POPULATION AGEING AND THE PUBLIC FINANCES IN IRELAND

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An Roinn Airgeadais
Department of Finance

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Executive Summary

In many advanced economies – the US, EU, Japan – a demographic turning point has been reached: the number of people of working age has peaked and is on a clear downward trajectory. As a direct result, economic growth rates are slowing and demographically-sensitive public expenditure is rising in many of these countries.

The challenges currently facing policymakers in these regions provide a useful snap-shot of the challenges that demographic change will bring for Ireland in the not-too-distant future. While Ireland's demographic structure is relatively favourable at present, shifting demographics in the coming decades will result in a slower pace of economic expansion and put significant pressure on the public finances.

Ireland's old-age dependency ratio – the number of retirees as a fraction of the number of workers – is set to double over the coming decades, from 21 per cent at present to a peak of around 46 per cent in the middle of this century. Put another way, there are currently around 5 persons of working age for each person aged 65 and over; by 2050, the equivalent figure will be just over 2. This will involve increased outlays in demographically-sensitive components of public expenditure, such as pensions and healthcare.

As well as the associated expenditure pressures, growth in the productive capacity of the Irish economy is set to slow significantly, as demographic trends weigh on additional labour supply. Growth is projected to decelerate from an estimated 4.3 per cent per annum over the 2016-2020 period to an average of around 1.8 per cent per annum over the 2020-2050 period. As public revenue evolves in line with economic growth, slower revenue growth will make it more difficult for the public finances to absorb the increase in age-related spending. The high level of public indebtedness – the debt-to-GNI* ratio is in excess of 110 per cent – further weighs on the capacity of the public finances in Ireland to absorb these additional costs.

In terms of quantifying the likely impact, projections point to an increase in age-related expenditure of 6.5 percentage points of GNI* by 2070, a significant cost for future generations. Simulations show that, in a purely hypothetical scenario in which there were no further policy responses, the impact of population ageing would be a significant increase – of the order of 50 percentage points – in the debt-to-GNI* ratio by 2070.

A range of policy reforms, such as increases in the State Pension age, have been implemented to mitigate the costs associated with the 'greying' of the population. A series of alternative scenarios run in this exercise show that an increase in both the employment rate of older workers and of those of working age could help to mitigate the impact of population ageing on the public finances. However, additional measures – including fiscal restraint in non-age related spending – will be necessary to safeguard the sustainability of the public finances.

Population ageing and the public finances in Ireland

September 2018[1]

Section 1 – Overview

A projected shift in the demographic composition of the Irish population in the coming decades will pose significant challenges for the public finances. Under reasonable assumptions, the old-age dependency ratio – the number of retirees expressed as a fraction of the number of people of working age – is set to double between now and the mid-part of the century. This means that while there are currently around 5 persons of working age for each person aged 65 and over, by 2050 the equivalent figure will be around just over 2. Population ageing will involve increased outlays in demographically-sensitive areas of public expenditure, such as healthcare, pensions and long-term care. It will also involve a moderation in the pace of economic growth, as a key source of growth, namely labour supply, becomes less prominent.

A key strategic goal of the Department of Finance is the achievement of a "sustainable macroeconomic environment and sound public finances."[2] Given the importance of sound public finances, it is important to understand, assess and report on the impact of shifting demographic trends on the public finances in Ireland and, in particular, on the long-term sustainability of the public finances.

The purpose of this document is to shed light on the likely economic and budgetary impacts of demographic change in Ireland. The analysis set out in the document attempts *inter alia* to quantify the likely budgetary costs of population ageing in order to inform the appropriate policy response. It builds on work undertaken by the Department in conjunction with other Finance Ministries in the European Union, together with the European Commission. The analysis in this document will be updated and published routinely.[3]

Section 2 briefly describes demographic trends in advanced economies as an insight as to what the future might hold for Ireland. The projected demographic shift in the composition of the Irish population in the coming decades is then detailed in section 3. Importantly, demographic changes will weigh on the productive capacity of the Irish economy as the growth in labour supply is set to slow; section 4 sets out the implications of these changes for the future growth rate of the Irish economy. Section 5 assesses the budgetary cost of an ageing population while, in Section 6, additional analysis of pension expenditure – the largest component of age-related expenditure – is provided. Section 7 outlines, for illustrative purposes, the potential impact of demographic change on the public finances on a hypothetical, purely no-policy-change basis. Section 8 draws together the key conclusions.

[1] This report was produced by the Economic Division of the Department of Finance, and does not necessarily reflect the views of the Minister of Finance or the Irish Government.

[2] *Statement of Strategy 2017-2020*, Department of Finance.

[3] An assessment of the budgetary impact of changing demographics over a shorter horizon (2017-2027) has been carried out by the Irish Government Economic and Evaluation Service.
Available at: https://igees.gov.ie/budgetary-impact-of-changing-demographics-2017-to-2027/

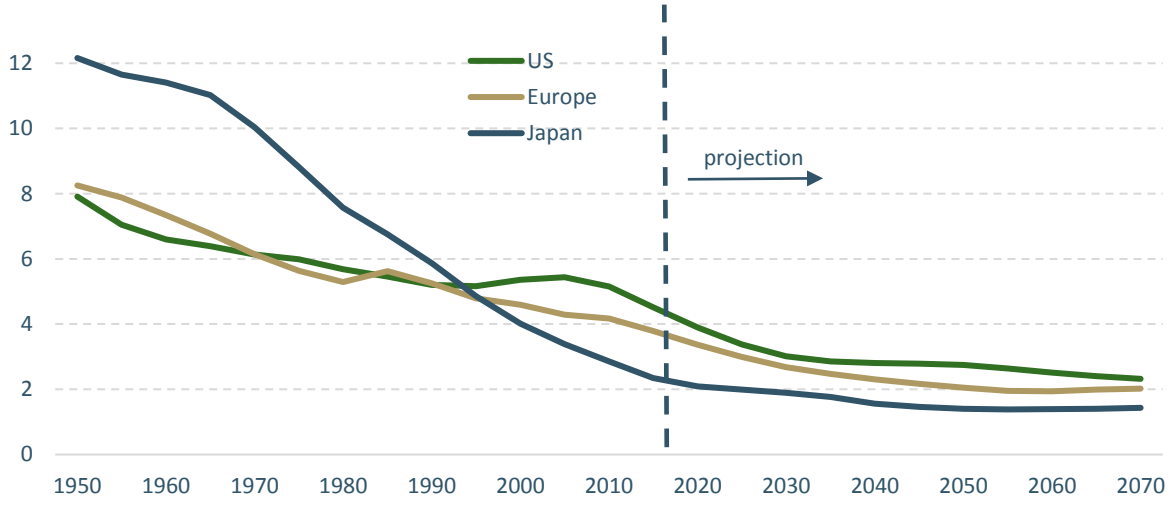
Section 2 – Demographic trends in advanced economies

In terms of analysing the economic and fiscal impact of demographic change, including for cross-country comparisons, the old-age dependency ratio (hereafter the 'OADR') is a crucial metric. This variable measures the share of the population aged 65 and over as a share of the population in the 15 to 64 age cohort. In other words, it is the number of people of working age relative to the number of 'old-age dependents' or 'retirees'.[4]

An ageing population is now a notable feature of many advanced economies. For the US, EU and Japan, for instance, a demographic tipping point has already been reached (figure 1). In the US, the OADR was 12.6 per cent in 1950 and rose steadily thereafter, before stabilising during the 1990s / 2000s. It has been on a clear rising path subsequently reaching 22.1 per cent in 2015, as the 'baby boom' generation moves into retirement. This ratio is expected to increase further in the coming decades, reaching 43.1 per cent in 2070. This means that the US will move from having 8 people of working age for every retiree in 1950 to having less than 2½ people of working age for each retiree in the next half-century.

A broadly similar pattern is evident in Europe, although the turning point occurred at an earlier stage. The OADR increased from 12.1 per cent to 26.4 per cent between 1950 and 2015, and is projected to increase to 49.4 per cent by 2070. This implies a reduction from nearly 8½ people of working age per retiree in 1950s Europe to just 2 people per retiree by 2070.

Figure 1: share of working age to old-age population in advanced economies^, number



^ this is the inverse of the dependency ratio.
Source: 2017 United Nations World Population Prospects (medium fertility scenario).

Even more striking is the impact of population ageing in Japan. Between 1950 and 2015, the OADR recorded a more-than-fivefold increase, from 8.2 per cent to 42.7 per cent. In Japan,

[4] For the purpose of the analysis in this document, the working age population is defined as the population aged 15-64 and the old-age population is defined as the population aged 65 and over. This in line with standard international definitions, although it is recognised *inter alia* that many individuals continue working beyond their 65th year.

deaths now outnumber births by an average of 1,000 per day.[5] The OADR is expected to increase to 69.6 per cent by 2070, meaning there will be less than 1½ people of working age for each retiree, a significant decrease from the 12 people of working age that prevailed in 1950.

Population ageing is presenting policy-makers in these countries with considerable challenges. Firstly, the economic growth rate is slowing as the growth in labour supply has peaked. As public sector revenue typically moves in line with nominal economic growth *ceteris paribus* the pace of revenue growth will slow. Secondly, demographically-sensitive public expenditure – typically pensions, healthcare, long-term care – is increasing.

From a public finances perspective, therefore, both sides of the accounts – revenue and expenditure – are adversely affected by unfavourable demographics. In the absence of a policy response, the public deficit and, consequently, public debt will be higher than would otherwise be the case. Moreover, many advanced economies have accumulated high levels of public indebtedness, which is hampering the capacity of the public finances to absorb these age-related costs.

