio. This can be calculated by taking the population at each age group and weighting by average labour income and consumption at that age.

This option aims more thoughtfully to quantify both the economically dependent population and the economically active population. Data from the National Transfer Accounts (NTA) can be used to relate the effective number of consumers in the population to the effective number of workers [50–52]. This is done by taking the population at each age and weighting it by average labour income or consumption at that age (where those aged 30–49 are considered to be the 'baseline' effective producer or consumer). Such an approach incorporates age-specific variation in labour force participation, unemployment, hours worked and productivity, as well as age-specific variation in needs or wants according to consumption data.

This type of support ratio also yields a second indicator, referred to as the first demographic dividend, and calculated as growth in the support ratio itself. The demographic first dividend is intended to reflect the effect of population change on economic growth that results from changes in the concentration of the population at working ages. That is, if the effective number of producers is growing more slowly than the number of consumers (i.e. a negative first dividend), economic growth will be slowed as a result.

In the United Kingdom, for example, since approximately the turn of the 21st century, there has been a decline in this support ratio (i.e. an increase in consumers relative to producers or, alternatively, a reduction in producers relative to consumers), which is expected to continue through the end of the century. The first demographic dividend calculations reveal the direct impact of this on economic growth, showing that ageing is expected to slow economic growth by as much as 0.6 percentage points per year around the year 2025.

The advantage of this approach over the regular old-age support ratio is that it does not dichotomize those who need support and those who provide support according to being above or below a pre-determined (and largely arbitrary) age threshold. However, not all consumers are still necessarily in need of or in receipt of financial support from producers since they may live off asset-based income or by spending private savings. Also, such an approach says nothing of whether consumers are in need of support because they are in poor health and cannot support themselves. Since the data are based on baseline cross-sectional per person consumption and labour income estimates, estimates of this support ratio and first demographic dividend over time do not capture cohort effects (e.g. differences in savings rates across cohorts), which could have substantial yet unmeasured effects on the need for financial support among older people in the future.

of consumption among those over age 65 is funded by public transfers (Figure 9), whereas in other regions, such as Latin America and the Caribbean, only around half of consumption is funded by public transfers (though this masks differences by country, such as in Brazil, where public transfers play a major role). In Cambodia, China, Taiwan and South Korea, familial support is very important to finance consumption at older ages, whereas in India, South Africa, Indonesia and Thailand, there is somewhat more reliance on asset income.

These data cannot tell the full story. Since they aggregate all people over the age of 65, they do not distinguish between patterns in the 'young old' and 'old old', or between the richer and poorer. Moreover, because demand for health and long-term care increases in the last years of life, which in some countries will have major implications for public transfers, patterns may vary between those of the same age at some distance from death and those more proximal to it. Overall, while there is a general trend that consumption expenditures increase at older ages in many countries, it is important for policy-makers to better understand the magnitude of the increase in spending, the patterns across the population, and the extent to which older people finance their own consumption or rely on government, before taking actions that reduce access to public funds for all older people in an attempt to increase sustainability of the welfare state.

It is not only the levels of support that may be important for sustainability but also the mechanisms used and the perceived fairness of these. Countries that rely on payroll-based contributions to fund health and long-term care may see increasing costs paid by a shrinking workforce, whereas systems that use revenues from a broader base, including taxes on consumption, will spread the burden across those with higher income and consumption, which includes some older people. Entitlements to services or pensions based on earlier contributions may be considered fairer than other public or private transfers. It is useful to understand both the overall level of transfers and the tools used to achieve these.

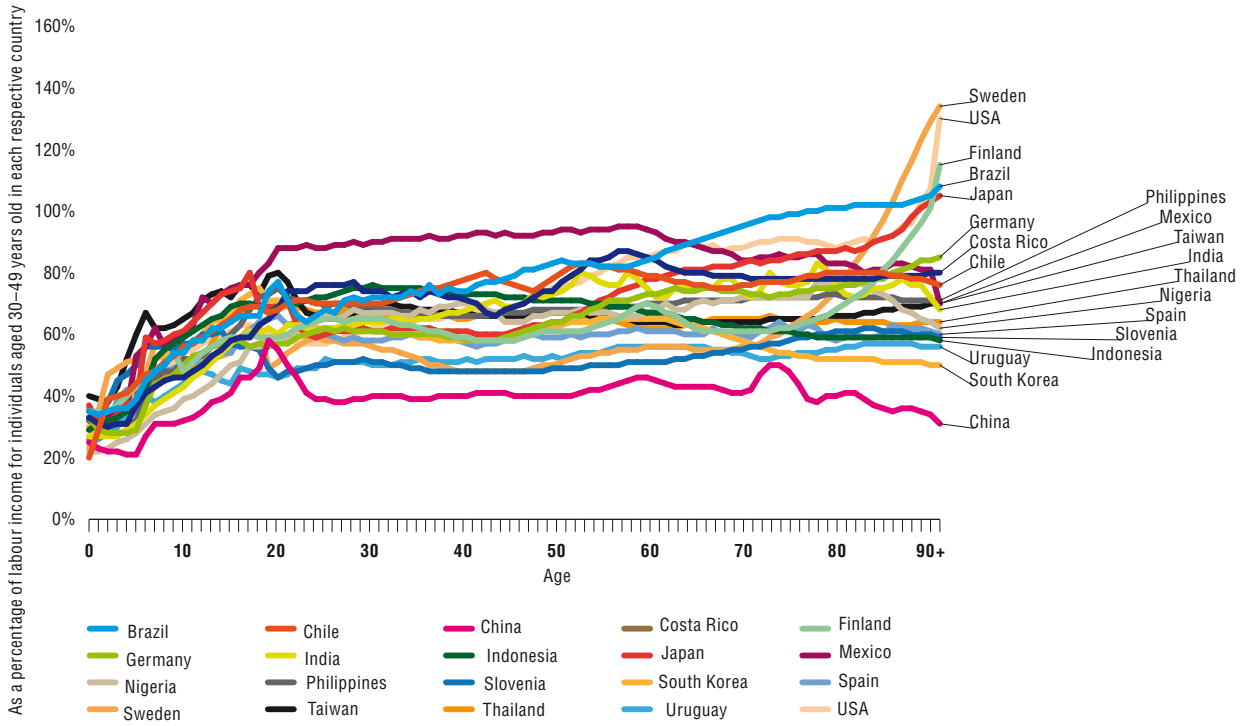
Where older people hold considerable asset wealth, this can also contribute to economic growth

