ASSESSING AGE-RELATED PRESSURES ON THE PUBLIC FINANCES, 2005 TO 2050

Alan Barrett and Adele Bergin[*]

1. Introduction

The purpose of this paper is to quantify the pressures that will be put on the public finances over the next half century as a result of population ageing. While this is an issue that has been addressed in a number of studies, this study makes a useful addition to the literature for the following reasons.

- First, many of the studies have looked at individual components of the public finances, such as social welfare or long-term care, but have not considered aggregate impacts on variables such as the Exchequer deficit and the national debt. Examples of such studies include Department of Social and Family Affairs (2002a) and (2002b).
- Second, the one study that has taken an aggregate view (Department of Finance, 1998) was based on population projections that are somewhat outdated. Here, we consider both individual components of the public finances and the aggregate picture, using population projections based on the Census 2002. As improvements in life expectancy between 1996 and 2002 exceeded previous projected levels (CSO, 2004), it is important that these be captured in new projections.
- Third, the Department of Finance (1998) study was written before the introduction of the National Pension Reserve Fund. It is now important that its potential role be assessed in easing age-related fiscal pressures.

The paper is structured as follows. In Section 2, we review the literature in this area, especially as it relates to Ireland. In Section 3,

[*] We would like to acknowledge the helpful comments of Tony Fahey, John Fitz Gerald, Brian Nolan and the Editors. All remaining errors are our own.

we present the baseline population projections that underpin our public finance projections. We also outline the assumptions that are used in projecting GNP out to 2050. In Section 4, we turn to the public finance projections. We begin by setting out the projected values for the various components that are most likely to be affected by population ageing – these are social welfare, health and education. We then bring the various components together to assess the overall impact of population ageing on the public finances. In Section 5, we alter some of the assumptions underlying the population projections and consider the impacts on the public finance projections. In Section 6 we conclude with some policy-related observations.

2. Literature

Department of Finance (1998) presents possible long-term trends in the public finances out to 2056. The report includes a number of scenarios, all of which point to long-term pressures on the public finances as a result of population ageing. In the baseline scenario, the government is assumed to operate budget surpluses out to 2032 whereby the national debt becomes a national surplus (reaching 14 per cent of GNP in 2030). This leaves the Exchequer well placed to deal with the acceleration in the ageing of the population in the 2030s and 2040s although the Exchequer deficit does reach 2.3 per cent of GNP by 2050.

A number of alternative scenarios are presented. In one such scenario debt is held constant at 36 per cent of GNP from 2005 to 2020. In this case annual deficits rise to 12.9 per cent of GNP by 2050 and debt increases to 168 per cent of GNP in the same year. In another scenario, economic growth is assumed to be 1 per cent lower each year than in the baseline. This leads to a projected deficit of 36.1 per cent of GNP in 2050 and a debt level of 455 per cent.

This report was followed by another (Department of Finance, 1999) which recommended the setting up of the National Pension Reserve Fund (NPRF) as a way of *partly* pre-funding public pensions (public service and social insurance/assistance). According to calculations presented in this report, if the Fund was relied upon to bridge the gap between receipts and age-related spending, it would be exhausted by 2056 thereby creating a large funding gap in that year. Hence the Fund is only part of the solution and in our analysis below we consider what role it can play.

Other studies of long-term fiscal pressures in Ireland have looked at components of the public finances rather than the aggregate situation. Projections for Ireland included in Economic Policy Committee (2001) show spending on public service and social welfare pensions combined rising from 4.6 per cent of GNP in 2000 to 9 per cent in 2050. The projected increase of 4.4 percentage points is higher than that for the EU-15 average (3.2 per cent[1]). This can be partly explained by the fact that for many EU countries population ageing was already affecting spending on pensions in

[1] For all countries other than Ireland, spending is expressed as a share of GDP.

2000. Average spending for the EU stood at 10.4 per cent of GNP in 2000, partly because of more generous benefits but also because of population structure. That same report also contained projections on spending for health and long-term care combined. The result for Ireland was similar to the EU average – an increase of 2.5 percentage points of GNP between 2000 and 2050 in Ireland and a EU average of 2.7 percentage points.

One other point that is worth noting from EPC (2001) is that public pension spending across the EU is expected to peak, on average, in 2040. In Ireland's case, the projected value was at the end of the projection period and so we do not know when the peak will occur. The different pattern relates to the earlier onset of population ageing elsewhere. In the case of France, public pension spending was 12.1 per cent of GDP in 2000 and was projected to rise to 16 per cent in 2030. By 2040, this was projected to fall to 15.8 per cent. Italy shows a similar projected pattern, with public pension spending rising from 13.8 per cent of GDP in 2000 to 15.7 per cent in 2030. This largest projected increase is in the case of Greece, with spending projected to rise from 12.1 per cent of GDP in 2000 to 24.8 per cent in 2050.

Analyses of the age-related fiscal issues arise in the context of the periodic actuarial review of the Social Insurance Fund. The most recent review (Department of Social and Family Affairs, 2002a) captured the age-related fiscal pressures by estimating the required increases in contribution rates that would be needed to keep the Fund in balance. Assuming payments are indexed to earnings, it is estimated that contribution rates would have to be 240 per cent of current rates in 2056 to achieve a balance between expenditure and receipts. The report goes on to consider a situation in which payments are raised at the outset of the projection period so that the lowest benefit is equal to 27 per cent of average industrial earnings. This results in a contribution rate in 2056 that is 276 per cent of current rates if balance is to be achieved. This points to the importance of considering long-term cost implications of short-term policy changes. The report also includes an analysis of the situation in which payments are indexed to prices as opposed to earnings. This results in contribution rates in 2056 that are lower than today's rates but this, of course, is achieved at substantially devalued benefits rates.[2]

A final study of relevance is of the long-term cost of long-term care for the elderly (Department of Social and Family Affairs, 2002b). This report estimates that the cost of current state provision of long-term care could rise from €513 million in 2001 to €4.2 billion in 2051 (in real terms).