[5] Or, as the Financial Times (April 2018) put it: "*By the time the Olympic flame is lit in Tokyo in 2020, the indigenous population will have shrunk by about 842,000*".
Source: 'Japan's ageing population milestone intensifies investor focus', Financial Times. Available at: https://www.ft.com/content/be6bf7ac-43bd-11e8-803a-295c97e6fd0b

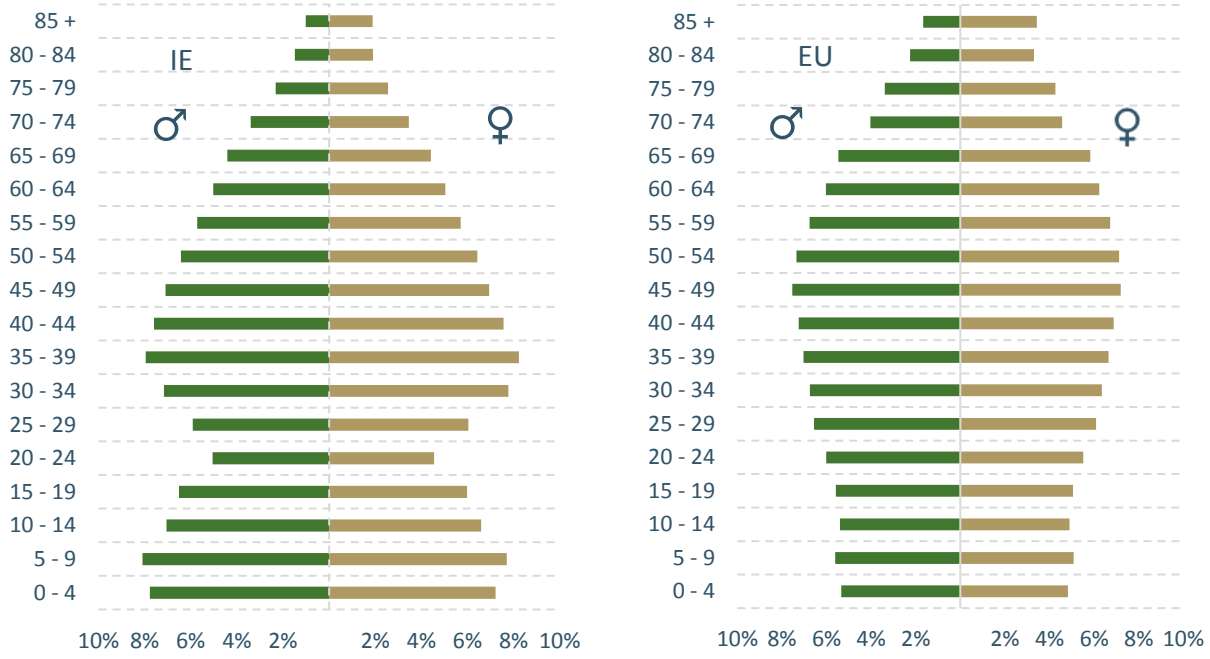
Section 3 – Demographic trends in Ireland[6]

These demographic challenges currently facing many advanced countries provide a good 'snap-shot' of the challenges that Ireland must confront in the not-too-distant future: while the demographic structure of the Irish population is relatively favourable at present, a demographic shift will occur in the coming decades.

3.1: current demographic structure in Ireland

The age structure of the Irish population at present compares favourably with other EU Member States. Figure 2 sets out the so-called 'population pyramid' – the share of the population accounted for by each five-year age cohort – for Ireland and for the EU in 2016 (latest available comparable data). The population pyramids show that, compared with the EU average, the Irish population is relatively young. Indeed, according to the latest *Eurostat* annual population estimates, Ireland has the highest share of population aged less than 15 years old and the lowest share of over 65 year olds in the EU. Ireland also has the lowest median age of population and the second highest (after France) fertility rate in the EU.[7]

Figure 2: population pyramid – 2016, per cent of population



Source: Eurostat.

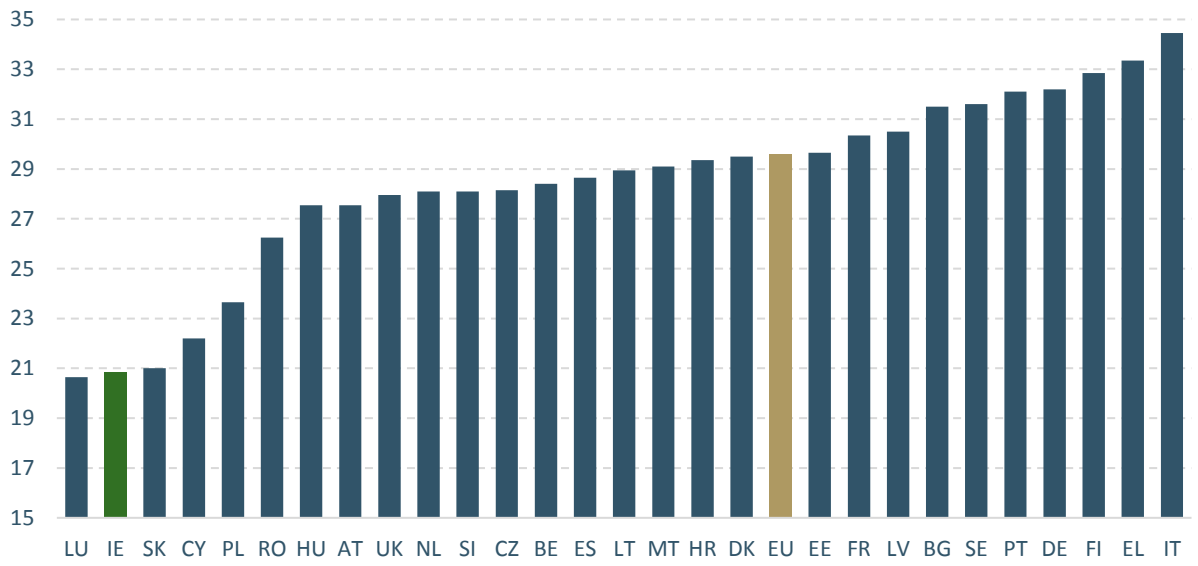
The Irish population aged 15 and over amounts to 3.6 million at present. The number in the working age cohort is currently 3.0 million, while the number in the retirees cohort is 0.6

[6] The population projections in this document are based on *Eurostat* population projections on the basis of 2015 data (to ensure cross-country comparability). These projections do not take account of the revised estimates of the population from the 2016 Census. The projections are available at: http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-projections-data

[7] http://ec.europa.eu/eurostat/web/population-demography-migration-projections/population-data/main-tables

million. This implies an OADR of 20.9 per cent, i.e. there are around 5 people of working age for each retiree, a figure which is amongst the lowest in the EU (figure 3). At the other end of the spectrum, Italy's OADR of 34.5 per cent means that there are only 3 people of working age to 'support' each retiree. The EU average is 29.6 per cent.

Figure 3: old age dependency ratios in the EU Member States, per cent in 2016



Source: Eurostat.

3.2: evolution of main demographic variables in Ireland

The static, point-in-time analysis paints a relatively benign demographic picture. However, it is necessary to complement this with a more dynamic, forward-looking analysis to assess how key variables will likely evolve over time. Table 1 provides an overview of the likely evolution of key population variables over the period 2016-2070.

Table 1: evolution of the main demographic variables

	2016	2020	2030	2040	2050	2060	2070	peak
Total population ('000)	4,689	4,872	5,158	5,411	5,707	5,905	6,042	2070
Population growth rate (per cent per annum)	0.9	0.8	0.5	0.5	0.5	0.3	0.2	2017
Share of working age population	64.4	63.3	63.1	60.4	56.0	57.0	58.7	2016
Old age dependency ratio	20.9	23.1	29.1	37.1	45.7	44.2	41.2	2053
Males - life expectancy at birth	79.5	80.1	81.5	82.9	84.1	85.3	86.4	2070
Females - life expectancy at birth	83.5	84.2	85.5	86.9	88.1	89.2	90.3	2070
Net migration ('000)	14.8	9.9	7.5	11.4	13.7	12.2	10.8	2017

Source: Ageing Report 2018, European Commission.[8]

[8] Available at: https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en

The Irish population is set to increase at an average rate of just under 1 per cent per annum in the short-term, with assumed positive contributions from 'natural' factors (births are assumed to exceed deaths) and from net inward migration. Over the medium- and longer-term, population growth is set to slow (although to remain in positive territory), mainly due to a slower natural increase in the population. By 2024, the total population is set to exceed the 5 million mark for the first time since 1851 and, on the basis of current projections, to exceed 6 million by 2070 (the first time since 1841).

From a public finances perspective, perhaps the most notable demographic development relates to the projection for the old-age dependency ratio, which is set to more-than-double from its current rate within the next three decades. To understand how these projections are arrived at, the remainder of this section sets out the key assumptions

3.2.1: process

As outlined earlier, population ageing in the EU has lowered economic growth and is raising public expenditure in demographically-sensitive areas. In order to quantify the impact of these trends on the public finances, and to assist in the design of mitigating policies to ensure fiscal sustainability, the European Council, through its Economic Policy Committee (EPC), undertakes an in-depth assessment every three years. The assessment involves long-range forecasts for both the demographic structure of the population and (not unrelated) for the economy. The exercise involves joint work between the Member States and the European Commission – the Ageing Working Group (AWG) of the EPC. The European Commission subsequently publishes its Ageing Report.

The population at a point in time is determined by the evolution of three variables:

- the number of births
- the number of deaths
- migration flows

Projections for each of the three variables, and the underlying methodology, are detailed below.