It is worth noting that the savings and assets (i.e. formal pension and life assurance systems, or private savings and investments) accumulated by people to finance their consumption at older ages may also indirectly lead to economy-wide productivity growth if the savings and assets translate into increased capital investment. Given slower labour force growth and lower fertility, this can lead to increased capital per worker and, ultimately, to greater productivity and economic growth [53].

In the United Kingdom, for example, older people's assets are estimated to contribute positively to economic growth, adding between 0.6–0.8% to GDP growth annually throughout the 2010s [53]. If the period of retirement gets longer and the working life stays the same, then the need for savings will increase and investment will also increase. Longer working lives and shorter retirement duration reduces the need for saving. The key point is that saving for retirement can have macroeconomic effects through the availability of capital and the effects on labour productivity.

People who are in poor health accumulate fewer assets during the life course because they have shorter life expectancies, lower earnings and higher out-of-pocket health care costs [54]. Improving health can therefore both increase the extent to which people can save for retirement and reduce the costs of care.

Figure 8: Per person consumption by age, selected countries



Source: [51,52].

Note: Data are made comparable by dividing by the simple average of labour income for individuals aged 30–49 years old.

Older people continue to contribute tax revenues

Despite some degree of self-financing in some countries, a key concern is the potential increase in the need for financial transfers from the working population to the non-working (retired) population. If the *de facto* retirement age remains constant and life expectancy increases, there will be a need for increased transfers. Projections are made of the impact on public finances through changes in taxation and public transfers (the fiscal support ratio). Without changes in policies, the ratio of tax revenues to transfers will increase in Africa and South and Southeast Asia but will fall in East Asia and Europe (see Table 1).

These projections do not take account of possible policy actions that might improve health and increase employment in older ages. Public finances also depend on other policies that encourage private saving for retirement. Since taxes are raised on incomes, asset transactions, consumption, wealth and profits of business, trends in future revenues will depend on the structure of the tax system. Countries with a high dependence on payroll taxes and labour-related charges are likely to see falling revenues if the numbers of employed fall. This suggests that the mechanisms for raising taxes fairly may have to adapt to fewer people being employed and more people being supported on pensions and income from savings.

Considerable public revenues are still likely to be generated from older people through some forms of taxation. Older people who are not in paid work continue to pay taxes on incomes, consumption and property. As shown in Figure 10, tax revenues generated from purely non-income sources (as a proxy for non-labour-related sources) comprise around 30% to upwards of 50% of tax revenues in OECD countries.

Therefore, while older people may contribute less towards the public sector than working-age people on average, older people may finance a considerable portion of the public purse through taxation. Data on the share of public revenues contributed by older people could itself be regularly reported to better understand the dynamics of revenue generation and population ageing [46].

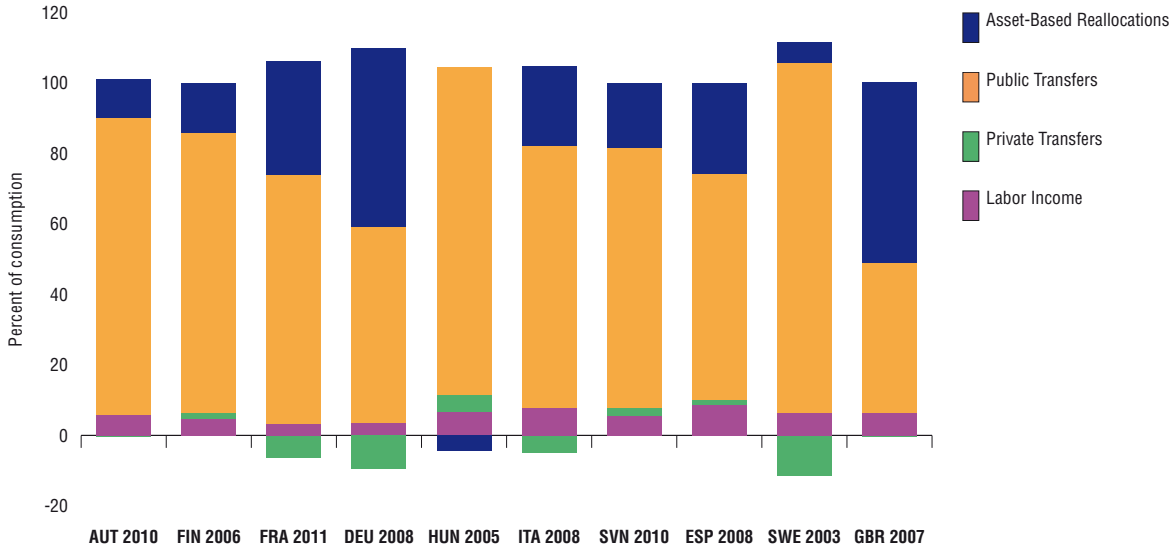
Evidence is needed on the implications of further broadening taxation beyond labour income to take advantage of revenue generation potential from older populations. Research from Japan, for example, suggests that, while demographic shifts will deleteriously impact

Table 1: Fiscal support ratios, by region

	Fiscal support ratios (projected tax revenues relative to public transfers as % values in 2015)		
	2035	2055	Difference
Africa	110	117	7.6
East Asia and the Pacific	87	77	–10.1
South and Southeast Asia	109	114	4.7
Latin America and the Caribbean	94	83	–11.0
Europe	85	78	–7.1

Sources: [51,52].