[2] The indexing of pension payments to prices as opposed to earnings has been adopted in the UK and has resulted in projections of pensions spending showing lower spending in 2050 relative to today. In EPC (2001), UK public spending on pensions is projected to fall from 5.5 per cent of GNP in 2000 to 4.4 per cent in 2050.

3. Population and GNP Projections

The population projections are generated in the following way. Beginning with the baseline year of 2002 (the year of the most recent Census), we impose assumptions on fertility, mortality and migration to produce projected numbers of males and females in each yearly age cohort out to 2050. In making assumptions, we have decided to follow closely the CSO partly to ensure some degree of comparability with other published results (CSO, 2004).

With regard to fertility, we assume that the total fertility rate decreases to 1.85 by 2011 and remains constant thereafter. For mortality, we assume that the rate of improvement observed between 1986 and 2002 is maintained out to 2036; from then on the rate of improvement is halved.[3] This implies a life expectancy of 83.7 years for men in 2050 and 88 years for women. On migration, we assume that net inflows will be 30,000 in 2005 and 2006, 20,000 on average annually between 2006 and 2010, 10,000 on average annually between 2011 and 2015 and 5,000 annually thereafter.

The headline results from the projections are shown in Table 1. Looking firstly at the total population, it is projected to increase from 4.1 million in 2005 to 5.2 million in 2050, an increase of 28 per cent. For the purposes of this paper, what is of greater interest is the change in the structure of the population. In 2005, 11 per cent of the population is aged 65 and over. This proportion increases gradually to 12 per cent by 2010 but then grows more rapidly, rising to 29 per cent of the population by 2050. Hence, the ageing of the population is readily observable. An alternative view of this can be taken by looking at the relative sizes of the old-age and working-age[4] populations, i.e. the old-age dependency ratio. This increases from 16.4 per cent to 51.5 per cent.

Table 1: Population Structure 2005-2050

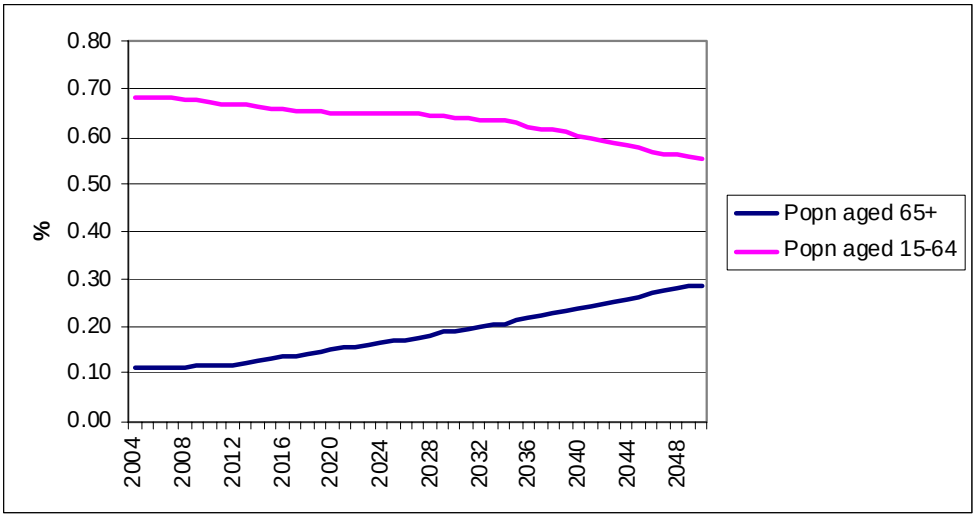
Age	2005	2010	2020	2030	2040	2050
0-14 years	856,900	923,979	954,022	847,107	829,230	838,852
15-64 years	2,789,249	2,949,469	3,103,383	3,195,614	3,113,398	2,903,635
65+ years	456,213	508,750	705,058	948,419	1,223,508	1,496,073
Total	4,102,362	4,382,197	4,762,462	4,991,140	5,166,136	5,238,561
	%	%	%	%	%	%
0-14 years	21	21	20	17	16	16
15-64 years	68	67	65	64	60	55
65+ years	11	12	15	19	24	29
Old-age DR	16.4	17.2	22.7	29.7	39.3	51.5

[3] There is one exception to this assumption – for 20-29 year olds, the improvement in mortality between 1996 and 2002 is used.

[4] We define "working age" to be 15-64 years although our GNP projections below do factor in people over the age of 65 who are still working.

In Figure 1, we provide a graphical representation of how the percentages of the population age 65 years and over and between 15 and 64 years will evolve out to 2050. The pattern is clear and the reason for age-related fiscal pressures is readily apparent, with the proportion of the older group rising and the proportion of working age people falling.

