Long-term Sustainability Report

Fiscal challenges and risks 2025-2050

Irish Fiscal Advisory Council

Publication date: 15 July 2020

ISBN 978-1-8381309-0-9

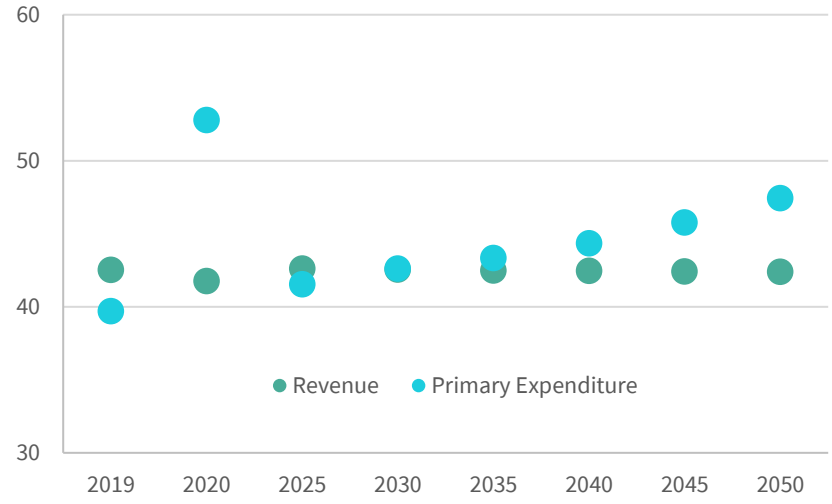
This report can be downloaded at www.FiscalCouncil.ie

Visual Summary

This report provides the Fiscal Council's assessment of the long-run sustainability of the public finances in Ireland to 2050. The projections reflect population ageing and future economic growth. As a baseline, they take current policies as maintained into the future. While long-term projections are uncertain, they can help to guide policy choices today.

Spending is projected to outpace revenue as ageing-related costs rise

% of GNI* (general government basis)



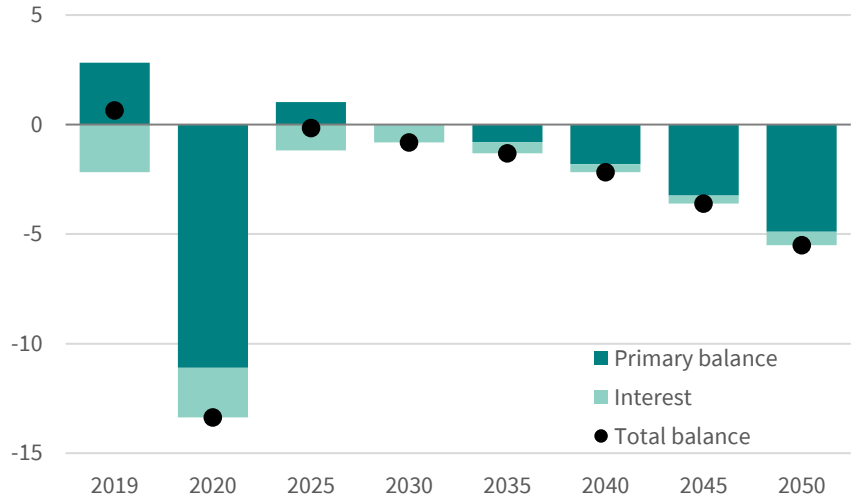
Government spending would outpace revenue growth under current policies.

While revenues are projected to remain just over 42 per cent of GNI*, primary spending rises from 40 to over 47 per cent by 2050.

Sources: Eurostat; CSO; Department of Finance; and Fiscal Council projections.

Increasingly large budget deficits would emerge after 2025 under current policies

% of GNI* (general government basis)



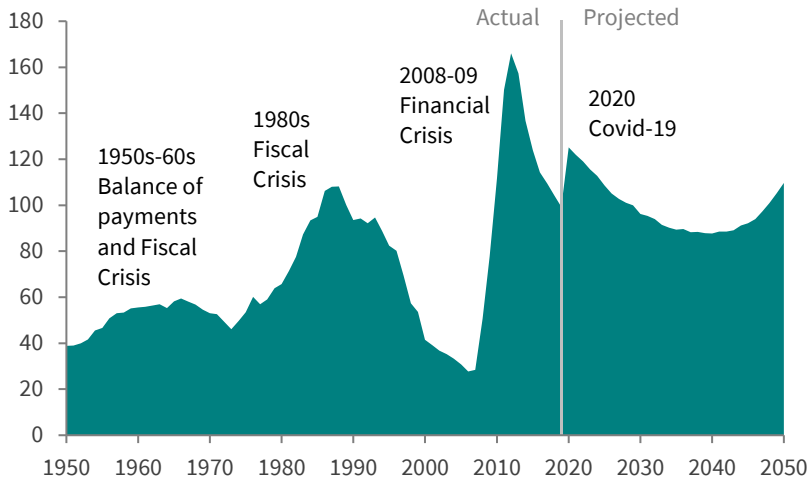
Assuming that the budget is balanced in 2025, the government deficit would grow substantially in the coming decades under current policies.

The gap between revenues and non-interest spending would rise to almost 5 per cent of GNI* by 2050.

Sources: Eurostat; CSO, Department of Finance; and Fiscal Council projections.
Note: Underlying balances are shown, which exclude financial transactions (such as bank recapitalisations) and other one-offs.

The government debt burden will rise in coming decades under current policies

% of GNI* (general government basis, gross)



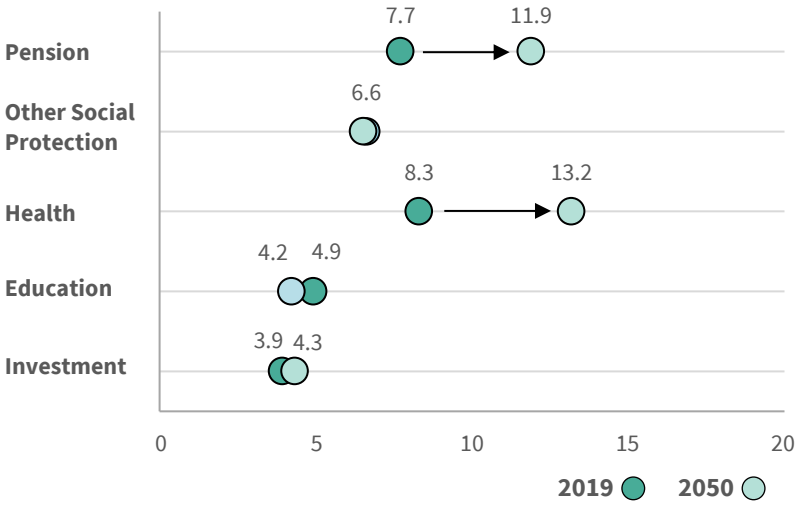
Starting from a balanced budget in 2025, the government debt burden would fall from its high Covid-19 levels to bottom out near 90 per cent of GNI* midway through the next decade.

Under current policies, the debt burden will then rise again steeply after 2040, as the population ages and as GNI* growth slows.

Sources: CSO; FitzGerald and Kenny (2018); Department of Finance; and Fiscal Council projections.
Note: Graph shows gross debt. Modified GNI* is linked to GNI for 1970–1995 and to GNP for 1950–1969.1

Spending increases will be driven by pensions and health care

% of GNI* (general government basis)



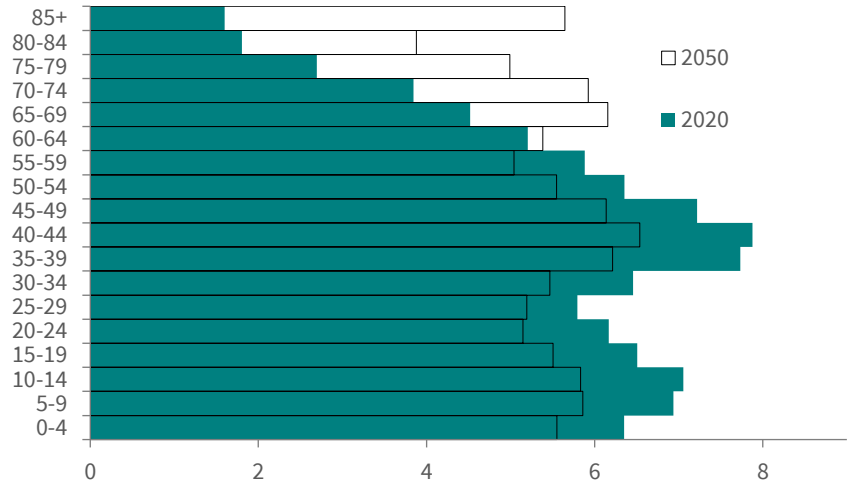
The increase in government spending as a share of GNI* is primarily driven by areas affected by ageing and higher health costs.

Under current polices, government spending on pensions would rise from 7.7 per cent of GNI* to 11.9 per cent in 2050. Health spending would rise from 8.3 per cent to 13 per cent.

Sources: Eurostat; CSO; Department of Public Expenditure and Reform; Department of Finance; and Fiscal Council projections.
Note: Pension includes public sector pensions; Health includes long-term care.

Older age groups are projected to grow faster than other age groups

Age Cohort as % total population



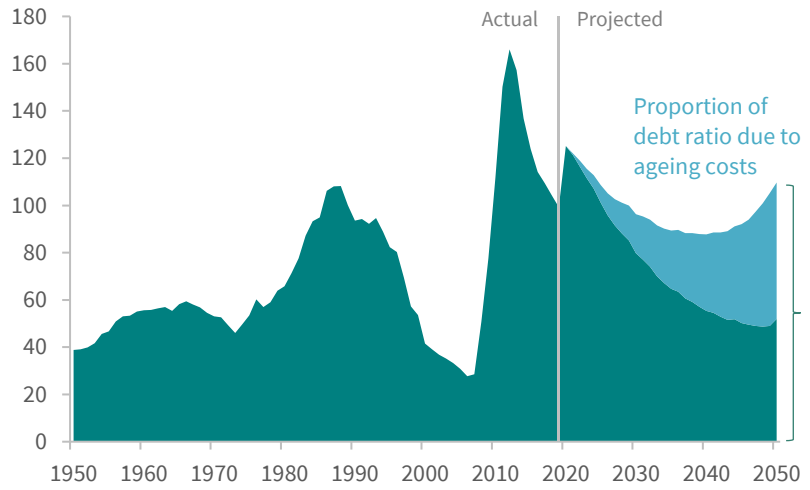
The rise in public spending on health and pensions primarily reflects an ageing population.

Older people will represent a higher share of the population, with the share of ages 65+ increasing from 14 per cent in 2020 to almost 27 per cent by 2050.

Sources: CSO; and Fiscal Council projections.
Note: The bars are in terms of shares of 5-year age cohorts, except for the 85+ age category. The underlying total population is 4.9 billion in 2020 and 6.0 billion in 2050.

Ageing costs are set to add significantly to the debt burden

% of GNI*

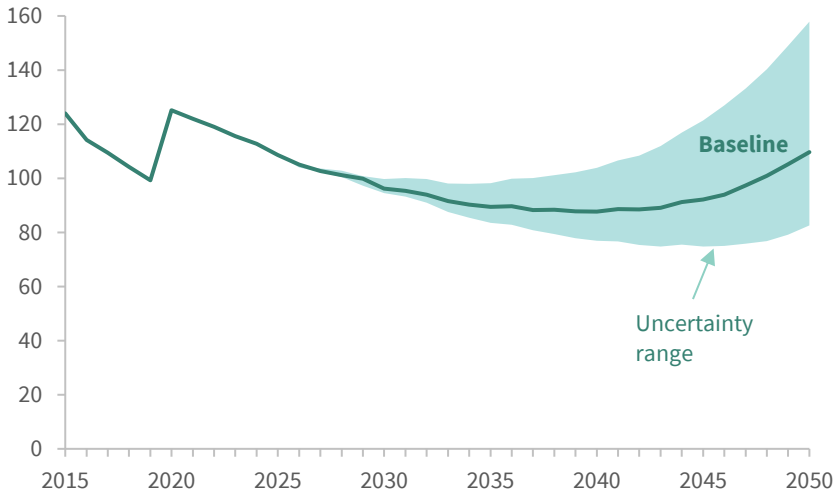


Under current policies, ageing-related costs will add to the debt burden, diverting it from a steady decline from 2025 to reach a higher trough before rising again. Around half the debt burden in 2050 would reflect unfunded ageing costs.

Sources: Fiscal Council workings.
Note: The blue shaded region shows the proportion of the baseline debt ratio that can be attributed to an ageing population relative to 2020 demographics. See Section 3.6 for details.

There is significant uncertainty about future fiscal challenges given risks around growth

General government gross debt as a % of GNI*



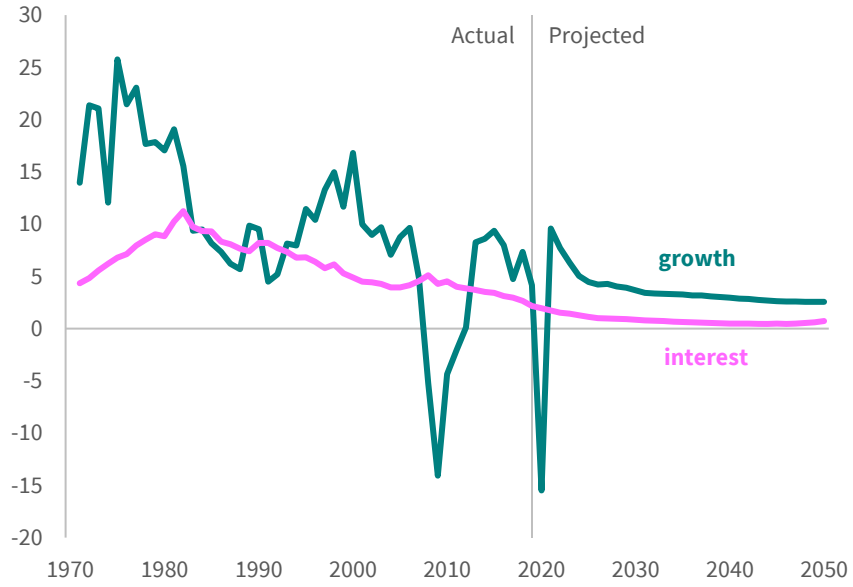
There is substantial uncertainty around long-term growth, migration and labour market projections.

Under a range of economic scenarios, gross debt is projected to range from 83 per cent to 158 per cent of GNI* by 2050.

Sources: CSO; Department of Finance; and Fiscal Council projections.
Note: The uncertainty range is based on alternative assumptions for TFP growth over the long run of +/- 0.5 percentage points. This roughly corresponds to the middle two-thirds of the range of potential outcomes estimated under various approaches. The range also includes participation rates +/- 5 percentage points (ages 20–64) and the higher/lower migration consistent with growth.

Ireland's interest-growth differentials are projected to be very favourable, but there are risks

%



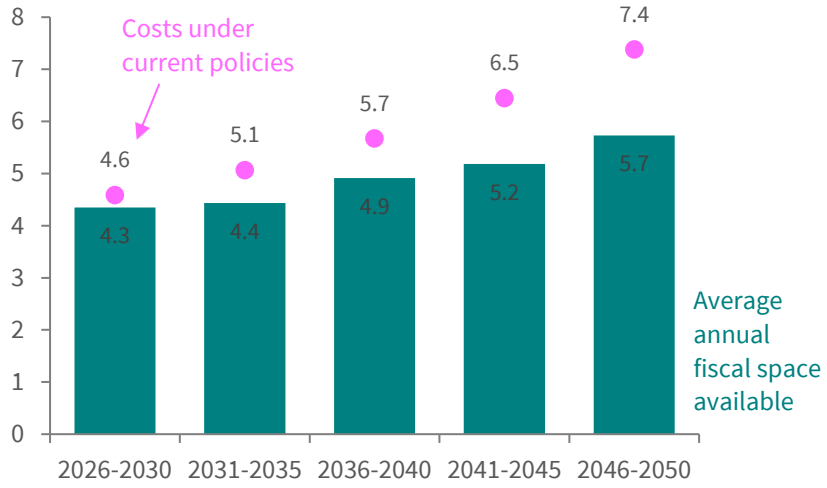
Ireland is projected to experience favourable debt dynamics, helping to keep the debt burden on a downward path over the next 10–15 years.

However, interest rates might rise without any increase in nominal growth rates for Ireland, reversing these dynamics.

Sources: CSO; and Fiscal Council projections.
Notes: "Growth" refers to annual nominal GNI* growth rates. "Interest" is the average effective interest rate on government debt (calculated as general government interest costs over the previous period's general government debt).

Ageing pressures mean that the cost of maintaining existing services levels each year would exceed the available fiscal space

€ billion



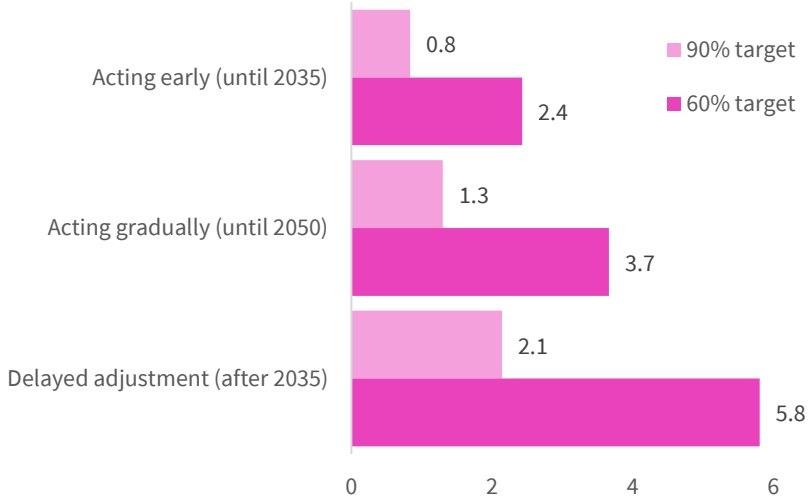
The cost of "standing still' in policy terms will increase at a faster pace than fiscal space generated by growth from 2026. This would require offsetting tax and spending measures.

By the early 2030s, this cost exceeds the available fiscal space by on average €1.7 billion per year.

Source: Fiscal Council workings.
Note: It is assumed potential growth equals actual growth over the long term. The fiscal space available for each year is determined by the previous year's policy spending multiplied by the current year's nominal growth rate. See Section 3.5 for further details.

Strengthening the public finances earlier would ultimately require less adjustment

Fiscal adjustment required after 2025 to stabilise debt by 2050, cumulative % of GNI*



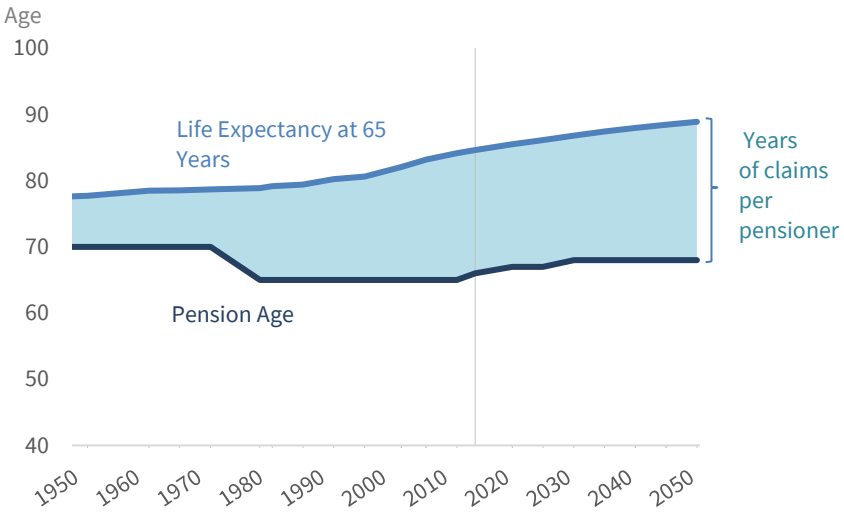
Acting sooner to manage ageing challenges would ultimately cost less.

To keep debt from rising back above 90 per cent of GNI*, governments would have to reduce spending or raise additional revenues by 0.8 per cent of GNI* if action is taken early but by 2.1 per cent if delayed to after 2035.

To reduce debt to 60 per cent of GNI*, larger adjustments would be needed.

Source: Fiscal Council workings.

Allowing the pension age to follow rising life expectancy would help to stabilise the public finances



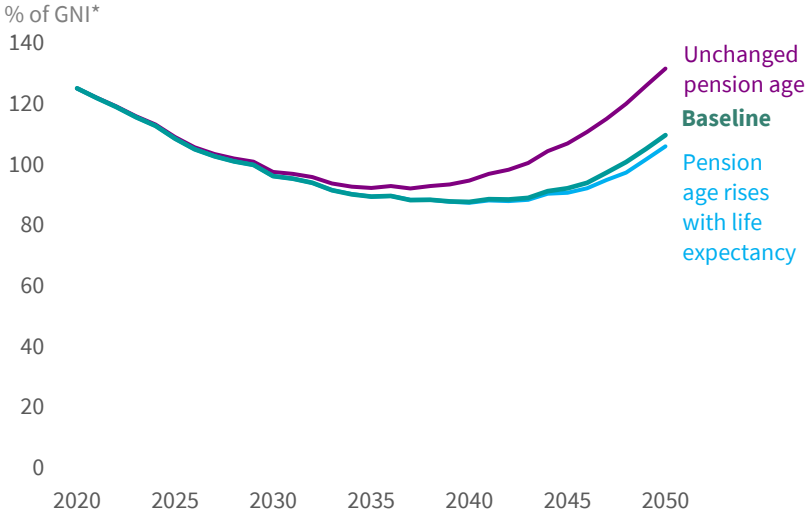
Pension policies have a clear link to spending pressures associated with ageing.

Ireland's pension age has been relatively constant over time, while average life expectancy has risen significantly.

Relative to a constant pension age scenario from 2020, adjustment with increases in life expectancy would initially save the Government some 0.3 per cent of GNI* annually, rising to 1.1 per cent by the late 2040s.

Sources: CSO; Government of Ireland; and Fiscal Council workings.
Note: The baseline includes legislated adjustments to the pension age in 2021 and 2028.

Gross debt is sensitive to different pension-age policies



Keeping the state pension age at its current level (66) would imply higher spending and gross debt.

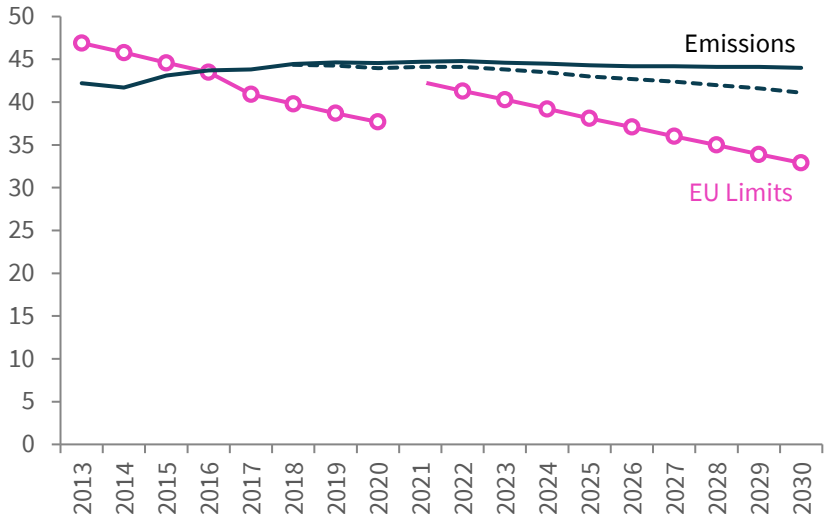
Increasing the pension age in 2021 and 2028 in line with current legislation would improve sustainability.

Continuing to increase the pension age as life expectancy increases in future decades would contribute further to slowing the rise in spending and debt ratios.

Sources: CSO; Department of Public Expenditure and Reform; Department of Finance; and Fiscal Council projections.
Note: The debt-ratio scenarios assume a pension age that rises to 67 in 2021 and then to 68 in 2028 in the baseline scenario, compared to a constant pension age of 66 (upper range) and pension age dynamically changing with projected life expectancy (lower range).

Ageing costs will come at a time when Ireland will face other challenges such as climate change

Levels of greenhouse gas emissions (Mt CO_2eq)



Ireland will face challenges from climate change, in terms of its adverse effect on both the economy and on the public finances.

Delaying action on climate change mitigation may mean that more drastic and costly measures may be required. This could come at the same time as Ireland is facing significant challenges from ageing pressures.

Sources: Climate Change Advisory Council (2019); and Fiscal Council workings.
Note: Original data are taken from the EPA (2019) National Emissions Inventory, Ireland's Greenhouse Gas Emissions Projections 2018–2040 and Effort Sharing Regulation (2016).

Foreword

The Irish Fiscal Advisory Council was established as part of a wider agenda of reform of Ireland's budgetary architecture. The Council was initially set up on an administrative basis in July 2011 and was formally established as a statutory body in December 2012 under the *Fiscal Responsibility Act*. It is a public body funded from the Central Fund, with the terms of its funding set out in the *Fiscal Responsibility Act*.

The mandate of the Irish Fiscal Advisory Council is to:

- endorse, as it considers appropriate, the macroeconomic forecasts prepared by the Department of Finance on which the Budget and Stability Programme Update are based;
- assess the official forecasts produced by the Department of Finance;
- assess government compliance with the Budgetary Rule;
- assess whether the fiscal stance of the Government in each Budget and Stability Programme Update (SPU) is conducive to prudent economic and budgetary management, including with reference to the provisions of the Stability and Growth Pact.

The Council's acting Chairperson is Mr Sebastian Barnes (Organisation for Economic Co-operation and Development). Other Council members are Dr Martina Lawless (Economic and Social Research Institute), Prof. Michael McMahon (Professor of Macroeconomics at the University of Oxford and Tutorial Fellow of St Hugh's College), and Ms Dawn Holland (Visiting Fellow, National Institute of Economic and Social Research). The Council's Secretariat consists of Dr Eddie Casey, Ms Friederike Vogler, Mr Niall Conroy, Mr Kevin Timoney, Mr Killian Carroll, Ms Karen Bonner, and Dr Elliott Jordan-Doak. The Council would like to acknowledge the kind help from staff at the CSO, ESRI, NTMA, the Department of Finance, the Department of Public Expenditure and Reform, the Health Service Executive and the Healthcare Pricing Office. The Council would also like to thank Dr Rachel Finnegan for copy editing the report.

More information on the Irish Fiscal Advisory Council can be found at www.FiscalCouncil.ie

Summary Assessment

Covid-19 will have a major impact on the economy and public finances over the coming 5 years, yet there are serious long-term fiscal challenges ahead that should also form an important part of today's budgetary decisions. This is the Council's first *Long-Term Sustainability Report*. The report assesses Ireland's long-term fiscal challenges and risks. The fiscal challenges arising from the legacy of very high government debt following the Covid-19 shock are being extensively discussed. Ireland's low cost of borrowing, alongside some fiscal adjustment once the economy has recovered, should play a key role in returning the debt ratio to a safe downward path. However, longer-term challenges, including those associated with a rapidly ageing population and health care costs, have received less coverage.

Economic growth is set to slow over the coming decades. As a small, highly-open economy in the Euro Area and the European Union (EU), Ireland has achieved remarkable income growth averaging 3.1 per cent per year, over recent decades, in real terms. Yet, the pace of growth has slowed since 2000. This report projects that growth will slow further over the coming decades before converging to a long-run growth rate of around 1 per cent. This is largely driven by a slowdown in labour-productivity growth. Ireland currently has relatively high labour productivity compared to elsewhere in the OECD and the scope for "catch up" growth is therefore limited. A general slowdown in productivity growth across OECD countries over the past decade also suggests that economic growth could be expected to slow.

While Ireland has a relatively young population, this is projected to radically change in the coming decades. The number of people over the age of 85 is likely to increase fourfold between 2020 and 2050. By contrast, the rest of the population is projected to expand by much less, rising by just 17 per cent. This rapid ageing of the population structure marks Ireland out as one of the fastest-ageing populations in the EU; Ireland is catching up in terms of ageing.

A measure of Ireland's ageing is the "old-age dependency ratio". This ratio measures the population aged 65 and over as a share of those aged 15–64 and is projected to more than double from 22 per cent in 2020 to 47 per cent in 2050. While the share of older people in Ireland is relatively low today by European standards, the population will age relatively fast so that the dependency ratio will reach the current EU average by the mid-2030s. The ageing process is set to accelerate in the 2030s and 2040s.

The ageing of the population has major implications for public spending. Government spending on state pensions, public service pensions, health, and long-term care will increase in real terms as the population ages. Under current policies, combined spending on pensions and health care is projected to increase from 13.3 per cent of GNI* in 2019 to almost 25 per cent in 2050, particularly after 2030. The projections assume that service levels remain constant and that social payments (such as pensions) rise in line with wages.

Without policy changes, spending growth will outstrip the rise in revenues, leading to large budget deficits after 2025. Without policy changes, the government deficit would gradually increase as a result of a growing and ageing population. Changing demographics will add to spending every year over the long run (2031–2050). Spending on age-sensitive areas like health and pensions will rise by a combined 0.25 percentage points of GNI* per annum over this period. This incremental rise in yearly spending would have substantial impacts on the government debt burden over the long run. Unlike the impacts associated with Covid-19, these are likely to be long-lasting changes.

Under current policies, ageing costs prevent a larger decline in the debt ratio, and it will start to rise again from 2040. Reaching a budget balance by 2025 would, in the absence of ageing pressures, put the debt ratio on a steady downward path to safer levels. Very low interest rates are central to this outcome but should not be taken for granted. However, under current policies and due to ageing, projections suggest that the debt-to-GNI* ratio will only fall to around

90 per cent by 2040 and then rise substantially, reaching around 110 per cent of GNI* in 2050.

Ageing and health pressures mean the cost of maintaining existing services levels each year will exceed the available "fiscal space" — a yearly measure of available new resources. Government spending is set to increase at a faster pace in the late 2020s than the pace at which fiscal space will be created — that is, the amount of additional revenue created by economic growth. For 2026–2030, the fiscal space generated by sustainable growth will be more than fully absorbed just by maintaining existing policies. This will require tax or spending adjustments to maintain a fiscal balance. By the early 2030s, costs will exceed the available fiscal space by on average €1.7 billion (0.3 per cent of GNI*) per year.

To ensure long-term fiscal sustainability, policymakers need to adjust policies over time. The adjustment to policies could be achieved in different ways. Ageing costs could be managed through broad revenue-raising measures or through spending cuts. Building up large fiscal balances, creating a fund, and reducing debt more rapidly over the next decade are options that are similar in impact and could help to smooth future fiscal pressures. Within pensions, ageing pressures could be managed by reducing benefits through indexing to prices (rather than wages as assumed in this report) or other changes, by raising the retirement age or by raising PRSI contributions. This could be supported by developing a second contributory pillar or by encouraging more private pension saving. Measures to boost growth could also raise revenues. However, given the scale of the challenges, a combination of measures is likely to be needed.

Adjusting the pension age in line with rising life expectancy would make the system more sustainable. Despite significant improvements in life expectancy, the retirement age in Ireland has remained relatively constant over time. The pension age was 65 in 1980, rose to 66 in 2014 and current legislation stipulates an increase to 67 in 2021 and 68 in 2018, with no further increases anticipated to 2035.

However, the new Programme for Government envisages keeping the pension age at 66 pending a review. By contrast, average life expectancy at age 65 has risen from 79 in 1980 to almost 85 in 2016 and is projected to rise further to 89, by 2050. Raising the pension age, as many other countries have done, would help to keep contributions and benefits closer to existing levels. A scenario where the pension age rises partly in line with life expectancy would produce annual savings of 0.3 per cent of GNI* initially, rising to 1.1 per cent of GNI* by the late 2040s relative to a situation where the pension age is unchanged at 66.

Strengthening the public finances earlier or making reforms sooner would reduce the scale of adjustment needed. Taking action earlier to strengthen the budget balance through increases in revenues or decreases in spending would ultimately require less fiscal adjustment overall. If these adjustments took place from 2026–2035, they would be less than half the scale of required adjustments if delayed until 2036–2050. Timely action to reform the pension system, including pension age increases, would reduce the impact of ageing costs.

A credible plan to address long-term pressures needs to be developed and implemented. Ireland has a mixed history in addressing pension reform with the pension age not having followed rising life expectancy and numerous official reports that have not lead to change, despite measures in some areas such as public sector pensions. Failure to implement the legislated increases in the pension age planned for 2021 and 2028 would raise spending and contribute to a rising debt burden over time. Not increasing the pension age as planned in 2021, for example, would add up to €575 million to annual spending, with this cost steadily rising over time. The proposed pension review set out in the *Programme for Government* should lead to credible commitments that ensure the sustainability of the pension system.

There is significant uncertainty about the scale of future fiscal and ageing challenges. Much will depend on Ireland's productivity growth, participation in the workforce, and the extent to which demand for

healthcare increases with incomes. Different plausible outcomes for some of the key macroeconomic variables could lead to gross government debt levels under current policies ranging from 83 to 158 per cent of GNI* by 2050.

The implementation of Sláintecare could add substantially to spending. Sláintecare—a large programme of reforms to how health care is provided in Ireland—is expected to lead to higher government health spending. While it could lead to cost-savings and reduce health costs to households, full implementation would be expected to add a further 1.1 percentage points of GNI* to government spending in 2030, rising to 1.2 percentage points by 2050 against the background of rising costs in healthcare.