3.2.2: births / fertility rate

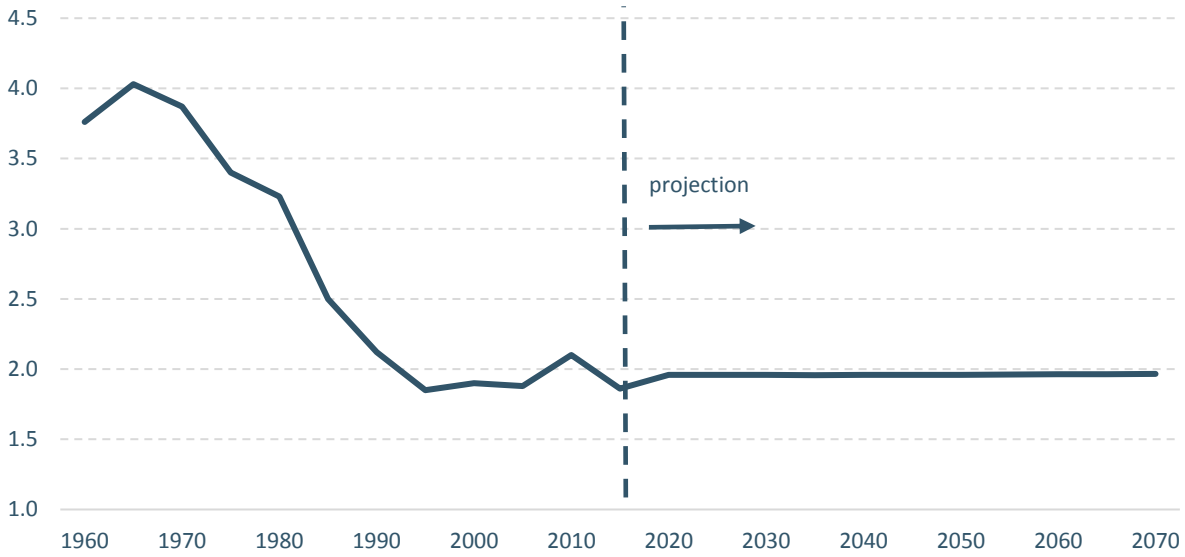
The fertility rate in Ireland, i.e. the number of births per woman of child-bearing age,[9] is projected to average 1.96 between 2017 and 2070 (figure 4). This is below the 'replacement level' of 2.1, i.e. the fertility rate needed to ensure a broadly stable population, assuming no change in mortality rates and no net migration.[10] This rate is also considerably below the average fertility rate of 3.3 recorded in Ireland over the 1960-1990 period. However, it is in line with the lower fertility trends experienced since then: between 1991 and 2015, the average fertility rate was also 1.96. The fertility rate fell dramatically between 1965 and 1994,

[9] The OECD defines the total fertility rate in a specific year as the total number of children that would be born to each woman if she were to live to the end of her child-bearing years and give birth to children in alignment with the prevailing age-specific fertility rates.

[10] https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en

from 4.0 to 1.9. There was some pick-up in the rate between 2007 and 2011 when the rate peaked at 2.1 before falling again to 1.8 in 2016.

Figure 4: fertility rate in Ireland 1960-2070, number



Estimates of the total fertility rate from 1960-2015 based on estimates from the CSO. Fertility rate from 2016 onwards based on projections by Eurostat.
Source: Central Statistics Office and Eurostat.

3.2.3: deaths / life expectancy

Despite a fertility rate slightly below the 'replacement level', the natural increase in the population, i.e. births minus deaths, is projected to remain positive over the projection period. This reflects both population momentum[11] as well as continued increases in life expectancy.

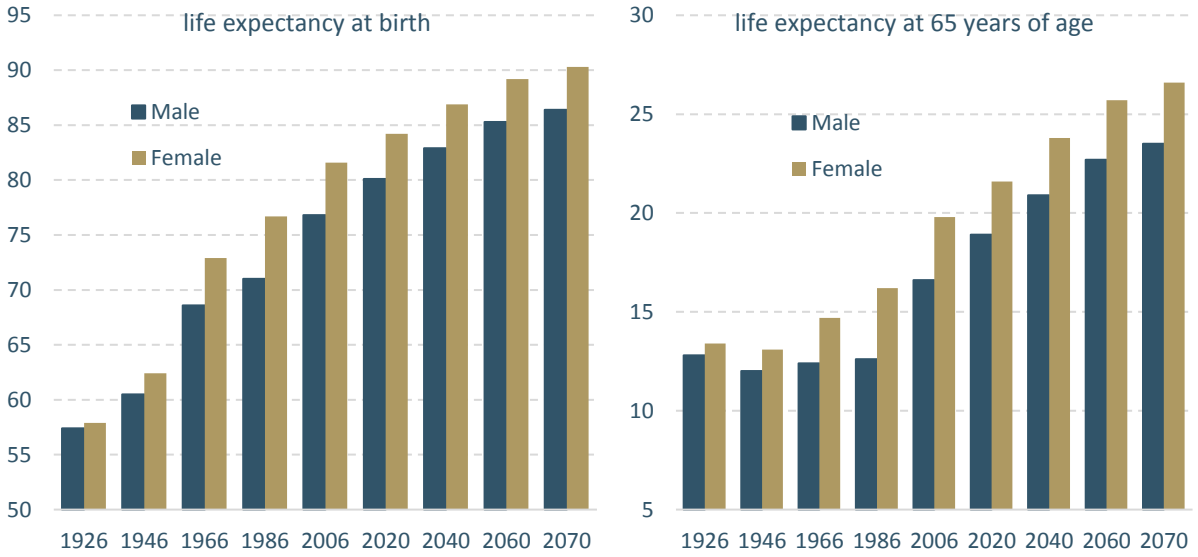
In relation to the latter, there have been significant improvements in life expectancy in Ireland over the last century, mirroring a trend evident in other advanced economies. Figure 5 shows the evolution of life expectancy at birth since just after the foundation of the Irish State. Male life expectancy at birth has increased by 22 years, from 57 years in 1926 to 79 years in 2015. The increase in life expectancy for females has been more dramatic. Having been broadly in line with that of males in 1926 (at 58 years), female life expectancy at birth was 84 in 2015, an increase of 25 years.[12]

This trend of rising life expectancy is projected to continue into the future. Population projections undertaken by the Central Statistics Office assume that life expectancy at birth for males will increase to 86 years by 2070; the corresponding figure for females is 90 years by 2070.

[11] Population momentum refers to the impact that the age structure of the population has on population trends.
[12] Source for these data is the CSO. Available at:
https://www.cso.ie/en/releasesandpublications/ep/p-plfp/populationandlabourforceprojections2017-2051/mortalityassumptions/

This increased longevity applies at all age cohorts, including the older age cohorts. For example, an average 65 year-old male could have been expected to live an additional 12½ years in 1986 (16 years for an average 65 year-old female). At present, the average 65 year-old male could be expected to live an additional 19 years (21½ years for an average 65 year-old female). By the mid-part of this decade, the average 65 year-old male will live an additional 22 years (25 years for an average 65 year-old female).[13]

Figure 5: life expectancy in Ireland 1926-2070, years



Source: Central Statistics Office and Eurostat.

3.2.4: migration

Migration is an additional channel determining the size of the population and, in an Irish context, has been an especially important driver of demographic trends. Economic stagnation, relatively poor living standards and a lack of employment opportunities have, historically, prompted several waves of large migration outflows. Between 1951 and 1971 for instance, net outward migration averaged approximately 28,000 people per annum – the equivalent of 1.0 per cent of the total population each year. While there was some net inflows during the 1970s, significant net outward migration resumed in the late-1980's, with average net outflows of 30,000 people (0.8 per cent of the total population) per annum.

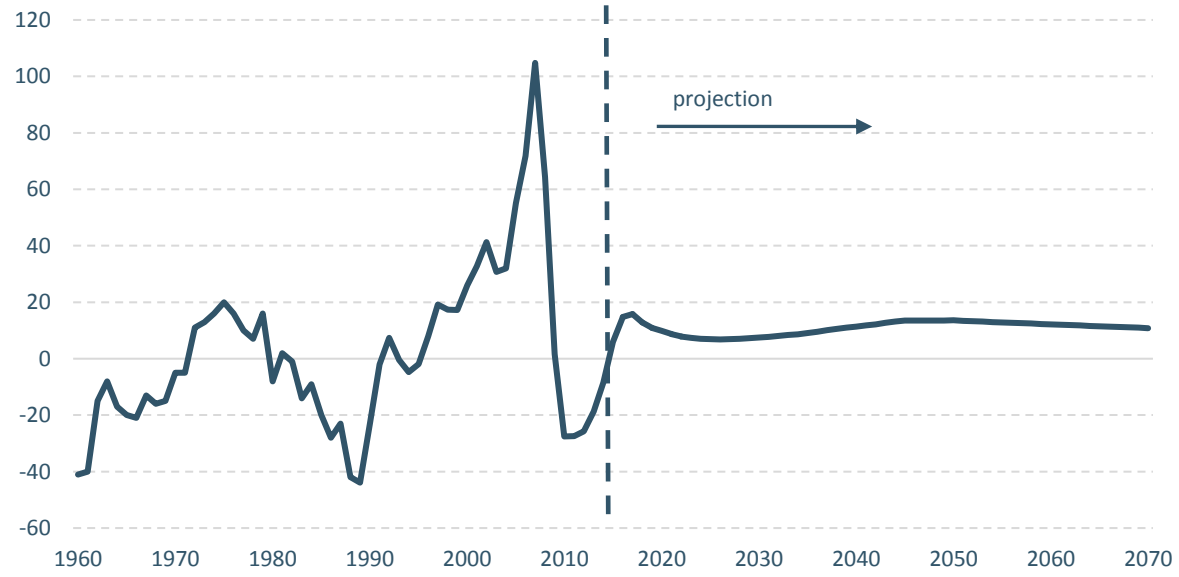
Changed economic conditions and, in particular, the convergence of Irish living standards to (and subsequently beyond) European norms from the second half of the 1990s resulted in substantial net inflows. Over the 1996-2009 period, average net inward migration amounted to 37,000 people per annum, the equivalent of 0.9 per cent of the population each year. Inward migration peaked in 2007, with inflows in net terms of 105,000 people, 2.4 per cent of the population. On the supply-side, this, in part, reflected flows from the 'New Member States', i.e. those Member States that joined the EU in May 2004. On the demand-side, these flows were partly a function of the credit-fuelled bubble at the time, which raised the output of labour-intensive sectors such as construction and retail.