Figure 1: Per Cent of Population Aged 15-64 years and 65+years, 2004 to 2050



We noted in the Introduction that improvements in life expectancy have exceeded earlier expectations, thereby making the population projections underpinning earlier studies (such as Department of Finance, 1998 and EPC, 2001) out-dated. We can illustrate the difference by noting that the population projections in Department of Finance (1998) saw the percentage of the population aged 65 years and over rising to 27 per cent by 2056; based on the assumptions used here, the corresponding figure in 2056 would be 29 per cent. Making a similar comparison but in terms of old-age dependency ratios, the Department of Finance (1998) value for 2056 was 53 per cent whereas our assumptions lead to a value of 58 per cent.[5]

When presenting projections for the public finances in the next section, we show all figures as proportions of GNP. At this point, we will set out the approach and assumptions used in generating a GNP series out to 2050. We should stress that the approach used here differs from the approach used in short-term forecasting exercises such as the ESRI's *Quarterly Economic Commentary*. As our interest is in the long term, we only attempt to project the long-run trend in national output. Actual output in the short and medium term will fluctuate around potential but we make no effort to capture this.

[5] These old-age dependency ratios are based on the population aged 19-64 years and not 15-64 years as is the case in Table 1.

The main building blocks in our GNP series are employment growth and productivity growth. By combining these with the baseline value for GNP in 2004, it is straightforward to generate a series. However, in order to produce figures for employment growth and productivity growth, more assumptions are needed.

We generate employment growth in the following way. Our population projections provide the number of people in each yearly age cohort by gender out to 2050. By applying age specific participation rates, we can generate a labour force series. In the case of men, we assume that participations rates will not change over the projection period. However, in the case of women, it seems reasonable to assume that some increase will occur. We have chosen to assume that for the age groups 35-44 years and 45-55 years, the Irish female labour force participation rates will converge towards those of the EU-15 by 2015. For the age group 35-44 years, the current participation rate is 0.66 with the EU-15 figure being 0.77. The corresponding figures for the 45-54 year age group are 0.6 and 0.71.

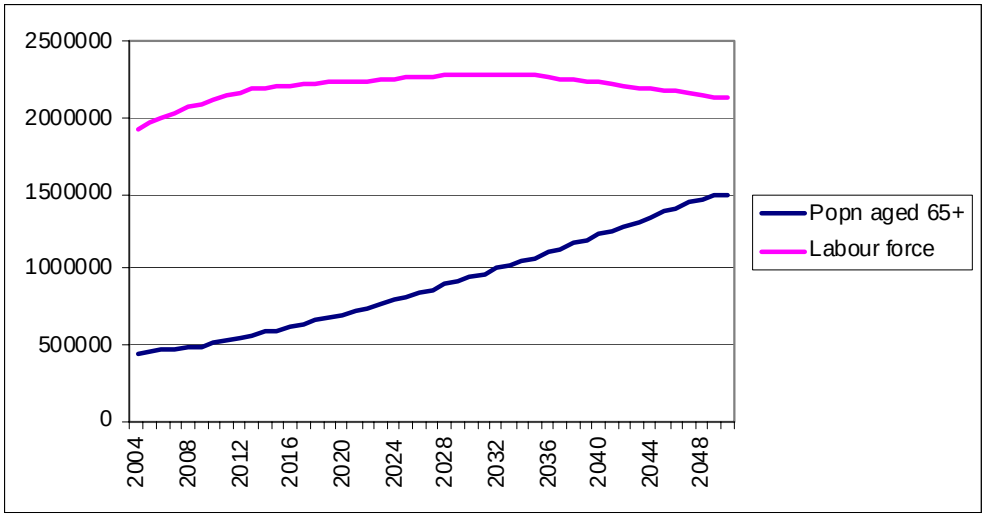
In order to move from a labour force series to an employment series, we need to impose an unemployment rate. In doing this we draw on Bergin *et al.* (2003); they forecast that the unemployment rate will fall from its current level of 4.3 per cent to 4 per cent in 2015. We assume that it will then stay at that level out to 2050.

These assumptions lead to a projected labour force out to 2050 as shown in Figure 2. The labour force peaks at 2.29 million in 2032, with the increase between 2005 and 2032 being partly driven by the increases in female participation (up to 2015) and partly by increases in those of working age (up to 2032). While the working age population is increasing up to 2032 it should be remembered that the population aged 65 years and over is increasing at a faster rate and so the working age population is declining as a share of the total (as shown in Table 1 and Figure 1 above). After 2032, the labour force declines while the population aged 65 years and over continues to increase. It should also be noted that the aggregate participation rate declines over time as more people move into the 55-64 year age bracket and hence are assumed to have a lower age-specific participation rate.

For assumptions on productivity growth, we draw again on Bergin *et al.* (2003). They forecast that productivity growth will average 3 per cent out to 2010 and 2.3 per cent between 2011 and 2020. Thereafter, we assume annual productivity growth rates of 2 per cent.

By multiplying GNP from one year by employment growth and productivity growth in the next year, GNP in real terms in the next year can be calculated. This can be translated into a nominal value by assuming a deflator – we assume 2.4 per cent and 2.2 per cent in 2005 and 2006 respectively (drawing on McCoy *et al.*, 2005) and 2 per cent thereafter (drawing on Bergin *et al.*, 2003). By assuming that wages will grow in line with productivity, we can generate a series for real and nominal wage growth. This is used when indexing some payments in the sections below.