Figure 9: How consumption is financed for people over age 65 in selected European countries



Source: [51,52].

Note: Negative shares (mainly for net private transfers) mean that older people give more financial assistance to others (e.g. to their children) than they receive.

public finances under current law, changes to public financing such as broadening the tax base (including some increases in consumption taxes), in addition to some reductions for social security benefits, would improve sustainability and be beneficial for economic welfare [56]. However, distortionary effects from consumption taxes could be detrimental to overall welfare. The extent to which these sorts of changes to financing systems are beneficial, as well as feasible from economic growth, political and equity standpoints should be considered.

4. The policy options: How can decision-makers respond to population ageing?

The conceptual framework for the policy brief depicted in Figure 1 identifies four main types of policy interventions that will contribute to healthy and active ageing, as well as economic and fiscal sustainability, in the context of demographic change:

I. ***Policies to promote healthy and active ageing*** (**Intervention 1**).

II. ***Policies to promote cost-effective health and long-term care interventions*** (**Intervention 2**).

III. ***Policies that support paid and unpaid work*** (**Intervention 3**).

IV. ***Policies to support acceptable, equitable and efficient funding and income transfers*** (**Intervention 4**).

The evidence presented here shows that, while ageing presents challenges, the pure effects of ageing are often exaggerated; they are more glacier than avalanche [57], and many of the problems are amenable to policy interventions. A better understanding of the effects of ageing, and of the extent to which policy actions can lead to sustainable outcomes, provides a basis for maximizing the benefits and minimizing the costs associated with ageing.

Policies should aim to reduce needs in older people (or slow down the increase in needs), manage those needs efficiently, and maximize the contribution that can be made by older people. It is also clear that some of the policy focus should be outside the conventional health system. In the following sections we review some of the policy options and where available, evidence of effectiveness.

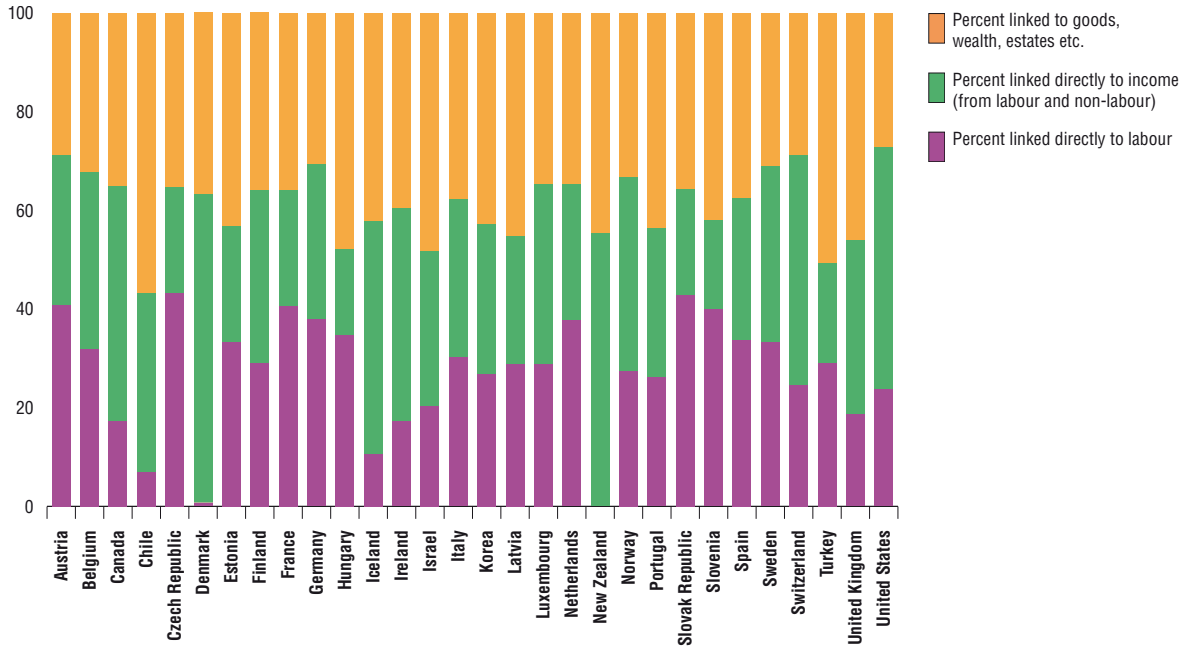
I. Policies to promote healthy and active ageing (Intervention 1)

Health promotion and prevention interventions at older ages are important to promote successful, healthy and active ageing. In this section, some effective actions to promote healthy behaviours throughout the life course and at older ages are outlined, followed by an overview of prevention interventions that aim to prevent or slow disease progression or delay care dependency.

Health promotion and disease prevention throughout the life course and at older ages by targeting behavioural risk factors

There is considerable research on how to achieve successful, healthy and active ageing [58,59]. In the United States, for example, data suggest declines in disability at older ages between the 1980s and early 2000s were driven in part by declines in heart and circulatory conditions, many of which are preventable by tackling risk factors such as high blood pressure, smoking, excess alcohol use, obesity, unhealthy diets and sedentary lifestyles [20,60]. Indeed, the WHO estimates that lifestyle changes linked to these risk factors could reduce the disease burden in people aged over 60 by more than half [61].