[13] *Eurostat* population projections on the basis of 2015 data.

The eventual bursting of this bubble resulted in a resumption of outward migration which, in net terms, averaged 22,000 people per year (0.5 per cent of the population) between 2010 and 2014. The stabilisation of the economy and, in particular, the recovery in the labour market meant that net migration turned positive once again in 2015, and has remained in positive territory since.

Turning to likely future trends, *Eurostat* projections suggest positive net migration over the next half century. While projections of migration flows over such a long horizon are clearly subject to wide confidence bounds, it is not unreasonable to assume that inward migration will be positive, on average, over this period: Ireland is a high-income country and, as such, will likely be a destination country for migrants. On this basis, an annual average inflow of 11,000 (0.2 per cent of the population) over the next half century is *Eurostat's* baseline scenario.

Figure 6: net migration in Ireland 1960-2070, thousands

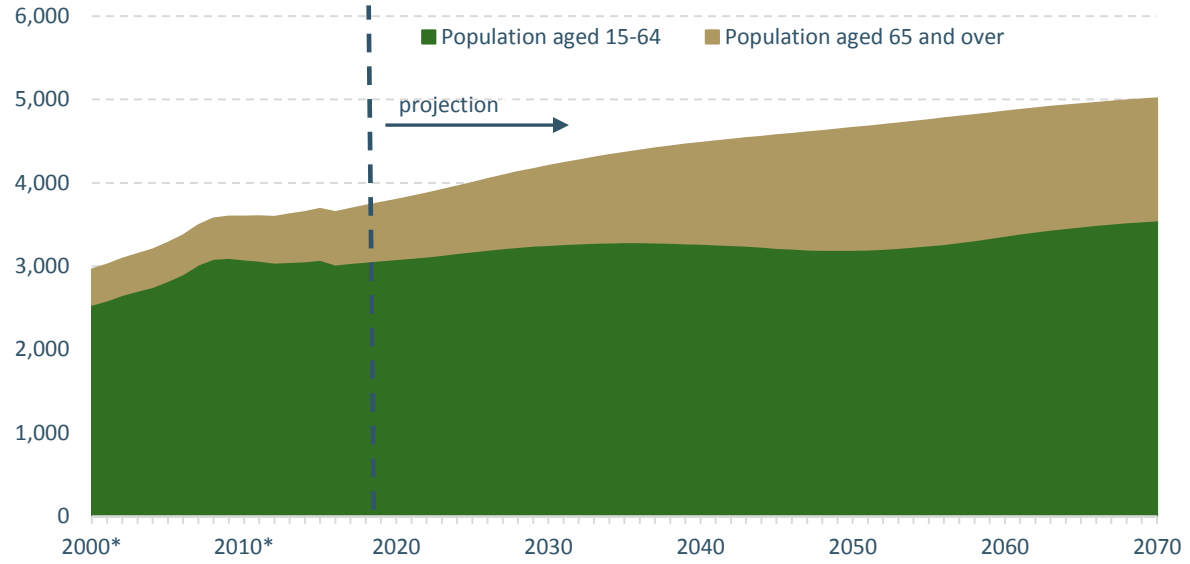


Estimates of net migration from 1960-2015 based on estimates from the CSO. Net migration from 2016 onwards based on projections by *Eurostat*.
Source: Central Statistics Office and Eurostat.

3.2.5: summary

Figure 7 combines all these elements (migration, fertility rate, life expectancy) to produce long-range population projections for Ireland by age cohort. The baseline population projections show a steady increase – averaging 0.6 per cent per annum – in the population aged 15 and over in the coming decades and, by 2070, the population in this cohort is projected to reach 5.0 million. Importantly, however, the bulk of the increase in the population is accounted for by retirees, the population of which is projected to increase from 0.6 million at present to 1.5 million over the next half century. On the other hand, the population of working age is projected to increase from 3.0 million to 3.5 million, a much slower pace of growth. As a result, the OADR is projected to increase from 20.9 per cent at present to 45.7 per cent by the mid-part of this century, i.e. there will be just 2 persons of working age for each person aged 65 and older.

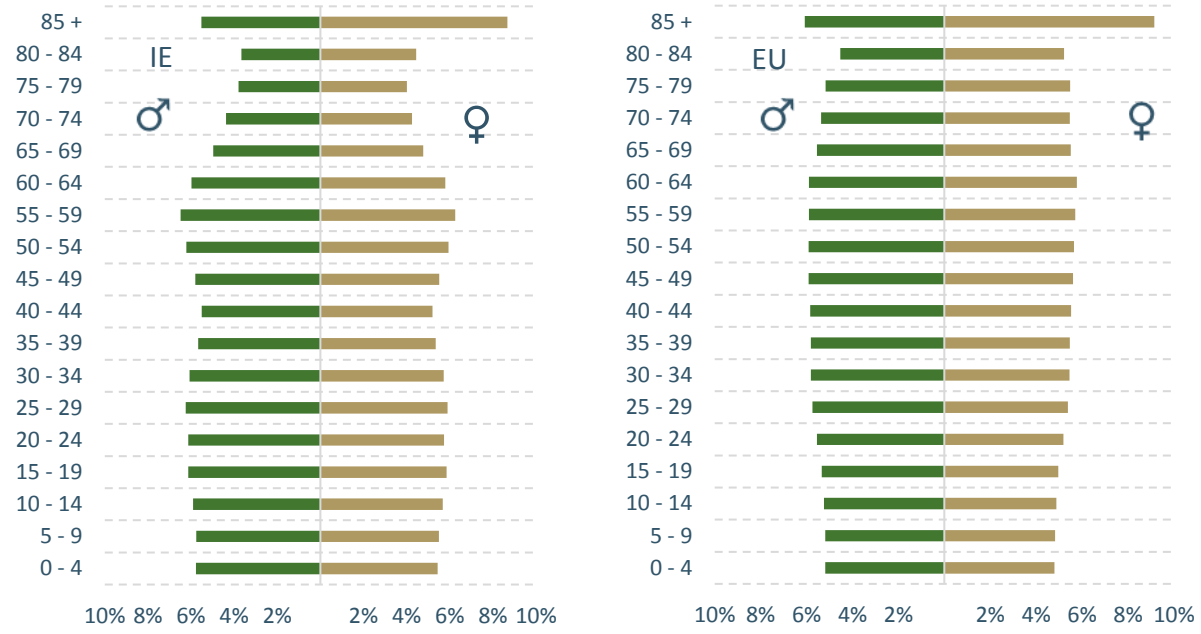
Figure 7: population aged 15 and over by age group,^ 000s



^ appendix 4 summaries these figures in (inverse of) the OADR.
* Population data over 2000-2015 are sourced from the *CSO*. Population estimates from 2016 onwards are based on *Eurostat's* projections.
Source: Eurostat 2015-based demographic projections and CSO Population and Migration estimates.

How does the projected Irish population structure compare internationally? Figure 8 compares the projected the population pyramids in 2070 for both Ireland and the EU. Compared with Figure 2, a significant shift is projected in the composition of the Irish population with the share of those aged 85 and over nearly 5 times higher than in 2016, for example. While the share of the Irish population in the 85 and over bracket was the smallest of all the cohorts in the pyramid in 2016, by the end of the projection period it is projected to become the largest cohort.

Figure 8: population pyramid – 2070, per cent of population



Source: Eurostat.

Section 4 – Evolution of potential growth

Long-term economic forecasts rely on the assumption that output moves in line with the growth rate of labour input (labour supply) together with an assumption for how productive each unit of labour is (labour productivity). In other words, the economy is assumed to move in line with its growth potential – that is, over the long-run, capital and labour are assumed to be deployed at their maximum sustainable levels. Of course, actual demand from year to year will fluctuate around this level in line with the business cycle but, on average, the trend growth rate of the economy is determined by the quantity of available inputs and the economy's ability to combine these inputs in order to produce outputs.

Labour input is a function of both the size of the workforce and the number of hours worked by each worker. Workforce projections are based on demographic projections, outlined in section 3, which show a significant slowdown in the growth of the working age population. The number of hours worked by each worker is projected to decline modestly over the next decade or so, and to flat-line thereafter. As a result, the contribution of labour input, i.e. total hours worked, to potential GDP is projected to decline significantly over the next half century.

With a projected slowdown in labour input, the sources of growth are expected to change dramatically over the projection horizon. In particular, growth will be driven mainly by gains in labour productivity. Indeed, labour productivity growth is expected to account for over 4/5ths of the projected GDP growth over this timeframe, averaging around 1.6 per cent per annum.

The projections for labour productivity are based on technical assumptions regarding developments for total factor productivity (TFP) and capital deepening. TFP growth, i.e. the efficiency with which capital and labour are combined to produce output, is assumed to converge to 1.0 per cent in the long-run. Capital deepening, i.e. the amount of capital per worker, is assumed to converge to a steady-state value of 0.5 per cent in the long-run.