Figure 2: Projected Labour Force and Population aged 65+ years, 2005-2050



4. Baseline Results

We will set out our baseline projections under four headings. The first three relate to the areas of spending which are most likely to be affected by population ageing, namely, social welfare, health and education. The fourth heading is the total budget where we bring together all elements of the public finances, including the National Pensions Reserve Fund.

4.1 SOCIAL WELFARE

In projecting social welfare expenditure out to 2050, we took the following approach. The *Revised Estimates for Public Expenditure 2005* (Department of Finance, 2005 hereafter referred to as REV 2005), provides spending figures for the current year under both social insurance and social assistance headings. Within each of these, the specific programmes are listed. This allows us to take the figures for spending on those aged 65 years and over and to project these figures forward indexing to the change in the population aged over 65 years. The programmes that we include are as follows:

- non-contributory old-age pension;
- widows', widowers' and orphans' (non-contributory) old-age pension;
- contributory old-age pension;
- widows', widowers' and orphans' (contributory) old-age pension;
- retirement pension;
- free schemes.

As mentioned, we index spending under each to the percentage change in the population aged 65 years and over. We also index to both the deflator and to changes in real earnings, thereby building in the assumption that payments under these programmes increase in line with average earnings in the economy. In Table 2, we show the

projected trend in spending across these six programmes out to 2050. The rise in spending as a percentage of GNP can be seen and also the acceleration. Although the figures reported in the EPC (2001) on public pensions are based on slightly different definitions and assumptions, it is interesting to note the trebling in spending projected here as opposed to the doubling projected in EPC report (see Section 2 above). This can be explained in part by improving mortality, as noted in the Introduction.

Table 2: Projected Old-age Social Welfare Spending (Assistance and Insurance) 2005-2050, Per Cent of GNP

	2005	2010	2020	2030	2040	2050
Old-age SW as % of GNP	3.1	3.2	4.2	5.5	7.3	9.3

While the old-age spending within the social welfare budget has received attention in exercises such as Department of Finance (1998) and EPC (2001), child-related spending (in the form of child benefit payments) have received less attention. But clearly, the changing age structure of the population suggests the possibility of savings in the child-related area which may offset to some degree increased spending pressures in the area of old-age spending. In order to explore this issue, we take the spending figure for child benefit from the REV 2005 and index it to changes in the population aged 0-17 years out to 2050. We also index to our assumed values of the deflator and productivity, on the assumption again that payments rise in line with nominal earnings. The projections are presented in Table 3. While the payments are projected to fall as a percentage of GNP, the fall is modest. In order to understand why this is so, it is useful to look back at Table 1 and to note that while the proportion of children in the population is falling, so also is the proportion in the standard working age population.

Table 3: Projected Spending on Child Benefit, 2005-2050

	2005	2010	2020	2030	2040	2050
Child benefit as % of GNP	1.5	1.4	1.4	1.3	1.2	1.3

In Table 4, we add together the old-age and child-related spending projections and also projections of the remainder of the social assistance and social insurance budgets. In the case of the non-child/non-old-age payments, we simply index to the change in the total population and to nominal earnings. Overall, it can be seen that spending is projected to rise from 9.2 per cent of GNP in 2005 to 16 per cent in 2050, a rise of 6.8 percentage points.

Table 4: Projected Total Social Welfare Spending 2005-2050

	2005	2010	2020	2030	2040	2050
Social welfare spending as % of GNP	9.2	9.2	10.3	11.9	13.6	16.0

4.2 HEALTH

While it might seem intuitively obvious that population ageing will have an impact on health spending, the literature in this area suggest that this may not in fact be the case. Empirical studies relating changes in health spending across countries to different rates of population ageing have generally failed to find a relationship (for example, see Barros (1998)). The explanation most frequently offered to explain this is that health spending is more strongly related to proximity to death (in particular in the last year of life) rather than age *per se*. As population ageing is related to reduced mortality, an increasing older population does not necessarily imply an increased population who are in their last year of life. The literature would also suggest that any impact of population ageing on health spending will be less than the potential impact of technological advances.

The approach we take does factor in an ageing component into the projections on the assumption that the intuitive expectation is at least partly correct. But we acknowledge the possibility that this may over-state future pressures on health spending and compensate by not attempting to capture the spending pressures related to technological progress.

The starting point for our projection is to take the REV 2005 figure for the Health Services Executive, less the amount for long-term care of the elderly and an amount for pensions as these are projected separately (see below). The figures in the REV show that two-thirds of this figure is related to pay so we divide the total into a pay and non-pay component in a two-thirds/one-third ratio.

In order to allow us to factor in ageing we need some sense of the relative spending by age group. This is not readily available so instead we need to infer this using information from HIPE and NPRS Units, ESRI (2002). Data presented in this publication show those aged 65 years and over using hospital beds six times more intensively than those aged less than 65 years. Clearly, hospital bed usage is only one dimension of health service usage but in the absence of other data, this 6:1 ratio drives our forecasts.[6]

The projections are generated in the following way. We divide total spending in 2005 on the Health Services Executive (pay and non-pay separately) by the population aged under 65 years plus *six times* the population aged 65 years and over. This gives us a value for spending *per under 65 years equivalent*. In the case of pay, this figure is indexed to nominal earnings; in the case of non-pay, the figure is indexed to the deflator. In both cases, spending per under 65 years

[6] OECD (1987) suggests that a rule of thumb in apportioning health spending between age groups is to assume that people over 65 consume four times as much healthcare as those under 65 years. Given this, our 6:1 split might seem excessive. However, we should state again that we are not adjusting for the spending pressures associated with technological change. Cutler and Sheiner (2001) suggest that an indexing adjustment of 2.5 percentage points over nominal GNP growth could be required to capture this effect. In this context, our 6:1 age-split and no technology adjustment is actually quite conservative.

equivalent is multiplied by the number of people aged under 65 years plus six times the number of people aged over 65 years.