Potential losses of corporation tax receipts remain an important fiscal risk. The OECD BEPS initiative is assumed in the baseline projection reduce receipts by €2 billion. In addition, other changes in the international tax environment could further impact on Irish corporation tax receipts. Based on the Council's 2019 estimates of excess receipts, a further cumulative fall in annual receipts of €3.5 billion would put further pressure on the public finances.

Over the long term, climate change poses significant risks to fiscal sustainability. Climate change could significantly impact on economic activity and long-run growth prospects. In addition, some specific revenue items (including excise, vehicle registration tax, motor tax and carbon tax) are likely to be impacted as behaviour changes in response to climate change mitigation policies. While adapting the economy to lower carbon emissions may have positive effects on employment and investment, it may also carry costs for both growth and the public finances. As with other long-term fiscal challenges, delaying adjustment may ultimately be more costly.

Contents

1. Introduction

This is the Council's first *Long-Term Sustainability Report*. It looks at public finances over the coming decades to 2050, as the population ages and the economy continues to grow. Starting from a very high post-Covid-19 government debt level, it focuses on the implications for the sustainability of the Irish public finances given current trends and known risks.

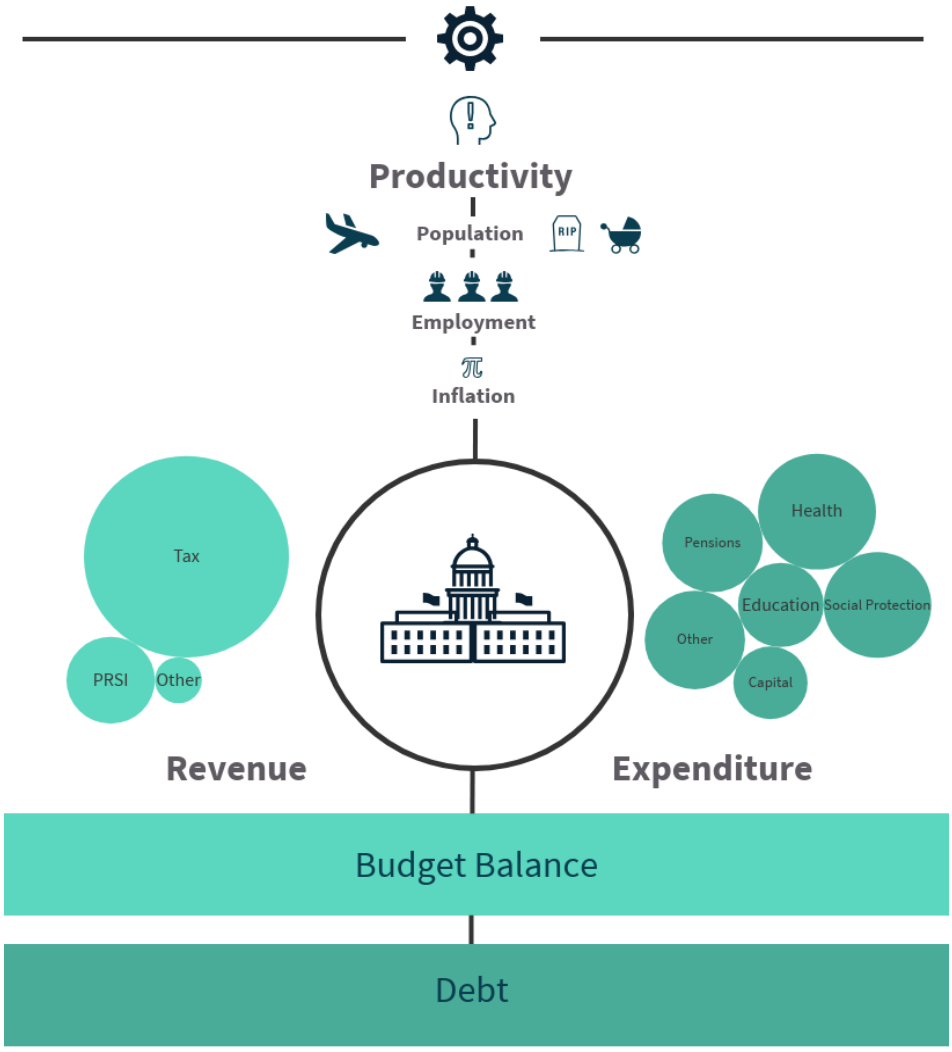
The *Long-Term Sustainability Report* primarily focuses on changes in government spending. It shows how pressures from an ageing population, rising prices, and wages will lead to much higher levels of government spending as a share of national income, absent any policy changes. It focuses on the expenditure that would arise if current service levels and welfare/pension rates were held at the same level in real terms. While policy and society will undoubtedly change over the coming 30 years, population ageing and cost pressures are likely to have an important bearing on the sustainability of current policies.

Starting from a balanced budget in 2025, the rapid ageing of Ireland's population is expected, under current policies, to see the gap between spending and revenue widen midway through the following decade. Budget deficits will gradually expand, hindering the decline in the debt ratio to GNI* that would otherwise occur, driving an increase in the debt burden from around 2040. This will require the making of difficult decisions to ensure the sustainability of the public finances.

Assessing the long-term path for the public finances is not explicitly part of the Council's mandate. However, its mandate does include assessing the appropriateness of the fiscal stance. The sustainability of today's commitments over the coming decades is an essential consideration for assessing how prudent the current fiscal stance is and for understanding budgetary forecast dynamics. The Council therefore views this analysis as an important part of its work in fulfilling its mandate under the Fiscal Responsibility Act.

This report develops projections of the public finances on the basis of consistent macroeconomic and demographic projections. The broad model can be represented by the graphic below. It starts with assumptions for Irish productivity growth, which is an important driver of migration. The migration forecast is then

used to form consistent demographic projections. These, along with productivity developments, play a key role in driving other macroeconomic projections. All these variables determine the model's government revenue and expenditure projections. Expenditure broadly depends on demographic and inflationary pressures, while revenues are largely assumed to grow with economic activity. An accompanying methodological document (Fiscal Council, 2020b) outlines the methodological details in full.



The rest of the report is structured as follows: Section 2 outlines the Economic Projections and explains the key assumptions underpinning these; Section 3 shows the resulting Fiscal Projections; Section 4 discusses policy implications that arise from the projections; and Section 5 assesses some sensitivities and risks around the projections.

2. Economic and Demographic Projections

The *Long-Term Sustainability Report* relies on new economic projections developed by the Council that are formed on the basis of consistent macroeconomic and demographic underpinnings. The accompanying methodological document (Fiscal Council, 2020b) gives further detail on the methodology underpinning the projections in this report.

The projections start from the "Central" Scenario of the Council's *May 2020 Fiscal Assessment Report* and extend this to 2050, using a standard "growth model" approach. Chapter 2 starts by outlining the modelling approach, and then details the macroeconomic and demographic projections.

2.1 Modelling Approach

The broad modelling approach can be summarised in three steps. First, an assessment of future productivity growth is made, based on several factors described below. Second, the Irish population is projected, based on the Council's demographics and migration models, with migration being influenced by the growth of Ireland relative to other countries and other factors in a gravity model setting. Third, these projections are combined with consistent assumptions for other macroeconomic variables, such as investment, inflation, labour market participation, and employment (consistent here meaning that this step is consistent with the first two steps in the modelling approach). These macroeconomic and demographic projections then feed into the fiscal projections.

At the heart of the Council's long-run projections is an assumption about total factor productivity (TFP) growth rates likely to be observed in future. TFP growth is the part of growth not explained by the accumulation of inputs from labour (total hours worked in the economy) and capital (including infrastructure and machinery and equipment). It is typically assumed to reflect advances in production technologies and processes. TFP is key to how economists think about growth over the long run. It is central to the macroeconomic projections and is a key driver of long-run sustainable growth. The approach is based on the idea of convergence across countries in TFP growth rates, with an assumption about growth of the technological frontier. The estimates are informed by regional analysis across the OECD, the historical performance of the domestic Irish economy, and comparative performances of advanced economies.

The population dynamics in this report are captured through (1) the Council's cohort-component model and (2) a gravity model of migration flows to and from Ireland. Migration plays an important role not only in the overall size of the population, but also the age structure. The projections in this report link migration flows to a number of factors, including Ireland's economic performance. The assumptions for mortality are taken from the CSO population projections, whereas fertility assumptions are based on Council modelling of age-specific fertility rates.

The cohort-component model is a comprehensive approach to projecting population changes. It involves modelling population dynamics as a combination of

developments in fertility rates, survival probabilities and migration flows, based on a detailed modelling of single-year age cohorts. This means modelling the behaviour of each age cohort of the population at each point in time. This methodology is widely used by statistics offices and forecasting bodies.

The migration model is a so-called "gravity model". It explains migration flows between individual countries, based on macroeconomic fundamentals such as economic growth and demographics. Broadly speaking, faster-growing economies attract more migrants, while factors such as shared language, existing migrant populations, and proximity are important in such models. The model is detailed in Osés Arranz (2019).

The growth in the total amount of hours worked in the economy is determined by the population projections developed in the Council's demographics models, together with three key assumptions:

(1) that labour force participation rates will continue to follow recent trends by age and gender;

(2) that the unemployment rate will tend towards 5½ per cent over the long run; and

(3) that average hours worked per week will remain relatively stable, in line with trends in past years.

The contributions to growth from capital accumulation rely on three key assumptions:

(1) that future governments will stick to targets set out in recent official publications for public investment rates equivalent to 4 per cent of GNI* on average;

(2) that private investment rates as a percentage of GNI* will converge on their long-run norms (19 per cent); and

(3) that depreciation will remain constant at recent rates (about 6 per cent).

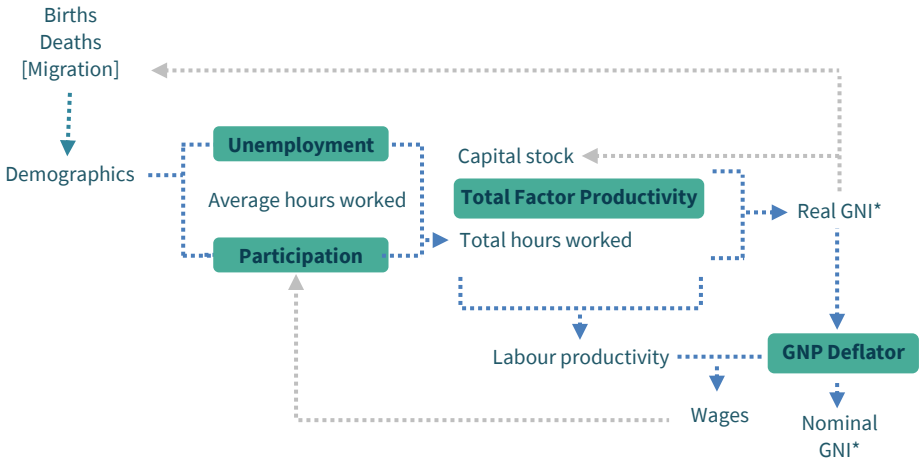
These assumptions determine how the capital stock will evolve and contribute to overall growth.[1]

The combination of assumptions about labour, capital and productivity determines how the economy is projected to perform. Some of the key macroeconomic variables are co-determined. For example, real GNI* depends on migration as it adds to the labour supply. But migration is also influenced by real GNI* growth in Ireland relative to other countries (with higher incomes in Ireland making it relatively more attractive to migrate to). This requires some iteration to find a stable solution. Another example would be to expect a positive relationship between wages and participation in the labour force. While the baseline does not formally model this link, the relationship is recognised when looking at the growth uncertainty range (Section 5.6).

Ireland's inflation rates are assumed to converge on the ECB's price stability objective for the Euro Area of below, but close to, 2 per cent over the long run. This applies to the Harmonised Index of Consumer Prices (HICP) as well as the GNP deflator, imposing that the two indicators are broadly similar over the coming decades. While in recent years the HICP has been below this target and the GNP deflator has varied relatively widely with GNP, both are modelled to stabilise over the medium run.

[1] An adjusted net capital stock based on the concept of Domestic GVA that strips out distortions associated with foreign-owned multinational enterprises.

Figure 2.1: The macroeconomic projections rely on four key assumptions



Other macroeconomic variables, such as nominal gross national income (GNI*) growth and wage growth, are then derived from the four key variables (highlighted in green in Figure 2.1): unemployment, participation rates, TFP and the GNP deflator. All these drivers are summarised in Table 2.1 and in Section 2.2.

2.2 Macroeconomic and Demographic Baseline

Ireland is a small, highly open economy in the Euro Area and the EU. On average, it has achieved remarkable income growth of 3.1 per cent per annum over recent decades, although the pace has slowed since 2000.

Given its size and openness, Ireland's growth can vary very widely, with migration and investment flows adjusting. Strong specialisation in certain activities makes its prospects highly sensitive to developments in specific firms and sectors. In this context, the economic baseline is derived considering trends in other similar economies as well as domestic factors.

Table 2.1: Summary of macroeconomic variables

% change year-on-year unless otherwise stated

Indicator	**2021–2025** Short run	**2026–2030** Convergence to long run	**2031–2050** Long run
Real GNI* growth	5.0	2.1	1.0
Total factor productivity	2.5	0.8	0.4
Labour inputs (p.p. contribution)	2.0	0.6	0.2
Capital inputs (p.p. contribution)	0.7	0.7	0.4
GNP deflator	1.6	1.9	1.9
HICP	1.1	1.9	2.0
Average effective interest rates on government debt (%) [1]	1.4	0.9	0.6
Labour Market			
Participation rate (%, ages 15+)	61.0	60.4	59.5
Participation rate (%, ages 20–70)	72.7	72.8	74.6
Unemployment rate (%)	6.9	5.3	5.5
Employment growth	2.9	1.0	0.3
Labour productivity growth	2.0	1.1	0.7
Average wage growth	2.0	2.7	2.6

Sources: CSO; Department of Finance; and Fiscal Council workings.
Note: Average hours worked per person are assumed constant from *Labour Force Survey 2019*. The participation rate depends on demographics; for assumptions on cohort-specific Labour Force Participation Rates, see Fiscal Council (2020b). For the medium term (2020–2025), we rely on the latest forecasts from the Department of Finance, which are extended beyond 2021 in the Council's central scenario of its *May 2020 Fiscal Assessment Report*. Thereafter, the projections converge on the Council's long-run assumptions over a five-year window. [1] Average effective interest rates are generated endogenously based on Euribor forward rates, changes in the debt ratio, and outstanding debt securities (see Section 3).

Some of the key macroeconomic projections underpinning this report are set out in Table 2.1. The table splits developments between: (1) the short run, largely based on the Central Scenario of the *Fiscal Assessment Report May 2020* and a period directly impacted by Covid-19; (2) a convergence period to 2030, where some of the strength of the pre-Covid period returns; and (3) the long run, where longer-term assumptions for steady state growth, given expected demographic changes, prevail.

The long-run projections focus primarily on the domestic economy as an outcome, with GNI* as the main measure of national income — one that excludes activities predominantly accounted for by foreign-owned multinational enterprises.[2] The excluded activities tend to have a weaker relationship with tax revenues and the firms involved can vary their production substantially, with little dependence on domestic factor inputs (Casey, 2019).

The Council's long-run projections assume TFP growth of close to an average of 0.4 per cent per annum. The Council's assessments of how TFP will evolve are partly informed by: (1) historical evidence for Ireland's domestic economy; (2) a related analysis of labour productivity (output per worker), given regional performances in OECD countries (Box A); and (3) a comparative assessment of growth rates in other advanced economies.

The long-run TFP growth rate of 0.4 per cent is close to the average observed over the period since 2000 for the domestic economy, though productivity growth has tended to be highly volatile (CSO, 2019a and Figure 2.2).[3] Longer-run data point to a downward trend in labour productivity growth rates for the domestic economy, which would be consistent with decelerating TFP growth. Labour productivity growth is closely related to TFP growth and can be expressed as the sum of TFP growth and the contribution from "capital deepening", which is the increase in capital inputs per hour worked. Average growth rates in labour productivity have fallen from 3.7 per cent on a GNI* basis and 2.4 per cent on a domestic GVA basis in

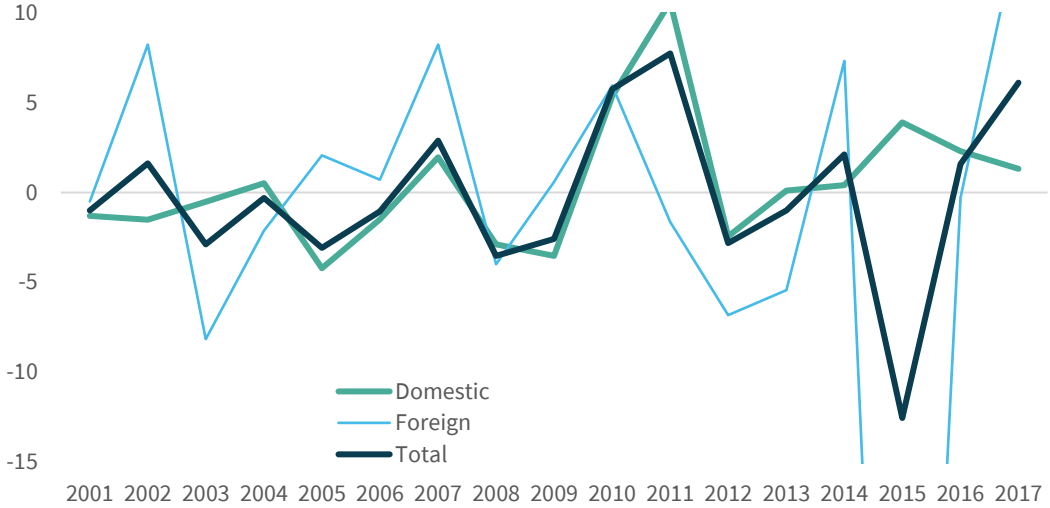
[2] Modified GNI* is an indicator produced by the Central Statistics Office (CSO) to exclude globalisation effects disproportionally impacting the measured size of the Irish economy.

[3] The CSO's (2019a) *Productivity in Ireland* publication computes the closely related multi-factor productivity for sectors other than those dominated by foreign-owned multinational enterprises as averaging 0.5 per cent per annum over the period 2000–2017.

the 1960s and 1970s to 1.2 per cent and 1.4 per cent, respectively, since the early 2000s, excluding the financial crisis period (Box A).

Figure 2.2: Ireland's recent historical total factor productivity growth

% change year-on-year



Source: CSO (2019a).
Notes: TFP is calculated as a residual, given the accumulation of labour and capital inputs. The "foreign" and "domestic" split used by the CSO separates the economy into sectors that are foreign dominated, domestic and other. Foreign-owned multinational enterprise-dominated NACE A64 sectors occur where multinational enterprise turnover on average exceeds 85 per cent of the sector total. All other sectors are categorised as domestic and other sectors. The vertical axis is tapered, with the 2015 foreign observation representing a large outlier (-65 per cent).

Productivity growth rates are likely to moderate further in the future, as labour productivity converges on regions with already high levels of productivity. Compared to other OECD regional economies, the Irish economy already has a relatively high level of labour productivity, even when distortions arising from multinational enterprises are removed (Box A). This suggests that Ireland has low potential to benefit from "catch up" growth. A generalised slowdown in productivity growth across OECD countries over the past decade also suggests that the economy could be expected to show relatively more moderate labour productivity growth in the long run.

The productivity assumptions are crucial and highly uncertain. As highlighted by Crafts (2019), much will depend on the future technology absorption capacity outside the multinational sector in Ireland, as well as the successful redeployment of workers over time, as technologies change and as new industries develop.

Box A: Looking at Ireland's productivity growth in a regional context

This box looks at prospects for Ireland's labour productivity growth. Labour productivity (output per worker) will be a key determinant of future living standards, with investment, education, technology and other innovations playing a role in raising productivity. However, there is considerable uncertainty about how it will evolve.

One way to shine some light on how Ireland, as a small economy in a larger economic area, might be expected to perform is by looking at regional outcomes across the OECD. Compared to other OECD regional economies, Ireland as a whole already has a relatively high level of labour productivity. This is clear even when distortions arising from multinational enterprises are removed.

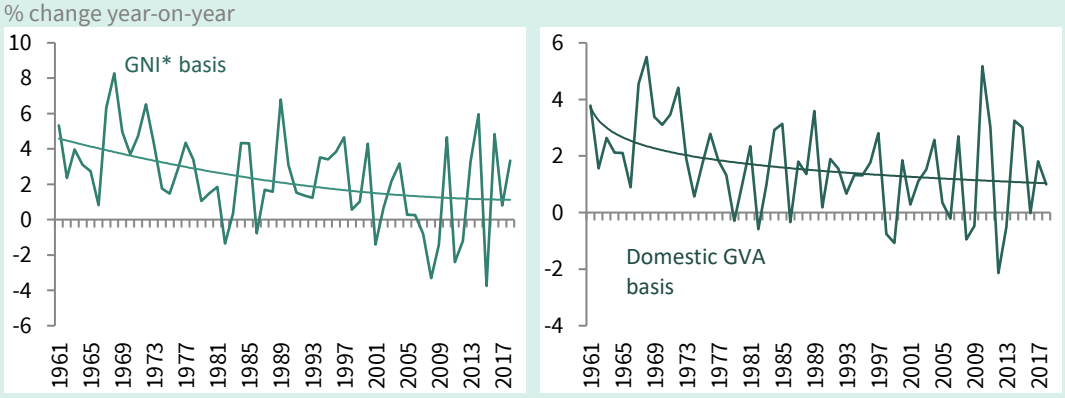
The higher relative starting level of productivity would suggest that Ireland has low potential to benefit from "catch up" growth and that many of the margins for better performance have already been exploited. Together with a generalised slowdown in productivity growth in Ireland and across OECD countries over the past decade, Ireland's now-relatively productive labour force suggests that the economy could be expected to show moderate labour productivity growth in the long run.

Historical Irish labour productivity growth

Irish labour productivity growth rates have historically been very high. If we take available data from 1961 to 2018, we can see that labour productivity growth rates, while volatile, have generally been declining. This is true, if we take output to be measured by modified real GNI* or real Domestic GVA — two measures designed to remove distortions related to the foreign-owned multinationals. The trend would be flatter if we were to ignore the financial crisis period, though it would still show a steady decline.

Figure A.1: Irish labour productivity growth on a GNI* and Domestic GVA basis

% change year-on-year



Sources: CSO; AMECO; and Fiscal Council workings.

Note: Real GNI* data are extended back using gross national income data prior to 1995 (this assumes that distortions are less of an issue in earlier time periods). Domestic GVA data are backcast for the period before 1995, by exploiting their relationship with GNP (see Casey, 2019).

It is easier to see these trends if we take periodic averages as in Table A.1. Here, we can see that average growth rates in labour productivity have fallen from 3.7 per cent on a GNI* basis and 2.4 per cent on a domestic GVA basis in the 1960s and 1970s to 1.2 per cent and 1.4 per cent, respectively, since the early 2000s (when the financial crisis is excluded).

Table A.1: Declining labour productivity

% change year-on-year

	GNI* basis	Domestic GVA basis
1961–1980	3.7	2.4
1981–2000	2.4	1.3
2001–2018	0.8	1.2
2001–2018[1]	1.2	1.4

Sources: CSO; and Fiscal Council workings.

[1] Excluding the financial crisis (2008–2009)

Without detailed capital stock data, it is difficult to tease out the drivers of labour productivity growth in terms of TFP growth and capital deepening. Yet a labour share of about 50 per cent and stable investment would be consistent with TFP growth of 0.4–0.7 per cent from 2001.

Regional labour productivity growth in the OECD

It is useful to consider the outlook for Ireland's future labour productivity performance, in terms of the extent to which it has already developed into a highly productive economy. The OECD "Regional Database" provides a set of comparable statistics on approximately 2,000 regions in 36 OECD countries. Using this, we can see what kind of labour productivity growth has been observed, on average, in recent decades for various regions.

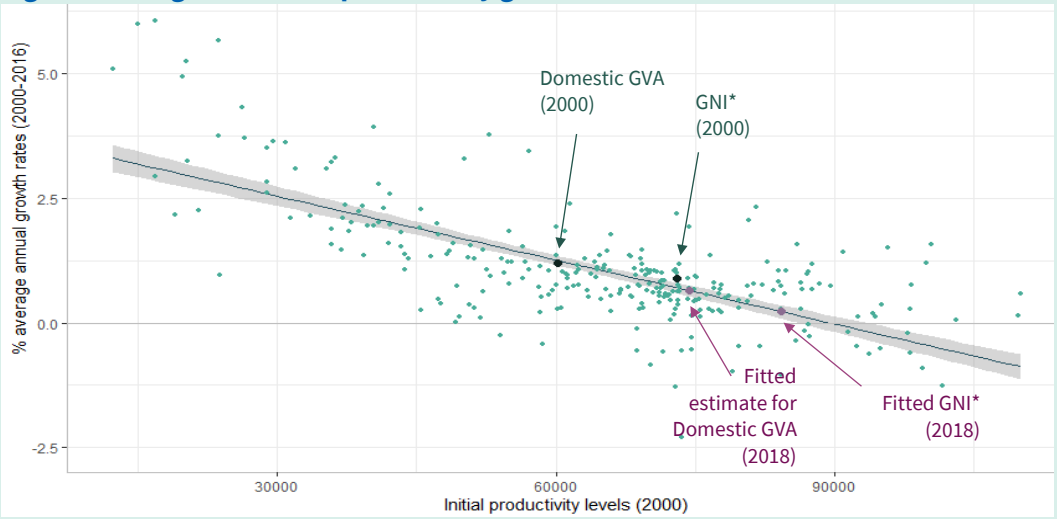
We can consider how productive regions have been given their initial starting point. We take labour productivity levels in the year 2000 and then compare this information with how productivity evolved over the subsequent years on average (2000–2018).

Figure A.2 shows that a clear pattern of lower productivity growth emerges for those regions that already have a high level of productivity. This finding is in keeping with the convergence literature. The Solow model, for example, predicts that poorer countries are expected to "catch up" with rich ones, as capital flows into these areas and as knowledge spreads to them, implying that countries that were initially less productive should grow faster. Countries would then be expected to converge to a "balanced growth path" — that is, a growth path where labour productivity grows at a constant rate.

For Ireland, we can see that the labour productivity performance measured on both a GNI* basis and a Domestic GVA basis performed very much in line with the fitted estimates. In other words, its growth performance was as might have been expected, given the initial level of productivity seen in 2000. Looking forward, if this relationship were to hold, then we might expect labour productivity to grow at an annual average rate of 0.2 to 0.7 per cent per annum (or 0.6 to 0.8 when taking country-fixed effects).

These estimates are highly uncertain. One standard error around the estimates based on regional data is equivalent to 0.8 percentage points, while one standard deviation for Irish productivity growth since 2000 is 1.8 percentage points for Domestic GVA and 2.9 percentage points for GNI*.

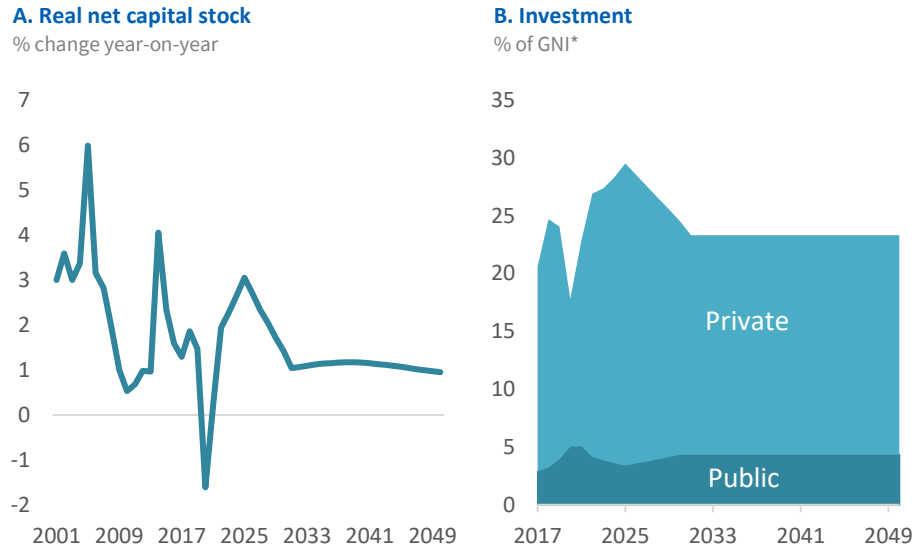
Figure A.2: Regional labour productivity growth



Sources: OECD (Regional Database); and Fiscal Council workings.
Note: Labour productivity is measured as output per worker (US dollars, constant 2010 prices, constant purchasing power parity). The analysis covers 284 large regions in 24 OECD countries. The regression fit excludes Ireland, while Luxembourg and Norway are also excluded, as they represent large outliers. We test the same relationship with a quadratic and higher order polynomial, which yields similar predictions. When country-fixed effects are included, the linear specification has the best fit.

The growth in the net **capital stock** is set to recover sharply by 2025, before gradually moderating over the period 2030–2050 (Figure 2.3). Overall, the projections are that the real net capital stock grows by 24 per cent over the horizon of 2030–2050. This forecast is consistent with private **investment** settling at 19 per cent and public investment settling at 4 per cent of GNI* in long-run projections (Fiscal Council, 2020b), with a constant depreciation rate of 6 per cent (Department of Public Expenditure and Reform, 2018a).

Figure 2.3: Capital stock projections



Sources: CSO; Department of Finance; and Fiscal Council workings.

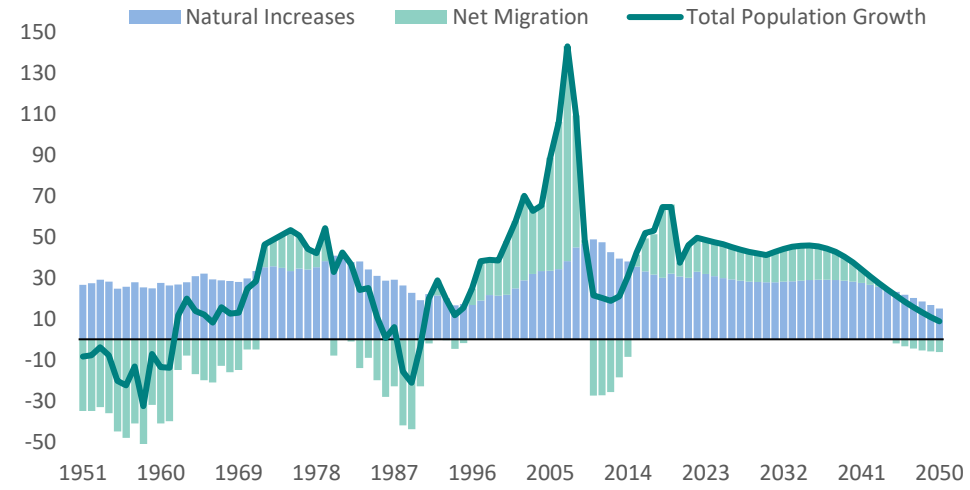
In terms of demographic projections, Ireland's population growth is projected to slow gradually but to nevertheless increase in absolute terms from 5 million in 2020 to over 6 million in 2050 (Table 2.2). The increases are largely due to the so-called "natural increase": the difference between annual births and deaths. However, over the coming decades, the natural increase is projected to slow down, as deaths increase compared to new births, even with broadly unchanged fertility rates. This also reflects a pattern of older individuals living longer and a decline in the number of younger people.

Net migration is expected to contribute around one-quarter of the population growth in the next two decades. This largely reflects relatively favourable productivity growth. Migrants tend to be younger and so—with migration positive over the projection period—this reduces the average age. The decline in migration towards the end of the projection horizon reflects the lower productivity growth

assumed for this period. As shown in Figure 2.4 and Table 2.2, migration is a more volatile contributor to population growth than natural increases.

Figure 2.4: Population trends over time

Thousands annually



Sources: CSO; Osés Arranz (2019); and Fiscal Council projections.

Ireland's population is projected to age rapidly. While the population aged 15 to 64 will remain around the same between 2020 and 2050 (+5 per cent), the population of older people (65+) is projected to more than double (+124 per cent). This trend is particularly noticeable in the 2040s, with the population aged 15–64 shrinking by 4.4 per cent over the period 2040–2050, having expanded in previous decades, and with numbers aged 65+ rising by 25 per cent.