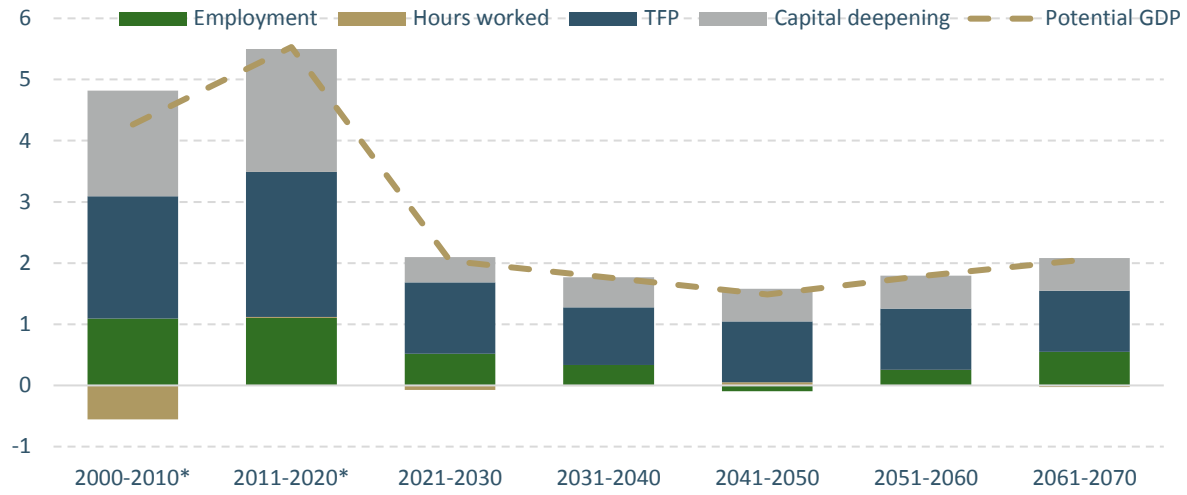
Table 2: evolution of GDP, growth rate per cent per annum

	2016	2020	2030	2040	2050	2060	2070	peak
Actual GDP	5.1	3.2	1.8	1.6	1.5	2.0	1.9	2016
1. Potential real GDP (1=2+3)	5.0	3.3	1.8	1.6	1.5	2.0	1.9	2016
2. Labour input (2= 2a+2b)	3.1	0.8	0.5	0.1	0.0	0.5	0.4	2016
: Employment (2a)	2.8	0.9	0.6	0.1	-0.1	0.5	0.4	2016
: Hours worked per employee (2b)	0.4	-0.1	-0.1	0.0	0.0	0.0	0.0	2017
3. Labour productivity (3= 3a+3b)	1.8	2.4	1.3	1.5	1.5	1.5	1.5	2020
: Total Factor Productivity (TFP) (3a)	1.9	1.8	0.9	1.0	1.0	1.0	1.0	2016
: Capital deepening (3b)	-0.1	0.6	0.4	0.5	0.5	0.5	0.5	2020
GDP per capita	4.1	2.4	1.4	1.0	1.0	1.8	1.7	2016

Rounding may affect totals.
Source: Ageing Report 2018.

Taking these developments into account, the economy is projected to grow at an average rate of just over 2 per cent per annum in the next decade (figure 9). The projected growth rate will then slow further, to just 1.5 per cent per annum by the mid-part of this century, before picking up slightly thereafter.

Figure 9: evolution of potential GDP 2000-2070, average growth rate per annum



* Estimates of potential GDP from 2000-2015 are based on Department of Finance calculations based on the Commonly Agreed Methodology (CAM). Estimates from 2016 onwards are provided by the Commission.
Source: Ageing Report 2018 and Department of Finance calculations.

In summary, therefore, GDP growth over the next half century will, in all likelihood, slow relative to current growth rates, as labour supply increases more modestly and Ireland converges towards the productivity 'frontier'.[14]

[14] Expenditure and fiscal ratios in this document are primarily reported as a share of GNI*. This variable, in turn, is assumed to grow in line with nominal GDP projections.

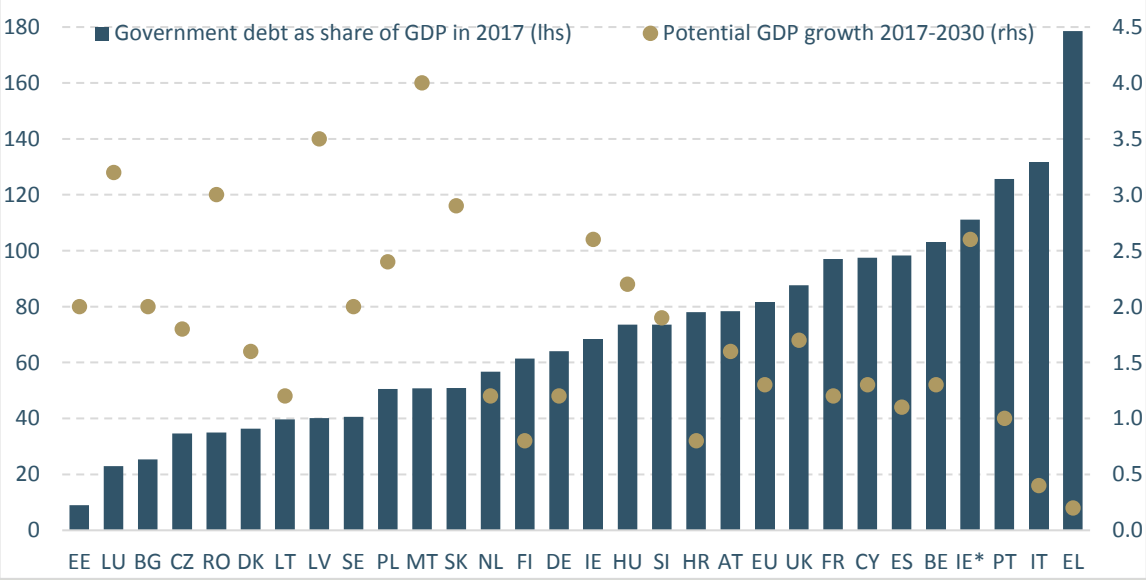
Box 1: Case Study – Italy

While it is difficult to conceptualise some of the developments and challenges outlined in this document – not least given the drawn-out timeframe involved – the demographic situation in Italy, and the associated challenges for the public finances, provide a useful case study. It could also be argued that Japanese demographic challenges are insightful although, in the latter's case, the shifting demographics are extreme (as outlined earlier, the Japanese indigenous population is declining at a pace of 1,000 per day!).

Given its different population structure, Italy is already confronting many of the challenges that future Irish generations will have to confront. The Italian OADR is the second highest in the EU at 34.5 per cent, nearly 5 percentage points above the EU average. In other words, there are just under 3 persons of working age for every person aged 65 or over at present. As a result, total age-related expenditure in Italy was 28 per cent of GDP in 2016, the fourth highest in the EU.

Not unrelated is a sluggish pace of economic growth – Italy's potential growth rate over the 2017-2030 period is estimated at just 0.4 per cent per annum, the second lowest growth rate in the EU.

Figure 10: General government debt and GDP growth of EU Member States



IE* Irish debt scaled by GNI*.
Source: Ageing Report 2018, Eurostat and Department of Finance calculations.

On the public finances front, the Italian debt-to-GDP ratio, at 132 per cent last year, is the second highest in the EU (after Greece). This means that policy-makers have less room for manoeuvre, limiting capacity to address age-related costs.

For policy-makers in Ireland, this perspective offers several insights. Firstly, by the mid-2030s Ireland's population structure will broadly resemble the age structure in Italy at present. Secondly, the potential growth rate of the Irish economy will slow, albeit not to the same extent as in Italy. Finally, Ireland's debt per capita is currently higher than in Italy.^^

^^ see *Annual Debt Report 2018, Department of Finance*.

Section 5 – Age-related public expenditure

Demographically-sensitive public expenditure consists of spending that is heavily influenced by demographic factors. In this report, age-related expenditure is defined as the sum of public expenditure on pensions, healthcare, long-term care, education and unemployment benefits.

An important caveat arises when comparing trends in demographically-sensitive expenditure in Ireland with other countries. In particular, when seen through the prism of GDP, age-related public expenditure in Ireland is projected to remain well below the EU average over the forecast horizon. This is because of the problems associated with using GDP as a measure of the size of the Irish economy: as GDP overstates the size of the economy, it follows that ratios with GDP as the denominator give a misleading picture.[15]

The Central Statistics Office publishes an alternative measure of the size of the Irish economy, commonly referred to as 'modified Gross National Income (GNI*)'. Fiscal ratios, including the fiscal costs of ageing, are more meaningful when GNI* is used to scale the data in Ireland[16] (for completeness, the expenditure ratios scaled by GDP are set out in Appendix 2).

In order to compile public expenditure projections, table 3 details the main drivers of change for the key demographically-sensitive components of public expenditure. For instance, multiannual pension projection costs are determined by projections for the number of pensioners, the coverage rate and the assumption that pension benefits for each covered pensioner increase in line with nominal earnings (the latter are assumed to move in line with productivity growth).

Table 3: components of total age-related expenditure

Component	Volume	Price	Δ 2016-2070 (p.p. GNI*)
Pension	Number of Pensioners = population projections * pension coverage rate	Base year: Pension rates in 2016. Projections: Pension rates announced in 2017 and 2018 Budgets. From 2019, rates are indexed to nominal earnings.	+2.5
Health Care	Number of Recipients = population projections * health status profiles	Base year: Average health expenditure per recipient in 2016. Projections: indexed to GDP per capita.	+1.7
Long-Term Care	Number of Recipients = population projections * size of incapacitated population * health status profiles	Base year: Average long-term expenditure per recipient in 2016. Projections: indexed to GDP per capita.	+3.0
Education	Number of Students = population projections * enrolment rate	Base year: Average expenditure per student in 2016. Projections: Indexed to GDP per capita	-0.4
Unemployment Benefits	Number of Beneficiaries = labour force projections * unemployment rate	Base year: Average unemployment per beneficiary in 2016. Projections: Indexed to GDP per capita	-0.4

Source: Ageing Report 2018 and Department of Finance calculations.

[15] This is discussed in more detail in "GDP and 'Modified GNI'- Explanatory Note", Department of Finance. Available at: https://www.finance.gov.ie/wp-content/uploads/2018/05/180504-GDP-and-Modified-GNI-Explanatory-Note-May-2018.pdf

[16] The figure for GNI* in 2016 is taken from outturn data from the CSO's 2017 National Income and Expenditure release. From 2017, GNI* is assumed to evolve in line with the projections for GDP growth.