Figure 10: Share of tax revenues by source, OECD countries, 2015



Source: [55].

There is growing evidence that adopting healthier lifestyles can have important health effects even when behavioural changes are adopted in later life. For example, there is good evidence that those who quit smoking at age 65 live longer lives [62] and have lower rates of pulmonary conditions, cardiovascular disease risk and mild cognitive impairment than those who continue to smoke [63]. Extensive research has also linked increased physical activity in older ages with lower hazard of disability and improved balance, mobility, cognition and wellbeing [64–66].

Despite clear evidence on the importance of maintaining healthy lifestyles at older ages, there is less understanding on how to effectively establish behaviour change in older adults. To a large extent, this is due to a scarcity of interventions tailored towards older people, reflecting the relative lack of importance placed on promoting health in older adults compared to other age groups [67].

However, despite a small evidence base, there is some research available on effective strategies to promote behavioural change in older adults. A systematic review on smoking, for example, reported that provision of cessation medications (nicotine patch or gum, bupropion or varenicline) significantly reduced smoking rates in older adults in the United States, with increased effectiveness when combined with behavioural counselling [68]. A review by Kelly et al. also found some evidence that intensive, multifaceted interventions involving personalized feedback, physician advice, educational materials and follow-up may be effective in reducing excess alcohol consumption in older adults [69]. Similarly, there is emerging evidence from a number of countries that walking groups [70] and use of pedometers [71–73] are effective at promoting long-term walking and step-counts among older adults, although it is not known whether this level of activity will result in health benefits.

Research also shows that despite low priority often being given to prevention in many health systems, there are cost-effective strategies. In particular, 'best buy' interventions that target population-wide behavioural changes, including restrictions on advertising, regulations on the availability of tobacco, alcohol and unhealthy foods, and taxes and other fiscal measures that influence the costs of different behaviour choices, are often shown to be highly cost-effective [74]. However, there is currently less understanding of the cost-effectiveness of strategies at the individual or community level, making this a necessary area for further research. A key challenge overall is to identify the main behavioural risks threatening the health of the next cohorts of older people and implementing corresponding cost-effective preventive strategies.

Preventing or slowing disease progression

While preventing disease by health promotion and disease prevention has been shown to be effective and cost-effective in many instances, better management of chronic conditions and earlier intervention to prevent disease progression can also be cost-effective. Since the majority of people in older age have two or more chronic conditions, much can be done to improve the care of these illnesses to prevent disability and dependency through effective management of non-communicable diseases (NCDs) and related medical risk factors. Extensive literature from the United States has demonstrated that lifestyle modifications for older people related to smoking, diet, physical activity and alcohol intake can be effective at improving glycaemic control in people living with diabetes [75,76], lowering high blood pressure [77,78] and secondary prevention of

recurrent cardiovascular events such as heart attacks and strokes [79,80].

Secondary prevention and rehabilitation delivered through health services also play a key role in reducing dependency in older adults. This includes age-appropriate use of effective and cost-effective medications, such as aspirin or oral anticoagulants (e.g. warfarin), to reduce recurrence of strokes, and anti-hypertension therapies, including ACE inhibitors, to lower blood pressure [81,82]. Nevertheless, although effective treatment and lifestyle strategies are available, it can often remain challenging for older patients to adhere to NCD management, in particular for those with multiple chronic conditions and cognitive decline.

To assist older patients in managing NCDs, it is becoming increasingly common for primary care to use multifaceted self-management programmes that provide education and support to patients to enable self-titration of medicines and self-monitoring of symptoms. Randomized controlled trials (RCTs) have shown that self-management can effectively improve health behaviours, lower blood pressure and improve the health status of individuals with previously diagnosed heart disease, lung disease, stroke and arthritis [83,84]. Self-management is sometimes supported by the use of interactive digital interventions (IDIs) that afford patients access to detailed, personalized feedback and allow health professionals to remotely monitor patients' conditions. Meta-analyses have shown that these are effective at improving asthma [85] and hypertension [86] control, although more evidence is needed on their cost-effectiveness and effectiveness for older adults.

Preventing cognitive decline

A key focus to prevent care dependency should be on preventing cognitive decline. There is some evidence that taking a multidomain approach can improve or maintain cognitive function. For example, a Finnish randomized study (known colloquially as 'FINGER') to prevent cognitive impairment and disability with interventions in diet, exercise, cognitive training and vascular risk monitoring found that cognitive functioning either improved or remained constant [87].

A growing body of evidence also indicates that computerized brain-training programmes may be effective in delaying cognitive decline. The ACTIVE clinical trial, for instance, randomly assigned US participants aged 65 years or over to receive memory, reasoning or processing speed training [88]. After 10 years, ACTIVE found that intervention participants reported fewer declines in IADL than controls and had improved reasoning and speed, but not memory [88]. Similarly, three other RCTs determined that intervention participants had improved memory and processing speed compared with controls [89]. Although computerized training represents a potentially effective avenue to prevent cognitive decline, it is still unclear how frequently brain training should be undertaken and how the reach of programmes can be expanded, particularly in hard-to-reach older adults.