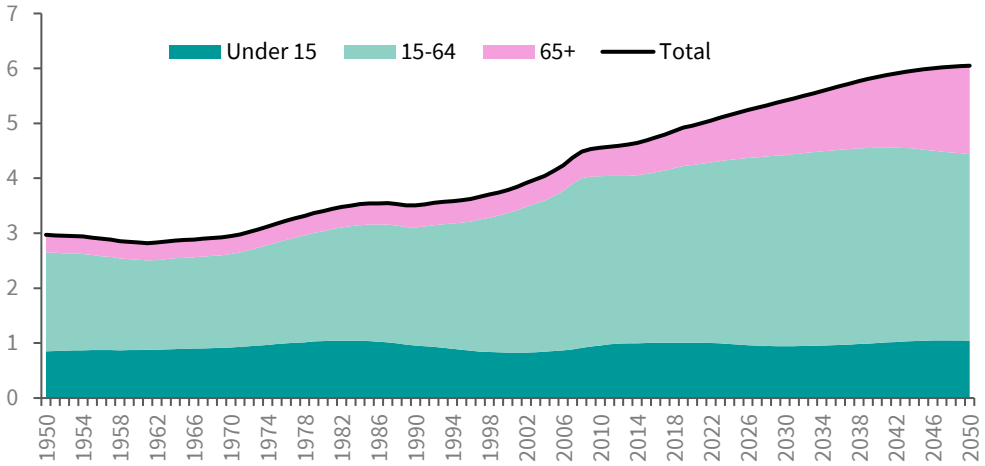
From an economic perspective, it is important to look at the number of people working compared to the number of retirees. A widely-used indicator here is the "old-age dependency ratio" — the population aged 65+ as a share of the population aged 15–64. This ratio is projected to more than double over the projection horizon, rising from 22 per cent in 2020 to 47 per cent in 2050. This implies that the number of old people supported by the average working-age adult will rise sharply. Yet, depending on policy changes, this indicator may be less informative if more people over the age of 65 remain in the workforce in the future.

Over the period since 1950, the Irish population has gone from one with a large share of young people to one that is increasingly aged more than 65. Figure 2.5

shows this pattern, which mostly reflects the fact that people are living longer, but also reflecting past "baby boom" effects.

Figure 2.5: The share of older cohorts in the population will increase significantly

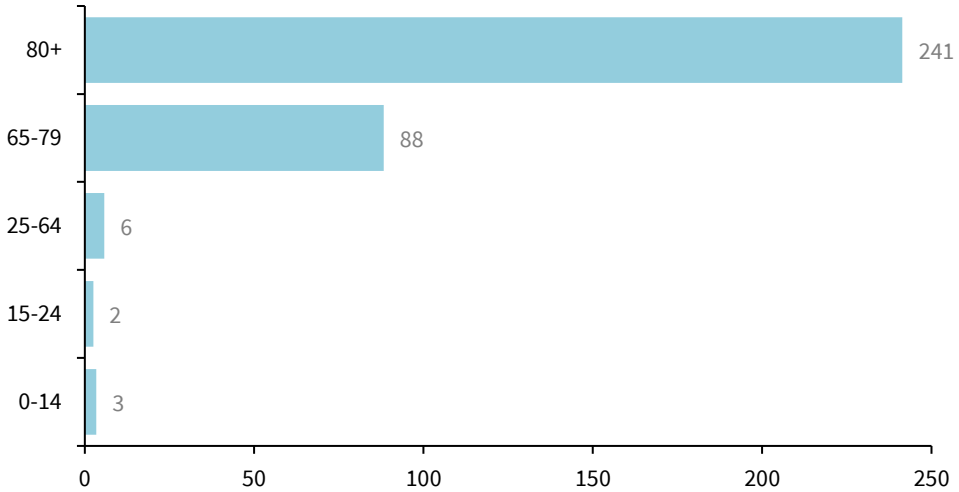
Population by broad age group in million



Sources: CSO; and Fiscal Council projections.
Note: 2017, 2018 and 2019 are preliminary estimates. Data from 2020 onwards are projections.

Figure 2.6: Substantial growth for older cohorts is projected between 2020 and 2050

Per cent growth from 2020



Source: Fiscal Council projections.

The rapid pace of ageing that Ireland faces is evident from the dramatic growth rates projected for older-age categories. As shown in Figure 2.6, age groups below 65 are set to see modest increases over 2020–2050, while older cohorts will increase much more markedly. The population aged 65–79 will expand by 88 per cent and the 80+ population will expand by 240 per cent.

Table 2.2: Total population projections in Ireland

Thousands in selected years, unless stated

	2000	2010	2020	2030	2040	2050
Total Population	3,790	4,555	4,960	5,411	5,844	6,048
Population <15	828	958	1,009	944	1,003	1,043
Population 15–64	2,537	3,082	3,233	3,480	3,554	3,397
Population 65+	425	515	717	987	1,287	1,608
Population 20–70	2,361	2,984	3,175	3,460	3,634	3,517
Population <15 (% total)	21.8	21.0	20.3	17.5	17.2	17.2
Population 15–64 (% total)	66.9	67.7	65.2	64.3	60.8	56.2
Population 65+ (% total)	11.2	11.3	14.5	18.2	22.0	26.6
Population 20–70 (% total)	62.3	65.5	64.0	63.9	62.2	58.1
Old-age dependency ratio	16.7%	16.7%	22.2%	28.4%	36.2%	47.3%
Population growth	47.9	21.4	37.3	41.1	37.5	8.8
from natural increases	21.8	48.8	30.6	27.8	28.1	15.0
births	54.0	77.2	64.2	63.0	71.7	65.5
deaths	32.1	28.4	33.6	35.2	43.6	50.4
from net migration	26.0	-27.5	6.7	13.3	9.4	-6.2

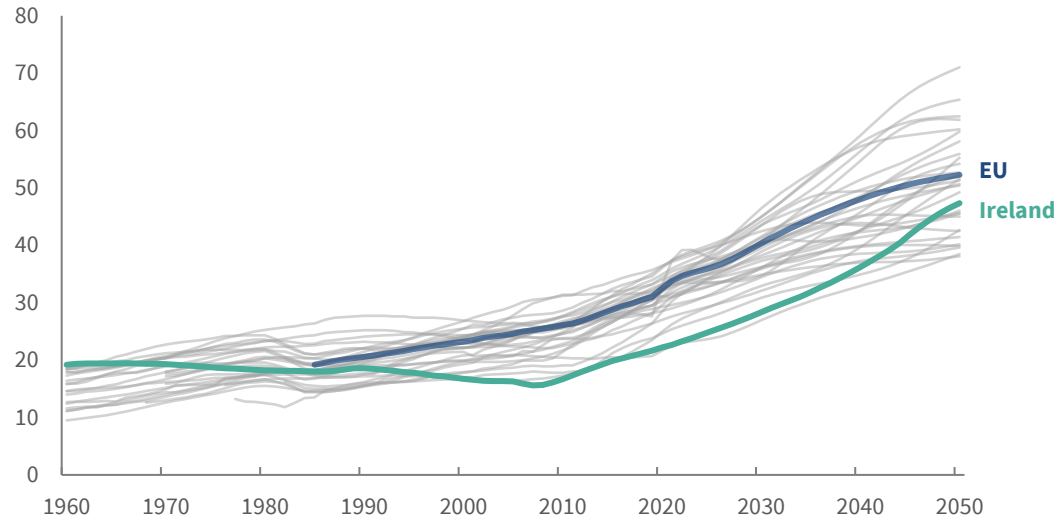
Sources: CSO; and Fiscal Council projections.

Note: Natural increases constitute the difference between births and deaths. The old-age dependency ratio is calculated as the population aged 65+ as a percentage of the population aged 15–64 (traditionally considered the "working age population").

The relatively fast pace of expansion in older age cohorts will see Ireland ageing very quickly. The old-age dependency ratio for Ireland was just 16 per cent in 2008 and is currently around 22 per cent, well below the EU average of around 30 per cent. However, by the mid-2030s, Ireland will have caught up with today's EU average and it is set to reach 47 per cent by 2050. By 2050, Ireland will find itself much closer to the typical EU country, in terms of age profile (Figure 2.7). This catch up partially reflects that Ireland experienced a "baby boom" in the 1970s/80s, later than most of the EU.

Figure 2.7: Old-age dependency ratios in Ireland and Europe

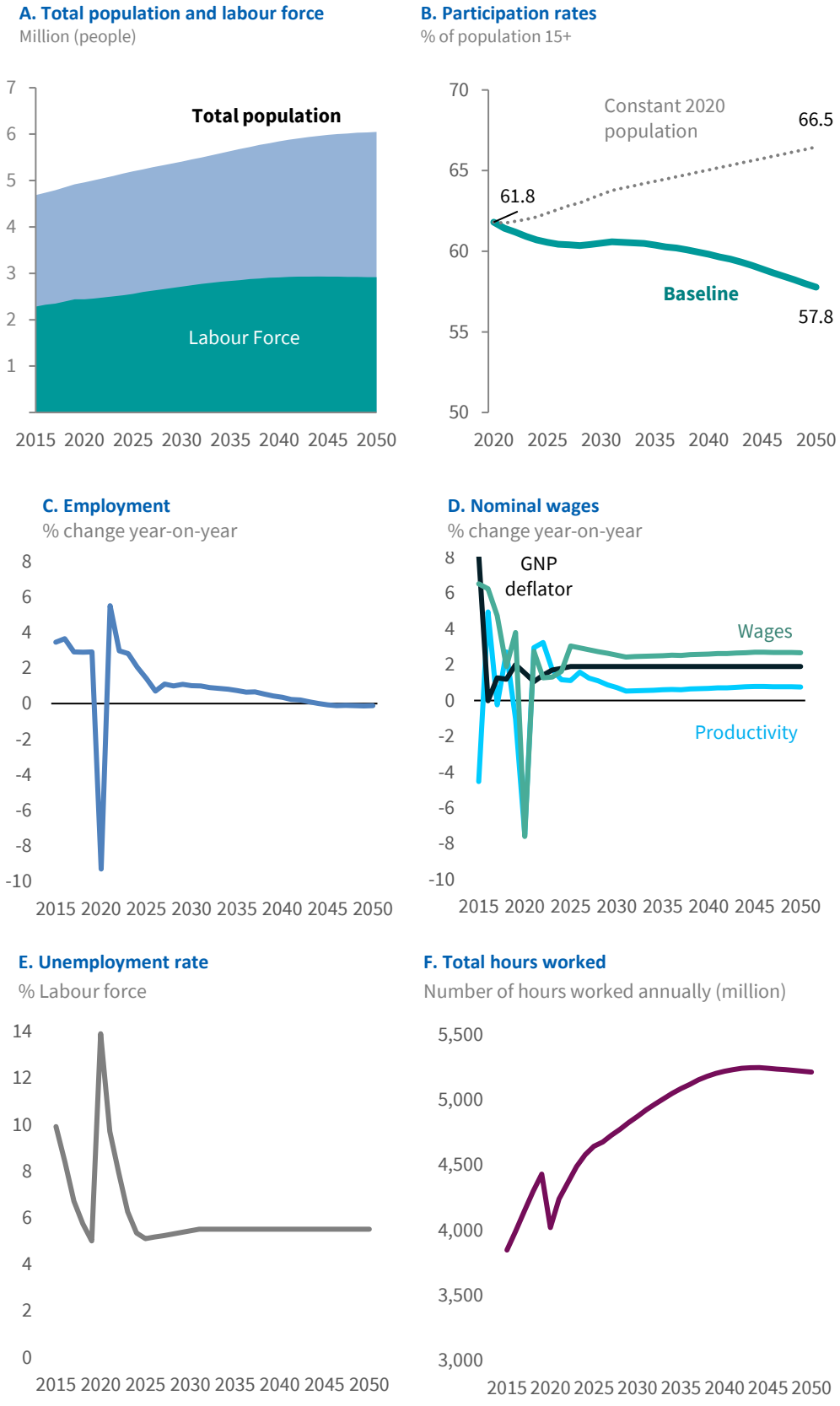
Ages 65+ as % of population aged 15–64



Sources: Fiscal Council projections; Eurostat; and Ageing Working Group projections.
Notes: Grey lines indicate trajectories for other European economies. The Council's projections for Ireland are in Green.

Employment is projected to grow from 2.3 million people in 2019 to 2.8 million in 2050. However, as a share of total population, the number of people employed relative to the total population is set to fall from around 47 per cent in 2019 to 45 per cent in 2050. The projections reflect population ageing depressing the workforce (as more people retire). An ageing population also impacts participation rates. Figure 2.8B shows that—if the population were to remain constant at 2016 levels—the **participation rate** of the population aged 15+ would be expected to increase by more than 5 percentage points from 2016 to 2050 as a result of increased female participation and higher participation of ages 55–64. However, this is likely to be more than offset by ageing. The projections assume some increase in those over 65 working, in line with recent trends, and assuming that the statutory retirement age increases to 68 by 2028.

Figure 2.8: Labour market projections



Sources: CSO; Department of Finance; and Fiscal Council workings.

Unemployment is projected to decline to a low of 5.1 per cent by 2025 but is then assumed to revert to its assumed natural rate of 5.5 per cent by 2031 and to remain at this level thereafter. This rate is based on the Department of Finance's frequently used convergence assumption over the medium term (Fiscal Council, 2018).[4]

Total hours worked in the economy, owing to a diminishing labour force, are set to provide a gradually reduced contribution to economic growth over the period 2020–2050. As indicated in Figure 2.8F, total hours worked are only expected to recover to levels seen in 2008 by 2030, owing to both the 2008 financial crisis and the economic contraction associated with Covid-19 in 2020. By 2050, the levels will have increased by around 7 per cent over the period from 2030.[5]

Wage growth is assumed to rise in line with labour productivity, so that real wage growth matches labour productivity gains in the long run (see Figure 2.8D). This is in line with economic theory (Blanchard and Katz, 1999). Nominal wage growth simply adjusts this rate for yearly inflation (GNP deflator). This implies average growth rates of nominal wages in the region of 2.9 per cent annually, over the period 2030–2050.

Real economic growth is projected to average 1.1 per cent per year for the period 2031–2050 (Table 2.1). This is below the average growth in advanced economies since 1980, and lower than Ireland has achieved for many decades.[6] This slowdown reflects Ireland's maturing economy, its already strong productivity performance relative to other countries, and an assumed slowdown in global productivity growth. Such projections are inevitably highly uncertain and risk scenarios are developed in Section 5.

[4] This is broadly consistent with the unemployment rate below which real wage growth has tended to accelerate in a non-linear fashion (Linehan *et al.*, 2017). Age-specific unemployment rates are derived from the total rate and the latest available distribution of unemployment. As shown in Figure 2.8C, employment growth slows after 2028, despite a stable unemployment rate. Again, this can be attributed to population ageing.

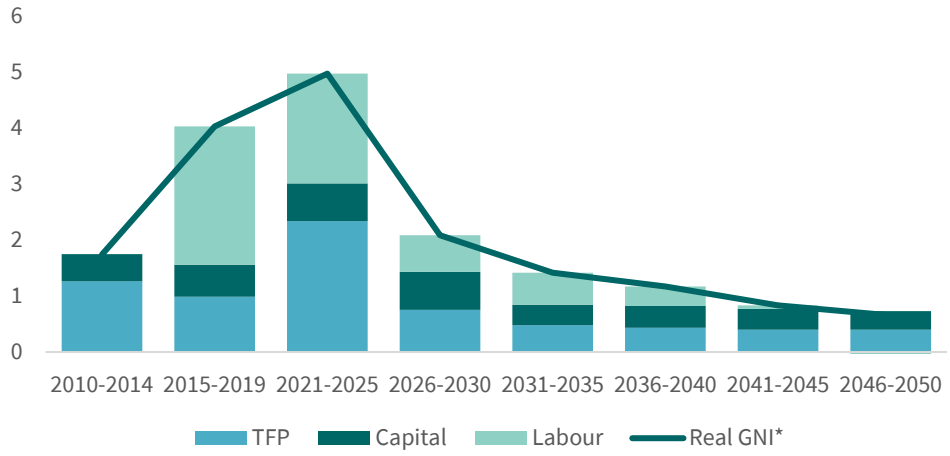
[5] Note that hours worked are based on average weekly hours observed in 2019, so any changes are due to changes in employment and in the labour force. Potential increases in part-time work of any cohort are not modelled.

[6] Source: IMF World Economic Outlook database.

Figure 2.9 shows how this overall growth rate is built up from the contributions from TFP, capital and labour discussed above.[7] Given how the Irish economy is expected to evolve, smaller contributions from labour are expected over time, as the pace of expansion of the workforce slows. Productivity growth—as captured by TFP—is also projected to contribute significantly less over time. Capital investment is also projected to make more modest contributions.

Figure 2.9: Projected economic growth and its components

% change year-on-year



Sources: CSO; Department of Finance; and Fiscal Council workings.
Note: Figures are calculated as averages over the time intervals; data for 2020 are excluded.

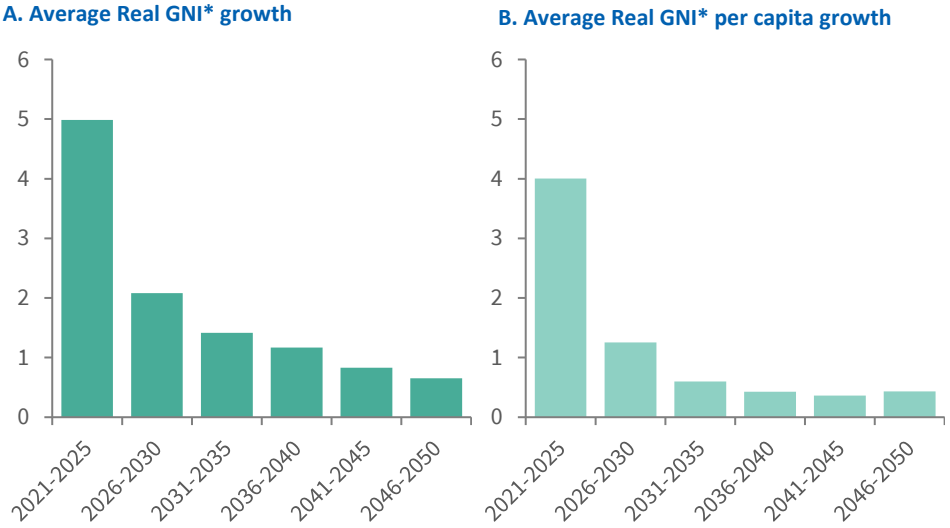
The Council's projections of Irish growth rates might be considered conservative, in light of its growth performance over the 5 years prior to the Covid-19 crisis. However, as noted in Box A, there are good reasons to expect productivity growth to slow over time as projected (Figure 2.10). The Council's long-run projections fall within the range of various projections made for the Irish economy (Box B). To account for the inevitable uncertainties, alternative scenarios are considered in Section 5.[8]

[7] We follow the standard assumption in the literature and for EU countries that the elasticity of output to labour is 2/3 and to capital is 1/3. Note that it is assumed that GNI*, GNP and GDP all grow at the same rate in the medium and long run.

[8] These include scenarios where productivity growth is 0.5pp higher or lower than assumed in the long run.

Figure 2.10: Growth is set to decline over the coming decades

% year-on-year



Sources: Department of Finance; and Fiscal Council workings.

Box B: An overview of long-term growth projections for Ireland

This box examines medium- and long-term growth projections for Ireland from other bodies. Estimates of long-run growth for the Irish economy range from 0.7 per cent to 2.4 per cent and are available from a number of sources.

Most assessments of Ireland's long-run growth outlook follow a similar approach. This involves a Cobb-Douglas style production function with labour, capital and productivity as the main inputs.

While differences of one percentage point in annual average growth rates may sound small, they imply a difference of around 10 per cent in the level of output and income over a decade. This highlights the scale of uncertainty underpinning these exercises.

Various international institutions regularly provide updated estimates of Ireland's long-run growth outlook. The latest estimates from the OECD (2018), for example, project annual average growth for Ireland of 2.7 per cent over the period 2024–2027 and 2.4 per cent over the period 2028–2050. These projections rely heavily on the theoretical concept of convergence: a process of catching up between countries featured in the projection. Similarly, the European Commission's *Ageing Report* (2018) uses a common framework to project growth for all EU Member States. This assumes convergence of European labour productivity over the long run. For Ireland, growth projections are an average of 1.7 per cent for 2024–2027, and an average of 1.6 per cent thereafter, until 2050.

In terms of Irish institutions, the ESRI Economic Outlook (Bergin *et al.*, 2016) offers another take on the medium-run performance of the Irish economy. Estimates are produced using COSMO, a macro-econometric model of the Irish economy. Unlike other projections, COSMO models the structural interdependence of production in various economic areas, such as the Government and the housing market. Estimates derived in the model project average annual growth rates of 3.7 per cent per annum over the period 2016–2020 and 3.3 per cent over the period 2021–2025, with substantial reductions depending on post-Brexit trade scenarios.

There have also been some academic publications that assess the outlook for the Irish economy. McQuinn and Whelan (2015) estimate growth using a production function. Their projections cover Euro area countries, assuming gradual recovery based on recent productivity and labour market trends, where TFP is assumed to grow at the Euro area average of 2000–2013. Their cautious TFP assumptions entail growth averaging 0.9 per cent per annum from 2024–2033, followed by 0.7 per cent in the longer run (2034–2043). Crafts (2014) considers the outlook for the Irish economy out to 2030, analysing recent production function trends in the period following the financial crisis. Based on an examination of estimates of potential labour supply and productivity in Ireland, Crafts assesses that an average annual growth rate of 3 per cent for the period 2018–2030 is possible, though it would require a strong labour productivity growth performance.

Table B.1: Summary of other long-term growth projections for Ireland

% annual average growth rates

	Period	Real GDP (%)	TFP (%)
ESRI (2016)	2021–2025	3.3	n. a.
Crafts (2014)	2018–2030	3.0	n. a.
OECD (2018)	2028–2050	2.4	n. a.
European Commission (2018)	2028–2050	1.6	1.0
Fiscal Council Baseline (Real GNI*)	2028–2050	1.1	0.5
McQuinn and Whelan (2015)	2034–2043	0.7	0.2

Sources: Various.

Notes: Growth rates for the Council's baseline are in terms of real GNI*, rather than real GDP.

The projections considered in this box suggest that the Council's long-run projections fall within the range of various projections made for the Irish economy. Relative to other long-run projections, the long-run growth rate projections contained in this report might be considered slightly conservative. Yet, there are good reasons to suggest that Ireland's growth rates will moderate over time, as productivity growth slows (Box A). Of course, the differences between these estimates are small relative to the wider uncertainties that might be considered over such a long projection horizon (some of these uncertainties are considered in Section 5). It should be noted that even marginal differences in annual growth rates projected can make a large difference to the levels of income observed over such a long period of time. These will impact the fiscal projections in different ways. For example, higher incomes would be expected to mean higher tax receipts, but also higher health spending, given the responsiveness of healthcare demand to income increases (Section 5.4).

3. Long-term Fiscal Projections

This section presents the fiscal projections based on the macroeconomic and demographic baseline. It shows how age-related spending will increase over the coming decades and how this will translate into pressures for the Government's balance and debt burden under current policies.

3.1 Methodology

The Council's long-term spending projections (from 2026 onwards) are primarily driven by (1) price pressures and (2) demographic factors. The projections are broadly based on a continuation of existing levels of public services and supports. They factor in only those policy changes already legislated for (such as pension-age changes). While service levels are held broadly constant, demand for these services is assumed to change in line with demographics. For example, education spending is driven by changes in the number of young people in the population, while the pupil-teacher ratio (i.e., the level of service) is held fixed. This approach is broadly similar to the Council's medium-term Stand-Still Scenario (Fiscal Council, 2019).

Price pressures can be thought of in terms of two key channels: wages and general prices of goods and services. Public sector pay is assumed to evolve in line with private sector wages, such that, implicitly, the model assumes that for the retention of staff, wages need to follow private sector pay developments. Social payment rates are also assumed to grow in line with wages. Broadly speaking, this should prevent an implicit rise in income inequality. Price pressures for the non-pay aspects of government spending are assumed to be driven by economy-wide price pressures (typically represented by the GNP deflator). In the case of health spending, a premium is assumed on top of the GNP deflator for growth of non-pay spending.

As described in further detail in Fiscal Council (2020b), demand for health spending is also assumed to increase as national income expands. In other words, future generations spend some of their additional income on better or more health care as their incomes rise. This assumption is based on widely observed international evidence (Licchetta and Stelmach, 2016; and Lorenzoni *et al.*, 2019).

Pensions expenditure is projected to increase substantially as the population ages. For these projections, it is assumed that the pension age increases to 67 in 2021 and to 68 in 2028, in line with current legislation.[9]

[9] Box C examines changes in life expectancy and the pension age in greater detail.

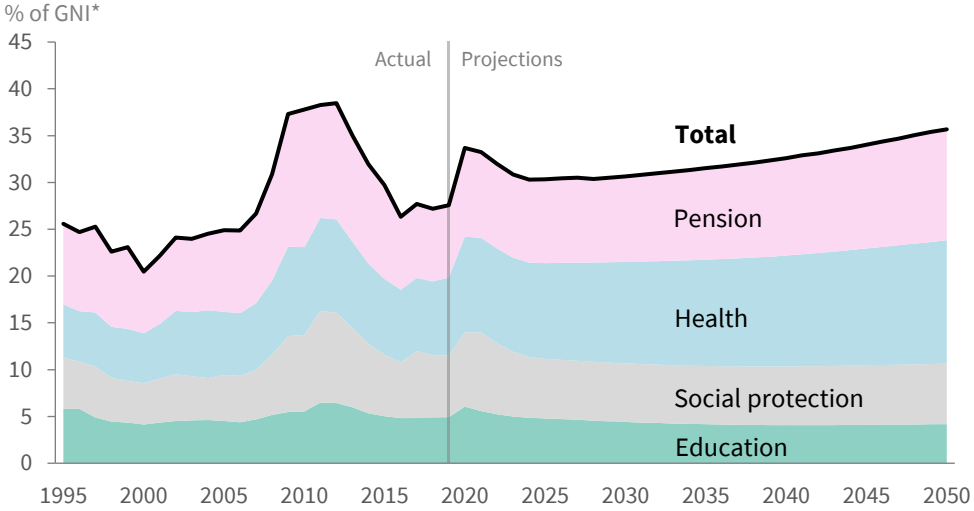
On the revenue side, it is broadly assumed that tax rates are held fixed and tax bands and credits are indexed, such that government revenue remains at a fixed share of GNI* after 2025.

Interest expenditure is projected to fall to as low as €1.7 billion in 2040, before rising steeply as deficits ramp up. It is modelled as the cost of existing debt plus the cost of new borrowing and debt rollovers, as existing debt matures over time. The cost of new borrowing and debt rollovers are a function of the marginal 10-year interest rate, which depends on variables, including the 6-month Euribor forward curve, and the change in the gross general government debt ratio. Further details are available in the methodology report (Fiscal Council, 2020b).

3.2 Spending

In the coming decades, and under current policies, government spending on areas that are sensitive to ageing is expected to rise significantly as a share of GNI*. Spending in other areas is assumed to show a broadly stable share of GNI*.

Figure 3.1: Spending on areas sensitive to ageing are set to rise

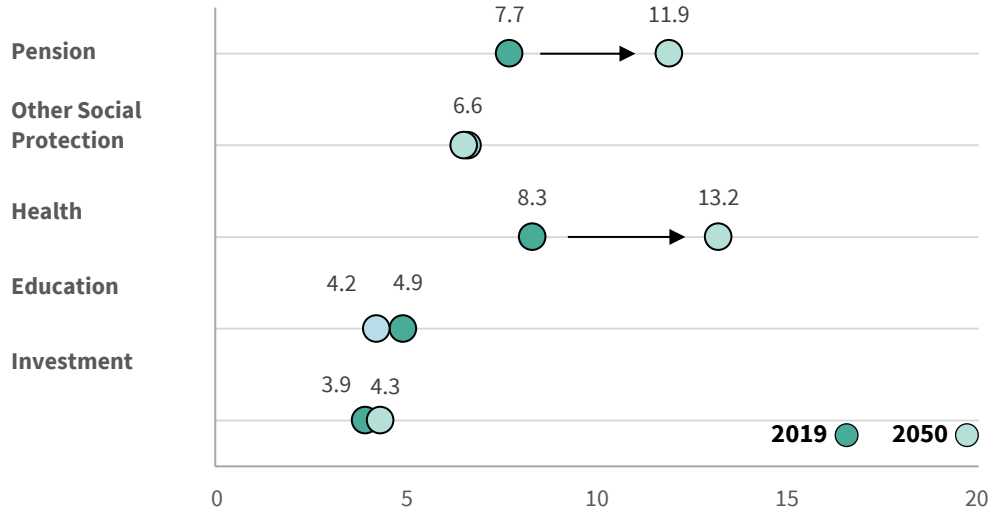


Sources: Eurostat; Department of Public Expenditure and Reform; and Fiscal Council workings.
Notes: Data for 1995–2015 are current and are based on Eurostat COFOG data. For 2016–2020, data are from the Department of Public Expenditure and Reform. Pension includes old-age, sickness/disability, and survivors' pensions. Social protection is exclusive of pensions and, in 2020, Covid-19 related expenditure. Health includes spending on long-term care.

Total spending on areas sensitive to demographic changes is projected to increase from 27.6 per cent of GNI* in 2019 to 35.7 per cent of GNI* in 2050. Figure 3.1 shows that—within the age-sensitive spending areas—the main contributions to the increases in spending would come from pensions and health (see Figure 3.2 also). With fewer young people, there would be a modest offsetting reduction in spending on education. As it stands, pensions and health are already among the largest current spending areas in 2019. Table 3.1 shows the changes by decade.

Figure 3.2: Spending increases will be driven by pensions and health care

% of GNI* (general government basis)



Sources: Eurostat; CSO; Department of Public Expenditure and Reform; Department of Finance; and Fiscal Council projections.
Note: Pension includes public sector pensions; Health includes long-term care.

Table 3.1: General government age-related spending by area

% of GNI*

	2000	2010	2019	2030	2040	2050
Total demographics-related spending	**20.5**	**37.8**	**27.6**	**30.6**	**32.6**	**35.7**
Of which						
Education	4.1	5.5	4.9	4.4	4.1	4.2
Health and Long-term Care	5.3	9.4	8.3	10.8	11.9	13.2
Pensions	6.6	14.7	7.7	9.1	10.4	11.9
Social Protection	4.4	8.2	6.6	6.2	6.3	6.5

Sources: Eurostat; Department of Public Expenditure and Reform; and Fiscal Council workings.
Note: Table 3.1 shows 2019, rather than 2020, to avoid showing spending in terms of Covid-19-scarred GNI*.

The projected ageing of the population would result in pension spending increasing considerably as a share of GNI*. This is projected to occur even with the two legislated increases in the pension age (from 66 to 67 in 2021 and from 67 to 68 in 2028). Total government spending on pensions is projected to increase from 7.7 per cent of GNI* in 2019 to 11.9 per cent in 2050, as shown in Table 3.1.

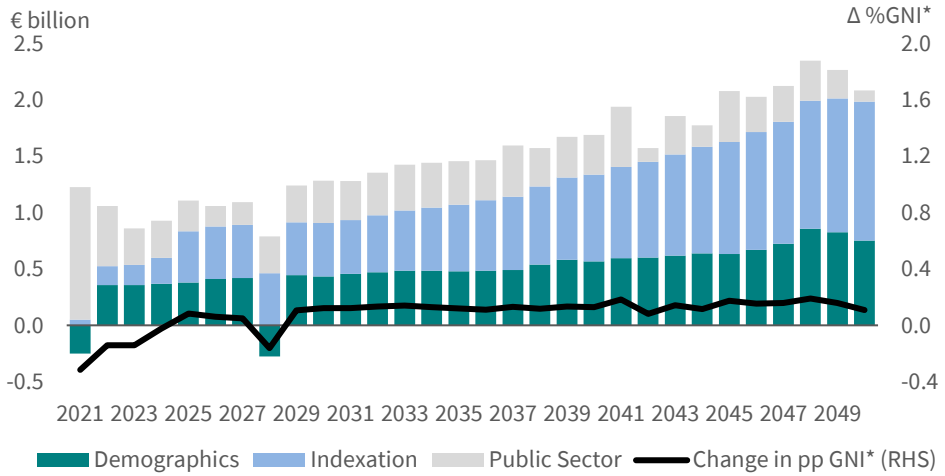
Figure 3.3 provides a breakdown of demographics and indexation pressures within pension spending. As more people reach retirement age, and pensioners live longer lives, the number of pension recipients increases. In 2021 and 2028, the increase in pension age has the opposite effect: the number of pensioners decreases, which

leads to savings due to demographics.[10] It is worth noting that indexation becomes a bigger pressure as the number of pensioners increases, because the wage-inflated average pension is paid to more recipients.[11]

Total yearly increases outgrow GNI* in the long run. As shown in Figure 3.3 (secondary axis), the annual percentage point change of pension expenditure in share of GNI* is above zero every year after 2028, eventually leading to pensions representing almost 12 per cent of GNI* (see Table 3.1).

Figure 3.3: Pension expenditure increases by driver

Annual changes in € billion and in p.p. GNI*



Sources: Department of Public Expenditure and Reform; and Fiscal Council projections.
Note: Changes in spending as a share of GNI* depend on the relative pace of growth in spending and GNI*. Demographic contributions are based on the year-on-year changes in claimants in the current year (t) and the average pension payments in the previous year (t-1). Public sector pension estimates from 2021-2050 are official estimates consistent with the *Ageing Report 2018* (European Commission, 2018). The 2021 increase is a break in time series, since 2020 public sector pensions are taken from the Revised Estimates, 2020.

As information on the numbers, ages, and specific pension entitlements of individuals involved is not available, it was not possible to model public sector pension spending for the purposes of this report. Therefore, this report uses official projections of public sector pension spending from 2021 onwards. These estimates are consistent with the *Ageing Report 2018* (European Commission, 2018) and are not broken down by demographics and indexation.

[10] Note that the decomposition shown in Figure 3.3 derives contributions from demographics based on the year-on-year changes that would result were average pensions paid to remain at their previous year's value. For the total change, pensions are assumed to rise in line with wages.

[11] Section 4.2 shows the sensitivity of pension expenditure to indexing to prices rather than wages.