Table 4 shows the increase in age-related public expenditure in each of the demographically-sensitive components. Pension-related expenditure, which currently amounts to just under 8 per cent of GNI* at present, accounts for the largest increase in expenditure, with a projected increase of 2.5 percentage points. As a result, this component of public expenditure is projected to account for around one-third of all age-related expenditure by 2070 (this is discussed in more detail in section 6). Expenditure on healthcare and long-term care is projected to increase by 1.7 and 3.0 percentage points of GNI*, respectively, under the baseline scenario.[17] [18] Operating in the other direction, the projected expenditure on education[19] and unemployment benefits is expected to decrease by 0.4 percentage points over the projection period, to 5.2 per cent and 1.4 per cent of GNI*, respectively.

Table 4: overview of total age-related expenditure, per cent of GNI*

	2016	2020	2030	2040	2050	2060	2070	Peak Year
Total age-related expenditure	23.8	23.6	26.0	28.0	30.4	31.2	30.3	2059
of which:								
Pension	7.8	8.0	9.1	10.5	11.7	11.3	10.3	2053
Healthcare	6.5	6.6	7.2	7.7	8.0	8.2	8.2	2067
Long-term care	2.1	2.2	2.7	3.4	4.0	4.7	5.1	2070
Education	5.6	5.6	5.6	5.0	5.3	5.5	5.2	2026
Unemployment benefits	1.8	1.2	1.4	1.4	1.4	1.4	1.4	2016

Figures may not sum due to rounding.
Source: Ageing Report 2018 and Department of Finance calculations.

As a result, total age-related expenditure is projected to increase by 6.5 percentage points of GNI* over the forecast horizon, reaching 31.2 per cent of GNI* in 2059 before falling slightly to 30.3 per cent of GNI* in 2070.[20]

Projected total age-related expenditure in Ireland, as proportion of GNI*, is set to overtake the EU and euro area average over the next 15 years (table 5). This reflects *inter alia* a significant reduction in the projected EU average benefit ratio compared to Ireland's benefit ratio, which is projected to stay at a constant rate (detailed further in Appendix 3).

[17] Long-term care is defined as services required by persons with a reduced degree of functional capacity, who as a consequence of this, are dependent for an extended period of time on help with basic or instrumental activities of daily living.
[18] Due to data limitations, the Commission had to use EU-15 average age cost profiles as a proxy for specific age cost profiles for Ireland when producing health-care and long-term care projections for Ireland.
[19] Education expenditure is made up of four components: expenditure on staff compensation, other current expenditure, capital expenditure and transfers (e.g. scholarships and public subsidies).
[20] https://ec.europa.eu/info/publications/economy-finance/2018-ageing-report-economic-and-budgetary-projections-eu-member-states-2016-2070_en

Table 5: comparison of total age-related expenditure, per cent of GDP unless stated

	2016	2020	2030	2040	2050	2060	2070	Δ 16-70
Ireland (as a share of GNI*)	23.8	23.6	26.0	28.0	30.4	31.2	30.3	+6.5
Euro Area	26.0	25.9	27.0	28.2	28.2	27.6	27.1	+1.1
EU 28	25.0	24.8	25.7	26.8	26.9	26.8	26.6	+1.7

Source: Ageing Report 2018 and Department of Finance calculations.

Section 6 – Pension expenditure projections

As set out in the previous section, pension-related expenditure is both the largest component of age-related expenditure and also the expenditure component where the largest age-related increase will occur in the coming decades. Given its importance, the analysis in this section provides more granular detail.

The Irish pension system is multi-pillar. The first pillar is the State Pension (SP), a pay-as-you-go system which is administered by the Department of Employment Affairs and Social Protection (DEASP) and funded through social insurance contributions and tax revenue. The second pillar consists of occupational pensions including non-funded Public Service Occupational (PSO) Pensions pay-as-you-go schemes. The third pillar is made up of voluntary, privately funded personal pensions.

The projections presented below relate to public pensions, i.e. first pillar State pensions and the public service component of the second pillar. They cover the following components of the pension system:

Contributory Public Pensions: these cover old-age, disability and survivors' pensions under the social insurance system and the public service component of the second pillar (PSO).[21]

Non-earnings related Public Pensions: these cover non-contributory old-age and early retirement, disability and survivor pensions under the Social Assistance system (non-earnings means-tested basic pensions).

6.1: Pension expenditure projections

Total pension expenditure is projected to increase from 7.8 per cent of GNI* in 2016 to a peak of 11.7 per cent in 2053 before falling to 10.3 per cent in 2070.

Table 6: projected gross pension expenditure, per cent of GNI*

	2016	2020	2030	2040	2050	2060	2070	Peak Year
Gross Total Pension Expenditure	7.8	8.0	9.1	10.5	11.7	11.3	10.3	2053
of which:								
Gross State Pension (SP)	6.0	6.0	6.8	8.1	9.5	9.9	9.4	2057
Public Service Occupational Pension (PSO)	1.9	2.0	2.3	2.4	2.2	1.5	1.0	2041

Figures may not sum due to rounding.
Source: Department of Finance calculations.

However, the profile of the two components of total pension expenditure differs significantly. SP spending as a proportion of GNI* remains broadly stable until 2023, increasing from 6.0 per cent to 6.2 per cent of GNI*, before increasing steadily between 2023 and 2057 to 9.9 per cent and then falling moderately from 2057 until the end of the forecast period, with SP expenditure in 2070 of 9.4 per cent.

[21] Public service pension expenditure projections were provided by the Department of Public Expenditure and Reform (DPER).

In contrast, PSO pension expenditure increases from 1.9 per cent of GNI* in 2016 to a peak of 2.4 per cent in 2041, before falling to 2.2 per cent in 2050 and further to 1.0 per cent of GNI* in 2070. The main driving factor behind this is the compositional shift towards 'integrated' pensions over the forecast horizon.[22] As a result, there is a substantial reallocation of pension expenditure from PSO to SP over the projection period. The introduction of the Single Public Service Pension Scheme for new public service entrants also helps to drive down expenditure.

Therefore, the rise in overall pension expenditure as a share of GNI* is entirely driven by State Pension expenditure increases.

The bulk of the increase in total expenditure is attributable to the State contributory pension (SCP). This component is set to increase by 3.2 p.p. of GNI* between 2016 and 2070. This increase is driven by both demographics and the effect of longer, improved contributory periods, amongst females in particular.

Despite a considerable increase in the dependency ratio over the forecast period, spending on the State non-contributory pensions is set to decline by 0.2 percentage points of GNI*, while expenditure on survivor's pensions is set to increase by 0.3 percentage points of GNI* over the forecast horizon. However, this relatively constrained growth is largely compositional as more individuals are assumed to transition to receipt of the SCP over the forecast horizon.[23]

It is important to note that the State pension benefit ratio, i.e. the ratio between average pension benefits and average earnings, is assumed to stay broadly unchanged over the projection period (see figure A1). This is in line with the policy set out in the recently published *Roadmap for Pension Reform 2018-2023*, which outlined a commitment to maintain the value of state pensions at approximately one-third of average earnings.[24]

6.2: Sensitivity Analysis

In order to test the robustness of these pension projection results to a range of assumptions, a sensitivity analysis is presented in figure 11. The sensitivity scenarios are applied exclusively to the State Pension (SP). It is worthwhile noting that the results set out in the analysis are broadly symmetrical and that, within reason, could be scaled in a broadly linear manner.

alternative scenario: increased longevity

A scenario which results in increased life expectancy clearly results in increased SP-related pension expenditure, as *ceteris paribus* recipients spend longer in retirement. The higher life expectancy scenario set out below assumes an increase in life expectancy at birth of two years

[22] Public servants hired before 6th April 1995 do not qualify for the SP. As such their pension payments come entirely from PSO pension expenditure. Public servants hired after 6th April 1995 receive an 'integrated' pension, whereby they receive the SP with the remaining proportion of their pension coming from the PSO pension.

[23] It is not possible to receive the State non-contributory pension or widows, widowers or surviving civil partners pension at the same time as the SCP.

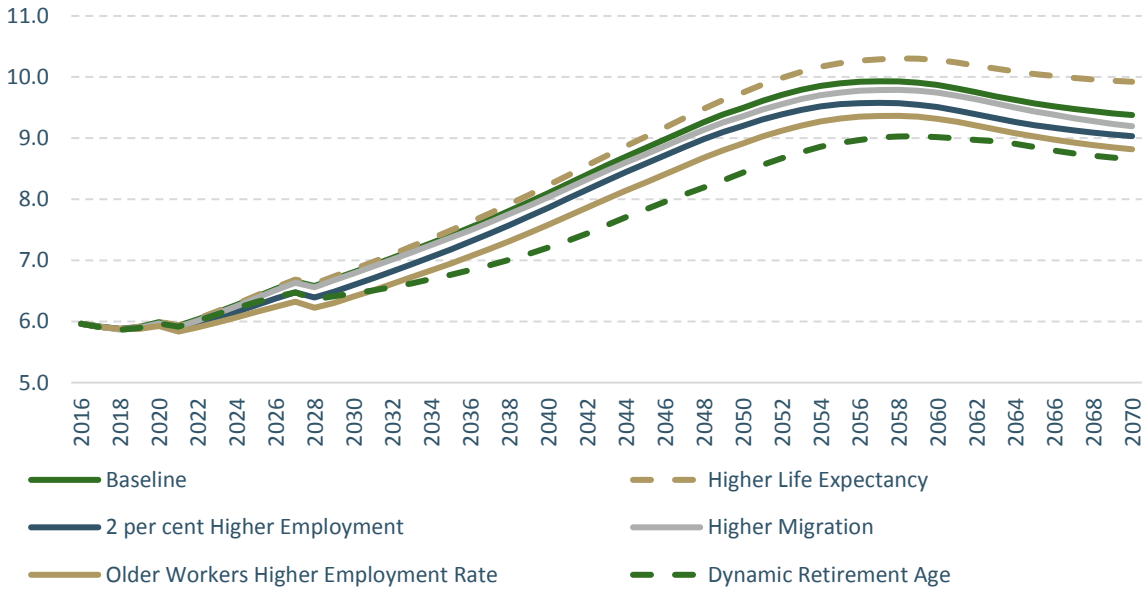
[24] *The Roadmap for Pension Reform 2018-2023.* Available at: http://www.welfare.ie/en/pressoffice/pdf/PensionsRoadmap.pdf

by 2070 compared with the baseline scenario. In these circumstances, SP expenditure in 2070 is 0.5 percentage points of GNI* higher than in the baseline scenario.

alternative scenario: increase in retirement age

The *Roadmap for Pension Reform 2018-2023* sets out a commitment to link future changes in the State pension age to life expectancy, subsequent to the already planned increases in 2021 and 2028.[25] The impact of such a policy is highlighted in the dynamic retirement age scenario in figure 11. The impact of linking retirement age to increases in life expectancy would be expected to reduce – relative to the baseline – SP expenditure by 0.7 percentage points of GNI* by 2070.