Preventing falls and reducing frailty

Resistance training or other interventions promoting physical activity at older ages may be effective to prevent or reduce frailty [90,91]. A wide body of evidence has explored the impact of exercise programmes on reducing falls in older people. A notable and much researched fall prevention intervention is the Otago Exercise Programme, which consists of muscle strengthening and balance training delivered by trained professionals. Research has shown the programme to be cost-effective, reducing falls and fall-related injuries, particularly in the oldest age groups, and the programme has been successfully adapted internationally to a variety of care settings [92–95].

In general, research suggests that exercise is likely to be more effective in preventing falls than other strategies such as removal of environmental hazards or assistive technology in homes [96]. However, this may depend on the type of exercise undertaken and the intervention setting. For instance, a systematic review determined that Tai Chi reduced risk of falls, but only in those at lowest risk of falling, while exercise more generally is effective in preventing falls in community-based settings, but the impact in care homes is less clear [96].

II. Policies to promote cost-effective health and long-term care interventions (Intervention 2)

While most estimates suggest that ageing *per se* will increase health care spending, the effects are small and manageable. The large increases in health care expenditures have been shown to be driven mainly by adopting and paying for new treatments and services, and widening access to existing treatments. Much of this is highly desirable, but many new services have been included without full evaluation of their usefulness or cost-effectiveness. An important step is to ensure that these choices to include services in entitlements to care are cost-effective, and in particular that they are cost-effective for those people who are offered them. Many treatments have not been properly evaluated for use in older people (who are often excluded from trials and studies) and may not be cost-effective for people with multiple chronic conditions. The rising costs from adopting new treatments and widening access are not really costs of ageing but rather the costs of decisions to pay for additional services.

A key question for the financial viability of health systems in the context of population ageing is therefore whether future health care provided to older people becomes more expensive relative to younger people. If there is a substantial rise in per person spending on older people relative to younger people, this will become a major driver of expenditure growth and will undermine sustainability. A number of policy options are, however, available to contain ageing-related health care expenditure growth. Some of these options include greater use of innovative cost-effective technology; increased integration or coordination of care; and incentives to provide rational care towards the end of life.

Use of technology for efficiency gains

Achieving efficiency gains in care for older people is difficult given the high labour intensity involved compared to care for younger people [97]. Nevertheless, better use of technology can help dampen these so-called Baumol effects and reduce the overall cost of medical treatment for older people [97,98].

Making greater use of information and communication technology (ICT) services can help improve efficiency of long-term care delivery. This may be through the use of electronic health records or e-commerce across and within care settings to improve care coordination or the use of telemedicine to support delivery of remote health care. The use of telemedicine in particular is being increasingly adopted to enable medical professionals to provide timely assessments, support and advice to frail older people and their carers. However, although evaluations have suggested that telehealth may be an effective approach for improving care management for older adults with long-term conditions [99,100], there is little evidence to show it is cost-effective [101,102]. Use of assistive technologies, such as digital memory aids or automated medication dispensers, to support older people to live independently for longer have also been shown to improve the quality of life and health outcomes for older people, although there is little evidence available on cost-effectiveness [103].

Overall, there is limited understanding of the incentives to use technological innovations for the treatment of older people and the efficacy of technologies in general, particularly in long-term care settings [98]. Further work is needed to assess the use of innovative technologies, supported by health technology assessment (HTA), for the treatment of older people, including their potential to contain health care expenditure growth. This is especially important as the adoption of innovative technologies in long-term care is becoming increasingly viable as new technology costs fall.

Integration of health and long-term care and other service delivery models

There has also been widespread interest in new models of care delivery, particularly given the complex care needs of older populations. One such approach (really comprising many different approaches) is to harness the expertise of providers in both the health and long-term care sectors by integrating care in an effort to improve quality of care and, ideally, improve efficiency [104].

Integrated care can take many forms and is understood in many ways. However, a distinction can be made between three types of integration, ranging from full integration comprising complex mergers of organizations, to increased coordination between professionals and teams, and finally to linkage where organizations develop protocols and procedures to improve referral and management of patients' needs [105]. Integration can be horizontal and take place between providers working at the same level or vertical between providers working at different levels.

There are many varied examples of delivering coordinated or integrated health and long-term care. One example of organizational integration can be found in Torbay, England, where multidisciplinary teams from health and social care have been brought together in community hospitals [106]. These integrated teams have been given control of pooled health and long-term care budgets to support older people at risk of hospitalization to remain independent for longer. It is estimated that increased integration in Torbay created savings of £250,000 in the first year; increased access to intermediate care; and led to a 24% fall in emergency bed day use for people aged 75 years and over [106]. There is other evidence that case management targeting frequent emergency room attendees can be cost-effective and reduce unnecessary and expensive hospital utilization [107].

A number of countries have developed approaches to provide coordinated home care, to help delay admissions to hospitals or nursing homes. A notable example is the Buurtzorg ('care in the neighbourhood') scheme in the Netherlands, initiated in 2007 to enable district nurses to provide integrated home care with support from social services, general practitioners and other providers, while encouraging links with informal carers [108,109]. The model has resulted in higher levels of satisfaction for both patients and health professionals, and has contributed to lower admissions to hospitals and nursing homes. Due to its success, the model is currently being adapted to settings in Minnesota, Japan and Sweden [109].

Developing defined pathways of care is a common approach to care linkage. One example of a defined pathway is discharge planning, which is designed to promote the safe and timely transfer of patients from one care setting to another [110]. Systematic reviews have found that discharge planning tailored towards individuals can reduce length of hospital stay and may increase satisfaction of patients and health care professionals [111], while comprehensive discharge planning with individualized follow-up is more effective at reducing readmissions than other interventions [110]. These findings suggest that appropriate and individually tailored discharge planning may reduce delayed transfers of care and hospital admissions, although neither review cited here was able to draw conclusions on cost-effectiveness.