The results are presented in Table 5. Starting at 7.7 per cent of GNP in 2005, spending falls out to 2010 and then begins to rise. After 2030, the rise accelerates with spending reaching 11.2 per cent of GNP by 2050. As discussed above, although our projections may over-state the impact of ageing, they almost certainly under-state the impact of technological change. One way of factoring this impact into the analysis is to allow the non-pay component to rise at a rate faster than the GNP deflator. If non-pay "health inflation" is assumed to be 1 percentage point higher each year out to 2050, health spending as a percentage of GNP in 2050 would be 12.1 per cent.

Table 5: Projected Health Spending 2005-2050

	2005	2010	2020	2030	2040	2050
Health spending as % of GNP	7.7	7.4	7.9	8.6	9.8	11.0

4.3 EDUCATION

As noted in the Introduction, much of the work in the area of population ageing has focused on the analysis on spending that is likely to increase. However, as the corollary of population ageing is a relatively smaller young population, it is necessary to look at spending on young people to see if there are likely to be savings which can offset the pressures for increased spending. We have already looked at spending on child benefit and in this sub-section we will consider education.

In projecting spending on education, we begin by taking the REV 2005 figures for first, second and third level spending. Each of the three is then indexed to nominal wage growth and to changes in the population in the respective age category. The balance (less pensions) is indexed to nominal GNP growth (which, of course, is equivalent to keeping it constant as a share of nominal GNP). The results of the projection are shown in Table 6. Spending is projected to fall from 5.1 per cent of GNP in 2005 to 4.3 per cent in 2050. This saving of 0.7 percentage points is clearly small relative to the projected spending increases in social welfare and health. Even when combined with the projected saving on child benefit (0.2 percentage points of GNP, as shown in Table 3, the youth-related spending reduction is less than 1 per cent of GNP. What is more, the implicit assumptions in this projection include no increase in participation and no improvements in service quality. Both are likely to be violated and so spending on education in 2050 may well exceed the projected 4.3 per cent of GNP, thereby removing most and if not all of the potential saving.

Table 6: Projected Education Spending 2005-2050

	2005	2010	2020	2030	2040	2050
Education Spending as % of GNP	5.1	4.6	4.7	4.5	4.3	4.4

4.4 TOTAL BUDGET

Having looked at each component of public spending, we now turn to the total budget. Our goal in this section is to produce a measure of the overall pressure on the public finances as a result of ageing. One possible approach would be to hold the tax share constant at the 2005 level and to see what would happen to the Exchequer deficit and national debt over time. The problem with this approach is that it leads to debt and deficit figures that are unrealistic and so difficult to interpret. For this reason, we take another approach. We ask what tax share, if held constant out to 2050, would ensure that the Exchequer deficit does not exceed 5 per cent in 2050 and use this as a measure of age-related fiscal pressure. In order to determine the "sustainable" tax share, we need projections on all elements of the public finances. At this point, we set out here how we produced the projections for the items not yet discussed and present the figures in Table 7.

Spending on long-term care for the elderly is indexed to changes in the population aged 65 years and over and to nominal earnings. This may well be a conservative approach to projecting spending on this area because Ireland's system of long-term care is currently based more on informal care-giving relative to elsewhere. An increase in formal care, such as through nursing homes, would see spending rise even in the absence of population ageing. Here, we take the conservative approach. On the basis of our assumptions, spending on long-term care for the elderly would rise from 0.8 per cent of GNP to 2.4 per cent in 2050.

Public sector pensions have been modelled by drawing on the work on the Commission on Public Service Pensions (2000). The category "rest of gross voted" is a residual and is indexed to nominal GNP. Debt interest is calculated as being 6 per cent of the National Debt in the preceding period. Given our assumed deflator of 2 per cent, this means we are assuming a long-term interest rate of 4 per cent. The remainder of Central Fund spending is indexed to nominal GNP.

Summing across the expenditure categories gives gross current expenditure. From this, we need to subtract appropriations-in-aid so as to arrive at net current expenditure. In the case of contributions to the Social Insurance Fund, we assume a growth rate equal to nominal GNP.

With regard to capital expenditure, there is one important assumption that needs to be set out. Gross voted capital expenditure is currently 5 per cent of GNP, a level that is substantially higher than in other developed economies. This high level reflects the Government's commitment to reducing Ireland's infrastructural deficit. Once the deficit has been filled, it will be possible to reduce spending on infrastructure to more usual levels. However, anticipating when this will occur is difficult. We assume that this will happen around 2020 and so hold gross voted capital expenditure at 5 per cent of GNP until 2020 and 2.5 per cent thereafter. The other important elements of capital expenditure (non-voted and contributions to the NPRF) are projected to grow in line with

nominal GNP. In this case of the NPRF, this is in accordance with the relevant legislation that requires that a contribution of 1 per cent of GNP be made up until 2055, even through withdrawals can begin in 2025.