Spending on health will increase from 8.3 to 13.2 per cent of GNI* from 2019 to 2050. This reflects the higher cost of treating an older population as well as demand and cost pressures.

The cost of providing health care increases with age, so an older population will lead to higher needs. For example, long-term care, while only a relatively small part of total health expenditure, is expected to triple over the period 2019–2050 (from 0.5 per cent of GNI* to 1.5 per cent by 2050). As shown in the methodology report (Fiscal Council, 2020b), the projections assume that the age structure of the costs of treating an individual in each age group stays as observed, but there will be more people in relatively more costly older age groups. This does not take account of specific health trends, such as rising obesity or dementia that could raise the costs of treating people at a given age. On the other hand, "healthy ageing" developments and improved primary care may delay need for high-cost care into later age cohorts and could lessen the pressure from ageing on costs.

Productivity in healthcare may grow more slowly than in the economy as a whole. This is in accordance with the so-called "Baumol effect" (Lorenzoni *et al.*, 2019; and Wren *et al.*, 2017). At the same time, demand for healthcare tends to increase over time as countries become wealthier, as described in Section 3.1. While these effects are hard to disentangle, the projections assume that pay in the health sector rises with economy-wide wage growth. Additionally, prices for medicines and medical devices (incorporated in non-pay health spending) are assumed to rise faster than household consumer goods.[12] This leads to health spending rising at a faster rate than GNI*, which can be interpreted as a mix of demand/cost pressures.

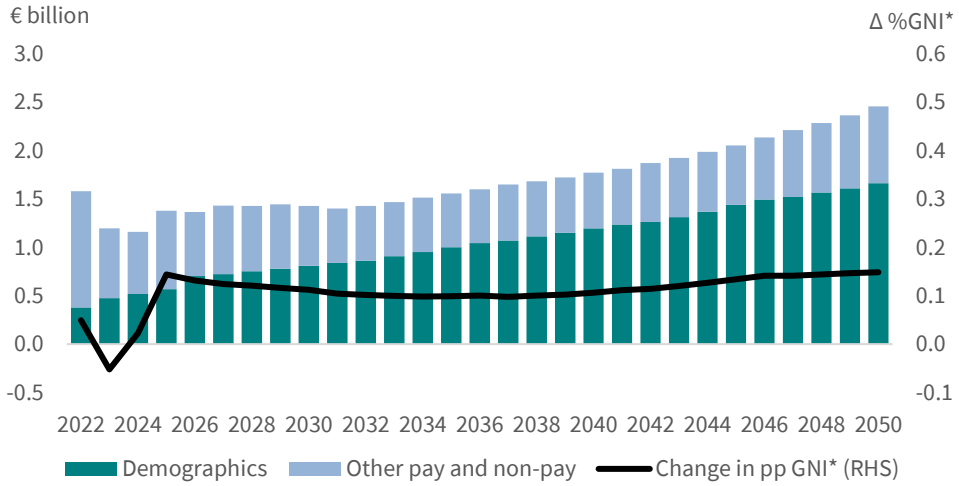
Figure 3.4 shows the composition of annual changes due to these spending drivers in health. Changes attributed to demographics are derived using population changes by age group in the current year (t) and cohort-specific costs of the previous period (t-1). The remaining difference to the total yearly increase includes the effect of both pay and non-pay inflation as well as the "income effect" — the

[12] The non-pay health driver is assumed to grow at a pace equivalent to the GNP deflator growth rate plus one percentage point. See methodology report (Fiscal Council, 2020b) for more detail.

widely observed phenomenon of spending on healthcare rising as incomes rise.[13] The combination of drivers leads to health spending as a share of GNI* continuously increasing by around 0.1 percentage points per year after 2025 (see secondary axis in Figure 3.4). In the short run health expenditure levels also increase, but at a slower rate than GNI*, leading to a slight fall in the share of GNI*.

Figure 3.4: Healthcare spending pressures

Annual changes in € billion and in p.p. GNI*



Sources: Department of Public Expenditure and Reform; and Fiscal Council workings.
Note: Healthcare spending includes spending on long-term care. Changes in spending as a share of GNI* depend on the relative pace of growth in spending and GNI*. Demographic contributions are based on the year-on-year changes in relevant cohorts in the current year (t) and the cohort costs in the previous year (t-1).

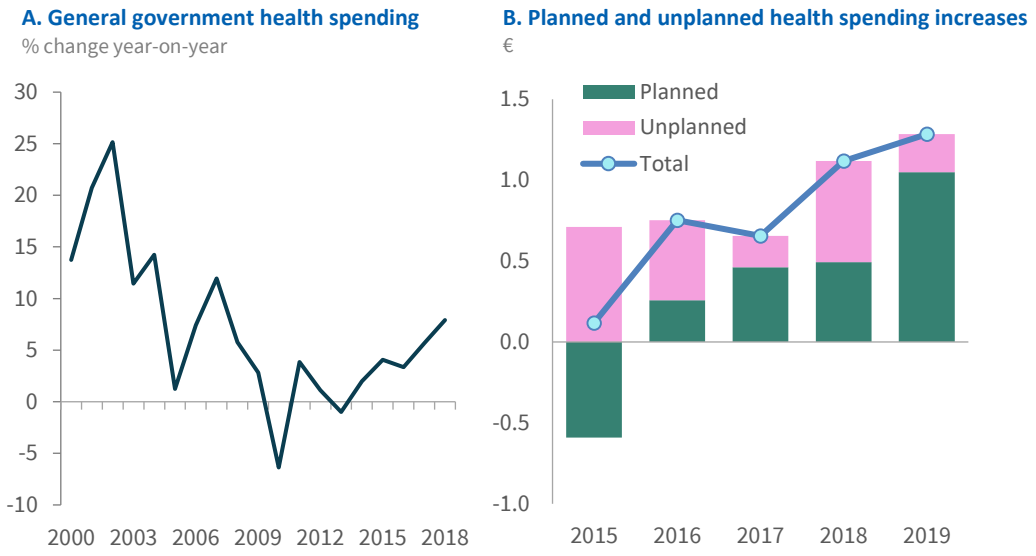
As economic growth slows in the long run compared to the convergence period in the 2020s, the growth rate of health-related spending also slows, though health spending remains at high levels. Section 5.4 considers some of the uncertainties around this assumption.

Health spending growth has accelerated in recent years, due to both increasing demand for services and rising price pressures (Figure 3.5A). Much of the recent increases in spending have been unplanned, however (Figure 3.5B).[14]

[13] This income effect is based on real national income per capita growth at an elasticity of one. This treatment of the income effect is comparable to the approach of the Office for Budget Responsibility in its Fiscal Sustainability Report (OBR, 2018; 2017; 2014; and 2011). See Licchetta and Stelmach (2016) for more detail on the methodology used.

[14] Box I of the *November 2019 Fiscal Assessment Report* explores these issues in more detail.

Figure 3.5: Health spending increases



Sources: Eurostat; Department of Finance; and Fiscal Council workings.
Notes: General government health spending data is taken from Eurostat COFOG data. Panel B shows planned and unplanned increases in gross voted current expenditure in the Department of Health. The 2015 growth takes into account the transfer from the HSE to Tusla (the Children and Family Agency) that took place in 2014.

Social protection, which is presented exclusive of pensions, is a current expenditure area that is less affected by older age cohorts. It is projected to stay relatively stable as a share of GNI* throughout the forecast period (Table 3.1). Note that social protection expenditure in 2020 does not include Covid-19-related supports, which are included separately as a one-off spending item.

Spending on working-age supports, which accounted for more than one third of social protection in 2019, remains relatively unchanged over the projection period in per cent of GNI*. This includes unemployment benefits and other income supports which are indexed with wages. In contrast, spending related to older ages (e.g., free travel and the household benefits package) is projected to increase markedly, although from a low level of 0.5 per cent of GNI* to 1 per cent in 2050. Children and other social protection spending (including administration and spending linked to total population growth such as rent supplement) is projected to decrease marginally over 2019–2050, by around 0.2 per cent of GNI*.

Similarly, age groups of school age are expected to grow at a much slower rate than older cohorts and may even experience a slight decline in some years. As a result, spending on education is projected to fall slightly as a share of GNI* over the projection horizon, as shown in Table 3.1. To account for uncertainty, Section 5.6 illustrates education spending with higher and lower fertility than in the baseline.

It is important to note that spending on education assumes a standing-still of services provided and does not include any new educational policies or a change in education participation. In contrast with health, a potential income effect implying increased demand for investment in education as society grows richer is not modelled. This also means that any positive spill-over effects of more education spending for productivity and the wider society are not considered.

Interest

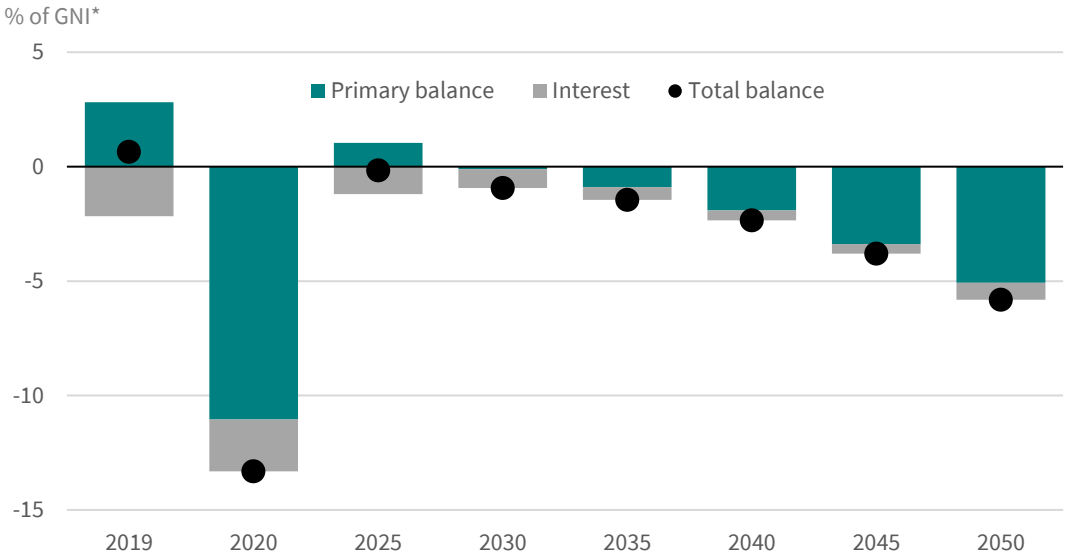
Interest expenditure is projected to decline in the coming years, before rising again in the 2040s. Despite the higher level of debt after the Covid-19 crisis, interest payments are assumed to fall in the near term. A combination of currently low forward interest rates—reflecting both accommodative monetary policy and long-run market forces—and an initially falling ratio of general government debt to GNI*, help to reduce the cost of servicing new debt. This is also helped by modest refinancing requirements in the coming decade. A rising cash-borrowing requirement beyond 2030 leads to a steady increase in annual refinancing needs, which rise more rapidly than the pace of economic growth, as measured by GNI*. For more details on the projection of interest, please refer to the methodology report (Fiscal Council, 2020b).

3.3 Revenue and the Government's Budget Balance

Under current policies, spending would rise significantly as a share of national income in the coming decades, as the population ages. At the same time, general government revenues are projected to remain constant as a share of national income.

The general government balance is projected to deteriorate under current policy settings, starting from an assumed budget balance in 2025 and gradually worsening, by 2050, to a deficit of 5.8 per cent of GNI*. Figure 3.6 shows the yearly balance as per cent of GNI*. The starting point of a budget balance in 2025 is in line with the Council's advice in its *May 2020 Fiscal Assessment Report*, which was that some fiscal adjustment may be required to put the debt ratio on a downward trajectory, after the economy has recovered from the Covid-19 pandemic (Fiscal Council, 2020a). A budget balance in 2025 would be in line with a 3-percentage-point reduction in the debt ratio, which was the planned pace of debt reduction over the period 2020–2023, prior to the Covid-19 pandemic, as outlined in *SPU 2019.*

Figure 3.6: Primary and total balance



Sources: CSO; Department of Finance; and Fiscal Council workings.

To put the ageing pressures in context, the impact of these pressures on the deficit in 2050, is projected to be almost half that of the fiscal impact from the Covid-19 pandemic. However, while the fiscal impact from the Covid-19 emergency measures will be temporary, the ageing pressures will be on a permanent basis and growing,

leading to an ever-wider deficit unless policy measures are implemented to offset these pressures (Table 3.2).

Table 3.2: Projections of government balance and debt

% GNI*

	2019	2020	2030	2040	2050
Budget balance	0.7	-13.3	-0.9	-2.3	-5.8
Primary balance	2.8	-11.0	-0.1	-1.9	-5.1
Interest	-2.2	-2.3	-0.8	-0.4	-0.7
Gross debt	99.2	125.1	96.2	87.6	109.7

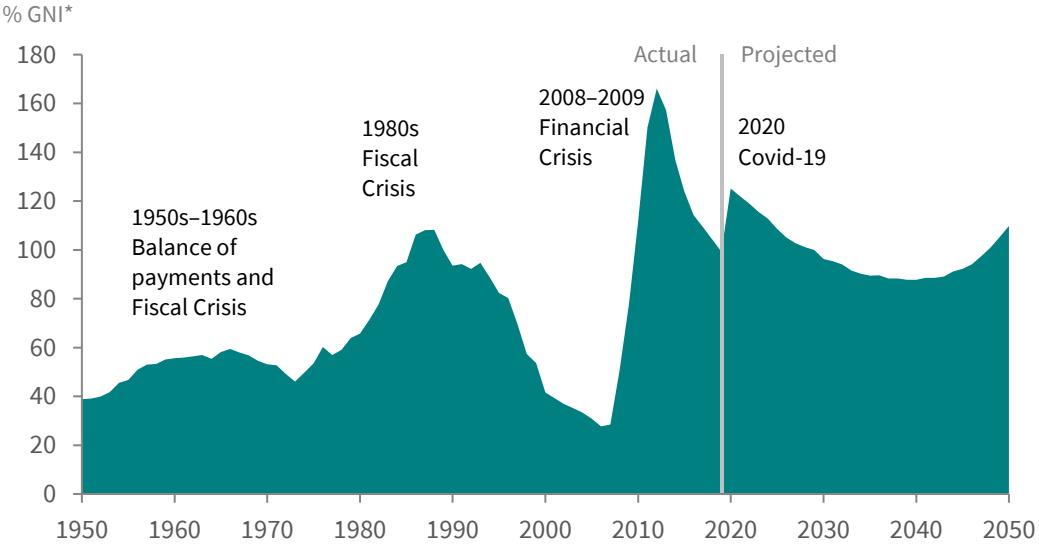
Sources: Department of Finance; and Fiscal Council workings.
Note: Rounding may affect totals. Data are in general-government terms.

3.4 Government Debt

These effects will add significant upward pressure to government debt levels. These pressures will prevent the debt burden from falling further from very high levels, and it will start to rise from 2040. Reaching a budget balance by 2025 will, in the absence of these pressures, put the debt ratio on a steady downward path toward safer levels. This will be supported by the low interest rates projected. However, under current policies, projections suggest that the debt GNI* ratio will only fall to around 85 per cent by 2040. The debt burden will then be projected to rise sharply, as ageing pressures mount, reaching 110 per cent of GNI* in 2050 (Figure 3.7).

In a historical context, these pressures mean that debt will remain at relatively elevated levels, surpassed only by the fiscal crisis of the 1980s, the financial crisis of 2008–2009, and the Covid-19 pandemic. The debt ratio had decreased steadily since its post financial crisis peak in 2012, amid a number of tailwinds. However, the debt remained relatively elevated by the end of 2019. Following the Covid-19 pandemic, debt-to-GNI* is estimated to surge again, before declining to a low in the late-2030s, provided the budget is brought to balance by 2025. This improvement after 2020 is primarily due to a pickup in GNI*, as the economic impact of Covid-19 fades.

Figure 3.7: Gross general government debt



Sources: CSO; FitzGerald and Kenny (2018); Department of Finance; and Fiscal Council projections.
Note: Graph shows gross debt. Modified GNI* is linked to GNI for 1970–1995 and to GNP for 1950–1969.

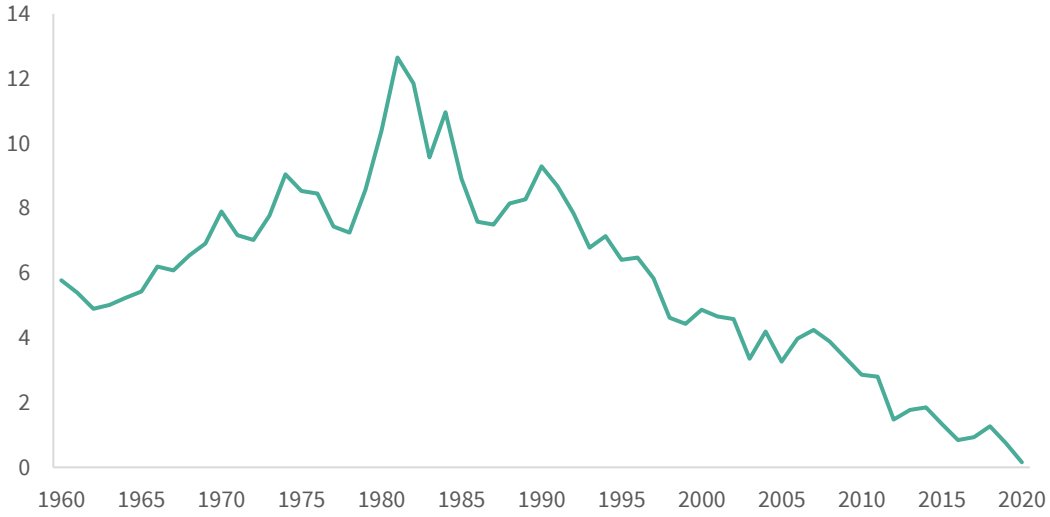
The path for the debt burden will depend on a number of factors, but a crucial one is the so-called "interest-growth" differential. For a given debt ratio and budget balance (excluding interest), the path followed over time by the debt ratio depends

on the difference between the effective interest rate on government debt and the nominal growth rate of the economy. The more that nominal growth rates exceed effective interest rates, the larger the debt reductions expected.

The projection period considered in this report is one in which interest rates are likely to be very low. Interest rates in advanced economies have been on a downward trajectory for more than three decades and are now close to historical lows (Figure 3.8). The reasons for this fall remain an open question, though Rachel and Summers (2019), among others, provide a useful discussion on this long-run trend. Blanchard and Summers (2020) note how rates are expected to remain very low for a long time, with important fiscal implications. At the time of writing, the interest rate on Irish 10-year borrowing was effectively zero.

Figure 3.8: Interest rates falling in advanced economies for over three decades

% ten-year G7 (excl. Italy) bond yields



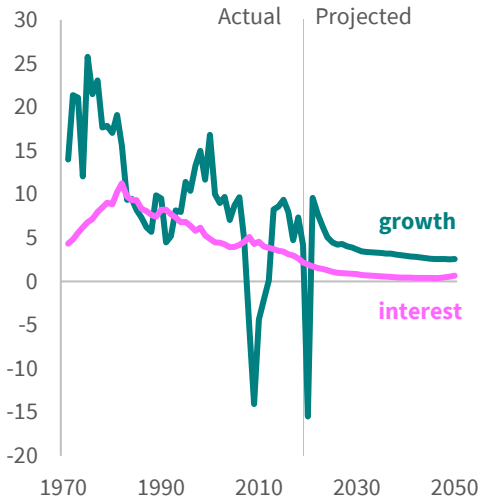
Sources: Datastream; and Fiscal Council workings.

Note: As in Rachel and Summers (2019), yields are the average of securities across the G7, excluding Italy. Data form an unbalanced panel.

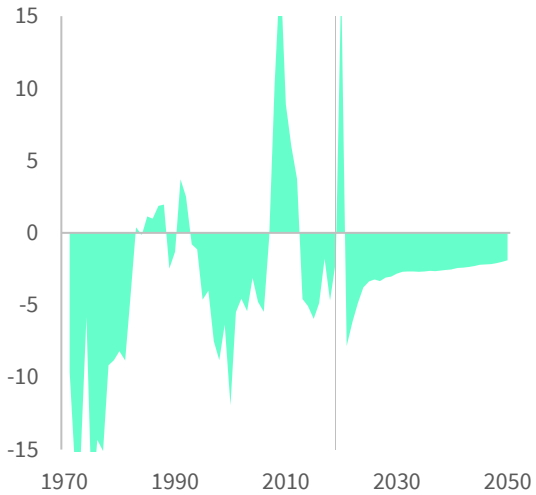
From 2026–2050, nominal growth averages 3.2 per cent per annum, while the effective interest rate on government debt averages just 0.5 per cent. This implies a favourable interest-growth differential of about 2½ percentage points every year (Figure 3.9). The implication of interest rates lower than nominal growth rates is that Ireland will experience favourable debt dynamics. These debt dynamics are large enough to more than offset the rising demographic- and health-related spending pressures over the next 10–15 years. However, in the 2030s demographic costs begin to exert sharp upward pressures and Ireland will likely face a rising path for government debt ratios.

Figure 3.9: Ireland's interest-growth differentials are projected to be very favourable

A. Growth is projected to exceed interest
%



B. With a favourable differential for debt reduction
Percentage points (interest less growth)



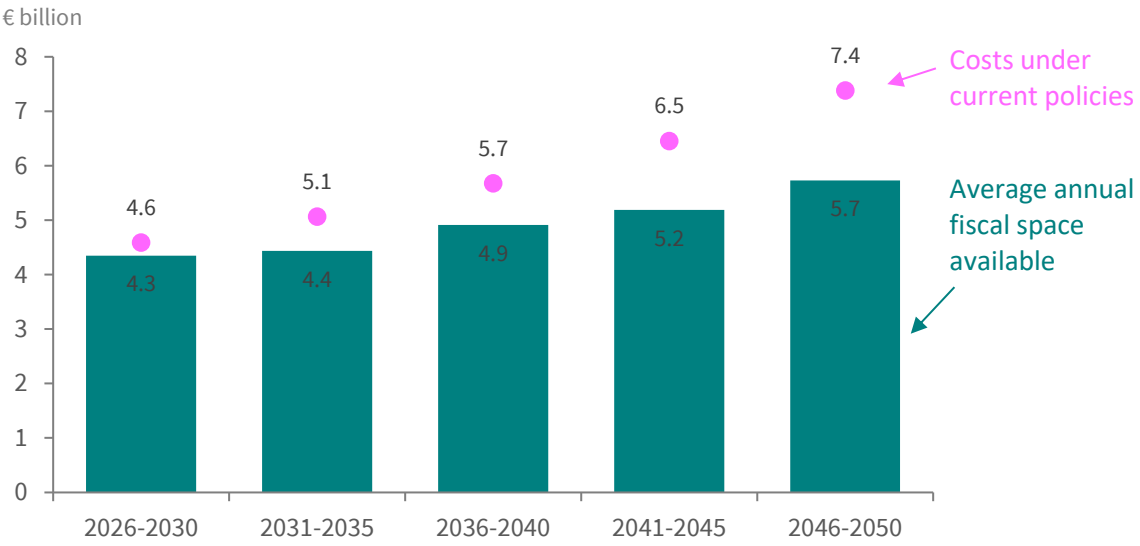
Sources: CSO; and Fiscal Council projections.
Notes: "Growth" refers to annual nominal GNI* growth rates. "Interest" is the average effective interest rate on government debt (calculated as general government interest costs over the previous period's general government debt).

Of course, there are risks that debt dynamics might not be so favourable over the long run. Interest rates might rise, for reasons that do not necessarily imply higher nominal growth rates for Ireland (e.g., if macroeconomic outcomes are better on average in other Member States than in Ireland over the coming decades). Section 5 considers this, among other risks.

3.5 Fiscal Space

In a growing economy, more resources typically become available for governments to expand services or to cut taxes. As economic activity and incomes rise, so do tax revenues. One way to assess "fiscal space" is to measure how much government spending (net of any tax cuts) can increase by in a given year, if it were to expand in line with "sustainable" growth rates; that is, if the increases in net spending were to rise in line with sustainable increases in government revenues.

Figure 3.10: Ageing pressures mean that expenditure will exceed the available fiscal space



Source: Fiscal Council workings.
Note: It is assumed potential growth equals actual growth over the long term. The fiscal space available for each year is determined by the previous year's corrected expenditure aggregate multiplied by the current year's nominal growth rate. The corrected expenditure aggregate = GGE – Int – UC – (GFCF -avg. GFCF), where GGE is general government expenditure, Int is interest expenditure, UC is cyclical unemployment expenditure, GFCF is gross fixed capital formation and avg. GFCF is the average of the last four years' gross fixed capital formation.

This definition gives a ready calculation of fiscal space. The amount of fiscal space available this year can be set as equal to last year's government spending multiplied by the sustainable growth rate of the economy. Additional fiscal space can be created in any given year by raising revenue from sustainable revenue sources.[15]

[15] More formally, the fiscal space in year t, FS_t is given by $FS_t = CEA_t \times g + DRM_t$, where CEA_t is the corrected expenditure aggregate, g is the sustainable nominal growth rate and DRM_t are the discretionary revenue measures. The corrected expenditure aggregate = GGE – Int – UC – (GFCF - avg. GFCF), where GGE is general government expenditure, Int is interest expenditure, UC is cyclical unemployment expenditure, GFCF is gross fixed capital formation and avg. GFCF is the average of the last 4 years' gross fixed capital formation. Here, we assume that the sustainable growth rate is equal to the actual growth rate in each year.

In the coming decades, increasing amounts of fiscal space will be taken up by demographic pressures. This means that, as the population ages, the spending required to maintain the real value of services currently provided will gradually exceed the fiscal space created by sustainable growth in the economy. For example, from 2046 to 2050, government spending is set to exceed fiscal space by an average of €1.7 billion (0.3 per cent of GNI*) per year (Figure 3.10).

3.6 The Role of Ageing Costs

This section attempts to quantify the fiscal impact due to ageing costs over the next 30 years.

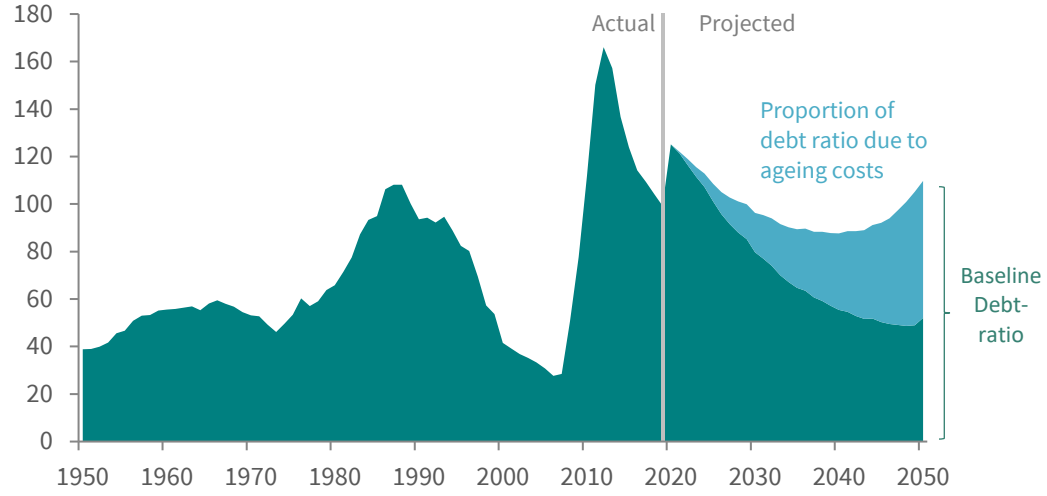
One way to isolate ageing costs is to decompose the changes in projected government spending into (1) spending that is related to an ageing population and (2) spending that is unrelated to an ageing and growing population. One way to estimate the relative contributions is to assume that demographic-related fiscal costs are unchanged relative to 2020, and that the only increases in costs arise from income, pay and price pressures. Other assumptions, including the rates of growth of GNI*, can then be kept the same as in the baseline.[16]

Under the decomposition used, ageing can be seen to be a major driver of pressures in the public finances in the years to come. Figure 3.11 shows the decomposition of the baseline debt ratio into the proportion that can be reasonably attributed to the consequences of rising ageing and population growth costs. In the absence of ageing pressures, the debt ratio falls until 2048. By 2050, the debt ratio is approximately 50 per cent of GNI*. This compares to a baseline debt ratio which stabilises in the late 2030s and begins to rise in the early 2040s. By 2050, the debt ratio is approximately 110 per cent of GNI* in the baseline, meaning approximately 60 percentage points of the debt ratio can be attributed to the rising ageing costs.

[16] Public sector pension figures for the baseline over 2021-2050 are official estimates consistent with the Ageing Report 2018 (European Commission, 2018). No detailed breakdown of these figures is available. As a result, for the decomposition, we assume that the change in public sector pension expenditure for these years is only linked to wage growth.

Figure 3.11: The role of ageing costs in baseline gross debt

% of GNI*



Sources: CSO; FitzGerald and Kenny (2018); Department of Finance; and Fiscal Council workings.
Note: The orange shaded region shows the proportion of the baseline debt ratio that can be attributed to an ageing population relative to 2020 demographics.

There are, of course, several ways to isolate the impact ageing pressures have on spending and debt ratios. While the choice of decomposition above is relatively simplistic, alternative decompositions do not significantly alter the results.[17]

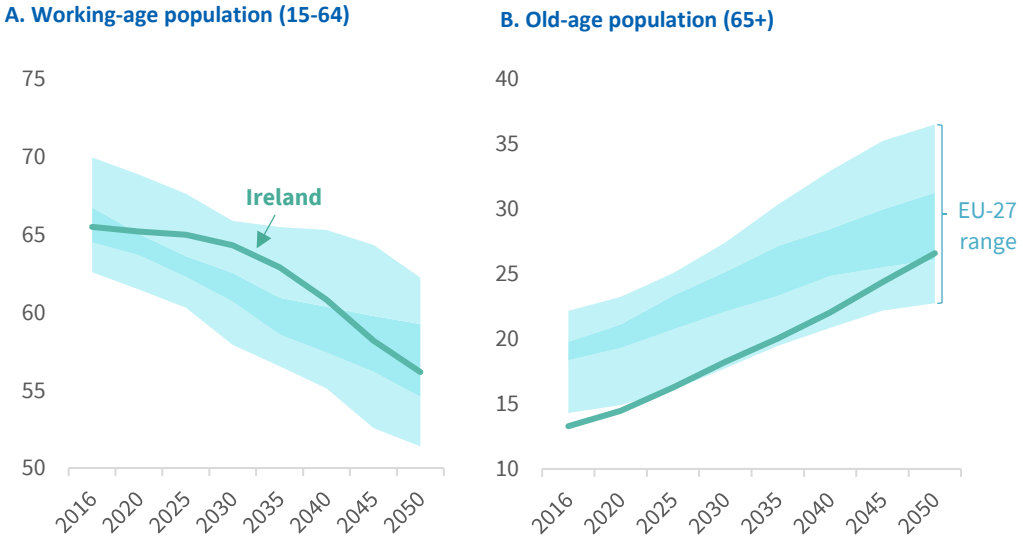
[17] For instance, another option is to incorporate feedbacks to growth from changes in the labour supply that would result from keeping the age profile constant. Another option is to have the same population expansion as in the baseline, but to keep the share of each age group constant at their 2020 shares. Both alternatives would have relatively little impact on the proportion of the debt-ratio attributed to ageing pressures shown in Figure 3.11. Under these alternatives, the proportion of the debt ratio attributed to ageing costs in 2050 would change by in the region of 5 percentage points.

3.7 Comparison with Other European Countries

Ireland is not alone in facing age-related spending pressures. Comparatively, Ireland has relatively favourable demographics right now. However, Ireland's demographics are set to change more rapidly than other countries over the coming years. In particular, Ireland is set to rapidly catch up with other EU countries, in terms of the relative size of its older population.

This section compares the projections for Ireland with projections for the EU 27, the UK and Norway, from the 2018 *Ageing Report* (European Commission, 2018). It should be stressed, that these projections from the European Commission do not incorporate any effect from the Covid-19 pandemic, whereas the Council's estimates do. The economic assumptions also differ in other respects, such as migration and productivity, so the comparison is only indicative. Furthermore, the Commission assumes that legislated future changes in pensions are implemented. For some countries, this may reduce future pension entitlements very significantly in later years.

Figure 3.12: Demographic trends
% of total population



Sources: European Commission (2018); and Fiscal Council workings.
Note: Light shaded regions show the minimum and the maximum range of the UK, Norway, and the EU 27 countries (excluding Ireland). Darker shaded region shows the interquartile range. Values for Ireland are represented as the green line.

The working-age population (defined here as 15-64 for comparison purposes) in Ireland is set to decline rapidly in Ireland from 2030 (Figure 3.12). The share of working-age population in Ireland is set to decline by 8.1 percentage points from

2030–2050, whereas the average decline in comparator countries over the same period is 4.6 percentage points. The share of Ireland's old-age population was below comparator countries as of 2016 but is set to rise rapidly in the coming years (Figure 3.12B). Ireland's old-age population share is projected to double from 13.3 per cent in 2016 to 26.6 per cent in 2050. The average increase for the other European countries over this period is projected to be 9.8 percentage points.