Addressing incentives for expensive care for older people towards the end of life

On all plausible assumptions, the needs for and costs of long-term care are likely to experience a large percentage increase (albeit from a low base). This should be affordable since the absolute amounts are quite small, but nevertheless there is a need to look carefully at how resources are used. For example, in many countries, financial incentives lead to too many people being cared for in nursing homes, and it is often difficult to access support that helps families to keep relatives at home. While costs are likely to rise, the increase might be contained with better value being found for the resources employed.

Health care costs near to the time of death are an important driver of higher health care expenditures among older people. This is a politically sensitive topic. While it is important not to deny people effective services based on age or ill health alone, it is equally important not to subject people to treatment that is expensive, distressing and unlikely to bring benefits – over-treatment can be as bad as under-treatment. It is widely accepted that people should be allowed to die with dignity. One challenge is the lack of consensus in terms of what it means to have a 'good death'.

Policy interventions which provide incentives for providers to offer appropriate end-of-life care are needed. There is now good evidence that supporting better treatment and care choices near the end of life can reduce the use of unnecessary treatments and tests, lower costs and improve the experiences of both patients and carers [112] – and, in

some cases, this can also achieve longer survival [113]. This has been shown to be particularly effective when patients have complex multimorbidity [114]. As the proportion of people approaching the end of life with complex diseases increases, there will be scope to achieve better outcomes and lower costs with better choices. Some of the reasons for over-treatment are driven by financial incentives, with it being common for more expensive services to be included in entitlement packages, while lower-cost support may not be. There might be scope to achieve better outcomes and lower costs if more rational structures and incentives were put in place to support people with complex needs and those near the end of life [115].

III. Policies to support paid and unpaid work (Intervention 3)

Keeping older people active and working – paid, unpaid or a mix of both – is a key economic and fiscal priority. Whether a person continues to work in older age depends on both personal and broader contexts: personal circumstances and preferences, adaptability of the work environment to the specific needs of older people, employer and employee attitudes to work and productivity at older ages, as well as rules regarding pension ages, will all play a role. Unpaid work is important in sustaining the availability of paid workers (through, for example, providing unpaid child care) and directly provides useful inputs into a wide range of community and care services. In the case of providing care for dependent relatives, the availability of unpaid workers often depends on supporting the caregivers. This may be in the form of financial allowances to meet costs, respite support and paid caregivers to supplement those providing the unpaid work. In this section, we review interventions to support working at older ages, including workplace interventions to promote health and productivity, retirement and pension policies, and interventions to support carers and those combining care responsibilities with employment.

Workplace interventions to enable people to work longer

Researchers find convincing evidence that health problems are a major reason people exit the labour market at all ages [116], with a 'health shock' after the age of 45 especially likely to lead to labour market exit, although the magnitude of the effect varies considerably among European countries [117]. There is evidence from England, however, that older people who are in good health are more likely to 'unretire' and participate in the workforce at older ages than those who are unhealthy [118].

There is growing recognition that workplace health promotion interventions, such as screening activities to identify potential health risks and lifestyle management activities to improve health and health behaviours, can keep older workers healthy and productive [119,120]. Some countries, most notably those in Central Europe, have responded by developing national policies to support workplace health promotion for older workers [121].

In many cases, a person is not able to continue in work that requires physical strength and stamina, but may be willing and able to do other less demanding work. People may not wish to continue to have high levels of stress and responsibility but would be willing to use their skills in less pressured roles. Adapting work practices to accommodate older workers' needs and circumstances can also help older people remain in work. Good evidence shows that flexible working practices, such as flexitime, part-time working, job-sharing and working from home, can help older people, particularly those with health issues or caring responsibilities, remain in employment for longer and can result in healthier lives overall [119,122,123]. Research from the New Dynamics of Ageing Programme also demonstrates that commuting can pose a substantial barrier to older people remaining in employment, necessitating development of locally driven strategies, such as car-sharing or free travel on public transport, to improve the journey to work [119].

Changes to the physical work environment can support older workers to remain in employment, while contributing to improvements in productivity [124]. An example of a successful innovation can be found in the experience of BMW, which piloted a production-line initiative in 2007 to support older workers. The pilot introduced a number of physical changes to the work environment (e.g. weight-adapted footwear and wooden flooring) to reduce physical strain on workers [125]. In one year, the pilot achieved a 7% productivity improvement and by 2009 had contributed to a significant reduction in absenteeism and quality improvement [125].

Retirement and pension policies

The reasons for retirement can be hard to detect – for example, a person might retire in order to care for a family member and change from paid to unpaid work. There are circumstances where a person might be willing to work but not in their current role, so the choice to retire is to leave a specific job rather than to leave the workforce. Incomes in retirement vary greatly, and this can affect the experience of retirement and may affect health. This suggests that policies on rules for retirement, continued paid work, pensions and other income support in older age should be more thoughtful than simply raising statutory retirement ages. They are likely to include options for working less than full-time; to change to different types of work; and to source income from combinations of paid work and pensions. It should be feasible to design rules that reduce the costs of pensions, increase the available workforce, and improve health in those who wish to work, without introducing negative effects on those who cannot or do not wish to continue in paid work.

There are often constraints on the choice to be supported by both some pension income and some income from work – in some cases, the person loses pension income at a rate that makes paid work unprofitable. There can also be penalties in terms of pension for moving to a lower salary or moving to part-time work. While it is important to have fair and efficient rules around pensions, much could be done to make work more attractive to older people, both in terms of income and the work experience.