There is a range of other elements of the public finance that are not shown in Table 7 but which are used when calculating the tax rate needed for sustainable public finances. Hence, we need to outline how we handle these in the projections. For capital revenues, we keep them constant as a percentage of GNP except in the case of receipts from the National Pensions Reserve Fund. No withdrawals are allowed until after 2025. Thereafter, we initially assume a withdrawal rate of 3 per cent per annum. Our choice of this percentage is somewhat arbitrary and is based on the Fund having a value of 50 per cent of GNP at the end of our projection period.

The remaining elements are as follows. A "contingency" item is included in order to be consistent with the Department of Finance practice in providing budget projections. As noted in the tables accompanying Budget 2005 "… a prudent contingency provision is made against factors outside the control of government that may impact upon the Budget but which cannot be foreseen" (Department of Finance, 2004, p. D.6). We have taken the Department of Finance figures for 2006 and 2007 and have indexed the 2007 figure to nominal GNP – this implies a contingency of 1 per cent of GNP out to 2050.

The national debt figure is generated by adding the Exchequer balance each year. The debt interest is included in the expenditure figure as discussed above. The NPRF figure is generated by adding contributions, subtracting outflows and adding in interest earned. As was the case with interest on the national debt, we assume a long-term real interest rate of 4 per cent. This interest earned is also factored into the analysis in the movement between the Exchequer balance and the General Government Balance.

Table 7 contains our projections for all elements of public spending out to 2050 and receipt figures for 2005. It should be noted that the Central Fund figure is not a projection. As interest payments on the national debt form a significant part of this figure, this item would increase to an unrealistic level if the tax share was kept at 30 per cent. When calculating the sustainable tax share, the Central Fund is allowed to vary in line with interest payments. Taking that qualification, it can be seen that total gross spending is projected to rise from 32.5 per cent of GNP in 2005 to 44 per cent of GNP in 2050, with net spending rising from 25.8 per cent to 37.5 per cent (the main difference being payments to the Exchequer from the Social Insurance Fund (SIF)).

While Table 7 provides a sense of the extent of the fiscal pressures, it is useful to have a single measure. As discussed above our approach is to ask by how much current receipts would have to be raised as a proportion of GNP in 2006 if a sustainable public finance path is to be achieved, assuming this proportion is held constant out to 2050.

Table 7: Public Spending Projections 2005-2050 (as Per Cent of GNP)

Year	2005	2010	2020	2030	2040	2050
Health	7.7	7.4	7.9	8.6	9.8	11.2
Long-term care	0.8	0.8	1.1	1.5	1.9	2.4
Education	5.1	4.6	4.7	4.5	4.3	4.4
Non-SIF Social Welfare	4.9	4.9	5.1	5.4	5.9	6.6
Expenditure from SIF	4.3	4.4	5.2	6.3	7.7	9.4
Public sector pensions	1.0	1.1	1.4	1.6	1.5	1.3
Rest of gross voted	5.7	5.7	5.7	5.7	5.7	5.7
Central Fund (2005 value assumed throughout)	3	3	3	3	3	3
Gross current expenditure	32.5	31.9	34.1	36.6	39.8	44
Appropriations in Aid (including SIF)	6.7	6.7	6.9	6.9	6.9	6.9
Net Current Expenditure	25.8	25.2	27.6	30.1	33.3	37.5
Net Capital Expenditure	6.3	6.7	6.7	4.2	4.2	4.2
Total net spending	32.1	31.9	34.3	34.3	37.5	41.7
Current receipts in 2005	29					
Capital resources in 2005	1					

Following this approach, we searched for a current receipt share that would keep the Exchequer deficit below 5 per cent of GNP in 2050. The tax share that would achieve this turned out to be 33.3 per cent (as opposed to the 2005 share of 29 per cent). The path of both the Exchequer deficit and the debt with this tax share in place are shown in Table 8. The negative signs before the national debt figures show that from the mid-2010s, the national debt actually becomes an accumulated surplus that will be run down in future decades. In a sense, the high tax share in the earlier period allows the Exchequer to save for the future and so what is being modelled is equivalent to higher contributions to the NPRF.

Table 8: Deficit, GGB, Debt and NPRF Figures Under a 33.3 Per Cent Tax Share

	2005	2010	2020	2030	2040	2050
Exchequer balance	-2.3	1.8	0.8	3.2	0.9	-4.7
General Government Balance (GGB)	-0.8	3.6	3.2	5.2	3.1	-2.2
National debt	28.2	13.9	-4.3	-28.9	-38.1	-7.1
NPRF	9.4	14.0	26.1	36.4	43.4	50.7

It is useful to translate the required increase in the tax share into the impact, for example, on the top tax rate. Based on figures provided to us by the Department of Finance, a 1 per cent increase in the top rate of income tax yields about €200 million. The required increase in the tax share amounts to €5.5 billion (€130 billion by 0.043) and so the required increase in the top rate of tax would be

over 27 percentage points on the current rate of 42 per cent. In reality, any tax increase would be spread over a range of tax headings but this figure does still point to the impact.

While the tax increase would be unwelcome for those impacted upon, we should note that a tax share of under 34 per cent would still leave Ireland a relatively low-taxed economy. The average tax share in the OECD in 2004 was 37.5 per cent, with countries such as Germany and France having substantially higher tax shares (44 per cent and 50.7 per cent respectively). Also, a tax share in the region of 34 per cent would only return Ireland to where it was in the mid-1990s. Hence, the situation does not appear to be unsustainable. However, it should be remembered that the sustainable tax share of 33.3 per cent is based on increasing taxes today; by postponing tax increases into the future, the increases will have to be higher.