Figure 11: state pension expenditure under selected scenarios, per cent of GNI*



Sensitivity scenarios applied to State Pension expenditure only.
Source: Department of Finance calculations.

alternative scenario: higher employment rate of older workers

A scenario in which the employment rate of older workers is increased is also considered. Under this scenario, an increase of 10 percentage points in the employment rate of older workers (those aged 55-74) over the period 2018-2030 is assumed and the employment rate remains unchanged thereafter.

Unsurprisingly, the impact is to reduce annual SP expenditure. Under this scenario, annual SP expenditure is 0.6 percentage points of GNI* lower – relative to the baseline case – by 2070. This suggests that targeted policies designed to boost employment for older workers could have a pronounced benefit in terms of ensuring fiscal sustainability.

[25] The *Roadmap for Pension Reform 2018-2023*, sets out a commitment that there will be no further increase in the State pension age prior to 2035 other than those already provided for in 2021 and 2028 and that any future changes after 2035 will be directly linked to increases in life expectancy.

alternative scenario: higher migration

A scenario in which net migration was 33 per cent higher than the baseline assumption would reduce pension expenditure by 0.2 per cent of GNI* by 2070, relative to the baseline. This standardised assumption (applied to all Member States) could understate the impact of any shift in migratory tends in an Irish context. As discussed earlier, migration flows in Ireland fluctuate significantly, complicating migration projections. It is certainly conceivable that migration could be much larger than the baseline assumes which would reduce pension expenditure accordingly.

alternative scenario: higher employment

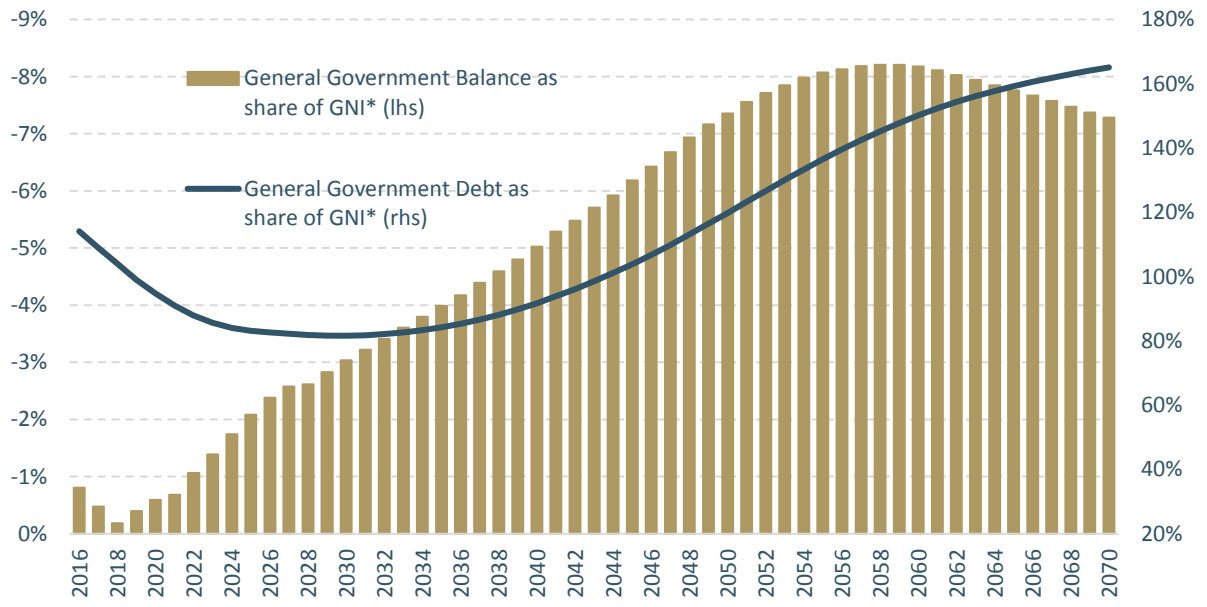
In a scenario where the overall employment rate for the 20-64 age group was 2 percentage points higher than the baseline assumption (for instance, through reforms designed to increase female participation rates), pension expenditure could be around 0.3 percentage points of GNI* lower than baseline in 2070.

Section 7 – Impact of ageing on key fiscal ratios on a no-policy change basis

For purely illustrative purposes, the analysis in this section highlights the potential impact of population ageing on the budget balance and public debt in the event that budgetary policy did not adjust. In this purely hypothetical, no-policy-change scenario, non-age related expenditure as a share is GNI* is assumed to remain unchanged over the forecast horizon while total revenue is assumed to move in line with nominal GDP/GNI*. In this simplified example, deficit and debt dynamics are driven solely by the age-related expenditure projections.

As set out in figure 12, age-related increases in public expenditure and a slower pace of revenue growth lead to the emergence of a significant deficit by the end of the next decade, reaching around 3 per cent of GNI* (2 per cent of GDP). The deficit would continue to increase sharply thereafter, peaking at over 8 per cent of GNI* (5 per cent of GDP) in the mid-part of this century. In compiling these projections, it is important to highlight that the simulations do not take into account second round effects or non-linearities. For instance, continuing to run deficits of this magnitude would, almost certainly, result in a significant risk premium, with adverse implications for sovereign borrowing costs and the interest bill.

Figure 12: hypothetical evolution of key fiscal ratios on a no-policy-change basis, per cent



Source: Department of Finance calculations.

On foot of these flows, the stock of public indebtedness would increase sharply. The simulations suggest that the debt-to-GNI* ratio would increase by 50 percentage points, from 114 in 2016 to 165 by 2070 (the debt-to-GDP ratio would rise from 73 per cent in 2016 to 106 per cent by 2070). Given the simplifying assumptions, this should be seen as a lower bound.

It is important to note that this should not be viewed as a forecast of the evolution of the GGB and GGD.[26] Instead, it should be viewed as an extrapolation of the age-related expenditure projections. However, this highly stylised example clearly illustrates the negative impact of population ageing on key fiscal ratios and highlights that a significant policy response will be necessary to safeguard the Irish public finances over the long-run.

[26] This approach does not take into account the medium-term forecasts produced in the Stability Programme Update (SPU) 2018. It also does not take into account the State's accumulated financial assets and remaining assets in the domestic banks. This approach also assumes that interest expenditure as a share of GDP/GNI* is constant over the projection period.

Section 8 – Conclusion

Shifting demographics in the coming decades mean that the structure of the Irish population will converge towards EU norms. Relative to the number of retirees, the working age population is expected to shrink, although it will continue to increase, albeit modestly, in absolute terms. The pace of economic growth will moderate *in tandem* as additional labour supply becomes more scarce; labour productivity will become the main source of improved living standards.

Ceteris paribus demographically-sensitive public expenditure looks set to expand, with increases of the order 6½ percentage points of GNI* in prospect by the mid-part of this century. In a hypothetical scenario in which there were no additional policy responses, the debt-to-GNI* ratio would increase significantly; indeed without a comprehensive policy response, it is not inconceivable that the debt ratio could move onto an unsustainable path.

Policy reforms that have already been enacted, such as increases in the State pension age, as well as reform of public service pension entitlements will help to mitigate the impact of population ageing on the public finances. However, in order to safeguard the public finances, the analysis in this document shows that additional policy responses will be necessary.

A comprehensive policy response would address the source of the problem. As the root causes are, at least in broad terms, threefold – rising old-age dependency ratio, slowing economic growth and limited room for manoeuvre given high levels of public indebtedness – an appropriate would encompass all of these areas.

The increase in the old-age dependency ratio can be mitigated by increasing both the employment rate of older people (for instance by linking retirement age to life expectancy) and the employment rate of those of working age (by addressing barriers that weigh on female participation rates).

The slowing economic growth rate could, in part, be reversed by implementing structural reforms that boost productivity.

Finally, additional measures to shore-up the public finances would be desirable. Balancing the fiscal accounts over the economic cycle – as is legally required – will be an important element. Fiscal restraint in non-age related expenditure will be necessary. Furthermore, any windfall gains, including the proceeds from the disposal of State owned banking assets, should be used to reduce public debt.

Appendix 1: Detail on the State and Public Service occupational pension systems

State Pension (SP) system

The State Pension (SP) provides flat rate payments under two types of schemes - social insurance and social assistance. Social insurance pension benefits are contributory and a function of an individual's Pay Related Social Insurance (PRSI)[27] record. Social assistance pensions are non-contributory and are available on a means-tested basis to those with insufficient PRSI contributions.

Social insurance pension payments are funded through the Social Insurance Fund (SIF) which is made up of a combination of contributions from employers, employees and the self-employed, with a subvention from the Exchequer in the event of a shortfall in the fund28. Social assistance payments are financed through general taxation.

Public Service Occupational (PSO) Pensions System

Second pillar Public Service Occupational (PSO) Pensions take the form of defined benefit schemes. For existing retirees and for staff hired up to end-2012, these schemes deliver or promise "final salary" benefits.