Nevertheless, in an effort to improve the financial sustainability of pension systems and public finances, there is a push in many countries to raise the retirement age. Current standard ages for access to pension were often set at times when life expectancy beyond that age was short. Raising the retirement age can reduce pressures on government budgets by raising payroll contributions from

Box 6: Health implications of remaining in paid and unpaid work for longer

There may be important health implications of changing the age of retirement. Health status and labour market participation are closely linked: while those who are in poor health may face difficulties doing work, evidence also suggests that there are complex causal relationships between work and health. Some studies find that retirement is beneficial for mental health, although there is only limited evidence of effects on physical health [127,128]. Retirement may also reduce health care utilization [129]. However, there is also convincing evidence that retirement can be bad for health [130,131]. The effects may also be gendered, impacting differently on men and women, and be affected by expectations of gendered roles [132].

Other researchers investigate the impact of retirement on cognitive function. Consistent with the 'use it or lose it' hypothesis, early retirement is often associated with declines in cognitive function [133–135]. This suggests that encouraging retirement at older ages among those who are able and willing to continue to work, may promote cognitive function later in life. However, recent research finds that in the United States, older Americans required to wait until older age to receive full social security benefits are reaching retirement age with poorer cognition and more physical limitations compared to previous cohorts; the precise reasons are unknown [136].

people staying in paid work and reducing benefit payments. If jobs are available, this is likely to increase the number of older people who are working and reduce the numbers who are retired. However, remaining in work may also have important, perhaps unpredictable, health implications (see Box 6). There is also some evidence that increases in official retirement ages may lead some older people to leave the labour market by alternative pathways, such as collecting unemployment and disability benefits until they reach the (higher) retirement age [126].

Supporting the provision of informal care by promoting carer well-being

Providing support to carers to increase their well-being is important to enhance their quality of life and to increase their propensity to provide care. Strategies that support informal carers through training or by providing cash for care have been shown to be effective in reducing carers' stress and may also improve the quality of care [137].

Research on training for carers suggests the potential to improve carer and patient well-being, but outcomes are likely to be dependent on the conditions (e.g. stroke or dementia) targeted, as well as the organization and content of training [138]. For example, RCTs from the United Kingdom found that stroke education programmes for patients and carers in the United Kingdom were not effective at improving the emotional well-being of carers [139,140], but did improve knowledge of stroke [139] and patient anxiety [140]. Findings on dementia care education programmes did, however, improve carer well-being and also reduced negative feelings toward the patient [141] and social isolation [142].

Extensive research has shown that cash-for-care benefits in the form of vouchers (e.g. as provided in Finland), home-care grants (e.g. Ireland), direct payments (e.g. England) or personal budgets (e.g. Netherlands) can be vital tools in encouraging the well-being and sense of worth, as well as improving the quality of life, of informal carers [143–145]. Cash benefits can often be a critical source of household income that enables individuals to carry on providing informal care, especially for those that have had to reduce work hours or are looking after a partner who has left employment due to illness [146]. Evidence suggests that the higher the amount of cash-for-care benefits, the higher the likelihood of providing care, particularly for those on low incomes [143,147].

However, it is important to acknowledge that cash-for-care benefits can act as a disincentive to take up formal employment, in particular for those on low incomes and women [147,148]. Carer allowances may also disincentivize carers from working additional hours or increasing employment earnings in order to stay within carer allowance eligibility thresholds [23].

Supporting unpaid carers who also remain in formal employment

Much emphasis has been placed on implementing reforms to enable carers to combine unpaid care with paid employment [146]. These include the introduction of paid or unpaid leave and flexible working arrangements [137]. In Japan, for example, amendments to the Child Care and Family Care Leave Act in 2009 introduced 'Time off for carers', which entitled carers to five days of unpaid leave per year, with further reforms in 2016 exempting carers from working overtime and increasing opportunities for flexible working for the care period [149].

The 2016 reforms also enabled carers of older people to take 93 days of long-term Family Care Leave (originally introduced in 1995) in three parts to account for varying intensity of care at the beginning, middle and terminal phases of care [149]. A study by Ikeda (2017) analysed the potential impact of these reforms, concluding that long-term leave and a reduction in working hours are likely to be effective in keeping people in the workforce if care is provided over a short-term period, but flexibility in the working schedule is more important if the period of care is likely to be longer [149].

IV. Policies to support acceptable, equitable and efficient funding and income transfers (Intervention 4)

Population ageing, coupled with changes in the share of the population in paid work, may have important effects on public finances, including but not limited to health and long-term care revenues. This is especially true in systems largely dependent on formal payroll contributions. To cope with changes in the labour market structure (some of which may result from population ageing), financing systems may need to diversify or otherwise reconsider public revenue sources. This has already happened in some countries, where funds from general tax revenues supplement funds from direct payroll contributions. The ways health systems and other

types of public transfers related to older people are financed can have important political and societal implications, which must also be considered to maintain the public acceptability of the welfare state.

Ensuring stable and sufficient revenues for health and long-term care systems in the context of population ageing

Countries are increasingly interested in diversifying the tax mix for health and long-term care financing. Nevertheless, there is considerable debate over the optimal mix of taxes for health and long-term care funding, in terms of generating stable and sufficient revenue in an equitable manner.

Labour markets serve as an important source of funding for public-sector revenues. If a large proportion of older people retire at the same time, this will limit revenues. Health and long-term care financing systems that are heavily reliant on payroll contributions may need to be redesigned to fill the financing gap from general revenues or private sources, to ensure they continue to generate sufficient, stable revenues.