5. Altering the Assumptions

As long-term forecasts of the type presented here are subject to enormous uncertainty, it is important to vary the assumptions used in Section 4 to see if the resulting scenario is altered significantly. In this section, we investigate two alternative assumptions. First, we assume a higher rate of net inward migration to establish the extent to which migration can ease the age-related fiscal pressures. Second, we increase the rate at which withdrawals are made from the NPRF. Rather than imposing each new assumption individually on the baseline, we will add them sequentially. We then ask what tax share would be needed in 2006 to achieve a sustainable public finance path, just as we did above.

5.1 HIGHER MIGRATION

Under our alternative migration assumption, the inflows are incorporated into the demographic model as follows: we assume that net inflows will be 30,000 in 2005 and 2006; 30,000 annually between 2006 and 2010 (earlier this was 20,000); 30,000 also annually between 2011 and 2015 (as opposed to 10,000 earlier); 20,000 annually to 2025 and 15,000 thereafter (our earlier assumption was 5,000 from 2016 onwards). We present the results under the new (higher) net migration assumption in Table 9.

If we compare the Gross Current Expenditure figure with that in Table 7, we get a sense of the contribution which higher immigration can make in alleviating the fiscal pressures associated with population ageing. Whereas in the lower immigration scenario, gross current spending would reach 44 per cent of GNP in 2050, under the higher immigration scenario, the corresponding figure is 41.5 per cent. While this shows that immigration can contribute to solving the problem, it also shows that immigration is likely to play only a partial role.

As before, we can ask what current tax share, if held constant from 2005 onwards, would lead to sustainable public finances as defined above. A tax share of 32 per cent leads to an Exchequer deficit of just under 55 in 2050.

Table 9: Public Spending Projections 2005-2050 Under a Higher Migration Assumption (as Per Cent of GNP)

Year	2005	2010	2020	2030	2040	2050
Health	7.7	7.4	7.6	8.2	9.2	10.3
Long-term care	0.8	0.8	1.0	1.3	1.7	2.2
Education	5.1	4.6	4.7	4.5	4.3	4.3
Non-SIF Social Welfare	4.9	4.8	5.0	5.3	5.7	6.3
Expenditure from SIF	4.3	4.3	5.0	5.9	7.1	8.6
Public sector pensions	1.0	1.0	1.3	1.4	1.3	1.1
Rest of gross voted	5.7	5.7	5.7	5.7	5.7	5.7
Central Fund (2005 value assumed throughout)	3	3	3	3	3	3
Gross current exp	32.5	31.6	33.3	35.3	38	41.5

5.2 HIGHER NATIONAL PENSION RESERVE FUND CONTRIBUTIONS

In the baseline projection, we assumed the 3 per cent of the NPRF was withdrawn each year after 2025. In this scenario, we double this withdrawal rate and ask once again what current tax share, if held constant from 2005 onwards, would lead to sustainable public finances. The figure this time is 31.7 per cent and the resulting paths of the deficit, debt and NPRF figures are shown in Table 10.

Table 10: Deficit, GGB, Debt and NPRF Figures Under Higher Immigration, a Higher NPRF Withdrawal Rate and a 31.7 Per Cent Tax Share

	2005	2010	2020	2030	2040	2050
Exchequer balance	-2.3	0.0	-1.1	2.0	-0.1	-5.0
General Government Balance (GGB)	-0.8	1.9	1.3	3.0	0.9	-4.0
National debt	28.2	21.3	15.0	-3.6	-11.0	16.3
NPRF	9.4	13.9	24.9	29.9	28.2	27.6

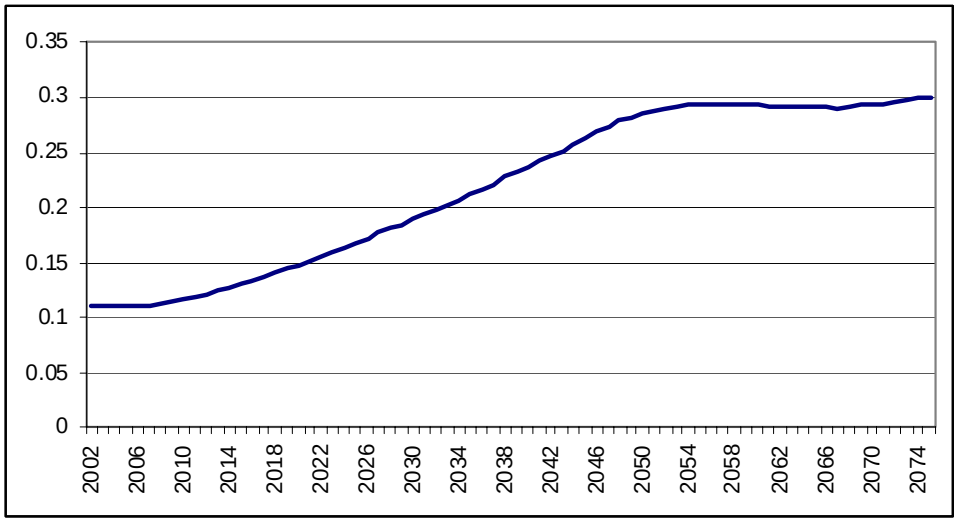
Before ending this section, we should report that we looked at the implications of altering one more assumption, namely, fertility. In our baseline forecasts, the total fertility rate is assumed to fall to 1.85 by 2011 and to remain constant thereafter. In our alternative fertility scenario, we keep the total fertility rate constant at 2. The impact turns out to be limited. For example, in the baseline, health spending is projected to rise to 11.2 per cent of GNP in 2050; in the higher fertility scenario, the figure is 10.9 per cent.