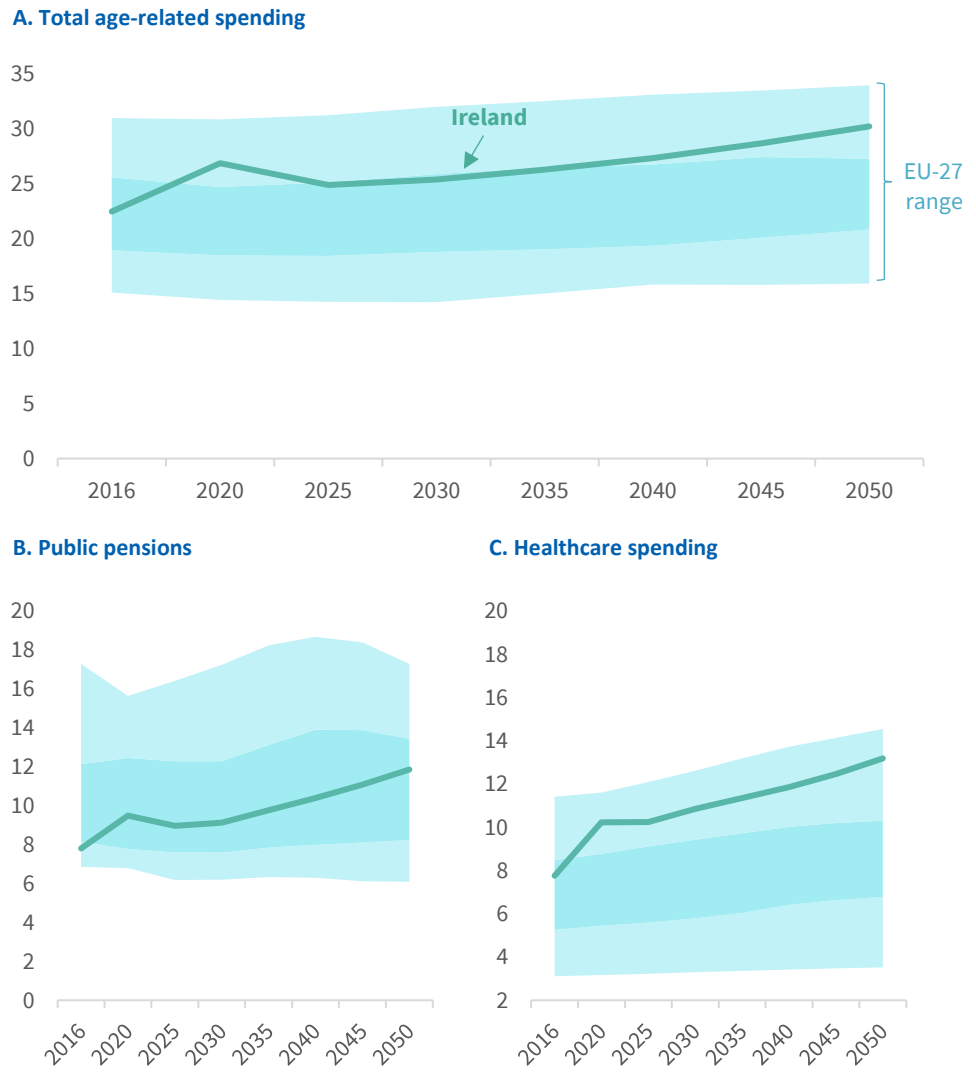
These rapidly changing demographics mean that the Council's projections for Ireland's age-related spending show faster increases than European Commission estimates for other countries (Figure 3.13). Under current policies, total age-related spending in Ireland is projected to increase from a share of 22.5 per cent of GNI* in 2016 to 30.2 per cent by 2050.[18]

Projected Irish spending on public pensions as a share of GNI* will rise by 4.1 percentage points between 2016 and 2050 (Figure 3.13B). Over the same period, the average increase estimated by the European Commission in comparator countries is 0.4 percentage points. Some countries are expected to experience a decline in the share of GDP spent on public pensions. For example, expenditure in Greece falls by as much as 4.8 percentage points over this period, while other countries, such as Slovenia, are expected to see an increase of 4.6 percentage points.

[18] Note, the definition of total-age related spending in *The Ageing Report 2018* is less broad than that used in this report. As a result, to make a like-for-like comparison with *The Ageing Report,* we have used the *Ageing Report's* definition of total-age related spending for Ireland in this section. The total ageing-related spending for Ireland in Figure 3.4 is therefore lower than that in Figure 3.1.

Figure 3.13: Age-related spending is set to increase more rapidly than in other European countries

% of GDP (GNI* for Ireland)



Sources: European Commission (2018); and Fiscal Council workings.
Note: Light shaded regions show the minimum and the maximum range of the UK, Norway, and the EU 27 countries (excluding Ireland). Darker shaded region shows the interquartile range. Values for Ireland are represented as the green line. To make a like-for-like comparison with the ageing report, total age-related spending for Ireland here only includes unemployment-related spending in social protection and is therefore not as broad a definition of age-related expenditure presented in Figure 3.1. Healthcare spending includes long-term care spending. Figures for Ireland incorporate the estimated impact of the Covid-19 pandemic. Figures for the other countries do not incorporate this impact.

The average increase in the share of healthcare spending in GDP, as estimated by the European Commission for comparator countries from 2016 to 2050, is 1.7 percentage points (Figure 3.13C).[19] Over the same period, the Council projects that

[19] The *Ageing Report 2018* presents healthcare spending and long-term care spending separately. Here, health and long-term care spending are presented together as "Healthcare" spending, to make the figures comparable to Ireland's health figures.

the share of Ireland's Healthcare spending in GNI* is to increase by 5.4 percentage points. However, significant differences in the projections for increased spending on health care may reflect differences in methodologies.

4. Policy Strategies to Meet Future Needs Sustainably

To ensure long-term fiscal sustainability, policymakers will need to adjust policies over time. To prepare for the rising costs associated with ageing, there are a number of policies that could be enacted.

The adjustment to policies could be achieved in different ways. Ageing costs could be managed through broad revenue-raising measures or through spending cuts. Building up large fiscal balances, creating a fund, and reducing debt more rapidly over the next decade could help to smooth future fiscal pressures. Within pensions, ageing pressures could be managed by developing a second contributory pillar, by encouraging more private pension saving, by reducing benefits through indexing to prices (rather than wages as assumed in this report), or by raising the retirement age. Measures to boost growth could also raise revenues. However, given the scale of the challenges, a combination of such measures is likely to be needed.

This section considers different potential policy strategies that could be used to ensure long-term fiscal sustainability. Section 4.1 outlines adjustments in the overall fiscal position, which could be achieved by tax increases or spending moderation, that would stabilise the debt ratio or bring it down to safer levels through running large budget balances to improve the State's financial position. The fiscal adjustment could be achieved within the pension system, by changing benefits or contributions, or through changes in other areas of spending or revenue. Section 4.2 explores the fiscal implications of the pension age under three scenarios: (1) the pension age changes in line with current legislation; (2) the pension age remains at 66; and (3) the pension age rises partly in line with life expectancy.

4.1 Using Fiscal Adjustments to Achieve Debt Targets

This section illustrates the broad fiscal adjustments (tax increases or spending cuts) that would be needed to achieve lower debt burdens by 2050, starting from a balanced budget in 2025 and taking into account ageing and heath costs. The adjustments shown in this section could either be applied to revenue or spending. In the model framework, a technical assumption is made that the wider economic impacts are broadly the same across either channel, although in reality some measures may be more efficient and less damaging to growth than others. The adjustments do, however, involve changes in terms of other fiscal and macroeconomic variables, including cash balances and interest costs.[20]

Debt sustainability depends on multiple factors with complex interactions, including long-run economic growth, global interest rates, risk assessments specific to a country's public finances and other factors. There is no agreed numerical definition of what a safe debt ratio is.

90% Target

A target that might be considered is one that avoids a rise in the debt ratio after 2040. This would be consistent with a debt ratio of approximately 90 per cent of GNI*, although this would leave the debt ratio at a high and vulnerable level. To achieve this, an annual fiscal consolidation of 0.14 per cent of GNI* would be required for 2036–2050. Alternatively, earlier consolidation with a smaller fiscal effort would be sufficient. For example, an annual increase in tax revenue of 0.08 per cent of GNI* for 2026–2035, or 0.05 per cent of GNI* until 2050, would achieve the same outcome. Figure 4.1 compares the cumulative share-of-GNI* adjustments necessary for stable and 60 per cent debt-ratio targets, for acting early, acting gradually, and delayed adjustment paths. These adjustments are relative to a "stand-still" approach—where spending rises with demographic and price pressures—but the adjustments could also partly be achieved by growing spending at a slower pace than the economy expands at.

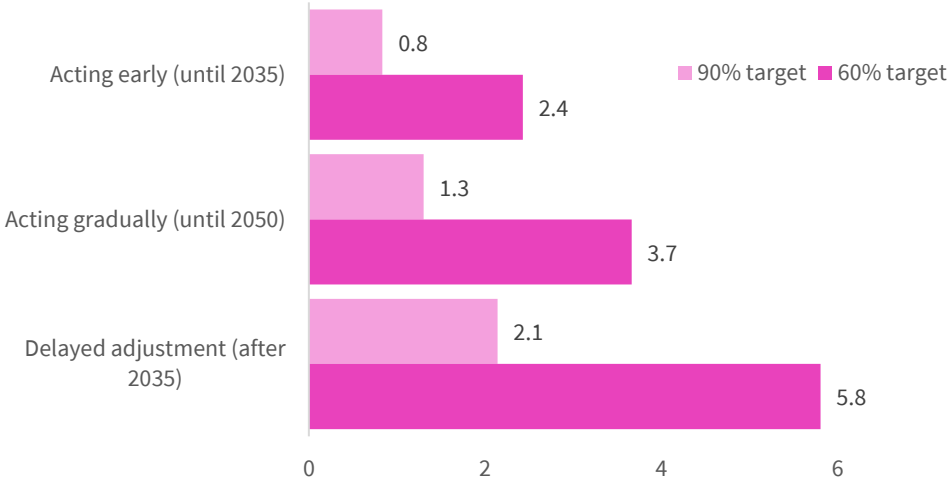
[20] A short-run deficit multiplier of 0.5 is assumed. Dynamic fiscal multipliers mean that the short-run impacts deteriorate, and the economy returns to trend levels (Box 3.2 in Fiscal Council, 2011).

60% Target

It is useful to take, as an illustration, the commonly referenced limit ratio of 60 per cent. This threshold is defined in a protocol to the Maastricht Treaty on European Union. Given the distortions to nominal GDP arising from foreign-owned multinational enterprises, it is more appropriate to assess the Maastricht debt and deficit criteria in terms of nominal GNI* for Ireland. Furthermore, Ireland's volatile growth rates would warrant a lower debt ratio than those deemed appropriate for other larger, less open economies.[21] To meet a target of 60 per cent of GNI* by the end of the projection period, annual fiscal adjustments of 0.1 per cent of GNI* for the period 2026–2050 would be required. Alternative approaches include adjustments of 0.2 per cent of GNI* for 10 years after 2025, or delaying until after 2035 which would require larger annual consolidations of 0.4 per cent of GNI*.

Figure 4.1: If fiscal adjustments are chosen, swifter action will cost less

Fiscal adjustment required after 2025 to stabilise debt by 2050, cumulative % of GNI*



Source: Fiscal Council calculations.
Note: These adjustments are relative to a "stand-still" approach—where spending rises with demographic and price pressures—but the adjustments could also partly be achieved by growing spending at a slower pace than the economy expands at.

[21] Box H of the *November 2017 Fiscal Assessment Report* explores these issues in more detail.

4.2 Pension Policies

The pressure from rising spending from pensions could be addressed through raising the pension age to reflect increasing longevity. It could also be addressed by linking changes in pension payments to prices rather than wages, and through the design of contributions to pensions.

Rising life expectancy means that people are likely to receive their pension for longer periods of time. The pension age in Ireland has stayed relatively stable over time, while life expectancy at birth and at age 65 has increased substantially. On average, in 2012, those receiving their state pension for the first time could expect to do so for around 19 years. This is 35 per cent longer than in 1980, when life expectancy at 65 was 14 years.

If people are not only living longer but are also healthier for longer, increasing the age at which pensions are paid would contribute to stabilising the public finances. Ireland has legislated for two pension-age increases in the coming years, which underlie the baseline projections: to 67 years in 2021 and to 68 years in 2028. To assess these reforms, this section estimates savings achieved in the baseline compared to staying at the status-quo pension age, which is 66 in 2020. Secondly, this section presents a scenario where the pension age is changed dynamically with life expectancy.

Box C: Pension Reforms in Recent Years

Concerns over the sustainability of pension systems in advanced economies are not new. Research highlighting the growing costs of demographic ageing was brought to the attention of policymakers by the World Bank as far back as 1994, with the global financial crisis exacerbating these strains in recent years (European Commission, 2018).[22]

In the Irish context, numerous studies have noted the scope for restructuring the pension system on the grounds of sustainability and equity (Collins and Hughes, 2017; OECD, 2013; Doorley *et al.*, 2018). Yet, the recent experience of important pension reforms in Ireland demonstrates both delays, which are costly, and risks of backtracking on previous commitments to reforms.[23]

This box considers some of the more recent developments relating to reforms of the state pension system in Ireland.

The recent history of reforms to the retirement age

The *National Pensions Framework* (*NPF*), outlined in 2010, following on from the Green Paper on Pensions in 2007, set out a range of prospective changes to the system of pensions in Ireland. This document, along with the conditionality arrangements in Ireland's bailout agreement in 2010, largely guided the reform of Ireland's pensions framework over the last decade. The *NPF* outlined a number of changes that would serve to ensure longer-term sustainability, given the rising costs of an ageing population.

In 2018, this framework was supplemented by the *Roadmap for Pensions Reform 2018-2023* (*RPR*). The *RPR* outlined the scale of the challenge in reforming the Irish pension system, noting that in its current format, a 4:1 ratio of workers to claimants was required to ensure sustainability, with this ratio set to fall to 2.3:1 by 2060 (Government of Ireland, 2019). The roadmap also described the ways in which the government committed to addressing these challenges over the period 2018-2023. A survey of these materials, and the *NPF* demonstrates that some of the most important proposed reforms to the pension system in Ireland have been delayed or only partially implemented.

Among the commitments in the *NPF,* many of which have been implemented, one of the most contentious was a long-term plan to incrementally raise the age at which the state pension is provided (the "pension age"), which had been constant for several decades. The goal would be to bring the age at which the state pension is paid more closely in line with life expectations, which have grown substantially over the last century, and to reduce the pensions burden on the State, due to ageing.

The recently released Programme for Government (*PfG)* has committed to deferring the planned increase of the pension age to 67, due to occur on January 2021. Instead, a Commission on Pensions is proposed to be established and tasked with examining sustainability and eligibility issues within the current pensions system. The deadline for delivery of this report is June 2021, with the Government pledging to take action with regard to the recommendations of the Commission within 6 months of publication. Additionally, the requirement to be actively searching for work has been suspended for those who finish working at age 65 and apply for regular jobseeker's payments. This discrepancy between the retirement age of some workers at 65 and the eligible state pension age of 66 is attributable to many private sector contracts expiring at 65, representing a concern for governments that might seek to raise the pension age.

[22] See World Bank (1994).

[23] A comprehensive discussion of all pension reforms in recent years is beyond the scope of this box. The policies detailed are merely for illustrative purposes and include some that have sizable fiscal implications.

A diminishing workforce and an increasingly large number of pensioners weigh on the State's pension expenditures (see Figure C.1) and this is compounded by the relatively low levels of private pension savings accumulated by the labour force in Ireland during their working years (CSO, 2020). With greater private pension savings, the state could spend less supporting citizens in retirement. To increase pension coverage across those of working age, the *PfG* includes a commitment to introduce an auto-enrolment pension system, with financial contributions from the State, the employer and the employee, thus reducing the burden on the Exchequer in future years. Commitments to this end were also announced initially a decade ago, with the 2010 *NPF* outlining an implementation date of 2014 at the time of launch, and also in the *Roadmap for Pension Reform 2018–2023*. Importantly, the OECD drew attention to the issue of insufficient pension coverage in Ireland, noting that auto-enrolment can serve as a "second best" option to increase coverage, with a compulsory system of enrolment being both less costly and more efficient.[24]

Moves to a Total Contributions Approach

Another consideration in the *PfG*, along equity lines, is the expansion of the "Total Contributions Approach". This approach is intended to align a person's contributory pension more closely with their actual contributions over time. It has been in place since 2012 for pensioners that do not hold a full pay related social insurance record. The approach would include credit contributions to compensate those who temporarily remove themselves from the labour market, while also saving the exchequer on pension payments to those that make the vast majority of the pay contributions in the immediate years before being eligible for the state pension. This adjustment broadly reflects the fact that pension structures have important distributional consequences, with policies needing to consider both equity and efficiency for long-term sustainability. This change, too, had been committed to in 2010 under the *NPF*, and was set to be implemented fully under the *Roadmap for Pension Reform* by Q3 2020. Demonstrating that even well-supported policies can face a lengthy period to implementation.

Conclusions

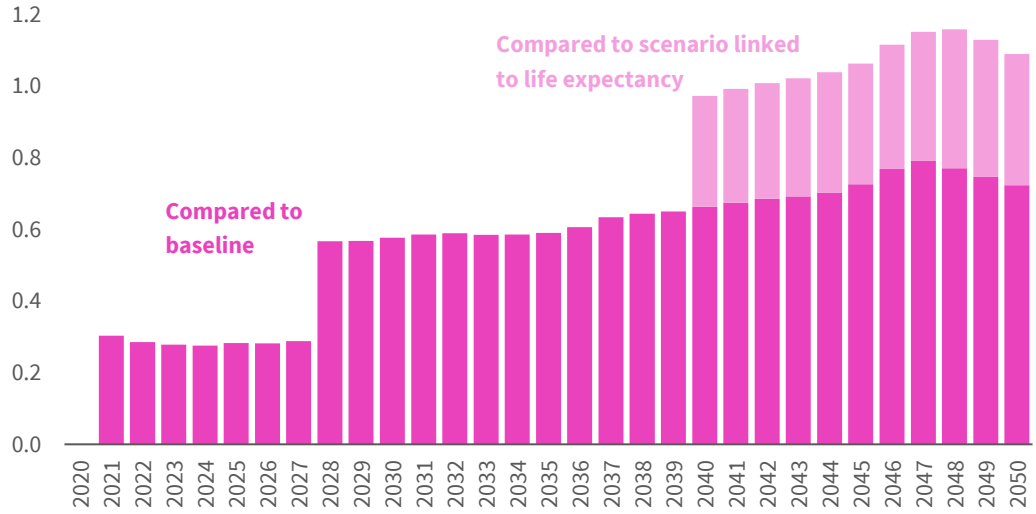
Ireland's recent history suggests that some fundamental reforms to pension systems can take a considerable length of time to implement, and there are strong risks of backtracking on changes to the retirement age. With life expectancy forecast to continue rising, this suggests risks for fiscal sustainability in the context of an increasingly ageing population in the coming decades. Future economic shocks will exacerbate these vulnerabilities. Adjustments to the pension system could include aligning the pension age with increases in life expectancy, developing a second contributory pillar, encouraging more private pension saving, or reducing benefits through indexing to prices (rather than wages as assumed in this report). If changes to the pension system are not made, then other means of adjustment would be required to contain the rising deficit pressures due to increasing pension costs, such as savings on spending elsewhere or increases in taxes. Incremental adjustment over a long period of time would be less painful and would have fewer distributional consequences than a large sudden adjustment.

The additional cost of leaving the pension age constant at 66 is initially estimated at close to €575 million in 2021, which is about 0.3 per cent of GNI*. For the change in 2028, the additional cost is €1.5 billion, or close to 0.6 per cent in GNI* terms (see Figure 4.2). This is because the pension age is assumed to be two years higher than in 2020. Over the period of 2030-2039, there could be annual savings in the baseline

[24] See OECD (2013).

of 0.6 per cent of GNI*. This is projected to rise to 0.7 per cent by 2040-2050 as cohorts aged 66–67 grow, and pensions are indexed with wage growth. These savings are equivalent to 1.8 per cent of total yearly social protection expenditure in 2021–2027, 3.8 per cent in 2028–2039 and 4.1 per cent in 2040–2050.

Figure 4.2: Additional costs in a scenario where the pension age is unchanged



Sources: Fiscal Council projections.
Notes: Unchanged pension age refers to the pension age staying at the 2020 age of 66. In the baseline, the pension age rises from 66 to 67 in 2021 and to 68 in 2028. The link to life expectancy assumes another rise to 69 in 2040. The costs include differences related to spending on state pensions and other old age supports. These are adjusted for associated changes to working-age supports.

Given the potential for savings as the pension age goes up by a year, further pension-age increases after 2028 could be implemented. The Pensions Roadmap states that there will be no such increases before 2035 and that any changes will be linked to an assessment of Irish life expectancy (Government of Ireland, 2019). To reach future consensus for this, it would be useful to assess actual savings of the 2021/2028 reforms, as well as whether life expectancy gains are shared equally within society.

To illustrate the potential savings of a more dynamic pension age, we consider a hypothetical scenario in which pension-age increases are linked to average life expectancy at age 65 in Ireland. We assume that for each one-year increase in life expectancy, the age at which the state pension is paid increases by two-thirds. By indexing on a two-thirds basis, the ratio between time spent working and in retirement is broadly preserved.

This process is in line with the pension age policy in many other European countries for over a decade (OECD, 2011). Importantly, some states have adopted a more continuous measure of the pension age, and the method used to calculate benefits in retirement. Examples of this include allowing the retirement age to follow life expectancy by changing after a portion of the year, rather than only implementing adjustments on an annual basis. Other reforms include allowing the pension age to be more closely aligned with personal incentives, where the option to retire is made available from 65, but workers can remain in employment to ensure a greater benefit rate upon retirement.[25]

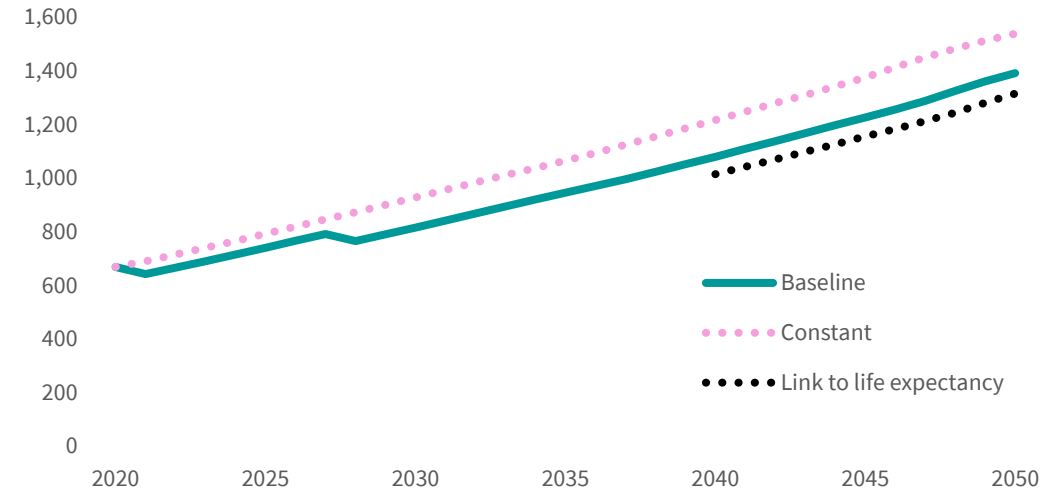
Under this framework, increases in the pension age would therefore occur initially in 2021 and 2028 as in the baseline, before rising by one year again in 2040. By this time, the pension age would have risen to 69. It is noteworthy that by 2050, life expectancy at age 65 is set to reach an average of 89 — a difference of 19 years between the pension age and life expectancy.

Relative to our baseline scenario of a one year increase in the pension age in 2021 and 2028, we estimate that linking the pension age to increases in life expectancy at age 65 after 2028 could save the Exchequer approximately 0.3 per cent of GNI* annually over the period 2040–2050, following an additional pension age increase in 2040. This is shown in Figure 4.3. Under this scenario, the fiscal costs associated with pensions and other old age supports could lower yearly total social welfare spending in the 2040s by around 2 per cent compared to the baseline.

[25] Life expectancy at 65 is also factored into this equation in some systems, where the pensioner's total benefit is divided by the expected number of years in retirement.

Figure 4.3 People above pension age by scenario

Thousands



Sources: CSO; and Fiscal Council projections.

Figure 4.3 shows the number of people who would be eligible to draw a state pension by scenario. Increasing the pension age would also have an impact on other social benefits linked to the pensionable age (including, the free travel and fuel allowances), which is included in Figure 4.3. Pension expenditure includes state pensions, as well as disability and survivor pensions.[26] Table 4.1 shows how claimants vary by scenario and pension type. Note that there may also be a revenue effect in the form of income tax paid by people working longer. However, revenue is projected as constant as a share of GNI* in the long run, such that this is not considered here.

One risk is that older workers would suffer from higher unemployment or sickness rates, which would offset some of the savings from pension age increases. For instance, individuals who are forced to retire at a previous pension age, such as age 65, may qualify for unemployment benefits before reaching the new pension age. Therefore, while a rise in the pension age can reduce spending on pensions, it may also increase unemployment expenditure. As shown in Table 4.1, the projected cost

[26] Disability pensions are paid to eligible adults until they reach retirement age. It is assumed that the share of recipients stays at the 2017 rate of 6.4 per cent of working age (based on Eurostat figures on pension beneficiaries, available until 2017, as of June 2020). As the pension age increases when linked to life expectancy, the number of disability beneficiaries increases more than in the constant scenario. Survivor pensioners are projected as a constant share of the population aged 20+ (5 per cent) and are the same across scenarios.

per person unemployed is higher than the average pension cost (both indexed to wages).

Note that the total unemployment rate is fixed at 5.5 per cent in the long run and is assumed to be unaffected by greater numbers of older workers available to the labour market. Since the labour force grows slowly, compared to the total population, it seems plausible that older workers will be able to (and will want to) stay in employment.[27] However, if a substantial number of older workers were unemployed and the total unemployment rate was also adversely affected, an increase in unemployment benefit claims would reduce savings on pensions. For example, consider a very high unemployment rate of 50 per cent of the workforce aged 66 in 2021. This would translate into almost 5,680 affected people.[28] If this group received average unemployment benefits and supports instead of an average pension, this would reduce savings in the baseline by around 110 million, compared to the constant age scenario.[29] Likewise, unemployment of younger cohorts may be higher if posts at the other end of the working age spectrum are not made available through natural turnover of staff.

On the other hand, it is worth noting that savings presented in Figures 4.2 and 4.3 consider state pensions but not public sector pensions. Total pension expenditure savings compared to keeping the pension age at 66 as well as the effects of dynamic changes with life expectancy may thus be slightly understated. It is also important that this exercise makes no assumption regarding the effect of retirement on productivity and the effect on the human capital development of the younger population.

[27] Unemployment of workers around pension age is adjusted as follows: the unemployment rate for ages 65–69 converges towards the share of total unemployment of the next youngest cohort (60–64), with every increase in pension age. At the same time, labour force participation of ages 65–69 is assumed to increase (while it remains stable in the constant pension age scenario). This boosts the labour force and at the same time results in different numbers unemployed by scenario, as shown in Table 4.1. The participation of older cohorts is partly offset by a slight decrease in participation of ages 15–19 in each year of an envisaged pension age increase.

[28] Based on a projected labour force of 11,355 out of a total population aged 66 of 47,875.

[29] To compare, Figure 4.2 shows additional costs of the constant pension-age scenario including around €40 million savings in working-age supports in 2021, based on a total unemployment rate of 9.7 per cent and unemployment at age 66 of 8.2 per cent.

Table 4.1: Pensioners and unemployed by pension age scenario

Persons in thousands, unless stated

	2019	2030	2040	2050
Baseline				
Total pensioners	1,027	1,243	1,535	1,844
Of whom				
Old age	650	816	1,080	1,392
Disability	197	222	230	220
Survivors	179	205	225	233
Unemployed 65+	0.5	2.1	3.2	4.0
Unchanged pension age at 66				
Total pensioners	1,027	1,348	1,663	1,981
Of whom				
Old age	650	928	1,217	1,539
Disability	197	215	221	210
Survivors	179	205	225	233
Unemployed 65+	0.5	0.7	0.9	2.5
Pension age rises with life expectancy				
Total pensioners	1,027	1,243	1,474	1,772
Of whom				
Old age	650	816	1,014	1,315
Disability	197	222	234	224
Survivors	179	205	225	233
Unemployed 65+	0.5	2.2	4.4	5.8
All scenarios				
Average pension cost per person (€ '000)	12.5	15.4	19.8	25.7
Average unemployment cost per person (€ '000)	19.5	24.1	30.8	40.1

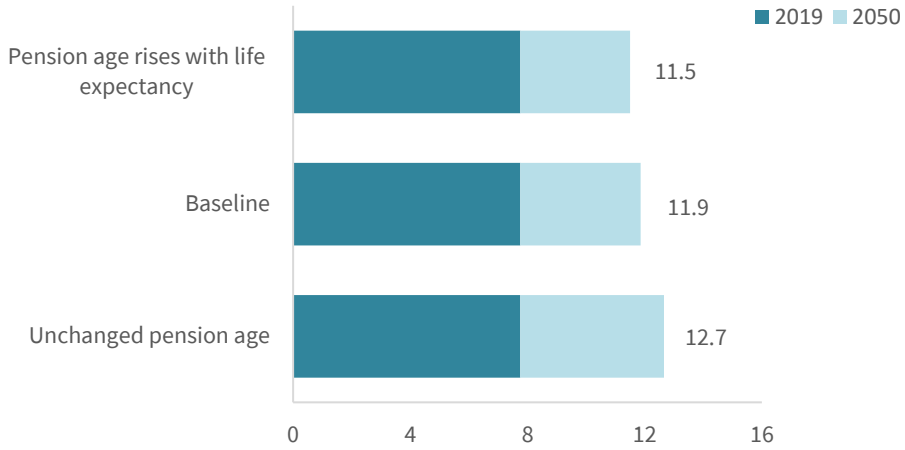
Sources: CSO; Eurostat; and Fiscal Council projections.

Note: Average unemployment cost per person includes income and employment supports as classified in Eurostat's Classification of the Functions of Government. It excludes Covid-19-related expenditure for 2020.

Contrasting the effects of the pension-age scenarios on the public finances, total expenditure on pensions would rise by 3.8 per cent of GNI* over the period 2020–2050, under dynamic pension-age changes, by 4.1 per cent in the baseline, and by 5 per cent if the pension age were unchanged (Figure 4.4).

Figure 4.4: Allowing the pension age to increase as life expectancy rises would help to reduce the budgetary cost

% of GNI*

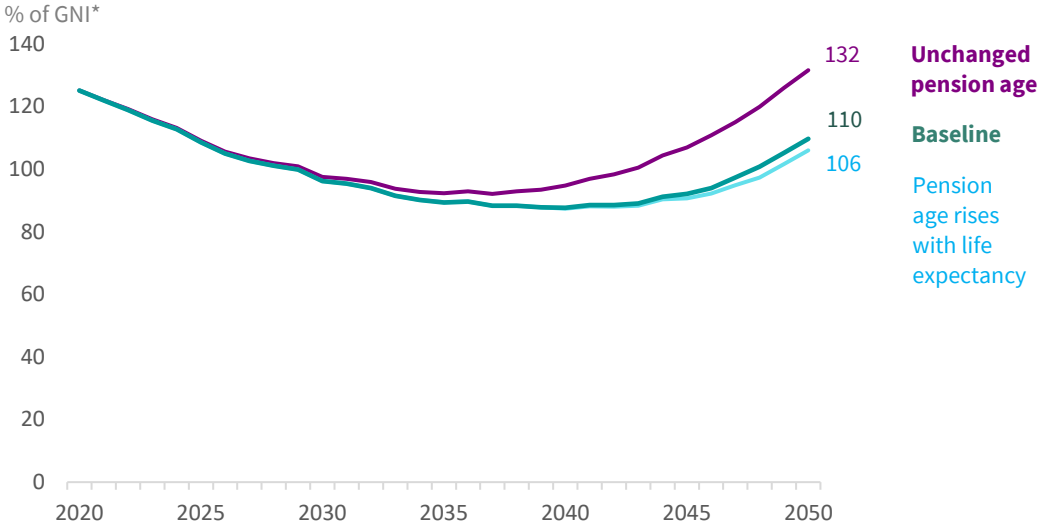


Sources: CSO; Department of Public Expenditure and Reform; and Fiscal Council projections.
Note: The unchanged pension-age scenario assumes that the pension age does not rise from age 66 for the full projection period.

Depending on the policy choice for pension-age changes, debt outcomes could be very different. As shown in Figure 4.5, if the pension age were left at 66 from 2021 onwards, the gross debt-to-GNI* ratio would be 3 percentage points higher than in the baseline in 2035. By 2050, the difference would grow to almost 22 percentage points. This large increase reflects the fact that pressures both in terms of ageing and interest payments are non-linear and are set to increase rapidly after 2035. By contrast, in a scenario where the pension age rises with life-expectancy increases, the gross debt ratio would be 3.7 percentage points lower than in the baseline in 2050.