Population ageing will also have important effects for general taxation. Both the level of direct taxes (e.g. income) and indirect taxes (e.g. spending on goods and services) vary over the life course and changes in the population age distribution could have notable effects on the ability to generate government revenues. As populations age, governments that depend highly on payroll taxes will likely see a slowdown in revenue generation growth as a result of declines in the share of the population in paid employment. However, older people who are not in paid work may continue to play a role in public revenue generation through consumption taxes (e.g. VAT or sales tax) as well as though taxes on non-labour income and assets (e.g. property).

Increasing the reliance on locally raised taxes or, conversely, centrally raised taxes is one focus of ongoing debate and reforms, with countries moving in different directions. In Finland and Sweden, for example, greater centralization of financing systems for health and long-term care is proposed to reduce inefficiencies and simplify existing multi-source financing systems [150,151]. In contrast, England has recently increased the share of long-term care revenue raised through local taxes by introducing an adult social care precept in 2016 as part of local area (council) property taxes to relieve financial pressure on adult social care budgets [146]. Concerns have, however, been raised that the precept will enhance local variability in the provision of social care, as wealthier local authorities are able to collect more tax revenue than less affluent authorities [152].

The use of hypothecation (or earmarking) of payroll or 'sin' taxes has been seen by some as a potential source of funding. Proponents of hypothecation advocate that it increases transparency and may make people more willing to pay higher taxes as they are able to see where their taxes are spent [153–155]. Counter-arguments note that hypothecation can introduce unwelcome budgetary controls that ensure spending is determined by revenue generated rather than based on changing needs and demand, while revenues may not increase if funding from other tax sources is concomitantly decreased [156,157]. Moreover, hypothecation remains vulnerable to economic fluctuations, as well as demographic changes, resulting in unstable revenue streams that are harder to smooth in comparison to more diverse general tax revenues.

Long-term care insurance

The most fundamental reforms to long-term care financing in recent years have seen some countries shift to mandatory long-term care insurance arrangements. Notable examples of these reforms can be seen in Germany, Japan and Korea, countries with previously long-established social health insurance systems. These countries have developed varied long-term care insurance designs, but all share common features, with individuals contributing proportional to income through payroll or pension contributions and coverage extended to all irrespective of income and availability of alternative informal caregiving options [158,159].

Germany is one of the few countries to have implemented some form of pre-financing to prepare for the potentially heavy burden on long-term care that is likely to emerge as a result of the retirement and ageing of the baby-boomer generation. The government has established a futures fund that is financed by set-aside contributions of 0.1% from long-term care insurance, which will not be used until 2035, when baby-boomers are expected to need long-term care [160]. However, whether the fund will remain unused for as long as envisaged remains unknown.

There is currently little evidence on the sustainability of long-term care insurance arrangements. It should, however, be noted that, like hypothecation of taxes, long-term care insurance can introduce unwelcome budgetary controls that ensure spending is determined by revenue generated rather than based on changing needs and demand. Long-term care insurance also remains susceptible to economic fluctuations and cycles, which are harder to smooth out than for general tax revenues.

Improving acceptability of income transfers

Incomes and costs of care for people who are not working come from private savings, formal contributory pension and related mechanisms, and transfers by the state through taxation. While the expectation of a longer period of retirement in itself creates some incentives for increased private savings, the treatment of savings and pensions in the tax system can influence the extent to which people opt to save for retirement. However, in most countries, state transfers are a primary source of income in older age, and it is important that the mechanisms used to collect and pool these resources are considered fair. Acceptability of higher taxes and transfers varies between countries and can depend in part on the transparency of the process and the perceived fairness of the rules. Policies discussed throughout this brief that support more income from work over the lifecourse can reduce the need for transfers, while improved health can also reduce the costs of care.

5. Building on what we know and improving the evidence base for policy-making

Policy-makers require high-quality information to make informed decisions and develop policies with respect to older people and the changing age-structure of the population. This overview of evidence on some of the costs and benefits associated with population ageing suggests that older people are likely to be less costly to societies than often perceived, both in terms of health and long-term care, but also in terms of other consumption expenditure, which in many countries is in part self-financed by older people themselves. Older people also provide benefits that are frequently not measured, such as in the form of informal caregiving or remaining in paid work at older ages, particularly if they are healthy.

There are many benefits from investing in the health of older people, not least for the sake of economic growth and sustainable public finances. Any questions regarding the costs of interventions to support the health and activity of older people should have good information about how much these actions could produce in terms of benefits from not only an economic perspective, as discussed in detail in this brief, but also to improve quality of life and experiences in older age. As has been described above, these sorts of benefits are not often properly taken into account.

One of the main goals of the European Observatory's series on the *Economics of Healthy and Active Ageing* is to get a better understanding of the gaps in knowledge and to focus efforts on these areas. Our approach is to use the conceptual framework described in this overview brief as a basis to inform the programme of work. This includes efforts to:

- clarify the degree to which older people are living longer in better or worse health and to understand the determinants of key trends
- better understand how population ageing affects health and long-term care (both formal and informal) expenditure trends
- explore policy options that improve the efficiency of health care expenditure at older ages, including rational end-of-life care
- explore policy options that achieve stable and sufficient revenues for health and long-term care systems in the context of population ageing
- better quantify the economic and societal benefits of older people
- understand the relationships between work and health, and identify salient policy options that maximize older people's potential to contribute
- consider the political economy challenges to ensuring population ageing is not used as a red herring by those seeking to dismantle the welfare state.

These areas and more are topics we will be investigating in detail as part of the *Economics of Healthy and Active Ageing* series.

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World Health Organization
Regional Office for Europe
UN City, Marmorvej 51,
DK-2100 Copenhagen Ø,
Denmark
Tel.: +45 39 17 17 17
Fax: +45 39 17 18 18
E-mail: postmaster@euro.who.int
web site: www.euro.who.int

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