Public servants hired up to 5 April 1995 in general accrue retirement benefits as follows:

- pension of 1/80th of final salary per year of service (maximum pension 40/80ths, i.e. half pay);
- retirement lump sum of 3/80ths of final salary per year of service (maximum lump sum 120/80ths).

These pre-1995 public servants usually pay a lower rate of Pay Related Social Insurance (PRSI) and do not qualify for the full range of Social Insurance benefits; in particular they do not qualify for the State Contributory Pension (SCP).

Public servants hired on or after 6 April 1995 up to end-December 2012 have the same retirement lump sum accrual as their pre-1995 counterparts. However their pension accrual arrangements, though still based on final salary and featuring a 40-year reckonable service limit, are somewhat different. In general these post-1995 recruits accrue occupational pension as follows:

- 1/200th of final salary per year of service up to a salary point ceiling of 3.33 times the value of the SCP (ceiling equal to approximately €42,300 in 2018);

Plus

- 1/80th of final salary per year of service on the portion of final salary (if any) above 3.33 times the value of the SCP.

The lower public service pensions of these post-1995 recruits, compared with those of earlier-hired counterparts, are described as "integrated" or "co-ordinated" pensions. These post-

[27] Most employers and employees (over 16 years of age and under 66) pay social insurance (PRSI) contributions into the national Social Insurance Fund.

[28] The Social Insurance Fund is projected to fall into deficit by 2020, with increasing annual shortfalls projected from that point.
http://www.welfare.ie/en/Pages/Actuarial-Review-of-The-Social-Insurance-Fund-31-December-2015.aspx

1995 personnel usually pay full PRSI and qualify for the SCP; on that account the calculation of their occupational public service pensions is moderated downward, via the 1/200 accrual rate on the first portion of earnings. The overall "integrated" pension outcome ensuing for such persons typically means that they receive both the SCP (at full or reduced rate) and a public service occupational (PSO) pension.

Public servants hired from 1 January 2013 onward are members of the Single Public Service Pension Scheme ("Single Scheme"). This pan-public service scheme is a radical departure from the earlier "pre-existing" public service pension schemes, notably on account of the fact that members accrue pension benefits based on career average revalued earnings, rather than on final salary.

Increases in public service pension rates have historically been linked to the pay increases of equivalent public service grades, however, this non-statutory linkage lapsed in 2010 when the pay of public servants was reduced during the financial emergency.

For members of the Single Scheme, post-retirement pension increases are linked to the consumer price index (CPI), rather than pay increases[29].

Department of Public Expenditure and Reform estimates suggest that the long-term annual savings from the introduction of this scheme will amount to €1.8 billion, with over a half of those savings due to changes to indexation (CPI linkage), almost a third due to the impact of career averaging, and the remainder arising from the increase in pension age.

A significant and growing reduction in longer-term pension costs is therefore envisaged once this cohort begins to retire.

[29] The Public Service Pensions (Single Scheme and Other Provisions) Act 2012 provided that post-retirement pension increases for existing public service pension schemes could be linked to the Consumer Price Index (CPI) in the event that the Minister for Public Expenditure and Reform was to make an order to that effect.
However, the recently agreed Public Service Stability Agreement 2018-2020, commits the Government to not triggering such linkage for "pre-existing" pension schemes for the duration of this agreement.

Appendix 2: Expenditure projections scaled by GDP

Table A1: overview of long term expenditure, per cent of GDP*

	2016	2020	2030	2040	2050	2060	2070	Peak Year
Total age-related expenditure	15.2	15.0	16.6	17.8	19.4	20.0	19.3	2059
of which:								
Pension	5.0	5.1	5.8	6.7	7.4	7.2	6.6	2053
Health Care	4.1	4.3	4.6	4.9	5.1	5.2	5.1	2067
Long-Term Care	1.3	1.4	1.7	2.1	2.7	3.1	3.3	2070
Education	3.6	3.5	3.6	3.2	3.4	3.5	3.3	2026
Unemployment Benefits	1.1	0.8	0.9	0.9	0.9	0.9	0.9	2016

Figures may not sum due to rounding. * 2016 GDP figure is taken from outturn data from the CSO's 2017 National Income and Expenditure release, published in July 2018. From 2017, GDP is grown in line with the Commission's assumptions on GDP growth.
Source: Ageing Report 2018 and Department of Finance calculations.

Table A2: projected gross pension expenditure, per cent of GDP

	2016	2020	2030	2040	2050	2060	2070	Peak Year
Gross Total Pension Expenditure	5.0	5.2	5.9	6.8	7.5	7.3	6.7	2053
of which:								
Gross State Pension (SP)	3.8	3.9	4.4	5.2	6.1	6.4	6.0	2057
Public Service Occupational Pension (PSO)	1.2	1.3	1.5	1.6	1.4	0.9	0.6	2041

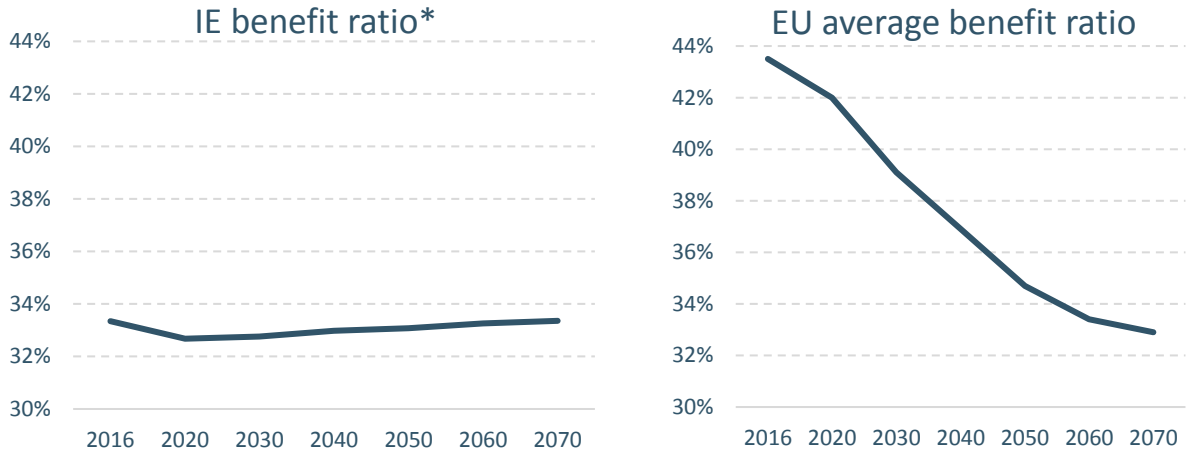
Figures may not sum due to rounding.
Source: Department of Finance calculations.

Appendix 3: Irish v EU pension benefit ratio

As highlighted in figure A1 below, the profiles of the Irish benefit ratio and the EU-average benefit ratios differ significantly. The benefit ratio in Ireland is assumed to remain broadly unchanged throughout the forecast period, in line with the commitment set out in the *Roadmap for* Pension Reform 2018-2023. This approach also conforms to the no-policy-change basis that is adopted in this report.

On the other hand, the EU average benefit ratio is set to fall significantly over the next half century. The reduction in the benefit ratio, of over 10 percentage points, is driven by reductions in the benefit ratios in almost all Member States. Particularly large declines (over 20 percentage points) are pencilled in for Greece, Poland, Portugal, Cyprus and Spain. In the Ageing Report 2018 (*op cit*), the Commission highlights that reforms leading to low benefit ratios could be politically challenging over the long-run.

Figure A1: pension benefit ratio

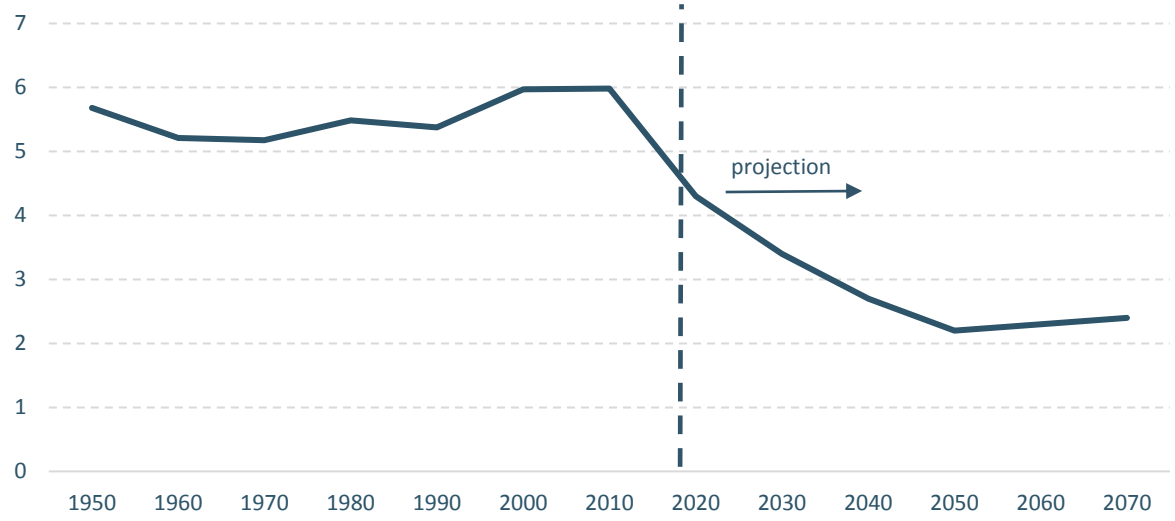


* State pension benefit ratio

Source: Ageing Report 2018 and Department of Finance calculations.

Appendix 4: Additional graphs

Figure A2: share of Irish working age to old-age population^, number



^ this is the inverse of the dependency ratio.
* Population data over 1950-2015 are sourced from the *CSO*. Population estimates from 2016 onwards are based on *Eurostat's* projections.
Source: Eurostat 2015-based demographic projections and CSO Population and Migration estimates.

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