Raising the pension age can be a useful tool for making expenditure on social benefits more sustainable. It is important to note that the timing of such policy reforms matters, too, as the effect on government debt becomes larger over time. Delaying pension reforms while the demographic profile of the country is relatively favourable will necessitate stronger adjustments in the future, as the fiscal costs to the State accumulate over time. Importantly, the baseline scenario of an increase to the pension age in 2021 and 2028 may prove to be optimistic, given that the legislated increase in 2021 has been postponed. This chimes with the recent Irish experience of pension reforms, which has been marked by delays and policy reversals (Box C).

Figure 4.5: Gross debt under different pension-age policies



Sources: CSO; Department of Public Expenditure and Reform; Department of Finance; and Fiscal Council projections.
Note: The debt-ratio scenarios assume a pension age that rises to 67 in 2021 and then to 68 in 2028 in the baseline scenario, compared to a constant pension age of 66 (upper range) and pension age dynamically changing with projected life expectancy (lower range).

Inaction can have both short- and long-run economic consequences. In the short run, consumers and businesses may begin to expect more substantial reforms in pension systems in the future, inducing them to change their consumption and savings behaviour in the present (Giavazzi & McMahon, 2012). In the long run, as fiscal pressures grow, more wholesale changes to achieve sustainability in the pension system may be more disruptive to the economy than making smaller changes incrementally. By providing a framework and reforms for pensions that are adhered to, certainty and stability regarding the long-term trajectory of the policy environment can be provided both to employers and employees.

Box D: Pension Reform Challenges

Many advanced economies face challenges in terms of pension reforms, given the long-term pressures posed by an ageing population. This box examines the budgetary constraints facing policymakers and the difficult choices that need to be made to address them.

Difficult choices and weak commitments

With the labour force set to diminish, and the number of pensioners set to rise over the coming decades, governments are therefore left with several choices if pension systems are to be made sustainable. The contribution rate drawn from the output of the labour force can be increased, providing the government with revenues to fund an increasingly large share of pensioners. Pension coverage in the population can be increased by encouraging or forcing workers to save before reaching retirement, reducing the numbers that will need the state pension in retirement. The increase in the number of people drawing the state pension can be stalled or decreased directly by raising the age at which the state pension is paid. Alternatively, the government can choose to reduce the outlay per claimant of a state pension. This can potentially be achieved by indexing payments to prices rather than wages or by decreasing the rate outright.

Political economy constraints mean that delivering on pensions reforms can be difficult and often slow to come about.

One reason pension reforms are difficult to deliver is due to "time inconsistency" problems — policymakers can easily reverse reforms made at an earlier stage just as the reforms are about to come in.[30] This often arises with pension reforms as changes to pension systems are usually implemented on a phased basis — that is, guidance is often issued long in advance.[31] This is helpful to reduce disruption and to allow adequate time for financial planning. But it means that the reforms can be subject to reversal at a later stage if opposition to the reforms is apparent at that time. For example, phased increases in Ireland's pension age, outlined in 2010, have now spanned three governments in Ireland. Yet so far only one increase has been implemented. This was before the most recent decision was made to defer a second increase.[32]

Another reasons why pensions reforms are difficult to enact is that governments face challenges in terms of maintaining political support for pension reforms among diverse stakeholders. The economic benefits of reduced expenditures and increased national output as a result of reforms to the pension system are accrued to the State as a whole. They are therefore diffused among the entire population. But the costs of pension reforms tend to be perceived as falling on those either close to or already drawing a state pension even if the actual cost of the reforms often falls on those below the pension age.

Governments therefore face difficulties following through on pension reforms made at an earlier stage. Ensuring the viability of pension-spending in the long run, as demographics change, can be difficult to achieve if decisions made today for pension age changes tomorrow are then reversed when tomorrow comes. Responding to these challenges while demographics are relatively favourable is essential to limit the direct and indirect costs to the

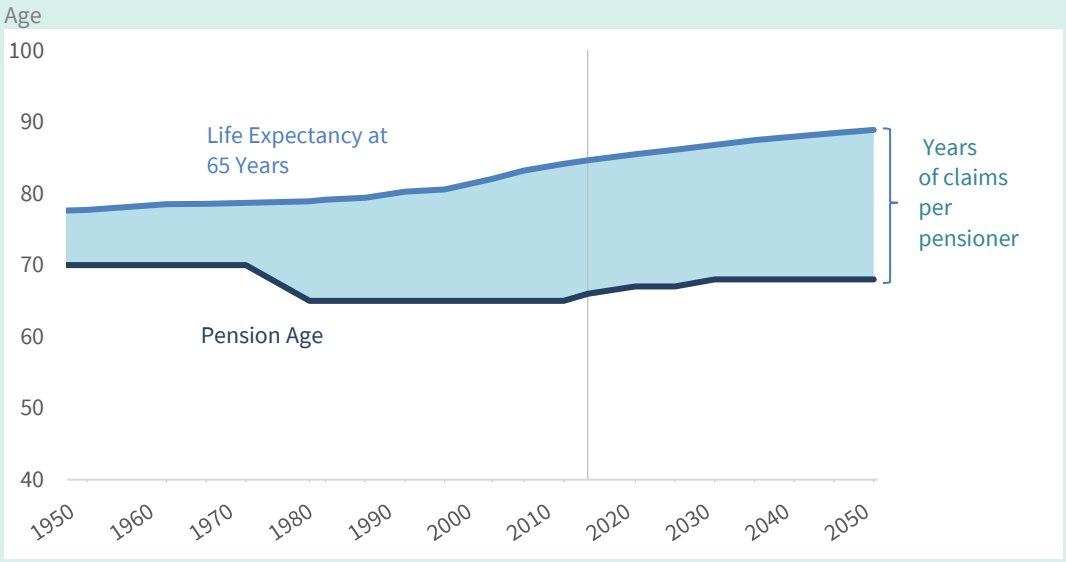
[30] Kydland and Prescott's (1977) time-inconsistency problem shows that policymakers with complete discretion at every point in time might not use resources available to them in the best way possible. In other words, good policy commitments made at an earlier stage might not be followed through on at a later stage. A key conclusion is that one can improve long-run outcomes by limiting future discretion so as to preserve earlier commitments.

[31] The *Roadmap for Pensions Reform 2018–2023* commits to a guidance period of 13 years prior to any changes to the pension age.

[32] Increasing the retirement age saves the State a recurring year of expenditure streams, while also incentivising workers to remain in employment, thus boosting revenues and consumption.

economy. Otherwise more severe adjustments are likely to be needed in the future as age-related fiscal pressures continue to mount.

Figure D.1 The gap between life expectancy and the pension age is widening



Sources: CSO; Government of Ireland; and Fiscal Council workings.
Note: The baseline assumed includes two legislated adjustments to the pension age: in 2021 and in 2028.

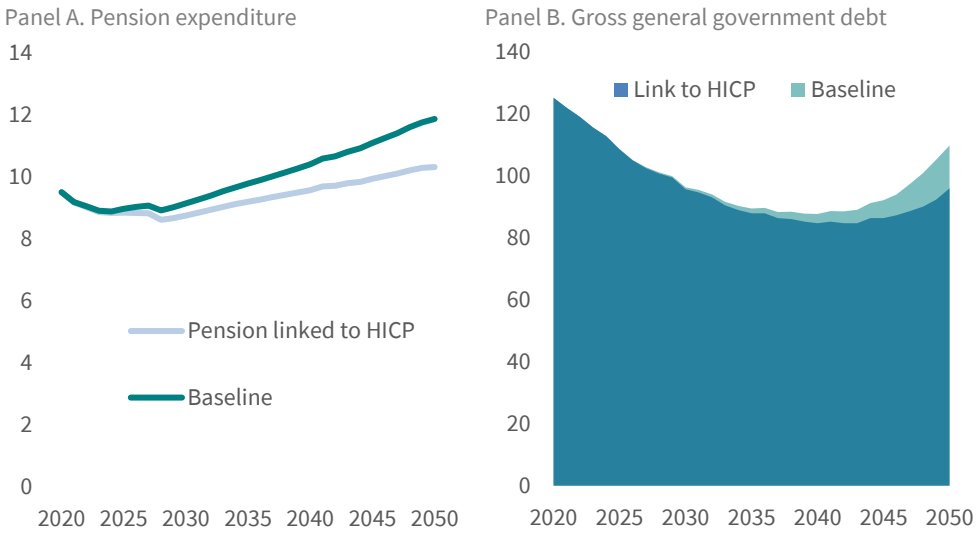
Another strategy for reducing the cost of pensions is to index pensions to the cost of living (inflation measured by the Harmonised Index of Consumer Prices (HICP), rather than with wages as in the baseline.[33] As a result, benefits would remain stable in real terms, in terms of purchasing power, but in nominal terms would rise more slowly than the wages of those in work. Figure 4.6 shows the potential gains of this adjustment over time. By 2050, debt could be almost 14 percentage points lower than in the baseline. The primary deficit in 2050 could be improved by up to 1.5 percentage points compared to the baseline.

To extend this illustration, if all social benefits (including pensions) were indexed to HICP inflation, the primary balance would be 2.3 percentage points below the 2050 baseline and debt would be around 86 per cent. While maintaining purchasing power relative to today, it would reduce the relative income of pensioners and those on benefits. This would likely increase relative measures of income inequality.

[33] Note that this is not applied to public sector pensions, as estimates are official estimates consistent with the Ageing Report 2018 (European Commission, 2018) rather than being modelled explicitly.

Figure 4.6: The effect of pension indexation to the HICP

% of GNI*



Sources: Department of Public Expenditure and Reform; Department of Finance; and Fiscal Council workings.

Notes: The change of indexation is not applied to public sector pensions.

5. Risks and Uncertainties

Long-term projections over many decades are inevitably imprecise and subject to large risks and uncertainties. This section assesses some of the quantifiable risks and uncertainties around the central projections that are set out in this report, as well as some of the sensitivities to key assumptions made about how the economy and public finances might evolve.

Section 5.1 shows the potential impacts of Covid-19 on long-term fiscal sustainability. Section 5.2 considers the impact that a fall in corporation tax receipts could have in the long run. Section 5.3 looks at the implications of a potential increase in interest costs. Section 5.4 considers alternative assumptions for how healthcare demand might rise with incomes and also explores the impact on the public finances of implementing Sláintecare. Section 5.5 looks at the potential impacts of climate change on the public finances. Section 5.6 explores some of the more general uncertainties and sensitivities around the baseline projections.

5.1 The Impact of Covid-19

Projections for the economy and the public finances have changed drastically since the emergence of the Covid-19 crisis. The medium-term path for the public finances and the economy is highly uncertain. In particular, the starting point for the debt is likely to be much higher than previously assumed. And policy requirements to stabilise the public finances are potentially more demanding.

The economic impacts of Covid-19 are expected to impact the medium-term fiscal outlook, though they do not significantly change long-term costs associated with ageing. Importantly, a higher starting debt ratio, following the pandemic, would make debt dynamics more challenging in future. This is especially evident when ageing pressures are expected to push spending upwards in later decades.

The macroeconomic outlook pre- and post-Covid-19

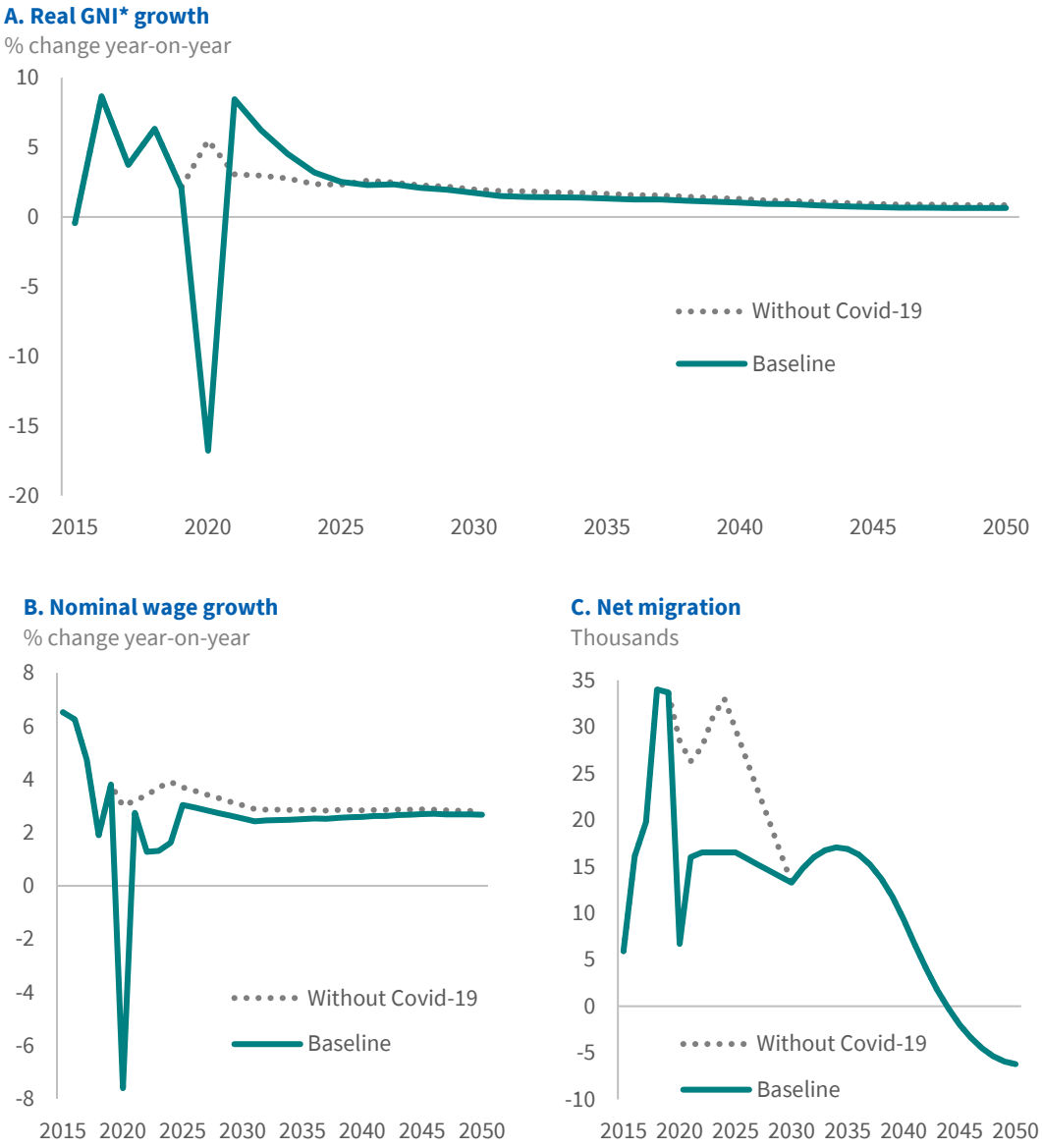
The economy currently faces significant disruption. Yet, over the long run, growth rates are likely to revert to close to the pace previously assumed even if the level of overall activity might be lower as a result of the recent disruption. However, the Covid-19 pandemic is expected to coincide with a sharp drop in real GNI* growth in 2020. This is expected to be followed by fast growth in subsequent years, as the economy reopens and regains some of its lost output (Figure 5.1).

Annual increases in spending associated with ageing are similar in the two scenarios, as demographic change is largely unaffected. However, in a "without-Covid-19" scenario, net migration would be higher (Figure D.1C), and unemployment would be lower in the short and medium run.

The differences reflect different drivers of public-sector pay and social protection spending arising from a reduced path for GNI* and GNI* growth as a result of Covid-19.[34] In particular, forecasts for inflation and wage growth are lower in the baseline scenario than in the without-Covid-19 scenario (Figure D.1B).

[34] If presented in per cent of GNI*, without-Covid-19-scenario increases would not be higher than the baseline. This is due to the higher GNI* denominator.

Figure 5.1: Covid-19 affects growth and unemployment in the short and medium run



Sources: CSO; Department of Finance; and Fiscal Council projections.
Notes: Although the 2015 real GNI* growth is negative and close to zero, its nominal growth was 9.4 per cent. The difference is mainly due to a deflator issue with goods exports, whose price deflator grew by 10 per cent that year. The GDP deflator consequently grew by close to 8 per cent, and this effect was not offset by price dynamics in net-factor income from abroad and other adjustments necessary to get to GNI*.

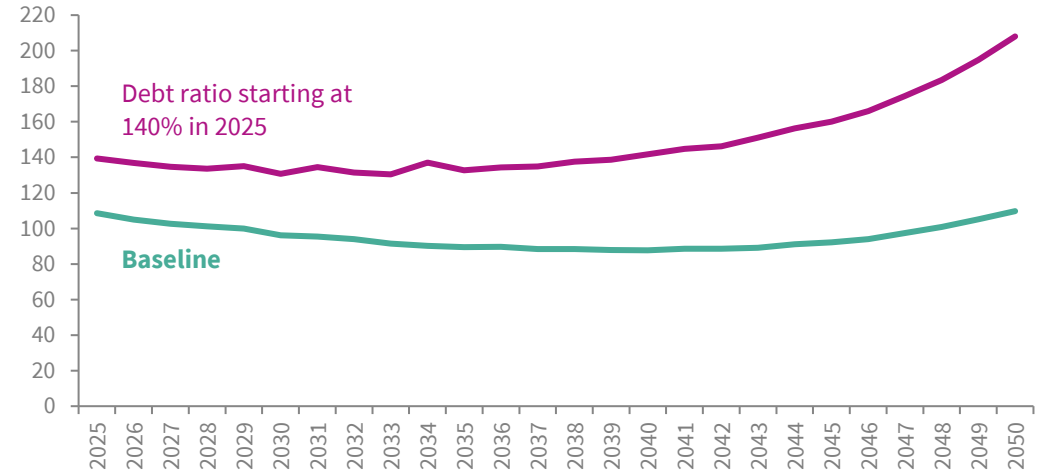
A higher starting debt ratio could lead to more severe debt dynamics

A key question is the extent to which a higher starting debt ratio following Covid-19 might amplify the same ageing pressures.

As an illustration, Figure 5.2 explores how a higher starting point for the debt ratio (at 140 per cent of GNI* in 2025) would lead to more challenging debt dynamics. This is broadly consistent with the debt ratio observed in the Severe scenario included in

the Council's *May 2020 Fiscal Assessment Report*, that results from repeat lockdowns due to further waves of the virus, first in late 2020 and then again in 2021.

Figure 5.2: A higher starting point for the debt ratio would involve a worse path



Sources: CSO; and Fiscal Council workings.
Note: This analysis uses the outcome for the Severe scenario in the *May 2020 Fiscal Assessment Report* as a starting point for the gross general government debt ratio in 2025.

If debt dynamics were similar to the baseline in other respects after 2025 (when most of the short-run effects of the pandemic would be expected to have faded), then a higher starting point for the debt ratio would lead it to remain elevated at close to 140 per cent of GNI* through the 2030s, before rising above 200 per cent of GNI* by 2050. This reflects the feedback of higher initial debt, the same ageing pressures and rising interest costs due to a higher risk premium being attached to Irish debt. Of course, such an outcome would very likely see worse outcomes elsewhere as well, such that monetary policy might respond to prevent borrowing costs from rising.

However, the scenario highlights that a higher starting debt ratio amplifies the risk channels for fiscal policy in the long run, given the challenging dynamics described in this report due to a number of factors related to ageing. Lower interest rates mitigate this risk but could also unwind in time.

5.2 Long-term Risks to Corporation Tax Receipts

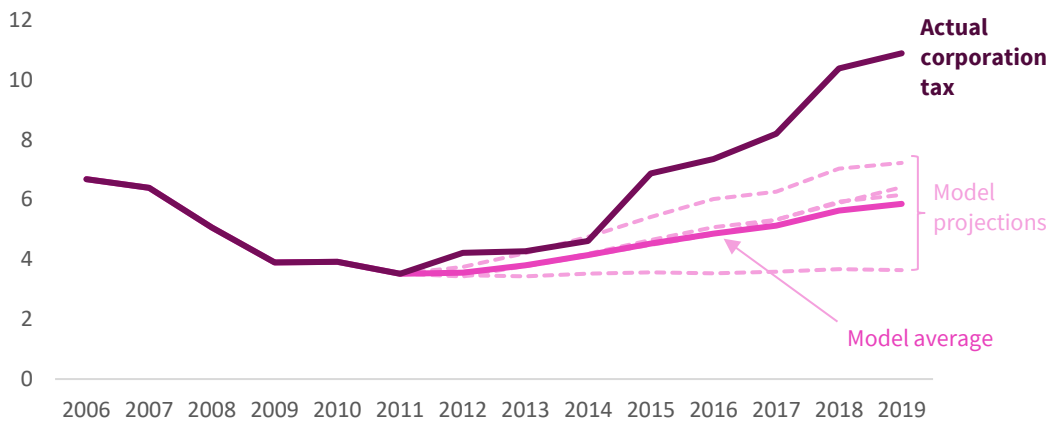
A key risk to the public finances to have emerged in recent years is the sustainability of Ireland's corporation tax receipts. Corporation tax receipts grew to represent 18 per cent of annual tax receipts in 2019. The receipts are highly concentrated, with just 10 corporate groups paying 40 per cent of corporation tax in 2019. Furthermore, 77 per cent of receipts are accounted for by foreign-owned multinationals. Partly reflecting this concentration and the idiosyncratic risks associated with it, corporation tax has also tended to be the most volatile and least forecastable of Ireland's main taxes (Casey and Hannon, 2016).

The risk of using corporation tax receipts to fund long-lasting spending increases has been highlighted repeatedly in the Council's Fiscal Assessment Reports since as early as 2015 (Fiscal Council, 2015). A repeated pattern of unplanned spending increases, particularly in health, used up much of the recent surges in corporation tax. These "within-year" spending increases were outside the normal budgetary process. That is, rather than being planned for in budget documents, they arose during the year as overspends or unplanned increases in total government spending.

The long-term risk that is that corporation tax receipts could fall if the taxable presence of companies in Ireland changes. This could happen as a result of company-specific decisions or changes in global circumstances and policy regimes (for example, including the OECD BEPS initiatives). If this were to happen, the Government could be faced with the possibility of a sharp drop in revenues and a related deterioration in the budget deficit.

A suite of models of corporation tax indicates that the potential "excess" of corporation tax receipts being taken in by the Government could be some €5½ billion (approximately half of the €10.9 billion collected in 2019). These model estimates account for the amount of receipts that can be explained by the performance of the domestic economy since 2012. As can be seen, the actual outturns for corporation tax in recent years have been far beyond what can be explained by the domestic economy (Figure 5.3).

Figure 5.3: Modelled corporation tax from 2012 well below actual outturns



Source: Fiscal Council workings.
Note: Model projections use a suite of models together with actual nominal GNI* and domestic GVA outturns to project forward expected corporation tax receipts from 2012. See Box H of the *May 2020 Fiscal Assessment Report*, for detail on the methodology.

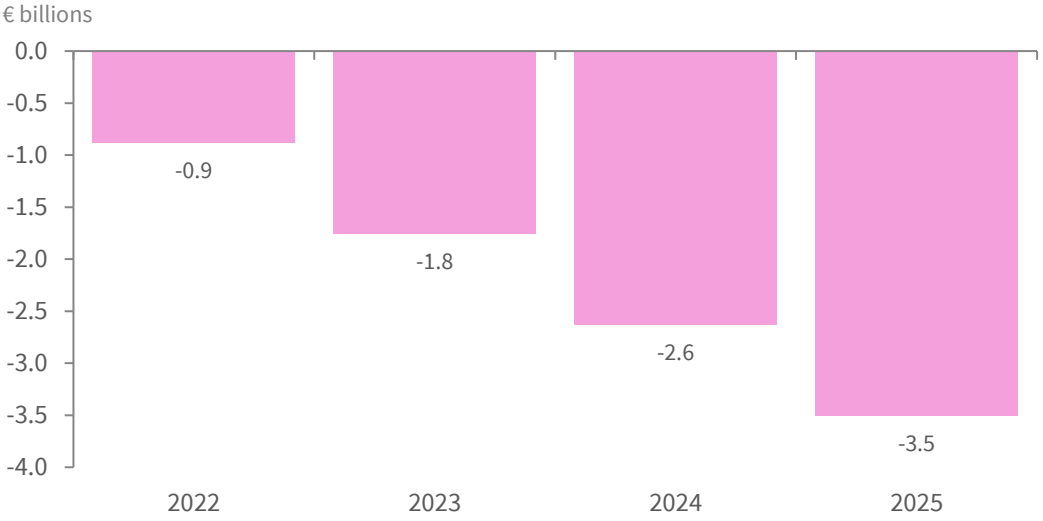
For the purposes of this report, the central projections of corporation tax assume a cumulative fall of €2 billion in receipts relative to a baseline where total receipts grow in line with nominal GNI*. This is in line with the Department of Finance's (2020) estimates of the potential impact of the OECD's BEPS initiatives on the level of corporation tax receipts (€0.5 billion in 2022, rising by a further €0.5 billion each year up to a cumulative €2 billion in 2025).

However, the OECD's BEPS initiatives and changes to the international tax environment more generally could impact on Irish corporation tax receipts over the medium term by more the €2 billion assumed in the baseline. As such, it is worth considering what could happen to the public finances in a scenario where receipts revert to levels consistent with what can be explained by the performance of the domestic economy. Based on the Council's estimates of excess receipts in 2019, we consider a scenario with a further cumulative fall in receipts of €3.5 billion.

The trajectory for Ireland's debt ratio would be worse in a scenario where corporation tax receipts were to fall by a further €3.5 billion beyond the €2 billion assumed by the Department of Finance in coming years. If, in an illustrative scenario, it is assumed that the receipts fall by €875 million annually between 2022 and 2025 relative to baseline, before then tax receipts would be €3.5 billion lower by 2025 (Figure 5.4). Corporation tax receipts would then be assumed to grow in line with nominal GNI* after 2025. The result—even with no real economy impact assumed—would be for the debt ratio to end up about 26 percentage points higher

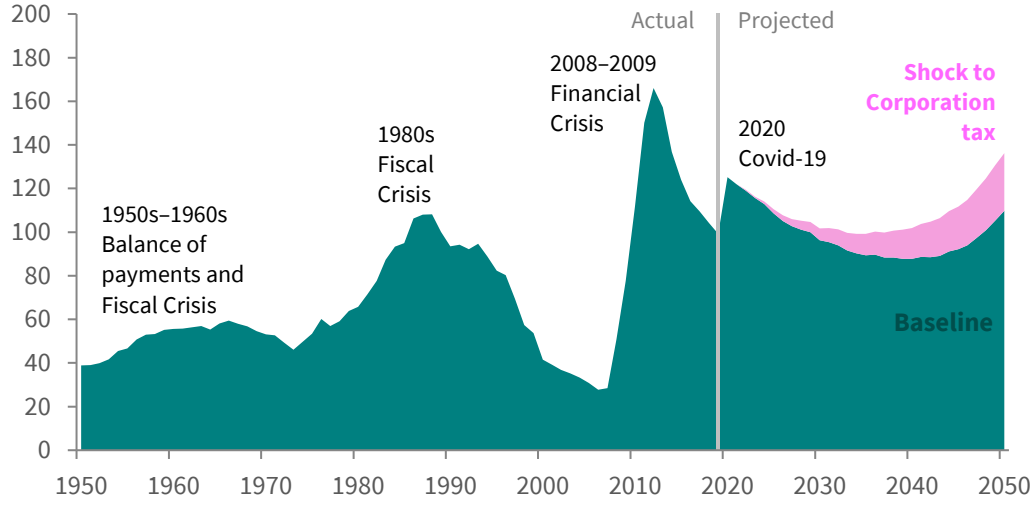
by 2050, unless policy were to respond by introducing additional revenue-raising measures or savings elsewhere (Figure 5.5).

Figure 5.4: Further falls in annual corporation tax of €3.5 billion assumed



Source: Fiscal Council workings.
Notes: The additional falls in corporation tax are assumed to happen over the same period as the reductions in corporation tax receipts due to the OECD's BEPS initiatives in the Department of Finance's projections. The cumulative impact of €3.5 billion corresponds to the remaining "excess" set out in Box H of the *May 2020 Fiscal Assessment Report.*

Figure 5.5: Further corporation tax falls would compound debt increases



Sources: CSO; FitzGerald and Kenny (2018); Department of Finance; and Fiscal Council projections.
Note: Graph shows gross debt. Modified GNI* is linked to GNI for the period 1970–1995 and to GNP for the period 1926–1969.

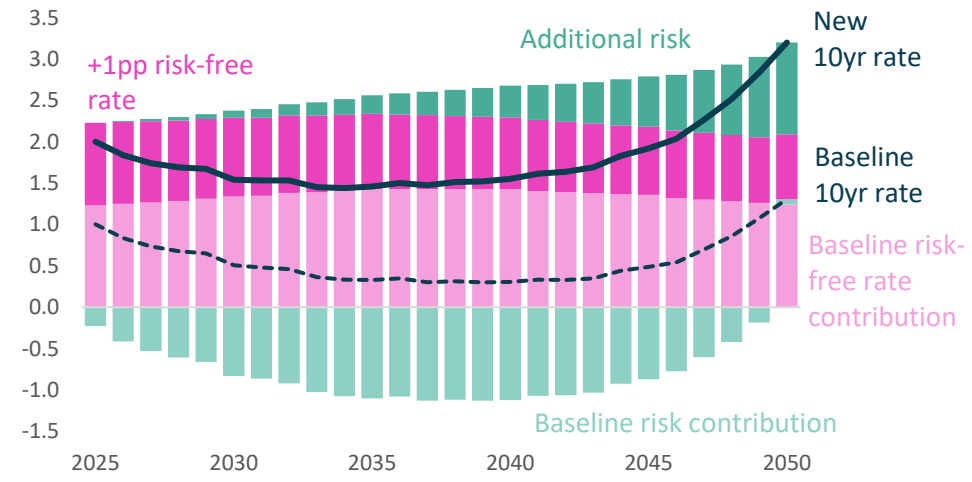
5.3 A Potential Increase in Interest Costs

As shown in Figure 3.8, projections included in the baseline are for interest rates to remain extremely low by historical standards for a long time and debt dynamics are very favourable as a consequence. Although government primary deficits are projected to rise sharply over time as ageing and healthcare costs climb, nominal GNI* growth is expected to exceed interest rates in the baseline scenario over the coming 30 years and the debt ratio falls for much of this period.

In a similar approach to that of the Congressional Budget Office (2019), Figure 5.6 applies a one percentage-point upward shift in the baseline assumption for the risk-free yield curve from 2025 onwards. This parallel shift could take place if there were changes in future Euro Area borrowing costs that are not specific to Ireland's economy. However, a higher risk-free rate would likely exert a secondary increase on Ireland's borrowing costs due to a higher risk premium, since a higher risk-free rate would in turn result in higher debt. Overall, the projected marginal 10-year yield on Ireland's debt in 2050 rises from 1.3 per cent in the baseline to 3.2 per cent.

Figure 5.6: The impact of a percentage-point upward shift in risk-free yields

Ireland's projected 10-year bond yield, %



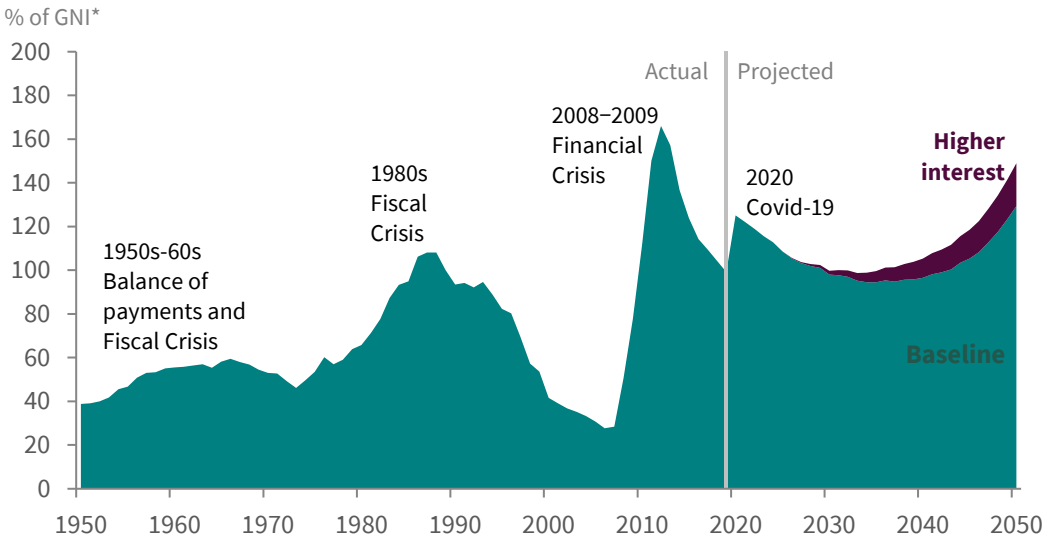
Sources: CSO; Fiscal Council calculations.

This is an important risk factor for fiscal policy given the historically low risk-free interest rates in mid-2020, which could change independently of Ireland's

creditworthiness relative to core Euro Area countries, whose borrowing costs are lowest.[35]

The higher cost of borrowing compounds over time and higher borrowing needs arise as a result, as shown in Figure 5.7. By 2050, debt as a share of GNI* is projected to rise by 20 percentage points due to the percentage-point upward shift in the risk-free yield curve.

Figure 5.7: A percentage-point upward shift in the risk-free yield curve would increase Ireland's debt ratio



Sources: CSO; Fiscal Council calculations.