6. Summary and Conclusions

Before recapping on the results, it is useful to consider one additional item, namely, what happens post-2050. In order to take a brief look at this issue, we ran our population projections out to 2075 to see if the process of population ageing continues. In Figure 3, we show the projected percentage of the population aged 65 years and over, where the assumptions are those in our baseline. It can be

seen in the figure that while the process of population ageing ceases around 2050, the percentage of people aged 65 years and over settles at a level of 30 per cent. Hence, while the process of population ageing may not continue after 2050, neither will it go into reverse.

Figure 3: Per Cent of Population Aged 65 years and Over, 2002 to 2075



The results from our projections suggest that spending on health, long-term care and social welfare combined could rise from 17.7 per cent of GNP in 2005 to 29.6 per cent in 2050 (under the higher migration assumption, the figure for 2050 is 27.4 per cent). While contributions from the NPRF will contribute to funding this age-related additional spending, a gap will still remain. In the context of higher migration and 6 per cent withdrawals from the NPRF every year from 2026 on, an increase in current receipts from 29 per cent of GNP to 31.7 per cent would keep the public finances on a sustainable path out to 2050. It should be noted that all of these figures are based on annual productivity increases of 2 per cent in the long run and increasing female participation.

Although Ireland is facing age-related fiscal challenges it is in a relatively good position to deal with these challenges. With a low debt level and low rates of taxation, the public finance base is solid. However, it will be important to maintain these features so that the age-related pressures do not destabilise the public finances or lead to tax increases at a level that could depress economic activity. With this in mind, we would argue that, at a minimum, the current level of contribution to the NPRF be maintained.

While care should be exercised in maintaining the quality of the public finances generally, the figures presented in this paper suggest that the Government should be mindful of the potential long-run costs of entering commitments. In this context, it is instructive to consider the cost in 2005 of increasing old age pensions and to project the cost implications in 2050. The weekly payment under the

old-age contributory pension is currently about 32 per cent of gross average industrial earnings. Were this to be increased to 40 per cent (and all the other social welfare pension payments raised accordingly), we estimate that the cost in 2005 would increase by 0.8 per cent of GNP. In 2050, the extra cost would be 2.3 per cent of GNP.

As a final note, we should point to three limitations in our analysis that could result in the age-related fiscal pressures being stronger than suggested. First, we have made no adjustment for the possibility of productivity rising less rapidly in an ageing population. To the extent that older workers may have skills that are obsolete, our GNP projections may be overly optimistic. Second, we have assumed that immigrants are as productive as domestic workers and this may not be true, at least in the years immediately after immigrants arrive when they may have lower levels of location-specific human capital. Third, when we imposed a higher tax share to achieve a sustainable path for the public finances, we made no allowance for the potential negative impact of such tax rises on economic activity. Were such impacts to be significant, our GNP projections would again be overly optimistic and hence our estimate of fiscal pressures and percentages of GNP may be understated.

REFERENCES

BARROS, P. P., 1998. "The Black Box of Healthcare Expenditure Growth Determinants", *Health Economics* Vol. 7, pp. 533-544.

BERGIN, A., J. CULLEN, D. DUFFY, J. FITZ GERALD, I. KEARNEY, D. McCOY, 2003. *Medium-Term Review 2003-2010*, No. 9, Dublin: The Economic and Social Research Institute.

CENTRAL STATISTICS OFFICE, 2004. *Population and Labour Force Projections 2006-2036*, Dublin: CSO.

COMMISSION ON PUBLIC SERVICE PENSIONS, 2000. *Final Report*, Dublin: Stationery Office.

CUTLER, D. M., and L. SHEINER, 2001. "Demographics and Medical Care Spending: Standard and Non-standard Effects", in A. J. Auerbach, and R. D. Lee (eds.), *Demographic Change and Fiscal Policy*, Cambridge: Cambridge University Press.

DEPARTMENT OF FINANCE, 1998. *Long-Term Issues Group Paper*, available at www.finance.gov.ie

DEPARTMENT OF FINANCE, 1999. *Report of the Budget Strategy for Ageing Group*, available at www.finance.gov.ie

DEPARTMENT OF FINANCE, 2004. *Budget 2005,* Dublin: Stationery Office.

DEPARTMENT OF FINANCE, 2005. *Revised Estimates for Public Services,* Dublin: Stationery Office.

DEPARTMENT OF SOCIAL AND FAMILY AFFAIRS, 2002a. *Actuarial Review of the Social Insurance Fund*, Dublin: Stationery Office.

DEPARTMENT OF SOCIAL AND FAMILY AFFAIRS, 2002b. *Study to Examine the Future Financing of Long-Term Care in Ireland*, Dublin: Stationery Office.

ECONOMIC POLICY COMMITTEE, 2001. *Budgetary Challenges Posed by Ageing Populations*, available at
www.europa.eu.int/comm/economy_finance/epc/epc_ageing_en.htm

HIPE AND NPRS UNIT, ESRI, 2002. *Activity in Acute Public Hospitals in Ireland 1990-1999*, Dublin: The Economic and Social Research Institute.

OECD, 1987. *Financing and Delivering Healthcare: A Comparative Analysis of OECD Countries*, Paris: OECD.