Ireland has a highly uncertain path for interest rates, and the size of the risk premium could be higher than modelled above if Ireland's market creditworthiness were to deteriorate. Furthermore, the risk-free rate could change over this period by far more than a percentage point. Although increases in Ireland's interest rates that are partially matched by higher economic growth rates would limit the impact on the public finances, changes in the Euro Area risk-free rate may not be reflected in higher GNI* growth rates for Ireland.

[35] As in the Council's May 2020 *Fiscal Assessment Report*, the baseline scenario assumes that Ireland's marginal 10-year bond yield is 1 per cent in 2025. Projected 10-year bond yields for Ireland evolve based on the assumed path of risk-free interest rates (which are informed by the six-month Euribor forward curve), changes in the debt ratio, and the gap between the debt ratio and a 60 per cent reference level. For further methodology details, see Fiscal Council (2020b).

5.4 Risks Around Healthcare Spending

Health is one of the largest areas of public expenditure and one of the fastest growing. All countries face significant pressures in this area. As outlined in Section 3 and the methodology report (Fiscal Council, 2020b), one factor for this is demand for healthcare growing with income per capita. In the baseline, demand for spending per capita grows with income per capita with an elasticity of one, meaning that they increase at the same rate. If this elasticity is lower, expenditure will grow at a slower pace. [36] The choice of scenario is based on international panel data suggesting that this elasticity tends to decrease from one (or even higher than one) for richer countries (Lorenzoni *et al.*, 2019 and Baltagi *et al.*, 2016). For more details refer to the methodology report (Fiscal Council, 2020b).

Table 5.1 Elasticities of health spending to income

Elasticity with respect to national income per capita

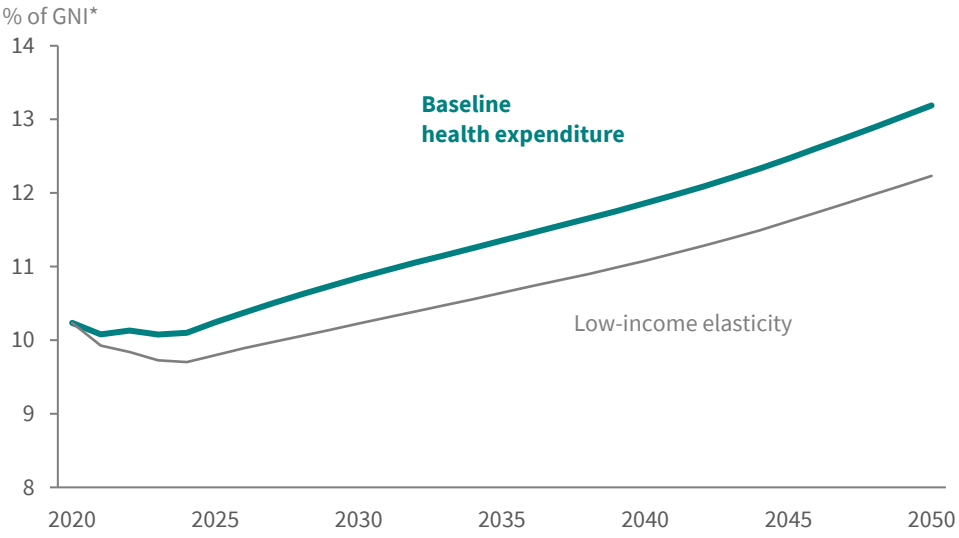
	Baseline	Low
Health spending elasticity to national income per capita	1.0	0.7

Sources: Fiscal Council workings.

Figure 5.8 shows the effect of assuming an elasticity of 0.7 compared to an elasticity of 1. This lower elasticity results in smaller annual expenditure increases attributed to income growth. By 2050, total health and long-term care expenditure would be about 1 percentage point lower in terms of GNI* (Figure 5.8).

[36] Note that scenarios on health income elasticity impact spending but do not affect economic growth by construction. In other words, benefits of additional per capita healthcare spending on the labour force's health and in terms of their potential reduction in other heath costs are not directly modelled.

Figure 5.8: Impact of alternative assumptions on how health demand increases with income



Sources: Department of Public Expenditure and Reform; and Fiscal Council calculations.

Sláintecare

The implementation of Sláintecare—a 10-year programme to transform Ireland's health and social care services—has been discussed for a number of years and the 2020 *PfG* commits to its implementation.

Sláintecare involves reducing private payments for healthcare services in favour of more universal care, including universal General Practitioner (GP) and primary care. Moving to a more universal system would be in line with the system in many other OECD countries. While such a policy could lead to cost reductions for healthcare as a whole, this depends on the implementation.

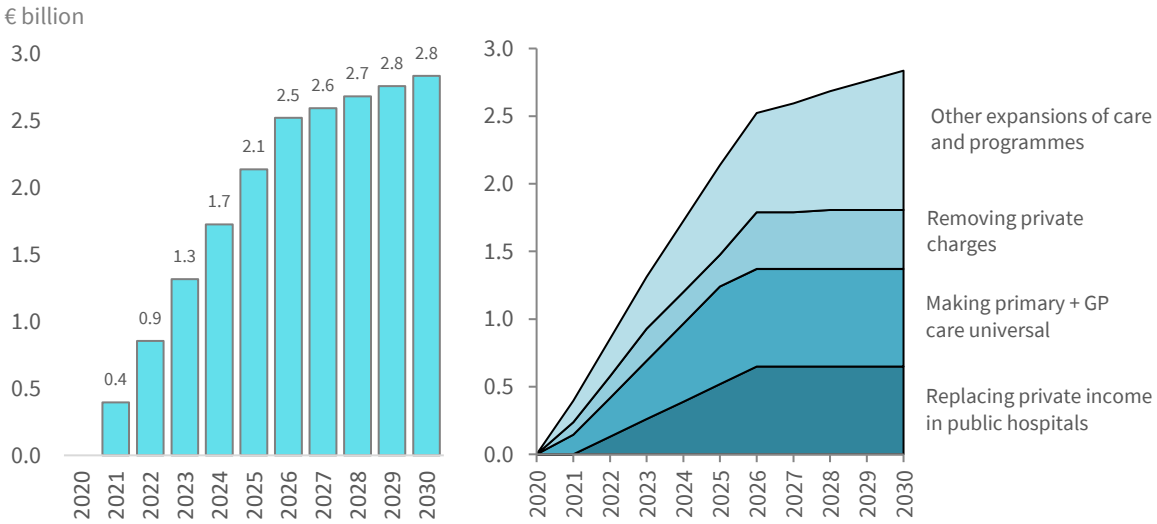
Estimates of the cost of implementation of the Sláintecare programme suggest an additional rise in annual public spending on health for the first 10 years that will accumulate to €2.8 billion per annum (Figure 5.9). These estimates are outlined in the *Sláintecare Report* (Committee on the Future of Healthcare, 2017).[37]The rate of cost increase would stabilise at that point, although the higher level of Sláintecare spending would amplify in future years the cost of demographics, income effects, wages, and non-pay inflation, in a similar way to the remainder of current health spending. It is possible that some of the costs of implementing Sláintecare have

[37] While the *Sláintecare Report* (Committee on the Future of Healthcare, 2017) highlights that there will be additional one-off costs arising from implementation of the plan, these are not factored into the analysis here, as one-off costs will not materially alter the dynamics of the model.

already been incurred, but estimates for this appear to be relatively small in the context of total increases.[38]

Sláintecare is likely to lead to efficiency gains in some areas of the health sector and to better health outcomes for the population that are difficult to estimate. No specific benefits to the population or public finances arising from the implementation of Sláintecare are modelled here, so the scenario should be seen as representing the impact purely on a cost basis. In addition, as a significant proportion of this spending will be in the form of displaced spending (i.e., costs that were previously borne by private individuals instead becoming a public cost), we have not assumed any feedback between this extra spending and economic growth.[39]

Figure 5.9: Assumed additional costs of Sláintecare relative to baseline in each of the first 10 years



Source: Committee on the Future of Healthcare (2017).
Note: We assume implementation begins in 2021. Additional annual spending is taken from Tables 8 and 9 of the *Sláintecare Report* (Committee on the Future of Healthcare, 2017).

The implementation of Sláintecare would mean under current policies with no offsetting tax or spending changes that the deficit would be €3.2 billion larger than the baseline by 2030. As we assume no offsetting revenue-raising measures, expenditure cuts or efficiency gains, the additional expenditure on Sláintecare has both a direct effect on the deficit through increased health spending and an indirect

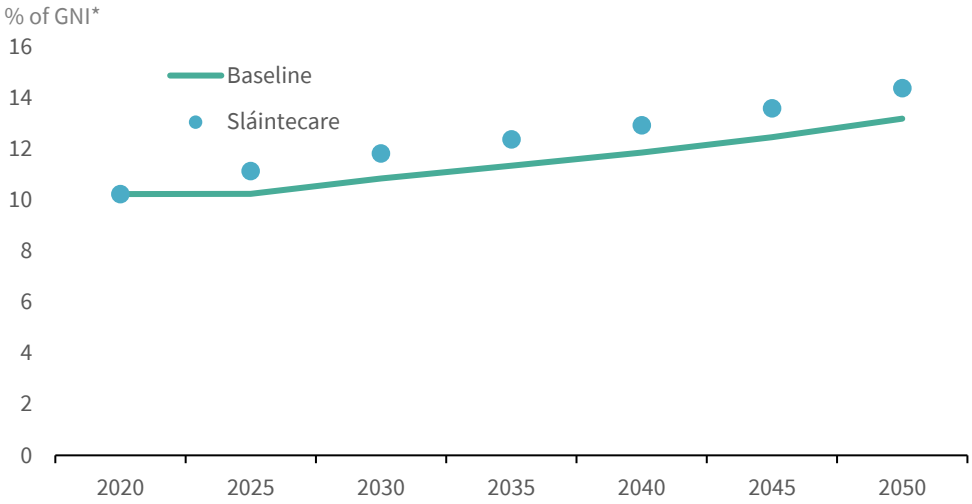
[38] For instance, *Budget 2020* committed €42 million to Sláintecare increasing to €92 million in 2021.

[39] According to the 2015/2016 *Household Budget Survey*, the average household spent just over €1,200 per annum on medical/dental insurance.

effect through the increase in interest expenditure from the borrowing that arises from this increased health expenditure.

Figure 5.10 shows the increase in public health expenditure as a share of GNI* due to the implementation of Sláintecare. In the first full year of implementation of Sláintecare, 2030, the share of public expenditure on health is 1.0 percentage point higher than the baseline. By 2050, public expenditure on health is 1.2 percentage points higher than in the baseline scenario.

Figure 5.10: Sláintecare will lead to a higher share of GNI* spent on public health

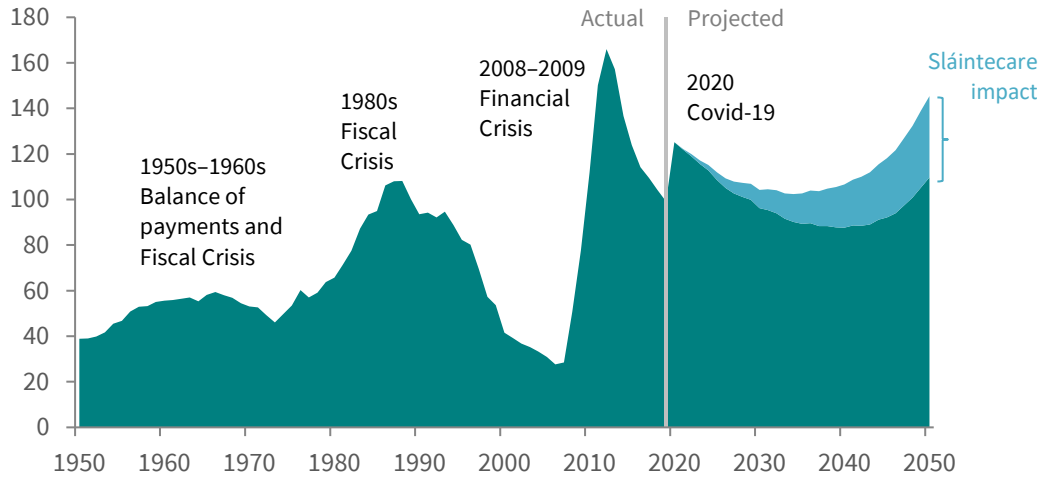


Source: Fiscal Council workings.

Figure 5.11 shows the impact of an unfunded (i.e., not offset by revenue-raising measures, expenditure cuts or efficiency gains) implementation of Sláintecare on the debt ratio. By 2030, the debt ratio is 8 percentage points higher than baseline. Due to the rising interest costs associated with this higher debt ratio, by 2050, the debt ratio is 36 percentage points higher than baseline.

Figure 5.11: Implementing unfunded Sláintecare reforms would have large impacts

% GNI*



Sources: Fiscal Council workings.
Note: Here, unfunded means not offset by revenue raising measures, expenditure cuts or efficiency gains.

5.5 Climate-change Costs

Ireland's climate is changing. This poses challenges to economic growth and fiscal sustainability. Quantifying fiscal risks is difficult, and this is especially true of fiscal risks related to climate change. This section briefly highlights some of the key issues that need to be considered when assessing the impact of climate change on the macroeconomy and the fiscal sustainability risks from climate change.

The impact of climate change on the macroeconomy can be broken down into its effects on long-run, supply-side aspects of the economy and short-run, demand-side aspects of the economy (Batten, 2018).

Figure 5.12: Climate-change impacts on the supply-side of the economy
% change year-on-year

Sources: Adapted from European Commission (2019); OBR (2019); Batten (2018); and Carney (2015).

Figure 5.12 highlights the impact that climate change can have on the supply side of the economy. Excessive dry weather, rainfall or rising sea levels could reduce the viability of land to be a basic input to production. Labour supply could be negatively affected if hours worked are permanently reduced by an increased frequency of extreme weather events, poorer health or a harsher work environment due to higher temperatures. On the other hand, migration may increase labour supply due to a relatively warmer climate, attracting more workers. Capital stock could be damaged as a result of extreme weather events. Changes in regulation/licencing may cause the capital stock to depreciate at a higher rate than would otherwise be the case (for instance diesel/petrol cars). The transitional risks to the supply side relate to energy supply and the rate of adaption of clean energy technologies — that is, the diversion

of resources away from more productive areas and towards the mitigation of climate change. On the positive side, climate change may result in higher productivity, for instance, by accelerating the take-up of new technologies. Additionally, investment in new renewable energy sources will improve Ireland's energy security as Ireland will be less dependent on foreign sources of energy.

On the demand side, extreme weather events could lead to reduced investment, due to uncertainty over the impacts of climate events. If the risks materialise, consumer spending may fall, given negative wealth effects from damage to property, and trade may be disrupted as a result of extreme weather events, to name but a few impacts. Mitigation policies may also influence the demand side of the economy. Additional investment in retrofitting homes, switching to renewable energies, and upgrading transport infrastructure may help stimulate demand particularly at a time when demand may be below its potential following the Covid-19 pandemic. Creating the capacity to allow a smooth transition to a low carbon economy will reduce the adverse impact other mitigation policies may have on the economy. In addition to reducing the impact of climate change on the economy, credible mitigation plans to meet sound targets could help limit adverse consequences that these mitigation policies may have on the economy. It is also likely that delayed mitigation action may result in more drastic and costly action having to be taken in later years, at the same time as ageing pressures are rapidly increasing. Without complimentary measures, a risk with any transition is that an over-ambitious schedule of carbon tax increases—above the economy's capacity to switch to lower carbon technologies—may result in falls in consumption and investment (Lane, 2019).

Box E outlines some of the many channels through which these impacts effect the public finances.

Box E: Fiscal sustainability risks from climate change

Potential Impacts on Revenue

There are a number of ways in which government revenue will be affected by climate change and policies to address it. First, tax revenue broadly follows economic growth with a roughly one-to-one relationship between their growth rates. To the extent that climate change causes a reduction in long-run economic growth, revenue growth is also likely to fall. Second, adverse weather conditions could also cause short-run disruptions to revenue. Third, there are also key links between specific taxes and the policy changes likely to be associated with climate change. Table E.1 shows revenues from taxes that are directly related to the production of carbon emissions. It is likely that the revenue from some of these tax heads will increase for some time, as the tax rate increases. However, given that the overriding policy goal is to change behaviour and reduce emissions to zero in net terms by 2050, revenues from tax heads closely linked to carbon emissions will eventually decline.[40] As such, the Irish tax base will have to shift away from emissions-based taxes over the long term.

Table E.1: Tax revenue with strong links to carbon emissions

	2014	2018	2014	2018
	€ bn	€ bn	%	%
Excise on heavy oils	1.2	1.6	3.0	2.8
VRT	0.5	0.9	1.3	1.7
Motor tax	0.9	0.8	2.2	1.4
Excise on light oils	0.8	0.6	1.9	1.1
Carbon Tax	0.4	0.4	0.9	0.8
Total	3.9	4.3	9.3	7.8
Total (% of GNI*)	2.6	2.2		

Source: Department of Finance (2019).
Note: The final two columns are expressed as a per cent of exchequer tax revenue for their respective year.

Given that the existing tax base is likely to change dramatically as a result of the transition to a carbon-neutral economy, further research may be needed to assess potential substitutes for revenue that would be optimal or desirable.

Potential impacts on expenditure

Climate change also has significant implications for government expenditure, both in terms of the cost of repairing damage caused by extreme weather events and in adapting to a low-carbon economy. For 2020, government expenditure on all climate-related activities is forecast

[40] At the time of writing, this target is not currently enshrined in legislation. However, the *PfG* (2020) commits to enshrining a 51 per cent reduction in greenhouse gas emissions, from 2021-2030, in legislation. The legislation is to include a provision for 5-year carbon budgets. In addition, the European Commission presented its *European Green Deal* in December 2019 (European Commission, 2019). It included proposals to further increases the emissions reduction targets for 2030. It set out a target of at least a 50 per cent reduction, relative to 2005 levels, in greenhouse gas emissions. This target includes both ETS and non-ETS sectors. The current—legally binding—target is for a 40 per cent reduction in total greenhouse gas emissions, relative to 2005 levels.

to be 2.9 per cent of gross voted expenditure or €2.0 billion annually (DPER, 2019).[41] However, both the level and share of expenditure on climate-related activities is likely to rise over the long term, given physical and transitional risks.

Table E.2: Total climate-related investments in the *National Development Plan 2018–2027*

	Exchequer (€ bn)	Non-Exchequer (€ bn)
Buildings Energy Efficiency	4.8	
Climate Action Fund		0.5
Electric vehicles	0.2	
Flood defences	1.0	
Energy (renewables, interconnector etc.)		13.7
Dart expansion	2.0	
Metro Links	3.0	
BusConnects	2.4	
Irish Water	6.8	1.7
Total	20.2	15.9

Source: *National Development Plan 2018-2027*.

Table E.2 shows the climate-related expenditure that is included in the *National Development Plan 2018-2017*. Expenditure of roughly 1.5 per cent of GNI* per annum is allocated to address climate change under this plan. Measures outlined in the *National Development Plan* relate to adaption to a low-carbon economy (e.g., retrofitting housing, improving public transport provision) and to mitigating the damage from extreme weather events (e.g., flood defences).

In addition, there are costs to the public finances in missing legally binding transition targets for emission reduction set by the European Commission. Ireland is set to miss its 2020 reductions targets. The measures included in the *National Development Plan* would have meant that Ireland was on course to miss its 2030 emissions reduction targets as well (CCAC, 2019). But the *PfG* is likely to result in additional efforts being adopted, and commitments are needed if targets are to be met. Figure E.2 shows the projected emissions for 2030, alongside the impact of current plans on these projects. Further government expenditure will be required, if Ireland is to meet its 2030 targets.

In addition to the costs outlined above, there are contingent liabilities. There is a risk that the increase in extreme weather events may affect the financial stability of the insurance industry and may require government support. This may have further implications for fiscal sustainability.

A forthcoming Council analytical note will assess both the macroeconomic and budgetary implications of climate change in greater detail.

[41] However, as argued by the Climate Change Advisory Council, the definition of climate-related activities used by the Department of Public Expenditure and Reform "appears excessively broad" (CCAC, 2019). The definition used by the Department is "Any expenditure which promotes, in whole or in part and whether directly or indirectly, Ireland's transition to a low-carbon, climate-resilient and environmentally sustainable economy." This definition includes expenditure items such as the National Parks and Wildlife Services, the Environmental Protection Agency, and all social housing regeneration (CCAC, 2019).

Figure E.2: Additional measures are needed to meet the 2030 ceiling

Levels of greenhouse gas emissions (Mt CO2eq)

Source: Climate Action Plan 2019.

Note: NDP = National Development Plan.

5.6 Uncertainties around the Central Projections

To gauge the uncertainty around the central projections, more optimistic and pessimistic assumptions for the key macroeconomic variables, such as TFP, participation and migration are considered (Table 5.2). These are designed to reflect a range of plausible alternative outcomes. This section also considers some of the uncertainties related to fertility rates in future and the assumption that revenues will rise in line with general economic activity.

Table 5.2: Summary of alternative assumptions

	Pessimistic	Baseline	Optimistic
TFP	-0.5 from baseline	Convergence to 0.4	+0.5 from baseline
Participation	-5 p.p. from baseline by 2050	See methodology report (Fiscal Council 2020b)	+5 p.p. from baseline by 2050
Migration	The estimation model links immigration and emigration to economic growth based on TFP and participation scenarios.		

Sources: Fiscal Council workings.

Productivity projections vary vastly (Box B). To reflect the uncertainties involved, alternative TFP assumptions can be made. The baseline assumptions draw on three analyses: an assessment of historical trends for Ireland, regional performances across Europe given initial labour productivity levels, and an assessment of advanced economy norms. The assessments of regional and historical productivity growth offer useful ways to assess uncertainties in this respect. One standard error around the estimates based on regional data for labour productivity growth is equivalent to 0.8 percentage points, while one standard deviation for TFP since 2000 is 1.8 percentage points (based on Domestic GVA).

To assess the sensitivity of baseline estimates to TFP growth, the pessimistic scenario reduces TFP growth by 0.5 percentage points relative to the baseline, while the optimistic scenario increases TFP growth by 0.5 percentage points. The resulting labour productivity growth rates over the long-run average between 0.1 and 1.2 per

cent, compared to 0.7 per cent in the baseline (Table 2.1). All the assumptions considered are further detailed in the methodology report (Fiscal Council, 2020b).

Through their effect on economic growth, alternative productivity growth rates are linked to migration scenarios. Migrants are attracted to countries based on their relative growth or income prospects. As detailed in the methodology report (Fiscal Council, 2020b), the projections for migration used in this report are modelled using a gravity model approach (Osés Arranz, 2019). Stronger TFP and hence wage growth leads to stronger net-inward migration and vice versa. While this approach is a useful one for capturing the complexities of migration flows, uncertainties remain. An example of this is the impact that policy changes internationally can have on migration. There may be further links between productivity and migration, summarised in Box F, but there is no clear consensus.

Box F: Immigration and productivity

This Box examines literature on the effects of immigration on productivity. From a theoretical viewpoint, two different channels may be at work (Portes, 2018b):

i. Immigrants may affect productivity through the knowledge and ideas they bring to the labour market. If their skills are complementary to the domestic workforce and/or lead to domestic workers acquiring new skills, immigration can enhance productivity.

ii. Immigration increases the availability of labour. This can help to moderate the cost of labour inputs, although this can lead to firms having a disincentive to invest in productivity-enhancing equipment and human capital.

Based on these channels, the 2018 *Review of Economic Migration Policy* (DBEI, 2018) calls for policymakers to recognise the potential trade-off with low-skilled migration between reducing labour shortages and slowing investment in technology. While immigrants are a highly diverse group, an estimated two-thirds of immigrants to Ireland aged 15+ held a third-level qualification in 2019 (CSO, 2019b).[42] This suggests that Ireland is successful in attracting highly educated workers.

Nonetheless, there is little consensus on the sign or magnitude of the effect of migrant employment on productivity. On the positive side, Ortega and Peri (2014) show that on a global level, the higher a country's share of migrants in total employment, the higher its TFP. They find no evidence for immigration affecting capital intensity. Campo *et al.* (2018), looking at different regions of Britain, find positive effects on productivity, especially for immigrants with a third-level education. For the US, there is some evidence that low-skilled immigration affects productivity positively by increasing participation of highly-skilled native women and by pushing natives into better paid jobs requiring good communication skills (Portes, 2018b). In contrast, Kangasniemi *et al.* (2012) estimate production functions for the UK and Spain and find that immigration during the period 1996–2005 was associated with reduced TFP in Spain, but barely had an effect in the British context.

[42] Note that this includes returning Irish emigrants.

Other studies indicate that results vary depending on the context and on the research design. Robinson *et al.* (2010) pool across 10 EU countries (including Ireland) for their production function approach. They find a small positive effect on productivity growth but a negative effect on the productivity level, as well as changing signs and significance, depending on the specification of immigration type and industry. Likewise, the UK Migration Advisory Council (2018), together with Portes (2018a), warn of some implausibly optimistic results in the literature and of the difficulty of distinguishing the effects of immigrants from other trends.

To summarise, there are three possible scenarios:

(1) Migration adds to overall TFP: the first scenario is that migrating workers are highly skilled, with these skills complementary to the existing Irish labour market, and that this fills labour supply gaps and pushes natives into more productive jobs.

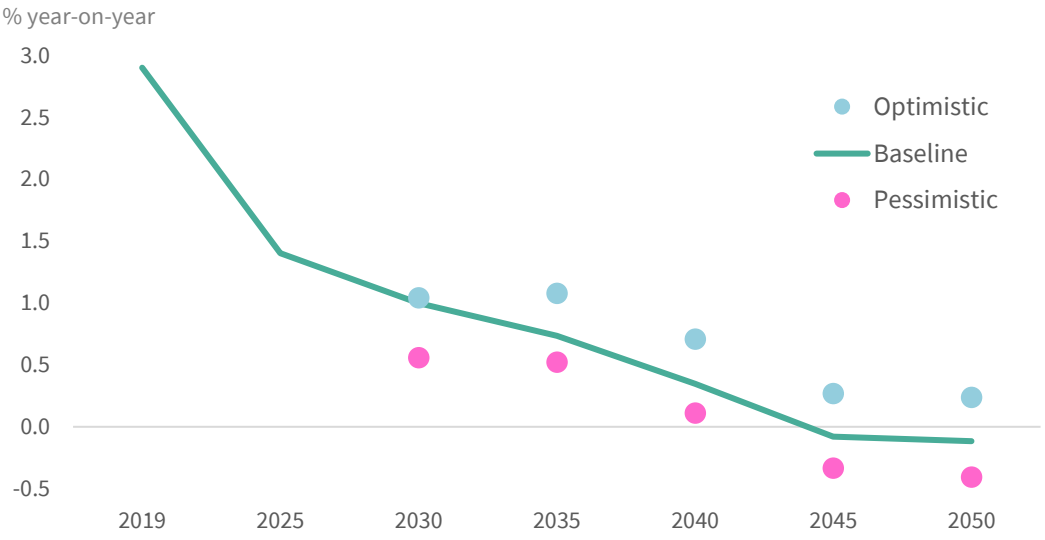
(2) Migration reduces TFP and labour productivity: the second scenario is that migrants' skill mix is not complementary to existing skills. Firms rely on increasing cheap labour supply rather than investing in innovative technology, and this reduces capital deepening.

(3) Migration does not significantly affect overall productivity: the third scenario is that, on average, the impacts of migrating workers balance each other out and/or the effect of immigration is negligible relative to other developments in the Irish economy.

The lack of a clear relationship between migration and TFP in the literature means that this report makes no specific assumption in this regard.

The participation rate within the working-age population is a key driver of the total hours worked in the economy. Alternative assumptions consider gradually higher or lower cohort-employment rates of ±5 percentage points compared to baseline participation by 2050 for ages 20–64. Figure 5.13 shows the sensitivity of employment growth to assumptions on participation, productivity, and hence migration.

Figure 5.13: Employment growth



Sources: Eurostat; Department of Finance; and Fiscal Council workings.
Note: Scenarios start to diverge from the baseline in the medium run (after 2024).

Alternative Growth Scenarios

Optimistic and pessimistic assumptions for productivity and participation are assessed in combination. While in some contexts different risks may offset each other, the growth dynamics tend to be self-reinforcing: low TFP depresses the growth outlook and productivity gains, which deters workers from entering the labour force and is also associated with lower net-inward migration. Conversely, high TFP drives up wages and participation and attracts relatively more net-inward migration.[43]

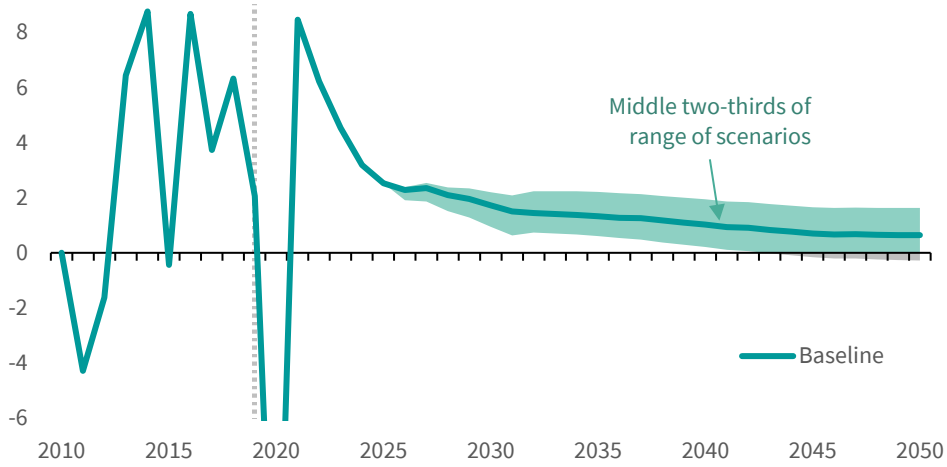
The growth rates of these alternatives give a plausible range of real GNI* growth per year averaging between 0.2 and 1.9 per cent over the period 2030–2050 (Figure 5.14).[44] Figure 5.14B and 5.14C show how the main drivers of these differences are the assumed contributions of TFP to growth, with labour inputs also having an effect. While these numbers may appear numerically similar, they have vastly different implications for the level of GDP, as the differences compound: the economy is 21 per cent larger than in the baseline by 2050 in the optimistic scenario, while it is 17 per cent smaller than in the baseline in the pessimistic scenario.

[43] Section 2 describes how TFP enters the wage equation, hence there are higher/lower wages in the optimistic/pessimistic cases respectively.

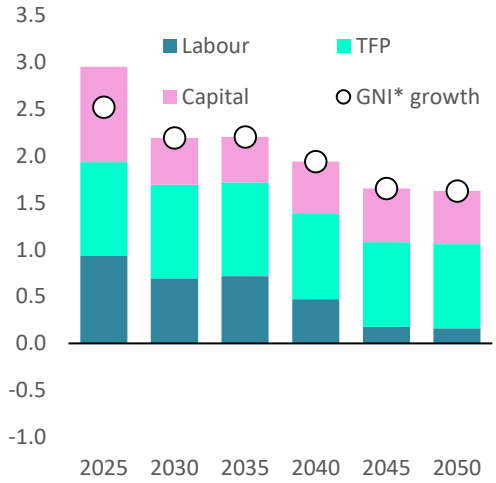
[44] For context, in the 20 years between 1999 and 2018, real GNI* grew by an average of 2.9 per cent per year.

Figure 5.14: Range of real GNI* growth: combination of TFP, participation and migration

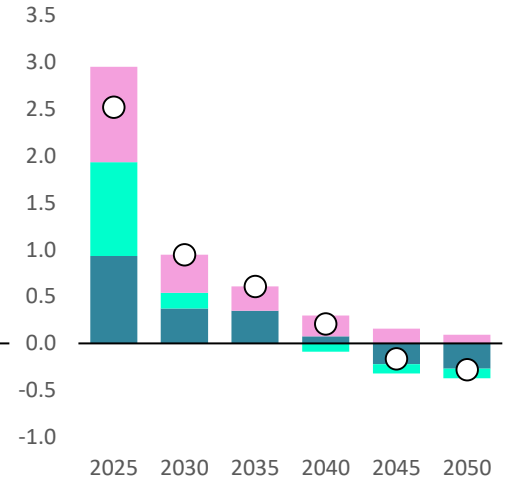
A. % change year-on-year



B. Decomposition of optimistic growth



C. Decomposition of pessimistic growth



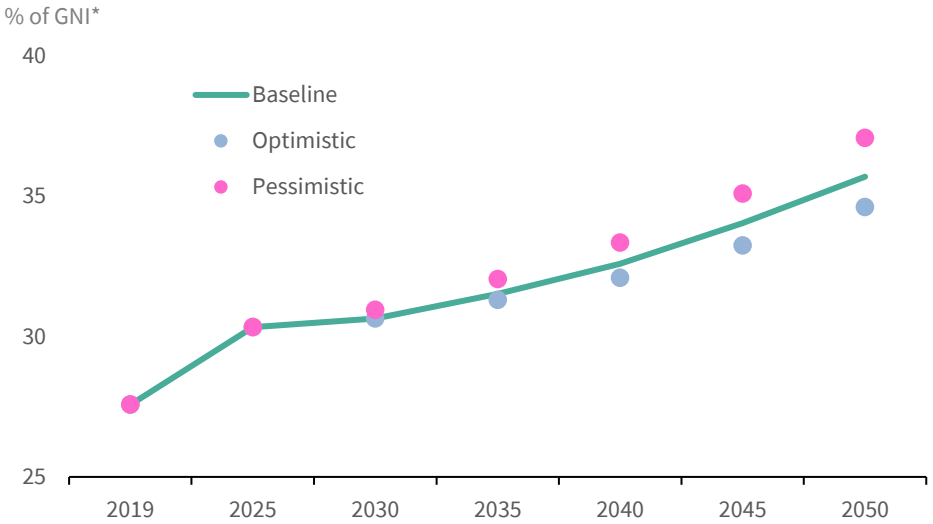
Sources: CSO; Department of Finance; Eurostat; and Fiscal Council projections.
Note: "Pessimistic" refers to a combination of low TFP, low labour force participation rates, and convergence to net emigration; "optimistic" refers to a combination of high TFP, high labour force participation rates, and net immigration for the entire period.

Fiscal Implications of Alternative Growth Scenarios

Importantly, the implications of alternative growth scenarios for the public finances depend on the reasons why the economy takes a different path. Despite the wide range of possible economic outcomes, Figure 5.15 shows that age-related expenditure as a share of GNI* varies only modestly across these alternative scenarios and the overall increase in age-related spending follows a similar upward path under all scenarios. This reflects, in part, the fact that the scenarios rest on essentially the same demographic assumptions, other than some variations in migration. More importantly, with pensions rising in line with wages, the cost per

person broadly follows GNI*. As a result, while the actual level of spending would differ greatly across scenarios, the variation, expressed as a per cent of GNI*, is relatively modest.

Figure 5.15: Total age-related expenditure



Sources: Department of Public Expenditure and Reform; and Fiscal Council projections.
Note: Total age-related expenditure includes pensions, health, social protection, and education.

However, the alternative scenarios have significant implications for the budget balance as a share of GNI*. Under more optimistic assumptions, the deficit increases more gradually through the projection period. By contrast, the higher share of ageing-related spending in the pessimistic scenario leads to a larger gap between spending and taxation. Although the cost of ageing itself does not vary significantly across the scenarios as a share of GNI*, the burden of ageing-related spending in all scenarios is more affordable in a context where the economy is growing faster and harder to sustain when the economy grows more slowly.

These different paths for the general government balance are then reflected in the build-up of general government debt (Figures 5.16A and 5.16B). The baseline projections would suggest that government debt would fall, until 2039, to about 88 per cent of GNI*, before rising sharply thereafter as ageing pressures mount. Under optimistic assumptions, debt falls as a share of national income out to 2040, with only a modest rise at the end of the projection horizon. Under pessimistic assumptions, debt rises from 2030, with the sharpest rise in the 2040s. This results in gross debt of almost 160 per cent of GNI* in 2050.

A question worth considering is just how strong Ireland's productivity (TFP) growth would need to be in order for debt to be stable at the end of the forecast period. Given the strong ageing pressures on spending in the later years of the projections, unrealistically high TFP growth of close to 5 per cent would be needed to keep debt constant as a share of GNI* in every year. If TFP growth was assumed to average 1 per cent per annum from 2030–2050 (as opposed to 0.4 per cent), this would yield debt averaging just under 90 per cent over the period 2040–2050. This is the lowest level seen in the baseline projections. However, even in this assumption, debt would rise as a share of GNI* in later years.

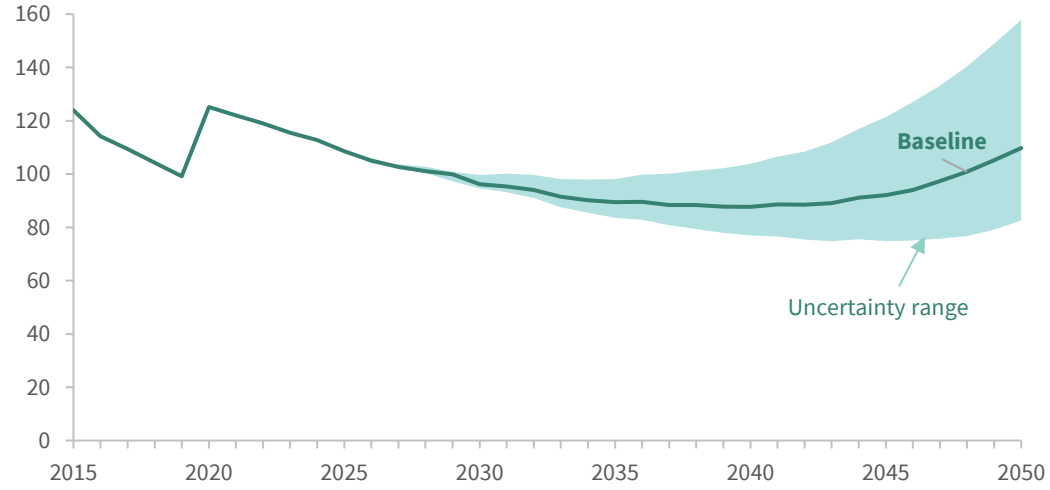
Interest expenditure varies greatly depending on the assumptions applied (Figure 5.16C). Interest rates are assumed to be the same under the various macroeconomic assumptions outlined here (interest rate risks are explored in Section 5.4). This may be plausible given that Ireland is a small country and conditions may diverge, but if all countries followed these paths, then the interest-growth differential might change less than the individual rates themselves. Under the pessimistic assumptions, there is a larger stock of debt (due both to larger deficits and smaller national income). This higher debt to GNI* ratio leads to a higher average interest rate. As a result of these two factors, interest payments rise sharply in the later projection years under the pessimistic assumptions. Under the optimistic assumptions, interest payments are lower than in the baseline case. However, these savings are much more modest, compared to the additional costs that arise under pessimistic assumptions.

Figure 5.16: Alternative fiscal outcomes under a range of macroeconomic scenarios

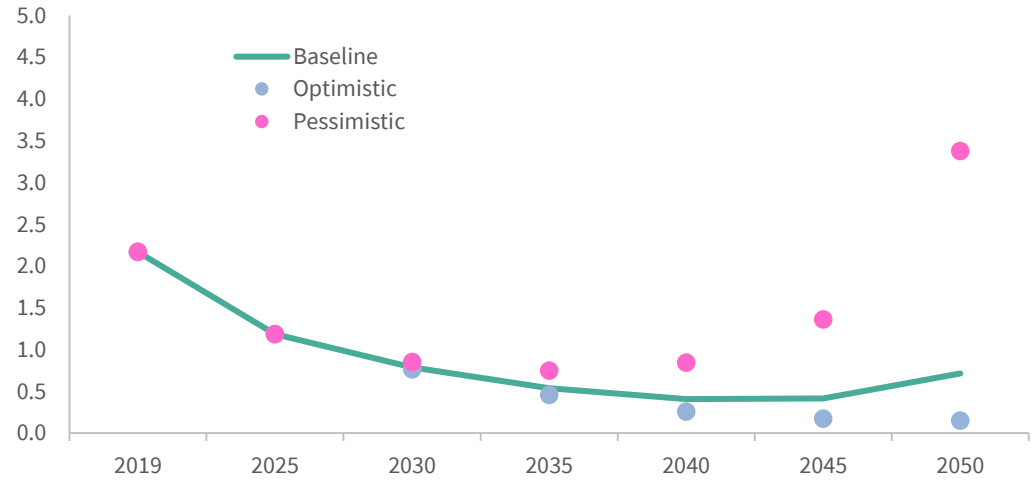
% of GNI*

A. General government balance

B. Gross debt



C. Interest expenditure



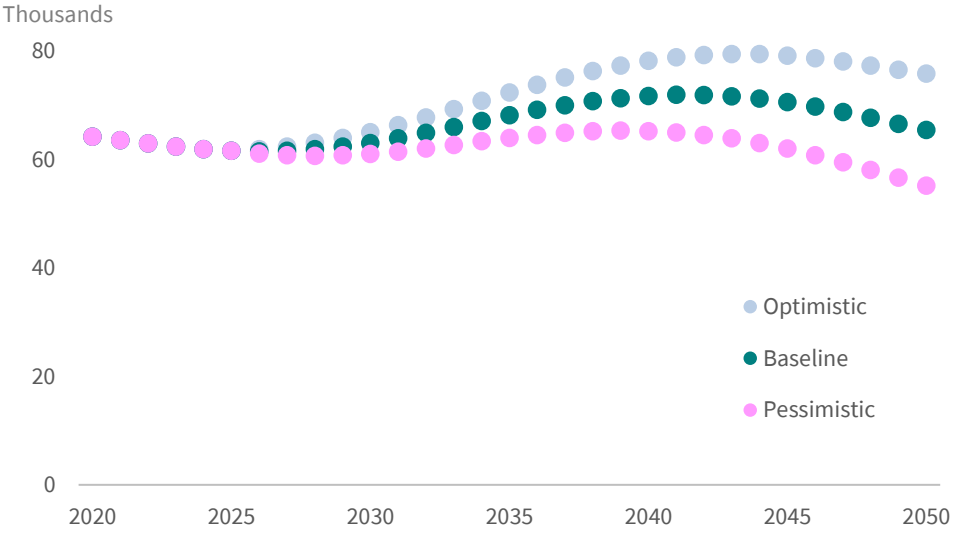
Source: Fiscal Council calculations.

Note: The assumptions underpinning the scenarios are detailed in Section 5.7 and in Fiscal Council (2020b).

Uncertainty around fertility

This section illustrates uncertainty around the assumptions on fertility. In the baseline, the total fertility rate remains relatively stable, changing only slightly from 1.87 in 2020 to 1.91 in 2050. For the Council's low fertility scenario, the total fertility rate goes down to 1.6 by 2050, just above the current EU-wide average (2017 figure, Eurostat). For high fertility, the rate goes up symmetrically from the Council's baseline, to 2.2. This results in a different number of births in the two scenarios compared to the baseline. Total population in 2050 would vary between 5.9 and 6.2 million (baseline: 6.05 million).

Figure 5.17: Births by fertility scenario



Sources: CSO and Fiscal Council workings.
Note: Divergence of fertility rates from the baseline starts in 2026.

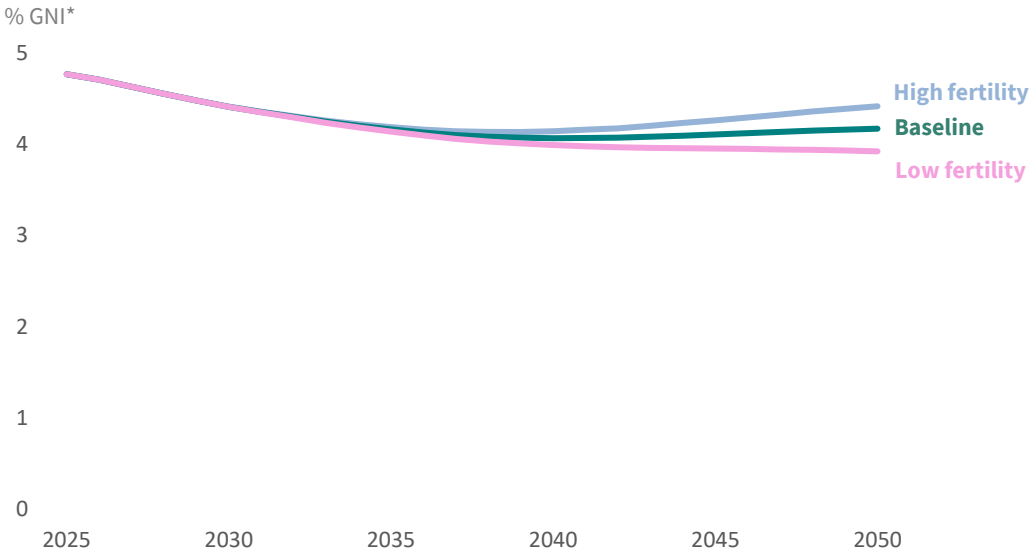
Note that the effect on economic growth is negligible before 2050, as children born after 2025 will only enter the labour force after the end of the projection horizon. There is a small effect of fertility on expenditure on education and child allowance, resulting in a ±0.2 percentage points change in the government balance (% GNI*) compared to the baseline by 2050.

The fertility scenarios result in different education expenditure as a share of GNI* due to a variation in demographics (Figure 5.18). In the medium term, this share falls somewhat in all scenarios, as the school-age cohort becomes smaller.[45] In the longer run, the number of schoolchildren starts to increase again in the baseline and

[45] As pointed out previously, potential positive effects of investing more in education per capita are not considered in this report.

optimistic fertility scenario, although annual increases remain modest. Under more pessimistic fertility assumptions, demographic pressures would remain around or below zero.

Figure 5.18: Education spending by fertility scenario



Source: Fiscal Council calculations.
Notes: Fertility rates start differing across scenarios from 2026. Thus, education expenditure starts to diverge in 2030, when a different number of children enter primary school.

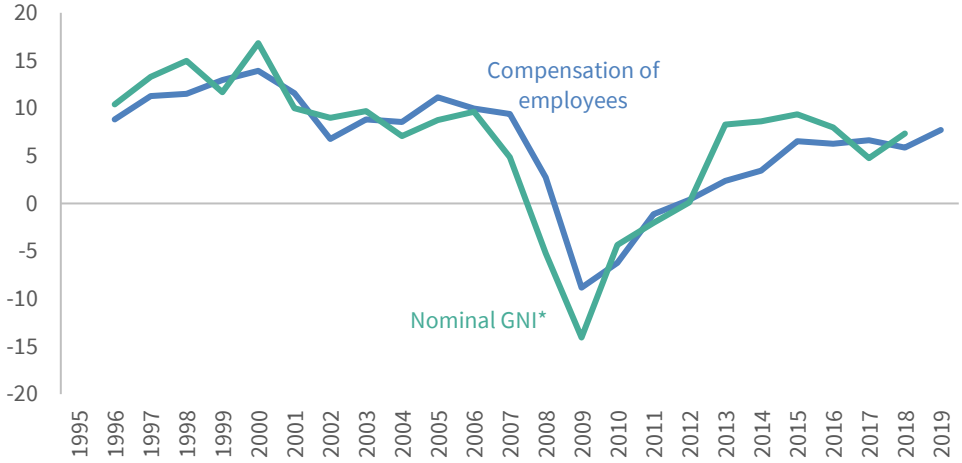
Uncertainty around revenues

This report broadly assumes that revenues will grow in line with wider economic activity, hence maintaining a stable share of GNI* over the long run. However, there are many reasons why a stable share of GNI* might not be an appropriate assumption.

One reason why revenue growth might deviate from nominal GNI* growth would be if the composition of the economy might change in important ways in the future such that revenues fall relative to overall incomes. Total wages paid in the economy have tended to grow in line with nominal GNI* (Figure 5.19), though this pattern might not hold.

Figure 5.19: Wages and nominal GNI* have had similar historical growth rates

% change year-on-year



Sources: CSO; and Fiscal Council workings.

There is also some consensus in the literature that younger individuals trade more frequently, make riskier investments and have different savings behaviour than older individuals (see, for example, Calvet *et al.*, 2009; Graham *et al.*, 2009). This could potentially have implications for transactional taxes arising from demographic changes, for example, with older individuals potentially trading less frequently, hence reducing stamp duty receipts. Elsewhere, Martin (2013) finds evidence that younger individuals show greater tax sensitivity than older individuals when it comes to capital gains taxes.

While not the focus of this report, modelling the path for the public finances in Ireland over the long term could benefit from further development of revenue projections. This is something that future Long-Term Sustainability Reports should seek to address.

Bibliography

Balleer, A., Gómez-Salvador, R. and J. Turunen, (2009). Labour Force Participation in the Euro area: a cohort based analysis. ECB Working Paper Series No. 1049. Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1049.pdf

Baltagi, B., Lagravinese, R., Moscone, F., and E. Tosetti, (2016). Health Care Expenditure and Income: A Global Perspective. Special Issue Paper, Health Economics 26(7).

Barr, N. (2002). Reforming Pensions: Myths, Truths, and Policy Choices. International Social Security Review, 55:2, pp. 3-36, April-June.

Barrell, R., FitzGerald, J., and R. Riley, (2010). EU enlargement and migration: Assessing the macroeconomic impacts. JCMS: Journal of Common Market Studies, 48(2), 373-395.

Batten, S. (2018). Climate change and the macro-economy: a critical review. Bank of England working papers 706, Bank of England.

Belan, P., Messe P.J. and F.C. Wolff, (2010). Postponing retirement age and labor force participation: the role of family transfers. Louvain Economic Review 76(4).

Blanchard, O. and L. Summers (2020). Automatic stabilizers in a low-rate environment. AEA Papers and Proceedings, American Economic Association, vol. 110, pages 125-130, May. American Economic Review, 89(2):69-74.

Blanchard, O. and L. F. Katz (1999). "Wage Dynamics: Reconciling Theory and Evidence." American Economic Review, 89(2):69-74.

Byrne, S. and M. D. O'Brien, (2016). Understanding Irish Labour Force Participation. Research Technical Paper, Central Bank of Ireland, May 2016.

Calahorrano, L., Ehrentraut, O., Limbers, J., Rebeggiani, L., Stoewhase, S. and M. Teuber, (2016). Herausforderungen für das Steuerrecht durch die demografische Entwicklung in Deutschland [Tax law challenges due to demographic change in

Germany]. Fraunhofer Institute and Prognos AG, commissioned by the Federal Ministry of Finance, August 2016.

Callaghan, N., Ivory, K. and O. Lavelle, (2018). Female Labour Force Participation. Social Impact Assessment. Department of Public Expenditure and Reform, October 2018

Calvet, L. E., J. Y. Campbell, and P. Sodini, (2009). Fight or flight? Portfolio rebalancing by individual investors. Quarterly Journal of Economics, 124, 301–48.

Carney, M. (2015). Breaking the tragedy of the horizon – climate change and financial stability. Speech at Lloyd's of London. September 2015.

Casey, E. (2019). Inside the "Upside Down": Estimating Ireland's Output Gap. Economic and Social Review, 50:1, pp. 5-34, Spring 2019. Dublin. Available at: https://www.esr.ie/article/view/1117

Casey, E., and Hannon, A., (2016). Challenges Forecasting Irish Corporation Tax. Irish Fiscal Advisory Council Analytical Note No. 10, September 2016. Dublin: Irish Fiscal Advisory Council. Available at: http://www.fiscalcouncil.ie/publications/

Castanheira, M., Ornaghi, C. and G. Siotis, (2017). The unexpected consequences of asymmetric competition: An application to Big Pharma. VOX CEPR Policy Portal, 1st March, 2017. Available at: https://voxeu.org/article/unexpected-consequences-asymmetric-competition

Central Statistics Office, (2018). Population and Labour Force Projections. June 2018. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-plfp/populationandlabourforceprojections2017-2051/

Central Statistics Office, (2019a). Productivity in Ireland 2017, July 2019. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-pii/productivityinireland2017/

Central Statistics Office, (2019b). Population and Migration Estimates. August 2019. Dublin. Available at:

https://www.cso.ie/en/releasesandpublications/er/pme/populationandmigrationestimatesapril2019/

Central Statistics Office, (2020). Pension Coverage 2019. January 2020. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-pens/pensioncoverage2019/overallpensioncoverage/

Charlesworth A. and P. Johnson, editors, (2018). Securing the future: funding health and social care to the 2030s. The Institute for Fiscal Studies & The Health Foundation, May 2018. Available at: https://www.ifs.org.uk/uploads/publications/comms/R143_Chapter3.pdf

Climate Change Advisory Council, (2019). Annual Review 2019. Available at: http://www.climatecouncil.ie/councilpublications/annualreviewandreport/

Collins, M., and G. Hughes., (2017). Supporting Pension Contributions Through the Tax System: Outcomes, Costs and Examining Reform. The Economic and Social Review, 48:4, pp. 489-514, Winter 2017. Dublin.

Committee on the Future of Healthcare, (2017). *Sláintecare Report.* Houses of the Oireachtas, May 2017. Dublin: https://assets.gov.ie/22609/e68786c13e1b4d7daca89b495c506bb8.pdf

Crafts, N., (2019). The Future Growth Path for Europe and Ireland. Keynote lecture, Irish Fiscal Advisory Council Path for the Public Finances Conference, Dublin, February 22, 2019. https://www.fiscalcouncil.ie/wp-content/uploads/2019/02/The-Future-Growth-Path-for-Europe-and-Ireland-Nicholas-Crafts-1.pdf

Crafts, N., (2014). Ireland's Medium-Term Growth Prospects: A Phoenix Rising? The Economic and Social Review, Vol. 45, No. 1, p. 87-112, March 2014. Available at: https://www.esr.ie/article/view/109

Congressional Budget Office, (2019). The 2019 Long-Term Budget Outlook. June 2019. Available at: https://www.cbo.gov/system/files/2019-06/55331-LTBO-2.pdf

Congressional Budget Office, (2009). CBO's Long-Term Model: An Overview. Background Paper, June 2009. Available at:

https://www.cbo.gov/sites/default/files/111th-congress-2009-2010/reports/06-26-cbolt.pdf

Department of Finance, (2020). Medium-Term Fiscal Strategy. January 2020. Available at: https://www.gov.ie/en/publication/98449d-medium-term-fiscal-strategy-slide-deck/

Department of Finance, (2019). Climate Action and Tax. Tax Strategy Group TSG 19/04. Available at: https://www.gov.ie/en/collection/dc3850-budget-2020-tax-strategy-group-papers/

Department of Public Expenditure and Reform, (2019). Revised Estimates for Public Services 2020. Available at: https://www.gov.ie/en/collection/e20037-revised-estimates/

Department of Public Expenditure and Reform, (2018a). National Development Plan 2018—2027. Project Ireland 2040. 16th February 2018. Available at: https://www.gov.ie/pdf/?file=https://assets.gov.ie/831/130718120306-5569359-NDP%20strategy%202018-2027_WEB.pdf#page=1

Department of Public Expenditure and Reform, (2018b). Pay Expenditure Drivers at Primary and Second Level. Spending Review 2018.

Department of Public Expenditure and Reform, (2018c). Revised Estimates for Public Services 2019. Available at: https://www.gov.ie/en/collection/e20037-revised-estimates/#2019

Department of Social and Family Affairs. (2010). National Pensions Framework. Dublin. Available at: https://www.investwise.ie/wp-content/uploads/2015/06/Pensionsdoc.pdf

Dolls, M., Doorley, K., Paulus, A., Schneider, H., Siegloch, S., and E. Sommer. (2017). Fiscal Sustainability and Demographic Change: A Micro Approach for 27 EU Countries. International Tax and Public Finance, 24(4), pp. 575-615.

Doorley, K., Callan, T., Regan, M., and J. Walsh. (2018). The Tax Treatment of Pension Contributions in Ireland. QEC Special Article, Economic and Social Research

Institute, Dublin. Available at: https://www.esri.ie/publications/the-tax-treatment-of-pension-contributions-in-ireland

Environmental Protection Agency, (2019a). Ireland's Greenhouse Gas Emission Projections 2018-2040. Available at: https://www.epa.ie/pubs/reports/air/airemissions/ghgprojections2018-2040/Greenhouse_Gas_Projections.pdf

European Commission (2018). The 2018 Ageing Report Economic and budgetary for the 27 EU Member States (2016-2070). Institutional Paper, 79, May 2018. Brussels. Available at: https://ec.europa.eu/info/sites/info/files/economy-finance/ip079_en.pdf

Faubert, V., (2019). Why has Labour Market Participation not fully recovered in Ireland since the Recession? European Commission Economic Brief 051, November 2019. Available at: https://ec.europa.eu/info/sites/info/files/economy-finance/eb051_en.pdf

Fiscal Council, (2011). Fiscal Assessment Report, October 2011. Dublin: Irish Fiscal Advisory Council. Available at: http://www.fiscalcouncil.ie/publications/

Fiscal Council, (2015). Fiscal Assessment Report, November 2011. Dublin: Irish Fiscal Advisory Council. Available at: http://www.fiscalcouncil.ie/publications/

Fiscal Council, (2018). Fiscal Assessment Report, June 2018. Dublin: Irish Fiscal Advisory Council. Available at: http://www.fiscalcouncil.ie/publications/

Fiscal Council, (2019). Stand-Still Scenario for Government Finances, 2020–2023, June 2019. Dublin: Irish Fiscal Advisory Council. Available at: https://www.fiscalcouncil.ie/stand-still-scenario/

Fiscal Council, (2020a). Fiscal Assessment Report, May 2020. Dublin: Irish Fiscal Advisory Council. Available at: http://www.fiscalcouncil.ie/publications/

Fiscal Council, (2020b). Long-Term Model: Methodology Report, Forthcoming. Dublin: Irish Fiscal Advisory Council.

Fine Gael, Fianna Fail, Green Party. (2020). Programme for Government: Our Shared Future. Dublin. Available at: https://www.greenparty.ie/programme-for-government/

FitzGerald, J. and I. Kearney, editors, (2013). Medium-Term Review 2013–2020, Number 12. Dublin: The Economic and Social Research Institute, July 2013.

Giavazzi, F., & McMahon, M. (2012). Policy uncertainty and household savings. Review of Economics and Statistics, 94(2), 517-531.

Government of Ireland, (2010). Launch of the National Pensions Framework, March 2010. Dublin. Available at: https://www.gov.ie/ga/oraid/ca8086-launch-of-the-national-pensions-framework/

Government of Ireland. (2019). A Roadmap for Pensions Reform: 2018-2023. Dublin. Available at: https://assets.gov.ie/10968/9740541c18cc4eaf92554ff158800c6f.pdf

Graham, J. R., C. R. Harvey, and H. Huang, (2009). Investor competence, trading frequency, and home bias. Management Science, 55: 1094–106.

Guillemette, Y. and D. Turner, (2018). The Long View: Scenarios for the World Economy to 2060, OECD Economic Policy Papers, No. 22, OECD Publishing, Paris. https://doi.org/10.1787/b4f4e03e-en.

Guillemette, Y. and D. Turner, (2017). The fiscal projection framework in long-term scenarios. OECD Economics Department Working Papers, No. 1440, OECD Publishing, Paris. https://doi.org/10.1787/8eddfa18-en.

Guillemette, Y., Kopoin, A., Turner, D. and A. De Mauro, (2017). A revised approach to productivity convergence in the long-term scenarios. Economic Department Working papers, No. 1385, OECD Publishing, Paris. https://doi.org/10.1787/0b8947e3-en

ILO Statistics, (2018). What about seniors? ILOSTAT Spotlight on work statistics note no. 1 of 2018, May 2018. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_629567.pdf

ILO, (2016). Women at work: Trends 2016. International Labour Office, Geneva, 2016. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_457317.pdf

Kangasniemi, M., Mas, M., Robinson, C., and Serrano, L., (2012). The economic impact of migration: productivity analysis for Spain and the UK. Journal of Productivity Analysis, 38(3), 333-343.

Keegan, C., Brick, A., Walsh, B., Bergin, A., Eighan, J., and M-A. Wren, (2018). How many beds? Capacity implications of hospital care demand projections in the Irish hospital system, 2015-2030. International Journal of Health Planning and Management 2018:1-14, https://doi.org/10.1002/hpm.2673

Klein, P. and Ventura G., (2019). Taxation, Expenditures and the Irish Miracle. Research Paper, 23rd July, 2019. Available at: http://paulklein.ca/newsite/research/irelandpaperwebsite190715.pdf

Lane, P., (2019). Climate Change and the Irish Financial System. Economic Letters 1/EL/19, Central Bank of Ireland.

Lavelle, O., (2019). Budget 2020: Analysis of Live Register Expenditure. Department of Public Expenditure and Reform, October 2019. Available at: http://www.budget.gov.ie/Budgets/2020/Documents/Budget/Analysis%20of%20Live%20Register%20Expenditure.pdf

Lavelle, O., (2018). Budget 2019: Analysis of Live Register Related Expenditure. Department of Public Expenditure and Reform, October 2018. Available at: http://www.budget.gov.ie/Budgets/2019/Documents/Live_Register_Related_Expenditure.pdf

Licchetta, M. and M. Stelmach, (2016). Fiscal sustainability and public spending on health. Office for Budget Responsibility, September 2016. Available at: https://obr.uk/docs/dlm_uploads/Health-FSAP.pdf

Linehan, S., R. Lydon, T. Mclndoe-Calder, P. Reddan, and D. Smyth, (2017). The Labour Market and Wage Growth after a Crisis. October 2017. Dublin: Central Bank of Ireland.

Lorenzoni, L., Marino, A., Morgan, D., and C. James (2019). Health Spending Projections to 2030. New results based on a revised OECD methodology. OECD Health Working Papers, No. 110, OECD Publishing, Paris. https://doi.org/10.1787/5667f23d-en

Martin, J., (2013). Taxes and life cycle capital gains realizations. Applied Economics Letters. Aug 2013, Vol. 20 Issue 12, 1130-1134.

McQuinn, K., & Whelan, K., (2015). Europe's Long-Term Growth Prospects: With and Without. Journal of Macroeconomics, 33, 121-136.

Meirmans, J., (2018). Trends in public Social Care Service Provision and Expenditure for Older Persons. Spending Review 2018, Department of Public Expenditure and Reform, July 2018.

Meirmans, J., (2017). Nursing Homes Support Scheme: Trends and Figures. IGEES Staff paper, Department of Public Expenditure and Reform, October 2017.

Migration Advisory Committee, (2018). EEA migration in the UK: Final report. London: September 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/741926/Final_EEA_report.PDF

Mosca, I. and A. Barrett, (2011). Retirement and Labour Market Participation. In: 50+ in Ireland 2011. First results from the Irish Longitudinal Study on Ageing, Trinity College Dublin, 2011.

O'Donoghue, C., (2004). Assessing the Impact of Pensions Policy Reform in Ireland: the Case of Increasing the Pension Age. Working Paper No. 74, Department of Economics NUI Galway, March 2004.

OECD. (2011). Pensions at a Glance, Chapter 5: Linking Pensions to Life Expectancy. Paris. Available at: https://www.oecd-ilibrary.org/docserver/pension_glance-2011-9-en.pdf?expires=1594374808&id=id&accname=guest&checksum=97A2B1ACEAD6BBDCDFEC199A7B47D9C5

OECD, (2018a). Long-term baseline projections, No. 103. OECD, Paris. https://doi.org/10.1787/68465614-en

OECD, (2018b). Financial Incentives and Retirement Savings, OECD Publishing, Paris. https://doi.org/10.1787/9789264306929-en

OECD, (2017). Pensions at a Glance: OECD and G20 Indicators, OECD Publishing, Paris, https://doi.org/10.1787/pension_glance-2017-en

OECD. (2013). Review of the Irish Pension System. Paris. Available at: http://cdn.thejournal.ie/media/2013/04/20130422oecdreport.pdf

Office for Budget Responsibility, (2019). Fiscal Risks Report. July 2019.

Office for Budget Responsibility, (2018). Fiscal Sustainability Report. July 2018.

Office for Budget Responsibility, (2017). Fiscal Sustainability Report. January 2017.

Office for Budget Responsibility, (2014). Fiscal Sustainability Report. July 2014.

Office for Budget Responsibility, (2011). Fiscal Sustainability Report. July 2011.

Ortega, F., and G. Peri, (2014). Openness and income: The roles of trade and migration. Journal of international Economics, 92(2), 231-251.

Osés Arranz, A., (2019). When gravity hits: projecting Ireland's migration. Irish Fiscal Advisory Council working paper no. 11. December 2019.

Portes, J., (2019). The Economics of Migration. Contexts, Vol. 18, Issue 2, pp. 12-17. American Sociological Association. Spring 2019.

Portes, J., (2018a). New evidence on the economics of immigration to the UK. VOX CEPR Policy Portal, 4th October 2018. Available at: https://voxeu.org/article/new-evidence-economics-immigration-uk

Portes, J., (2018b). The economic impacts of immigration to the UK. VOX CEPR Policy Portal, 6th April 2018. Available at: https://voxeu.org/article/economic-impacts-immigration-uk

Rachel, L. and L. Summers (2019) On falling neutral real rates, fiscal policy and the risk of secular stagnation. Brookings Papers on Economic Activity BPEA Conference Drafts.

Redmond, P., McGuiness S. and E. Kelly (2017). Did increasing the state pension age in Ireland affect the retirement rate of 65-year-olds? ESRI QEC Special Article, October 2017.

Redmond, P. and S. McGuiness (forthcoming). The Effect of Retirement on Consumption. ESRI Dublin.

Robinson, C., O'Mahony, M. and F. Peng, (2010). Migrant labour and its impact on productivity growth. In Huber, P. et al.: Migration, Skills and Productivity. Research Report No. 365. The Vienna Institute for International Economic Studies (wiiw), November 2010.

Schwabish, J. and J. Topoleski (2013). Modelling Individual Earnings in CBO's Long-Term Microsimulation Model. Congressional Budget Office Working Paper Series, June 2013.

Werding, M., (2014). Demographischer Wandel und öffentliche Finanzen [Demographic change and public finances]. German Council of Economic Experts Working paper 01/2014, November 2014.

World Bank. (1994). Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth. Washington DC: World Bank. Available at: http://documents.worldbank.org/curated/en/973571468174557899/Averting-the-old-age-crisis-policies-to-protect-the-old-and-promote-growth

Wren, M-A., Keegan, C., Walsh, B., Bergin, A., Eighan, J., Brick, A., Connolly, S., Watson, D. and J. Banks, (2017). Projections of Demand for Healthcare in Ireland 2015-2030. First Report from the Hippocrates Model. ESRI Research Series No. 67, October 2017.